Elf Farm Supplies Pty Ltd

Mushroom Substrate Plant – Modification to Approved Expansion

Odour Impact Assessment

Mulgrave, NSW

Final Report

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APPENDICES

1 INTRODUCTION

In September 2014 Elf Farm Supplies Pty Ltd (Elf Farm) engaged The Odour Unit Pty Ltd (TOU) to undertake an odour impact assessment for the modification to the approved expansion project of the mushroom substrate facility at Mulgrave, NSW (the Facility). The Department of Planning & Environment (DPE) project number for the proposed modifications to the approved expansion is 08_0255 MOD1.

1.1 PROJECT BACKGROUND

The original odour impact assessment for the approved expansion project was undertaken by PAE Holmes in a report titled *Air Quality Assessment Expansion of Substrate Facility* and dated 9 December 2010 (PAE Holmes, 2010). Since the approval, Elf Farm have identified and acquired new emissions technology specific for the mushroom compost industry that has superseded the existing technology currently employed at the Facility. This has resulted in the need for a modification of the approved expansion project.

1.2 ASSESSMENT SCOPE OF WORKS

The scope of works for this study is to undertake an odour impact assessment that reflects the new emissions technology that will be employed for the approved expansion project and identify all future odour emission sources. The assessment scope of works includes:

- Identification of all future odour emission sources;
- Sampling and testing of all future odour emission sources (both at the interim and final stages of the modification works – discussed later in **Section 3**);
- The development of a site-specific odour emissions inventory;
- Procurement of a suitable meteorological data file representative of the Facility location including local terrain and prevailing meteorological conditions;
- Input of the site-specific odour emissions inventory data for the purposes of odour dispersion modelling using the CALPUFF modelling system; and

- Report on whether the modification to the approved expansion project is expected to comply with the applicable New South Wales Environment Protection authority (NSW EPA) Odour Performance Criterion (opc) guidelines.

1.3 APPROVED PLANNED EXPANSION PROJECT

As outlined in the original odour impact assessment report (PAE Holmes, 2010), the approved expansion involved three key construction stages as follows:

- ***Stage 1*** *– construction of a new straw bale storage shed as the production level is increased to 1,600 tonnes of Phase 1 product per week;*
- ***Stage 2*** *- construction of a second bale storage shed, a new bale wetting area with water recycling pit, a new Phase 2/3 building and an extension to the existing pre-wet shed with an additional bio-scrubber. All fugitive odour sources will be enclosed and odours arising from these sources will be processed by the bio-scrubbers. Production is designed to reach 2,400 tonnes of Phase 1 substrate per week; and*
- ***Stage 3*** *- further extension to the new Phase 2/3 building and an extension of the Phase 1 building, the capacity of the facility is proposed to reach a maximum of 3,200 tonnes of Phase 1 substrate per week.*

The chronology of the construction stages will continue to remain generally consistent with the approved expansion project, however, will require the following key proposed modifications:

- Full containment and emissions capture at key process areas and sources;
- Primary air treatment of all captured emissions by the proposed on-site Emissions Plant. The Emissions Plant will consist of six ammonia scrubbers operating in parallel. The key air containment that will be targeted by the scrubbers is ammonia gas (NH_3); and
- Secondary air treatment of all captured emissions by an open-bed Biofilter System. The Biofilter System will be downstream of the Emissions Plant.

The details of the proposed modification works to the approved expansion is discussed in **Section 2.2.**

2 PROCESS OPERATIONS

The process operations at the Facility is a complex and dynamic operation that varies both spatially and temporary. The end product of the process is a mushroom substrate used for mushroom farming. The following sections aim to describe the existing process operations and how these operations will be impacted from the modification works to the approved expansion project.

2.1 EXISTING PROCESS OPERATIONS

The Facility produces a mushroom substrate by utilising a five-stage composting process, all of which is undertaken at the Facility. The five key stages are as follows:

1. **Raw Materials Storage Shed, Bale Wetting & Stable Bedding Areas:** storing and combining all ingredients ready for transport to the Pre-wet Shed (discussed in **Sections 2.1.1**)**.** Bale wetting involves gradually adding water and pulsing fresh air through the straw bales to keep the material aerobic (discussed in **Section 2.1.2**). Similarly, the stable bedding material undergoes wetting and fresh air is pulsed through to keep the material aerobic (discussed in **Section 2.1.3**);
2. **Pre-Wetting**: the straw bales and the ingredients are blended in the Pre-wet Shed and re-blended a number of times whilst always adding recycled water (discussed in **Section 2.1.4**);
3. **Phase 1:** the material is processed in bunkers whereby temperature, oxygen and moisture conditions are controlled and regulated (discussed in **Section 2.1.5**);
4. **Phase 2:** material is transferred to clean tunnels where it is pasteurised and peak heated to remove any weed, moulds or pests before spawning (discussed in **Section 2.1.6**); and
5. **Phase 3**: mushroom spawn is added and grown through the substrate for a minimum of two weeks prior to mushroom farm delivery (discussed in **Section 2.1.6.1**).

2.1.1 Raw Materials Storage Shed Area

The raw materials storage shed area consists of several bay areas that store dry additive products including chicken manure, cotton seed, gypsum and other seasonal organic nitrogen sources. The ingredients are weighed and mixed together in calculated ratios in a semi-enclosed area, where the dry chicken manure is stored. The mixing is carried out by the Kuhn mixing machine. Once mixed, the material is conveyed by a front-end loader to the Pre-wet Shed where it is placed on top of the straw bales ready for bale breaking by the Thilot blending machine. The mixing of the raw materials is known as the preparation of the 'brew' which is a blend of the above ingredients. This preparation process currently occurs in the south-western corner of the raw materials storage shed. The frequency and duration of this process is approximately four hours per week.

2.1.2 Bale Wetting Stage

The bale wetting stage involves the wetting of straw bales with process water (comprising predominately of water from the nearby creek) for several days (currently four days per week).

2.1.3 Stable Bedding Area

The stable bedding area is located in the north-eastern corner of the Pre-wet Building. The stable bedding material is wetted prior to transfer to the Pre-wet Shed and is placed as the final layer of a rick before the bale breaking process (see **Section 2.1.4** for details).

2.1.4 Pre-wet Shed

After bale wetting, the wetted bales are transported by front-end loader into the Pre-wet Shed and manually destringed. Whilst inside the Pre-wet Shed, the construction of a rick is undertaken. The process for constructing of a rick involves the breaking of bales and placement of brew and wetted stable bedding material. This essentially forms the construction of a three-layered rick which is, on average, 90 metres long, 2-3 metres wide and 6 metres high. Once the construction of a rick is complete, a Thilot blending machine is passed over each rick to mix and break all three layers of material. This process is known as bale breaking. Once the bale breaking process is

complete, air is pulsed through each rick via a proprietary in-floor aeration system. Currently, three ricks are typical constructed in the Pre-wet Shed.

The initial low temperature stage of the mushroom composting process occurs in the Pre-wet Shed. The building is currently fully enclosed, except for a (curtained) opening on the eastern-side through which a front-end loader transfers material to the Phase 1 Working Hall and two large (door) openings in the south-eastern and north eastern corners of the building. Building ventilation air from the Pre-wet Shed is currently collected by four ducts, each with in-duct axial fans, and conveyed to the Bioscrubber System through the Phase 1 Bunkers for treatment (see **Sections 2.1.5 & 2.1.7** for details) before discharge via a tall stack.

2.1.5 Phase 1 Working Hall & Bunkers

The material transferred from the Pre-wet Shed is placed into a hopper mixer in the Phase 1 Working Hall. Material in the hopper mixer is conveyed into designated aerated bunkers via an inclined overhead conveyor, located external to the Phase 1 building. The material is deposited into the bunkers where the aeration rate and temperature are tightly controlled. Material in each filled bunker is removed, deposited back into the hopper mixer and returned to an available bunker, to continue the Phase 1 process. Once the Phase 1 process cycle is complete, material is transferred to the Phase 2/3 building via the Phase 1 to Phase 2 transfer conveyor located outside in the north-western corner area of the Phase 1 Working Hall Area.

Ventilation air from the Pre-wet Shed is passed through the Phase 1 bunkers with the subsequent exhaust air emissions from the bunkers treated by the existing Bioscrubber System before discharge via a tall stack.

2.1.6 Phase 2/3 Building

The existing Phase 2/3 Building consists of a working hall area and a total of twenty two tunnels. Once the Phase 1 process is complete, material is loaded into a second hopper mixer in the Phase 1 Working Hall and outgoing material placed onto a conveyor (known as the Phase 1 to Phase 2 Cross Conveyor) to the Phase 2/3 Working Hall Area. Once material arrives at the Phase 2/3 Working Hall, a series of conveyors transfer the material into a dedicated tunnel. During this process, the tunnel is fully vented for up to two hours until filling is complete. The exhaust air during this

process stage is discharged via dedicated roof stacks on the current Phase 2/3 Building and is known as Tunnel Venting.

Material in the tunnels are kept constantly under aerobic conditions. This is achieved via an extensive airflow channel network. The quality of airflow is controlled by the PLC Supervisory which determines the volumes of recirculated air, make-up air and discharged air. The exhaust air is discharged via exhaust roof stacks that exist parallel to the tunnel venting exhaust roof stacks (i.e. the southern section of the Phase 2/3 building). Make-up air is drawn through filters in the Phase 2/3 Fan Room. Each tunnel has dedicated exhaust roof stacks and is capable of processing material through all Phase 2/3 stages.

The Phase 2/3 Building is kept under a slight positive pressure for quarantine reasons and tunnel conditions are monitored, automated and controlled via a PLC System. The Phase 2/3 process operations consist of several process stages (described in **Sections 2.1.6.1 & 2.1.6.2** respectively) with all stages automatically controlled by the PLC system.

2.1.6.1 Phase 2 Process Stages

The Phase 2 process cycle consists of the following stages:

- Tunnel Filling;
- Levelling;
- Warm-up Pasteurisation;
- Pasteurisation;
- Cool-down (conditioning); and
- Conditioning.

Once the Phase 2 process stages are complete, the tunnel will then enter into Phase 3.

2.1.6.2 Phase 3 Process Stages

The Phase 3 process cycle is characterised by the addition of mushroom spawn and consists of the following stages:

- Spawn Run 1;

- Spawn Run 2; and
- Cool-down (spawn/shipout).

Once the Phase 3 stages are complete, the fully processed product is shipped out either as a bulk product or packaged in twenty kilogram blocks.

2.1.7 Bioscrubber System

The existing Bioscrubber System services the Pre-wet and Phase 1 process operations only. Phase 2 and 3 exhaust air emissions are currently discharged untreated via roof stacks.

2.2 PROPOSED MODIFICATIONS

The proposed 7-week production cycle is depicted as a process flow schematic in **Figure 2.1** (**Dwg No.** 1952-001).

Figure 2.2 shows the proposed site layout. The proposed modifications to the approved expansion project entails the following elements:

1. Raw materials shed area will be contained within a new building enclosure;
2. The establishment of a Bale Wetting Building: the existing bale wetting area and associated process operations will shift from outdoors to indoors. The existing Pre-wet Shed Building will become the new Bale Wetting Building. This modification will be undertaken in two stages (discussed in **Section 7.1.2**);
3. Pre-wet process operations will shift from the existing Pre-wet Shed to newly constructed Pre-wet bunkers with a working hall area;
4. Phase 1 inclined and cross transfer conveyors operation will be contained;
5. Extension of the existing Phase 2/3 Building from twenty-two to twenty-five tunnels and the construction of a new Phase 2/3 building with twenty-five tunnels. This proposed modification will collectively provide up to fifty tunnels for Phase 2/3 process operations;

6. Air emissions generated at the Facility will be directed to an Emissions Plant and Biofilter System (see **Section 2.2.1**). Air emissions will be extracted from the following process areas and sources:

    a. Raw Material Shed Area;

    b. Bale Wetting Building;

    c. The new Pre-wet Bunkers and Working Hall Area;

    d. Phase 1 Working Hall Area;

    e. Phase 1 Bunkers; and

    f. Phase 2 Tunnels (existing and proposed): Only the initial stages of the Phase 2 discharge emissions will be directed to the Emissions Plant and Biofilter System. The latter Phase 2 stages and all of Phase 3 discharge emissions will be directed to dedicated tunnel exhaust roof stacks on the Phase 2/3 Buildings.

7. Future plans to increase on-site Phase 2/3 tunnel capacity to a total of fifty tunnels. This increase in tunnel numbers would necessitate the construction of a new Phase 2/3 building with twenty-five tunnels plus extending the existing Phase 2/3 building by three tunnels (currently there are twenty-two tunnels). The new Phase 2/3 building will be adjacent to the existing Phase 2/3 Building in the north-western corner of the Facility (see **Figure 2.2**);

8. The mothballing of the Bioscrubber System and stack; and

9. Provision for additional ammonia scrubbers and biofilter bed area. This may require an update to the odour dispersion modelling that has been undertaken in this odour impact assessment study and would be in conjunction with any future plant tonnage increase application to determine if additional emissions treatment capacity is required.

2.2.1 Emissions Plant and Biofilter System

The proposed modification works will be undertaken in a stage-wise approach consisting of two key stages as follows: an interim stage; and a final stage. This is described in **Section 3**. As part of this approach, the construction and commissioning of the Emissions Plant and Biofilter System will be completed in the first instance as to manage odour emissions from existing process operations at the Facility. This would subsequently result in the existing bioscrubber system becoming quiescent. Once in operation, the Emissions Plant and Biofilter System will then gradually receive emissions from the new source groups that will exist upon completion of the proposed modification works.

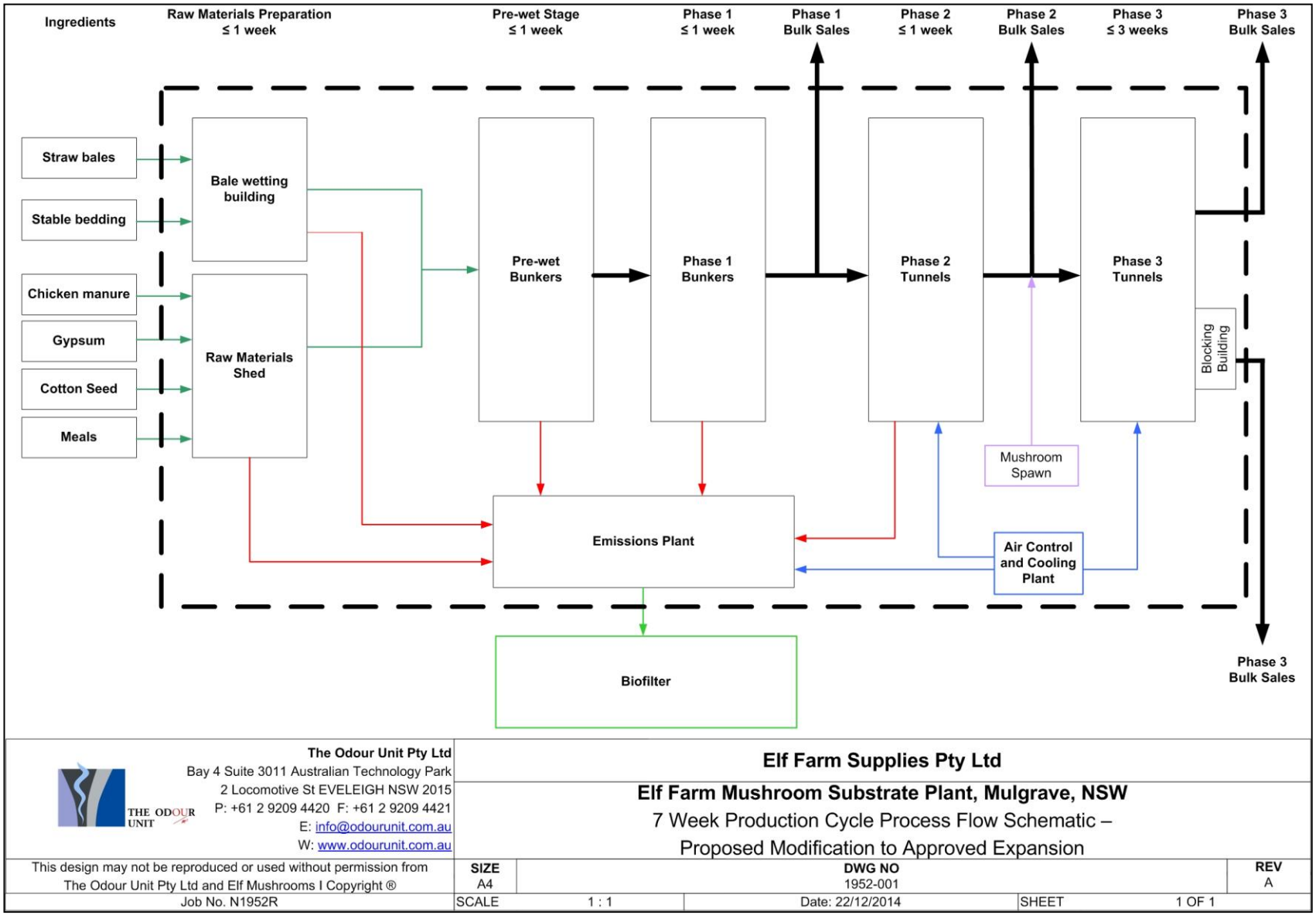


Figure 2.1 – 7 Week Production Cycle Process Flow Schematic: Proposed Modification to Approved Expansion

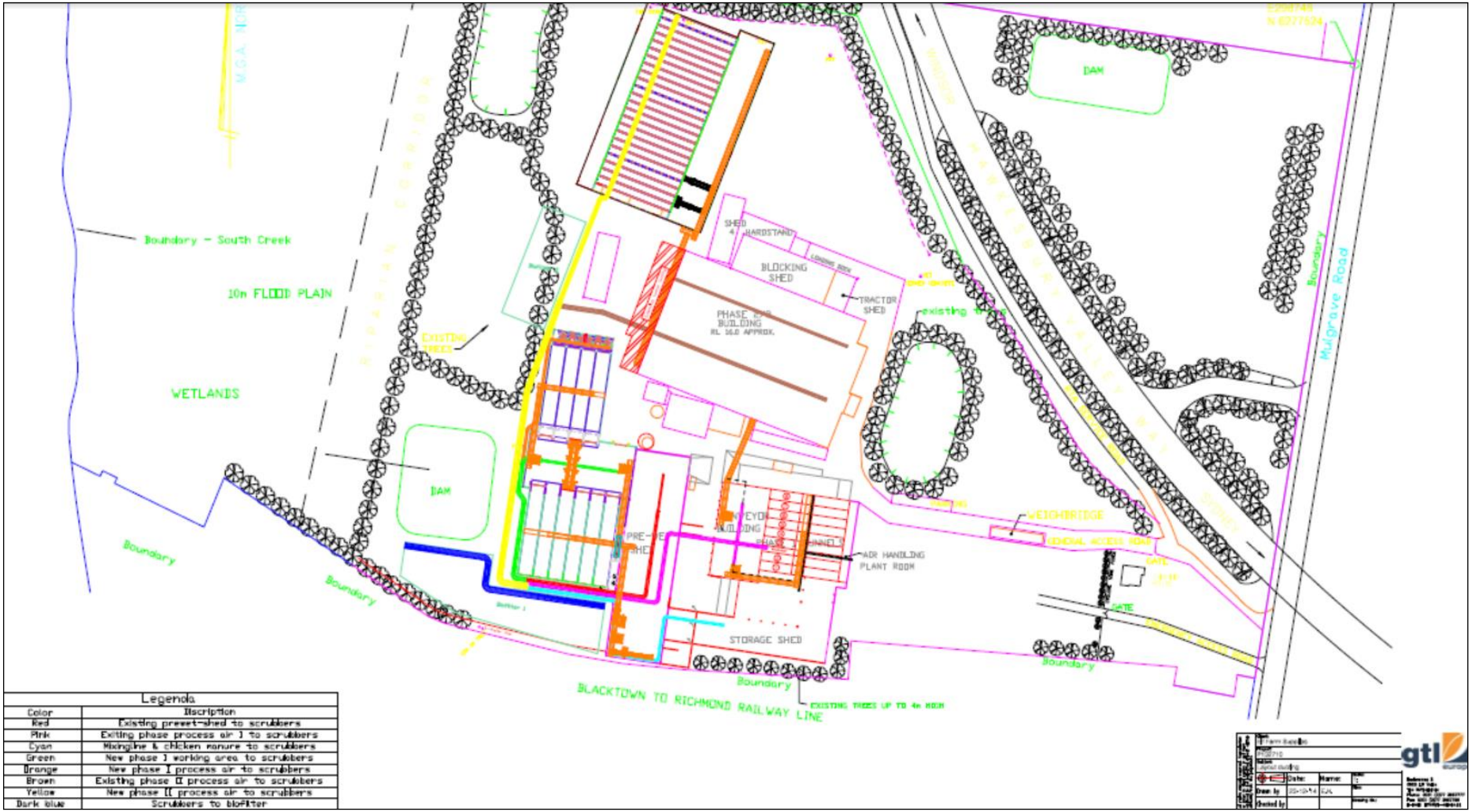


Figure 2.2 – Proposed layout of the Facility (valid as of 23 December 2014)

3 SAMPLING AND TESTING

As part of the proposed modifications to approved expansion project, TOU developed a site-wide odour emissions inventory. The objective of this inventory is to determine the odour emissions contribution from the various areas/sources that will exist at the Facility, both in the interim and final stages, and undertake odour dispersion modelling to assess the odour impact projection from those areas/sources.

The development of the odour emissions inventory required odour sampling and testing at the Facility over the period between August 2014 and November 2014 of all odour emission sources that will exist in the interim and final stages for the proposed modification works. Each modelled stage consists of the following key odour emission sources:

- Interim stage modelled odour emission sources:
    - Bale wetting area;
    - Stable bedding area;
    - Water recycle pit; and
    - Phase 2/3 process operations.
- Final stage modelled odour emission sources:
    - The later stages of Phase 2 and all of Phase 3 process operations (see **Section 3.2.1**) ; and
    - Biofilter system.

The sampling and testing undertaken at each of the above source groups is discussed in the following sections.

3.1 BALE WETTING & STABLE BEDDING AREAS

The bale wetting and stable bedding areas currently exist outdoors, immediately adjacent to the Pre-wet Shed. The sampling and testing in these areas consisted of:

- **Bale wetting area:** area source sampling of the straw bales during different stages of the bale wetting cycle. The sampling also accounted for aerating and non-aerating conditions; and
- **Stable bedding area:** area source sampling of wetted stable bedding.

Photo 3.1 & Photo 3.2 shows the sampling at the bale wetting area and stable bedding area on 27 & 29 October 2014 respectively.

Photo 3.1 – Area source sampling of wetted straw bales

Photo 3.2 – Area source sampling of wetted stable bedding material

3.1.1 Bale wetting & Stable Bedding Areas Odour Testing Results

The results of the odour sampling and testing of the Bale Wetting and Stable Bedding Areas are presented in **Table 3.1.**

Table 3.1 – Bale Wetting and Stable Bedding Areas: Odour concentration testing results

Source description	Odour concentration (ou)	Specific Odour Emission Rate ($ou.m^3/m^2/s$)
Bale wetting area: Monday (aerating)	42,500	25.3
Bale wetting area: Monday (non-aerating)	39,000	23.9
Bale wetting area: Tuesday (aerating)	60,100	32.7
Bale wetting area: Tuesday (non-aerating)	77,900	39.9
Bale wetting area: Broken Bales (Wednesday: non-aerating)	13,800	9.31
Bale wetting area: Broken Bales (Wednesday: aerating)	6,320	3.56
Bale Wetting Area (Sunday: aerating)	2,900	1.80
Bale Wetting Area (Sunday: non-aerating)	2,900	1.80
Stable bedding area (Wednesday: non-aerating)	11,600	5.28
Stable bedding area (Wednesday: aerating)	16,400	6.33

The following emission rates were used for the purposes of odour dispersion modelling:

- **Bale Wetting Area:** worst-case emission rate of 20,909 $ou.m^3/s$ based upon the mean value of Tuesday testing results and a maximum utilised area of 576 m^2; and
- **Stable Bedding Area**: odour emission rate of 575 $ou.m^3/s$ based upon the mean value of testing results and a maximum utilised area of 99 m^2.

3.2 WATER RECYCLE PIT

The water recycle pit exists outdoors and adjacent to the stable bedding area. The sampling and testing of this source consisted of:

- **Water recycle pit:** area source sampling of the water recycle pit near the completion of the bale wetting cycle (i.e. on the Wednesday of a typical 7-day production cycle). The recycled water contents inside the pit is most concentrated and was therefore considered to have the highest odour emission potential at this point of the cycle (i.e. worst case emission).

Photo 3.3 shows sampling of the water recycle pit on 29 October 2014.

Photo 3.3 – Area source sampling of the water recycle pit

3.2.1 Water Recycle Pit Odour Testing Results

The result of the water recycle pit testing is contained in **Table 3.2.**

Table 3.2 – Water Recycle Pit: Odour concentration testing results

Source description	Odour concentration (ou)	Specific Odour Emission Rate ($ou.m^3/m^2/s$)
Water Recycle Pit (non-aerating)	156,000	98.8

3.3 PHASE 2/3 PROCESS OPERATIONS

As described in **Sections 2.1.6.1 & 2.1.6.2,** Phase 2/3 process operations consist of several key stages that occur over a typical 7-week production cycle. Over this cycle, process air can be both recirculated and discharged simultaneously. This is controlled

by a series of automated damper control systems that are designed to optimise operating conditions in the tunnels. The process air that is discharged over a typical production cycle via the exhaust roof stacks was sampled in this assessment study for each key Phase 2/3 process stage.

3.3.1 Phase 2/3 Odour Testing Results

The time period over which a tunnel would enter each process stage of a typical Phase 2/3 cycle and the corresponding mean odour concentration result is summarised in **Table 3.3**. The odour concentration laboratory testing result sheets can be found in **Appendix A**. **Photo 3.4** shows the tunnel exhaust roof vents on the roof of the existing Phase 2/3 Building.

In combination with the Phase 2/3 airflow data matrix supplied by Elf Farm, the mean odour concentration data presented in **Table 3.3** was used for the development of an odour emissions inventory to represent all stages over a typical Phase 2/3 production cycle.

Table 3.3 – Phase 2/3 typical 7-day production cycle: Mean odour concentration testing results

Process Stage	Cycle time (hrs)	Mean odour concentration (ou)
Phase 2 process cycle		
Tunnel Venting	0-2	2,900
Levelling	2-18	5,090
Warm-up Pasteurisation	18-26	2,390
Pasteurisation	26-34	2,440
Cool-down (conditioning)	34-42	470
Conditioning #1	42-90	332
Conditioning #2	90-114	91
Cool-down (spawn)	114-148	43
Phase 3 process cycle		
Spawn run 1	148-334	118
Spawn run 2	334-652	152

Photo 3.4 – Existing tunnel exhaust roof stacks on the Phase 2/3 Building

3.3.2 Phase 2/3 Odour emissions trend profile

In the context of the proposed modification works, Elf Farm intend on directing the emissions from the first 36 hours (i.e. from Tunnel Venting to the initial stages of the Cool-down Conditioning) to the Emissions Plant and Biofilter System. At the end of this time period, the exhaust airflow discharge (i.e. post-36 hour time period) will be directed to the roof exhaust stack for direct atmospheric discharge via dedicated roof stacks. This proposed operating regime will apply to both the extended and new Phase 2/3 Buildings. An analysis of the odour emissions trend over the Phase 2/3 7-day production cycle supports this proposed operating regime, which indicates that odour emissions gradually reduce during the first 36 hour time period and virtually stabilise after this time period. This trend is illustrated in **Figure 3.1 & Figure 3.2** over an entire production cycle and 7-day production cycle respectively. The odour emissions tend profile worksheet representing the entire Phase 2/3 process stages can be found in **Appendix D**.

It should be noted that the fresh air inlet airflows were used in the determination of all Phase 2/3 odour emission rates and are therefore considered to be conservative. In reality, a portion of the airflow is recirculated and the other portion discharged via the

tunnel exhaust roof vents that exist on the Phase 2/3 Building. As previously mentioned in **Section 2.1.6,** this process is controlled by the PLC system which is designed to optimise operating conditions in the tunnels over the entire Phase 2/3 production cycle.

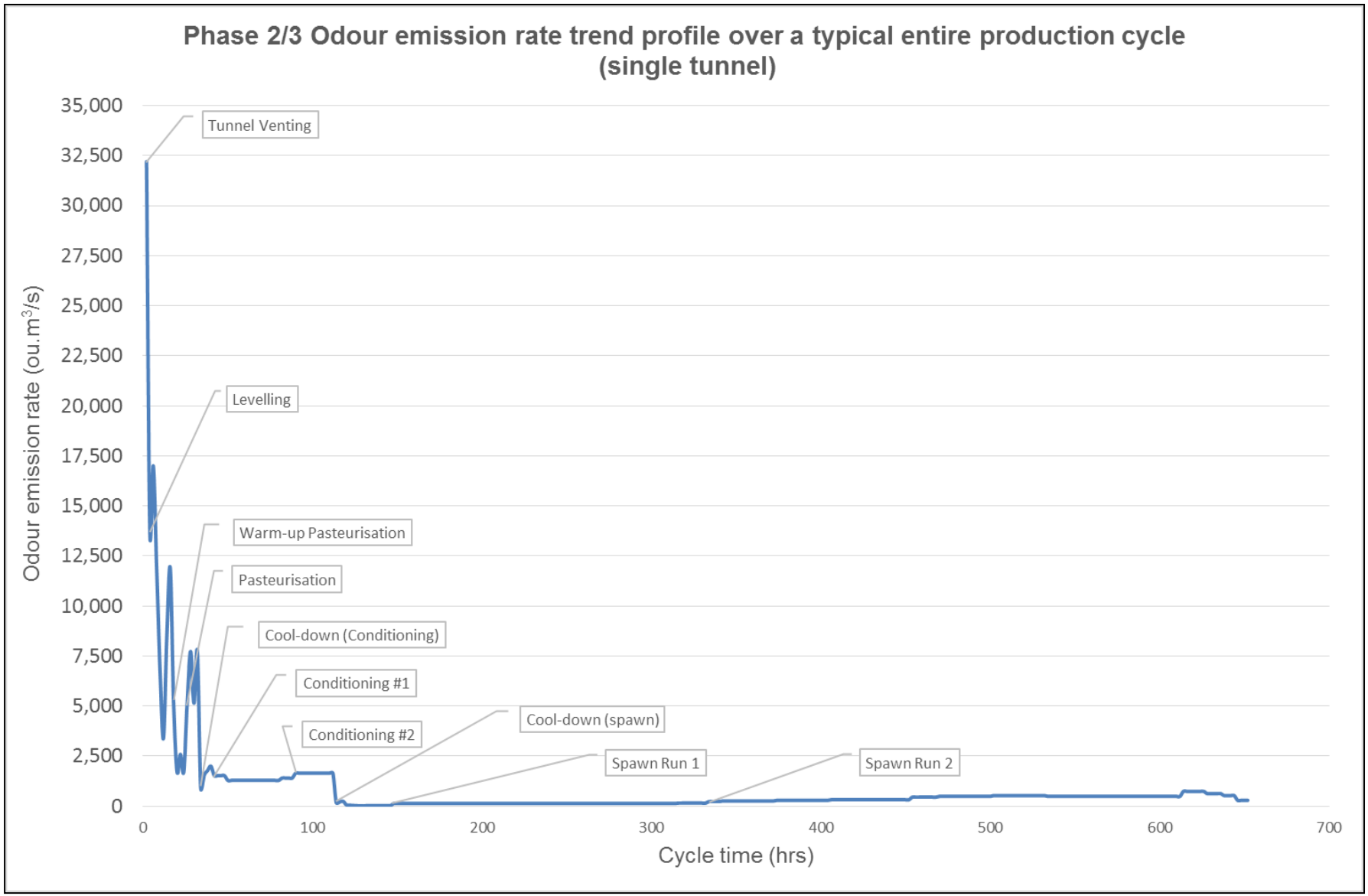


Figure 3.1 – Phase 2/3 Odour emission rate trend profile over a typical entire production cycle for a single tunnel

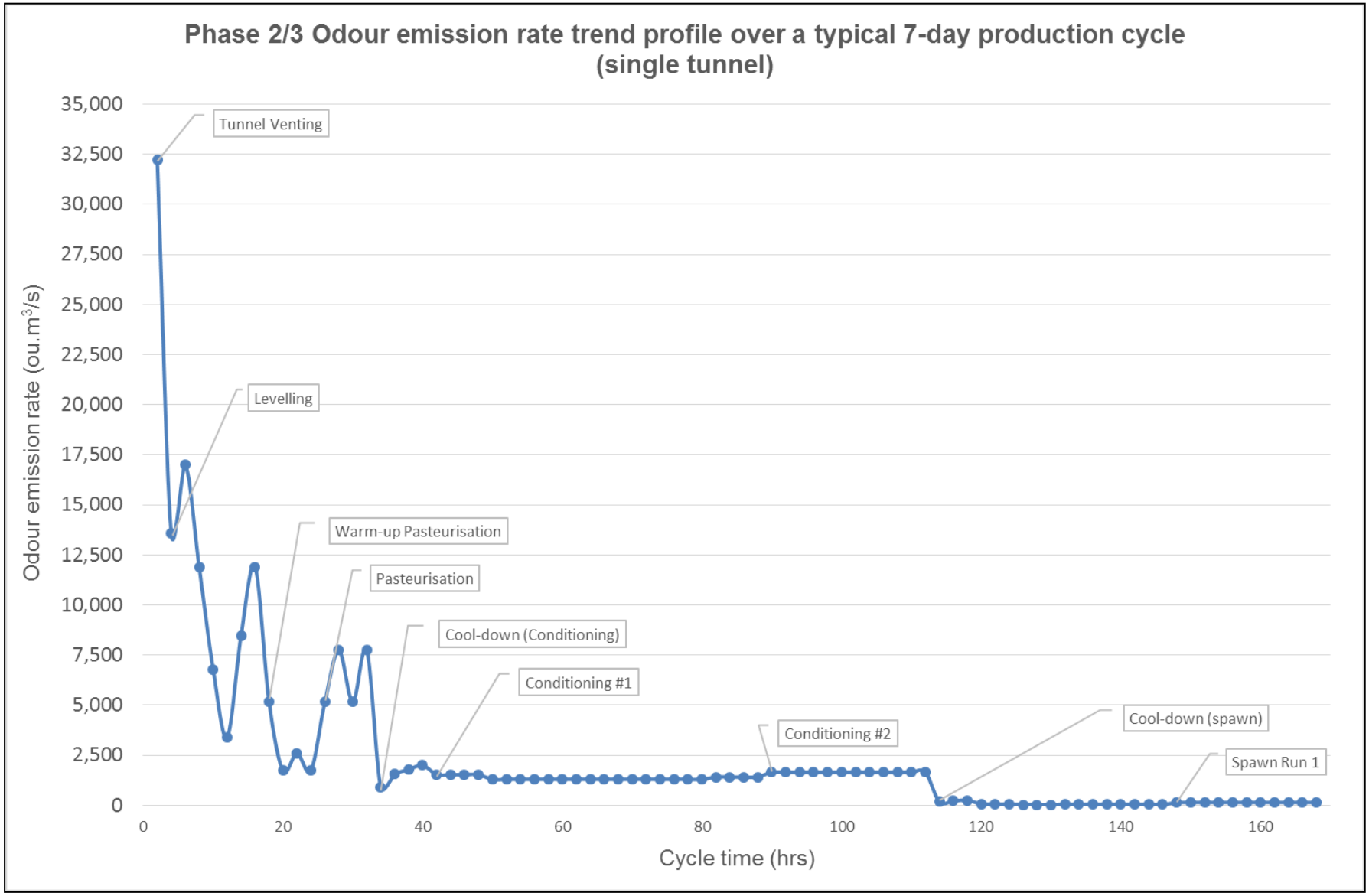


Figure 3.2 – Phase 2/3 Odour emission rate trend profile over a typical 7-day production cycle for a single tunnel

4 SAMPLING METHODOLOGIES

4.1 POINT SOURCE SAMPLING

The method used for collecting gas samples from the Phase 3 process emissions involved drawing the sample air through a polytetrafluoroethylene (PTFE) sampling tube into a single use, Nalophan sample bag. The bag was housed within a container (sampling drum) that was evacuated with a vacuum pump, and the sample collected by induced flow. The "lung method", by which this sampling procedure is known, allowed the sample air to be collected without coming into contact with any potentially odourous material. **Figure 4.1** illustrates a schematic of the point source sampling method.

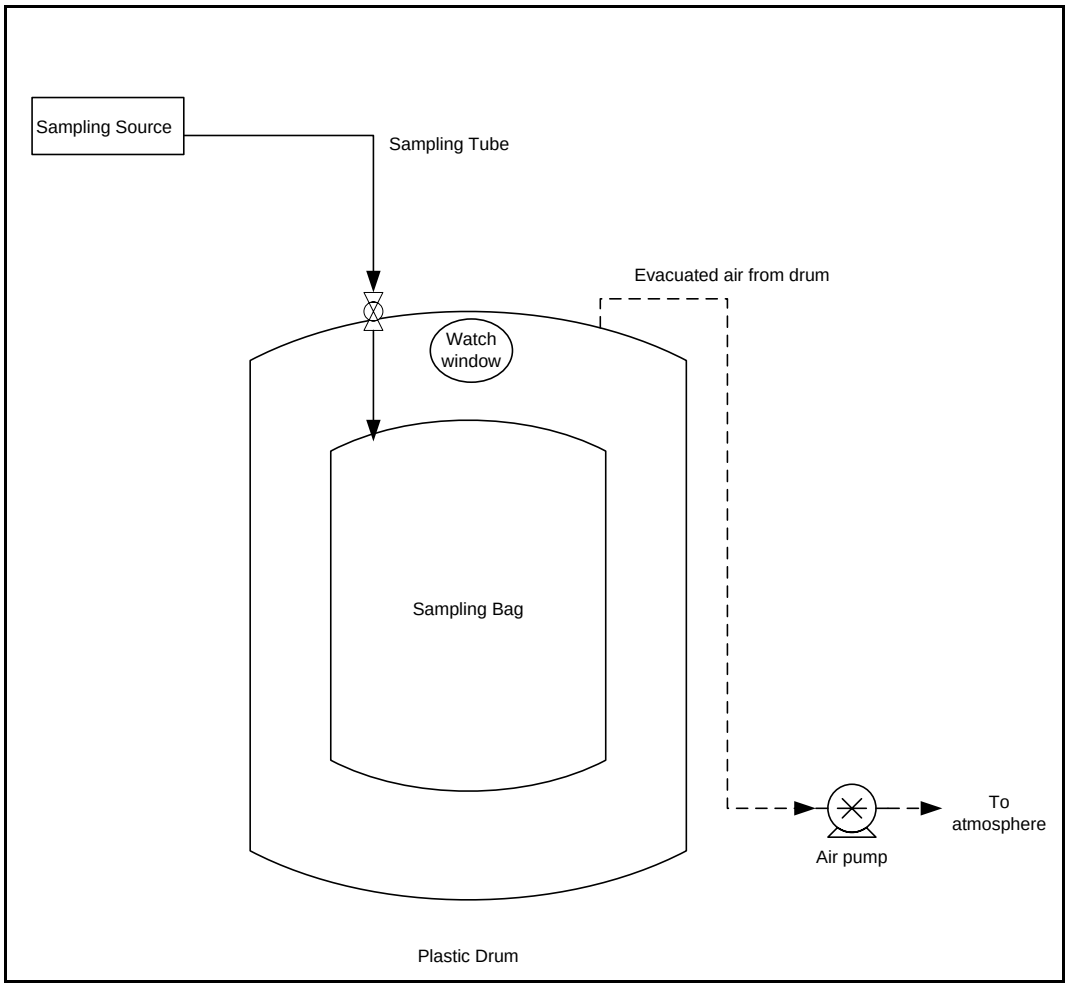


Figure 4.1 – Schematic of point source sampling

4.2 AREA SOURCE SAMPLING METHOD

The objective of the area source sampling programme was to collect representative samples at various locations at the Site, and included both solid and liquid surface area sources. The area source sampling is undertaken using an apparatus known as an isolation flux hood (IFH). All sampling using the IFH is carried out according to the method described in the United States Environment Protection Agency (US EPA) technical report '*EPA/600/8-86/008*'. This method is also defined in Australian Standard AS/NZS4323.4. TOU's IFH adheres to the design specifications, materials of construction and supporting equipment that the US EPA report '*EPA/600/8-86/008*' defines. **Table 4.1** summarises the design specifications of the IFH.

Once the IFH apparatus is set up for sample collection, dry nitrogen gas (N_2) is then introduced into the hood at a sweep rate of 5 litres per minute.

Table 4.1 - IFH design specifications

Parameter	Value
Diameter (m)	0.406
Surface Area (m^2)	0.13
Volume (L)	30*

* When the skirt of the hood is immersed into the water or solid surface by the specified 25 millimetres

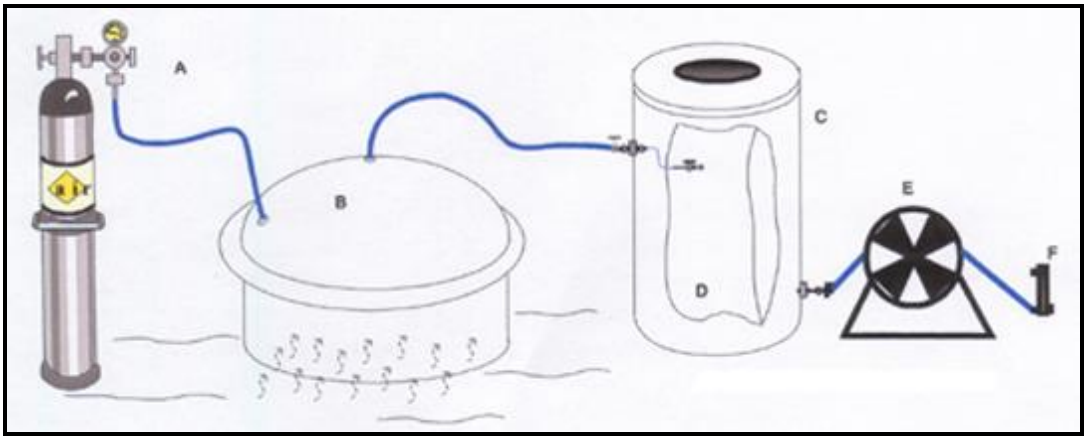
Area source samples are opened to the atmosphere resulting in wind being a major factor in the release of odorous pollutants from the surface and conveying the pollutant from the source to areas beyond the boundary of the Site. The IFH system is designed to simulate the mass transfer of odorous pollutants into the atmosphere, resulting in a controlled and consistent sampling environment. This is achieved by the flux of dry nitrogen sweep gas into the IFH, as it is positioned on the solid or liquid surface. On a liquid surface this is achieved by floating the IFH within an inflated tyre inner tube. The nitrogen gas then transports the odour from the surface in a similar manner to the wind, albeit at a very low sweep velocity. This odorous air is then sampled for subsequent odour testing.

As the IFH has a constant 5 litres per minute inflow of nitrogen gas to it, the sampling chamber remains under very slight positive pressure (less than 2 Pa) and produces a net outflow through the vent on top of the IFH, therefore eliminating any chance of contamination with external air from the atmosphere. The IFH's volume of 30 litres

and the 5 litres per minute nitrogen sweep rate results in a gas residence time of 6 minutes. The standard method prescribes a minimum of four air changes in order to achieve optimum purging and equilibrium in the hood, and hence a total of 24 minutes is allowed before sampling commences. The sample is then collected at a flow rate of approximately 2 litres per minute over a 5–10 minute period to obtain a 10–20 litre gas sample for analysis.

The method followed by for the area sampling in this project is depicted in the schematic of the sampling equipment shown in **Figure 4.2 & Figure 4.3**. The IFH is manufactured from acrylic resin to ensure it does not contribute to the odour sample. All other surfaces in contact with the sample are made from PTFE or stainless steel.

Figure 4.2 - Schematic Drawing of Sampling with the IFH

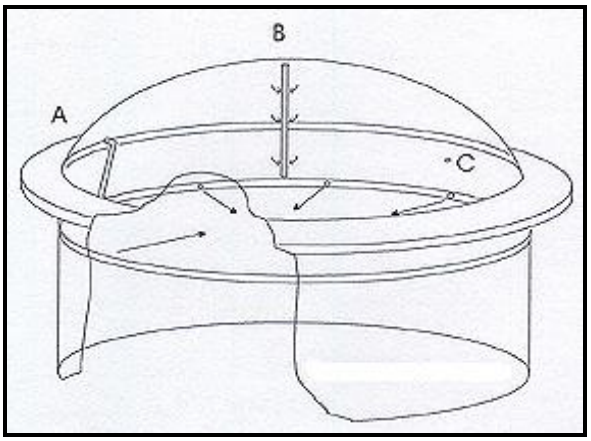


Source: Odortech - Odoflux IFH Manual

Key

A	Cylinder of medical air, nitrogen or any neutral gas.
B	IFH (detailed diagram shown in **Figure 4.3**)
C	Lung chamber (sampling drum)
D	Nalophan sampling bag
E	Sampling pump
F	Air flow meter

Figure 4.3 - Schematic of the IFH



Key

A Inlet gas from gas cylinder.

B Outlet to sample bag.

C Additional gas outlet points for other sampling, or temperature and moisture monitoring.

Source: Odotech - Odoflux IFH Manual

The use of the IFH method enables a Specific Odour Emission Rate (SOER) to be calculated (ou.m^3/m^2/s). A SOER is a measure of odour released from a representative area unit. The SOER is multiplied by the area of the source to obtain an Odour Emission Rate (OER) (ou.m^3/s), or the total odour released from each source. This calculation is demonstrated in **Equation 4.1 & Equation** 4.2 below.

$$SOER\ (ou.m^3 m^{-2} s^{-1}) = OC * \frac{Q}{A}$$ **Equation 4.1**

$$OER\ (ou.m^3 s^{-1}) = SOER * area\ of\ source\ unit\ (m^2)$$ **Equation 4.2**

where

OC = odour concentration of compound from air in the chamber (ou)

Q = sweep gas volumetric flow rate into chamber (m^3/s)

A = sample source total surface area (m^2)

All area source samples collected in this odour impact assessment were collected using the area source sampling method.

5 ODOUR CONCENTRATION MEASUREMENT METHOD

TOU's odour laboratory operates to the Australian Standard for odour measurement '*Determination of odour concentration by dynamic olfactometry'* (AS/NZS 4323.3:2001) which prescribes a method for sample analysis that provides quality assurance/quality control and ensures a high degree of confidence in the accuracy, repeatability and reproducibility of results.

The concentration of the gaseous odour samples were measured using a technique known as dynamic olfactometry. Dynamic olfactometry involves the repeated presentation of both a diluted gaseous odour sample and an odour-free air stream to a panel of qualified assessors through two adjacent ports on the olfactometer (known as the Odormat™). TOU utilises four to six trained assessors (or panellists) for sample analysis, with the results from four qualified panellists being the minimum allowed under the Australian Standard AS/NZS 4323.3:2001. For the odour testing in this project, four panelists were used.

The method for odour concentration analysis involves the odorous gas sample initially being diluted to the point where it cannot be detected by any member of the panel. The assessor's step- up to the olfactometer in turn, takes a sniff from each port, then choose which port contains the odour and enter their response. At each stage of the testing process, the concentration of the odorous gas is systematically increased (doubled) and re-presented to the panellist's. A round is completed when all assessors have correctly detected the presence of the odour with certainty. The odour is presented to the panel for three rounds and results taken from the latter two rounds, as stated in AS/NZS 4323.3:2001.

The results obtained give an odour measurement measured in terms of odour units (ou). One (1) ou is the concentration of odorous air that can be detected by 50% of members of an odour panel (persons chosen as representative of the average population sensitivity to odour). This process is defined within AS/NZS 4323.3:2001. The odour units can be subsequently multiplied by an emission rate or volumetric flow to obtain an Odour Emission Rate (ou.m^3/s) or a SOER (ou. m^3/m^2/s) for area source samples collected using the IFH method (described previously in **Section 4.2**).

5.1 ODOUR MEASUREMENT ACCURACY

The repeatability and odour measurement accuracy of the Odormat™ is determined by its deviation from statistically reference values specified in AS/NZS4323.3:2001. This includes calculation of instrumental repeatability (r), where r must be less than 0.477 to comply with the standard criterion for repeatability. Its accuracy (A) is also tested against the 95th percentile confidence interval, where A must be less than 0.217 to comply with the accuracy criterion as mentioned in the Standard.

The Odormat™ V05 was last calibrated in April 2014 and complied with all requirements set out in the AS/NZS4323.3:2001 (see **Appendix A** – Result sheets: *Repeatability and Accuracy*). The calibration gas used was 50 ppm n-butanol in nitrogen gas.

6 ODOUR MODELLING METHODOLOGY

6.1 NSW ODOUR CRITERIA AND DISPERSION MODEL GUIDELINES

Regulatory authority guidelines for odorous impacts of gaseous process emissions are not designed to satisfy a 'zero odour impact criteria', but rather to minimise the nuisance effect to acceptable levels of these emissions to a large range of odour sensitive receptors within the local community.

The odour impact assessment for this project has been carried out in accordance with the methods outlined by the documents:

- Environment Protection Authority, 2005. *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*;
- Environment Protection Authority, 2006. *Technical Framework (and Notes): Assessment and Management of Odour from Stationary Sources in NSW;* and
- Barclay & Scire, 2011. *Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'.*

The documents specify that the odour modelling for Level 3 impact assessments upon which this study has been conducted be based on the use of:

- 99.0th percentile dispersion model predictions;
- 1-hour averaging times with built–in peak-to-mean ratios to adjust the averaging time to a 1-second nose-response-time;
- Odour emission rates multiplied by the peak-to-mean ratios as outlined in **Table 6.1**;
- The near field distance, defined typically as 10 times the largest source dimension, either height or width; and
- The appropriate odour unit performance criterion, based on the population of the affected community in the vicinity of the development.

Table 6.1 - EPA peak-to-mean factors			
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

* Ratio of peak 1-second average concentrations to mean 1-hour average concentrations
Source: Environment Protection Authority, 2005 – Table 6.1

The impact assessment criteria (IAC) for complex mixtures of odours are designed to include receptors with a range of sensitivities. Therefore a statistical approach is used to determine the acceptable ground level concentration of odour at the nearest sensitive receptor. This criterion is determined by the following equation (Environment Protection Authority, 2005, p. 37):

$$IAC = \frac{\log_{10}(p) - 4.5}{-0.6}$$ **Equation 6.1**

where,

IAC = Impact Assessment Criteria (ou)

***p* =** population

Based on **Equation 6.1**, **Table 6.2** outlines the odour performance criteria for six different affected population density categories. It states that higher odour concentrations are permitted in lower population density applications.

Table 6.2 - Odour Performance Criteria under Various Population Densities	
Population of affected community	**Odour performance criterion (ou)**
Urban Area (≥ ~2000)	2.0
~500	3.0
~125	4.0
~30	5.0
~10	6.0
Single rural residence (≤ ~2)	7.0

Source: NSW Environment Protection Authority, 2005 – Table 7.5

Receptors to the south-west, west, north-west and north-east of the site are considered urban. Receptors to east and south-east of the Mulgrave site are of semi-rural and industrial nature. The original odour impact assessment had adopted the IAC of **2 ou** for the urban areas and **4 ou** to **7 ou** for the semi-rural and industrial areas "*as the population was sparser and in some instances only present during part of the day*" (PAE Holmes, 2010). TOU has maintained consistency with this approach as conditions have not significantly changed.

6.2 ODOUR DISPERSION MODEL SELECTION

The odour dispersion modelling assessment was carried out using the CALPUFF System (Version 6.42). CALPUFF is a multi-layer, multi-species, non-steady-state puff dispersion model that is able to simulate the effects of time- and space-varying meteorological conditions on pollutant transport (Environment Protection Authority, 2005). CALMET is a meteorological model that produces three dimensional gridded wind and temperature fields to be fed into CALPUFF (Atmospheric Studies Group, 2011). The primary output from CALPUFF is hourly pollutant concentrations evaluated at gridded and/or discrete receptor locations. CALPOST processes the hourly pollutant concentration output to produce tables at each receptor and contour plots across the modelling domain. The result is a summary of pollutant concentrations at various time averages and percentiles or a tally of hours where a pollutant has exceed a pre-determined concentration (Atmospheric Studies Group, 2011). For further technical information about the CALPUFF modelling system refer to the document *CALPUFF Modeling System Version 6 User Instructions* (Atmospheric Studies Group, 2011).

The CALPUFF system can account for a variety of effects such as non-steady-state meteorological conditions, complex terrain, varying land uses, plume fumigation and low wind speed dispersion (Environment Protection Authority, 2005). CALPUFF is considered an appropriate dispersion model for impact assessment by EPA in their document - *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales* in one or more of the following applications:

- complex terrain, non-steady-state conditions,
- buoyant line plumes,
- coastal effects such as fumigation,
- high frequency of stable calm night-time conditions,
- high frequency of calm conditions, and
- inversion break-up fumigation conditions.

In the case of the EFS odour impact assessment, CALPUFF was required in order to handle the complexity of surrounding terrain features. Also, the high incidence of calms and very light winds (60% annual frequency < 2.0 m/s) were likely to induce non-steady-state conditions such as accumulation of odour and/or downslope movement with drainage air flow.

For this study, the air contaminant was odour and ground level concentrations in odour units (ou) have been projected.

6.3 GEOPHYSICAL AND METEOROLOGICAL CONFIGURATION

A CALMET hybrid three-dimensional meteorological data file for Mulgrave, NSW was developed by pDs Consultancy that incorporated topography and land use over the domain area. The meteorological data file incorporated a 3 kilometre resolution 3D data tile prepared by The Air Pollution Model (TAPM) and two observed meteorological data sources including site-specific meteorological data supplied by EFS and an Australian Bureau of Meteorology site. The year 2008 was selected in order to maintain consistency with the original odour impact assessment (PAE

Holmes, 2010). The configurations are contained within the full meteorological dataset report provided in **Appendix B**.

6.4 GRIDDED RECEPTOR CONFIGURATION

The gridded receptors were configured as a Cartesian grid spaced at 50 m by 50 m intervals over a 5.0 km by 2.8 km computational domain. The gridded receptor values were based on the projected coordinate system *WGS 84 / UTM Zone 56S*. The contour plots derived from the receptor grid were overlaid on a geo-referenced Google Earth satellite image.

6.5 DISCRETE RECEPTOR CONFIGURATION

Discrete receptors used were placed in identical locations to those used in the original odour impact assessment (PAE Holmes, 2010) in order to maintain consistency. The nearest receptor locations at ground level are illustrated in **Figure 6.1** and listed in **Table 6.3**.

Figure 6.1 - Discrete receptor locations (red = near-field, blue = far-field)

Table 6.3 - Discrete receptor locations		
Sensitive Receptor	**Easting (km)**	**Northing (km)**
1	297.908	6277.456
2	297.920	6277.439
3	297.910	6277.399
4	297.888	6277.399
5	297.868	6277.420
6	297.863	6277.436
7	298.607	6277.090
8	298.711	6277.062
9	298.750	6277.071
10	298.772	6277.261
11	298.749	6277.138
12	298.833	6277.045
13	298.873	6277.024
14	298.893	6277.015
15	298.838	6276.901
16	298.906	6276.894
17	298.990	6276.947
18	298.798	6276.754
19	298.671	6276.768

6.6 BUILDING PROFILE INPUT PROGRAM

All significant structures were incorporated into the Building Profile Input Program (BPIP) and modelled with the PRIME algorithm and is illustrated in **Figure 6.2** along with odour source (including future redundant) locations.

6.7 SOURCE ODOUR EMISSION RATES

Full odour source configurations and emission rate details are available in **Appendix C**.

6.7.1 Phase 2/3 Building Upgrade

Odour emission rates (OER) from the existing and proposed Phase 2/3 buildings were modelled with use of worst-case diurnal 24 hour snapshot calculated from the sampling, analysis and fan inlet design airflows. The Phase 2/3 process airflows were provided by Elf Farm in order to enable the determination of odour emission rates and can be found in **Appendix D**. The worst case 24 hour emissions snapshot from the Phase 2/3 exhaust roof stacks was determined to be during the Phase 2 process period, typically from Thursday 8 pm to Friday 8 pm (i.e. 66-88 hrs cycle time). This is the highest odour emission potential period when a full batch of eight tunnels within

the existing building are in the Conditioning stage and when the batch contained within the proposed building has completed the Pasteurisation stage and entered the Cooldown stage in preparation for Conditioning (refer to **Section 3.2.1** for an outline of the various Phase 2/3 process stages). Concurrent to this period, the fifteen other tunnels are in later Phase 3 stage (i.e. spawn runs, cooldown and shipout). The worst case diurnal 24 hour snapshot was modelled every day of the year. This is highly conservative and it is probable to produce a higher result than if an arbitrarily varying emissions profile was used as input.

To represent the proposed modification upgrades it was assumed that the existing Phase 2/3 building emission sources are increased from twenty-two to twenty-five exhaust roof stacks and the construction of a new Phase 2/3 building with twenty-five exhaust roof stacks. This resulted in a total of fifty exhaust roof stacks modelled. The fan inlet design airflows for the existing Phase 2/3 Building will remain the same at 40,000 m^3/hr per tunnel and the new Phase 2/3 Building will have a new fan design airflow of 50,000 m^3/hr per tunnel. These are inlet fan conditions and therefore the derived odour emission rates are considered highly conservative (see **Section 3.2.1** for further details).

6.7.2 Proposed Biofilter System

The proposed biofilter odour emission rate was estimated with the use of a mean target performance concentration of 1,000 ou and maximum design extraction airflow of 450,000 m^3/hr and modelled as a constant emission rate. This assumes full containment and capture at all source groups except post-Pasteurisation Phase 2 and Phase 3 discharges.

6.7.3 Interim Raw Materials and Recycled Water Handling Upgrade

For the interim upgrade, the stormwater overflow retention dam will only continue to be used by Elf Farm under conditions such as high rainfall periods and will be kept empty at all other times. Also, the chicken manure and brew mix sources are to be fully contained by a new building enclosure. The bale wetting area, stable bedding area and water recycle pit will remain unchanged in the interim stage. Worst-case OERs have been modelled for the bale wetting area, stable bedding area and water recycle pit.

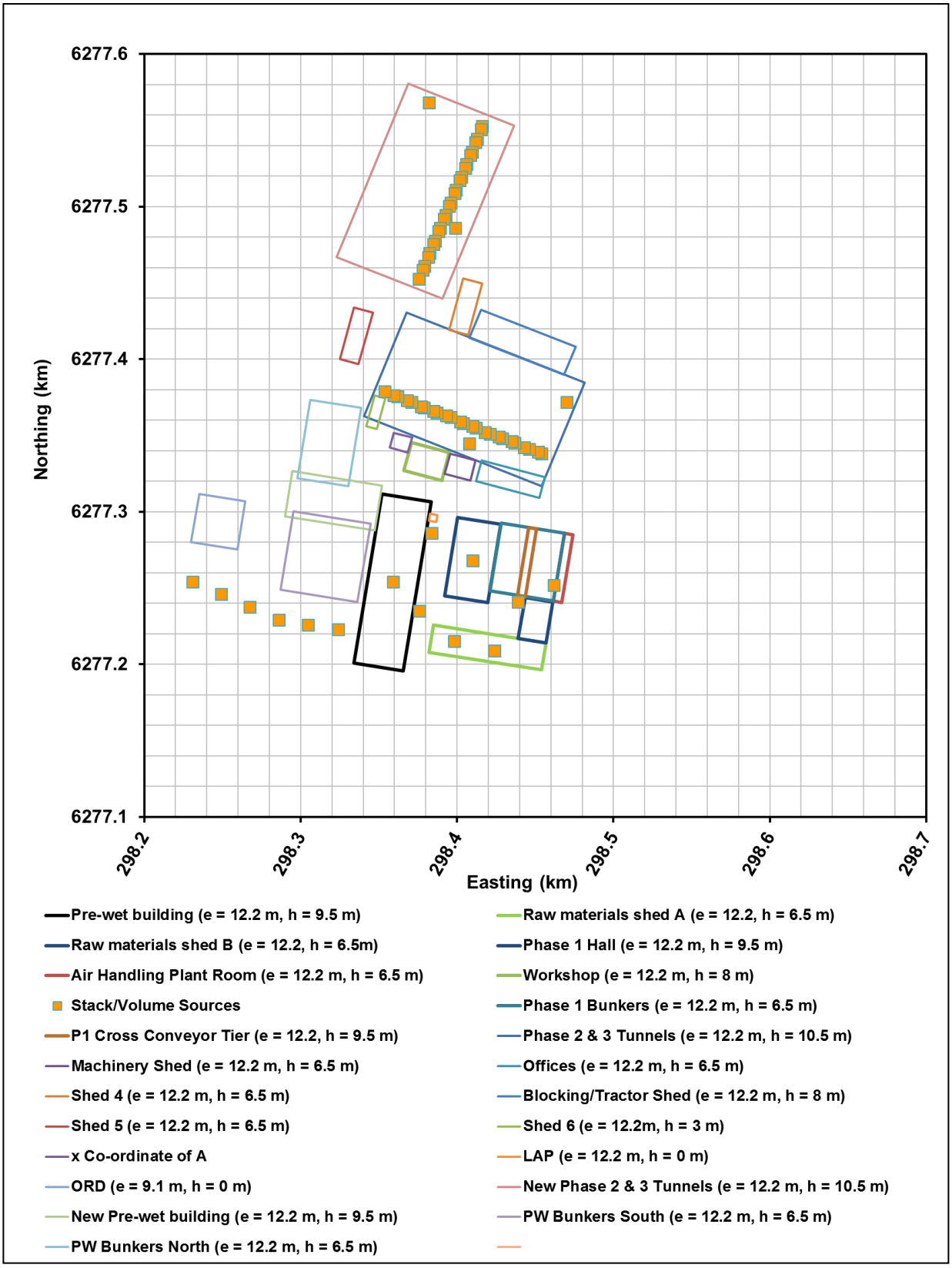


Figure 6.2 - BPIP input and odour source illustration

6.8 CALPUFF MODEL OPTIONS

CALPUFF default model options were set except for the following as recommended in *Table A*-4 contained and explained within Barclay & Scire, 2011:

- Dispersion coefficients (MDISP) = dispersion coefficients from internally calculated sigma v, sigma w using micrometeorological variables (2);
- Probability Density Function used for dispersion under convective conditions (MPDF) = Yes (1); and
- Minimum turbulence velocities sigma v for each stability class over land and water (SVMIN) = 0.2 m/s for A, B, C, D, E, F (0.200, 0.200, … , 0.200).

Further model configurations including a truncated CALPUFF list file are available in **Appendix C.**

6.9 ODOUR DISPERSION MODELLING SCENARIOS

Several odour dispersion modelling scenarios were modelled focusing on the following source groups:

- **Scenario 1** – Proposed modification interim stage: Raw Materials Area and Recycled Water Handling Upgrade. The source groups modelled included emissions from bale wetting area, stable bedding area and water recycle pit only. The raw materials area at this stage is contained i.e. set to zero emissions;
- **Scenario 2** – Biofilter System: modelled emissions from the biofilter system at 1,000 ou mean target concentration performance with containment of all other emission areas and sources; and
- **Scenario 3** – Phase 2 and 3 Upgrade: modelled emissions from the later stages of Phase 2 and all of Phase 3 from the roof exhaust vents from the extended and new Phase 2/3 Buildings. A total of fifty roof exhaust vents were modelled (i.e. twenty-five vents per building). The model represents the exhaust emissions of a worst-case 24 hour snapshot that was determined to be total of 26,625 ou.m^3/s one hour average running over a 24 hour period.

7 ODOUR EMISSIONS INVENTORY

The odour emissions inventory developed for the Site is complex as emissions vary both spatially and temporary. However the modifications to the approved expansion project has simplified this inventory as virtually all emissions will be contained and directed to the Emissions Plant and Biofilter System in the final stage of the modification works.

The following sections outline the assumptions and characteristics of each future emission source group that was taken into consideration in deriving all modelled odour emission rates.

7.1 ODOUR EMISSION SOURCE GROUPS

Each source group has been discussed and, where applicable, removed as an odour emission source as a result of the proposed modification works. The details for this is discussed for each source group in the following sections.

7.1.1 Raw Materials Shed Area

The raw materials shed area will be contained within a building. This building will have airflow extraction. The extracted airflow emissions from this area will be directed to the Emissions Plant and Biofilter System before discharge to atmosphere.

The modelling assumes that fugitive emissions from this area will be negligible given that the process operations and raw materials in this area will be contained in the proposed modification works.

7.1.2 Recycled Water Handling Areas

The recycled water handing areas include: the existing bale wetting area; the existing stable bedding area; and the water recycle pit. The bale wetting and stable bedding process operations will shift from outdoors to indoors and be contained. The existing Pre-wet Shed building will become the new Bale Wetting Building and have airflow extraction. The extracted airflow emissions from this area will be directed to the Emissions Plant and Biofilter System before discharge to atmosphere.

The modification works for the bale wetting area will continue once the Emissions Plant and Biofilter System has been successfully constructed and commissioned.

Therefore, two scenarios exist for this source group in the proposed modification works:

1. An interim scenario where the recycled water handling process operations will continue to operate under existing conditions. The odour emission rates selected for the interim scenario are identical to those derived from the odour sampling and testing exercise conducted by TOU (see **Sections 3.1 & 3.2**); and

2. The final scenario where the recycled water handling process operations shift to the existing Pre-wet Shed building and is contained. A nominal air change in this building will be up to 5 air changes/hr. The modelling assumes that fugitive emissions from this area will be negligible given this airflow extraction rate proposed.

7.1.3 Pre-wet Process Operations

The Pre-wet process operations will shift from the existing Pre-wet Shed building to new dedicated bunkers and working hall area that will exist in the western area of the Facility adjacent to the Pre-wet Shed building. All bunkers will have full airflow extraction with exhaust air directed to the Emissions Plant and Biofilter System for emissions treatment prior to discharge to atmosphere. A portion of the air used in the bunkers will be recirculated with the remainder discharged. This will be controlled by the PLC system.

The new Pre-wet working hall area will be contained and have a nominal airflow extraction rate of up to 5 air changes/hr during operations. The extracted air will be directed to the Emissions Plant and Biofilter System.

The modelling assumes that fugitive emissions from the proposed Pre-wet bunker and working hall will be negligible.

7.1.4 Phase 1 Process Operations

The Phase 1 inclined & cross transfer conveyors operation will be contained. The extracted airflow emissions from this area will be directed to the Emissions Plant and

Biofilter System before discharge to atmosphere. A nominal air change in this building will be up to 5 air changes/hr during operations.

The modelling assumes that fugitive emissions from the Phase 1 process operations will be negligible.

7.1.5 Phase 2/3 Process Operations

All emissions generated during Phase 2/3 process operations (for both existing and proposed) will have the capacity to be directed to the proposed Emissions Plant and Biofilter System. However, based on the modelling results (see **Section 9**), it has been determined that only Phase 2 process emissions will need to be directed to the Emissions Plant and Biofilter System for treatment with Phase 3 emissions discharged directly via the dedicated exhaust roof stacks for the existing and proposed Phase 2/3 buildings. This is considered an optimal manner in which to operate given that the Phase 3 emissions are of a low odour emission rate and neutral odour character.

The modelling assumes that fifty tunnels will be in the latter stages of Phase 2 (i.e. cool-down conditioning) and Phase 3 as the worst case scenario and fugitive emissions from process operations at both Phase 2/3 Buildings will be negligible.

7.1.6 Bioscrubber System

The existing bioscrubber system and stack will be mothballed following the completion and commissioning of the proposed modification works. Therefore, the modelling has assumed that this will no longer be an odour emission source at the Facility and has been removed from the modelling.

7.2 ODOUR EMISSIONS INVENTORY TABLES

The odour emissions inventory tables can be found in **Appendix C**.

8 ODOUR MODELLING RESULTS

The following model plots represent the ground level odour concentration (ou, 99th percentile, 1 second average) for all source groups. This represents TOU best estimate of worst-case emissions scenarios from Elf Farm. The odour impact results are therefore considered conservative:

- **Figure 8.1 (Scenario 1):** Projection of far-field odour impact from the recycled water handling areas including bale wetting area, stable bedding are and water recycle pit only. This was modelled as an interim stage before completion of the final modification works (i.e. full containment of these source groups). The stormwater overflow retention dam is not included in this scenario as advice from Elf Farm is that it will only be utilised under emergency conditions such as high rainfall periods and plant breakdowns and will be kept empty at all other times;
- **Figure 8.2 (Scenario 2):** Proposed biofilter odour control system at 1,000 ou mean target performance concentration at maximum design airflow of 450,000 m^3/hr. This assumes full containment and capture at all source groups. The emissions from the initial stages of the Phase 2 are not represented in this modelling plot and are shown in Scenario 3; and
- **Figure 8.3 (Scenario 3):** Phase 2/3 emission upgrade conditions i.e. emissions from the later stage of Phase 2 (i.e. from cool-down conditioning till cool-down spawn) and Phase 3 (i.e. spawn runs 1 & 2 and cool-down (spawn/ship-out)). It is assumed emissions during the early stages of the Phase 2 process cycle (i.e. tunnel venting, levelling, warm-up pasteurisation, pasteurisation and the commencement of cool-down conditioning) is directed to Emissions Plant and Biofilter System. The model represents the exhaust emissions of a worst-case 24 hour snapshot that was determined to be total of 26,625 ou.m^3/s one hour average running over a 24 hour period.

Projected ground level odour concentrations (ou, 99%, 1 second average) at each modelled discrete receptor are available in **Table 8.1**.

Table 8.1 - Discrete receptor odour impact results (ou, 99%, 1-s)				
Sensitive Receptor	**Scenario 1 Interim Upgrade**	**Scenario 2 Biofilter Upgrade**	**Scenario 3 Phase 2/3 Upgrade**	**Impact Assessment Criteria**
1	11.5	3.2	1.5	2
2	12.5	3.4	1.5	2
3	13.0	3.3	1.4	2
4	12.3	3.2	1.4	2
5	11.2	3.1	1.4	2
6	10.7	3.0	1.4	2
7	39.7	6.1	2.3	4 - 7
8	27.4	4.4	1.7	4 - 7
9	23.7	4.2	1.6	4 - 7
10	22.7	3.5	1.7	4 - 7
11	26.6	4.3	1.7	4 - 7
12	16.7	3.5	1.4	4 - 7
13	14.4	3.2	1.3	4 - 7
14	13.3	3.1	1.3	4 - 7
15	14.1	2.6	1.3	4 - 7
16	12.1	2.6	1.2	4 - 7
17	10.3	2.6	1.2	4 - 7
18	11.8	2.4	1.4	4 - 7
19	16.3	2.6	1.5	4 - 7

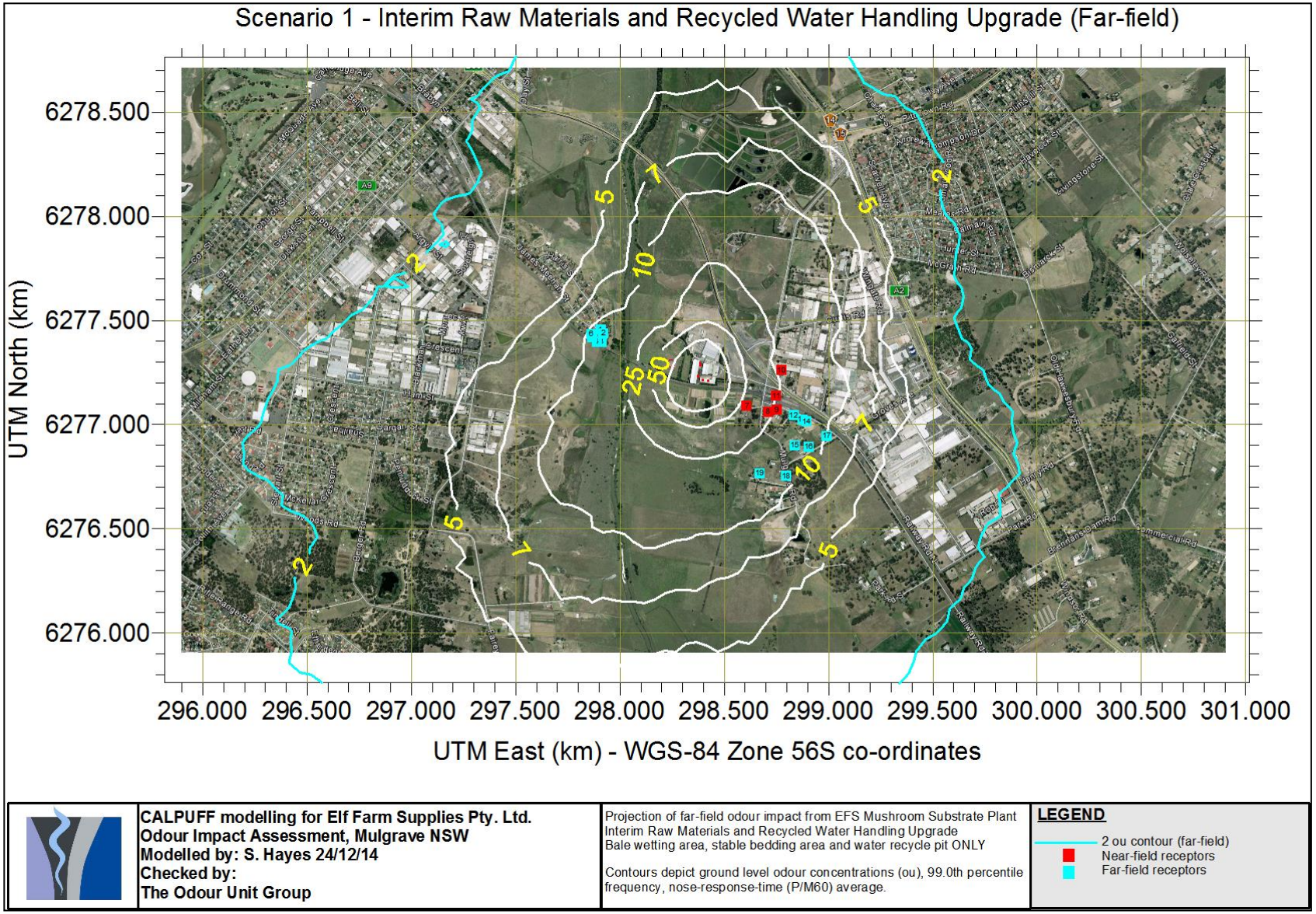


Figure 8.1 – Projection of far-field odour impact at the interim stage from the recycled water handling areas only

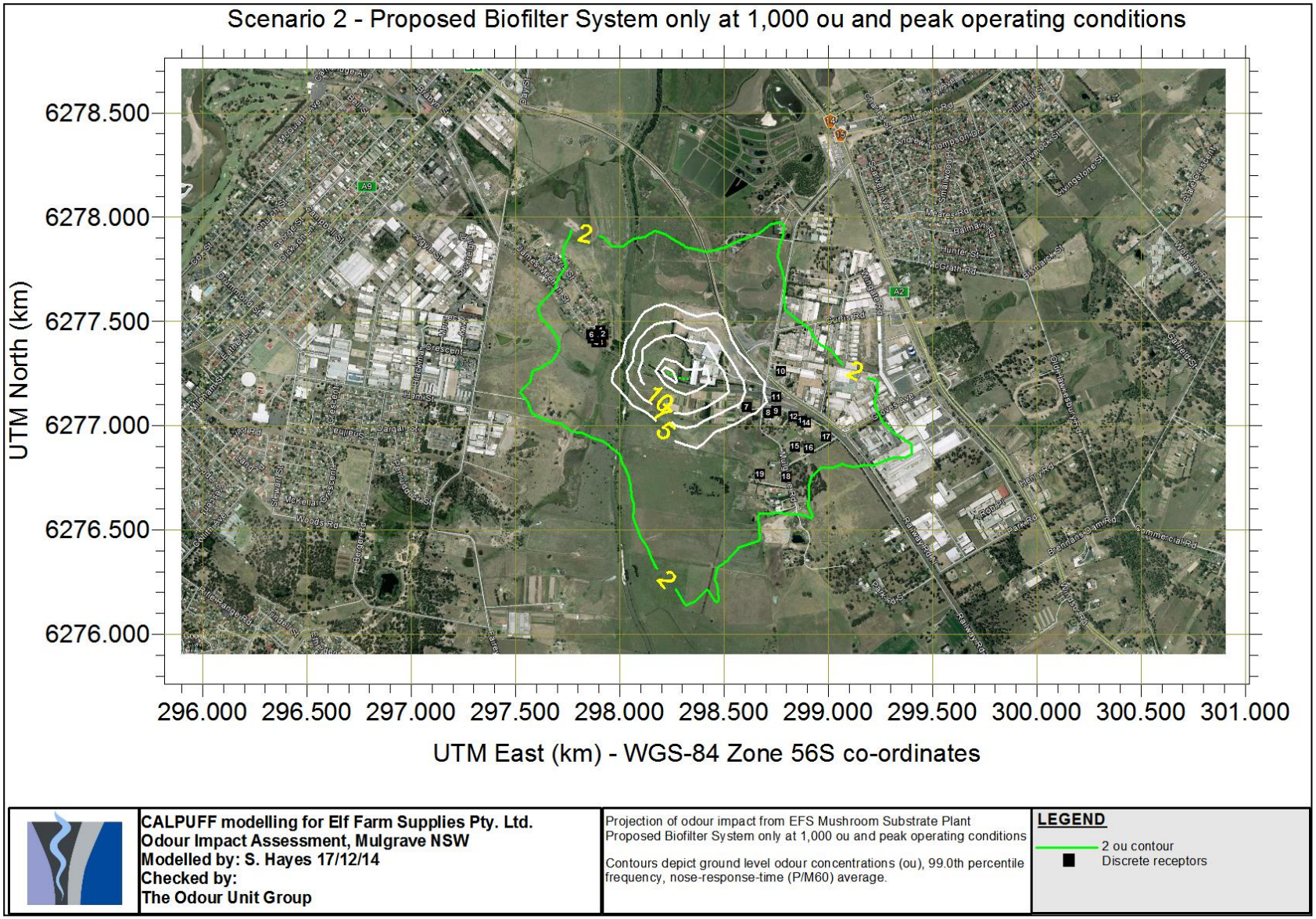


Figure 8.2 – Projection of odour impact map plot for proposed biofilter system at 1,000 ou mean target performance concentration

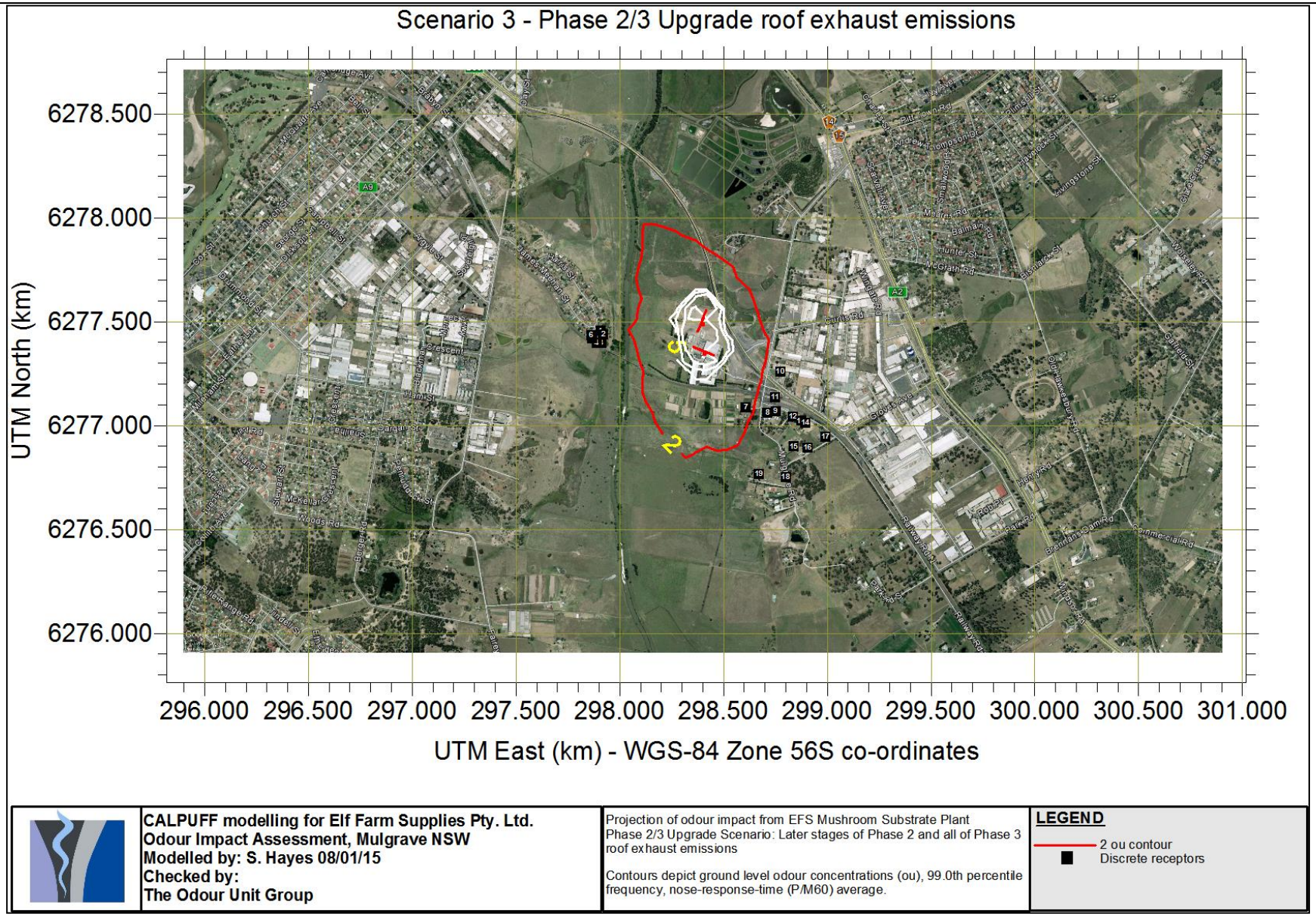


Figure 8.3 – Projection of odour impact map plot for proposed upgrade works for Phase 2 & 3 process operations

9 DISCUSSION OF MODELLING RESULTS

The following discusses the modelling results for the proposed modification works for each scenario including the interim and final stages.

9.1 SCENARIO 1 – INTERIM STAGE

Projection of far-field odour impact from bale wetting area, stable bedding area and water recycle pit shows exceedance of the 2 ou odour performance criterion for the urban areas to the south-west, west, north-west and north-east of the Facility. In addition, there is exceedance of the 4 ou to 7 ou for the semi-rural and industrial areas to east and south-east of the Facility. This projection is at the interim stage before completion of the final modification works (i.e. full containment of these source groups). It should be noted that worst case odour emission rates have been modelled for the bale wetting area, stable bedding area and water recycle pit. Therefore, the projected odour impact is highly conservative and will vary throughout a typical 7-day production cycle where water recycle quality is known to vary (see odour emission data for bale wetting area in **Appendices A & C**).

9.2 SCENARIO 2 – FINAL STAGE

The odour impact projection for this scenario shows that the proposed Emissions Plant and Biofilter System at 1,000 ou mean target performance concentration at maximum design airflow of 450,000 m^3/hr shows compliance with the 2 ou odour performance criterion for most of the urban areas to the south-west, west, north-west and north-east of the Facility. In addition, compliance is achieved with the 4 ou to 7 ou odour performance criterion for the semi-rural and industrial areas to east and south-east of the Facility.

This scenario represents worst case scenario under maximum operating conditions and is therefore considered conservative. In reality, the projected odour impact is likely to be much less than that modelled given the temporal and spatial variations that will occur during a typical 7-day production cycle at the Facility. These variations will have a significant impact on the airflow extraction demand on the Emissions Plant and Biofilter System over a production cycle. Also, the modelled biofilter emissions will be of a treated quality with no original process character present. Therefore, given the

above analysis, the exceedance shown in part of the urban area to the north-west is not considered to be problematical.

9.3 SCENARIO 3 – FINAL STAGE

The odour impact projection for this scenario shows that discharge of Phase 3 emissions under the proposed modification (i.e. two Phase 2/3 Buildings, each with twenty-five tunnels, equivalent to a total of fifty tunnels) shows compliance with the 2 ou odour performance criterion for the urban areas to the south-west, west, north-west and north-east of the Facility. In addition, there is compliance with the 4 ou to 7 ou odour performance criterion for the semi-rural and industrial areas to east and south-east of the Facility. This reflects emissions that are discharged post-36 hours' time period over the Phase 2/3 production cycle (i.e. upon the completion of the pasteurisation stage). All emission pre-the 36 hours' time period will be directed to the Emissions Plant and Biofilter System.

10 CONCLUSION

In September 2014 Elf Farm engaged TOU to undertake an odour impact assessment for the modification to the approved expansion project of the Facility. The Department of Planning & Environment (DPE) project number for the proposed modifications to the approved expansion is 08_0255 MOD1.

A site-wide odour emissions inventory was developed that is representative of conditions that will exist at the Facility following the proposed modification works. The key features of the proposed modification are full containment and airflow extraction of all existing odour emission source groups and process operations. The exception to this is the stormwater overflow retention dam and the later stages of Phase 2 and all of Phase 3 exhaust emissions.

The stormwater overflow retention dam has not included been included in the final stage scenarios as advice from Elf Farm is that it will continue only to be utilised under conditions such as high rainfall periods and will be kept empty at all other times. The Phase 2/3 modelled emissions shows clear compliance under the proposed upgrade scenario where emissions are discharged directly to atmosphere without the need for treatment by the proposed Emissions Plant and Biofilter System.

Overall, the proposed modifications at the final stage is expected to result in a highly significant reduction to the Facility's existing odour emissions and impact profile. The proposed modifications will achieve compliance with the 2 ou odour performance criterion for most of the urban areas to the south-west, west, north-west and north-east of the Facility and compliance with the 4 ou to 7 ou odour performance criterion for the semi-rural and industrial areas to east and south-east of the Facility. The modelled biofilter emissions will be of a treated quality with no original process character present. Also, in reality, the projected odour impact is likely to be much less than that modelled given the temporal and spatial variations that will occur during a typical 7-day production cycle at the Facility. Therefore, the exceedance of the odour performance criterion shown in part of the urban area to the north-west is not considered to be problematical.

The final stage modelling has not considered cumulative odour effects that would arise if the various odour types were to combine in the atmosphere. This decision was taken in the knowledge and experience by TOU that the widely different odour character in each of the two odour source groups (biofilter and Phase 2 emissions) retain their individual detectability at downwind locations, and do not combine into a homogeneous odour character.

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REPORT SIGNATURE PAGE

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ABN: 53 091 165 061

Terry Schulz
Managing Director

Michael Assal
Engineer

Steven Hayes
Senior Consultant & Modeller

Elf Farm Supplies Pty Ltd

Mushroom Substrate Plant – Modification to Approved Expansion

Odour Impact Assessment

Mulgrave, NSW

Appendices

Elf Farm Supplies Pty Ltd

Mushroom Substrate Plant – Modification to Approved Expansion

---

APPENDIX A:

ODOUR CONCENTRATION LABORATORY TESTING RESULTS

THE ODOUR UNIT PTY LTD

THE ODOUR UNIT

Aust. Technology Park
Locomotive Workshop
Bay 4 Suite 3011
2 Locomotive Street
Eveleigh NSW 2015

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Email: info@odourunit.com.au
Internet: www.odourunit.com.au
ABN: 53 091 165 061

NATA

Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Elf Farm Supplies Pty Ltd	Telephone	+61 2 4577 5000
Contact	Neil Cockerell	Facsimile	-
Sampling Site	Mulgrave, NSW	Email	manager@elffarm.com.au
Sampling Method	Drum & Pump	Sampling Team	TOU (J. Schulz, M. Assal)

Order details:

Order requested by	Neil Cockerell	Order accepted by	T.Schulz
Date of order	July 2014	TOU Project #	N1952R
Order number	Refer to correspondence	Project Manager	M. Assal
Signed by	Refer to correspondence	Testing operator	A. Schulz

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
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. NATA accredited for compliance with ISO/IEC 17025. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.2635$ (April 2014) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.1843$ (April 2014) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
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 in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Thursday, 21 August 2014 Panel Roster Number: SYD20140813_069

J. Schulz
NSW Laboratory Coordinator

A. Schulz
Authorised Signatory

THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20140813_069

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate (ou.m^3/m^2/s)
2-1 Levelling (Tunnel 1)	SC14469	12/08/2014 1106hrs	13/08/2014 1128hrs	4	8	-	-	4,870	4,870	N/A
8-1 Tunnel Venting (Tunnel 17)	SC14471	12/08/2014 1119hrs	13/08/2014 1232hrs	4	8	-	-	2,900	2,900	N/A
2-2 Levelling (Tunnel 3)	SC14472	12/08/2014 1113hrs	13/08/2014 1442hrs	4	8	-	-	5,310	5,310	N/A

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20140813_069	50,000	$20 \leq \chi \leq 80$	1,024	49	Yes

Comments None.

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

Note This report shall not be reproduced, except in full, without written approval of The Odour Unit Pty Ltd. Any attachments to this Report are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd.

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THE ODOUR UNIT PTY LTD

THE ODOUR UNIT

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ABN: 53 091 165 061

NATA
Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Elf Farm Supplies Pty Ltd	Telephone	+61 2 4577 5000
Contact	Neil Cockerell	Facsimile	-
Sampling Site	Mulgrave, NSW	Email	manager@elffarm.com.au
Sampling Method	Drum & Pump	Sampling Team	TOU (J. Schulz, M. Assal)

Order details:

Order requested by	Neil Cockerell	Order accepted by	T.Schulz
Date of order	July 2014	TOU Project #	N1952R
Order number	Refer to correspondence	Project Manager	M. Assal
Signed by	Refer to correspondence	Testing operator	A. Schulz

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
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. NATA accredited for compliance with ISO/IEC 17025. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.2635$ (April 2014) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.1843$ (April 2014) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
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 in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Thursday, 21 August 2014

Panel Roster Number: SYD20140814_070

J. Schulz
NSW Laboratory Coordinator

A. Schulz
Authorised Signatory

Odour Sample Measurement Results
Panel Roster Number: SYD20140814_070

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate (ou.m^3/m^2/s)
7A-1 Spawn Run 1 (Tunnel 4)	SC14477	13/08/2014 0919hrs	14/08/2014 1040hrs	4	8	-	-	118	118	N/A
4-2 Pasteurisation (Tunnel 3)	SC14478	13/08/2014 0933hrs	14/08/2014 1110hrs	4	8	-	-	2,660	2,660	N/A
4-1 Pasteurisation (Tunnel 2)	SC14479	13/08/2014 0941hrs	14/08/2014 0941hrs	4	8	-	-	2,230	2,230	N/A
3-2 Warm-up Pasteurisation (Tunnel 10)	SC14480	13/08/2014 0954hrs	14/08/2014 1218hrs	4	8	-	-	2,440	2,440	N/A
3-1 Warm-up Pasteurisation (Tunnel 1)	SC14481	13/08/2014 1000hrs	14/08/2014 1248hrs	4	8	-	-	2,350	2,350	N/A

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20140814_070	50,000	$20 \leq \chi \leq 80$	1,024	49	Yes

Comments None.

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

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NATA

Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Elf Farm Supplies Pty Ltd	Telephone	+61 2 4577 5000
Contact	Neil Cockerell	Facsimile	-
Sampling Site	Mulgrave, NSW	Email	manager@elffarm.com.au
Sampling Method	Drum & Pump	Sampling Team	TOU (J. Schulz, M. Assal)

Order details:

Order requested by	Neil Cockerell	Order accepted by	T.Schulz
Date of order	July 2014	TOU Project #	N1952R
Order number	Refer to correspondence	Project Manager	M. Assal
Signed by	Refer to correspondence	Testing operator	A. Schulz

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
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. NATA accredited for compliance with ISO/IEC 17025. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.2635$ (April 2014) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.1843$ (April 2014) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
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 in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Friday, 22 August 2014

Panel Roster Number: SYD20140815_071

J. Schulz
NSW Laboratory Coordinator

A. Schulz
Authorised Signatory

Odour Sample Measurement Results
Panel Roster Number: SYD20140815_071

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate ($ou.m^3/m^2/s$)
5-1-1 Conditioning #1 (Tunnel 1)	SC14482	14/08/2014 1040hrs	15/08/2014 1033hrs	4	8	-	-	512	512	N/A
5-2-1 Conditioning #1 (Tunnel 3)	SC14483	14/08/2014 1013hrs	15/08/2014 1108hrs	4	8	-	-	431	431	N/A
7B-1 Spawn run 2 (Tunnel 8)	SC14484	14/08/2014 0950hrs	15/08/2014 1144hrs	4	8	-	-	152	152	N/A
5-1-2 Conditioning #2 (Tunnel 1)	SC14485	14/08/2014 0920hrs	15/08/2014 1244hrs	4	8	-	-	362	362	N/A
5-2-2 Conditioning #2 (Tunnel 3)	SC14486	14/08/2014 0934hrs	15/08/2014 1311hrs	4	8	-	-	304	304	N/A

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20140815_071	50,000	$20 \leq \chi \leq 80$	1,024	49	Yes

Comments None.

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

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ABN: 53 091 165 061

NATA
Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Elf Farm Supplies Pty Ltd	Telephone	+61 2 4577 5000
Contact	Neil Cockerell	Facsimile	-
Sampling Site	Mulgrave, NSW	Email	manager@elffarm.com.au
Sampling Method	Drum & Pump	Sampling Team	TOU (J. Schulz, M. Assal)

Order details:

Order requested by	Neil Cockerell	Order accepted by	T.Schulz
Date of order	July 2014	TOU Project #	N1952R
Order number	Refer to correspondence	Project Manager	M. Assal
Signed by	Refer to correspondence	Testing operator	A. Schulz

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
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. NATA accredited for compliance with ISO/IEC 17025. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.2635$ (April 2014) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.1843$ (April 2014) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
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 in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Friday, 22 August 2014

Panel Roster Number: SYD20140817_072

J. Schulz
NSW Laboratory Coordinator

A. Schulz
Authorised Signatory

THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20140817_072

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate (ou.m^3/m^2/s)
5-1-3 Conditioning #3 (Tunnel 1)	SC14487	16/08/2014 0852hrs	17/08/2014 1251hrs	4	8	-	-	99	99	N/A
5-2-3 Conditioning #3 (Tunnel 3)	SC14488	16/08/2014 0910hrs	17/08/2014 1317hrs	4	8	-	-	83	83	N/A
6-2 Cooldown Spawn (Tunnel 3)	SC14489	17/08/2014 0903hrs	17/08/2014 1343hrs	4	8	-	-	41	41	N/A
6-1 Cooldown Spawn (Tunnel 1)	SC14490	17/08/2014 0915hrs	17/08/2014 1413hrs	4	8	-	-	45	45	N/A

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20140815_071	50,000	$20 \leq \chi \leq 80$	1,024	49	Yes

Comments None.

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

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Internet: www.odourunit.com.au
ABN: 53 091 165 061

NATA

Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Elf Farm Supplies Pty Ltd	Telephone	+61 2 4577 5000
Contact	Neil Cockerell	Facsimile	-
Sampling Site	Mulgrave, NSW	Email	manager@elffarm.com.au
Sampling Method	AS4323.3/4	Sampling Team	TOU (M. Assal)

Order details:

Order requested by	Neil Cockerell	Order accepted by	T.Schulz
Date of order	October 2014	TOU Project #	N1952R
Order number	Refer to correspondence	Project Manager	M. Assal
Signed by	Refer to correspondence	Testing operator	D. Hepple

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
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. NATA accredited for compliance with ISO/IEC 17025. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.2635$ (April 2014) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.1843$ (April 2014) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
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 in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Tuesday, 28 October 2014

Panel Roster Number: SYD20141028_092

J. Schulz
NSW Laboratory Coordinator

D. Hepple
Authorised Signatory

THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20141028-092

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate (ou.$m^3/m^2/s$)
[redacted]										

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20141028_092

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate (ou.m^3/m^2/s)
#9 – Bale Wetting Bed Area (Monday), Aerating	SC14648	27/10/2014 1402 hrs	28/10/2014 1419hrs	4	8	-	-	42,500	42,500	25.3
#10 – Bale Wetting Bed Area (Monday), Non-aerating	SC14649	27/10/2014 1443 hrs	28/10/2014 1452 hrs	4	8	-	-	39,000	39,000	23.9

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20141028_092	50,000	$20 \leq \chi \leq 80$	1,024	49	Yes

Comments None.

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

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THE ODOUR UNIT PTY LTD

THE ODOUR UNIT

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Email: info@odourunit.com.au
Internet: www.odourunit.com.au
ABN: 53 091 165 061

NATA

Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Elf Farm Supplies Pty Ltd	Telephone	+61 2 4577 5000
Contact	Neil Cockerell	Facsimile	-
Sampling Site	Mulgrave, NSW	Email	manager@elffarm.com.au
Sampling Method	AS4323.3/4	Sampling Team	TOU (M. Assal)

Order details:

Order requested by	Neil Cockerell	Order accepted by	T.Schulz
Date of order	October 2014	TOU Project #	N1952R
Order number	Refer to correspondence	Project Manager	M. Assal
Signed by	Refer to correspondence	Testing operator	D. Hepple

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
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. NATA accredited for compliance with ISO/IEC 17025. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.2635$ (April 2014) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.1843$ (April 2014) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
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 in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Wednesday, 29 October 2014 Panel Roster Number: SYD20141029_093

J. Schulz
NSW Laboratory Coordinator

D. Hepple
Authorised Signatory

THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20141029_093

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate ($ou.m^3/m^2/s$)
#15 – Bale Wetting Area (Tuesday), Aerating, Saturated	SC14654	28/10/2014 1022 hrs	29/10/2014 1019 hrs	4	8	-	-	60,100	60,100	32.7
#16 – Bale Wetting Area (Tuesday), Non-aerating, Saturated	SC14655	28/10/2014 1058 hrs	29/10/2014 1046 hrs	4	8	-	-	77,900	77,900	39.9
[redacted]										

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20141029_093

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate ($ou.m^3/m^2/s$)
[redacted]										

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20141029_093	50,000	$20 \leq \chi \leq 80$	861	58	Yes

Comments [redacted]

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

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Internet: www.odourunit.com.au
ABN: 53 091 165 061

NATA

Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Elf Farm Supplies Pty Ltd	Telephone	+61 2 4577 5000
Contact	Neil Cockerell	Facsimile	-
Sampling Site	Mulgrave, NSW	Email	manager@elffarm.com.au
Sampling Method	AS4323.3/4	Sampling Team	TOU (M. Assal)

Order details:

Order requested by	Neil Cockerell	Order accepted by	T.Schulz
Date of order	October 2014	TOU Project #	N1952R
Order number	Refer to correspondence	Project Manager	M. Assal
Signed by	Refer to correspondence	Testing operator	D. Hepple

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
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. NATA accredited for compliance with ISO/IEC 17025. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.2635$ (April 2014) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.1843$ (April 2014) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
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 in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Thursday, 30 October 2014

Panel Roster Number: SYD20141030_094

J. Schulz
NSW Laboratory Coordinator

D. Hepple
Authorised Signatory

THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20141030_094

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate ($ou.m^3/m^2/s$)
#24 - Stable Bedding Area, Non-aerating	SC14665	29/10/2014 0830 hrs	30/10/2014 1015 hrs	4	8	-	-	11,600	11,600	5.28
#25 - Broken Wetted Bales, Non-aerating	SC14666	29/10/2014 0858 hrs	30/10/2014 1043 hrs	4	8	-	-	13,800	13,800	9.31
#26 - Stable Bedding Area, Aerating	SC14667	29/10/2014 0938 hrs	30/10/2014 1108 hrs	4	8	-	-	16,400	16,400	6.33
#27 - Broken Wetted Bales, Aerating	SC14668	29/10/2014 1008 hrs	30/10/2014 1134 hrs	4	8	-	-	6,320	6,320	3.56
#28 - Freshly Made Brew Mix	SC14669	29/10/2014 1102 hrs	30/10/2014 1157 hrs	4	8	-	-	17,900	17,900	11.2
#29 –Water Recycle Pit (Wed), Aeration Offline	SC14670	29/10/2014 1115 hrs	30/10/2014 1257 hrs	4	8	-	-	156,000	156,000	98.8

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples.

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20141030_094	50,000	$20 \leq \chi \leq 80$	861	58	Yes

Comments [redacted]

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

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Internet: www.odourunit.com.au
ABN: 53 091 165 061

NATA
Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Elf Farm Supplies Pty Ltd	Telephone	+61 2 4577 5000
Contact	Neil Cockerell	Facsimile	-
Sampling Site	Mulgrave, NSW	Email	manager@elffarm.com.au
Sampling Method	AS4323.3/4	Sampling Team	TOU (M. Assal)

Order details:

Order requested by	Neil Cockerell	Order accepted by	T.Schulz
Date of order	October 2014	TOU Project #	N1952R
Order number	Refer to correspondence	Project Manager	M. Assal
Signed by	Refer to correspondence	Testing operator	D. Hepple

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
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. NATA accredited for compliance with ISO/IEC 17025. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.2635$ (April 2014) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.1843$ (April 2014) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
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 in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Friday, 31 October 2014 Panel Roster Number: SYD20141031_095

J. Schulz
NSW Laboratory Coordinator

D. Hepple
Authorised Signatory

THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20141031_095

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate ($ou.m^3/m^2/s$)
#30 – Chicken Manure, Composite of Odd and Even	SC14672	30/10/2014 0826 hrs	31/10/2014 1020 hrs	4	8	-	-	7,510	7,510	5.28
[redacted]										
#37 – Stormwater Overflow Retention Dam	SC14679	31/10/2014 1210 hrs	3110/2014 1413 hrs	4	8	-	-	11,600	11,600	7.48

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20141031_095	50,000	$20 \leq \chi \leq 80$	1,024	49	Yes

Comments None.

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Accreditation Number: 14974

Odour Concentration Measurement Results

The measurement was commissioned by:

Organisation	Elf Farm Supplies Pty Ltd	Telephone	+61 2 4577 5000
Contact	Neil Cockerell	Facsimile	-
Sampling Site	Mulgrave, NSW	Email	manager@elffarm.com.au
Sampling Method	AS4323.3/4	Sampling Team	TOU (M. Assal)

Order details:

Order requested by	Neil Cockerell	Order accepted by	M.Assal
Date of order	October 2014	TOU Project #	N1952R
Order number	Refer to correspondence	Project Manager	M. Assal
Signed by	Refer to correspondence	Testing operator	A. Schulz

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
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. NATA accredited for compliance with ISO/IEC 17025. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.2635$ (April 2014) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.1843$ (April 2014) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
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 in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Monday, 24 November 2014

Panel Roster Number: SYD20141124_102

J. Schulz
NSW Laboratory Coordinator

D. Hepple
Authorised Signatory

Odour Sample Measurement Results
Panel Roster Number: SYD20141124_102

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate (ou.m^3/m^2/s)
Sample 3# - Bale wetting area (Sunday), Aerating	SC14723	23/11/2014 0855 hrs	24/11/2014 1159 hrs	4	8	-	-	2,900	2,900	1.80
Sample 4# - Bale wetting area (Sunday), Non-aerating	SC14724	23/11/2014 0939 hrs	24/11/2014 1230 hrs	4	8	-	-	2,900	2,900	1.80

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd. have performed the dilution of samples

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20141124_102	50,000	$20 \leq \chi \leq 80$	861	58	Yes

Comments None.

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

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Elf Farm Supplies Pty Ltd

Mushroom Substrate Plant – Modification to Approved Expansion

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APPENDIX B:

PDS CONSULTANCY METEOROLOGICAL DATASET REPORT

Three Dimensional (3D) Meteorological data file for CALPUFF

Mulgrave(NSW)-2008

This file was exclusively compiled for **The Odour Unit** Pty Ltd By pDs Consultancy Service.

pDs Consultancy
@1999-2014

Introduction

Non steady state PUFF model such as CALPUFF (Californian PUFF model) requires meteorological data, preferably hourly average for the entire modelling domain which is in question. Meteorological domain is usually bigger than the computational domain which is intended to use for dispersion modelling. There are several recommended options available to construct 3D meteorological data files. Selection of the suitable option is depending on the data availability.

Three modes available to run CALMET:

1. CALMET No-Observations (No-Obs) Mode. CALMET using gridded numerical model output (e.g., from the MM5, WRF, RAMS, RUC, or TAPM models). No surface, upper air or buoy observations are used in No-Obs mode.
2. CALMET Hybrid Mode. CALMET run using a combination of gridded numerical meteorological data supplemented by surface and optional overwater buoy data.
3. CALMET Observations-Only (Obs) Mode. - CALMET using observed surface and upper air data, plus optional buoy data.

pDs Consultancy has been engaged by **The Odour Unit(TOU)** to compile an 3D meteorological data file for a site at **Mulgrave** in New South Wales using site-specific meteorological data supplied by their client and other available

meteorological data obtain from Australian Bureau of Meteorology (BoM). The year 2008 was used on TOU's request.

CONSTRUCTION OF GEOPHYSICAL DATA FILE :

Topography and land used over the area were examined and topography data with 90m resolution was used (Source :SRTM3-Global data). Map showing topography in 3D was prepared and preliminary QA/QC was done comparing it with Google maps.

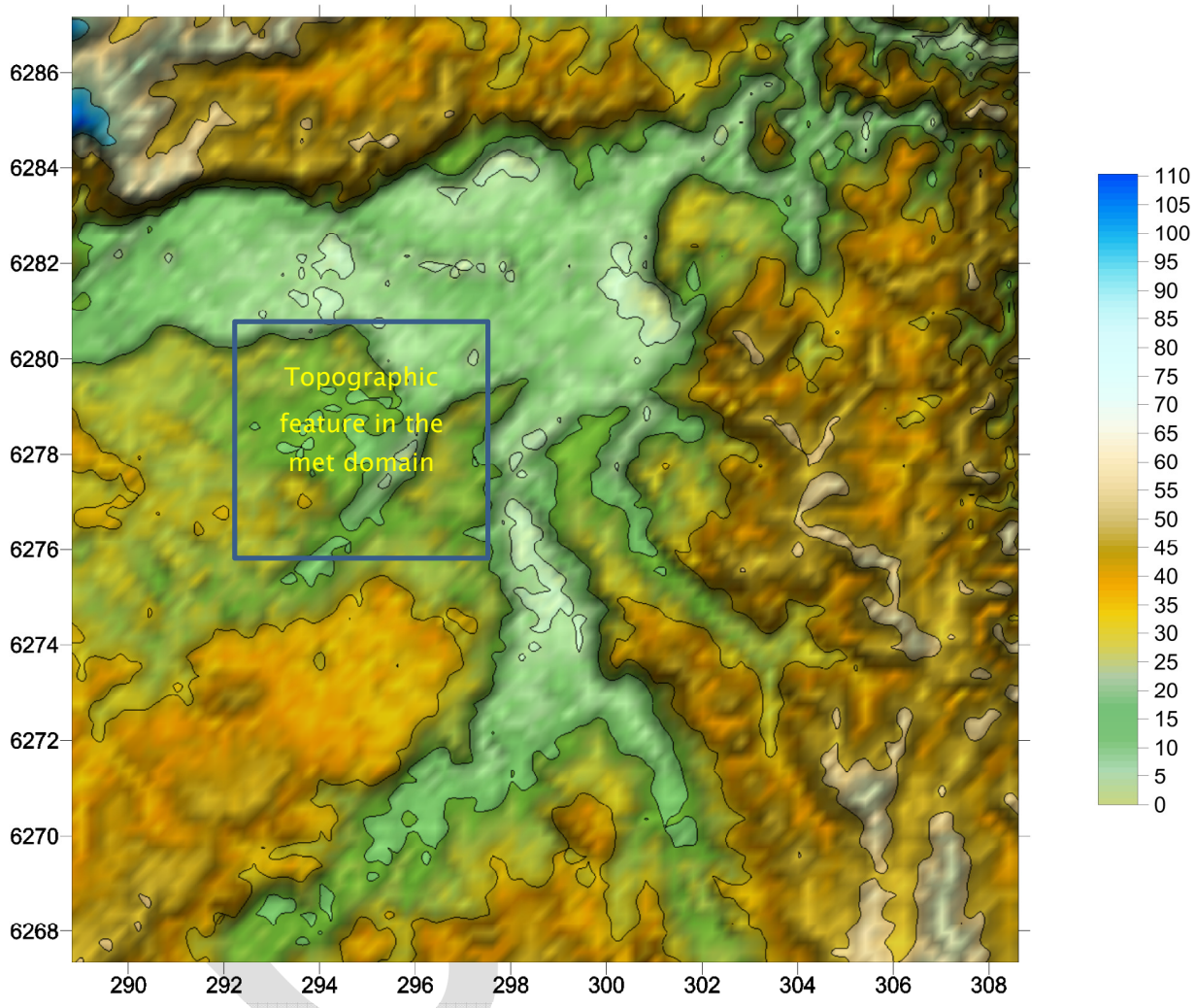


FIGURE 1: TOPOGRAPHY OVER THE METEOROLOGICAL DOMAIN

Global land cover data (Source :GLCC-Australia Pacific) with 900 m resolution was initially used and modified manually to match with real land-use over the area. Only three compatible land use categories were assigned (Built up, Range Land, Forest).

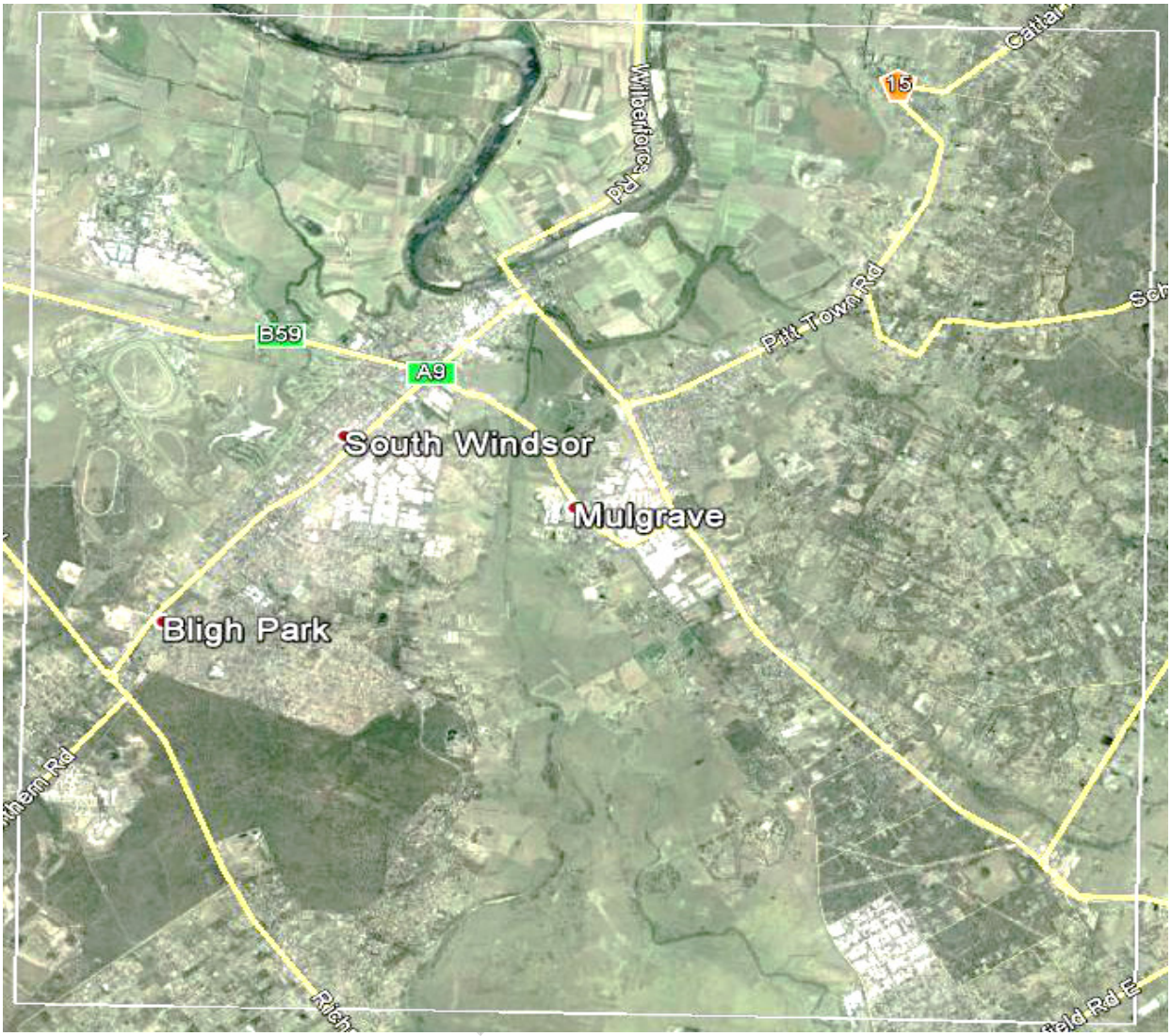


FIGURE 2: LAND USE OVER THE METEOROLOGICAL DOMAIN

Geophysical data file (GEO.Dat) was prepared based on above data sets (Topography and Land use) running TERREL for topography, CTGPROC for Land-use and MAKEGEO for final .geo file, pre-processors of CALPUFF modelling system.

In order to resolve near source terrain features, as well as to capture actual meteorological observations, 200 m grid resolution with 20KM by 20KM grid was used. The dominant scale of the terrain (TERRAD- radius of influence) was set to 1 KM.

INPUT METEOROLOGY

There were two meteorological data sources within the meteorological domain including the data at the site. Therefore we could use 'Hybrid" option available in CALMET-The meteorological module of CALPUFF modelling system.

CALMET was initialised with 3D data tile prepared running meteorological module of TAPM (CISIRO's **T**he **A**ir **P**ollution **M**odel). Topography with 90m resolution and land use with ~1 Km resolution were used to prepare 3KM resolution 3D data tile. This will help resolve topography for some extent even with the 3KM resolution met-tile used for initialisation.

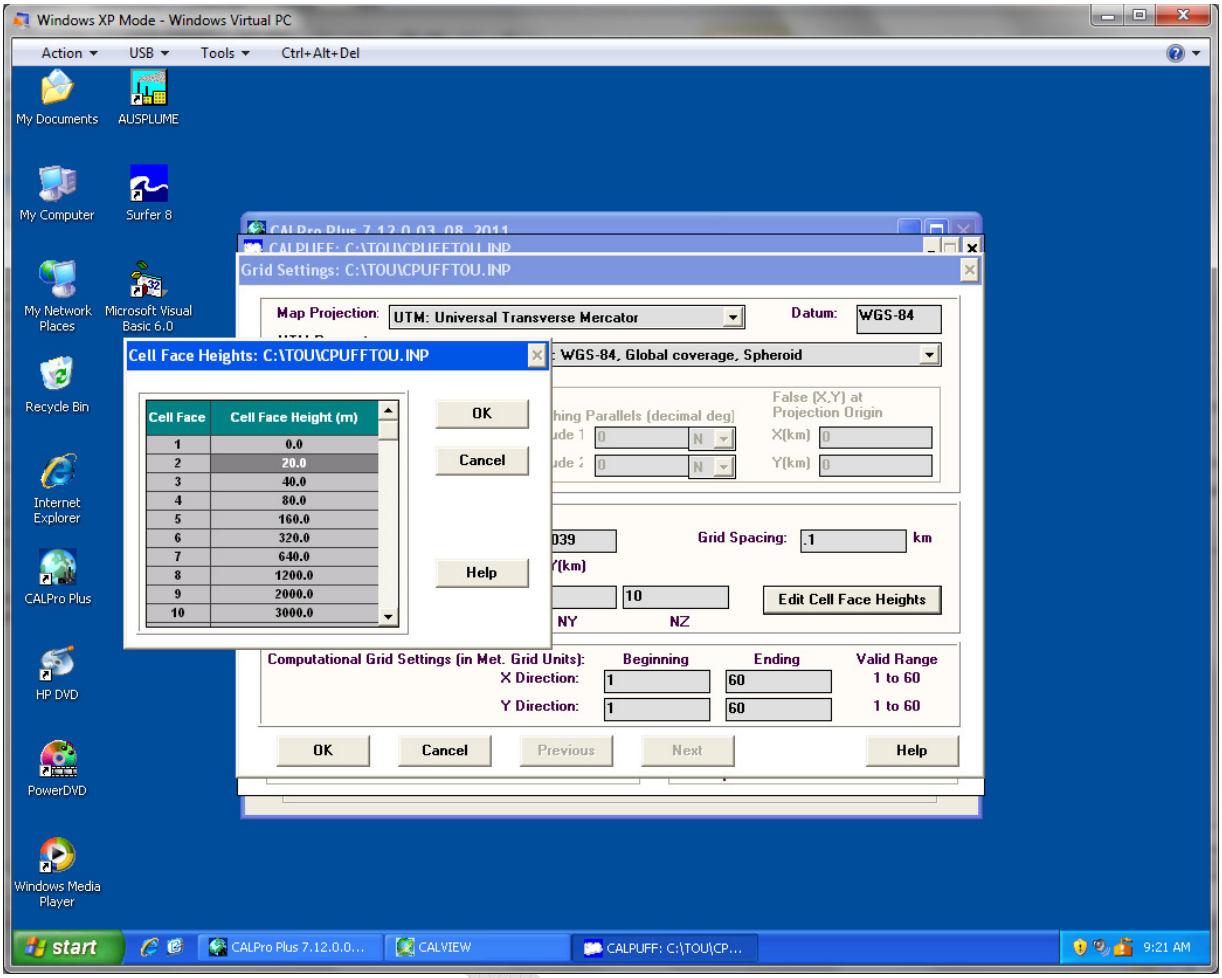
METEOROLOGICAL DOMAIN:

Meteorological domain was designed with 20 KM by 20 KM map extent with 200 m grid resolution in order to capture topography around the application site. Topographic features around the meteorological domain was captured in 3D meteorological data file which was used to initialise CALMET domain which is intended to use for near source modelling.

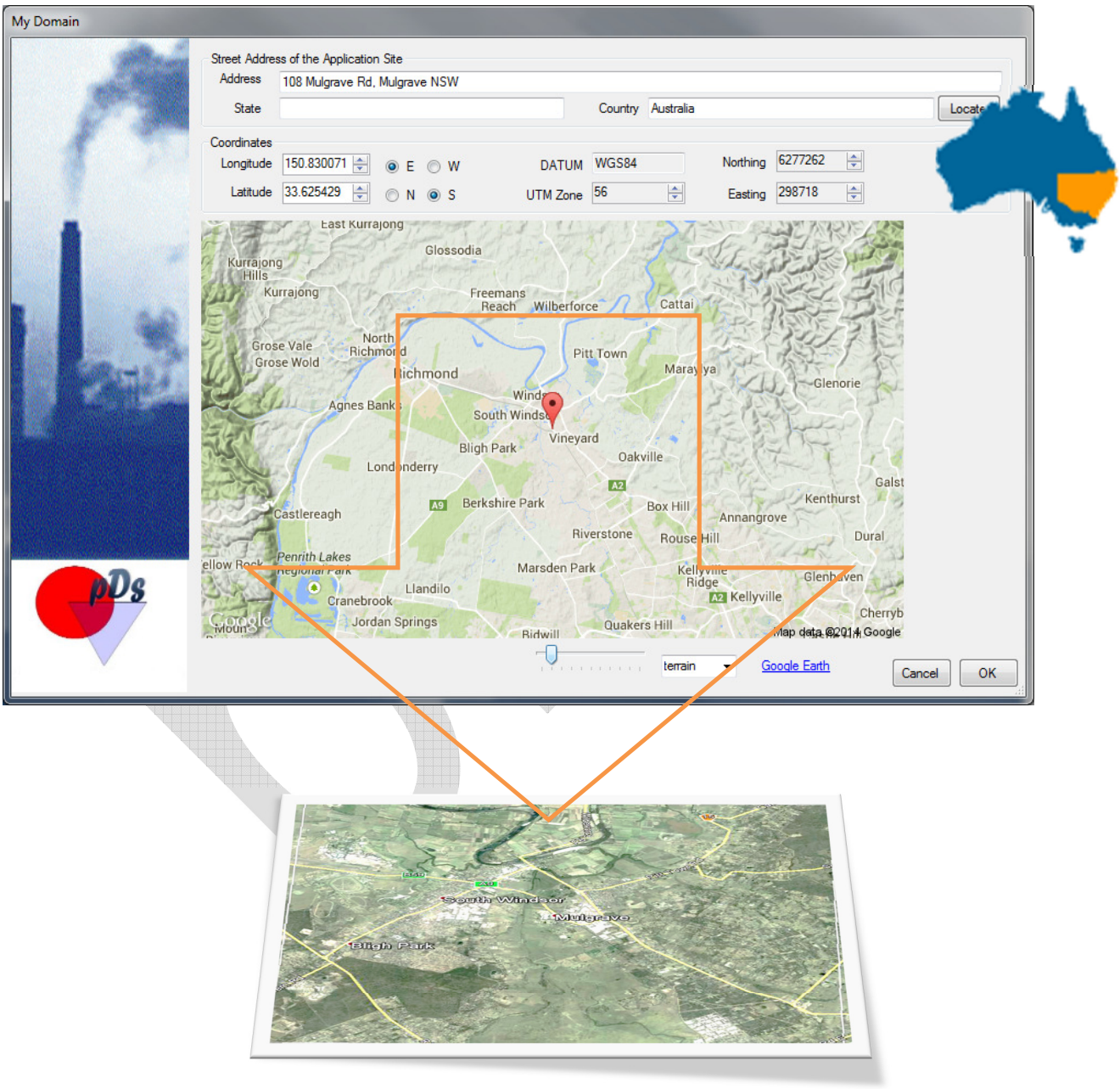
None of the observed data were biased in the modelling since there is not much confidence in the site-specific data. This helps CALMET's model physics to be dominant when deciding the flow pattern.

VERTICAL STRUCTURE

Eleven cell faeces were set up with 0,20,40,80,160,320……,4000m. Predictions were done at 10,30,60 etc..

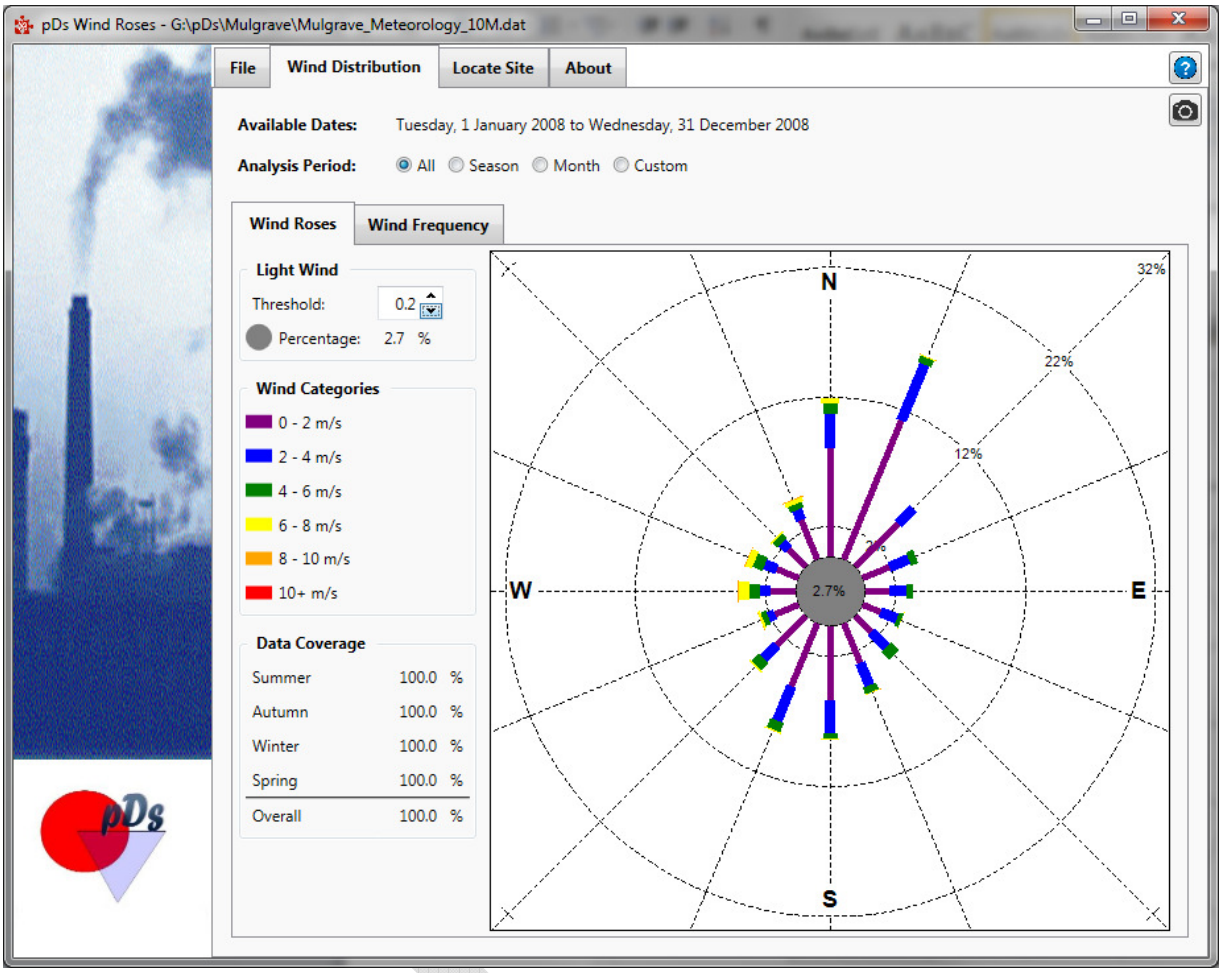


LOCATION: MULGRAVE, NSW

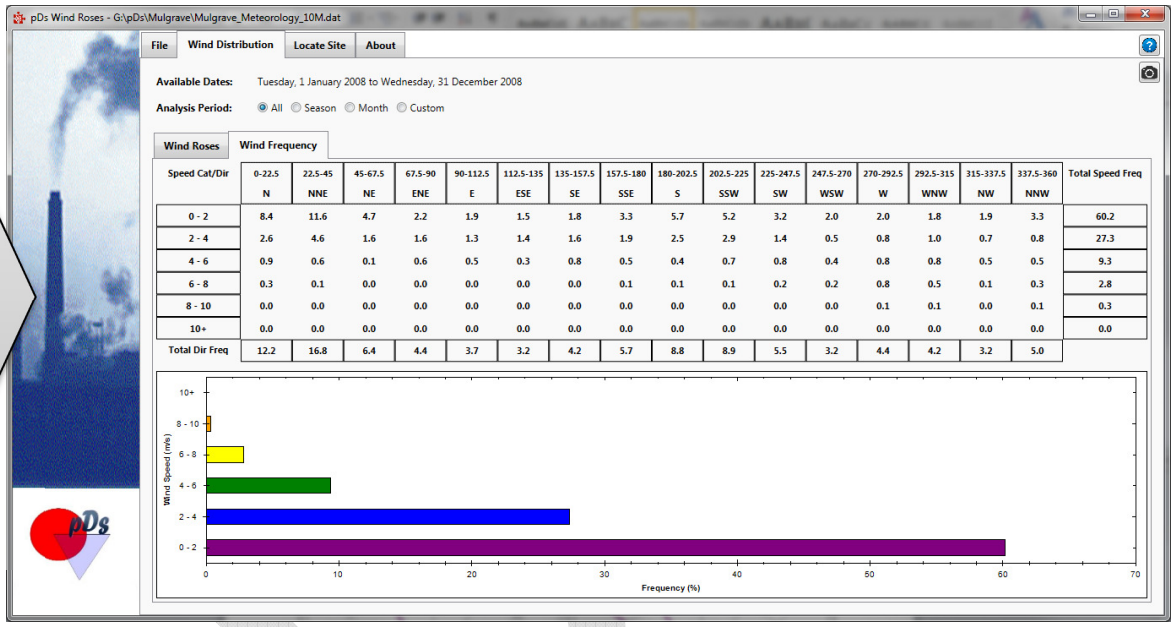


ANALYSIS OF THE SIMULATED DATA EXTRACTED FOR THE SITE IN QUESTION.

ANNUAL WINDROSES



Wind speed frequency

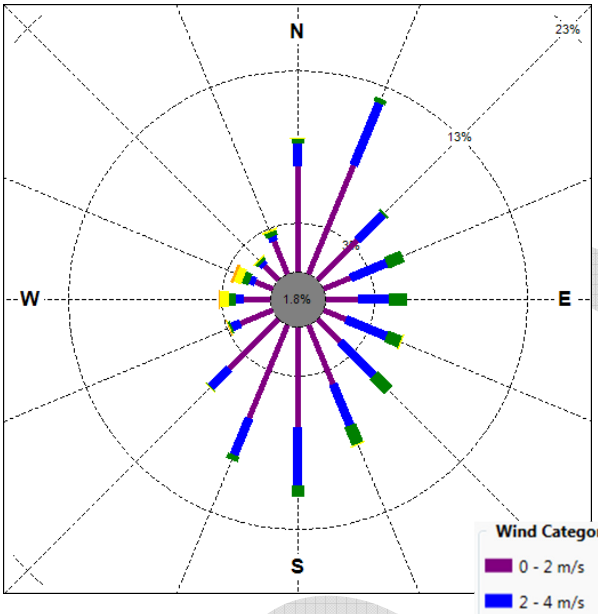


Speed Cat/Dir	0-22.5 N	22.5-45 NNE	45-67.5 NE	67.5-90 ENE	90-112.5 E	112.5-135 ESE	135-157.5 SE	157.5-180 SSE	180-202.5 S	202.5-225 SSW	225-247.5 SW	247.5-270 WSW	270-292.5 W	292.5-315 WNW	315-337.5 NW	337.5-360 NNW	Total Speed Freq
0 - 2	8.4	11.6	4.7	2.2	1.9	1.5	1.8	3.3	5.7	5.2	3.2	2.0	2.0	1.8	1.9	3.3	60.2
2 - 4	2.6	4.6	1.6	1.6	1.3	1.4	1.6	1.9	2.5	2.9	1.4	0.5	0.8	1.0	0.7	0.8	27.3
4 - 6	0.9	0.6	0.1	0.6	0.5	0.3	0.8	0.5	0.4	0.7	0.8	0.4	0.8	0.8	0.5	0.5	9.3
6 - 8	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.8	0.5	0.1	0.3	2.8
8 - 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.3
10+	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Dir Freq	12.2	16.8	6.4	4.4	3.7	3.2	4.2	5.7	8.8	8.9	5.5	3.2	4.4	4.2	3.2	5.0	

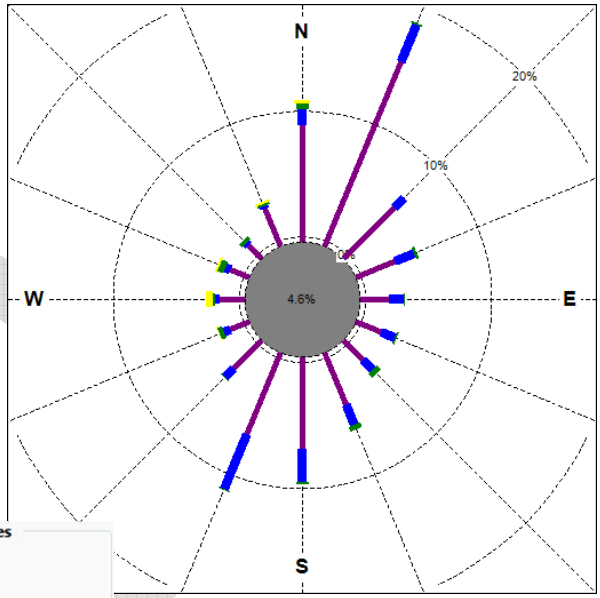
Wind Speed frequency is showing that the intended modelling area experiences more light winds.

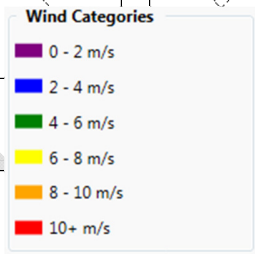
SEASONAL WINDROSES

Summer

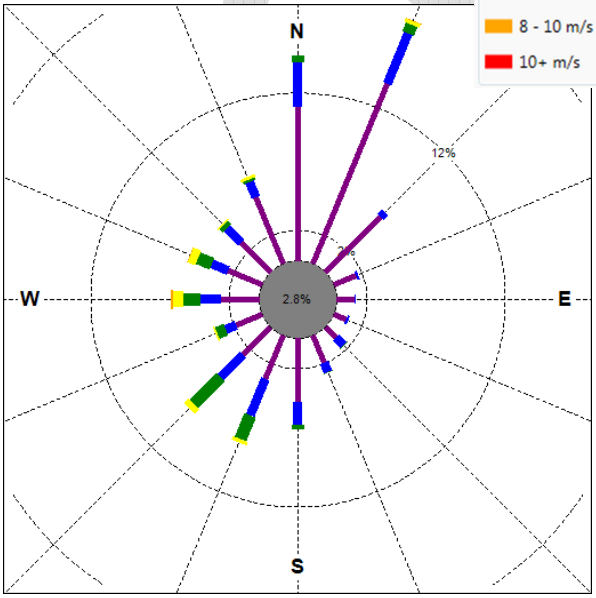


Autumn

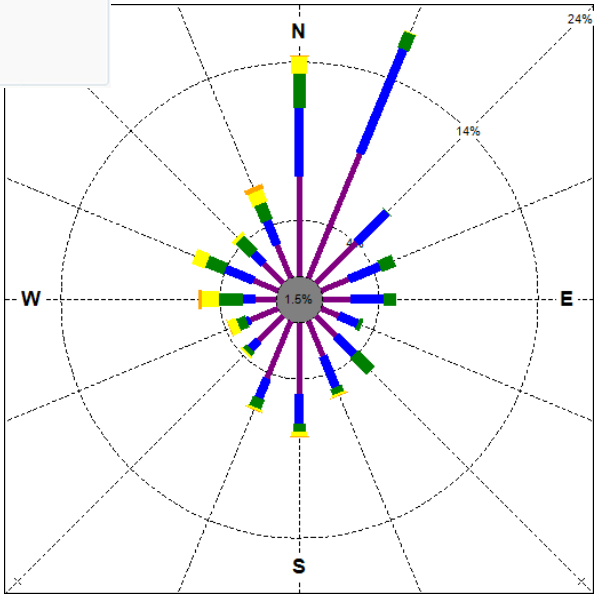




Winter

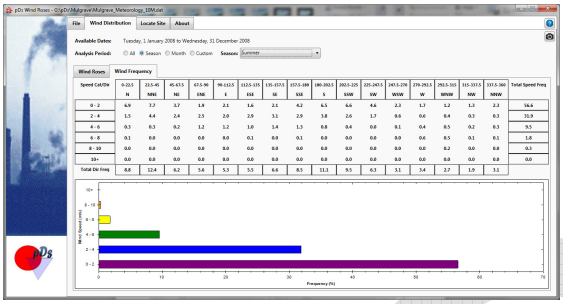


Spring

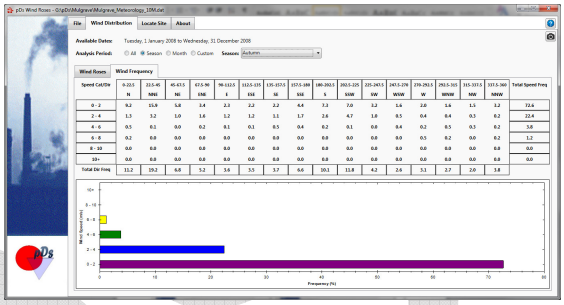


SEASONAL WIND SPEED FREQUENCY

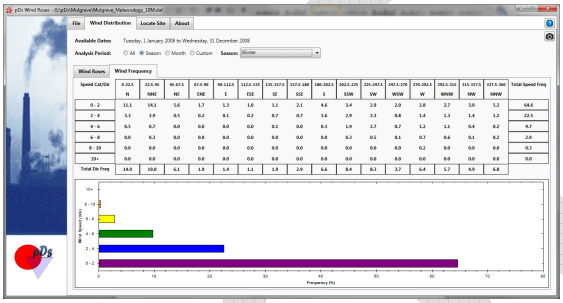
Summer



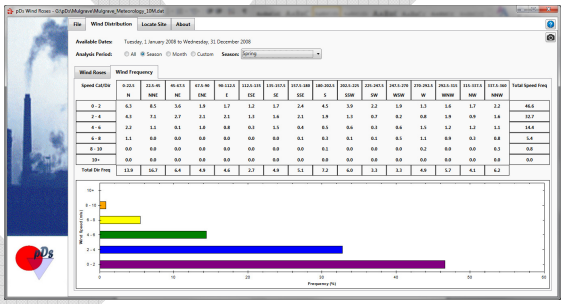
Autumn



Winter



Spring



DATA

Data Source

- Global Synoptic data for 2012 in .glo format, Source :CSIRO
- GLCC (Australia Pacific ~900m)
- Google Earth/Mapping
- SRTM3-gap filled

DISCLAIMER

Compilation of input meteorological data file for CALPUFF was done under the supervision of qualified and experienced meteorologists. Although all due care has been taken, we cannot give any warranty, nor accept any liability (except that required by law) in relation to the information given, its completeness or its applicability to a particular problem. These data and other material are supplied on the condition that you agree to indemnify us and hold us harmless from and against all liability, losses, claims, proceedings, damages, costs and expenses, directly or indirectly relating to, or arising from the use of or reliance on the data and material which we have supplied.

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Mushroom Substrate Plant – Modification to Approved Expansion

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APPENDIX C:

CALPUFF MODELLING INPUT PARAMETERS AND CONFIGURATIONS

Area Sources										
Source Description	Source ID	Vertice coordinates (km)	Effective Height (m)	Base Elevation (m)	Initial Sigma Z (m)	Specific Odour Emission Rate ($ou.m^3/m^2.s$)	Area (m^2)	Odour Emission Rate ($ou.m^3/s$)	Scaling Factors	Comments
Water Recycle Pit	LAP	298.381, 6277.294 298.383, 6277.299 298.387, 6277.298 298.387, 6277.293	0.00	12.2	1.00	98.8	22	2,182	Stability Class Near-/Far-Field A - D = 2.5 / 2.3 E - F = 2.3 / 1.9	

Volume Sources										
Source Description	Source ID	Vertice coordinates (km)	Effective Height (m)	Base Elevation (m)	Initial Sigma Y (m)	Initial Sigma Z (m)	Odour Emission Rate ($ou.m^3.s$)	Scaling Factors		Comments
Bale Wetting Area	BWA	298.376, 6277.235	2.00	12.2	6.77	1.00	20,909	2.3		Worst-case 24 hr snapshot.
Stable Bedding Area	SBA	298.384, 6277.286	2.00	12.2	2.81	1.00	575	2.3		

Point Sources										
Source Description	Source ID	Vertice coordinates (km)	Stack Height (m)	Base Elevation (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	Odour Emission Rate ($ou.m^3/s$)	Scaling Factors	Comments
New Biofilter Section 1	BF01	298.324,6277.223	2.00	12.2	24.28	0.045	313.2	20,833	2.3	Based upon total biofilter system capacity of 450,000 m3/h and 2,778 m2 surface area at a nominal 1,000 ou discharge concentration.
New Biofilter Section 2	BF02	298.305,6277.226	2.00	12.2	24.28	0.045	313.2	20,833	2.3	
New Biofilter Section 3	BF03	298.286,6277.229	2.00	12.2	24.28	0.045	313.2	20,833	2.3	
New Biofilter Section 4	BF04	298.267,6277.237	2.00	12.2	24.28	0.045	313.2	20,833	2.3	
New Biofilter Section 5	BF05	298.249,6277.246	2.00	12.2	24.28	0.045	313.2	20,833	2.3	
New Biofilter Section 6	BF06	298.231,6277.254	2.00	12.2	24.28	0.045	313.2	20,833	2.3	

Point Sources										
Source Description	Source ID	Vertice coordinates (km)	Stack Height (m)	Base Elevation (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	Max Odour Emission Rate ($ou.m^3/s$)	Scaling Factors	Comments
Exhaust - Tunnel 01	Exst01	298.454, 6277.338	10.50	12.2	1.35	1.9	320.9	913	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Conditioning 1 Phase.
Exhaust - Tunnel 02	Exst02	298.452, 6277.339	10.50	12.2	1.35	1.9	320.9	913	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Conditioning 1 Phase.
Exhaust - Tunnel 03	Exst03	298.446, 6277.341	10.50	12.2	1.35	1.9	320.9	913	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Conditioning 1 Phase.
Exhaust - Tunnel 04	Exst04	298.443, 6277.342	10.50	12.2	1.35	1.9	320.9	913	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Conditioning 1 Phase.
Exhaust - Tunnel 05	Exst05	298.437, 6277.345	10.50	12.2	1.35	1.9	320.9	996	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Conditioning 1 Phase.
Exhaust - Tunnel 06	Exst06	298.435, 6277.346	10.50	12.2	1.35	1.9	320.9	996	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Conditioning 1 Phase.
Exhaust - Tunnel 07	Exst07	298.429, 6277.348	10.50	12.2	1.35	2.0	320.9	996	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Conditioning 1 Phase.
Exhaust - Tunnel 08	Exst08	298.427, 6277.349	10.50	12.2	1.35	2.0	320.9	996	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Conditioning 1 Phase.
Exhaust - Tunnel 09	Exst09	298.421, 6277.351	10.50	12.2	1.35	0.8	297.3	138	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 10	Exst10	298.418, 6277.352	10.50	12.2	1.35	0.8	297.3	138	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 11	Exst11	298.412, 6277.355	10.50	12.2	1.35	0.8	297.3	138	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 12	Exst12	298.410, 6277.356	10.50	12.2	1.35	0.8	297.3	138	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 13	Exst13	298.404, 6277.358	10.50	12.2	1.35	0.8	297.3	138	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 14	Exst14	298.402, 6277.359	10.50	12.2	1.35	0.8	297.3	138	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 15	Exst15	298.396, 6277.362	10.50	12.2	1.35	1.4	296.0	325	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 16	Exst16	298.393, 6277.363	10.50	12.2	1.35	1.4	296.0	325	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 17	Exst17	298.387, 6277.365	10.50	12.2	1.35	1.4	296.0	325	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 18	Exst18	298.385, 6277.366	10.50	12.2	1.35	1.4	296.0	325	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 19	Exst19	298.379, 6277.368	10.50	12.2	1.35	1.5	296.0	325	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 20	Exst20	298.377, 6277.369	10.50	12.2	1.35	1.5	296.0	325	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 21	Exst21	298.371, 6277.372	10.50	12.2	1.35	2.3	296.0	494	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 22	Exst22	298.368, 6277.373	10.50	12.2	1.35	2.3	296.0	494	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 23	Exst23	298.362, 6277.375	10.50	12.2	1.35	1.4	296.0	84	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Cooldown Shipout Phase.
Exhaust - Tunnel 24	Exst24	298.36, 6277.376	10.50	12.2	1.35	0.0	296.0	0	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Empty Tunnel.
Exhaust - Tunnel 25	Exst25	298.354, 6277.379	10.50	12.2	1.35	0.0	296.0	0	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Empty Tunnel.
Exhaust - Tunnel 26	Exst26	298.416, 6277.553	10.50	12.2	1.35	2.7	320.8	2,497	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Pasturisation > Cooldown (conditioning) > Conditioning 1 Phases.

Point Sources										
Source Description	Source ID	Vertice coordinates (km)	Stack Height (m)	Base Elevation (m)	Stack Diameter (m)	Exit Velocity (m/s)	Exit Temp (K)	Max Odour Emission Rate ($ou.m^3/s$)	Scaling Factors	Comments
Exhaust - Tunnel 27	Exst27	298.415, 6277.55	10.50	12.2	1.35	2.7	320.8	2,497	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Pasturisation > Cooldown (conditioning) > Conditioning 1 Phases.
Exhaust - Tunnel 28	Exst28	298.413, 6277.544	10.50	12.2	1.35	2.7	320.8	2,497	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Pasturisation > Cooldown (conditioning) > Conditioning 1 Phases.
Exhaust - Tunnel 29	Exst29	298.412, 6277.542	10.50	12.2	1.35	2.7	320.8	2,497	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Cooldown (conditioning) > Conditioning 1 Phases.
Exhaust - Tunnel 30	Exst30	298.409, 6277.536	10.50	12.2	1.35	2.8	320.8	2,497	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Cooldown (conditioning) > Conditioning 1 Phases.
Exhaust - Tunnel 31	Exst31	298.409, 6277.534	10.50	12.2	1.35	2.7	320.8	1,349	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Cooldown (conditioning) > Conditioning 1 Phases.
Exhaust - Tunnel 32	Exst32	298.406, 6277.528	10.50	12.2	1.35	2.6	320.8	1,349	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Cooldown (conditioning) > Conditioning 1 Phases.
Exhaust - Tunnel 33	Exst33	298.405, 6277.525	10.50	12.2	1.35	2.5	320.8	1,349	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Conditioning 1 Phase.
Exhaust - Tunnel 34	Exst34	298.403, 6277.519	10.50	12.2	1.35	1.0	297.3	172	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 35	Exst35	298.402, 6277.517	10.50	12.2	1.35	1.0	297.3	172	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 36	Exst36	298.399, 6277.511	10.50	12.2	1.35	1.0	297.3	172	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 37	Exst37	298.398, 6277.509	10.50	12.2	1.35	1.0	297.3	172	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 38	Exst38	298.396, 6277.503	10.50	12.2	1.35	1.0	297.3	172	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 39	Exst39	298.395, 6277.5	10.50	12.2	1.35	1.0	297.3	172	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 1 Phase.
Exhaust - Tunnel 40	Exst40	298.393, 6277.494	10.50	12.2	1.35	1.6	296.0	369	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 41	Exst41	298.389, 6277.486	10.50	12.2	1.35	1.7	296.0	369	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 42	Exst42	298.388, 6277.484	10.50	12.2	1.35	1.7	296.0	369	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 43	Exst43	298.386, 6277.478	10.50	12.2	1.35	1.7	296.0	369	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 44	Exst44	298.385, 6277.475	10.50	12.2	1.35	1.7	296.0	369	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 45	Exst45	298.383, 6277.469	10.50	12.2	1.35	1.7	296.0	369	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 46	Exst46	298.382, 6277.467	10.50	12.2	1.35	2.8	296.0	618	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 47	Exst47	298.379, 6277.461	10.50	12.2	1.35	2.8	296.0	618	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Spawn Run 2 Phase.
Exhaust - Tunnel 48	Exst48	298.378, 6277.459	10.50	12.2	1.35	4.0	296.0	263	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Cooldown Shipout Phase.
Exhaust - Tunnel 49	Exst49	298.378, 6277.459	10.50	12.2	1.35	1.7	296.0	105	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Cooldown Shipout Phase.
Exhaust - Tunnel 50	Exst50	298.376, 6277.453	10.50	12.2	1.35	1.7	296.0	105	2.3	Worst-case 24 hour snapshot (Thu 8pm to Fri 8pm). Cooldown Shipout Phase.

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Mushroom Substrate Plant – Modification to Approved Expansion

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APPENDIX D:

PHASE 2/3 ODOUR EMISSIONS TREND PROFILE WORKSHEET

Appendix D

Worksheet title: Phase 2/3 Odour emission trend profile for a single tunnel
Associated object ID: Figure3.1 & 3.2

Cycle Time (hrs)	Fan inlet airflow (ac²/hr)	Fan inlet airflow (ac³/s)	Odour emission rate (ou.ac³/s)	Stage
2	10,000	11.1	10,000	Cancel venting
3	9,800	2.7	14,800	Loading
4	12,000	3.3	17,800	
5	12,000	3.3	17,800	
6	5,400	1.5	8,790	
7	2,400	0.7	3,930	
8	2,400	0.7	3,930	
9	4,000	1.1	6,550	
10	2,800	0.8	4,580	
11	2,800	0.8	4,580	Warm-up Pasteurisation
12	2,400	0.7	3,930	
13	3,800	1.1	2,090	
14	3,800	1.1	2,090	
15	7,600	2.1	5,160	Pasteurisation
16	11,400	3.2	7,740	
17	7,800	2.2	5,297	
18	11,400	3.2	7,736	
19	13,600	3.8	1,496	Cool-down conditioning
20	13,600	3.8	1,496	
21	13,600	3.8	1,496	
22	19,800	5.5	2,178	
23	11,700	3.3	1,936	Conditioning 1
24	11,700	3.3	1,936	
25	11,700	3.3	1,936	
26	11,700	3.3	1,936	
27	9,800	2.7	1,296	
28	9,800	2.7	1,296	
29	9,800	2.7	1,296	
30	9,800	2.7	1,296	
31	9,800	2.7	1,296	
32	9,800	2.7	1,296	
33	9,800	2.7	1,296	
34	9,800	2.7	1,296	
35	9,800	2.7	1,296	
36	9,800	2.7	1,296	
37	9,800	2.7	1,296	
38	9,800	2.7	1,296	
39	9,800	2.7	1,296	
40	9,800	2.7	1,296	
41	9,800	2.7	1,296	
42	9,800	2.7	1,296	
43	9,800	2.7	1,296	
44	9,800	2.7	1,296	
45	9,800	2.7	1,296	
46	9,800	2.7	1,296	
47	12,400	3.4	1,637	
48	12,800	3.6	1,690	
49	12,800	3.6	1,690	
50	12,800	3.6	1,690	
51	12,800	3.6	1,690	Conditioning 2
52	12,800	3.6	1,690	
53	12,800	3.6	1,690	
54	12,800	3.6	1,690	
55	12,800	3.6	1,690	
56	12,800	3.6	1,690	
57	12,800	3.6	1,690	
58	12,800	3.6	1,690	
59	12,800	3.6	1,690	
60	12,800	3.6	1,690	
61	12,800	3.6	1,690	
62	12,800	3.6	1,690	
63	12,800	3.6	1,690	
64	12,800	3.6	1,690	
65	12,800	3.6	1,690	
66	12,800	3.6	1,690	
67	12,800	3.6	1,690	
68	12,800	3.6	1,690	
69	12,800	3.6	1,690	
70	12,800	3.6	1,690	
71	12,800	3.6	1,690	
72	12,800	3.6	1,690	
73	12,800	3.6	1,690	
74	12,800	3.6	1,690	
75	12,800	3.6	1,690	
76	12,800	3.6	1,690	
77	12,800	3.6	1,690	
78	12,800	3.6	1,690	
79	12,800	3.6	1,690	
80	12,800	3.6	1,690	
81	12,800	3.6	1,690	
82	12,800	3.6	1,690	
83	12,800	3.6	1,690	
84	12,800	3.6	1,690	
85	12,800	3.6	1,690	
86	12,800	3.6	1,690	
87	12,800	3.6	1,690	
88	12,800	3.6	1,690	
89	12,800	3.6	1,690	
90	12,800	3.6	1,690	
91	12,800	3.6	1,690	
92	12,800	3.6	1,690	
93	12,800	3.6	1,690	
94	12,800	3.6	1,690	
95	12,800	3.6	1,690	
96	12,800	3.6	1,690	
97	12,800	3.6	1,690	
98	12,800	3.6	1,690	
99	12,800	3.6	1,690	
100	12,800	3.6	1,690	
101	12,800	3.6	1,690	
102	12,800	3.6	1,690	
103	12,800	3.6	1,690	
104	12,800	3.6	1,690	
105	12,800	3.6	1,690	
106	12,800	3.6	1,690	
107	12,800	3.6	1,690	
108	12,800	3.6	1,690	
109	12,800	3.6	1,690	
110	12,800	3.6	1,690	
111	14,800	4.1	1,834	
112	19,000	5.3	2,356	
113	19,000	5.3	2,356	Cool-down spawn
114	12,000	3.3	1,487	
115	12,000	3.3	1,487	
116	9,900	2.8	1,226	
117	9,900	2.8	1,226	
118	9,900	2.8	1,226	
119	9,900	2.8	1,226	
120	9,900	2.8	1,226	
121	9,900	2.8	1,226	
122	9,900	2.8	1,226	
123	9,900	2.8	1,226	
124	9,900	2.8	1,226	
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127	9,900	2.8	1,226	
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129	9,900	2.8	1,226	
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132	9,900	2.8	1,226	
133	9,900	2.8	1,226	
134	9,900	2.8	1,226	
135	9,900	2.8	1,226	
136	9,900	2.8	1,226	
137	9,900	2.8	1,226	
138	9,900	2.8	1,226	
139	9,900	2.8	1,226	
140	9,900	2.8	1,226	
141	9,900	2.8	1,226	
142	9,900	2.8	1,226	
143	9,900	2.8	1,226	
144	9,900	2.8	1,226	
145	9,900	2.8	1,226	
146	9,900	2.8	1,226	
147	9,900	2.8	1,226	
148	9,900	2.8	1,226	
149	9,900	2.8	1,226	
150	9,900	2.8	1,226	
151	9,900	2.8	1,226	
152	9,900	2.8	1,226	
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164	9,900	2.8	1,226	
165	9,900	2.8	1,226	
166	9,900	2.8	1,226	
167	9,900	2.8	1,226	
168	9,900	2.8	1,226	
169	9,900	2.8	1,226	
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180	9,900	2.8	1,226	
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202	9,900	2.8	1,226	
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213	9,900	2.8	1,226	
214	9,900	2.8	1,226	
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373	9,900	2.8	1,226	
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542	7,000	1.9	296	
543	7,000	1.9	296	
544	7,000	1.9	296	
545	7,000	1.9	296	
546	7,000	1.9	296	
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565	7,000	1.9	296	
566	7,000	1.9	296	
567	7,000	1.9	296	
568	7,000	1.9	296	
569	7,000	1.9	296	
570	7,000	1.9	296	
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579	7,000	1.9	296	
580	7,000	1.9	296	
581	7,000	1.9	296	
582	7,000	1.9	296	
583	7,000	1.9	296	
584	7,000	1.9	296	
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599	7,000	1.9	296	
600	7,000	1.9	296	
601	7,000	1.9	296	

Mean odour concentration (ou/m³)	Phase 2/3 Stage
2,000	Venting
5,000	Leaving
2,000	Warm-up Pasteurisation
2,000	Pasteurisation
670	Cool-down conditioning
670	Conditioning 1
670	Conditioning 2
63	Cool-down spawn
115	Spawn Run 1
152	Spawn Run 2

90,000		Tunnel Fill Venting	Levelling 0-2	Levelling 2-4	Levelling 4-6	Levelling 6-8	Levelling 8-10	Levelling 10-12	Levelling 12-14	Warm Up 0-2	Warm Up 2-4	Warm Up 4-6	Warm Up 6-8	Pasteurisation 0-2	Pasteurisation 2-4	Pasteurisation 4-6	Pasteurisation 6-8	Cooldown Conditioning 0-2	Cooldown Conditioning 2-4	Cooldown Conditioning 4-6	Cooldown Conditioning 6-8	Conditioning 1a	Conditioning 1b	Conditioning 1c	Conditioning 2	Cooldown Spawn a 0-2	Cooldown Spawn a 2-4	Cooldown Spawn a 4-6	Cooldown Spawn b 0-2	Cooldown Spawn b 2-4	Cooldown Spawn b 4-6	Cooldown Spawn b 6-8	Cooldown Spawn b 8-10	Cooldown Spawn b 10-32	Spawn Run 1a	Spawn Run 1b	Spawn Run 2a	Spawn Run 2b	Spawn Run 2c	Spawn Run 2d	Spawn Run 2e	Spawn Run 2f	Spawn Run 2g	Spawn Run 2h	Cooldown Shipout a	Cooldown Shipout b	Cooldown Shipout c	Cooldown Shipout d	Total Exhaust Air Volume	Number of Tunnels in Process
	Cycle Time																																															
	+2 hrs	100% Fan	40% FAD, 60% Fan	50% FAD, 60% Fan	35% FAD, 60% Fan	20% FAD, 60% Fan	10% FAD, 60% Fan	25% FAD, 60% Fan	35% FAD, 60% Fan	30% FAD, 65% Fan	10% FAD, 65% Fan	15% FAD, 65% Fan	10% FAD, 65% Fan	20% FAD, 95% Fan	30% FAD, 95% Fan	20% FAD, 95% Fan	30% FAD, 95% Fan	20% FAD, 85% Fan	35% FAD, 85% Fan	40% FAD, 85% Fan	45% FAD, 85% Fan	45% FAD, 65% Fan	45% FAD, 55% Fan	45% FAD, 60% Fan	45% FAD, 70% Fan	50% FAD, 75% Fan	60% FAD, 75% Fan	70% FAD, 75% Fan	55% FAD, 25% Fan	45% FAD, 25% Fan	35% FAD, 25% Fan	25% FAD, 25% Fan	15% FAD, 25% Fan	10% FAD, 25% Fan	30% FAD, 35% Fan	30% FAD, 40% Fan	35% FAD, 40% Fan	35% FAD, 45% Fan	35% FAD, 50% Fan	35% FAD, 55% Fan	45% FAD, 60% Fan	45% FAD, 65% Fan	45% FAD, 70% Fan	45% FAD, 65% Fan	55% FAD, 80% Fan	50% FAD, 75% Fan	45% FAD, 70% Fan	35% FAD, 50% Fan	m3/hr	/50
Tuesday 4am - 6am	2	40,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,750	56,700	14,400	16,800	-	-	-	96,525	37,800	-	22,000	-	12,600	-	305,575	38
	4	40,000	9,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,500	56,700	15,600	22,400	-	-	-	84,825	50,400	-	22,000	-	12,600	-	321,625	39
	6	40,000	9,600	12,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,250	56,700	16,800	22,400	6,300	-	-	-	73,125	63,000	-	22,000	-	12,600	-	340,775	40
	8	40,000	9,600	12,000	8,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,000	56,700	18,000	22,400	12,600	-	-	-	73,125	63,000	-	22,000	-	-	7,000	349,825	41
	10	40,000	9,600	12,000	8,400	4,800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,750	56,700	24,000	16,800	18,900	-	-	-	73,125	37,800	-	57,200	-	-	7,000	370,075	42
	12	40,000	9,600	12,000	8,400	4,800	2,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,500	56,700	30,000	11,200	25,200	-	-	-	73,125	37,800	-	57,200	-	-	7,000	377,925	43
Tuesday 4pm - 6pm	14	40,000	9,600	12,000	8,400	4,800	2,400	6,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,250	56,700	36,000	5,600	31,500	-	-	-	73,125	37,800	-	57,200	-	-	7,000	389,375	44
	16	40,000	9,600	12,000	8,400	4,800	2,400	6,000	8,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	36,000	-	37,800	-	-	-	73,125	37,800	-	35,200	18,750	-	-	386,975	43
	18	-	9,600	12,000	8,400	4,800	2,400	6,000	8,400	7,800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	36,000	-	37,800	-	-	-	73,125	37,800	-	35,200	18,750	-	-	354,775	43
	20	-	-	12,000	8,400	4,800	2,400	6,000	8,400	7,800	2,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	36,000	-	37,800	-	-	-	73,125	37,800	-	35,200	18,750	-	-	347,775	43
	22	-	-	-	8,400	4,800	2,400	6,000	8,400	7,800	2,600	3,900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	30,000	7,000	37,800	-	-	-	58,500	53,550	-	35,200	18,750	-	-	341,800	43
	24	-	-	-	-	4,800	2,400	6,000	8,400	7,800	2,600	3,900	2,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	24,000	14,000	37,800	-	-	-	43,875	69,300	-	35,200	-	15,750	-	335,125	43
Wednesday 4am - 6am	26	50,000	-	-	-	-	2,400	6,000	8,400	7,800	2,600	3,900	2,600	7,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	18,000	21,000	37,800	-	-	-	29,250	85,050	-	-	30,000	15,750	-	384,850	44
	28	50,000	12,000	-	-	-	-	6,000	8,400	7,800	2,600	3,900	2,600	7,600	11,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	12,000	28,000	37,800	-	-	-	14,625	100,800	-	-	30,000	15,750	-	407,975	45
	30	50,000	12,000	15,000	-	-	-	-	8,400	7,800	2,600	3,900	2,600	7,600	11,400	7,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	6,000	28,000	45,675	-	-	-	-	78,750	35,100	-	30,000	15,750	-	424,875	46
	32	50,000	12,000	15,000	10,500	-	-	-	-	7,800	2,600	3,900	2,600	7,600	11,400	7,600	11,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	-	28,000	53,550	-	-	-	-	78,750	35,100	-	30,000	-	8,750	433,250	47
	34	50,000	12,000	15,000	10,500	6,000	-	-	-	-	2,600	3,900	2,600	7,600	11,400	7,600	11,400	6,800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	-	21,000	61,425	-	-	-	-	47,250	23,400	61,600	-	25,200	8,750	452,725	48
	36	50,000	12,000	15,000	10,500	6,000	3,000	-	-	-	-	3,900	2,600	7,600	11,400	7,600	11,400	6,800	11,900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	-	14,000	69,300	-	-	-	-	47,250	23,400	61,600	-	25,200	8,750	465,900	49
Wednesday 4pm - 6pm	38	50,000	12,000	15,000	10,500	6,000	3,000	7,500	-	-	-	-	2,600	7,600	11,400	7,600	11,400	6,800	11,900	13,600	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	-	7,000	70,875	7,000	-	-	-	47,250	23,400	61,600	-	25,200	8,750	484,675	50
	40	50,000	12,000	15,000	10,500	6,000	3,000	7,500	10,500	-	-	-	-	7,600	11,400	7,600	11,400	6,800	11,900	13,600	15,300	-	-	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	72,450	14,000	-	-	-	47,250	23,400	61,600	-	25,200	-	500,700	50
	42	-	12,000	15,000	10,500	6,000	3,000	7,500	10,500	9,750	-	-	-	-	11,400	7,600	11,400	6,800	11,900	13,600	15,300	11,700	-	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	66,150	21,000	-	-	-	47,250	23,400	61,600	-	-	14,000	454,050	50
	44	-	-	15,000	10,500	6,000	3,000	7,500	10,500	9,750	3,250	-	-	-	-	7,600	11,400	6,800	11,900	13,600	15,300	23,400	-	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	59,850	28,000	-	-	-	47,250	23,400	61,600	-	-	14,000	446,300	50
	46	-	-	-	10,500	6,000	3,000	7,500	10,500	9,750	3,250	4,875	-	-	-	-	11,400	6,800	11,900	13,600	15,300	35,100	-	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	53,550	35,000	-	-	-	47,250	23,400	61,600	-	-	14,000	440,975	50
	48	-	-	-	-	6,000	3,000	7,500	10,500	9,750	3,250	4,875	3,250	-	-	-	-	6,800	11,900	13,600	15,300	46,800	-	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	47,250	42,000	-	-	-	47,250	23,400	61,600	-	-	14,000	434,725	50
Thursday 4am - 6am	50	-	-	-	-	-	3,000	7,500	10,500	9,750	3,250	4,875	3,250	9,500	-	-	-	-	11,900	13,600	15,300	46,800	9,900	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	47,250	42,000	-	-	-	47,250	23,400	-	52,500	-	-	418,225	48
	52	-	-	-	-	-	-	7,500	10,500	9,750	3,250	4,875	3,250	9,500	14,250	-	-	-	-	13,600	15,300	46,800	19,800	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	47,250	42,000	-	-	-	47,250	23,400	-	52,500	-	-	427,475	48
	54	-	-	-	-	-	-	-	10,500	9,750	3,250	4,875	3,250	9,500	14,250	9,500	-	-	-	-	15,300	46,800	29,700	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	47,250	42,000	-	-	-	-	67,275	-	52,500	-	-	422,400	48
	56	-	-	-	-	-	-	-	-	9,750	3,250	4,875	3,250	9,500	14,250	9,500	14,250	-	-	-	-	46,800	39,600	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	47,250	42,000	-	-	-	-	67,275	-	52,500	-	-	420,750	48
	58	-	-	-	-	-	-	-	-	-	3,250	4,875	3,250	9,500	14,250	9,500	14,250	8,500	-	-	-	35,100	49,500	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	47,250	42,000	-	-	-	-	52,650	22,000	-	44,100	-	416,675	48
	60	-	-	-	-	-	-	-	-	-	-	4,875	3,250	9,500	14,250	9,500	14,250	8,500	14,875	-	-	23,400	59,400	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	47,250	42,000	-	-	-	-	52,650	22,000	-	44,100	-	426,500	48
Thursday 4pm - 6pm	62	-	-	-	-	-	-	-	-	-	-	-	3,250	9,500	14,250	9,500	14,250	8,500	14,875	17,000	-	11,700	69,300	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	39,375	50,750	-	-	-	-	52,650	22,000	-	44,100	-	437,700	48
	64	-	-	-	-	-	-	-	-	-	-	-	-	9,500	14,250	9,500	14,250	8,500	14,875	17,000	19,125	-	79,200	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	31,500	59,500	-	-	-	-	52,650	22,000	-	44,100	-	452,650	48
	66	-	-	-	-	-	-	-	-	-	-	-	-	-	14,250	9,500	14,250	8,500	14,875	17,000	19,125	14,625	79,200	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	23,625	68,250	-	-	-	-	52,650	22,000	-	-	24,500	439,050	48
	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,500	14,250	8,500	14,875	17,000	19,125	29,250	79,200	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	15,750	77,000	-	-	-	-	52,650	22,000	-	-	24,500	440,300	48
	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14,250	8,500	14,875	17,000	19,125	43,875	79,200	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	7,875	78,750	7,700	-	-	-	52,650	22,000	-	-	24,500	447,000	48
	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,500	14,875	17,000	19,125	58,500	79,200	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	80,500	15,400	-	-	-	52,650	22,000	-	-	24,500	448,950	48
Friday 4am - 6am	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14,875	17,000	19,125	58,500	91,575	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	73,500	23,100	-	-	-	52,650	-	18,750	-	-	425,775	45
	76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17,000	19,125	58,500	103,950	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	66,500	30,800	-	-	-	52,650	-	18,750	-	-	423,975	45
	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19,125	58,500	116,325	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	59,500	38,500	-	-	-	52,650	-	18,750	-	-	420,050	45
	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	58,500	128,700	-	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	52,500	46,200	-	-	-	52,650	-	18,750	-	-	414,000	45
	82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43,875	131,175	10,800	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	52,500	46,200	-	-	-	52,650	-	-	15,750	-	409,650	45
	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29,250	133,650	21,600	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	52,500	46,200	-	-	-	52,650	-	-	15,750	-	408,300	45
Friday 4pm - 6pm	86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14,625	136,125	32,400	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	52,500	46,200	-	-	-	52,650	-	-	15,750	-	406,950	45
	88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	138,600	43,200	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	52,500	46,200	-	-	-	52,650	-	-	15,750	-	405,600	45
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	128,700	43,200	12,600	-	-	-	-	-	-	-	-	-	56,700	-	-	-	52,500	46,200	-	-	-	52,650	-	-	-	8,750	401,300	45
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	118,800	43,200	25,200	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	52,500	46,200	-	-	-	52,650	-	-	-	8,750	404,000	45
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	108,900	43,200	37,800	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	43,750	55,825	-	-	-	52,650	-	-	-	8,750	407,575	45
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99,000	43,200	50,400	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	35,000	65,450	-	-	-	52,650	-	-	-	8,750	411,150	45
Saturday 4am - 6am	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99,000	32,400	63,000	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	26,250	75,075	-	-	-	52,650	-	-	-	-	405,075	44
	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99,000	21,600	75,600	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	17,500	84,700	-	-	-	52,650	-	-	-	-	407,750	44
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99,000	10,800	88,200	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	8,750	94,325	-	-	-	52,650	-	-	-	-	410,425	44
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99,000	-	100,800	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	-	103,950	-	-	-	52,650	-	-	-	-	413,100	44
	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	86,625	13,500	100,800	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	-	103,950	-	-	-	52,650	-	-	-	-	414,225	44
	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	74,250	27,000	100,800	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	-	103,950	-	-	-	52,650	-	-	-	-	415,350	44
Saturday 4pm - 6pm	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	61,875	40,500	100,800	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	-	103,950	-	-	-	29,250	35,200	-	-	-	428,275	44
	112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49,500	54,000	100,800	-	-	-	-	-	-	-	-	-	-	56,700	-	-	-	-	103,950	-	-	-	29,250	35,200	-	-	-	429,400	44
	114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37,125	54,000	103,950	15,000	-	-	-	-	-	-	-	-	-	56,700	-	-	-	-	103,950	-	-	-	29,250	35,200	-	-	-	435,175	44
	116	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24,750	54,000	107,100	15,000	18,000	-	-	-	-	-	-	-	-	56,700	-	-	-	-	103,950	-	-	-	29,250	35,200	-	-	-	443,950	44
	118	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,375	54,000	110,250	15,000	18,000	21,000	-	-	-	-	-	-	-	56,700	-	-	-	-	96,250	10,800	-	-	29,250	35,200	-	-	-	458,825	44
	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	54,000	113,400	15,000	18,000	21,000	5,500	-	-	-	-	-	-	56,700	-	-	-	-	88,550	21,600	-	-	29,250	35,200	-	-	-	458,200	44
Sunday 4am - 6am	122	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40,500	116,550	15,000	18,000	21,000	5,500	4,500	-	-	-	-	-	56,700	-	-	-	-	80,850	32,400	-	-	29,250	-	30,000	-	-	450,250	44
	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27,000	119,700	15,000	18,000	21,000	5,500	4,500	3,500	-	-	-	-	56,700	-	-	-	-	73,150	43,200	-	-	29,250	-	30,000	-	-	446,500	44
	126	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13,500	122,850	15,000	18,000	21,000	5,500	4,500	3,500	2,500	-	-	-	56,700	-	-	-	-	65,450	54,000	-	-	29,250	-	30,000	-	-	441,750	44
	128	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	126,000	15,000	18,000	21,000	5,500	4,500	3,500	2,500	1,500	-	56,700	-	-	-	-	57,750	64,800	-	-	29,250	-	30,000	-	-	436,000	44
	130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	126,000	-	18,000	21,000	5,500	4,500	3,500	2,500	1,500	1,000	56,700	-	-	-	-	57,750	64,800	-	-	29,250	-	-	25,200	-	417,200	44
	132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	126,000	-	-	21,000	5,500	4,500	3,500	2,500	1,500	2,000	56,700	-	-	-	-	57,750	64,800	-	-	29,250	-	-	25,200	-	400,200	44
Sunday 4pm - 6pm	134	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	126,000	-	-	-	5,500	4,500	3,500	2,500	1,500	3,000	56,700	-	-	-	-	57,750	54,000	11,700	-	-	44,000	-	25,200	-	395,850	44
	136	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	126,000	-	-	-	-	4,500	3,500	2,500	1,500	4,000	56,700	-	-	-	-	57,750	43,200	23,400	-	-	44,000	-	25,200	-	392,250	44
	138	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110,250	18,750	-	-	-	-	3,500	2,500	1,500	5,000	56,700	-	-	-	-	57,750	32,400	35,100	-	-	44,000	-	-	14,000	381,450	44
	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	94,500	18,750	22,500	-	-	-	-	2,500	1,500	6,000	56,700	-	-	-	-	57,750	21,600	46,800	-	-	44,000	-	-	14,000	386,600	44
	142	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	78,750	18,750	22,500	26,250	-	-	-	-	1,500	7,000	56,700	-	-	-	-	48,125	24,300	58,500	-	-	44,000	-	-	14,000	400,375	44
	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63,000	18,750	22,500	26,250	6,875	-	-	-	-	8,000	56,700	-	-	-	-	38,500	27,000	58,500	-	-	61,600	-	-	14,000	401,675	44
Monday 4am - 6am	146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47,250	18,750	22,500	26,250	6,875	5,625	-	-	-	7,000	56,700	-	-	-	-	28,875	40,500	58,500	-	-	17,600	37,500	-	-	373,925	42
	148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31,500	18,750	22,500	26,250	6,875	5,625	4,375	-	-	6,000	56,700	4,800	-	-	-	19,250	54,000	58,500	-	-	17,600	37,500	-	-	370,225	42
	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15,750	18,750	22,500	26,250	6,875	5,625	4,375	3,125	-	5,000	56,700	9,600	-	-	-	9,625	67,500	58,500	-	-	17,600	37,500	-	-	365,275	42
	152	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18,750	22,500	26,250	6,875	5,625	4,375	3,125	1,875	4,000	56,700	14,400	-	-	-	-	81,000	58,500	-	-	17,600	37,500	-	-	359,075	42
	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22,500	26,250	6,875	5,625	4,375	3,125	1,875	4,250	56,700	19,200	-	-	-	-	81,000	58,500	-	-	17,600	-	31,500	-	339,375	42
	156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26,250	6,875	5,625	4,375	3,125	1,875	4,500	56,700	24,000	-	-	-	-	81,000	58,500	-	-	17,600	-	31,500	-	321,925	42
Monday 4pm - 6pm	158	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,875	5,625	4,375	3,125	1,875	4,750	56,700	28,800	-	-	-	-	67,500	73,125	-	-	17,600	-	31,500	-	301,850	42
	160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,625	4,375	3,125	1,875	5,000	56,700	28,800	-	-	-	-	54,000	87,750	-	-	-	15,000	31,500	-	293,750	42
	162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,375	3,125	1,875	6,250	56,700	28,800	-	-	-	-	40,500	102,375	-	-	-	15,000	-	17,500	276,500	42
	164	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,125	1,875	7,500	56,700	28,800	-	-	-	-	27,000	117,000	-	-	-	15,000	-	17,500	274,500	42
	166	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,875	8,750	56,700	24,000	5,600	-	-	-	13,500	119,925	12,600	-	-	15,000	-	17,500	275,450	42
	168	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,000	56,700	19,200	11,200	-	-	-	-	108,225	25,200	-	22,000	-	12,600	17,500	282,625	42
Tuesday 4am - 6am		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40

Contained discharge to biofilter

Worst case 24 hour snapshot

90,000	Cycle Time	Tunnel Fill Venting	Levelling 0-2	Levelling 2-4	Levelling 4-6	Levelling 6-8	Levelling 8-10	Levelling 10-12	Levelling 12-14	Warm Up 0-2	Warm Up 2-4	Warm Up 4-6	Warm Up 6-8	Pasteurisation 0-2	Pasteurisation 2-4	Pasteurisation 4-6	Pasteurisation 6-8	Cooldown Conditioning 0-2	Cooldown Conditioning 2-4	Cooldown Conditioning 4-6	Cooldown Conditioning 6-8	Conditioning 1a	Conditioning 1b	Conditioning 1c	Conditioning 2	Cooldown Spawn a 0-2	Cooldown Spawn a 2-4	Cooldown Spawn a 4-6	Cooldown Spawn b 0-2	Cooldown Spawn b 2-4	Cooldown Spawn b 4-6	Cooldown Spawn b 6-8	Cooldown Spawn b 8-10	Cooldown Spawn b 10-32	Spawn Run 1a	Spawn Run 1b	Spawn Run 2a	Spawn Run 2b	Spawn Run 2c	Spawn Run 2d	Spawn Run 2e	Spawn Run 2f	Spawn Run 2g	Spawn Run 2h	Cooldown Shipout a	Cooldown Shipout b	Cooldown Shipout c	Cooldown Shipout d	Total OER	Number of Tunnels in Process	Running 24hr Avg OER
	+2 hrs	100% Fan	40% FAD, 60% Fan	50% FAD, 60% Fan	35% FAD, 60% Fan	20% FAD, 60% Fan	10% FAD, 60% Fan	25% FAD, 60% Fan	35% FAD, 60% Fan	30% FAD, 65% Fan	10% FAD, 65% Fan	15% FAD, 65% Fan	10% FAD, 65% Fan	20% FAD, 95% Fan	30% FAD, 95% Fan	20% FAD, 95% Fan	30% FAD, 95% Fan	20% FAD, 85% Fan	35% FAD, 85% Fan	40% FAD, 85% Fan	45% FAD, 85% Fan	45% FAD, 65% Fan	45% FAD, 55% Fan	45% FAD, 60% Fan	45% FAD, 70% Fan	50% FAD, 75% Fan	60% FAD, 75% Fan	70% FAD, 75% Fan	55% FAD, 25% Fan	45% FAD, 25% Fan	35% FAD, 25% Fan	25% FAD, 25% Fan	15% FAD, 25% Fan	10% FAD, 25% Fan	30% FAD, 35% Fan	30% FAD, 40% Fan	35% FAD, 40% Fan	35% FAD, 45% Fan	35% FAD, 50% Fan	35% FAD, 55% Fan	45% FAD, 60% Fan	45% FAD, 65% Fan	45% FAD, 70% Fan	45% FAD, 65% Fan	55% FAD, 80% Fan	50% FAD, 75% Fan	45% FAD, 70% Fan	35% FAD, 50% Fan	ou.m3/s	/50	ou.m3/s
Tuesday 4am - 6am	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	105	1,859	472	709	-	-	-	-	4,076	1,596	-	263	-	151	-	9,229	38	9,663
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90	1,859	511	946	-	-	-	-	3,582	2,128	-	263	-	151	-	9,528	39	9,614
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75	1,859	551	946	266	-	-	-	3,088	2,660	-	263	-	151	-	9,856	40	9,598
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	1,859	590	946	532	-	-	-	3,088	2,660	-	263	-	-	84	10,080	41	9,605
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45	1,859	787	709	798	-	-	-	3,088	1,596	-	683	-	-	84	9,648	42	9,587
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	1,859	983	473	1,064	-	-	-	3,088	1,596	-	683	-	-	84	9,859	43	9,596
Tuesday 4pm - 6pm	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	1,859	1,180	236	1,330	-	-	-	3,088	1,596	-	683	-	-	84	10,070	44	9,632
	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	1,180	-	1,596	-	-	-	3,088	1,596	-	420	224	-	-	9,962	43	9,663
	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	1,180	-	1,596	-	-	-	3,088	1,596	-	420	224	-	-	9,962	43	9,709
	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	1,180	-	1,596	-	-	-	3,088	1,596	-	420	224	-	-	9,962	43	9,755
	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	983	296	1,596	-	-	-	2,470	2,261	-	420	224	-	-	10,109	43	9,800
	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	787	591	1,596	-	-	-	1,853	2,926	-	420	-	188	-	10,219	43	9,874
Wednesday 4am - 6am	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	590	887	1,596	-	-	-	1,235	3,591	-	-	358	188	-	10,304	44	9,963
	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	393	1,182	1,596	-	-	-	618	4,256	-	-	358	188	-	10,450	45	10,040
	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	197	1,182	1,929	-	-	-	-	3,325	1,482	-	358	188	-	10,519	46	10,095
	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	-	1,182	2,261	-	-	-	-	3,325	1,482	-	358	-	105	10,572	47	10,136
	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	888	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	-	887	2,594	-	-	-	-	1,995	988	736	-	301	105	10,351	48	10,195
	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	888	1,554	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	-	591	2,926	-	-	-	-	1,995	988	736	-	301	105	11,941	49	10,369
Wednesday 4pm - 6pm	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	888	1,554	1,776	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	-	296	2,993	296	-	-	-	1,995	988	736	-	301	105	13,783	50	10,678
	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	888	1,554	1,776	1,998	-	-	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	3,059	591	-	-	-	1,995	988	736	-	301	-	15,743	50	11,160
	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	888	1,554	1,776	1,998	1,079	-	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	2,793	887	-	-	-	1,995	988	736	-	-	167	16,718	50	11,723
	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	888	1,554	1,776	1,998	2,158	-	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	2,527	1,182	-	-	-	1,995	988	736	-	-	167	17,826	50	12,378
	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	888	1,554	1,776	1,998	3,237	-	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	2,261	1,478	-	-	-	1,995	988	736	-	-	167	18,935	50	13,113
	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	888	1,554	1,776	1,998	4,316	-	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	1,995	1,773	-	-	-	1,995	988	736	-	-	167	20,043	50	13,932
Thursday 4am - 6am	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,554	1,776	1,998	4,316	913	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	1,995	1,773	-	-	-	1,995	988	-	627	-	-	19,793	48	14,723
	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,776	1,998	4,316	1,826	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	1,995	1,773	-	-	-	1,995	988	-	627	-	-	19,152	48	15,448
	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,998	4,316	2,739	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	1,995	1,773	-	-	-	-	2,841	-	627	-	-	18,147	48	16,084
	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,316	3,652	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	1,995	1,773	-	-	-	-	2,841	-	627	-	-	17,062	48	16,624
	58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,110	-	-	-	3,237	4,565	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	1,995	1,773	-	-	-	-	2,223	263	-	527	-	17,551	48	17,225
	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,110	1,942	-	-	2,158	5,478	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	1,995	1,773	-	-	-	-	2,223	263	-	527	-	19,327	48	17,840
Thursday 4pm - 6pm	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,110	1,942	2,219	-	1,079	6,391	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	1,663	2,143	-	-	-	-	2,223	263	-	527	-	21,417	48	18,476
	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,110	1,942	2,219	2,497	-	7,304	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	1,330	2,512	-	-	-	-	2,223	263	-	527	-	23,785	48	19,146
	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,110	1,942	2,219	2,497	1,349	7,304	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	998	2,882	-	-	-	-	2,223	263	-	-	293	24,937	48	19,831
	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,110	1,942	2,219	2,497	2,698	7,304	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	665	3,251	-	-	-	-	2,223	263	-	-	293	26,323	48	20,539
	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,110	1,942	2,219	2,497	4,046	7,304	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	333	3,325	325	-	-	-	2,223	263	-	-	293	27,738	48	21,273
	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,110	1,942	2,219	2,497	5,395	7,304	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	-	3,399	650	-	-	-	2,223	263	-	-	293	29,153	48	22,032
Friday 4am - 6am	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,942	2,219	2,497	5,395	8,445	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	-	3,103	975	-	-	-	2,223	-	224	-	-	28,883	45	22,790
	76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,219	2,497	5,395	9,587	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	-	2,808	1,300	-	-	-	2,223	-	224	-	-	28,112	45	23,536
	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,497	5,395	10,728	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	-	2,512	1,626	-	-	-	2,223	-	224	-	-	27,063	45	24,279
	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,395	11,869	-	-	-	-	-	-	-	-	-	-	-	1,859	-	-	-	2,217	1,951	-	-	-	2,223	-	224	-	-	25,737	45	25,002
	82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,046	12,097	996	-	-	-	-	-	-	-	-	-	-	1,859	-	-	-	2,217	1,951	-	-	-	2,223	-	-	188	-	25,576	45	25,671
	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,698	12,326	1,992	-	-	-	-	-	-	-	-	-	-	1,859	-	-	-	2,217	1,951	-	-	-	2,223	-	-	188	-	25,452	45	26,181
Friday 4pm - 6pm	86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,349	12,554	2,988	-	-	-	-	-	-	-	-	-	-	1,859	-	-	-	2,217	1,951	-	-	-	2,223	-	-	188	-	25,327	45	26,507
	88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,782	3,984	-	-	-	-	-	-	-	-	-	-	1,859	-	-	-	2,217	1,951	-	-	-	2,223	-	-	188	-	25,203	45	26,625
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,869	3,984	317	-	-	-	-	-	-	-	-	-	1,859	-	-	-	2,217	1,951	-	-	-	2,223	-	-	-	105	24,523	45	26,591
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,956	3,984	634	-	-	-	-	-	-	-	-	-	1,859	-	-	-	2,217	1,951	-	-	-	2,223	-	-	-	105	23,928	45	26,391
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,043	3,984	951	-	-	-	-	-	-	-	-	-	1,859	-	-	-	1,847	2,357	-	-	-	2,223	-	-	-	105	23,369	45	26,027
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,130	3,984	1,268	-	-	-	-	-	-	-	-	-	1,859	-	-	-	1,478	2,763	-	-	-	2,223	-	-	-	105	22,810	45	25,498
Saturday 4am - 6am	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,130	2,988	1,586	-	-	-	-	-	-	-	-	-	1,859	-	-	-	1,108	3,170	-	-	-	2,223	-	-	-	-	22,063	44	24,930
	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,130	1,992	1,903	-	-	-	-	-	-	-	-	-	1,859	-	-	-	739	3,576	-	-	-	2,223	-	-	-	-	21,421	44	24,373
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,130	996	2,220	-	-	-	-	-	-	-	-	-	1,859	-	-	-	369	3,983	-	-	-	2,223	-	-	-	-	20,779	44	23,849
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,130	-	2,537	-	-	-	-	-	-	-	-	-	1,859	-	-	-	-	4,389	-	-	-	2,223	-	-	-	-	20,137	44	23,382
	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,989	1,245	2,537	-	-	-	-	-	-	-	-	-	1,859	-	-	-	-	4,389	-	-	-	2,223	-	-	-	-	20,241	44	22,938
	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,848	2,490	2,537	-	-	-	-	-	-	-	-	-	1,859	-	-	-	-	4,389	-	-	-	2,223	-	-	-	-	20,345	44	22,512
Saturday 4pm - 6pm	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,706	3,735	2,537	-	-	-	-	-	-	-	-	-	1,859	-	-	-	-	4,389	-	-	-	1,235	420	-	-	-	19,881	44	22,058
	112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,565	4,980	2,537	-	-	-	-	-	-	-	-	-	1,859	-	-	-	-	4,389	-	-	-	1,235	420	-	-	-	19,985	44	21,623
	114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,424	4,980	2,616	179	-	-	-	-	-	-	-	-	1,859	-	-	-	-	4,389	-	-	-	1,235	420	-	-	-	19,102	44	21,172
	116	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,283	4,980	2,695	179	215	-	-	-	-	-	-	-	1,859	-	-	-	-	4,389	-	-	-	1,235	420	-	-	-	18,255	44	20,699
	118	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,141	4,980	2,775	179	215	251	-	-	-	-	-	-	1,859	-	-	-	-	4,064	456	-	-	1,235	420	-	-	-	17,575	44	20,216
	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,980	2,854	179	215	251	66	-	-	-	-	-	1,859	-	-	-	-	3,739	912	-	-	1,235	420	-	-	-	16,709	44	19,708
Sunday 4am - 6am	122	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,735	2,933	179	215	251	66	54	-	-	-	-	1,859	-	-	-	-	3,414	1,368	-	-	1,235	-	358	-	-	15,666	44	19,175
	124	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,490	3,012	179	215	251	66	54	42	-	-	-	1,859	-	-	-	-	3,089	1,824	-	-	1,235	-	358	-	-	14,673	44	18,612
	126	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,245	3,092	179	215	251	66	54	42	30	-	-	1,859	-	-	-	-	2,763	2,280	-	-	1,235	-	358	-	-	13,668	44	18,020
	128	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,171	179	215	251	66	54	42	30	18	-	1,859	-	-	-	-	2,438	2,736	-	-	1,235	-	358	-	-	12,651	44	17,396
	130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,171	-	215	251	66	54	42	30	18	12	1,859	-	-	-	-	2,438	2,736	-	-	1,235	-	-	301	-	12,427	44	16,745
	132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,171	-	-	251	66	54	42	30	18	24	1,859	-	-	-	-	2,438	2,736	-	-	1,235	-	-	301	-	12,224	44	16,068
Sunday 4pm - 6pm	134	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,171	-	-	-	66	54	42	30	18	36	1,859	-	-	-	-	2,438	2,280	494	-	-	526	-	301	-	11,313	44	15,354
	136	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,171	-	-	-	-	54	42	30	18	48	1,859	-	-	-	-	2,438	1,824	988	-	-	526	-	301	-	11,298	44	14,630
	138	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,775	224	-	-	-	-	42	30	18	60	1,859	-	-	-	-	2,438	1,368	1,482	-	-	526	-	-	167	10,988	44	13,954
	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,378	224	269	-	-	-	-	30	18	72	1,859	-	-	-	-	2,438	912	1,976	-	-	526	-	-	167	10,868	44	13,338
	142	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,982	224	269	314	-	-	-	-	18	84	1,859	-	-	-	-	2,032	1,026	2,470	-	-	526	-	-	167	10,969	44	12,788
	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,586	224	269	314	82	-	-	-	-	96	1,859	-	-	-	-	1,626	1,140	2,470	-	-	736	-	-	167	10,566	44	12,276
Monday 4am - 6am	146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,189	224	269	314	82	67	-	-	-	84	1,859	-	-	-	-	1,219	1,710	2,470	-	-	210	448	-	-	10,144	42	11,816
	148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	793	224	269	314	82	67	52	-	-	72	1,859	157	-	-	-	813	2,280	2,470	-	-	210	448	-	-	10,109	42	11,435
	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	396	224	269	314	82	67	52	37	-	60	1,859	315	-	-	-	406	2,850	2,470	-	-	210	448	-	-	10,059	42	11,135
	152	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	224	269	314	82	67	52	37	22	48	1,859	472	-	-	-	-	3,420	2,470	-	-	210	448	-	-	9,994	42	10,913
	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	269	314	82	67	52	37	22	51	1,859	629	-	-	-	-	3,420	2,470	-	-	210	-	376	-	9,859	42	10,699
	156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	314	82	67	52	37	22	54	1,859	787	-	-	-	-	3,420	2,470	-	-	210	-	376	-	9,750	42	10,493
Monday 4pm - 6pm	158	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	82	67	52	37	22	57	1,859	944	-	-	-	-	2,850	3,088	-	-	210	-	376	-	9,644	42	10,354
	160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	52	37	22	60	1,859	944	-	-	-	-	2,280	3,705	-	-	-	179	376	-	9,582	42	10,211
	162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52	37	22	75	1,859	944	-	-	-	-	1,710	4,323	-	-	-	179	-	209	9,410	42	10,080
	164	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37	22	90	1,859	944	-	-	-	-	1,140	4,940	-	-	-	179	-	209	9,420	42	9,959
	166	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	105	1,859	787	236	-	-	-	570	5,064	532	-	-	179	-	209	9,562	42	9,842
	168	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	119	1,859	629	473	-	-	-	-	4,570	1,064	-	263	-	151	209	9,336	42	9,739
Tuesday 4am - 6am		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		40	

Contained discharge to biofilter

Worst case 24 hour snapshot

Tunnel discharges - Worst-case 24 hour snapshot of air flows (m^3/s)																										
Day	Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	TOTAL
Thu	21, 22	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	1.2	1.2	1.2	1.2	1.2	1.2	1.9	1.9	1.9	1.9	1.9	1.9	3.3	3.3	1.9	0.0	0.0	49.1
	23, 24	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	1.2	1.2	1.2	1.2	1.2	1.2	1.9	1.9	1.9	1.9	1.9	1.9	3.3	3.3	1.9	0.0	0.0	49.1
Fri	1, 2	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	1.2	1.2	1.2	1.2	1.2	1.2	1.9	1.9	1.9	1.9	1.9	2.1	3.3	3.3	1.9	0.0	0.0	49.3
	3, 4	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	1.2	1.2	1.2	1.2	1.2	1.2	1.9	1.9	1.9	1.9	2.1	2.1	3.3	3.3	1.9	0.0	0.0	49.5
	5, 6	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	1.2	1.2	1.2	1.2	1.2	1.2	1.9	1.9	1.9	2.1	2.1	2.1	3.3	3.3	0.0	0.0	0.0	47.8
	7, 8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	1.2	1.2	1.2	1.2	1.2	1.2	1.9	1.9	2.1	2.1	2.1	2.1	3.3	3.3	0.0	0.0	0.0	47.9
	9, 10	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	1.2	1.2	1.2	1.2	1.2	1.2	1.9	2.1	2.1	2.1	2.1	2.1	3.3	3.3	0.0	0.0	0.0	48.1
	11, 12	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	1.2	1.2	1.2	1.2	1.2	1.2	2.1	2.1	2.1	2.1	2.1	2.1	3.3	3.3	0.0	0.0	0.0	48.3
	13, 14	2.8	2.8	2.8	2.8	2.8	2.8	2.8	3.0	1.2	1.2	1.2	1.2	1.2	1.2	2.1	2.1	2.1	2.1	2.1	2.1	3.3	3.3	0.0	0.0	0.0	48.6
	15, 16	2.8	2.8	2.8	2.8	2.8	2.8	3.0	3.0	1.2	1.2	1.2	1.2	1.2	1.2	2.1	2.1	2.1	2.1	2.1	2.1	3.3	3.3	0.0	0.0	0.0	48.8
	17, 18	2.8	2.8	2.8	2.8	2.8	3.0	3.0	3.0	1.2	1.2	1.2	1.2	1.2	1.2	2.1	2.1	2.1	2.1	2.1	2.1	3.3	3.3	0.0	0.0	0.0	49.1
	19, 20	2.8	2.8	2.8	2.8	3.0	3.0	3.0	3.0	1.2	1.2	1.2	1.2	1.2	1.2	2.1	2.1	2.1	2.1	2.1	2.1	3.3	3.3	0.0	0.0	0.0	49.3
Day	Hours	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	
Thu	21, 22	4.0	2.6	4.0	2.4	4.1	4.7	5.3	4.1	1.5	1.5	1.5	1.5	1.5	1.5	2.2	2.2	2.2	2.4	2.4	2.4	4.1	4.1	6.1	2.4	2.4	TOTAL
	23, 24	2.6	4.0	2.4	4.1	4.7	5.3	4.1	4.1	1.5	1.5	1.5	1.5	1.5	1.5	2.2	2.2	2.4	2.4	2.4	2.4	4.1	4.1	6.1	2.4	2.4	73.2
Fri	1, 2	4.0	2.4	4.1	4.7	5.3	4.1	4.1	4.1	1.5	1.5	1.5	1.5	1.5	1.5	2.2	2.4	2.4	2.4	2.4	2.4	4.1	4.1	6.1	2.4	2.4	74.9
	3, 4	2.4	4.1	4.7	5.3	4.1	4.1	4.1	4.1	1.5	1.5	1.5	1.5	1.5	1.5	2.4	2.4	2.4	2.4	2.4	2.4	4.1	4.1	6.1	2.4	2.4	75.2
	5, 6	4.1	4.7	5.3	4.1	4.1	4.1	4.1	3.4	1.5	1.5	1.5	1.5	1.5	1.5	2.4	2.4	2.4	2.4	2.4	2.4	4.1	4.1	5.2	0.0	0.0	70.5
	7, 8	4.7	5.3	4.1	4.1	4.1	4.1	3.4	3.4	1.5	1.5	1.5	1.5	1.5	1.5	2.4	2.4	2.4	2.4	2.4	2.4	4.1	4.1	5.2	0.0	0.0	69.8
	9, 10	5.3	4.1	4.1	4.1	4.1	3.4	3.4	3.4	1.5	1.5	1.5	1.5	1.5	1.5	2.4	2.4	2.4	2.4	2.4	2.4	4.1	4.1	5.2	0.0	0.0	68.5
	11, 12	4.1	4.1	4.1	4.1	3.4	3.4	3.4	3.4	1.5	1.5	1.5	1.5	1.5	1.5	2.4	2.4	2.4	2.4	2.4	2.4	4.1	4.1	5.2	0.0	0.0	66.7
	13, 14	4.1	4.1	4.1	3.4	3.4	3.4	3.4	3.4	1.5	1.5	1.5	1.5	1.5	1.5	2.4	2.4	2.4	2.4	2.4	2.4	4.1	4.1	4.4	0.0	0.0	65.2
	15, 16	4.1	4.1	3.4	3.4	3.4	3.4	3.4	3.4	1.5	1.5	1.5	1.5	1.5	1.5	2.4	2.4	2.4	2.4	2.4	2.4	4.1	4.1	4.4	0.0	0.0	64.6
	17, 18	4.1	3.4	3.4	3.4	3.4	3.4	3.4	3.4	1.5	1.5	1.5	1.5	1.5	1.5	2.4	2.4	2.4	2.4	2.4	2.4	4.1	4.1	4.4	0.0	0.0	64.0
	19, 20	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	1.5	1.5	1.5	1.5	1.5	1.5	2.4	2.4	2.4	2.4	2.4	2.4	4.1	4.1	4.4	0.0	0.0	63.3

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0	Pasturisation (contained)
470	Cool-down (conditioning)
332	Conditioning 1
118	Spawn Run 1
152	Spawn Run 2
43	Cool-down (spawn/shipout)

Tunnel discharges - Worst-case 24 hour snapshot of odour emission rates (ou.m3/s)

Day	Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Thu	21, 22	913	913	913	913	913	913	913	913	138	138	138	138	138	138	296	296	296	296	296	296	494	494	84	0	0
	23, 24	913	913	913	913	913	913	913	913	138	138	138	138	138	138	296	296	296	296	296	296	494	494	84	0	0
Fri	1, 2	913	913	913	913	913	913	913	913	138	138	138	138	138	138	296	296	296	296	296	325	494	494	84	0	0
	3, 4	913	913	913	913	913	913	913	913	138	138	138	138	138	138	296	296	296	296	325	325	494	494	84	0	0
	5, 6	913	913	913	913	913	913	913	913	138	138	138	138	138	138	296	296	296	325	325	325	494	494	0	0	0
	7, 8	913	913	913	913	913	913	913	913	138	138	138	138	138	138	296	296	325	325	325	325	494	494	0	0	0
	9, 10	913	913	913	913	913	913	913	913	138	138	138	138	138	138	296	325	325	325	325	325	494	494	0	0	0
	11, 12	913	913	913	913	913	913	913	913	138	138	138	138	138	138	325	325	325	325	325	325	494	494	0	0	0
	13, 14	913	913	913	913	913	913	913	996	138	138	138	138	138	138	325	325	325	325	325	325	494	494	0	0	0
	15, 16	913	913	913	913	913	913	996	996	138	138	138	138	138	138	325	325	325	325	325	325	494	494	0	0	0
	17, 18	913	913	913	913	913	996	996	996	138	138	138	138	138	138	325	325	325	325	325	325	494	494	0	0	0
	19, 20	913	913	913	913	996	996	996	996	138	138	138	138	138	138	325	325	325	325	325	325	494	494	0	0	0

Day	Hours	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Thu	21, 22	0	0	0	1,110	1,942	2,219	2,497	1,349	172	172	172	172	172	172	333	333	333	369	369	369	618	618	263	105	105
	23, 24	0	0	1,110	1,942	2,219	2,497	1,349	1,349	172	172	172	172	172	172	333	333	369	369	369	369	618	618	263	105	105
Fri	1, 2	0	1,110	1,942	2,219	2,497	1,349	1,349	1,349	172	172	172	172	172	172	333	369	369	369	369	369	618	618	263	105	105
	3, 4	1,110	1,942	2,219	2,497	1,349	1,349	1,349	1,349	172	172	172	172	172	172	369	369	369	369	369	369	618	618	263	105	105
	5, 6	1,942	2,219	2,497	1,349	1,349	1,349	1,349	1,141	172	172	172	172	172	172	369	369	369	369	369	369	618	618	224	0	0
	7, 8	2,219	2,497	1,349	1,349	1,349	1,349	1,141	1,141	172	172	172	172	172	172	369	369	369	369	369	369	618	618	224	0	0
	9, 10	2,497	1,349	1,349	1,349	1,349	1,141	1,141	1,141	172	172	172	172	172	172	369	369	369	369	369	369	618	618	224	0	0
	11, 12	1,349	1,349	1,349	1,349	1,141	1,141	1,141	1,141	172	172	172	172	172	172	369	369	369	369	369	369	618	618	224	0	0
	13, 14	1,349	1,349	1,349	1,141	1,141	1,141	1,141	1,141	172	172	172	172	172	172	369	369	369	369	369	369	618	618	188	0	0
	15, 16	1,349	1,349	1,141	1,141	1,141	1,141	1,141	1,141	172	172	172	172	172	172	369	369	369	369	369	369	618	618	188	0	0
	17, 18	1,349	1,141	1,141	1,141	1,141	1,141	1,141	1,141	172	172	172	172	172	172	369	369	369	369	369	369	618	618	188	0	0
	19, 20	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	172	172	172	172	172	172	369	369	369	369	369	369	618	618	188	0	0

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0	Pasturisation (contained)
470	Cool-down (conditioning)
332	Conditioning 1
118	Spawn Run 1
152	Spawn Run 2
43	Cool-down (spawn/shipout)

Day	Hours	TOTAL
Thu	21, 22	24,937
	23, 24	26,323
Fri	1, 2	27,738
	3, 4	29,153
	5, 6	28,883
	7, 8	28,112
	9, 10	27,063
	11, 12	25,737
	13, 14	25,576
	15, 16	25,452
	17, 18	25,327
	19, 20	25,203