# REVISED AND QUANTITATIVE ODOUR IMPACT ASSESSMENT
# PROPOSED SUBDIVISION, 792 SEAHAM ROAD SEAHAM NSW

**Prepared for Mr B Statham**

**Prepared by RCA Australia**

**RCA ref 15111a – 401/2**

**NOVEMBER 2021**

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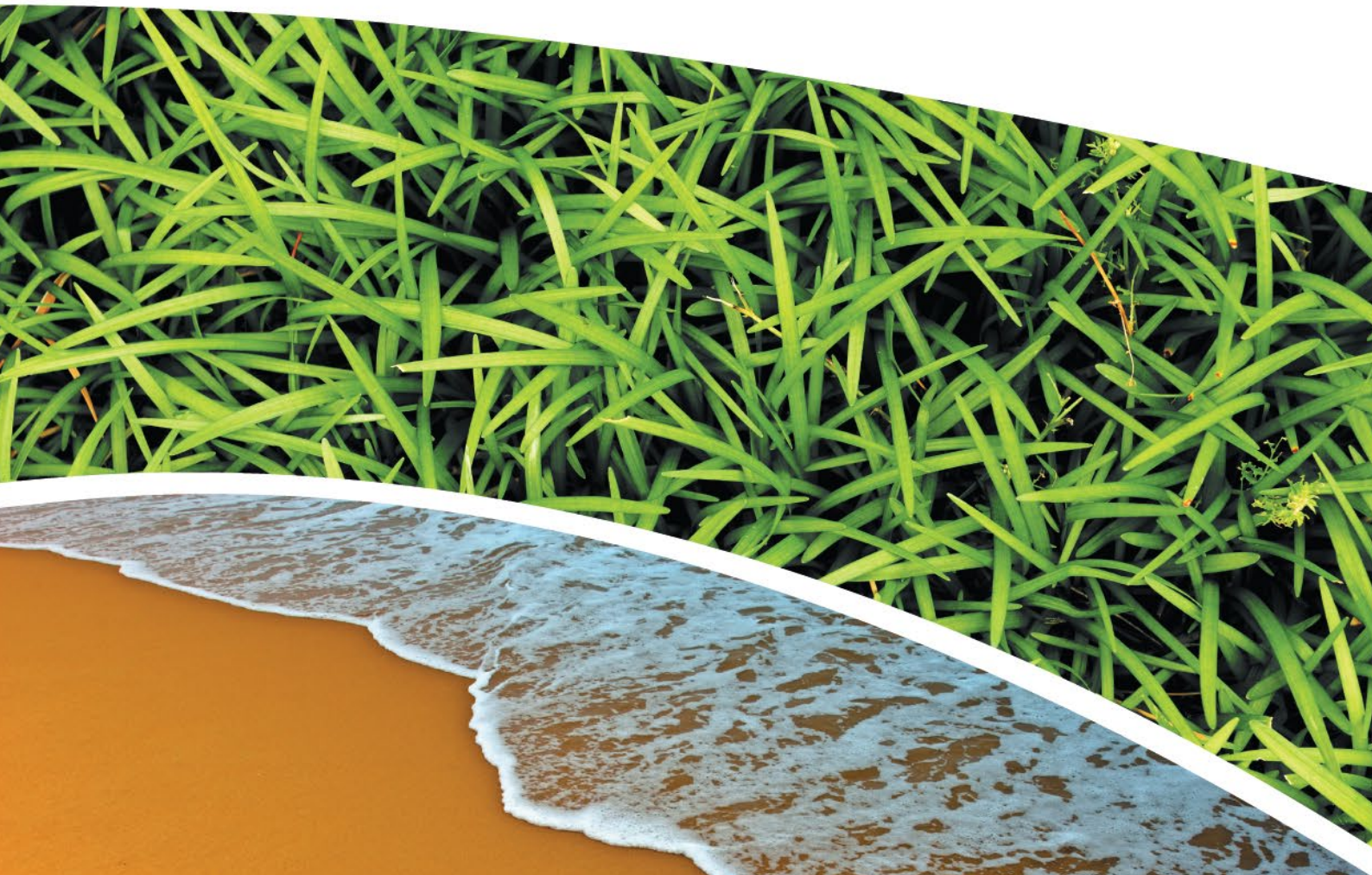

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# *Contents*

RCA ref 15111a – 401/2

8 November 2021

Mr B Statham
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Attention: Ms Kate Wheeler (Le Mottee Group)

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**REVISED AND QUANTITATIVE ODOUR IMPACT ASSESSMENT**
**PROPOSED SUBDIVISION**
**792 SEAHAM ROAD, SEAHAM NSW**

## 1 INTRODUCTION AND BACKGROUND

RCA Australia (RCA) was requested by the owner of the site to complete a Revised and Quantitative Odour Impact Assessment for a proposed development (a subdivision) at 792 Seaham Road, Seaham.

RCA has previously undertaken a qualitative odour impact assessment at the site (Ref [1]) to address the requirements of Port Stephens Council as part of the development approval. The assessment included dispersion modelling, which was based on typical odour impacts associated with poultry operations and traffic as these were considered to pose potential for adverse odour impacts at the site. The assessment (Ref [1]) concluded that, based on conservative assumptions, the peak odour level would be between 2 and <3 odour units, well below the conservative threshold of 5 odour units and that there would be no adverse odour impacts at the site. Following Port Stephens Council's (Council) review of this assessment, Council requested that the modelling be "ground truthed" by onsite monitoring.

The purpose of the investigation is to provide a report to address Council's requirement and facilitate the continued assessment of the proposed rezoning and associated development. The objective of this investigation is to verify the results of the modelling with actual odour measurements from the poultry farms to confirm that there are no potential adverse odours impacts at the site.

The site, proposed subdivision and the modelled odour sources are presented on **Drawing 1**, **Appendix A**.

The following sections outline RCA's methodology, and results of the odour impact assessment. Odour can be a complex mixture of gaseous emissions for example sulphurous and ammonia - based compounds and this assessment focuses on the general emission of "odour" and the modelling of odour to compare with impact criteria.

## 2 POTENTIAL ODOUR EMISSIONS AND SOURCE LOCATIONS

Potential odour sources within the area that could impact on the proposed residential development of the site are considered to comprise:

- Odours from poultry operations during the growth stages of the birds. There are a number of poultry sheds in the area however the nearest "cluster" of poultry sheds are located approximately 430m to the southwest of the site (refer **Drawing 1**, **Appendix A**):
    - *Four (4) sheds for growing chickens* – these are located within the poultry farm at 667 Seaham Road, Nelsons Plains. From RCA's observations and research the sheds appear to be the "tunnel ventilated" design.
    - *Six (6) sheds for growing turkeys* – these are located within the "Karingal" farm at 683 Seaham Road, Nelsons Plains. From RCA's observations and research the sheds appear to be the "natural ventilated" design incorporating modern features.

    Note that other poultry operations are in the area as shown in **Drawing 1**, **Appendix A** however these were considered to be too distant (>1km) to potentially cause adverse odour impact at the site and were not monitored for odours in this assessment.
- Short term odour emissions during cleaning out of the sheds between poultry batches.
- Odours from traffic moving along Seaham Road, which is adjacent to the site and the main thoroughfare between Raymond Terrace and Seaham, and to further towns such as Clarence Town and Dungog.
- Minor odour emissions originating from residences, e.g., cooking odours; and feed silos located within farms.

It is noted that all air emissions including odours are known to diminish over distance and based on this and RCA's previous assessment (Ref [1]) odours from the existing residences, feed silos, traffic and the cleaning of the poultry sheds were considered not to pose a risk of adverse odour impact at the site.

Therefore, the main contributor to odour impact at the site is considered to be from odours produced during normal "growing" operations from the nearest cluster of poultry sheds. As such, odour modelling was only conducted for these poultry operations.

RCA notes that there is a childcare centre, *Jacaranda Grove Preschool*, situated immediately adjacent (north) of the poultry operations which established in 2002 (refer to **Drawing 1**, **Appendix A**). The poultry operations commenced between 1976 and 1984 based on historical aerial photography.

# 3 ODOUR ASSESSMENT METHODOLOGY

The assessment methodology undertaken for this assessment was derived following a meeting between RCA, Council, proponent and the owners of the poultry farms, and submitted to Council (Ref [2]) prior to commencement. RCA understands that the proposed methodology as outline within this section was accepted by Council.

RCA's assessment approach is a "Level 2" as defined in the NSW EPA methods document (Ref [3]) and incorporated the following components to satisfy Council Requirements.

## 3.1 PRELIMINARY WORK

The preliminary steps included:

- Contacting the owners of the two (2) relevant poultry operations regarding the schedule of bird growing within each farm.
- A preliminary inspection of both poultry farms on Monday 13 September 2021. This included checks of:
    - The positioning and orientation of exhaust fans and openings on the sheds and other 'significant' odour sources to be incorporated in this assessment.
    - The topography surrounding the poultry farms, and other features such as foliage which may affect the dispersion of odours from the farms and the mitigation of odours.
- Consideration of the prevailing weather conditions such as wind speed and direction to assist in the planning of odour monitoring at ambient locations.

Following the completion of the preliminary work, RCA organised and coordinated the odour sampling with a sub-contracted laboratory, The Odour Unit.

## 3.2 INSPECTION OF THE POULTRY FARMS

RCA carried out the detailed inspection of the poultry farms undertaken between 8.30 a.m. to 1.00 p.m. on Thursday 30 September 2021 to obtain information that was essential for the revised odour assessment, including:

- Subjective odour observations from odour sources within the farms(sheds) and other minor sources (e.g. feed silos).
- Exhaust fan conditions at the poultry farm sheds (number of fans operating, exhaust velocity, height above ground, operating time) and their locations.
- Configuration and dimensions of the sheds, including openings to the outside air (and for the modelling configuration).
- Visual observations that may affect the propagation and mitigation of odours, for example terrain and foliage within, and surrounding the property.

This site inspection conducted by RCA also coincided with the odour monitoring conducted on the same day by The Odour Unit (refer **Section 3.3**) for the purposes of consistency.

## 3.3 ODOUR MONITORING

Odour monitoring was undertaken between 9.12 a.m. to 1.41 p.m. on Thursday 30 September 2021 at:

- The two (2) poultry farms situated to the south of the site along Seaham Road. Monitoring was undertaken to ascertain the appropriate odour rates to be used in the odour modelling as part of the assessment.
- The proposed site. Monitoring was aimed to ascertain the odour impacts at the site from the nearby odour sources.

All monitoring was aimed to coincide with the optimal stage of odour emissions for the odour assessment and was intended to be between weeks five (5) and eight (8) of the growing cycle however, the growing schedules at both farms could not be aligned appropriately until early 2022. As such a compromise was made to facilitate sampling of both farms on the same day:

- The chicken farm: growth stage approximately six (6) weeks (out of 8 weeks).
- The turkey farm: growth stage between 11.5 and 13.5 weeks (out of 19 weeks).

Conservative assumptions have been made in the modelling (refer to **Section 5.4**) to account for the slightly less than optimal monitoring timing.

All odour sampling and analysis was carried out in accordance with the Australian Standard for monitoring odour (Ref [4]) by an experienced and NATA accredited The Odour Unit (TOU) and comprised.

- The collection of samples by the “lung in drum” method as per the Australian Standard (Ref [4]).
    - A total of nine (9) samples were collected across both of the farms from locations within the sheds and (a) near exhaust fans for the chicken sheds and (b) within the turkey sheds and near the litter “surface” (i.e inside the shed, not at an opening a the side of the shed). This sampling approach was considered the most representative for these sheds, as they are mostly operated in “natural” ventilation mode (i.e. via side openings) and the fans seldomly operate. The total of nine (9) samples includes one (1) duplicate and one (1) blank sample at each farm. These samples were also collected in accordance with the Australian Standard (Ref [4]).
    - Three (3) ambient samples were collected downwind of the farms:
        - Two (2) at the southwest extremity of the site (refer **Drawing 2**, **Appendix A**). It should be noted that RCA were present at these locations at the time of sampling and RCA did not observe any odours, based on RCA’s opinion.
        - One (1) approximately 33m directly downwind of Turkey shed no.4, (refer **Drawing 2**, **Appendix A**). It should be noted that RCA were present at this location at the time of sampling, and RCA observed an odour that was just detectable and not offensive (based on RCA’s opinion).
- Analysis of odour samples by olfactometry at an ‘odour panel’ (a trained group of people). The analysis was conducted within 24 hours of sample collection to ensure compliance with the ‘holding time’ of the samples.

RCA appreciates that ideally, odour sampling is carried out under different weather conditions and times of the day. Due to the complexities of co-ordinating the two (2) separate businesses associated with the poultry operations as well as the laboratory analysis of odour samples within twenty-four (24) hours of collected this was not possible.

## 4 RESULTS

The weather conditions on the day of inspection were considered suitable for odour observations: fine and mild (18ºC to 22ºC as measured by RCA, using a hand held thermocouple) with no rain or mist and very light (5 km/h to 10 km/h) winds from the east, southeast and northwest[1].

No odours were observed by RCA from 20m directly downwind of the feed silos nor from either farm *outside* of the farm boundaries during the site inspection, noting that these were subjective observations and not odour results obtained from direct sampling and analysis.

RCA made the following subjective odour observations during the site inspection and *within* these poultry farm locations:

- Higher odour levels were observed at and immediately adjacent to the fan exits (for those that were operating) at each of the (4) chicken sheds within 667 Seaham Road, Nelsons Plains. RCA also checked the odour levels at positions directly outwards from the exhaust fans – the odours diminished at approximately 20m from the fans: at levels observed by RCA as low to moderate and were only just noticeable at approximately 30 to 40m from the fans. RCA did not consider these odour levels to be offensive.
- Moderate odour levels were observed at the turkey farms, near the openings on the larger shed openings (located on the south and north sides); and on the narrower openings located on the east side of each shed (approximately 4m wide by 4m high). The odours diminished at approximately 20m from the openings to low levels and were only just noticeable at approximately 30 to 40m from these openings. RCA did not consider these odour levels to be offensive.

Birds were present in each shed of both of the farms as per **Table 1** following and refer to **Drawing 2**, **Appendix A** for shed numbering.

[1] Elders weather website for Maitland Airport, the nearest weather station approximately 20km west of the poultry farms. The other weather stations are based at Williamtown and Paterson.

**Table 1** *Bird Numbers within Shed*

| Shed Number | Bird Numbers on day of Monitoring | Bird Growth Stage |
|---|---|---|
| Chicken Shed 1 | 9,700 | 6.1 weeks |
| Chicken Shed 2 | 9,870 | 6.1 weeks |
| Chicken Shed 3 | 14,800 | 5.9 weeks |
| Chicken Shed 4 | 16,080 | 5.9-6.1 weeks |
| Turkey Shed 1 | 6,848 | 11.5 weeks |
| Turkey Shed 2 | 6,199 | 11.5 weeks |
| Turkey Shed 3 | 5,680 | 12.5 weeks |
| Turkey Shed 4 | 7,646 | 13.5 weeks |
| Turkey Shed 5 | 8,540 | 13.5 weeks |
| Turkey Shed 6 | 10,490 | 12.5 weeks |

Bird numbers as RCA was advised by farm owners.

A total of sixteen (16) exhaust fans were operating at the southern side of the sheds: four (4) at the each of the poultry farms. For the later purpose of odour dispersion modelling RCA measured the size, exhaust velocity and temperature of each fan by a hand held anemometer with an integrated thermocouple. RCA were advised that the maximum possible number of fans is six (6) at each poultry shed, however this seldomly occurs, approximately 5% of the operational time.

The terrain of both farms was a gentle slope towards the northern and eastern boundaries and gaining elevation to the west.

Both of the farms were grassed and had scattered trees in some areas of the farms and along their boundaries. This would assist in the mitigation of odours from the poultry operations.

The results of the ambient odour sampling are presented in **Table 2** following; the full report from The Odour Unit is included in **Appendix B**.

**Table 2** *Results of Odour Sample Analysis*

| Sample Identification | Location | Result (OU) | Odour Description |
|---|---|---|---|
| 1 | Chicken Shed 1 | 128 | ammoniacal, feathers, bird |
| 2 | Chicken Shed 2 | 108 | ammoniacal, feathers, bird |
| 3 | Duplicate of Sample 2 | 128 | ammoniacal, feathers, bird |
| 4 | Chicken Shed 4 | 99 | ammoniacal, feathers, bird |
| 5 | Turkey Shed 2 | 1,880 | ammoniacal, feathers, bird |
| 6 | Duplicate of Sample 6 | 2,660 | ammoniacal, feathers, bird |
| 7 | Turkey Shed 1 | 2,440 | ammoniacal, feathers, bird |
| 8 | Turkey Shed 6 | 3,160 | ammoniacal, feathers, bird |
| 9 | 33m Downwind of Turkey Shed 4 | <16 | musty |
| 10 | Ambient Downwind at Site's Southern Boundary | <16 | musty |
| 11 | Ambient Downwind 20m from Site's Southern Boundary | <16 | musty |

Samples 12 and 13 were blanks.

## 5 MODELLING OF AIR EMISSIONS

The aim of the air dispersion modelling for the site is to predict odour concentrations at ground level receptors nominated (including maximum concentrations under conservatively realistic conditions) to compare the results to the appropriate criteria.

The following sections outline background on air dispersion modelling, the methodologies used in this assessment and results.

### 5.1 DISPERSION MODELS

Dispersion models can simulate atmospheric conditions and behaviour based on mathematical calculations. Dispersion models are used to calculate spatial and temporal fields of concentrations and particle deposition due to emissions from various sources. The results from the modelling can be compared against odour impact assessment criteria including the ground-level concentration (GLC).

Air dispersion modelling is a useful tool in assessing the air quality impacts associated with existing and proposed air emission sources. Dispersion modelling can be used to estimate the cumulative effect on various industries that are located close to one another and to develop control strategies to reduce the effects. Dispersion models are widely used in Australia, New Zealand, USA and Europe.

Modelling was undertaken using Ausplume Dispersion Model Version 6.0 which is a commercially available air modelling package based on a 99$^{th}$ percentile nose time average predictions for odour performance criteria. This is in accordance with the NSW EPA method document (Ref [3]) for Level 2 impact assessments which are defined as '*a refined dispersion modelling technique using site-specific input data'*. The reasons that this assessment complies with Level 2 requirements as detailed by the NSW EPA (Ref [3]) are:

- Meteorological data was sourced from the Williamtown Airport, Beresfield and Paterson meteorological stations, all of which are less than 20 km from the site, considered representative of the area surrounding the site. Refer to **Section 5.3** and **Appendix C**.
- Meteorological data was generated by the TAPM model (refer to **Section 5.3**) and not by using synthetic data (which apply to Level 1 assessments).
- The model was consistent with section 6.2 of the NSW EPA method document (Ref [3]) which states that "*AUSPLUME v. 6.0 or later is the approved dispersion model for use in most simple, near field applications in NSW, where coastal effects and complex terrain are of no concern*". The site is not considered to be influenced by coastal effects or terrain as the site is located approximately 20 km inland of Australia's east coast and there is only a moderate slope in the vicinity of the site.
- The odour data is based on measurements collected from the primary sources of odours during representative loadings and conditions.

For the purposes of odour modelling, the sensitive receptors should be those that reflect the ground level emission concentrations for conservative considerations such that the modelling results can be compared with the appropriate criterion (Ref [3]). In the context of this assessment the sensitive receptors are locations within the proposed development. Note that no consideration of existing sensitive receptors has been undertaken.

### 5.2 MODELLING ASSUMPTIONS AND CONSIDERATIONS

A number of assumptions and considerations were used in the odour dispersion modelling for this assessment, most of which were based on a conservative approach to be consistent with the aims of this assessment:

- RCA assumed that four (4) fans were operating on each of the six (6) chicken sheds 100% of the time to be conservative. Further, RCA adjusted the operating times in the odour model to account for the low likelihood (5% of operational time) of six (6) fans operating concurrently; and to represent worse case odour conditions (and as best as practicable).
- Calculation of odour rates for sheds which couldn't be sampled within the single day were derived from:
    - The average of odour concentration from the other poultry sheds.
    - A comparative rate based on the number of birds within the monitored shed with the next highest number of birds.
- No odour controls were used in the modelling of odour sources in order to be consistent with a conservative approach in this study.

### 5.3 DISPERSION MODELLING PARAMETERS

Receptor grid information was included with the location using the "MGA 94" reference system and a Cartesian grid.

A site-specific meteorological data file was developed as discussed in **Section 5.1** and presented in **Appendix C**. The data file includes hourly average values for a period of one (1) year and includes:

- Wind speed.
- Wind direction.
- Ambient temperature.
- Atmospheric stability class.
- Mixing height.

The meteorological data is over 90% complete and is therefore acceptable for use in this Level 2 impact assessment.

Ten (10) volume sources (poultry sheds) were identified as sources of odour from the poultry farm cluster. The information including odour emission rates, based on the results of the monitoring as detailed in **Section 4**, used for each volume source are presented in **Table 3** below.

Peak to mean ratios of 2.3 were applied to the odour emission rates for all of the volume sources in accordance with the NSW EPA requirements (Ref [3]).

**Table 3** *Information used in Odour Dispersion Modelling – Poultry sheds near to Seaham subdivision*

| Odour Source Type | Odour Source Type and Location | Odour emission rate, OU.m$^3$/s |
|---|---|---|
| *Chicken farm at 667 Seaham Road - modern tunnel design with temperature control tunnel ventilation. Fans located on southern end of shed.* N1 | Shed 1 | 4,180 |
| | Shed 2 | 3,582 |
| | Shed 3 | 2,497 N2 |
| | Shed 4 | 2,846 |
| *Turkey farm at 683 Seaham Road - natural ventilation design with modern design features.* N3 | Shed 1 | 540.8 |
| | Shed 2 | 507.2 |
| | Shed 3 | 464.7 N4 |
| | Shed 4 | 512.0 N5 |
| | Shed 5 | 571.8 N6 |
| | Shed 6 | 702.4 |

N1 Also calculated from test odour concentration (Refer to **Appendix B**), diameter of 1.4m and average velocity measured at that shed. The odour rate is *per fan* at that shed; and four (4) fans were operational.

N2 Shed not sampled for odour, rate calculated from average odour concentration for chicken sheds 1,2, and 4 and diameter of 1.4m and average velocity for Shed no.3.

N3 Calculated from the specific odour emission rate concentration for that shed (Refer to **Appendix B**), area of shed opening and bird numbers (as shown in other notes below).

N4 Not sampled for odour, rate calculated from comparative bird numbers in shed 2 = (5,680/6,199) x 507.2 = 464.7 OU.m$^3$/s

N5 Not sampled for odour, rate calculated from comparative bird numbers and odour rate in shed 6 to be conservative (7,646/10,490) x 702.4 = 512.0 OU.m$^3$/s

N6 Not sampled for odour, rate calculated from bird numbers and odour rate in shed 6 to be conservative (and highest bird total (8,540/10,490) x 702.4 = 571.8 OU.m$^3$/s

### 5.4 ODOUR MODELLING RESULTS AND DISCUSSION

The NSW EPA (Ref [3]) recommends a criterion of 5.0OU for sensitive receptors such as residential land use and RCA therefore considers this to be the appropriate criterion for the assessment of potential odour impacts at the site. This criterion allows for a maximum of 30 people in each Lot which is considered to be conservative for the single dwelling residential Lots being proposed except on rare occasions. A criterion of 6.0 OU is applicable for a population of ten (10) people.

The range of modelling results at the proposed site are shown in **Table 4** and compared with the relevant odour impact assessment criteria; the contours are illustrated on **Drawing 2**, **Appendix A**.

**Table 4** *99th Percentile Model Results, Range of Ground Level Odour Concentrations within Proposed Subdivision*

| **General Area within Subdivision** | **99th percentile Peak to Mean Ground level odour concentration** Range of results within site section (OU) |
|---|---|
| Southern portion: nearest proximity to poultry sheds | 3.0 to <5.0 |
| Central portion | 2.0 to 3.0 |
| Northern portion | <2.0 |

OU = Odour Units

The modelling results indicate that the ground level odour concentrations within the proposed subdivision site are unlikely to exceed the most stringent odour impact criterion of 5.0 OU in any portion of the site based on the collected sample results and the parameters used. It is noted that the monitoring was undertaken during relatively cool and still conditions that are considered to have resulted in odour impact at site.

It is noted that these modelling results are slightly higher than those obtained in the previous assessment (Ref [1]).

## 6 CONCLUSIONS AND RECOMMENDATIONS

RCA Australia (RCA) was requested by the owner of the site to complete a Quantitative Odour Impact Assessment for a proposed nineteen (19) Lot residential subdivision development at 792 Seaham Road, Seaham NSW.

RCA's previous assessment (Ref [1]) identified that while there was a number of potential odour sources within the area that only the two (2) poultry farms situated at a distance of 430m (minimum) from the development site had potential to cause an adverse impact at the site. Dispersion modelling (Ref [1]) undertaken on the basis of typical odour emission values indicated that there would be no adverse odour impact within the boundaries of the site.

In accordance with Council's request to undertake further assessment to 'ground truth' the values used as part of the modelling, RCA have undertaken further "Level 2" (Ref [3]) assessment which has included an inspection and collection of samples for odour analysis from the two (2) poultry operations, and dispersion modelling.

Results of the odour sampling, undertaken at one (1) location in vicinity of the sheds and at three (3) ambient locations downwind of the odour sources, indicated substantial odours within the sheds however that odours were not able to be detected at any of the ambient sampling locations. Monitoring was undertaken when all of the sheds were occupied with poultry, four (4) out of the six (6) exhaust fans were in operation (chicken sheds); the turkey sheds were operating in natural ventilation mode and between 9.12 a.m to 1.41 p.m in appropriate weather conditions. As such it is considered that the samples are representative of the potential for odour impact for most poultry operations although it is noted that RCA performed the odour modelling as best as practicable to represent worst case conditions i.e. incorporating an allowance for all (6) fans operating on all (4) chicken sheds at the same time. It should be noted that this seldomly occurs, i.e the maximum six (6) fans are running only (approximately) 5% of the shed operational time at the chicken sheds.

The dispersion modelling indicates that, based on the sample results, the peak odour level within the development would be <5OU which is less than the residential land use criterion with thirty (30) people (Ref [3]). Accordingly, there is also no portion of the site with peak odour levels greater than 6OU, the residential land use criterion with ten (10) people (Ref [3]).

As such it is considered that there will be no adverse impact of odour at the proposed development which is considered to pose a constraint to the development of the site for the proposed residential use. It is noted that odour is subjective and that there may be isolated incidences in which odour is just detected by some persons and not offensive, and based on the odour sampling methodology, odour results obtained and the dispersion modelling it is considered that these odour levels (i.e. just detected by some persons and not offensive) will be limited to rare times when worse case conditions occur. In most weather conditions odours from the poultry operations will not be detected within the proposed development. RCA does not consider that there is any need to conduct additional odour assessments for the proposed development.

It is noted that there are currently no mitigation factors for potential odour at the development site; development of the site is likely to cause a disruption to the air flow by the positioning of structures in certain areas of the site. However it also noted that foliage within the poultry farms would assist in mitigating odour emissions. All air emissions including odour are known to be reduced by foliage.

Although this assessment concludes that there will be no adverse impact of odour at the proposed development from the nearby poultry operations, the previous recommendation shown in Ref [1] for the planting of fast growing trees and shrubs along the western and southern boundaries of the proposed development should be considered by the owner. The foliage would provide additional mitigation of potential odour impacts on the site (during rare times when worse case conditions occur) as well as potential noise impacts from traffic movements along Seaham Road.

## 7 LIMITATIONS

This report was prepared for Mr Brett Statham in accordance with the agreement between RCA dated 20 April 2021. The services performed by RCA have been conducted in a manner consistent with that generally exercised by members of its profession and consulting practice.

This report has been prepared for the sole use of Mr Brett Statham. The report may not contain sufficient information for purposes of other uses or for parties other than Mr Brett Statham. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without permission.

The air dispersion modelling was carried out using a limited amount of information. Dispersion models are still under significant development in particular with respect to the forecasting of average concentrations (typically over one hour of steady state meteorology). The natural variability caused by atmospheric turbulence and imprecise input parameters can limit the accuracy of a good model. However, standard dispersion models such as AUSPLUME are considered to be reasonable tools that can be used to predict behaviour over a large number of like events.

It is noted that the only air emission assessed within this study for the proposed facility is odour; and no other air emissions such as dust. Odour can be a complex mixture of gaseous emissions for example sulphurous and ammonia based compounds, but this assessment (including the modelling) focuses on the general emission of “odour” and not details about the individual compounds that comprise the odour.

Yours faithfully

**RCA AUSTRALIA**

Martin Belk
Associate Environmental Engineer

Fiona Brooker
Manager of Environmental Services

## REFERENCES

[1] RCA Australia, *Odour Impact Assessment, Proposed Subdivision, 792 Seaham Road Seaham NSW*, RCA 15111-402/1, November 2020.

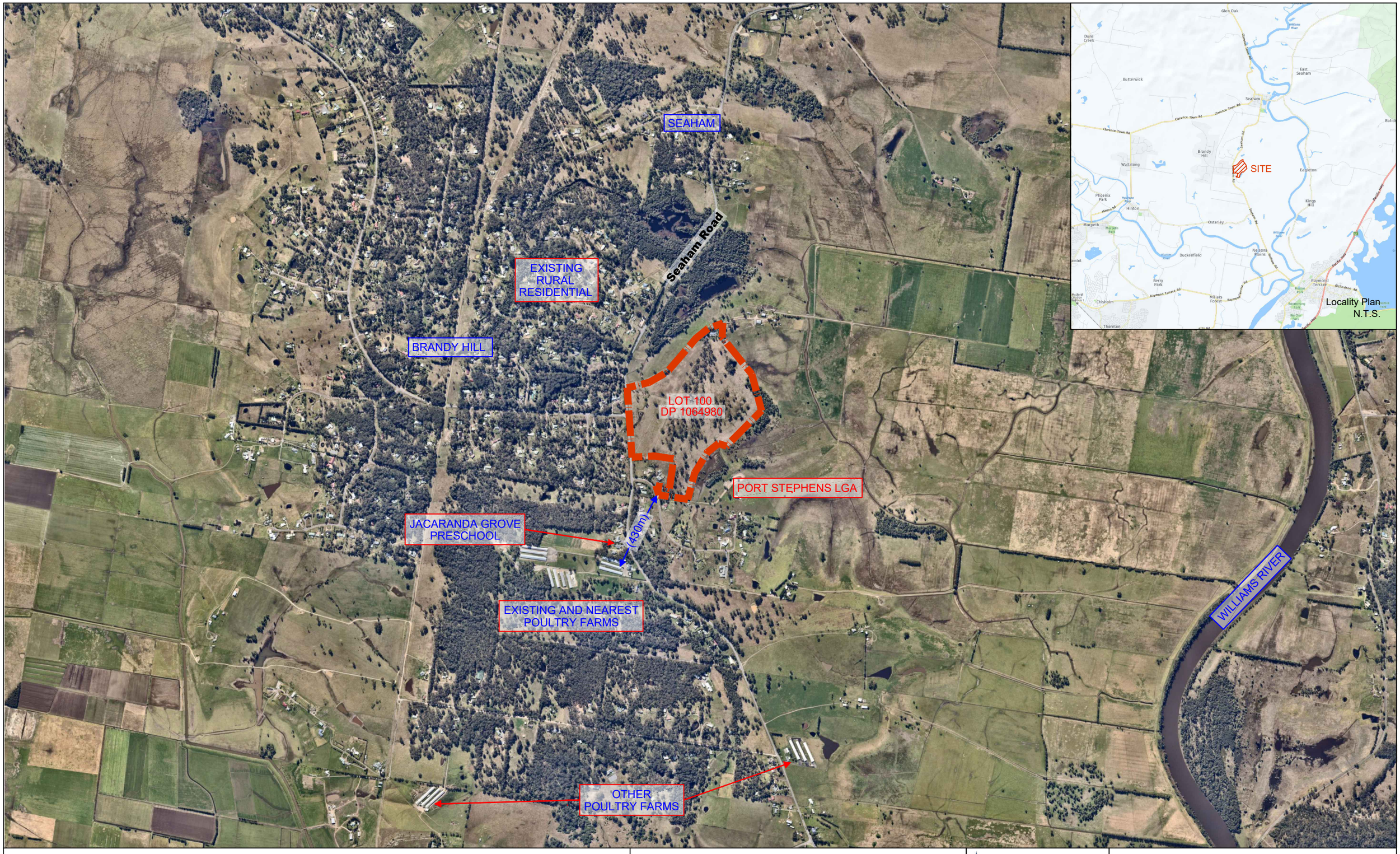
[2] RCA Australia, *Proposed Methodology for Revised Odour Assessment, Seaham NSW*, 15111a-102, April 2021.

[3] NSW EPA, *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*, January 2017.

[4] AS/NZS4323.3:2001- ‘*Determination of Odour Concentration by Dynamic Olfactometry*’

# Appendix A

Drawings




LEGEND

Site location, Lot 100 DP1064980

NOTE: Aerial image taken from Nearmap, 6 August 2021 (used in accordance with commercial licence)

0 200 400 600 800 1000
metres

N

RCA AUSTRALIA
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LOCALITY AND LAYOUT PLAN
REVISED AND QUANTITATIVE ODOUR IMPACT ASSESSMENT
PROPOSED SUBDIVISION
792 SEAHAM ROAD
SEAHAM NSW

| | | | | | |
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| CLIENT | Mr B Statham C/- Le Motte Group | | | RCA Ref | 15111a-401/2 |
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| APPROVED BY | FB | DATE | 8/11/2021 | OFFICE | NEWCASTLE |

CDT-DWG-A3H-001/1

EXISTING RURAL RESIDENTIAL

BRANDY HILL

Seaham Road

LOT9 LOT18 LOT8 LOT10 LOT17 LOT7 LOT6 LOT11 LOT16 LOT5 LOT12 LOT15 LOT4 LOT3 LOT13 LOT14 LOT2 LOT1 LOT19

PROPOSED ROAD

11 10

PORT STEPHENS LGA

JACARANDA GROVE PRESCHOOL

9

(430m)

EXISTING AND NEAREST POULTRY FARMS

4 5 6

3 2 1

4 3 2 1

LEGEND

Site location, Lot 100 DP1064980

Contour lines are odour concentrations expressed in odour inits (OU) at ground level

Turkey farm shed number

Chicken farm shed number

Ambient odour sample location

NOTE: Aerial image taken from Nearmap, 6 August 2021
(used in accordance with commercial licence)

0 100 200 300 400 500
metres

N

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

LOCALITY AND LAYOUT PLAN
REVISED AND QUANTITATIVE ODOUR IMPACT ASSESSMENT
PROPOSED SUBDIVISION
792 SEAHAM ROAD
SEAHAM NSW

| | | | | | |
|---|---|---|---|---|---|
| CLIENT | Mr B Statham C/- Le Motte Group | | | RCA Ref | 15111a-401/2 |
| DRAWN BY | MB | SCALE | 1:10000 (A3) | DRAWING No 2 | REV 0 |
| APPROVED BY | FB | DATE | 8/11/2021 | OFFICE | NEWCASTLE |

CDT-DWG-A3H-001/1

# Appendix B

External Laboratory Report – Odour Testing

THE ODOUR UNIT

**SYDNEY**
Level 3 Suite 12
56 Church Avenue
MASCOT, NSW, 2020
Phone: +61 2 9209 4420
A C N 091 165 061
A B N 53 091 165 061

**BRISBANE**
Unit 2
57 Neumann Road
CAPALABA QLD 4157
Phone: +61 7 3245 1700
A C N 87 102 255 765
A B N 102 255 765

Website: www.odourunit.com.au

Martin Belk
RCA Australia
92 Hill Street
CARRINGTON NSW 2294

20 October 2021

by email: martin.b@rca.com.au

**ODOUR LABORATORY TESTING RESULTS SUMMARY – 1 OCTOBER 2021**

Dear Martin,

Please find **appended** the odour laboratory analysis results from the gas samples collected on 30 September 2021 at the following locations:

- The poultry farm located at 667 Seaham Road, Seaham, New South Wales; and
- The turkey farm located 683 Seaham Road, Seaham New South Wales.

A summary of the odour testing results is **appended** as **Table 1**.

Yours sincerely,

Alex Schulz
NSW Laboratory Coordinator

**Attachments:**

- Table 1 - Odour testing results summary: 1 October 2021; and
- Odour laboratory results report: 1 October 2021.

**Table 1** – Odour testing results summary: 1 October 2021

| Sample Location | Sample ID | Odour Concentration (ou) | Specific Odour Emission Rate ($ou.m^3/m^2/s$) | Odour Character | Sampling Notes |
|---|---|---|---|---|---|
| **667 Seaham Road, Seaham** | | | | | |
| Sample 1 – Poultry Shed 1 | SC21653 | 128 | | ammoniacal, feathers, bird | Mechanically ventilated shed in tunnel mode during sampling<br>Floor area = 1,147 $m^2$<br>Bird count = 9,700 birds<br>Number of fans operating during sampling = 4 |
| Sample 2 – Poultry Shed 2 (1 of 2) | SC21654 | 108 | | ammoniacal, feathers, bird | Mechanically ventilated shed in tunnel mode during sampling<br>Floor area = 1,147 $m^2$<br>Bird count = 9,870 birds<br>Number of fans operating during sampling = 4 |
| Sample 3 – Poultry Shed 2 (2 of 2) | SC21655 | 128 | | ammoniacal, feathers, bird | Mechanically ventilated shed in tunnel mode during sampling<br>Floor area = 1,147 $m^2$<br>Bird count = 9,870 birds<br>Number of fans operating during sampling = 4 |
| Sample 4 – Poultry Shed 4 | SC21656 | 99 | | ammoniacal, feathers, bird | Mechanically ventilated shed in tunnel mode during sampling<br>Floor area = 1,403 $m^2$<br>Bird count = 16,080 birds<br>Number of fans operating during sampling = 4 |
| Sample 9 – 33 m Downwind of Turkey Farm Shed 4 | SC21650 | < 16 | | musty | Wind direction SE, 0.5 - 0.8 m/s |
| Sample 10 – Ambient Downwind at the Southern Boundary of the Proposed Development | SC21649 | < 16 | | musty | At the southern of the Proposed Development boundary |
| Sample 11 – Ambient Downwind of the Proposed Development: 20 m from Southern Boundary | SC21648 | < 16 | | musty | 20 m from Sample 10 location |
| Sample 12 – Point Source Blank (Poultry Farm) | SC21651 | < 16 | | musty | Blank<br>Sampled 01.10.2021 |
| **683 Seaham Road, Seaham** | | | | | |
| Sample 5 – Turkey Shed 2 (1 of 2) | SC21657 | 1,880 | 1.14 | ammoniacal, feathers, bird | Naturally ventilated sheds.<br>Fans can be switched on during very warm periods. |
| Sample 6 – Turkey Shed 2 (2 of 2) | SC21658 | 2,660 | 1.61 | ammoniacal, feathers, bird | Naturally ventilated sheds.<br>Fans can be switched on during very warm periods. |
| Sample 7 – Turkey Shed 1 | SC21659 | 2,440 | 1.47 | ammoniacal, feathers, bird | Naturally ventilated sheds.<br>Fans can be switched on during very warm periods. |
| Sample 8 – Turkey Shed 6 | SC21660 | 3,160 | 1.91 | ammoniacal, feathers, bird | Naturally ventilated sheds.<br>Fans can be switched on during very warm periods. |
| Sample 13 – Isolation Flux Hood Blank (Turkey Farm) | SC21652 | < 16 | < 0.01 | musty | Blank<br>Sampled 01.10.2021 |

# THE ODOUR UNIT PTY LTD

THE ODOUR UNIT

Level 3 Suite 12
56 Church Avenue
MASCOT NSW 2020

Phone: +61 2 9209 4420
Email: info@odourunit.com.au
Internet: www.odourunit.com.au
ABN: 53 091 163 061

NATA
Accreditation Number: 14974

## Odour Concentration Measurement Report

The measurement was commissioned by:

| | | | |
|---|---|---|---|
| Organisation | RCA Australia | Telephone | 02 4902 9216 |
| Contact | M. Belk | Facsimile | -- |
| Sampling Site | Undisclosed | Email | martin@rca.com.au |
| Sampling Method | Undisclosed | Sampling Team | RCA |

Order details:

| | | | |
|---|---|---|---|
| Order requested by | M. Belk | Order accepted by | M. Assal |
| Date of order | 20 September 2021 | TOU Project # | N1865R.03 |
| Order number | PO40001403 | Project Manager | M. Assal |
| Signed by | Refer to correspondence | Panel 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/New Zealand Standard: Stationary source emissions – *Part 3*: '*Determination of odour concentration by dynamic olfactometry* (AS/NZS4323.3). The odour perception characteristics of the panel within the presentation series for the samples were analogous to that for butanol calibration. 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 at 22 °C ±3 °C.

**Measuring Dates**
The date of each measurement is specified with the results.

**Instrument Used**
The olfactometer used during this testing session was:
TOU-OLF-004.

**Instrumental Precision**
The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the AS/NZS 4323.3.
$r = 0.280$ Compliance – Yes

**Instrumental Accuracy**
The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the AS/NZS 4323.3.
$A = 0.076$ Compliance – Yes

**Lower Detection Limit (LDL)**
The LDL for the olfactometer has been determined to be 16 ou, which is 4 times the lowest dilution setting.

**Traceability**
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. 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. Note Disclaimers on last page of this document.

**Accredited for compliance with ISO/IEC 17025 - Testing.**
**This report shall not be reproduced, except in full.**

Date: Tuesday, 20 October 2021

Panel Roster Number: SYD20211001_088

**A. Schulz**
Authorised Signatory

# THE ODOUR UNIT PTY LTD

Accreditation Number: 14974

**Odour Sample Measurement Results**
**Panel Roster Number: SYD20211001_088**

| Sample Location | TOU Sample ID | Sampling Date & Time | Analysis Date & Time | Panel Size | Valid ITEs | Sample Odour Concentration (ou) | Specific Odour Emission Rate ($ou.m^3/m^2/s$) |
|---|---|---|---|---|---|---|---|
| Sample #11 – Ambient Downwind of Proposed Development: 20 m from Southern Boundary | SC21648 | 30.09.2021 1341 hrs | 01.10.2021 0949 hrs | 4 | 8 | < 16 | - |
| Sample #10 – Ambient Downwind at the Southern Boundary of the Proposed Development | SC21649 | 30.09.2021 1333 hrs | 01.10.2021 1010 hrs | 4 | 8 | < 16 | - |
| Sample #9 – Downwind of Turkey Farm Shed 4 (33 m) | SC21650 | 30.09.2021 1248 hrs | 01.10.2021 1031 hrs | 4 | 8 | < 16 | - |
| Sample #12 – Point Source Blank (Poultry Farm) | SC21651 | 01.10.2021 1002 hrs | 01.10.2021 1053 hrs | 4 | 8 | < 16 | - |
| Sample #13 – Isolation Flux Hood Blank (Turkey Farm) | SC21652 | 01.10.2021 1055 hrs | 01.10.2021 1119 hrs | 4 | 8 | < 16 | < 0.01 |
| Sample #1 – Poultry Shed 1 | SC21653 | 30.09.2021 0912 hrs | 01.10.2021 1151 hrs | 4 | 8 | 128 | - |
| Sample #2 – Poultry Shed 2 (1 of 2) | SC21654 | 30.09.2021 0923 hrs | 01.10.2021 1255 hrs | 4 | 8 | 108 | - |
| Sample #3 – Poultry Shed 2 (2 of 2) | SC21655 | 30.09.2021 0928 hrs | 01.10.2021 1323 hrs | 4 | 8 | 128 | - |
| Sample #4 – Poultry Shed 4 | SC21656 | 30.09.2021 0943 hrs | 01.10.2021 1351 hrs | 4 | 8 | 99 | - |

**Samples Received in Laboratory –** From: TOU Date: 01.10.2021 Time: 0900 hrs

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

1. The collection of samples by the methods of AS/NZS 4323.4 and the calculation of 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: SYD20211001_088**

| Sample Location | TOU Sample ID | Sampling Date & Time | Analysis Date & Time | Panel Size | Valid ITEs | Sample Odour Concentration (ou) | Specific Odour Emission Rate ($ou.m^3/m^2/s$) |
|---|---|---|---|---|---|---|---|
| Sample #5 – Turkey Shed 2 (1 of 2) | SC21657 | 30.09.2021 1146 hrs | 01.10.2021 1442 hrs | 4 | 8 | 1,880 | 1.14 |
| Sample #6 – Turkey Shed 2 (2 of 2) | SC21658 | 30.09.2021 1200 hrs | 01.10.2021 1511 hrs | 4 | 8 | 2,660 | 1.61 |
| Sample #7 – Turkey Shed 1 | SC21659 | 30.09.2021 1158 hrs | 01.10.2021 1538 hrs | 4 | 8 | 2,440 | 1.47 |
| Sample #8 – Turkey Shed 6 | SC21660 | 30.09.2021 1304 hrs | 01.10.2021 1604 hrs | 4 | 8 | 3,160 | 1.91 |

**Samples Received in Laboratory –** From: TOU Date: 01.10.2021 Time: 0900 hrs

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

1. The collection of samples by the methods of AS/NZS 4323.4 and the calculation of 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 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/NZS 4323.3 (Yes / No) |
|---|---|---|---|---|---|---|
| n-butanol | SYD20211001_088 | 51,000 | $20 \leq \chi \leq 80$ | 724 | 70 | Yes |

Comments

Odour characters (non-NATA accredited) as determined by odour laboratory panel:

SC21648 musty
SC21649 musty
SC21650 musty
SC21651 musty
SC21652 musty
SC21653 ammoniacal, feathers, birds
SC21654 ammoniacal, feathers, birds
SC21655 ammoniacal, feathers, birds
SC21656 ammoniacal, feathers, birds
SC21657 ammoniacal, feathers, birds
SC21658 ammoniacal, feathers, birds
SC21659 ammoniacal, feathers, birds
SC21660 ammoniacal, feathers, birds

Disclaimers

1. Parties, other than The Odour Unit Pty Ltd, responsible for collecting odour samples have advised that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing.
2. 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.
3. Any comments included in, or attachments to, this Report are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd.
4. This report shall not be reproduced, except in full, without written approval of The Odour Unit Pty Ltd.

Report Status

| Status | Version | Date | Prepared by | Checked by | Change | Reason |
|---|---|---|---|---|---|---|
| Draft | 0.1 | 13.10.2021 | AS | IF | - | - |
| Final | 1.0 | 20.10.2021 | IF | MA | Minor update | Typographical error |
| Revised | - | - | - | - | - | - |

**END OF DOCUMENT**

# Appendix C

## Details of Meteorological File for Air Dispersion Modelling

TODOROSKI AIR SCIENCES
Suite 2B, 14 Glen Street Eastwood, NSW 2122
Phone: 02 9874 2123
Fax: 02 9874 2125
Email: info@airsciences.com.au
Web: www.airsciences.com.au
ACN: 151 202 765 | ABN: 74 955 076 914

7 October 2020

Martin Belk
Associate Environmental Engineer
RCA Australia
Via email: martinb@rca.com.au

**RE: AUSPLUME meteorological data file – Seaham, NSW**

Dear Martin,

As per your request we have processed an AUSPLUME meteorological data file for 792 Seaham Road, Seaham, NSW. The 2018 simulation year was selected as suitably representative from a review of the last five years of meteorological data at the nearest Bureau of Meteorology (BOM) stations at Paterson (TOCAL) AWS, Williamtown RAAF and the NSW Department of Planning, Industry and Environment (DPIE) Bersefield station.

The generation of the AUSPLUME meteorological data file utilised the TAPM model.

A summary of the modelling and outputs is provided below:

| | |
|---|---|
| TAPM (V4.0.4) simulation | Seaham, NSW |
| Client | Martin Belk, RCA Australia |
| Year of simulation | 1 January 2018 – 31 December 2018 |
| Observation stations | DPIE Beresfield 374625 mE, 6370446 mS |
| | BOM Paterson 367908 mE, 6388899 mS |
| | BOM Williamtown 390998 mE, 6371038 mS |
| Number of grids | 4 grids |
| Grid spacing | 30km, 10km, 3km, 1km |
| Post-processing output | AUSPLUME meteorological data file (1km grid) |
| | Name: Seaham.apl |
| | Location: 379708 mE, 6381242 mS |

Yours faithfully,

Todoroski Air Sciences

Katie Trahair

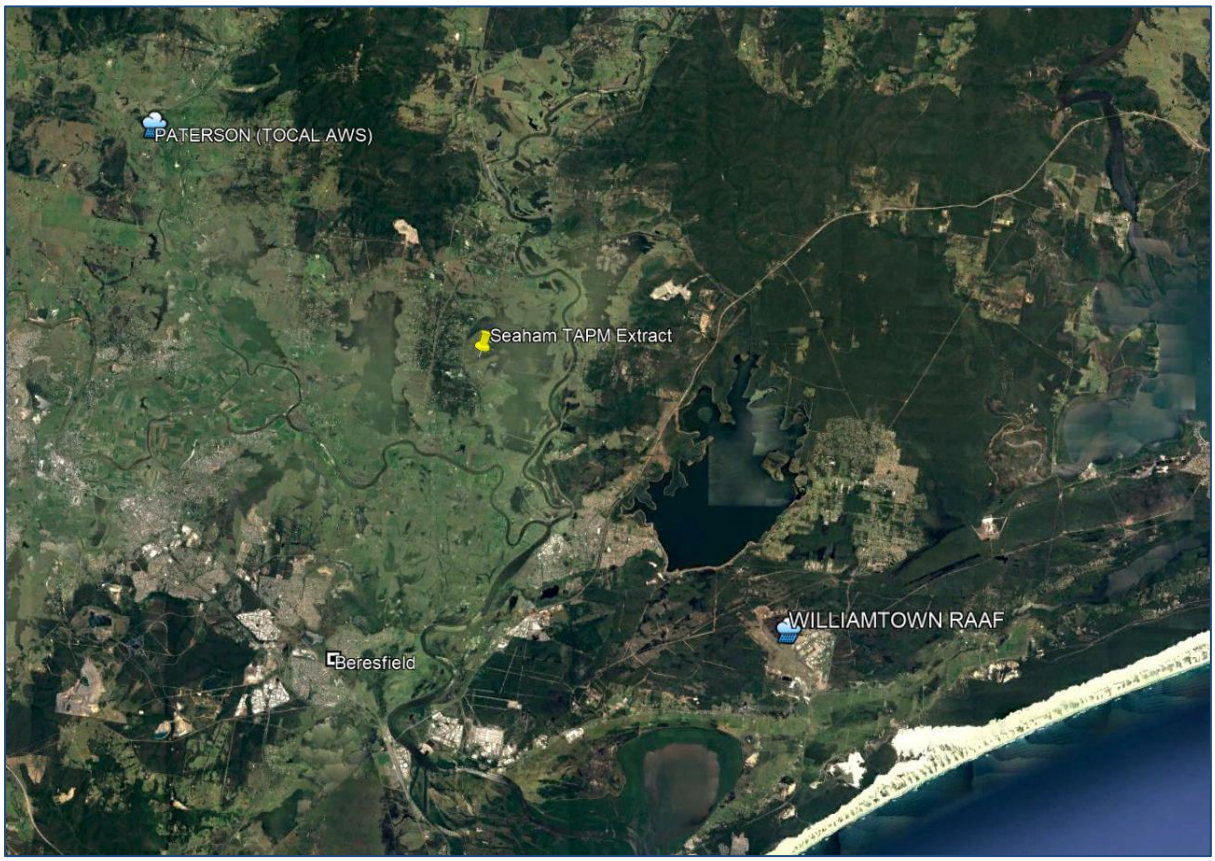


**Figure 1: Location of site**

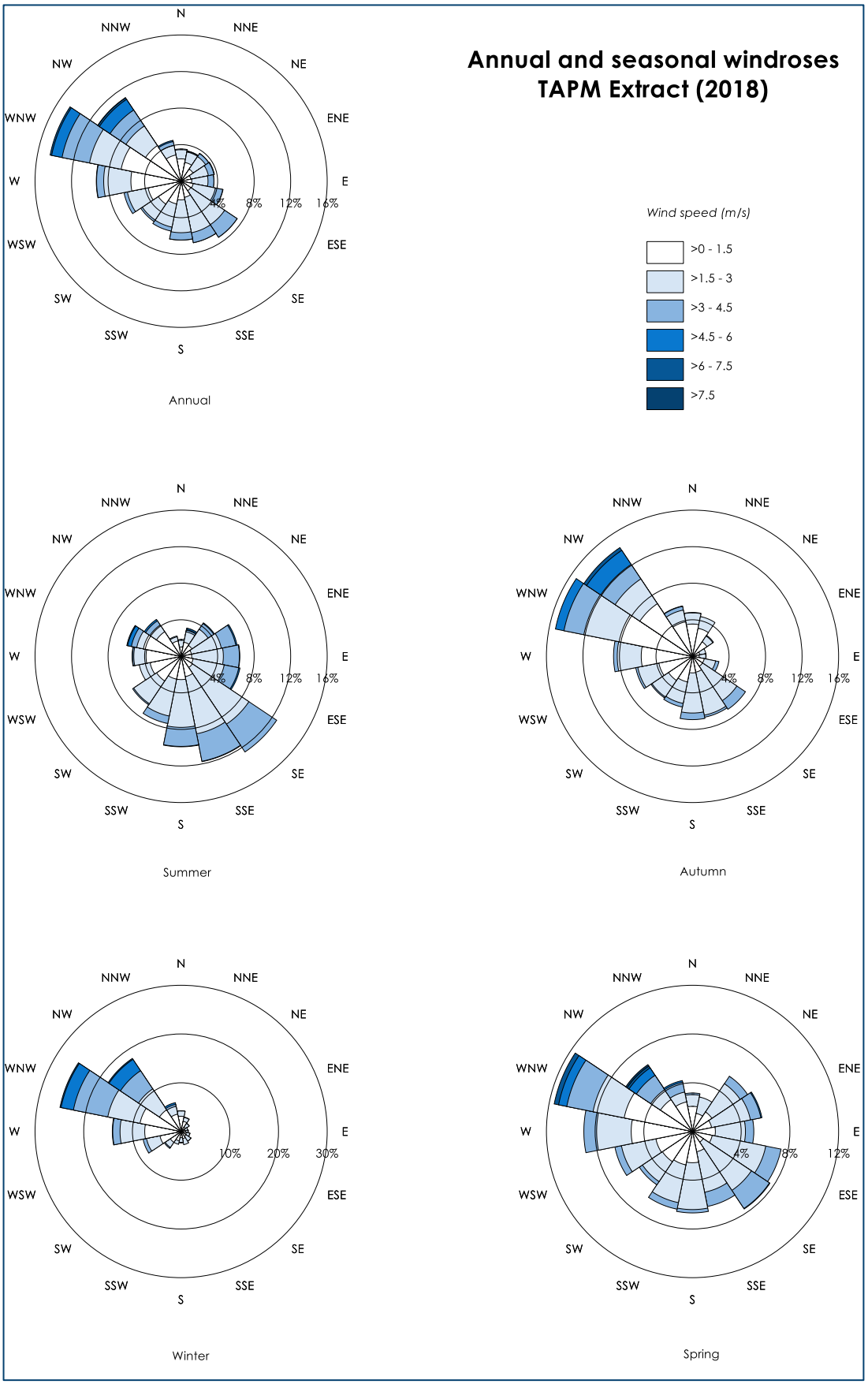


**Figure 2: Annual and seasonal windrose (2018)**