

ODOUR IMPACT ASSESSMENT

PROPOSED SUBDIVISION, 792 SEAHAM ROAD SEAHAM NSW

Prepared for Mr B Statham

Prepared by RCA Australia

RCA ref 15111- 402/1

NOVEMBER 2020



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RCA ref 15111 – 402/1

17 November 2020

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

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Engineering Geology

Environmental Engineering

Hydrogeology

Construction Materials Testing

Environmental Monitoring

Sound & Vibration

Occupational Hygiene

**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 an Odour Impact Assessment for a proposed development (a subdivision) at Seaham NSW. The site is described as 792 Seaham Road, Seaham and Lot 100 and DP1064980.

RCA understands that the owner of the site is seeking to rezone the land for a nineteen (19) Lot subdivision for residential use and as part of Council's conditions following the anticipated gateway approval an odour assessment will be required.

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 identify whether there is potential for odour impacts at the site which may pose a constraint to the proposed development of the site.

The following sections outline RCA's methodology, and results of the odour impact assessment. It is noted the only air emission required in this assessment is odour; and no other emissions such as dust. 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 ODOUR ASSESSMENT METHODOLOGY

RCA's methodology involved:

- Consideration of odour sources based on aerial photographs.
- An inspection of the property and area immediately surrounding the property.
- Research into odour emission rates for the sources of odour which may impact at the site.
- Odour dispersion modelling using NSW EPA approved methodology and the most appropriate protocol for odour assessments of this type (Ref [1]).

RCA's assessment approach is a "Level 2" as defined in the NSW EPA methods (Ref [1]) Note that other poultry operations in the area as shown in **Drawing 1, Appendix A** were considered to be outside the influence of the odours generated from the poultry operations on the property and have not been modelled.

Details of the inspection and modelling are shown in the following sections.

3 POTENTIAL ODOUR EMISSIONS AND SOURCE LOCATIONS

Based on review of aerial photography for the area, RCA considers that potential odours that could potentially impact on the proposed residential development of the site are:

- Odours from poultry operations. There are a number of poultry sheds in the area, the nearest "cluster" of poultry sheds are located approximately 430m to the southwest of the site (refer **Drawing 1, Appendix A**) and **Figure 1** below.
- 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.
 - There is no data for traffic volumes on Seaham Road however Transport for NSW (Ref [2]) indicate that traffic on Raymond Terrace Road to the south of the site was 10,877 vehicles per day in 2018 and documents related to a recently approved quarry expansion application states that Brandy Hill Drive, which intersects with Seaham Road opposite the site, is subject to between 1681 (Ref [3]) and 2166 (Ref [4]) vehicles per day with between 14% (Ref [3]) and 19.6% (Ref [4]) which are heavy vehicles. Traffic on Brandy Hill Drive would also travel on Seaham Road either from north/south or entering to the north/south and would potentially impact at the site. It is noted that the traffic impact assessment for the quarry expansion (Ref [3]) notes that the vehicle increase associated with the quarry would be 524 vehicles per day and has modelled 100 vehicles per day entering/leaving Brandy Hill Drive from/to the south along Seaham Road.
- Minor odour emissions originating from residences, e.g. cooking odours. These odours were not considered by RCA to be significant for the purposes of this assessment as this is the case for every residential development.
 - It is noted that all air emissions including odours are known to diminish over distance and odours from the existing residences would be insignificant at the site due to the minimum lateral distances involved (approximately 100m) between the residences and the site.

RCA considered, based on experience with conducting similar odour assessments, that the main contributor to odour within the site is from odours produced from the nearest cluster of poultry sheds. As such, odour modelling was only conducted for the poultry operations. This 'nearest' cluster of ten (10) sheds located to the southwest of the site comprise the following operations, as checked by RCA from research and satellite images:

- *Six (6) sheds for growing turkeys* – these are located within the “Karingal” farm at 683 Seaham Road, Nelsons Plains as shown in **Figure 1** below. From RCA’s observations and research the sheds appear to be the “natural ventilated” design incorporating modern features.
- *Four (4) sheds for growing chickens* – these are located within the poultry farm at 667 Seaham Road, Nelsons Plains as shown in **Figure 1** below. From RCA’s observations and research the sheds appear to be the “tunnel ventilated” design.

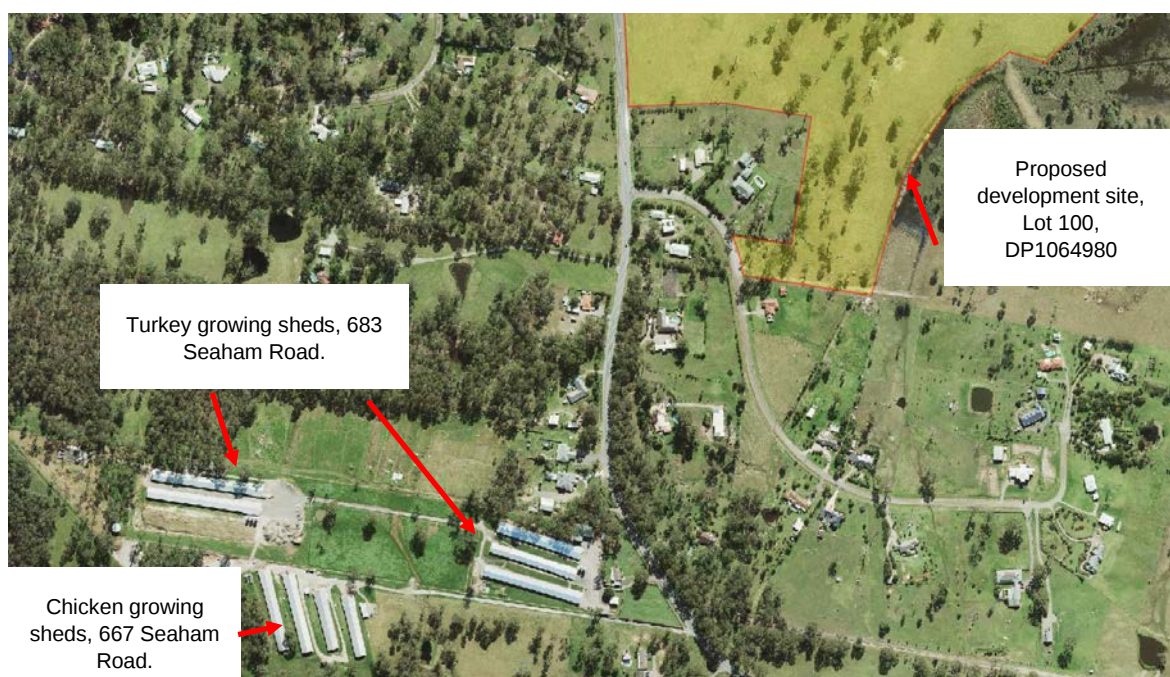


Figure 1 *Location of poultry operations modelled with regards to potential odour impact at 792 Seaham Road, Seaham NSW (based on SixMaps).*

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

4 PROPERTY INSPECTION AND FINDINGS

RCA carried out a site inspection from 7 am until 11 am on Wednesday 7 October 2020 to obtain information that was essential for the assessment and odour modelling, including:

- Subjective odour observations from poultry operations nearby and from traffic along the roadway adjacent to the property (Seaham Road including intersection with Brandy Hill Drive).

- Visual observations that may affect the propagation and mitigation of odours, for example terrain and foliage within, and surrounding the property.

The weather conditions on the day of inspection were considered suitable for odour observations: fine and mild with no rain or mist and very light (9 km/h to 13 km/h) winds from the south (as stated by Elders weather website for Maitland Airport, the weather station nearest to this site). The wind direction was considered suitable for odour observations as the property was downwind of the nearest poultry operations.

RCA did not undertake a traffic count however notes that the traffic impact assessment for the quarry (Ref [3]) identified the peak morning traffic times as:

- Quarry AM peak period – 6 am – 7 am.
- Road network AM peak period – 8 am – 9 am.

As such it is considered that the inspection was undertaken within the period of peak traffic volumes adjacent to the site.

RCA undertook odour observations along the boundaries and at various locations within the property to assess whether the odour levels within the property were likely to approach or exceed the odour impact criteria.

No odours were observed by RCA during the site inspection.

The terrain of the site was a gentle slope with the lowest portion of the site at the western boundary and gaining elevation to the east, to the south and to a lesser extent to the north.

The site was grassed with only scattered trees in some areas of the site with one small clump situated in the western section of the site adjacent to the neighbouring drive entrance off Seaham Road. More significant foliage was observed on both sides of Seaham Road in close proximity to the poultry facilities.

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 99th percentile nose time average predictions for odour performance criteria. This is in accordance with the method document (Ref [1]) 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 Ref [1] are:

- Meteorological data was sourced from the Williamtown Airport, Beresfield and Paterson meteorological stations, all of which are within approximately 20 km from the site. The data is considered representative of the area surrounding the site. In addition, the 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). Further, section 6.2 of the method document (Ref [1]) 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. Refer to **Appendix B** for additional details.
- The odour data is based on realistic and conservative information, as shown in **Section 5.2**.

Ausplume is widely used in the industry and is recognised by the NSW EPA (Ref [1]). Ausplume is also considered a suitable model to assess the near-field impacts at the proposed development at 792 Seaham Road Seaham NSW and as impacted from the ‘nearest’ poultry operations.

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 [1]). 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 SOURCE CHARACTERISATION AND EMISSIONS INVENTORY

Ten (10) volume sources (poultry sheds) were determined and assessed as sources of odour from the poultry farm cluster. The information including odour emission rates used for each volume source are presented in **Table 1** 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 [1]).

Table 1 Information used in Odour Dispersion Modelling – Poultry sheds near to Seaham subdivision

Odour Source Type and Location	Number of sheds and design type*	Odour emission rate per existing shed, OU.m ³ /s (including peak to mean ratio of 2.3 for modelling)
Poultry farm at 667 Seaham Road	Four (4) sheds, modern tunnel design with temperature control tunnel ventilation. Fans located on shed perimeters.	11,753**
Turkey farm at 683 Seaham Road	Six (6) sheds, natural ventilation design with modern design features.	9,315 (for the 4 larger sheds) and 7,452 (for the 3 smaller sheds)***

* Based on RCA review of from aerial photography, and RCA's visual observations on 7 October 2020.

** Based on an emission rate of 6132 OU.m³/s per 30,000 birds in a ventilated tunnel (Ref [5] and also based on measurements from poultry) and adjusted based on the understood capacity of 100,000 birds (Ref [7]) over the 4 sheds (25,000/30,000) x 6132 = 5,110 OU.m³/s. This was checked against other literature for consistency, then multiplied by the peak to mean ratio of 2.3 for the modelling.

*** Based on the odour rates and factors (Ref [6]) and shed areas estimated from satellite imagery

5.3 DISPERSION MODELLING PARAMETERS

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

A site-specific meteorological data file was developed. The data file includes hourly average values for a period of one (1) year. The data includes:

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

The data was derived using the TAPM Model, driven by data inputs from the Williamstown Airport, Beresfield and Paterson meteorological stations and is therefore considered representative of the area surrounding the proposed development site in accordance with Level 2 assessment definition (Ref [1]).

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

5.4 MODELLING ASSUMPTIONS AND CONSIDERATIONS

A number of assumptions and considerations were used in the odour dispersion modelling for this assessment. Most of these assumptions were based on a conservative approach to be consistent with the aims of this assessment for odour emissions at the off-site receptors and at ground level:

- Other poultry operations in the area as shown in **Drawing 1, Appendix A** were considered to be outside the influence (>1km) of the odour impact to the site.

- The number of birds within the sheds located within the poultry farm at 667 Seaham Road was assumed to be a total of 100,000 birds (across 4 sheds) based on the shed sizes (as determined by aerial photography for the whole year and information shown in Ref [7]) and assuming an 'old' batch would be replaced with a new batch. Further, given that these sheds are the "tunnel" ventilation design which incorporates fans on the roof, RCA allowed for the maximum number of fans operating at any time to represent 'worst case' odour emission rates for these sheds.
- The odour rate for the six (6) sheds at 683 Seaham Road was based on the odour factors for a similar odour assessment for turkeys (Ref [7]), and satellite imagery to determine the shed sizes.
- No odour controls were used in the modelling of odour sources, in order to be consistent with a conservative approach in this study.

6 ODOUR MODELLING RESULTS AND DISCUSSION

The odour incremental modelling results are illustrated as a contour plot on **Drawing 2, Appendix A**.

The range of modelling results at the proposed site are shown in **Table 2** and compared with the relevant odour impact assessment criteria.

Table 2 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 at site Range of results within site section (OU)	Impact assessment criterion, (OU) *
Southern portion: nearest proximity to poultry sheds	>2.0 to <3.0	5.0
Majority of site	>1.0 to <2.0	5.0
Northern tip	>0 to <1	5.0

OU = Odour Units

* The criterion (Ref [1]) applies within the subdivision and is based on the "population of affected community". The criterion of 5.0 is conservative and allows for a maximum of 30 people in each Lot, however the realistic number of people at each Lot is expected to be closer to 10 (estimated by RCA). A different and higher criterion of 6.0 odour units could be applied at a specific Lot, if there will be only 10 people within that Lot.

The modelling results indicate that for conservative odour emission data and adverse weather conditions such as a cold, still morning, 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.

7 CONCLUSIONS AND RECOMMENDATIONS

RCA Australia (RCA) was requested by the owner of the site to complete an Odour Impact Assessment for a proposed residential development at 792 Seaham Road, Seaham NSW. The development will comprise nineteen (19) Lot subdivision for residential use and as part of Council's conditions following the anticipated gateway approval an odour assessment will be required.

This Odour Impact Assessment has been undertaken as a "Level 2" assessment in accordance with the Approved Methods (Ref [1]) and comprised a desktop assessment, site inspection and dispersion modelling.

RCA's desktop assessment identified a number of potential odour sources within the area comprising:

- Poultry facilities situated approximately 430m to the south west of the southern most portion of the site.
- Road traffic on Seaham Road and Brandy Hill Drive.

Other potential sources of odour including other poultry facilities, refer **Drawing 1, Appendix A**, were considered beyond the potential impact of odour as these were >1km from the site.

No odours were identified during a site inspection by RCA personnel, noting that the inspection was undertaken when the site was downwind of the poultry facility and in the peak morning traffic flows.

The dispersion modelling indicates 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.

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. It is noted that odour is subjective and that there may be isolated incidences in which odour is considered offensive by some persons however RCA does not consider that there is any need to conduct additional odour assessments for the proposed development.

There is currently no mitigation factors for potential odour at the 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. RCA recommend that planting of fast growing trees and shrubs are undertaken along the western and southern boundaries of the proposed development. Foliage is known to reduce all air emissions, including odour. If the proposed planting is undertaken, these trees are considered to provide additional mitigation of odour impacts on the site as well as potential noise impacts from traffic movements along Seaham Road.

8 LIMITATIONS

This report was prepared for Mr Brett Statham in accordance with the agreement between RCA dated 24 September 2020. 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] NSW EPA, *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*, January 2017.
- [2] <https://www.rms.nsw.gov.au/about/corporate-publications/statistics/traffic-volumes/aadt-map/index.html/?z=15&lat=-32.758863320531425&lon=151.75274538158416&pco=1&pcl=1&sco=1&scl=1&nd=0&v=0>
- [3] Intersect Traffic, *Traffic Impact Assessment – Brandy Hill Quarries*, Ref 13/024, June 2016 sourced from majorprojects.planningportal.nsw.gov.au
- [4] Voice of Woodville Wallalong inc, *Re: Submission by VOWW – SSD 5899 – Brandy Hill Quarry Expansion*, 9 April 2017 sourced from majorprojects.planningportal.nsw.gov.au.
- [5] The Odour Unit, *Odour Impact & Dispersion Modelling Assessment of Proposed Free-Range Egg Layer Farm*, January 2013.
- [6] SLR Consulting, *Odour Assessment, 50 Tahmoor Road, Tahmoor*, Ref 610.18020-R01, April 2018
- [7] <https://www.commercialrealestate.com.au/property/667-seaham-road-nelsons-plains-nsw-2324-2016515011>

Appendix A

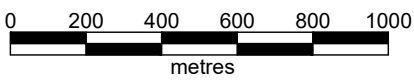
Drawings



LEGEND

 Site location, Lot 100 DP1064980

NOTE: Aerial image taken from Nearmap, 23 September 2020
(used in accordance with commercial licence)



 GEO TECHNICAL • ENVIRONMENTAL		LOCALITY AND LAYOUT PLAN ODOUR IMPACT ASSESSMENT PROPOSED SUBDIVISION 792 SEAHAM ROAD SEAHAM NSW	
CLIENT	Mr B Statham C/- Le Motte Group	RCA Ref	15111-402/1
DRAWN BY	MB	SCALE	1:20000 (A3)
APPROVED BY	FB	DATE	17/11/2020
		DRAWING No	1
		REV	0
		OFFICE	NEWCASTLE

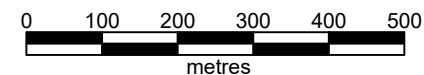


LEGEND

 Site location, Lot 100 DP1064980

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

NOTE: Aerial image taken from Nearmap, 23 September 2020
(used in accordance with commercial licence)



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ODOUR MODELLING CONTOURS AND PROPOSED DEVELOPMENT ODOUR IMPACT ASSESSMENT PROPOSED SUBDIVISION 792 SEAHAM ROAD, SEAHAM NSW			
CLIENT	Mr B Statham C/- Le Motte Group	RCA Ref	15111-402/1
DRAWN BY	MB	SCALE	1:10000 (A3)
APPROVED BY	FB	DATE	17/11/2020
		OFFICE	NEWCASTLE

Appendix B

Details of Meteorological File for Air Dispersion Modelling



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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 Bersefield 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

A handwritten signature in black ink, appearing to read 'Katie Trahair'.

Katie Trahair

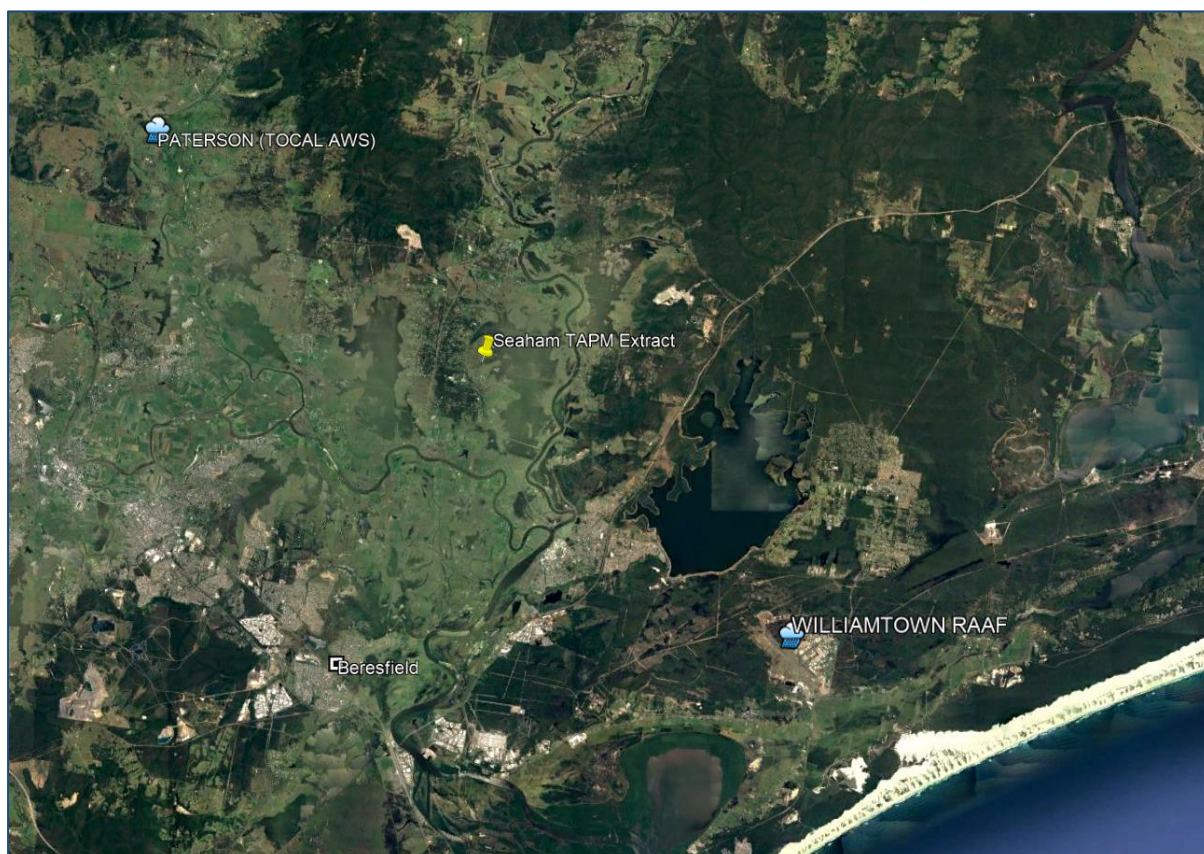


Figure 1: Location of site



Figure 2: Annual and seasonal windrose (2018)