Whittlesea City Council

Broiler Farm, Wollert Precinct

Adverse Amenity Impact Assessment

June 2014

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1. Introduction

GHD was engaged by City of Whittlesea (CoW) to conduct an adverse amenity assessment of the odour risk associated with the broiler farm operated by Wollert Poultry on the development of the Wollert Precinct Structure Plan (PSP).

The purpose of the assessment is to provide an indication of the appropriate buffer[1] constraint on sensitive land uses in the PSP and to assess whether the odour emissions from the current broiler farm affect development in the Wollert PSP.

The Metropolitan Planning Authority (MPA) is the statutory authority responsible for overseeing the preparation of all PSPs in Melbourne's growth areas and advising the Minister for Planning on their approval. The MPA is working in partnership with the CoW to develop the Wollert PSP.

The broiler farm operated by Wollert Poultry is located at 160 Bodycoats Road, Wollert. Figure 1 shows the location of the existing broiler farm, in relation to the Wollert PSP. It comprises of two sheds with a combined stocking capacity of approximately 60,000 birds.

The PSP will outline separation distance considerations for various uses in the Wollert PSP area. In relation to the existing Broiler farm at 160 Bodycoats Road, the MPA were advised that the minimum separation distance (1000 m) required by Approved Measure E1 M1.1 of the Victorian Code for Broiler Farms 2009 (the Code) applies in addition to the minimum separation distance required for farms (250 m for a farm of this size). Thus an overall separation distance of 1250 m was interpreted.

Note that the EPA publication 1518 (Recommended separation distances for industrial residual air emissions) was released in 2013, replacing the 1990 version which specified a separation distance of 500 m for broiler farms. The new buffer guideline defers to the Code for broiler farm separation distances.

GHD propose that the chosen separation distance be revised on the basis of:

1. The size and nature of the farm as operated by Wollert Poultry
2. Considerations of local meteorological conditions (see Approved Measure E1 M1.3 on p 27 of the Code)
3. Considerations of reverse amenity as canvassed in section 11 of the Code

The scope of work for this assessment can be divided into three sections, namely:

1. **Directional Buffers:** The appropriate separation distance to minimise odour impact in the event of an upset or malfunction in farm operation, allowing for the effect of local meteorological conditions.
2. **Broiler Code Criterion:** The modelling of predicted off-site odour impact during normal operations of the farm, and comparison of this prediction to the Code criterion of 5 odour units (3 minute average, 99.9 percentile).
3. **Environmental Risk Assessment (ERA) for most exposed residence:** This part was not originally scoped as it was anticipated that all residences would comply with the Code criterion. However, one residence (#4) showed marginal non-compliance, so an ERA was conducted for that residence only.

[1] The terms buffer distance and separation distance are synonymous and are used interchangeably in this report.

Note that, the appropriate default separation distance as specified in the Code is calculated as a function of the farm capacity. The corresponding buffer area is radial from the envelope of the shed array. However the shape of this buffer area can then be varied to account for the local meteorology without changing the area. The so-called directional buffer is extended in the directions of poor dispersion and retracted in the direction of good dispersion. The advantage is that the directional buffer gives equal protection to sensitive land uses – independent of their direction from the broiler farm.

GHD has developed a methodology[2] to determine directional buffers using the regulatory dispersion model Ausplume 6.0 and a 12 month, hourly meteorological data file. GHD has applied directional buffers in a wide range of planning scenarios and the analysis has been accepted in Planning Panel and VCAT hearings.

The predicted off-site odour impact in this case can be conducted using the current EPA regulatory dispersion model, (now AERMOD as from 1 January 2014), as there is little terrain features between source and sensitive land uses. Model inputs include:

1. Site representative meteorology (12 month dataset at hourly intervals)
2. Shed odour emission rate (OER) expressed as a function of bird age and ambient temperature
3. The release geometry representative of the ventilation regime used in the sheds

GHD will use the EPA meteorological dataset at Craigieburn. Shed OER will be based on measurements conducted on tunnel ventilated broiler farms in Victoria.

1.1 Scope and Limitations

This report: has been prepared by GHD for Whittlesea City Council and may only be used and relied on by Whittlesea City Council for the purpose agreed between GHD and the Whittlesea City Council as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Whittlesea City Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on explicit assumptions made by GHD, described in section 1.2 and throughout the body of this document, and limitations of the modelling software AERMOD. GHD disclaims liability arising from any of the assumptions being incorrect. GHD has prepared this report on the basis of information provided by Whittlesea City Council and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

[2] Enviro 04 P. Clarey and T. Pollock – Integrating Separation Distances with Dispersion Modelling

1.2 Assumptions

The major assumptions used in this assessment are as follows:

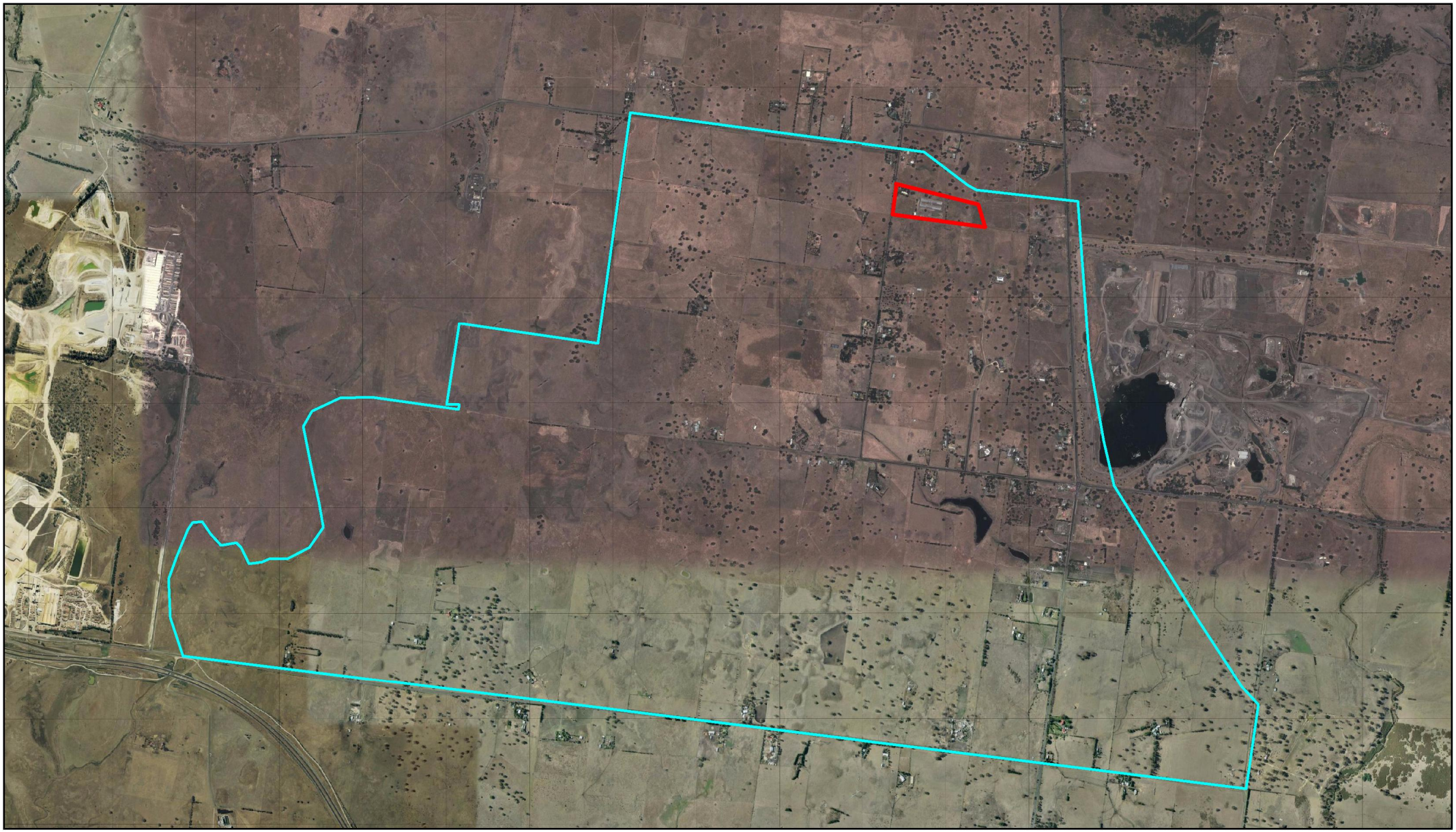
- The birds are grown on an 8 week cycle (56 days). The first harvest occurs at about 35 days where 20% of the birds are removed while there are at least three smaller picks occurring up to day 56.
- The age factor was modelled at unity for weeks 5, 6, 7 and 8, to be conservative.
- A shed cleanout age factor of 0.5 was adopted for two days in week 9. The remaining days in week 9 and 10 were modelled with zero emissions. This value of 0.5 allows for one of the two sheds in the farm to emit at an age factor of unity to account for the shed emissions during cleanout of litter. That is, rather than model the sequence of clean out of individual sheds, all sheds were modelled at one half of the adopted shed cleanout factor.
- During the two week period between batches (shed cleanout), shed cleanout odour emission rate (OER) has been distributed over both sheds in the farm.
- No farm batch stocking time lag between sheds.
- The site representative meteorology for Craigieburn was supplied by EPA.
- The odour dispersion modelling using the EPA approved regulatory dispersion model AERMOD, which was considered appropriate for the location.
- All sheds are naturally ventilated with covered side flaps and a continuous ridgeline slot able to be progressively closed by raising horizontal panels.

Odour emissions from each shed were modelled as variable emission area sources in AERMOD with appropriate, yet conservative, dispersion characteristics.

1.3 Report Structure

The report structure is presented below.

- Site location discussion including surrounding land uses and nearest sensitive receptors
- Outline operation of farm and examine odour complaint history
- Characterisation and analysis of site representative meteorological file
- Discussion on relevant buffer guidelines to examine default and directional buffer
- Shed odour emission rate expressed as a function of bird age and ambient temperature
- Modelling of off-site odour impact using AERMOD
- Comparison of predicted odour impact to odour complaint history – if any
- Recommendations and framework for site specific assessment to calculate a suitable separation distance.



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metres (at A4)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

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Broiler Farm Site Boundary

Wollert PSP Boundary

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City of Whittlesea
Wollet Broiler Farm

Job Number	3131176
Revision	A
Date	07/03/2013

Site Aerial - Broiler farm location in relation to PSP

Figure 1

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Google Earth Imagery 2014. Created by: M.A

2. Site Location and existing Operations

2.1 Site Description – Wollert PSP

PSPs are master plans for communities which can cater for over 30,000 people. PSPs lay out roads, shopping centres, schools parks, housing and employment connections to transport by considering issues of biodiversity, cultural heritage, infrastructure provision and council charges.

The Wollert PSP is 1,540 hectares in size and provides growth opportunities for housing, mixed use town centres and employment opportunities. The PSP area incorporates areas of national and local significance including a major gas transmission easement, a rural conservation zone and various areas of high biodiversity areas.

The Wollert PSP is bordered to the north west by the APA Gasnet compressor station and to the east by the Hanson landfill and quarry.

The broiler farm is located at 160 Bodycoats Road, Wollert as shown in Figure 1. The farm is bounded by Summerhill Road to the north, Epping Road to the east and Boundary Road to the south.

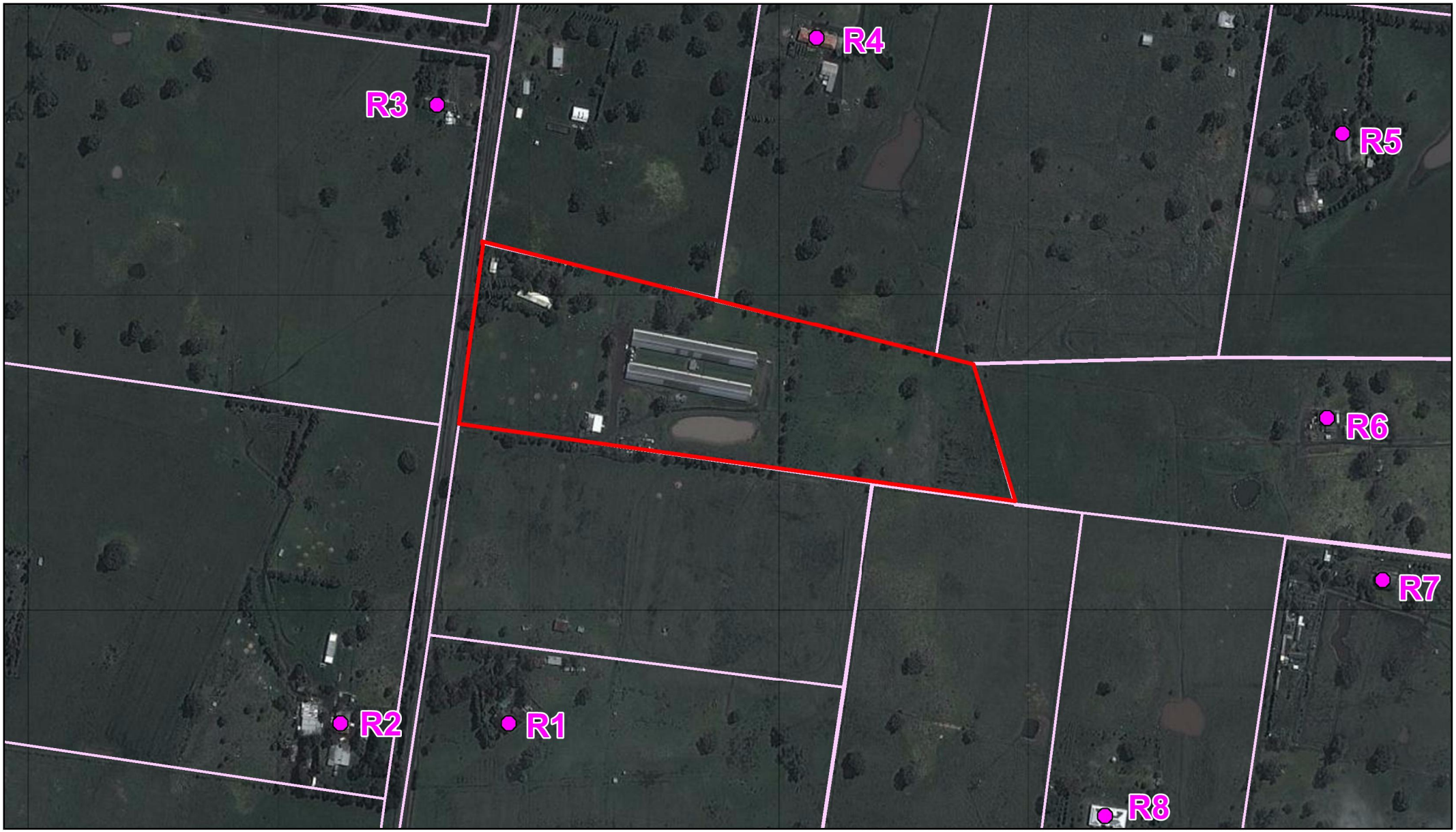
2.1.1 Surrounding land uses

The property containing the farm is located within the City of Whittlesea (CoW) and is situated on land currently zoned for Urban Growth and anticipated for future residential development as shown in the North Growth Corridor Plan (Growth Areas Authority 2012). The land directly surrounding the site is also zoned Urban Growth. Further north, the land is zoned Green Wedge, with Farming to the east and Urban Growth in the west and south.

2.1.2 Sensitive receptors

The definition of a sensitive receptor or sensitive land use is defined by the Code as *'A use that involves the presence of people, causing the use to be sensitive to amenity considerations such as odour, dust and noise. Sensitive uses (also referred in other documents as sensitive land uses) include a dwelling, a dependent persons unit, a residential building, a hospital, a school, a day care centre, a caravan park and other uses involving the presence of people for an extended period'.* Sensitive use does not include recreational areas such as parks and sporting facilities or light industrial uses.

Figure 2 shows the location of the currently existing sensitive receptors in relation to the farm and are marked in pink. The figure identifies a number of isolated rural residences surrounding the farm with the most exposed being the residence (R3) approximately 275 m from the most northern proposed shed. The next nearest receptor (R4) is north of the most northern proposed shed at approximately 300 m.



0 50 100 150
metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

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Site Boundary

Property Boundaries

Sensitive Receptors

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City of Whittlesea
Wollert Broiler Farm

Job Number 3131176
Revision A
Date 07/03/2013

Sensitve Receptors

Figure 2

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Google Earth Imagery 2014. Created by: M.A

2.2 Existing Broiler Farm Operations

A site inspection of the broiler farm at 160 Bodycoats Road Wollert (aerial shown in Figure 3) was undertaken by GHD in the company of the operator Mr Arthur Sovlitas on the morning of 3 March 2014. During this inspection it was confirmed that:

- Farm capacity is 60,000 birds in two sheds, each ~ 125 m long by 15 m wide
- Sheds are naturally ventilated with covered side flaps, and a continuous ridgeline slot able to be progressively closed by raising horizontal panels.

2.2.1 Ventilation

- Shed ventilation is effected by automatically setting (rotating) the side flaps to restrict the aperture of the horizontal side slots so that the set-point temperature in the shed (32ºC - 21ºC dependent on bird age) is met by a natural draft (Figure 4 and Figure 5). Shed exhaust is via a ridgeline vent which can be throttled with a raiseable plate.
- When ambient temperature rises above ~ 24ºC, fogger lines discharge a very fine mist into the shed interior. The mist readily evaporates, cooling the shed air. A total of 16 stirring fans located along the shed ceiling in two banks of eight operate to equalise shed temperature and aid evaporation.
- Shed end doors can also be opened when wind conditions are favourable to aid ventilation and the stirring fans can augment the airflow along the shed (Figure 6).
- Internal shed curtains are used to partition the area in which the birds inhabit while they are small (Figure 6).
- Overhead gas heaters are installed and used when the chicks are first brought into the shed and in cold weather until the birds are fully fledged (Figure 7).

2.2.2 Bird production

Birds are grown as a series of five ‘batches’ in a year. At the start of a batch, chicks are brought in by truck and placed onto clean litter (wood shavings and sawdust) in the eastern segment of each shed (~ 15 m). The birds feed and drink from alternate rows of feed and water (nipple drinkers and evaporation cups) lines that are suspended from the ceiling. As the birds grow the lines are raised and from week 5 onwards birds are harvested or ‘picked’ at intervals decided by the producer so as to match bird size with demand.

At the completion of the batch at week 8, the remaining birds are removed. The shed litter is then removed by front end loader and placed in temporary stockpiles at the west end of the sheds. All litter is removed from site within days of removal from the sheds. The sheds are then sanitised and fresh litter is placed on the earthen floor in preparation for the next batch.

Figure 3 Broiler sheds

Figure 4 Facing side of shed showing opened flap above the side slot

Figure 5 Shed ceiling showing fogger lines and ridgeline vent

Figure 6 Inside of Shed showing stirring fans, concrete side wall, side slots and ridgeline vent. Note lowered feeder and nipple drinker lines and opened end door

Figure 7 Vent Aperture, fogger and gas heater controller.

2.2.3 Litter stockpile

There is a small short term litter pile, located behind each shed. This litter pile consists of the spent litter that has been removed from the sheds at the end of a batch grow out. It remains on-site for up to three days prior to its removal off-site.

During the site inspection, the odour level observed from the litter pile was considered to be low.

2.3 Odour Complaint History

To date, there have been nine known complaints with regards to odour to Council. However these nine complaints were in the period from 1995 to 2001 which represent the early years of operation of the shed. Since 2001 there have been no odour complaints GHD has requested complaint data from EPA but has yet to receive a response.

3. Site-Representative Meteorological data

A 12 month meteorological dataset at hourly intervals that is representative of the farm site is required for both the directional buffer determination and for the odour impact modelling of the broiler farm under normal operations.

3.1 Climate

The local climate at the Wollert site is affected by broader regional patterns of synoptic pressure and wind with embedded weather systems. Synoptic features vary in intensity and location according to the season. For instance, during summer a high-pressure belt is usually found over or just to the south of Australia, bringing warm weather while the subtropical easterlies cover most of the continent. In winter, the subtropical high-pressure belt is usually located further north over the continent, allowing westerly winds and occasional to frequent strong cold fronts to affect southern Australia.

3.2 Choice of Meteorological Dataset

Ideally, a 12 month dataset recorded at hourly intervals is required to fully characterise annual average, diurnal and seasonal variations in wind climate. The nearest meteorological dataset is from the temporarily installed EPA AQMS (air quality monitoring station) located at Craigieburn, approximately 11.5 km west of the broiler farm. The data did not cover a whole year during the measurement period (measurement period 13 October 2003 – 24 June 2004). The meteorological processor within The Air Pollution Model (TAPM) was used to generate synthetic data to supplement the measured dataset for inclusion into AERMOD. This was not conducted by GHD as the meteorological files were provided by the EPA.

3.3 Wind Pattern

The local meteorology largely determines the pattern of off-site odour impact on receptors (houses, businesses and industry). The effect of wind on odour dispersion patterns can be examined using the wind and stability class distributions at the site from the dataset provide by EPA. The winds at a site are most readily displayed by means of wind rose and stability rose plots, giving the distribution of winds and the wind speeds from these directions as well as the distribution of the stability classes.

The features of particular interest in this assessment are: (i) the dominant wind directions and (ii) the relative incidence of stable light wind conditions that yield minimal mixing (defines peak impacts from ground-based sources).

3.3.1 Annual and seasonal variation in wind

Figure 8 shows the annual average wind rose for the Craigieburn for the period 25 June 2003 – 24 June 2004, and the following features can be seen:

- Annual average wind speed of 4.35 m/s
- Winds are most prevalent from the northwest and southwest quadrants (with approximately 18% from the north and 14% from the south)
- Winds are least prevalent for the east
- There is an north-south axis of wind direction aligned to the Merri Creek

- Light winds (the black segments) are more prevalent from the southwest.
- The observed wind speed distribution indicates that the largest proportion of high wind speeds (> 6 m/s) are from the north, while the largest proportion of light winds (<2 m/s) are from the southwest.

The seasonal variation within the annual pattern given in Figure 8 can be shown by seasonal wind roses as given in Figure 9. There are several significant seasonal features:

- In winter, the winds are predominantly from the north and northwest with a total incidence comprising of 74.5% of all incident winds; this observation reflects cool air drainage flows from the hills and mountains from the surrounding land in the north including the squeeze through the Kilmore Gap, as well as with pre-frontal (stronger) winds associated with the synoptic winter westerlies.
- In summer, the vast majority of winds are from the south and southwest comprising of 63% of all incident winds reflecting weak sea breezes in the afternoon and evening from the Victorian coast combined with the synoptic sub-tropical ridge migrating to the south of this location during the warmer months of the year.

Autumn and spring are transitional seasons with a mixture of both winter and summer observations, with peak incidences from the north in autumn (18.5% of all incident winds) and north in spring (16.5% of all incident winds).

The seasonal incidence of high winds (>6 m/s) is greatest in winter, and lowest in spring, while the incidence of light (<2 m/s) winds is greatest in autumn, followed by summer and least in winter. As with the annual winds, there is a lack of easterly winds in all seasons although winds south of east can occur in summer.

The direction and high proportion of light winds in autumn is a mixture between north, south and southwest. These drainage flows are likely to be associated with high stability.

Figure 8 Annual wind rose – Craigieburn

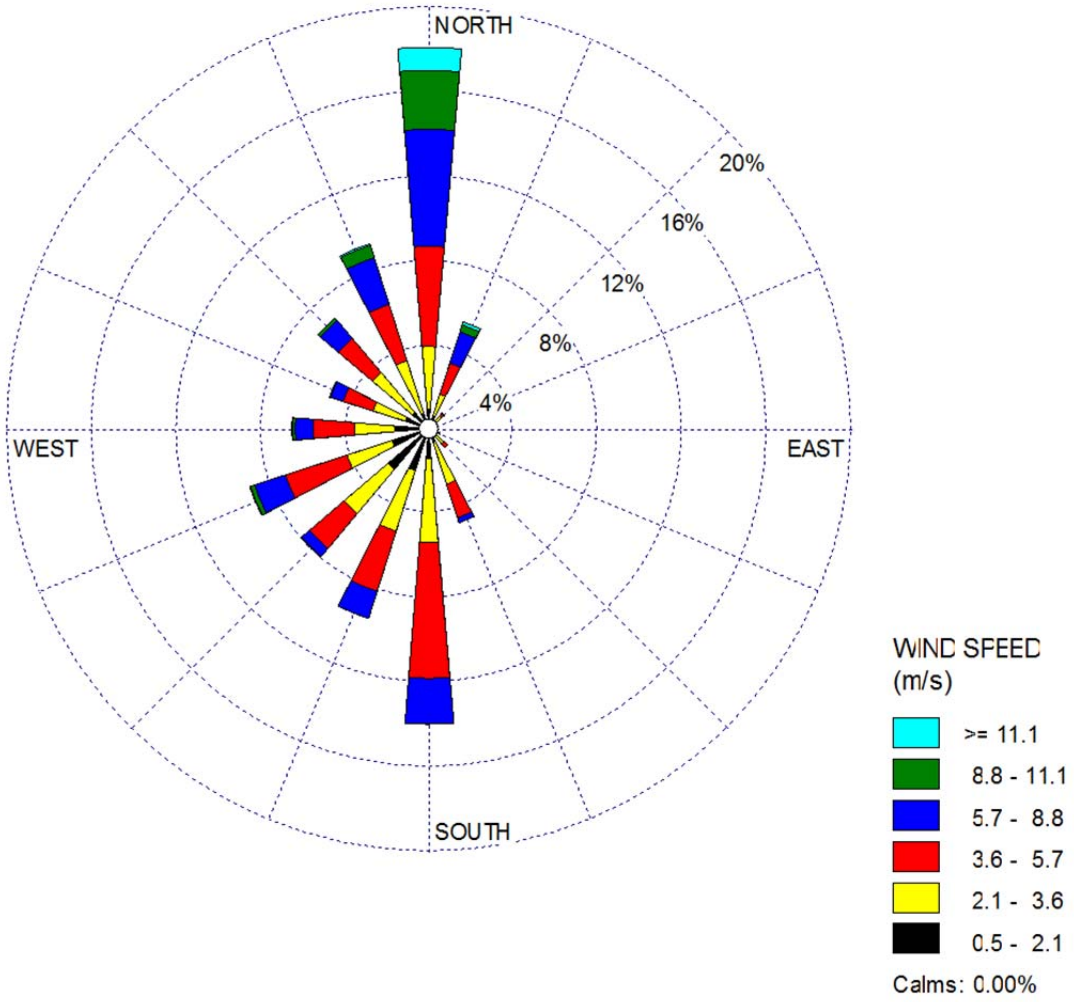
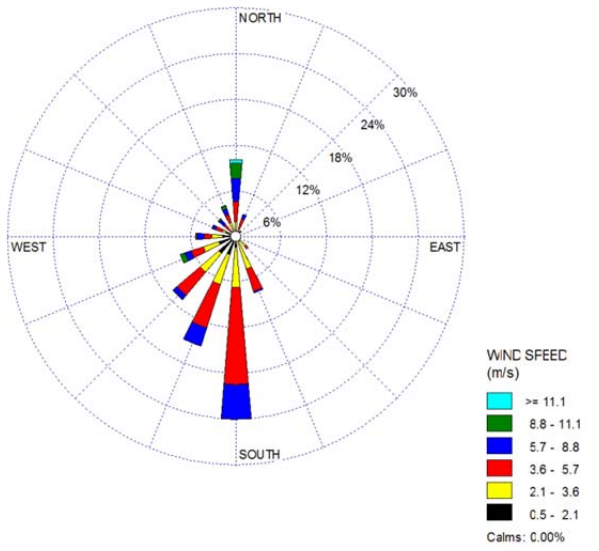
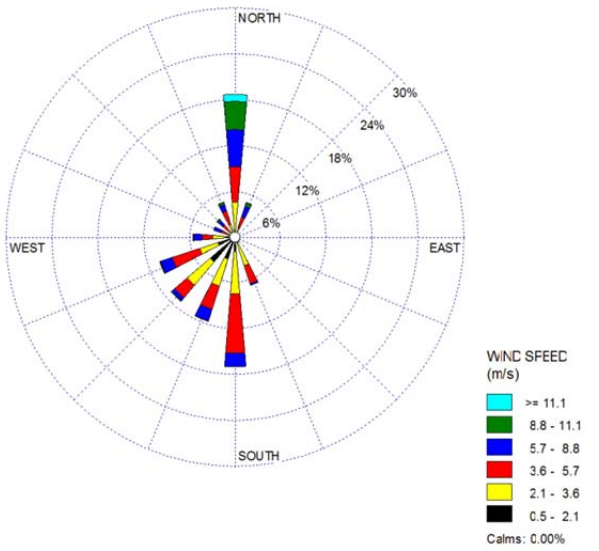


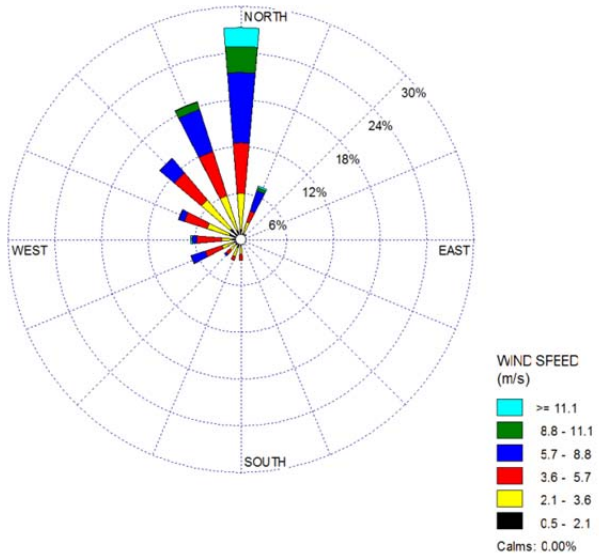
Figure 9 Seasonal wind roses – Craigieburn



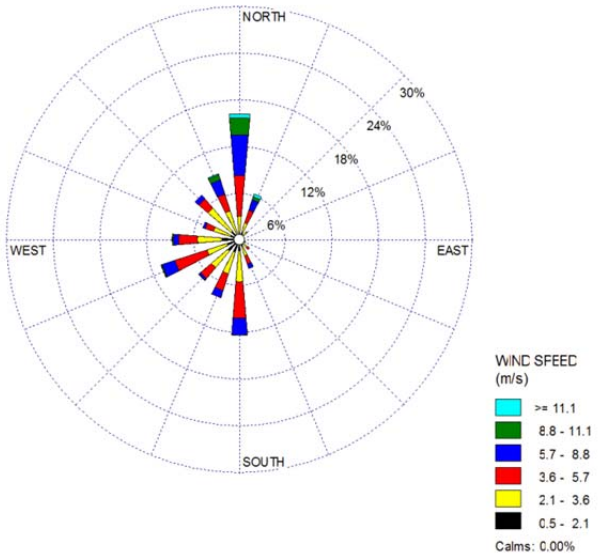
Summer – Average Wind Speed 4.19 m/s



Autumn - Average Wind Speed 4.27 m/s



Winter - Average Wind Speed 4.78 m/s



Spring - Average Wind Speed 4.12 m/s

3.4 Pattern of Atmospheric Stability

3.4.1 Incidence of stable conditions

Atmospheric stability substantially affects the capacity of a pollutant such as gas, particulate matter or odour to disperse into the surrounding atmosphere upon discharge and is a measure of the amount of turbulent energy in the atmosphere. For a broiler farm, odour emissions from sheds during the batch growout and cleanout will have greatest impact downwind during stable conditions, reducing to a minimum impact during unstable conditions.

There are six Pasquill–Gifford classes (A-F) used to describe atmospheric stability, and these classes are grouped into three stability categories; stable (classes E-F), neutral (class D), and unstable (classes A-C). The climate parameters of wind speed, cloud cover and insolation are used to define the stability category as shown in Table 1, and as these parameters vary diurnally, there is a corresponding variation in the occurrence of each stability category. Stability is most readily displayed by means of stability rose plots, giving the frequency of winds from different directions for various stability classes A to F.

Table 1 Stability category relationship to wind speed, and stability characteristics

Stability Category	Wind Speed Range (m/s) [a]	Stability Characteristics
A	0 – 2.8	Extremely unstable atmospheric conditions, occurring near the middle of day, with very light winds, no significant cloud
B	2.9 – 4.8	Moderately unstable atmospheric conditions occurring during mid-morning/mid-afternoon with light winds or very light winds with significant cloud
C	4.9 – 5.9	Slightly unstable atmospheric conditions occurring during early morning/late afternoon with moderate winds or lighter winds with significant cloud
D	≥6	Neutral atmospheric conditions. Occur during the day or night with stronger winds or during periods of total cloud cover, or during the twilight period
E	3.4 – 5.4 [b]	Slightly stable atmospheric conditions occurring during the night-time with significant cloud and/or moderate winds
F	0 – 3.3 [b]	Moderately stable atmospheric conditions occurring during the night-time with no significant cloud and light winds

a. Data sourced from the Turner's Key to the P-G stability Categories, assuming a Net Radiation Index of +4 for daytime conditions (between 10:00 am and 6:00 pm) and –2 for night-time conditions (between 6:00 pm and 10:00 am)

b. Assumed to only occur at night, during Net Radiation Index categories of –2.

The incidence of stable conditions can be viewed by means of a stability rose.

Figure 10 shows the annual stability rose for the entire data period. Noting that a neutral atmosphere (D) is the dominate stability state of the atmosphere comprising of 56.2% incidence while the A, B and C class contribute unstable atmospheres 17.3% of the time and the stable E and F conditions contributing 26.6%. Figure 10 shows that the majority of stable winds are from the north and southwest.

Figure 10 Annual stability rose – Craigieburn

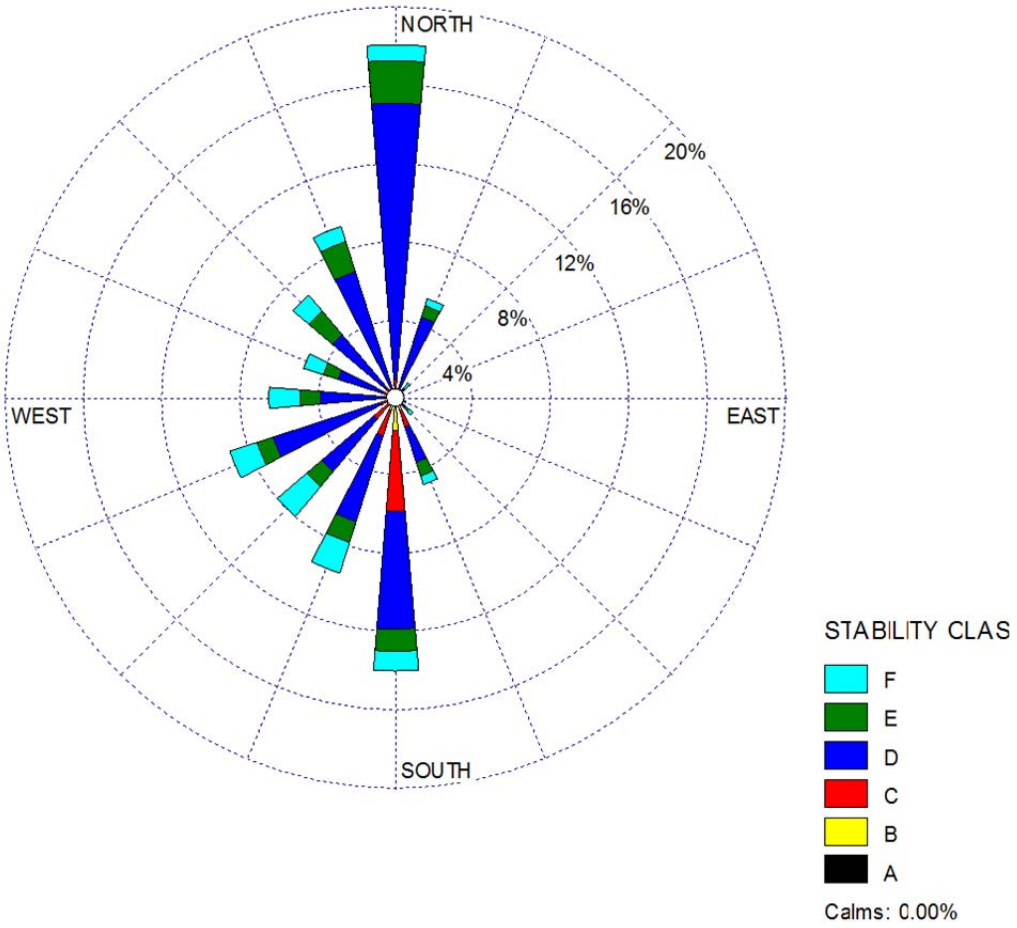


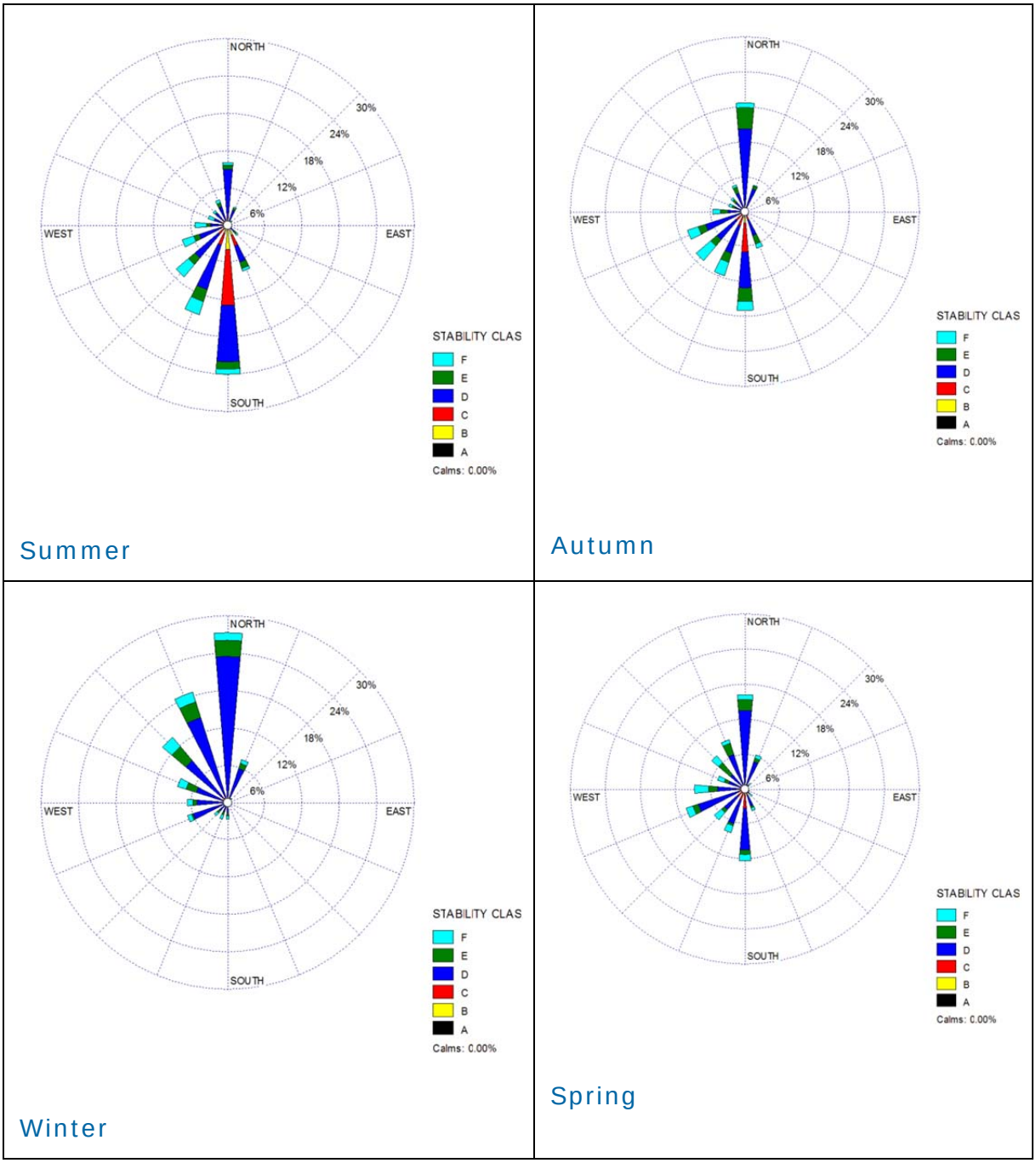
Figure 11 shows the seasonal variation in the directional distribution of wind stabilities and the following features can be seen:

- Stable conditions most often occur in winter and autumn
- Stable conditions are most tightly directed in winter (from the NW quadrant)

3.4.2 Summary

The directional incidence of poor dispersion is focussed to the south, south-east and northeast and as a consequence the zone of odour impact will be extended in this southeast (SE) quadrant and northeast direction. The incidence of stable conditions from southerly winds is lower, which will reduce the predicted impact to the north.

Figure 11 Seasonal stability roses – Craigieburn AWS



4. Relevant Buffer Guidelines

4.1 Victorian Broiler Code

The Victorian Broiler Code (the Code) was first introduced in 2001 and applies **only** to a planning permit application to use and develop land for a broiler farm that includes any of the following:

- The establishment of a new broiler farm
- An increase in the farm capacity of an existing broiler farm (farm expansion)

The Code does **not** apply to an existing broiler farm where there is no increase in the farm capacity, which is the case here.

The Code revision in 2009 changed the threshold farm size defining 'special class' farms to increase to 400,000 birds (viz eight, 50,000 bird sheds), and defined the separation distance for farms of lower capacity by a formula. In addition, the separation distance was applied to the perimeter (rather than the centroid) of the shed array. The separation distance is calculated by the formula as given below.

$$D = 27\ N^{0.54}$$

Where **D** is the separation distance in metres and **N** is the farm capacity in thousands of birds.

The advantage of the equation (as opposed to the table in the 2001 Code) is that the separation distance can be directly calculated for any farm capacity.

Note that as mentioned in Section 1, the EPA publication 1518 (Recommended separation distances for industrial residual air emissions) was released in 2013, replacing the 1990 version which specified a separation distance of 500 m for broiler farms. The new buffer guideline defers to the Code for broiler farm separation distances.

4.2 Application to Wollert Poultry Farm

The farm has a capacity of 60,000 birds and the formula then gives a value for **D** of 246 m. From the 'Classification of broiler farms' section of the Code it indicates that the identified farm would be classified as a Class B farm in which the following apply:

- The farm capacity is less than or equal to 400,000 birds
- The development can meet the minimum separation distance requirement (as defined by the formula) but this distance is not fully contained within the broiler farm boundary.

However the separation distance for a Class B farm must be at least 250 m (minimum separation distance for a broiler farm) as specified in the Code, thus a 250 m buffer distance would apply to this 60,000 bird farm.

Figure 12 shows the 250 m buffer (green line) scribed from the envelope of the two sheds. It can be seen from the figure that this buffer is clear of all existing residences, but would preclude some land from residential development within the PSP, extending to the north (~190 m), west (90 m) and south (~190 m) (as measured from the farm site boundary).

4.3 Reverse Amenity

Approved Measure E1 M1.1 of the Code requires a separation distance of 1000 m for any **proposed** broiler farm development from: (i) a residential zone, urban growth zone or other urban zone where housing is a primary purpose of the zone, or (ii) a future residential area shown on a plan or strategy incorporated in the planning scheme. Clearly the purpose of the 1000 m buffer is in the application to the siting of a **new** broiler farm or upgrades to an existing broiler farm; it does **not** apply to existing broiler farms not undergoing an upgrade or increase to capacity or to the reverse amenity situation of establishing sensitive uses near an existing broiler farm (which is the case here).

Reverse amenity issues **are** however addressed in Section 11 of the Code 'Establishing sensitive uses near broiler farms'. This section states that the separation distances as found in the 'classification of broiler farms' section (as calculated by the formula in section 4.1 above) should be used as a **guide** when planning for urban use and development near a broiler farm; thus the 250 m buffer would apply.

Section 11 also states that for farms approved and built under the Code (i.e. after 2001), planning authorities should maintain the setbacks as described in Element 1 (E1 M1.1) for urban and rural living zones. However, as this farm was built prior to the Code, (in the early 1990's) the setback (separation distance) recommended in E1 M1.1 does **not** apply.

For older farms built prior to 2001, the application can be problematic and unreasonable as these farms were established at a time when there was no expectation that the approval of the farm would limit the use of adjoining land. In these cases, the historical performance of these farms in regards to odour impact should be used to assess an appropriate buffer distance as well as the current separation to the nearest residences. The Code calls for a buffer distance that is as large as reasonably possible. Thus, GHD has assessed the current complaint history, the odour impact from current operations and the odour risk to the existing residences to assist in determining an adequate separation distance from the farm.

As discussed in section 2.3 GHD understands there have been no odour complaints received by Council within the last 10 years in relation to this broiler farm. This indicates that the current operations of the farm are being well managed to best practice standards.

4.4 Recommended Buffer Distance

GHD recommends that the separation distance of 250 m as calculated in the Code should apply to the farm.

It can also be argued that, as this is a small example of a broiler farm (and not likely to expand), the 1000 m buffer recommended by the Code should be de-rated in any case if it were to be required. A standard farm is considered to be 400,000 birds (viz. eight, 50,000 bird sheds) thus using the Code de-rating method by the approximate square root of the capacity ratio, the 60,000 bird farm would attract a much smaller buffer as follows.

Derating factor:

$$\left[\frac{60,000}{400,000}\right]^{0.54} = 0.36$$

So, for a 60,000 bird farm, the appropriate application of the 1000 m buffer would be to reduce it to:

0.36 x 1000 = 360 m

The 360 m buffer is also plotted in Figure 12 and shows that this buffer does encompass two existing residents (R3 and R4) and grazes one (R1). It would also preclude a greater amount of land from residential development within the PSP (~ an additional 110 m) to the west, north and south compared to the 250 m buffer.

4.5 EPA Advised Buffer

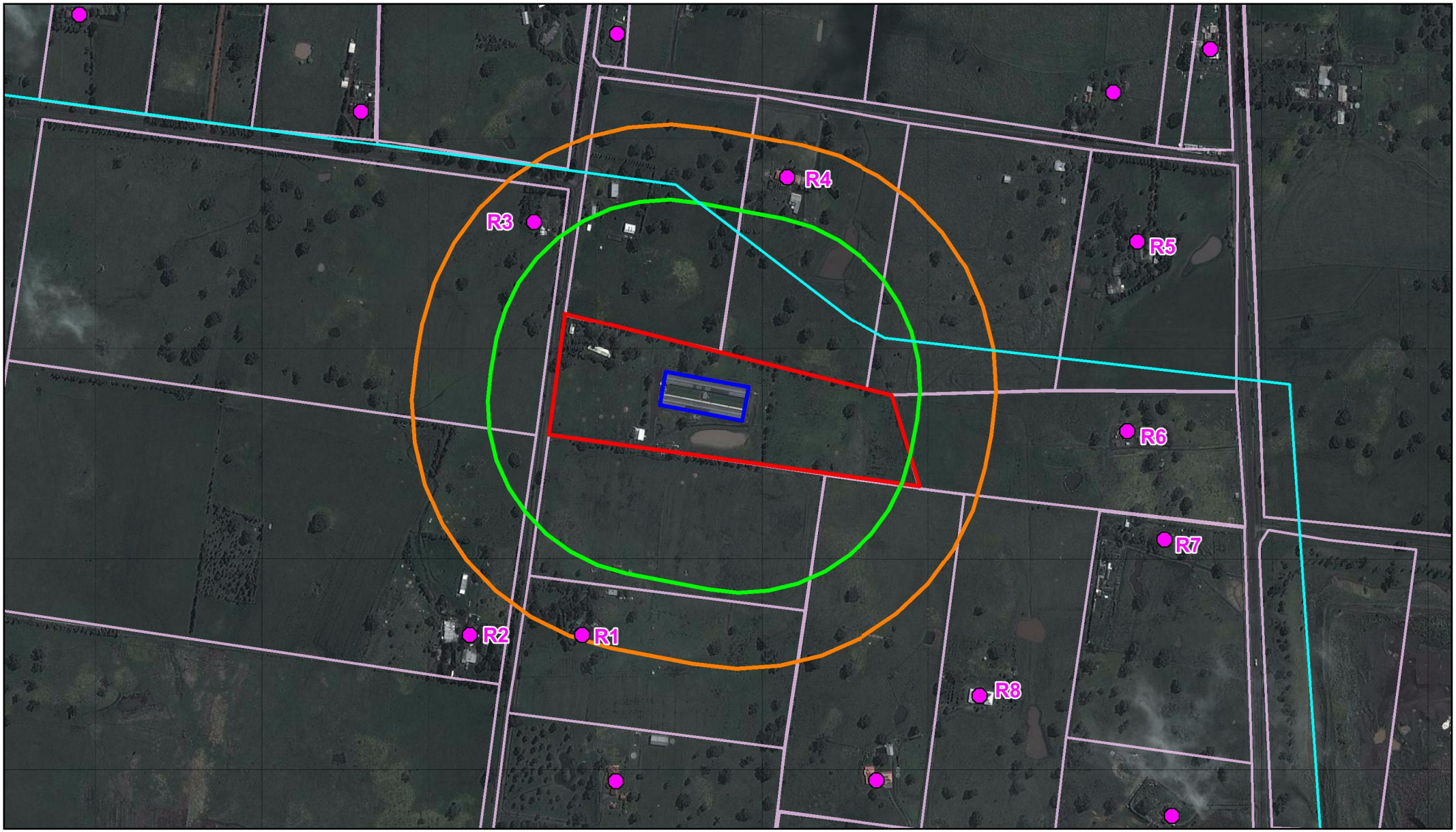
The MPA were advised that the minimum separation distance required by Approved Measure E1 M1.1 of the Code (a minimum of 1000 m) applies in addition to the minimum separation distance required for farms (250 m for a farm of this size). This was interpreted to equate to a separation distance of 1250 m. The rationale for this interpretation appears to be the preface note in Element 1 of the Code. That note states:

"The following requirements apply in addition to the separation distance requirements used to determine the farm classification (found in the 'Classification of broiler farms' section of this Code".

GHD considers that it is a misunderstanding of the intent of this note to interpret it to mean that the 'in addition' refers not only to the additional measures detailed, but also to a numeric addition of the separation distances cited.

In any event, it is inappropriate, and clearly not intended by the Code, to apply for this instance of reverse amenity.

The adoption of a large buffer distance for such a small broiler farm appears to be excessively stringent and would reduce the extent of new residential development in the PSP. This could only be supported were there evidence of odour impact from the boiler farm at ranges shorter than the 1000 m range suggested.



0 75 150 225
metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

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LEGEND

- Site Boundary
- Sensitive Receptors
- Shed Envelope
- 250 m Buffer
- 360 m Buffer
- PSP Boundary
- Property Boundaries

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Job Number 3131176
Revision A
Date 07/03/2013

Default 250 m Buffer and de-rated 360 m Buffer

Figure 12

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5. Part 1 - Directionally- Dependant Buffer

Approved Measure E1, M1.3 of the Code refers to meteorological and topographic conditions that might require an **increase** to the default value in the buffer distance in specific directions. To examine the potential for this measure to constrain the site, GHD has determined a directional buffer distance using a methodology developed in 2004[3] and used in numerous buffer assessments conducted by GHD. In effect, the directional buffer takes account of site-representative meteorology to determine a buffer distance that varies with direction from the farm and provides equal protection from potential disamenity independent of the direction from the emitting source.

Where site-representative meteorological data is available the directions of good and poor dispersion can be identified as shown in section 3.4. Further, if the 12 month dataset is configured to derive atmospheric stability category and mixing height, then dispersion modelling can be conducted using a nominal source emission rate (odour) to determine the directional change in extent from the default 250 m buffer.

This was performed for the farm using the EPA Craigieburn meteorological dataset and adopting a nominal 10 m x 10 m area source with a nominal emission rate. The 99.5% contour that gave the **same** enclosed area as a 250 m radius circle (default buffer i.e. 190,116 m^2) was selected and is presented in Table 2. The angular change in buffer distance is given as a function of direction Θ in Table 2. This information has also been used to demonstrate the effect on the 250 m buffer when applied to the envelope of the broiler farm sheds. From this table, it is seen that the extent of the contour is greater than the all-direction mean of 250 m in the north-easterly sector – out to 425 m. Similarly, the extent of the contour to the west is significantly less than 250 m, down to 73 m. The contour effectively gives the departure from the fixed 250 m radius that would be required if an equal exposure to disamenity was to be given in the event of an upset/malfunction at the broiler farm.

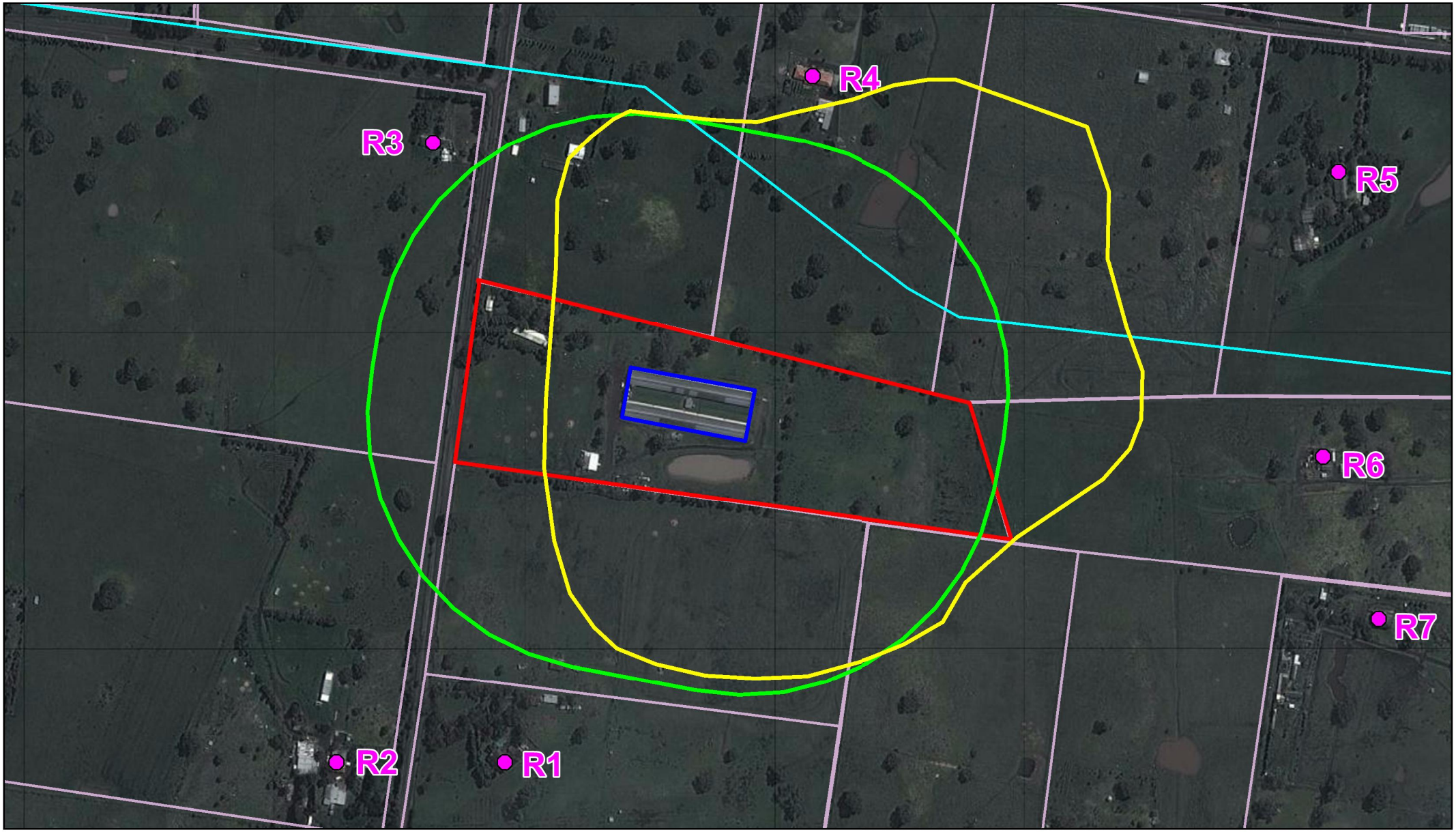
As seen in Figure 13 the directional buffer extends further east and northeast when compared to the default 250 m buffer and retracts significantly in the westerly direction. Similar to the default buffer, the directional buffer does not extend to encompass any existing sensitive receptors. When compared to the default buffer, the directional buffer encompasses less land within the PSP to the west (retracts by ~175 m) but extends to encompass a greater amount of land to the west (extends further by ~ 140 m).

Note that the area enclosed by the directional buffer (yellow line) is the same as that enclosed by the default buffer (green line).

[3] Clarey P, Pollock T "Integrating Separation Distances with Dispersion Modelling", Enviro 04, 28 March – 1 April 2004, Darling Harbour, Sydney.

Table 2 Directional Variation in Buffer in Response to Local Meteorology – Craigieburn AQMS

Direction Θ Sector	deg.	Range m	% of mean range	Direction Θ Sector	deg.	Range m	% of mean range
N	0	255	102	S	180	235	94
NNE	22.5	363	145	SSW	202.5	178	71
NE	45	425	170	SW	225	108	43
ENE	67.5	345	138	WSW	247.5	78	31
E	90	390	156	W	270	73	29
ESE	112.5	253	101	WNW	292.5	83	33
SE	135	265	106	NW	315	123	49
SSE	157.5	243	97	NNW	337.5	220	88



0 50 100 150
metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N
W E
S

LEGEND

- Site Boundary
- Sensitive Receptors
- Shed Envelope
- 250 m default Buffer
- 250 m directional Buffer
- PSP Boundary
- Property Boundaries

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Revision A
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Directional 250 m Buffer

Figure 13

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6. Shed odour emission rates (OER)

This section details the characterisation of broiler shed odour emission rate (OER) where the factors of bird age and ambient temperature are accounted for so as to model the variation in shed OER through the batch and diurnally as ambient temperature changes. This input is required for the odour dispersion modelling in Part 2.

6.1 Factors affecting shed OER

It is generally accepted that shed OER is a function of:

- Bird age/mass
- Ventilation Rate/ Ambient Temperature

Both GHD and Pacific Environment Limited (PEL) have developed expressions for shed OER based on these parameters and these have been accepted in VCAT tribunal hearings.

Recently ERM[4] has provided an expression for shed OER based on a statistical analysis of the results of the Queensland Department of Employment, Economic Development and Innovation (DEEDI) investigation[5] of odour and dust emissions from broiler sheds for Australian Poultry Cooperative Research Centre (APCRC). The relation developed by ERM is repeated below:

$$OER_{per\ bird} = 27.665\left[-2\text{x}10^{-5}A^3 + 0.0024\,A^2 - 0.0029\,A \quad + 0.029\right] + \ 0.2637 \qquad \text{Equation 1}$$

where A is the batch age in days.

As can be seen, this expression does not include ventilation rate or ambient temperature as an independent variable and as detailed in the GHD position paper[6]; the expression as a consequence, substantially over-estimates the off-site peak odour impact.

6.2 Odour Emissions from the Existing Broiler Farm

Any prediction of off-site odour impact must characterise broiler shed odour emission rate (OER) including its variation: (i) during the batch grow out for broiler sheds, and (ii) diurnally due to changes in ventilation rate – if the predictions of odour level are to represent the actual exposure at nearby residences.

The shed OER for tunnel ventilated sheds can be linked directly to ambient temperature.

6.2.1 Characterisation of broiler shed OER

Shed ventilation

As described in section 2.2, the shed ventilation is effected by automatically setting (rotating) the side flaps to restrict the aperture of the horizontal side slots so that the set-point temperature in the shed (32ºC - 21ºC dependent on bird age) is met by a natural draft. Shed exhaust is via a ridgeline vent which can be throttled with a raiseable plate.

When ambient temperature rises above ~ 24 ºC, fogger lines discharge a very fine mist into the shed interior. The mist readily evaporates, cooling the shed air. A total of 16 stirring fans located along the shed ceiling in two banks of eight operate to equalise shed temperature and aid

[4] ERM "Broiler farm Odour Environmental Risk Assessment – Background to Technical Guidance", 29 June 2012 Report #0164677

[5] Qld DEEDI "Dust and Odour Emissions from Meat Chicken Sheds"APCRC report, Project 04 – 45, September 2011.

[6] GHD, 2013. Position Paper – Submission to EPAV, Review of Proposed ERA. Report to VCMC #217977, February 2013

evaporation. The shed odour emissions can be represented by a series of eight volume sources along the shed.

Shed OER

GHD has developed a methodology to define broiler shed odour emission rate (OER) as a function of (i) batch age and (ii) ambient temperature.

The second factor accounts for the observations, (from OER measurements through the day) at broiler farms that OER increases with ambient temperature, as more fans are switched on and odour from the litter is more effectively stripped off the shed floor.

Details of the methodology are given in a paper[7] and the equation for shed OER is expressed as follows:

$$\text{OER/shed} = \text{Age factor (wk)} * \left(\frac{\#birds}{1000}\right) T_F \qquad \text{Equation 1}$$

Where $T_F = 51.12 * T\ (^oC) - 458.2$ Equation 2

Note that here T_F has been expressed in AS 4323.3 odour units.

In the application of Equation 2, T_F is set limits

At T > 24.3°C, $T_F = 800$

At T < 12.3°C, $T_F = 200$

That is, the linear relation is plateaued outside the measurement limits – see Pollock and Friebel.[8]

Adopted age factor

The 'age' factor **f**[9] takes account of the increase in shed emissions through the batch as the birds grow and as the load of faeces on the litter increases and is based on ammonia surrogacy[10] given in Table 3.

The age factor was modelled at unity for weeks 5, 6, 7 and 8, to be conservative even though 20% of birds are picked at week 5 with subsequent smaller picks up to the end of the batch.

Note also that a shed cleanout age factor of 0.50 was adopted for 2 days within week 9 as correspondence with the farm operator indicated that the two sheds are cleaned out over a two day period. This value allows for one of the two sheds in a module to emit at an age factor of unity to account for the shed emissions during cleanout of litter. That is, rather than model the sequence of clean out of individual sheds, both sheds were modelled at one half of the adopted shed cleanout factor. Note that in reality the sheds will be cleaned out during the daytime only, the modelling emissions were for the entire day including night, this is another conservative approach.

Table 3 Age factor for broiler shed emission rates

Week	1	2	3	4	5	6	7	8	9*	10*
f	0.056	0.074	0.24	0.62	1	1	1	1	0.5	0

***** Shed cleanout after batch for 2 days in week 9 only

[7] Pollock and Friebel, 2002, Effect of Batch Age and Ambient Temperature in Broiler Shed Odour Modelling

[8] Ibid

[9] Friebel E, Pollock T, 2000 "Odour Dispersion Modelling for Broiler Farms". Enviro 2000

[10] RIRDC 1999

APCRC OER Data

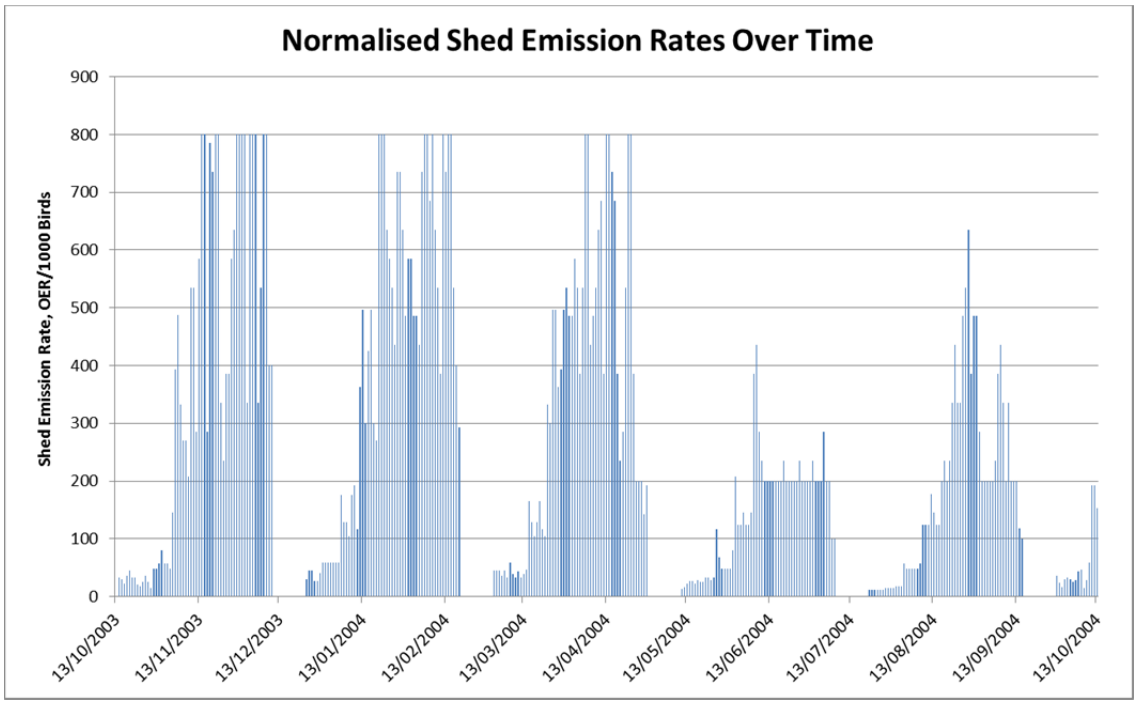
More recently, both Rural Industry Research Development Corporation (RIRDC) and the Australian Poultry Cooperative Research Centre (APCRC) have funded an extensive broiler shed OER survey in Queensland and Victoria. The studies were reviewed by GHD in 2010 and the final report[11] was issued in September 2011. The results have been assessed and of the eleven broiler farms measured, only one (Farm B) was located in Victoria. The OER results from that farm appear to be anomalously high, with OER values ranging from 1800 to 4000 OU $m^3 l_{1000\ birds}$. Until the source of the anomaly is determined, GHD propose to use the equations for OER presented above.

Adopted shed OER

The combination of these factors was used in Equation 2 to derive a time-varying OER data file giving the shed $OER|_{1000\ birds}$ for the 12 months of meteorological data. The time varying OER file also provided the OER sequence to be delayed by 3 weeks between the shed arrays in each of the three modules.

Figure 14 shows the time variation in shed OER per 1000 birds for a single shed as calculated from the hourly temperature readings in the 2003/4 simulation. The short-term variation due to diurnal variation in ambient temperature and the progressive build-up in shed OER through the batch cycle are also apparent. A seasonal drop in shed OER can also be seen across the figure.

Figure 14 Normalised shed odour emission rate variation of 12 months



Note that predicted peak odour levels are dependent on the degree to which the peak (i.e. weeks 5 to 8) of each batch cycle correlates to periods of poor dispersion. GHD has modelled a sensitivity check to assess which lag in batch 'start date' gives peak odour levels. This is analysis resulted in starting the batch in both sheds at day 1.

[11] APCRC 2011 "Dust and Odour Emissions from Meat Chicken Sheds" Project 04 – 45, 25 September 2011.

7. Part 2 - Odour Dispersion Modelling

As detailed in Section 4.3 (reverse amenity situation) for older farms built prior to 2001, the application of a separation distance can be problematic and unreasonable. In these cases, the historical performance of these farms in regards to odour impact should be used to assess an appropriate buffer distance. This section presents the odour impact from current operations to assist in determining an adequate separation distance for the farm.

7.1 Model

The regulatory dispersion model since 1 January 2014 in Victoria is AERMOD. AERMOD is an advanced Gaussian plume dispersion model and replaces the previous regulatory model AUSPLUME. AERMOD extends on the Pasquill-Gifford atmospheric stability categorisation by modelling the turbulence using micro-meteorological parameters to calculate the Monin-Obukov length **L.** Use of **L** provides a continuously varying measure of atmospheric turbulence from one hour to the next – in contrast to the seven Pasquill Gifford categories used in AUSPLUME.

The new EPA modelling guideline requires air dispersion modelling to be assessed against five years of meteorological data, with compliance to be shown for all five years. However, clarification from EPA was sought regarding this requirement for this application and EPA's advice was that they would accept 12 months of site representative data from Craigieburn in this instance.

7.2 Model Configuration and Parameter Selection

The following settings were used in the simulations – further detail is given in the AERMOD input text file shown in Appendix A (including a sample input file for the grid run and output file for the discrete receptor run). EPA publication 1551 - Guidance notes for using the regulatory air pollution model AERMOD in Victoria was used in this assessment.

- Model: AERMOD Version 12345
- The receptor grid was 10 km x 10 km, with a 50 m grid resolution
- Eight (8) nearby residences were identified as discrete receptors
- Source odour emission rates were time variable with allowance for batch age and ambient temperature – see section 6
- An averaging time of 1 hour was modelled, with a factor of 1.8 applied to the concentration to convert it to a 3 minute average
- Meteorology was taken from the EPA Craigieburn AQMS 2003/4 synthesised dataset see section 3
- Emissions from the existing sheds were modelled as:
  - Eight volume sources for each shed; with the following parameters
  - Release height of 5 m, sigma y of 3.75 m, sigma z of 2.5 m and a width of 15 m.

7.3 Odour Criterion

The design criterion specified in the Code and more generally in State environment protection policy (Air Quality Management) (2001) (SEPP-AQM) specifies a criterion of five odour units at the 99.9th percentile over a 3-minute averaging time for intensive animal husbandry located in an area with a low density of sensitive land uses – a rural zone. The criterion is applied at and beyond the site boundary.

7.4 Pattern of Predicted Peak 99.9th Percentile Off-Site Odour Impact

Figure 15 shows the predicted peak odour impacts from the existing broiler farm, at the 99.9th percentile and based on a 3-minute averaging period. The five odour unit criterion contour extends a maximum 330 m north from the northern site boundary, approximately 165 m east, 270 m south and 50 m west of the site boundary.

Whilst the predicted odour impacts from the existing farm exceed 10 odour units (OU) at the site north and south boundaries, the predicted peak levels at the nearest residences barely exceed the five odour unit (OU) criterion. GHD understands that there have been no complaints from surrounding residences during the past 10 years that the farm has existed in its current form. Figure 15 also shows that the five odour unit criterion is marginally exceeded at one residence (R4). This lack of complaint strongly suggests that the farm does not pose an unacceptable environmental risk and demonstrates that the SEPP criterion is conservative.

The predicted five odour unit concentration at ground level produced from normal operations of the farm indicates that the 250 m default and directional buffers are consistent in size with the extent of the 5 OU contour except for a marginal extrusion towards the northeast (direction of poor dispersion). This extension to the northeast due to local meteorology is also reflected in the directional buffer also shown in Figure 15.

However, to the extent that existing resident R4 is marginally within the zone of potential odour impact, it is possible that they have acclimatised to the occasional exposure – for this resident, in effect it may have become part of the background palette of ambient odour. This situation may not be replicated with the development of new residential areas – new residents may find odour from the broiler farm unusual and objectionable and this may result in a new source of complaints. To gauge whether this is likely to occur an Environmental Risk Assessment (ERA) was conducted to examine the implications of the non-compliance (see Section 8). In essence, an ERA is designed to determine the risk (in terms of both likelihood and consequence) of potential odour impact at the nearest residences and thereby on new residential development in the vicinity of R4. If the risk is assessed to be Low or Negligible, then there would be no issues with respect to odour impact from the broiler farm in developing new residences in the vicinity of R4 and therefore unlikely to result in complaints.

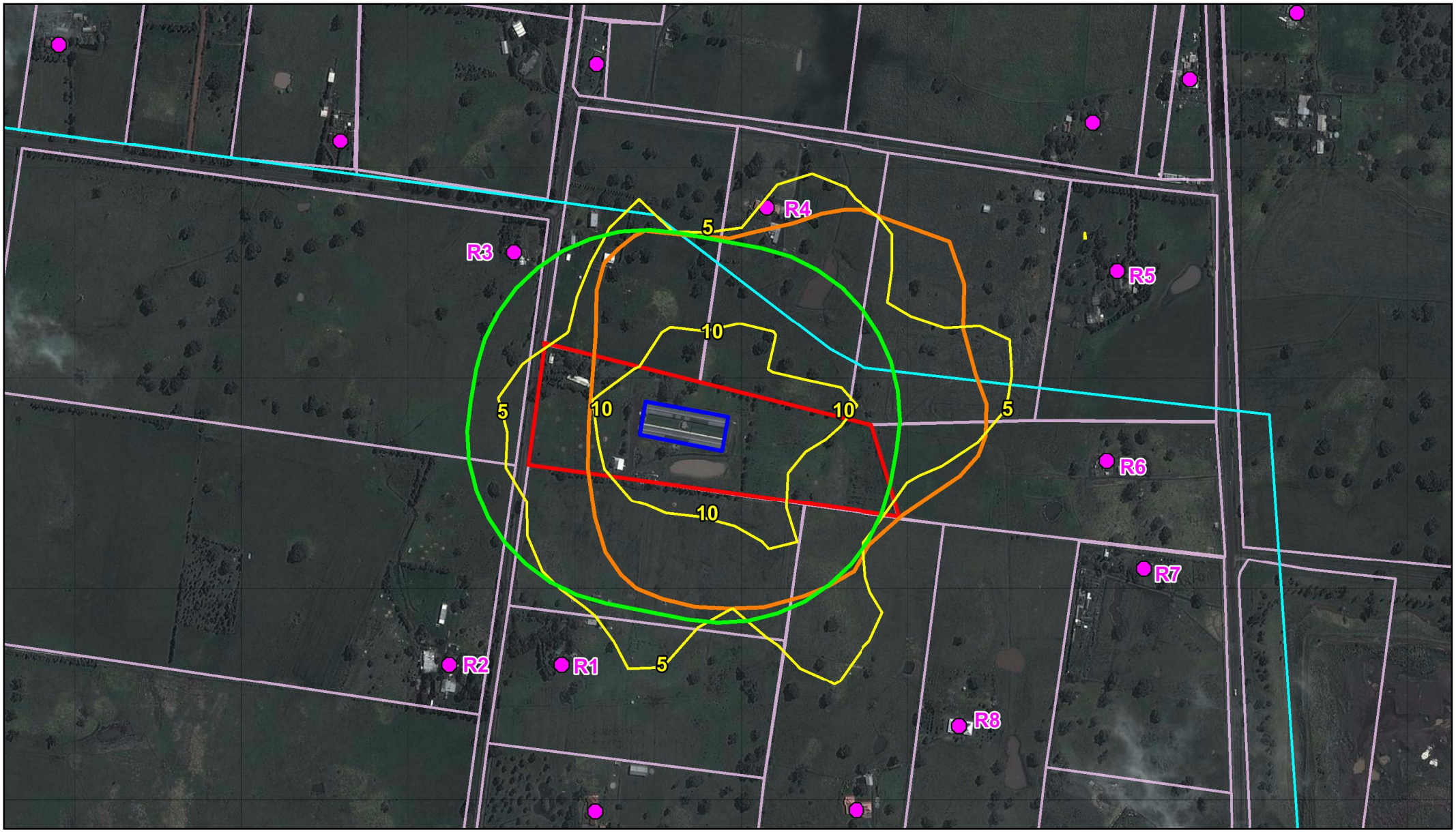
7.5 Predicted Odour Exposure at Nearby Residences

Table 4 shows the predicted 99.9th percentile odour levels at each receptor for the existing farm. Refer to Figure 2 for receptor locations.

Table 4 shows that only one receptor (R4) had a predicted 99.9 percentile concentration greater than 5 OU that is at 5.5 OU, while the least exposed receptor was R7 at 1.9 OU.

Table 4 Predicted Peak (99.9th percentile, 3 minute averaged) Odour Impact at Nearby Receptors

Residence ID	Residence Location [Easting (m), Northing(m)]	Odour Impact (OU) 99.9th 3 min Avg
1	325354, 5838667	3.7
2	325191, 5838664	2.9
3	325271, 5839264	2.9
4	325637, 5839337	5.5
5	326149, 5839255	2.8
6	326141, 5838979	3.2
7	326198, 5838823	1.9
8	322935, 5838590	3.4



0 75 150 225
metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

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LEGEND

- Site Boundary
- Sensitive Receptors
- Shed Envelope
- 250 m default Buffer
- Odour Units (Ground Level)
- PSP Boundary
- Property Boundaries
- 250 m directional Buffer

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Predicted 99.9th Percentile Ground Level Odour Concentrations (OU)

Figure 15

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Google Earth Imagery 2014. Created by: M.A

8. Part 3 - ERA for Nearest Residence R4

The Code details the method of calculating separation distances to assess whether a **proposed** broiler farm has sufficient separation to the nearest residences. However, where the farm capacity exceeds 400,000 birds (not the case here), the farm is termed a Special Class and instead of using a separation distance criterion, odour dispersion modelling is required to calculate whether the predicted peak (99.9 percentile) odour levels exceed the five odour unit (OU) criterion at the site boundary.

Where the 5 OU criterion is not met then the Code requires that an Odour ERA be conducted to examine the implications of the non-compliance. In essence, the ERA is designed to assess the **risk** of odour impact at the nearest residences. If the risk is assessed to be **Low** then there would be no issue. If the risk is assessed to be **Medium** then mitigation of the impact may be required. If the risk is assessed to be **High** then the site is probably not suitable.

Even though an ERA is not formally required in this case as the farm already exists and is small at approximately 60,000 birds, a preliminary ERA was conducted for R4 to determine the risk of disamenity to assist in determining an adequate separation distance for the farm.

8.1 Current State of Development of ERA for Broiler Industry in Victoria

EPA has recently (November 2012) provided a discussion paper[12] (see Appendix B) which outlines a proposed ERA for evaluation of odour impact from broiler farms as outlined in the Code[13]. The Code outlines the ERA process as a sequence of three stages and the analyses provided in this report uses this format.

To assist in the development of the ERA, EPA commissioned a consultant (ERM) to develop an ERA methodology for the broiler industry. GHD has attended an initial briefing session by ERM to the Victorian Farmers Federation (VFF). The subsequent Discussion Paper[7] issued by EPA defines an ERA risk matrix that is slightly more stringent than that developed by ERM. The risk is categorised as **Low**, **Medium** or **High** and the paper follows earlier draft ERAs in specifying the following implications for each risk category:

- **Low** - If a proposed farm is assessed as having a Low risk, then EPA recommends approval of the planning permission.
- **Medium** - If a proposed farm is assessed as having a Medium risk, then further mitigation strategies need to be implemented to reduce the overall risk of odour impact.
- **High** - If assessed as High, EPA recommends the proposed siting and scale of the farm be reconsidered or odour destruction technology is implemented.

Note that GHD has provided a Position Paper[14] for the Victorian Chicken Meat Council (VCMC) wherein the ERA proposed by EPA was compared to that adopted by VCAT[15] and that developed by GHD[16]. That analysis is used here to argue that the GHD ERA is consistent with

[12] EPA (Vic),2012 "Broiler farm Odour Environmental Risk Assessment", Pubn. No. 1509, November 2012

[13] EPA (Vic), 2009 (a)

[14] GHD 2013 "Position Paper – Submission to EPA, Review of Proposed ERA" Report to VCMC #217977 , February 2013

[15] S & R Barac v Strathbogie Shire Council,VCAT No. P1055/2010.

[16] Mueller,G, Pollock, T, Sichlau, B "A proposed methodology for environmental risk assessment" Air Quality and Climate Change V43, No.3 August 2009

the separation distances used in the Code and delivers a more useful rating of risk than does either the VCAT or EPA proposed ERAs.

8.2 GHD's Approach to Quantifying Risk of Odour Impact

GHD's risk matrix approach has adopted the classic risk matrix approach specified in Australian Standard AS ISO 31000 "Risk Management – Principles and Guidelines" as detailed below. This methodology has also recently been published[17]. The risk matrix approach provides an estimated qualitative measure of risk (i.e. 'low', 'moderate' and 'high') based on: (i) the weighting of a parameter indicating the likelihood of risk and (ii) a parameter indicating the consequence of risk given that the event has occurred. Hence, risk is characterised as:

Risk = Likelihood x Consequence

It is noted that the Code is now silent on the use of risk matrix and nothing is said of the risk weighting to be given to aspects of odour impact, notably: (i) the **F**requency of exceedance of a critical odour level and (ii) the **I**ntensity of odour impact.

8.2.1 Elements of Odour Nuisance

These two parameters from the **FIDOL** factors are often used to characterise odour nuisance, where in sequence the acronym letters stand for:

F frequency of impact

I intensity of an event

D duration of an event

O offensiveness of odour

L location of receivers

8.2.2 Accounting for FIDOL in Odour Criteria

In Victoria, the EPA odour criterion is effectively taking account of only the **I** and **F** factors. The **F** factor is accounted for by choosing an exceedance of 99.9 percentile (i.e. 9 exceedances in 12 months), and the **I** factor is taken into account with the selection of five odour units as the criterion. In New South Wales the three factors (**I**, **F** and **L**) are accounted for by choosing 99 percentile (90 occurrences in 12 months), and by altering the criterion odour level to vary from seven to two odour units dependent on the population of the affected area.

8.2.3 Design of Risk Matrix

The ranges of **I** have been set to three categories as follows (based on extensive ground truthing of model results to odour complaint history):[18]

- Detection above background ambient 5 – 10 OU
- Recognition from background ambient 20 –50 OU
- Annoyance 40 – 100 OU

Similarly, the range of **F** (frequency of exposure) has been set to four categories, namely:

[17] Mueller, Pollock and Sichlau, 2009, 'A proposed methodology for environmental risk assessment' *Air Quality and Climate Change*, Vol. 43, No.3

[18] Lunney C, and Ormerod R, 1997, Implications of Odour Study Results for Policy Guidelines, National Conference of Odour Measurement Standardisation, UNSW Sydney

- Once per year
- Up to once per month (12/year)
- Up to once per week (52/year)
- Greater than once per week (> 52/year)

The risk matrix for odour impact at a sensitive receptor with the weightings of risk level selected by GHD is then given in Table 5 below.

Table 5 Adopted GHD Risk Matrix for Odour Impact

	Consequence I (OU)				
Likelihood F (events/year)	**>40**	**>20**	**>10**	**>5**	**>1**
> 52	**H**	**H**	**M**	**L**	**L**
13 – 52	**H**	**M**	**L**	**L**	**N**
2 – 12	**M**	**L**	**L**	**N**	**N**
0 - 1	**L**	**L**	**N**	**N**	**N**

Note that in Table 5, an additional column at low ranges of predicted odour level has been included, so as to categorise any off-site impact even when well under the levels found to cause complaint. Additionally, only events which occur during non-sleep hours are counted in the risk matrix. This is because human sensitivity to odour is significantly reduced during sleep (see section 8.2.4).

In assessing Table 5, it should be remembered that the weighting has been based on actual complaint data linked to model output. As such, it will seem to be more lenient than the odour design criterion used by EPA Victoria (see GHD position paper[19]). This is because the design criterion has been set to ensure that odour nuisance **never** occurs, whereas the matrix is giving a measure of the risk of nuisance and subsequent complaint.

As an example of the stringency contained within the EPA criterion, EPA have not accounted for the increased sensitivity (approx.2:1) in odour level determination when in 2001 the new Australian Standard AS 4323.3 protocol for olfactometry replaced the Vic EPA B2 method.

8.2.4 Significance of sleep and non-sleep odour impacts

The predicted exposure of residences was further examined to consider the timing of events in relation to sleep hours. When asleep, olfactory acuity is lessened[20] and it is judged that odour levels would need to be in excess of 1000 OU before sleep would be interrupted. Due to rural location of the site in question GHD has taken night 'sleep' hours as spanning 12 am to 5 am.

It should be noted that this requirement (C> 5000 OU) applies to **odorants**. The corresponding 'awake' threshold for **irritants** (e.g. ammonia, allyl alcohol, etc.) that act on the trigeminal nerve, is only slightly above the 'awake' odour threshold (C>2 – 5). However, broiler farm exhaust contains only low levels of ammonia (the only candidate irritant in broiler shed exhaust) and the

[19] GHD 2013 "Position Paper – Submission to EPA, Review of Proposed ERA" Report to VCMC #217977 , February 2013

[20] Amoore J E and Hautala E 1983. "Odour as an Aid to Chemical safety; odour thresholds compared with Threshold Limit values and Volatilities for 214 Industrial Chemicals in Air and water dilution" *J. Applied Toxicology*

dilution of the shed odour plume downwind results in ammonia concentrations that are below the ‘awake’ odour thresholds.

8.3 ERA Results

The preliminary ERA was assessed for R4 only, which involved a discrete receptor run for R4. The results indicated that there were 9 exceedances of 5 OU.

Using the GHD ERA this would suggest that the predicted odour risk at R4 would be **Negligible**, while applying the EPA Draft ERA the predicted odour risk at R4 would be **Low**.

Thus the analysis suggests that:

- Where there is **negligible** or **low** risk of odour impact, then this land may be developed for sensitive land uses such as residential housing, schools and hospitals.
- All other receptors surrounding the farm would be predicted to have a **low** or **negligible** risk using either the GHD or EPA risk matrix.
- The 250 m default and directional buffers provide an appropriate separation distance to apply to the farm to protect from offsite odour impact.

9. Refinements to Site-Specific Assessment

The approved regulatory dispersion model, AERMOD, was used to conduct dispersion modelling of odour emissions from the broiler farm using site representative meteorology. The assessment used generic upper limit odour emission rate (OER) data for broiler farms, sourced from publically available literature and previous non-confidential projects conducted by GHD. The predicted off-site odour impact was presented as contours of 99.9th percentile odour levels.

Additional work to refine the buffer for a site specific assessment would entail shed OER measurements at the broiler farm to be conducted to obtain **site-specific** source OERs. This would involve sampling and analysis by a NATA accredited laboratory. The site-specific OER data could then be used in odour dispersion modelling for the broiler farm using AERMOD as conducted within this report. The same ERA approach as used in the report can also be used to determine the level of predicted odour risk and subsequently a suitable separation distance.

However, in this case, the consequent change in the recommended buffer is unlikely to be significant, especially given that the broiler farm is likely to cease operations in the medium term. In these circumstances GHD considers that the additional expense and delay to refine the assessment may not be justified at the PSP stage.

10. Recommendations and Conclusions

GHD has been engaged by CoW to conduct an odour impact assessment of an existing broiler farm. The farm consists of two sheds with a farm stocking of 60,000 birds. The purpose of the assessment was to provide an indication of the buffer and odour constraint associated with the current broiler farm which may affect the development of the Wollert PSP. In essence the aim was to determine the recommended area within which further site-specific assessment would be required prior to sensitive development occurring in the future.

Relevant Buffer Guidelines

The Victorian Broiler Code (the Code) applies only to a planning permit application to use and develop land for a broiler farm that includes the establishment of a new broiler farm and an increase in the farm capacity of an existing broiler farm. The Code does **not** apply to an existing broiler farm where there is no increase in the farm capacity, which is the case here.

As a guide from the 'Classification of broiler farms' section of the Code, the farm requires a separation distance of **250 m**.

Approved Measure E1 M1.1 of the Code requires a separation distance of 1000 m for any proposed broiler farm development from: (i) a residential zone, urban growth zone or other urban zone, or (ii) a future residential area.

This 1000 m buffer only applies to the siting of a **new** broiler farm or **upgrades** to an existing broiler farm.

It does **not** apply to; (i) existing broiler farms not undergoing an upgrade or increase to capacity, or (ii) to the reverse amenity situation of establishing sensitive uses near an existing broiler farm (which is the case here).

It can also be argued that, as this is a small example of a broiler farm (and not likely to expand), the 1000 m buffer should be de-rated in any case **if** it were to be required. Based on the Code de-rating method, the 60,000 bird farm would attract a smaller buffer of **360 m.**

Section 11 of the Code addresses the issue of establishing sensitive uses near broiler farms (reverse amenity) – and this is the relevant Section in this situation.

Section 11 states that the separation distances as found in the 'classification of broiler farms' section should be used as a guide when planning for urban use and development near a broiler farm - thus the 250 m buffer would apply. It also states that for older farms built prior to 2001, the historical performance of these farms in regards to odour impact and potential risk should be used to assess an appropriate buffer distance as well as the current separation to the nearest residences.

Default Buffer

The default 250 m buffer is clear of all existing residences, but would preclude some land from residential development within the PSP, with extensions to the north (~190 m), west (90 m) and south (~190 m) – as measured from the farm site boundary.

Directional Buffer

Approved Measure E1, M1.3 of the Code refers to meteorological and topographic conditions that might require an **increase** to the default value in the buffer distance in specific directions. To examine the potential for this measure to constrain the site, GHD has determined a directional buffer distance.

The directional buffer extends further east and northeast when compared to the default 250 m buffer and retracts significantly in the westerly direction. Similar to the default buffer, the directional buffer does not extend to encompass any existing receptors. The directional buffer encompasses less land within the PSP to the west (~75 m) but extends to encompass a greater amount of land to the west (~ 140 m).

Odour Complaint History

GHD understands there have been no odour complaints received by Council in the last 10 years in relation to the broiler farm. This indicates that the current operations of the farm are being well managed to best practice standards to avoid off-site impact.

Compliance to the Code criterion

Air dispersion modelling with the EPA regulatory dispersion model AERMOD found that the existing farm is mostly compliant with the five odour unit (OU) 99.9th percentile Code criterion, except for some marginal excursions beyond the southern and north-eastern boundaries and encompassing one existing receptor (R4).

The majority of broiler farms do not comply with the SEPP-AQM criterion and in these cases, a second stage of assessment in which the risk posed to nearby sensitive land uses is conducted. In this case, a preliminary risk assessment was conducted for R4.

Environmental risk assessment

Based on the ERA, R4 was predicted to have either a **Low** or **Negligible** risk of odour impact using the EPA and GHD ERAs respectively.

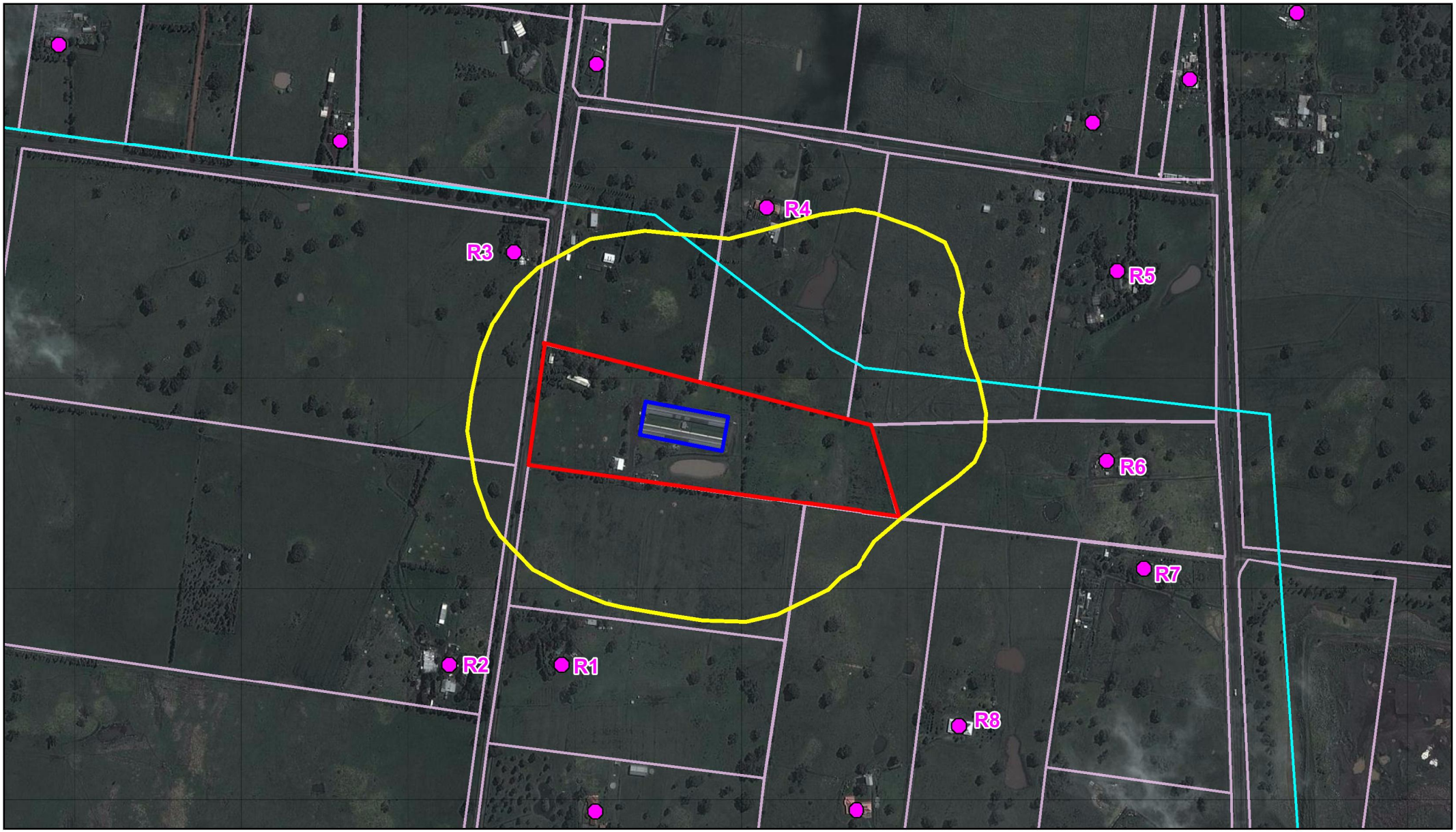
Thus the analysis suggests that:

- Where there is **negligible** or **low** risk of odour impact, then this land may be developed for sensitive land uses such as residential housing, schools and hospitals.
- All other receptors surrounding the farm would be predicted to have a **low** or **negligible** risk using either the GHD or EPA risk matrix.
- The 250 m default and directional buffers provide an appropriate separation distance to apply to the farm to protect from offsite odour impact.

Recommended Buffer Distance

GHD considers the application of a 1250 m buffer distance to be excessive, with no basis for adoption in the Code. It should be replaced by the envelope of the 250 m default and directional buffers as shown in Figure 16 below. This is a conservative measure and is in accordance with the Code Approved Measure E1, M1.3 which allows for meteorological and topographic conditions to **increase** the default value in the buffer distance.

It is also important to note that in the new buffer guideline 1518, EPA allow for transitioning of the industry as a means to reduce the buffer on a site-specific basis. In discussions with the farm operator, it is more than likely that the farm will transition out of the area in the medium term (~5-10 years).



0 75 150 225
metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N
W E
S

LEGEND

- Site Boundary
- Sensitive Receptors
- Shed Envelope
- Recommended Buffer
- PSP Boundary
- Property Boundaries

GHD
CLIENTS PEOPLE PERFORMANCE

City of Whittlesea
Wollert Broiler Farm

Recommended Buffer

Job Number 3131176
Revision A
Date 07/03/2013

Figure 16

G:\31\31176\GIS\Maps\Working

8/180 Lonsdale St Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com.au W www.ghd.com.au

Google Earth Imagery 2014. Created by: M.A

Appendices

Appendix A – Input File and Output file

```
** AERMOD Input Produced by AUSMOD v1.0
** Licensed to MichaelA-GHD
** AERMOD Control Pathway
CO STARTING
   TITLEONE Wollert Run 1
   TITLETWO RUN1
   MODELOPT CONC FLAT NOCHKD
   AVERTIME 1
   POLLUTID ODOUR
   RUNORNOT RUN
   ERRORFIL test.err
CO FINISHED

** AERMOD Source Pathway
SO STARTING
   LOCATION VOL01 VOLUME 325468.000 5839010.000 0.000
   LOCATION VOL02 VOLUME 325483.000 5839008.000 0.000
   LOCATION VOL03 VOLUME 325499.000 5839005.000 0.000
   LOCATION VOL04 VOLUME 325513.000 5839003.000 0.000
   LOCATION VOL05 VOLUME 325528.000 5839000.000 0.000
   LOCATION VOL06 VOLUME 325543.000 5838998.000 0.000
   LOCATION VOL07 VOLUME 325558.000 5838995.000 0.000
   LOCATION VOL08 VOLUME 325573.000 5838992.000 0.000
   LOCATION VOL09 VOLUME 325473.000 5839042.000 0.000
   LOCATION VOL10 VOLUME 325488.000 5839039.000 0.000
   LOCATION VOL11 VOLUME 325504.000 5839036.000 0.000
   LOCATION VOL12 VOLUME 325518.000 5839034.000 0.000
   LOCATION VOL13 VOLUME 325533.000 5839032.000 0.000
   LOCATION VOL14 VOLUME 325547.000 5839029.000 0.000
   LOCATION VOL15 VOLUME 325562.000 5839027.000 0.000
   LOCATION VOL16 VOLUME 325576.000 5839024.000 0.000
   BACKGRND ANNUAL 0.000
   SRCPARAM VOL01 1.80000 5.000 3.750 2.500
   SRCPARAM VOL02 1.80000 5.000 3.750 2.500
   SRCPARAM VOL03 1.80000 5.000 3.750 2.500
   SRCPARAM VOL04 1.80000 5.000 3.750 2.500
   SRCPARAM VOL05 1.80000 5.000 3.750 2.500
   SRCPARAM VOL06 1.80000 5.000 3.750 2.500
   SRCPARAM VOL07 1.80000 5.000 3.750 2.500
   SRCPARAM VOL08 1.80000 5.000 3.750 2.500
   SRCPARAM VOL09 1.80000 5.000 3.750 2.500
   SRCPARAM VOL10 1.80000 5.000 3.750 2.500
   SRCPARAM VOL11 1.80000 5.000 3.750 2.500
   SRCPARAM VOL12 1.80000 5.000 3.750 2.500
   SRCPARAM VOL13 1.80000 5.000 3.750 2.500
   SRCPARAM VOL14 1.80000 5.000 3.750 2.500
   SRCPARAM VOL15 1.80000 5.000 3.750 2.500
   SRCPARAM VOL16 1.80000 5.000 3.750 2.500
   HOUREMIS VariableEmissionFile_ALL.VRE VOL01

   HOUREMIS VariableEmissionFile_ALL.VRE VOL02

   HOUREMIS VariableEmissionFile_ALL.VRE VOL03

   HOUREMIS VariableEmissionFile_ALL.VRE VOL04

   HOUREMIS VariableEmissionFile_ALL.VRE VOL05
```

```
   HOUREMIS VariableEmissionFile_ALL.VRE VOL06

   HOUREMIS VariableEmissionFile_ALL.VRE VOL07

   HOUREMIS VariableEmissionFile_ALL.VRE VOL08

   HOUREMIS VariableEmissionFile_ALL.VRE VOL09

   HOUREMIS VariableEmissionFile_ALL.VRE VOL10

   HOUREMIS VariableEmissionFile_ALL.VRE VOL11

   HOUREMIS VariableEmissionFile_ALL.VRE VOL12

   HOUREMIS VariableEmissionFile_ALL.VRE VOL13

   HOUREMIS VariableEmissionFile_ALL.VRE VOL14

   HOUREMIS VariableEmissionFile_ALL.VRE VOL15

   HOUREMIS VariableEmissionFile_ALL.VRE VOL16

   CONCUNIT 1 OUVperSecond OdourUnits
   SRCGROUP ALL
SO FINISHED

** AERMOD Receptor Pathway
RE STARTING
   GRIDCART RGCART STA
                  XYINC 323051.000 201 50.000 5836502.000
201 50.000
   GRIDCART RGCART END
** Cartesian discrete receptors
RE FINISHED

** AERMOD Meteorology Pathway
ME STARTING
   SURFFILE CRAIGIE_NEW.SFC
   PROFFILE CRAIGIE_NEW.PFL
   SURFDATA 0011 2003
   UAIRDATA 0099 2003
   PROFBASE 0 METERS
ME FINISHED

** AERMOD Output Pathway
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 9TH
   MAXTABLE ALLAVE 999
   RANKFILE 1 100 ALL_02_100T.RNK
   MAXIFILE 01 ALL 0 ALL_02_0.FRQ
   PLOTFILE 01 ALL 9TH ALL_02_9H.PLT
   PLOTFILE 01 ALL 1ST ALL_02_1H.PLT
OU FINISHED
```

```
** AERMOD Input Produced by AUSMOD v1.0
** Licensed to MichaelA-GHD
** AERMOD Control Pathway
CO STARTING
   TITLEONE Wollert Run 1
   TITLETWO RUN1
   MODELOPT CONC FLAT NOCHKD
   AVERTIME 1
   POLLUTID ODOUR
   RUNORNOT RUN
   ERRORFIL run03.err
CO FINISHED

** AERMOD Source Pathway
SO STARTING
   LOCATION VOL01 VOLUME 325468.000 5839010.000 0.000
   LOCATION VOL02 VOLUME 325483.000 5839008.000 0.000
   LOCATION VOL03 VOLUME 325499.000 5839005.000 0.000
   LOCATION VOL04 VOLUME 325513.000 5839003.000 0.000
   LOCATION VOL05 VOLUME 325528.000 5839000.000 0.000
   LOCATION VOL06 VOLUME 325543.000 5838998.000 0.000
   LOCATION VOL07 VOLUME 325558.000 5838995.000 0.000
   LOCATION VOL08 VOLUME 325573.000 5838992.000 0.000
   LOCATION VOL09 VOLUME 325473.000 5839042.000 0.000
   LOCATION VOL10 VOLUME 325488.000 5839039.000 0.000
   LOCATION VOL11 VOLUME 325504.000 5839036.000 0.000
   LOCATION VOL12 VOLUME 325518.000 5839034.000 0.000
   LOCATION VOL13 VOLUME 325533.000 5839032.000 0.000
   LOCATION VOL14 VOLUME 325547.000 5839029.000 0.000
   LOCATION VOL15 VOLUME 325562.000 5839027.000 0.000
   LOCATION VOL16 VOLUME 325576.000 5839024.000 0.000
   BACKGRND ANNUAL 0.000
   SRCPARAM VOL01 1.80000 5.000 3.750 2.500
   SRCPARAM VOL02 1.80000 5.000 3.750 2.500
   SRCPARAM VOL03 1.80000 5.000 3.750 2.500
   SRCPARAM VOL04 1.80000 5.000 3.750 2.500
   SRCPARAM VOL05 1.80000 5.000 3.750 2.500
   SRCPARAM VOL06 1.80000 5.000 3.750 2.500
   SRCPARAM VOL07 1.80000 5.000 3.750 2.500
   SRCPARAM VOL08 1.80000 5.000 3.750 2.500
   SRCPARAM VOL09 1.80000 5.000 3.750 2.500
   SRCPARAM VOL10 1.80000 5.000 3.750 2.500
   SRCPARAM VOL11 1.80000 5.000 3.750 2.500
   SRCPARAM VOL12 1.80000 5.000 3.750 2.500
   SRCPARAM VOL13 1.80000 5.000 3.750 2.500
   SRCPARAM VOL14 1.80000 5.000 3.750 2.500
   SRCPARAM VOL15 1.80000 5.000 3.750 2.500
   SRCPARAM VOL16 1.80000 5.000 3.750 2.500
   HOUREMIS VariableEmissionFile_ALL.VRE VOL01

   HOUREMIS VariableEmissionFile_ALL.VRE VOL02

   HOUREMIS VariableEmissionFile_ALL.VRE VOL03

   HOUREMIS VariableEmissionFile_ALL.VRE VOL04

   HOUREMIS VariableEmissionFile_ALL.VRE VOL05

   HOUREMIS VariableEmissionFile_ALL.VRE VOL06

   HOUREMIS VariableEmissionFile_ALL.VRE VOL07

   HOUREMIS VariableEmissionFile_ALL.VRE VOL08

   HOUREMIS VariableEmissionFile_ALL.VRE VOL09

   HOUREMIS VariableEmissionFile_ALL.VRE VOL10

   HOUREMIS VariableEmissionFile_ALL.VRE VOL11
```

```
   HOUREMIS VariableEmissionFile_ALL.VRE VOL12

   HOUREMIS VariableEmissionFile_ALL.VRE VOL13

   HOUREMIS VariableEmissionFile_ALL.VRE VOL14

   HOUREMIS VariableEmissionFile_ALL.VRE VOL15

   HOUREMIS VariableEmissionFile_ALL.VRE VOL16

   CONCUNIT 1 OUVperSecond OdourUnits
   SRCGROUP ALL
SO FINISHED

** AERMOD Receptor Pathway
RE STARTING
** Cartesian discrete receptors
   DISCCART       325354.000 5838667.000
   DISCCART       325191.000 5838664.000
   DISCCART       325271.000 5839264.000
   DISCCART       325637.000 5839337.000
   DISCCART       326149.000 5839255.000
   DISCCART       326141.000 5838979.000
   DISCCART       326198.000 5838823.000
   DISCCART       325935.000 5838590.000
RE FINISHED

** AERMOD Meteorology Pathway
ME STARTING
   SURFFILE CRAIGIE_NEW.SFC
   PROFFILE CRAIGIE_NEW.PFL
   SURFDATA 0011 2003
   UAIRDATA 0099 2003
   PROFBASE 0 METERS
ME FINISHED

** AERMOD Output Pathway
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 9TH
   MAXTABLE ALLAVE 999
   RANKFILE 1 100 ALL_01_100T.RNK
   MAXIFILE 01 ALL 0 ALL_01_0.FRQ
   PLOTFILE 01 ALL 9TH ALL_01_9H.PLT
   PLOTFILE 01 ALL 1ST ALL_01_1H.PLT
OU FINISHED


  *** Message Summary For AERMOD Model Setup ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            1 Warning Message(s)
 A Total of            0 Informational Message(s)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 SO W317      83  SRCQA:Specified SRCID not included in any PSD/SRCGROUP:
BACKGROUND

 **********************************
 *** SETUP Finishes Successfully ***
 **********************************
```

```
♀ *** AERMOD - VERSION  12345 ***   *** Wollert Run 1
                             ***       03/07/14
                                    *** RUN1
                            ***       15:47:50

                                      PAGE   1
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
                        NOCHKD


                                          ***     MODEL SETUP OPTIONS SUMMARY
     ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses RURAL Dispersion Only.

 **Model Allows User-Specified Options:
         1. Stack-tip Downwash.
         2. Model Assumes Receptors on FLAT Terrain.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.

 **Other Options Specified:
         NOCHKD   - Suppresses checking of date sequence in meteorology files

 **Model Assumes No FLAGPOLE Receptor Heights.

 **Model Calculates  1 Short Term Average(s) of:   1-HR

 **This Run Includes:     16 Source(s);       1 Source Group(s); and       8
Receptor(s)

 **This Run Includes BACKGRND Concentrations Varying by ANNUAL   for      0
Source Group(s)

 **The Model Assumes A Pollutant Type of:  ODOUR

 **Model Set To Continue RUNning After the Setup Testing.

 **Output Options Selected:
          Model Outputs Tables of Highest Short Term Values by Receptor
(RECTABLE Keyword)
          Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE
Keyword)
          Model Outputs External File(s) of Threshold Violations (MAXIFILE
Keyword)
          Model Outputs External File(s) of High Values for Plotting (PLOTFILE
Keyword)
          Model Outputs External File(s) of Ranked Values (RANKFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm
Hours
                                                                 m for Missing
Hours
                                                                 b for Both Calm
and Missing Hours
```

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 0.00 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = OUVPERSECOND ;
Emission Rate Unit Factor = 1.0000
Output Units = ODOURUNITS

**Approximate Storage Requirements of Model = 3.5 MB of RAM.

**Detailed Error/Message File: run03.err

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (USER UNITS) SCALAR VARY BY	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE
VOL01	0	0.18000E+01	325468.0	5839010.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL02	0	0.18000E+01	325483.0	5839008.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL03	0	0.18000E+01	325499.0	5839005.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL04	0	0.18000E+01	325513.0	5839003.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL05	0	0.18000E+01	325528.0	5839000.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL06	0	0.18000E+01	325543.0	5838998.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL07	0	0.18000E+01	325558.0	5838995.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL08	0	0.18000E+01	325573.0	5838992.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL09	0	0.18000E+01	325473.0	5839042.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL10	0	0.18000E+01	325488.0	5839039.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL11	0	0.18000E+01	325504.0	5839036.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL12	0	0.18000E+01	325518.0	5839034.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL13	0	0.18000E+01	325533.0	5839032.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL14	0	0.18000E+01	325547.0	5839029.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL15	0	0.18000E+01	325562.0	5839027.0	0.0	5.00	3.75	2.50	NO	HOURLY
VOL16	0	0.18000E+01	325576.0	5839024.0	0.0	5.00	3.75	2.50	NO	HOURLY

PAGE 3

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID SOURCE IDs

ALL VOL01 , VOL02 , VOL03 , VOL04 , VOL05 , VOL06 , VOL07 , VOL08 ,

VOL09 , VOL10 , VOL11 , VOL12 , VOL13 , VOL14 , VOL15 , VOL16 ,

♀ *** AERMOD - VERSION 12345 *** *** Wollert Run 1
*** 03/07/14
*** RUN1
*** 15:47:50

PAGE 4

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

* ANNUAL (NON-VARYING) BACKGROUND CONCENTRATION (UG/M3) *

.00000E+00

♀ *** AERMOD - VERSION 12345 *** *** Wollert Run 1
*** 03/07/14
*** RUN1
*** 15:47:50

PAGE 5

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** DISCRETE CARTESIAN RECEPTORS ***

(X-COORD, Y-COORD, ZELEV, ZHILL, ZFLAG)

(METERS)

(325354.0, 5838667.0, 0.0, 0.0, 0.0); (325191.0, 5838664.0, 0.0, 0.0, 0.0);
(325271.0, 5839264.0, 0.0, 0.0, 0.0); (325637.0, 5839337.0, 0.0, 0.0, 0.0);
(326149.0, 5839255.0, 0.0, 0.0, 0.0); (326141.0, 5838979.0, 0.0, 0.0, 0.0);
(326198.0, 5838823.0, 0.0, 0.0, 0.0); (325935.0, 5838590.0, 0.0, 0.0, 0.0);

♀ *** AERMOD - VERSION 12345 *** *** Wollert Run 1
*** 03/07/14
*** RUN1
*** 15:47:50

PAGE 6

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1
1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1
1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1
1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1
1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1
1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1
1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1
1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

♀ *** AERMOD - VERSION 12345 *** *** Wollert Run 1 *** 03/07/14
*** RUN1 *** 15:47:50

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**MODELOPTs: NonDFAULT CONC FLAT NOCHKD

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

```
   Surface file:   CRAIGIE_NEW.SFC
                     Met Version:  12345
   Profile file:   CRAIGIE_NEW.PFL

   Surface format: FREE

   Profile format: FREE

   Surface station no.:       11                  Upper air station no.:
99
                  Name: UNKNOWN                                Name: UNKNOWN

                  Year:   2003                                 Year:   2003

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN
ALBEDO  REF WS   WD     HT  REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - -
 03 10 13 286 13   87.2  0.398  1.098  0.005 1466.  577.    -65.0  0.10   1.00
0.20    4.20    9.   10.0  290.8    2.0
 03 10 13 286 14   83.9  0.389  1.093  0.005 1466.  558.    -63.0  0.10   1.00
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0.20    4.10  356.   10.0  291.5    2.0
 03 10 13 286 15   61.8  0.339  0.921  0.005 1466.  453.    -56.0  0.10   1.00
0.20    3.90    2.   10.0  291.9    2.0
 03 10 13 286 16   31.5  0.356  0.754  0.005 1466.  489.   -128.0  0.10   1.00
0.20    4.10    8.   10.0  292.3    2.0
 03 10 13 286 17   -9.9  0.373 ****** ****** -999.  525.    471.0  0.10   1.00
0.20    4.30   14.   10.0  292.4    2.0
 03 10 13 286 18  -24.1  0.278 ****** ****** -999.  337.     80.0  0.10   1.00
0.20    3.20   21.   10.0  291.3    2.0
 03 10 13 286 19  -21.8  0.243 ****** ****** -999.  276.     59.0  0.10   1.00
0.20    2.80  333.   10.0  289.0    2.0
 03 10 13 286 20  -27.7  0.104 ****** ****** -999.   77.     10.0  0.10   1.00
0.20    2.40  326.   10.0  287.9    2.0
 03 10 13 286 21  -45.1  0.061 ****** ****** -999.   34.      6.0  0.10   1.00
0.20    1.40  133.   10.0  287.2    2.0
 03 10 13 286 22  -49.9  0.123 ****** ****** -999.   99.     12.0  0.10   1.00
0.20    2.60   13.   10.0  284.8    2.0
 03 10 13 286 23  -59.4  0.182 ****** ****** -999.  179.     27.0  0.10   1.00
0.20    2.90    5.   10.0  284.3    2.0
 03 10 13 286 24  -58.6  0.220 ****** ****** -999.  238.     39.0  0.10   1.00
0.20    3.20  351.   10.0  283.9    2.0
 03 10 14 287 01  -59.5  0.254 ****** ****** -999.  294.     52.0  0.10   1.00
0.20    3.50  359.   10.0  283.1    2.0
 03 10 14 287 02  -52.9  0.243 ****** ****** -999.  275.     47.0  0.10   1.00
0.20    3.40    9.   10.0  282.3    2.0
 03 10 14 287 03  -56.8  0.325 ****** ****** -999.  427.     84.0  0.10   1.00
0.20    4.20    7.   10.0  280.1    2.0
 03 10 14 287 04  -64.4  0.325 ****** ****** -999.  427.     84.0  0.10   1.00
0.20    4.20    6.   10.0  280.9    2.0
 03 10 14 287 05  -68.1  0.391 ****** ****** -999.  562.     88.0  0.10   1.00
0.20    4.50    6.   10.0  281.1    2.0
 03 10 14 287 06  -70.3  0.417 ****** ****** -999.  619.     92.0  0.10   1.00
0.20    4.80    2.   10.0  281.8    2.0
 03 10 14 287 07  -49.1  0.443 ****** ****** -999.  678.    158.0  0.10   1.00
0.20    5.10    2.   10.0  283.5    2.0
 03 10 14 287 08  -16.0  0.521 ****** ****** -999.  865.    790.0  0.10   1.00
0.20    6.00    4.   10.0  285.6    2.0
 03 10 14 287 09   13.5  0.704  0.378  0.005  145. 1357.  -2301.0  0.10   1.00
0.20    8.10  358.   10.0  288.0    2.0
 03 10 14 287 10   45.8  0.886  0.734  0.005  309. 1918.  -1354.0  0.10   1.00
0.20   10.20    3.   10.0  289.3    2.0
 03 10 14 287 11   42.1  0.860  0.862  0.005  544. 1834.  -1347.0  0.10   1.00
0.20    9.90    3.   10.0  290.1    2.0
 03 10 14 287 12   32.2  0.816  0.967  0.005 1003. 1697.  -1508.0  0.10   1.00
0.20    9.40    1.   10.0  290.7    2.0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 03 10 13 13   10.0 1    9.    4.20   291.0   19.0  -99.00    1.32

 F indicates top of profile (=1) or below (=0)
♀ *** AERMOD - VERSION  12345 ***   *** Wollert Run 1
                                ***        03/07/14
                                       *** RUN1
                                ***        15:47:50

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 **MODELOPTs:  NonDFAULT CONC                                        FLAT
                         NOCHKD


                                    *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION
 VALUES FOR SOURCE GROUP:  ALL         ***
                                       INCLUDING SOURCE(S):     VOL01       , VOL02
    , VOL03       , VOL04       , VOL05       ,
                 VOL06       , VOL07       , VOL08       , VOL09       , VOL10
    , VOL11       , VOL12       , VOL13       ,
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VOL14 , VOL15 , VOL16 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF ODOUR IN ODOURUNITS **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
325354.00	5838667.00	6.18399	(04081701)	325191.00	5838664.00	6.76915	(04041001)
325271.00	5839264.00	5.94764	(04090424)	325637.00	5839337.00	9.51035	(04081720)
326149.00	5839255.00	4.78144	(04020522)	326141.00	5838979.00	4.72369	(04042524)
326198.00	5838823.00	5.41200	(04081723)	325935.00	5838590.00	6.73301	(04090222)

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** THE 9TH HIGHEST 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): VOL01 , VOL02 , VOL03 , VOL04 , VOL05 ,
VOL06 , VOL07 , VOL08 , VOL09 , VOL10 , VOL11 , VOL12 , VOL13 ,
VOL14 , VOL15 , VOL16 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF ODOUR IN ODOURUNITS **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
325354.00	5838667.00	3.74727	(04081623)	325191.00	5838664.00	2.92556	(04040304)
325271.00	5839264.00	2.92865	(04090519)	325637.00	5839337.00	5.52194	(04081819)
326149.00	5839255.00	2.85402	(04061623)	326141.00	5838979.00	3.21202	(04090201)
326198.00	5838823.00	1.92145	(04090205)	325935.00	5838590.00	3.39264	(04082222)

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** THE MAXIMUM 999 1-HR AVERAGE CONCENTRATION

VALUES FOR SOURCE GROUP: ALL *** INCLUDING SOURCE(S): VOL01 , VOL02 , VOL03 , VOL04 , VOL05 , VOL06 , VOL07 , VOL08 , VOL09 , VOL10 , VOL11 , VOL12 , VOL13 , VOL14 , VOL15 , VOL16 ,

** CONC OF ODOUR IN ODOURUNITS **

RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE		RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE	
1.	9.51035	(04081720)	(325637.00, 5839337.00)	DC	41.	4.11223	(04041920)	(325637.00, 5839337.00)	DC
2.	8.84179	(04081719)	(325637.00, 5839337.00)	DC	42.	4.09840	(03112604)	(325637.00, 5839337.00)	DC
3.	7.56995	(04020701)	(325637.00, 5839337.00)	DC	43.	4.08979	(04061620)	(326149.00, 5839255.00)	DC
4.	7.20198	(04020703)	(325637.00, 5839337.00)	DC	44.	4.02806	(04081623)	(325191.00, 5838664.00)	DC
5.	6.86062	(04020702)	(325637.00, 5839337.00)	DC	45.	4.01967	(04041001)	(325354.00, 5838667.00)	DC
6.	6.76915	(04041001)	(325191.00, 5838664.00)	DC	46.	4.00701	(04011601)	(325637.00, 5839337.00)	DC
7.	6.73301	(04090222)	(325935.00, 5838590.00)	DC	47.	3.99078	(03120723)	(325271.00, 5839264.00)	DC
8.	6.39579	(04020704)	(325637.00, 5839337.00)	DC	48.	3.98106	(03112403)	(325637.00, 5839337.00)	DC
9.	6.18399	(04081701)	(325354.00, 5838667.00)	DC	49.	3.95646	(04021423)	(325637.00, 5839337.00)	DC
10.	6.07312	(04081624)	(325354.00, 5838667.00)	DC	50.	3.91031	(03111021)	(325637.00, 5839337.00)	DC
11.	6.01488	(04081622)	(325191.00, 5838664.00)	DC	51.	3.89767	(04020721)	(325637.00, 5839337.00)	DC
12.	5.94764	(04090424)	(325271.00, 5839264.00)	DC	52.	3.80647	(04021423)	(325271.00, 5839264.00)	DC
13.	5.90014	(04090602)	(325354.00, 5838667.00)	DC	53.	3.78311	(04090301)	(325935.00, 5838590.00)	DC
14.	5.89190	(04040821)	(325637.00, 5839337.00)	DC	54.	3.77636	(04090423)	(325271.00, 5839264.00)	DC
15.	5.68466	(03111320)	(325637.00, 5839337.00)	DC	55.	3.76694	(03111422)	(325637.00, 5839337.00)	DC
16.	5.60317	(04081901)	(325935.00, 5838590.00)	DC	56.	3.74727	(04081623)	(325354.00, 5838667.00)	DC
17.	5.52194	(04081819)	(325637.00, 5839337.00)	DC	57.	3.70066	(03120801)	(325637.00, 5839337.00)	DC
18.	5.41200	(04081723)	(326198.00, 5838823.00)	DC	58.	3.68231	(04020722)	(325637.00, 5839337.00)	DC
19.	5.07456	(04090223)	(325935.00, 5838590.00)	DC	59.	3.67725	(04061108)	(325354.00, 5838667.00)	DC
20.	5.06785	(04090524)	(325191.00, 5838664.00)	DC	60.	3.64537	(04020523)	(326149.00, 5839255.00)	DC
21.	4.98162	(04081621)	(325191.00, 5838664.00)	DC	61.	3.62768	(03111422)	(325271.00, 5839264.00)	DC
22.	4.81989	(04081801)	(325935.00, 5838590.00)	DC	62.	3.62333	(04082221)	(325935.00, 5838590.00)	DC
23.	4.78144	(04020522)	(326149.00, 5839255.00)	DC	63.	3.62110	(04090619)	(325191.00, 5838664.00)	DC
24.	4.75150	(03120802)	(326198.00, 5838823.00)	DC	64.	3.62052	(04082220)	(326198.00, 5838823.00)	DC
25.	4.72369	(04042524)	(326141.00, 5838979.00)	DC	65.	3.57937	(03120801)	(325271.00, 5839264.00)	DC
26.	4.66573	(04090219)	(325637.00, 5839337.00)	DC	66.	3.56116	(03120723)	(325354.00, 5838667.00)	DC
27.	4.61593	(03112601)	(325637.00, 5839337.00)	DC	67.	3.52801	(04021305)	(325637.00, 5839337.00)	DC
28.	4.54971	(04090224)	(325935.00, 5838590.00)	DC	68.				

3.42266 (04081721) AT (325637.00, 5839337.00) DC
29. 4.48316 (04081523) AT (325191.00, 5838664.00) DC 69.
3.42172 (03120724) AT (326149.00, 5839255.00) DC
30. 4.45648 (04090601) AT (325354.00, 5838667.00) DC 70.
3.41977 (04040503) AT (326141.00, 5838979.00) DC
31. 4.42142 (03112501) AT (325637.00, 5839337.00) DC 71.
3.41480 (04040221) AT (325637.00, 5839337.00) DC
32. 4.38045 (03112404) AT (325637.00, 5839337.00) DC 72.
3.39264 (04082222) AT (325935.00, 5838590.00) DC
33. 4.36736 (04081702) AT (325354.00, 5838667.00) DC 73.
3.37453 (04061624) AT (326149.00, 5839255.00) DC
34. 4.33588 (04061020) AT (325637.00, 5839337.00) DC 74.
3.36357 (04090124) AT (326141.00, 5838979.00) DC
35. 4.28443 (04081524) AT (325354.00, 5838667.00) DC 75.
3.36047 (04090220) AT (326149.00, 5839255.00) DC
36. 4.25823 (04020524) AT (326141.00, 5838979.00) DC 76.
3.35248 (04012920) AT (325637.00, 5839337.00) DC
37. 4.24100 (04081824) AT (325935.00, 5838590.00) DC 77.
3.34927 (04032420) AT (325637.00, 5839337.00) DC
38. 4.22723 (04081601) AT (325354.00, 5838667.00) DC 78.
3.32447 (04021423) AT (325354.00, 5838667.00) DC
39. 4.12602 (03120723) AT (325637.00, 5839337.00) DC 79.
3.29830 (04032601) AT (325637.00, 5839337.00) DC
40. 4.11945 (04040206) AT (326141.00, 5838979.00) DC 80.
3.29503 (04040720) AT (325637.00, 5839337.00) DC

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** THE MAXIMUM 999 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): VOL01 , VOL02 , VOL03 , VOL04 , VOL05 , VOL06 , VOL07 , VOL08 , VOL09 , VOL10 , VOL11 , VOL12 , VOL13 , VOL14 , VOL15 , VOL16 ,

** CONC OF ODOUR IN ODOURUNITS **

RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE		RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE	
81.	3.27780	(04090123) AT	(326141.00, 5838979.00)	DC	121.	2.75086	(03112722) AT	(326149.00, 5839255.00)	DC
82.	3.26366	(04090203) AT	(326141.00, 5838979.00)	DC	122.	2.74588	(03110518) AT	(325637.00, 5839337.00)	DC
83.	3.26339	(04090202) AT	(326141.00, 5838979.00)	DC	123.	2.72547	(04042720) AT	(325637.00, 5839337.00)	DC
84.	3.23950	(04032420) AT	(325271.00, 5839264.00)	DC	124.	2.72270	(04090120) AT	(326149.00, 5839255.00)	DC
85.	3.22838	(04021120) AT	(325637.00, 5839337.00)	DC	125.	2.71895	(04083019) AT	(325637.00, 5839337.00)	DC
86.	3.21202	(04090201) AT	(326141.00, 5838979.00)	DC	126.	2.71188	(04042303) AT	(325271.00, 5839264.00)	DC
87.	3.19404	(03120801) AT	(325354.00, 5838667.00)	DC	127.	2.71188	(04021204) AT	(325271.00, 5839264.00)	DC
88.	3.18132	(03111422) AT	(325354.00, 5838667.00)	DC	128.	2.70106	(03111020) AT	(325637.00, 5839337.00)	DC
89.	3.17383	(04081722) AT	(326149.00, 5839255.00)	DC	129.	2.68901	(04020422) AT	(325637.00, 5839337.00)	DC

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   90.       3.14435 (04011921) AT ( 325354.00, 5838667.00)  DC      130.
2.66514 (03112819) AT ( 325271.00, 5839264.00)  DC
   91.       3.11142 (04040203) AT ( 326149.00, 5839255.00)  DC      131.
2.66304 (04032421) AT ( 325354.00, 5838667.00)  DC
   92.       3.08544 (04032421) AT ( 325637.00, 5839337.00)  DC      132.
2.65435 (04061023) AT ( 326141.00, 5838979.00)  DC
   93.       3.06727 (04041906) AT ( 325637.00, 5839337.00)  DC      133.
2.64595 (03120722) AT ( 325637.00, 5839337.00)  DC
   94.       3.05120 (04090523) AT ( 325191.00, 5838664.00)  DC      134.
2.64318 (03110518) AT ( 325271.00, 5839264.00)  DC
   95.       3.04067 (04081718) AT ( 325637.00, 5839337.00)  DC      135.
2.63560 (03112922) AT ( 325354.00, 5838667.00)  DC
   96.       3.02644 (04040706) AT ( 325637.00, 5839337.00)  DC      136.
2.63398 (03111920) AT ( 325354.00, 5838667.00)  DC
   97.       3.02254 (04040504) AT ( 326141.00, 5838979.00)  DC      137.
2.62051 (04081822) AT ( 326141.00, 5838979.00)  DC
   98.       2.98431 (04032421) AT ( 325271.00, 5839264.00)  DC      138.
2.60428 (04040920) AT ( 325637.00, 5839337.00)  DC
   99.       2.98145 (04081802) AT ( 325935.00, 5838590.00)  DC      139.
2.58558 (04040902) AT ( 325637.00, 5839337.00)  DC
  100.       2.97406 (04020423) AT ( 325637.00, 5839337.00)  DC      140.
2.55822 (03112720) AT ( 325637.00, 5839337.00)  DC
  101.       2.92865 (04090519) AT ( 325271.00, 5839264.00)  DC      141.
2.54564 (03120722) AT ( 325271.00, 5839264.00)  DC
  102.       2.92556 (04040304) AT ( 325191.00, 5838664.00)  DC      142.
2.54445 (03110821) AT ( 325637.00, 5839337.00)  DC
  103.       2.91380 (04041419) AT ( 325354.00, 5838667.00)  DC      143.
2.54094 (03111723) AT ( 326198.00, 5838823.00)  DC
  104.       2.89075 (04032420) AT ( 325354.00, 5838667.00)  DC      144.
2.51975 (03120724) AT ( 326141.00, 5838979.00)  DC
  105.       2.88342 (04040521) AT ( 325354.00, 5838667.00)  DC      145.
2.51465 (03111921) AT ( 325354.00, 5838667.00)  DC
  106.       2.87097 (04090204) AT ( 326141.00, 5838979.00)  DC      146.
2.49842 (03111722) AT ( 325935.00, 5838590.00)  DC
  107.       2.85412 (04081724) AT ( 325935.00, 5838590.00)  DC      147.
2.49830 (04090506) AT ( 325354.00, 5838667.00)  DC
  108.       2.85402 (04061623) AT ( 326149.00, 5839255.00)  DC      148.
2.47283 (03120801) AT ( 325191.00, 5838664.00)  DC
  109.       2.85177 (04082223) AT ( 325935.00, 5838590.00)  DC      149.
2.47283 (04040805) AT ( 326149.00, 5839255.00)  DC
  110.       2.84838 (04081823) AT ( 326198.00, 5838823.00)  DC      150.
2.47256 (04082704) AT ( 325935.00, 5838590.00)  DC
  111.       2.83051 (04090218) AT ( 325637.00, 5839337.00)  DC      151.
2.47114 (04021423) AT ( 325191.00, 5838664.00)  DC
  112.       2.81875 (04021605) AT ( 325637.00, 5839337.00)  DC      152.
2.46420 (04021302) AT ( 325637.00, 5839337.00)  DC
  113.       2.81446 (04012103) AT ( 326141.00, 5838979.00)  DC      153.
2.46363 (03112822) AT ( 325191.00, 5838664.00)  DC
  114.       2.80892 (04042303) AT ( 325637.00, 5839337.00)  DC      154.
2.46196 (04040423) AT ( 325637.00, 5839337.00)  DC
  115.       2.80892 (04021204) AT ( 325637.00, 5839337.00)  DC      155.
2.44644 (04082718) AT ( 325935.00, 5838590.00)  DC
  116.       2.79757 (04061706) AT ( 325354.00, 5838667.00)  DC      156.
2.44409 (04040501) AT ( 326149.00, 5839255.00)  DC
  117.       2.78305 (03112819) AT ( 325637.00, 5839337.00)  DC      157.
2.42204 (04090122) AT ( 326141.00, 5838979.00)  DC
  118.       2.77725 (04090206) AT ( 326198.00, 5838823.00)  DC      158.
2.40234 (04042303) AT ( 325354.00, 5838667.00)  DC
  119.       2.77482 (04041220) AT ( 325637.00, 5839337.00)  DC      159.
2.40234 (04021204) AT ( 325354.00, 5838667.00)  DC
  120.       2.75706 (03120723) AT ( 325191.00, 5838664.00)  DC      160.
2.39857 (04090518) AT ( 325271.00, 5839264.00)  DC
♀ *** AERMOD - VERSION  12345 ***   *** Wollert Run 1
                              ***        03/07/14
                             *** RUN1
                           ***          15:47:50

                                       PAGE  12
 **MODELOPTs:  NonDFAULT CONC                                        FLAT
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NOCHKD

*** THE MAXIMUM 999 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

INCLUDING SOURCE(S): VOL01 , VOL02 , VOL03 , VOL04 , VOL05 , VOL06 , VOL07 , VOL08 , VOL09 , VOL10 , VOL11 , VOL12 , VOL13 , VOL14 , VOL15 , VOL16 ,

** CONC OF ODOUR IN ODOURUNITS **

RANK	CONC	(YYMMDDHH)	AT	RECEPTOR (XR,YR)	OF TYPE
161.	2.39203	(04020405)	AT	(325271.00, 5839264.00)	DC
201.	2.16653	(03120721)	AT	(325637.00, 5839337.00)	DC
162.	2.38969	(03120324)	AT	(325637.00, 5839337.00)	DC
202.	2.16605	(04021206)	AT	(325637.00, 5839337.00)	DC
163.	2.38194	(03111422)	AT	(325191.00, 5838664.00)	DC
203.	2.16281	(04020521)	AT	(325637.00, 5839337.00)	DC
164.	2.37792	(04061702)	AT	(326141.00, 5838979.00)	DC
204.	2.15283	(04090303)	AT	(325935.00, 5838590.00)	DC
165.	2.36895	(04041020)	AT	(325354.00, 5838667.00)	DC
205.	2.14328	(03120723)	AT	(325935.00, 5838590.00)	DC
166.	2.34794	(04090302)	AT	(325935.00, 5838590.00)	DC
206.	2.14138	(04020921)	AT	(325637.00, 5839337.00)	DC
167.	2.34399	(04040722)	AT	(325637.00, 5839337.00)	DC
207.	2.12822	(04021304)	AT	(325637.00, 5839337.00)	DC
168.	2.34134	(04081519)	AT	(325271.00, 5839264.00)	DC
208.	2.12815	(04021201)	AT	(326149.00, 5839255.00)	DC
169.	2.34096	(04011602)	AT	(325637.00, 5839337.00)	DC
209.	2.11231	(04041523)	AT	(325271.00, 5839264.00)	DC
170.	2.33261	(04011523)	AT	(325637.00, 5839337.00)	DC
210.	2.08615	(04020420)	AT	(325637.00, 5839337.00)	DC
171.	2.33155	(04020501)	AT	(326149.00, 5839255.00)	DC
211.	2.08504	(04021206)	AT	(325271.00, 5839264.00)	DC
172.	2.32694	(04081703)	AT	(325354.00, 5838667.00)	DC
212.	2.08207	(03120721)	AT	(325271.00, 5839264.00)	DC
173.	2.32581	(04061101)	AT	(326141.00, 5838979.00)	DC
213.	2.07663	(03120303)	AT	(325637.00, 5839337.00)	DC
174.	2.31377	(03110518)	AT	(325354.00, 5838667.00)	DC
214.	2.06824	(04042604)	AT	(325637.00, 5839337.00)	DC
175.	2.30842	(04040721)	AT	(325637.00, 5839337.00)	DC
215.	2.06748	(04081622)	AT	(325354.00, 5838667.00)	DC
176.	2.30713	(03120324)	AT	(325271.00, 5839264.00)	DC
216.	2.06173	(04032421)	AT	(325191.00, 5838664.00)	DC
177.	2.29759	(04081820)	AT	(325637.00, 5839337.00)	DC
217.	2.04380	(03120324)	AT	(325354.00, 5838667.00)	DC
178.	2.28760	(04060521)	AT	(325354.00, 5838667.00)	DC
218.	2.03828	(04083020)	AT	(325637.00, 5839337.00)	DC
179.	2.28120	(03112819)	AT	(325354.00, 5838667.00)	DC
219.	2.03165	(03120723)	AT	(326141.00, 5838979.00)	DC
180.	2.27423	(03112724)	AT	(326149.00, 5839255.00)	DC
220.	2.00718	(04020720)	AT	(325637.00, 5839337.00)	DC
181.	2.26556	(04040305)	AT	(325191.00, 5838664.00)	DC
221.	2.00408	(03111323)	AT	(326198.00, 5838823.00)	DC
182.	2.25488	(04082224)	AT	(325935.00, 5838590.00)	DC
222.	1.99926	(04012105)	AT	(325637.00, 5839337.00)	DC
183.	2.25439	(03111420)	AT	(325637.00, 5839337.00)	DC
223.	1.99926	(04012104)	AT	(325637.00, 5839337.00)	DC
184.	2.25101	(04061701)	AT	(326149.00, 5839255.00)	DC
224.	1.99659	(03120303)	AT	(325271.00, 5839264.00)	DC
185.	2.24857	(04090601)	AT	(325191.00, 5838664.00)	DC
225.	1.99494	(04041620)	AT	(325637.00, 5839337.00)	DC

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  186.       2.24277 (04010923) AT ( 325637.00, 5839337.00)  DC      226.
1.98973 (04090618) AT ( 325191.00, 5838664.00)  DC
  187.       2.23803 (04032420) AT ( 325191.00, 5838664.00)  DC      227.
1.98507 (04012623) AT ( 325637.00, 5839337.00)  DC
  188.       2.22429 (04081602) AT ( 325354.00, 5838667.00)  DC      228.
1.97782 (03112921) AT ( 325191.00, 5838664.00)  DC
  189.       2.22330 (03120722) AT ( 325354.00, 5838667.00)  DC      229.
1.95438 (04021306) AT ( 325637.00, 5839337.00)  DC
  190.       2.21914 (04040302) AT ( 325271.00, 5839264.00)  DC      230.
1.93865 (04040201) AT ( 326198.00, 5838823.00)  DC
  191.       2.21382 (04041004) AT ( 326149.00, 5839255.00)  DC      231.
1.93374 (04012105) AT ( 325271.00, 5839264.00)  DC
  192.       2.21005 (04083119) AT ( 325637.00, 5839337.00)  DC      232.
1.93374 (04012104) AT ( 325271.00, 5839264.00)  DC
  193.       2.20465 (04090205) AT ( 326141.00, 5838979.00)  DC      233.
1.92729 (04082301) AT ( 325935.00, 5838590.00)  DC
  194.       2.20082 (03113020) AT ( 325637.00, 5839337.00)  DC      234.
1.92320 (03112823) AT ( 325354.00, 5838667.00)  DC
  195.       2.19650 (04061104) AT ( 326149.00, 5839255.00)  DC      235.
1.92233 (03120801) AT ( 325935.00, 5838590.00)  DC
  196.       2.19232 (04041523) AT ( 325637.00, 5839337.00)  DC      236.
1.92145 (04090205) AT ( 326198.00, 5838823.00)  DC
  197.       2.18733 (04081818) AT ( 325637.00, 5839337.00)  DC      237.
1.91586 (04041519) AT ( 325637.00, 5839337.00)  DC
  198.       2.18411 (04040505) AT ( 326141.00, 5838979.00)  DC      238.
1.91559 (04021022) AT ( 325637.00, 5839337.00)  DC
  199.       2.18256 (04032602) AT ( 325637.00, 5839337.00)  DC      239.
1.90722 (04040202) AT ( 326149.00, 5839255.00)  DC
  200.       2.18079 (03112424) AT ( 325637.00, 5839337.00)  DC      240.
1.90602 (04020803) AT ( 325354.00, 5838667.00)  DC
♀ *** AERMOD - VERSION  12345 ***   *** Wollert Run 1
                          ***        03/07/14
                                  *** RUN1
                         ***         15:47:50

                                     PAGE  13
 **MODELOPTs:  NonDFAULT CONC                                        FLAT
                       NOCHKD


                                *** THE MAXIMUM  999   1-HR AVERAGE CONCENTRATION
 VALUES FOR SOURCE GROUP:  ALL      ***
                                   INCLUDING SOURCE(S):     VOL01       , VOL02
    , VOL03       , VOL04       , VOL05       ,
                VOL06       , VOL07       , VOL08       , VOL09       , VOL10
    , VOL11       , VOL12       , VOL13       ,
                VOL14       , VOL15       , VOL16       ,

                                        ** CONC OF ODOUR    IN ODOURUNITS
                         **

 RANK        CONC    (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE    RANK
CONC    (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  241.       1.88249 (04021005) AT ( 326198.00, 5838823.00)  DC      281.
1.76170 (03111002) AT ( 325637.00, 5839337.00)  DC
  242.       1.87565 (03113003) AT ( 325354.00, 5838667.00)  DC      282.
1.75911 (04040204) AT ( 326141.00, 5838979.00)  DC
  243.       1.87493 (04011901) AT ( 325637.00, 5839337.00)  DC      283.
1.75735 (04090617) AT ( 325354.00, 5838667.00)  DC
  244.       1.86000 (03110516) AT ( 325354.00, 5838667.00)  DC      284.
1.75615 (04082818) AT ( 325354.00, 5838667.00)  DC
  245.       1.85745 (04021423) AT ( 325935.00, 5838590.00)  DC      285.
1.75603 (04040305) AT ( 325354.00, 5838667.00)  DC
  246.       1.85615 (04041523) AT ( 325354.00, 5838667.00)  DC      286.
1.75211 (04011302) AT ( 326141.00, 5838979.00)  DC
  247.       1.85259 (04011524) AT ( 325637.00, 5839337.00)  DC      287.
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1.75071 (04012103) AT (325637.00, 5839337.00) DC					
248.	1.85088 (04040304) AT (325354.00, 5838667.00)	DC	288.		
1.74966 (04021423) AT (326141.00, 5838979.00) DC					
249.	1.84830 (04090620) AT (325354.00, 5838667.00)	DC	289.		
1.74923 (04041522) AT (325637.00, 5839337.00) DC					
250.	1.84377 (04021121) AT (325637.00, 5839337.00)	DC	290.		
1.74897 (03111919) AT (325354.00, 5838667.00) DC					
251.	1.84377 (04021402) AT (325637.00, 5839337.00)	DC	291.		
1.74610 (03110324) AT (326141.00, 5838979.00) DC					
252.	1.84032 (04041519) AT (325271.00, 5839264.00)	DC	292.		
1.74487 (04012624) AT (325637.00, 5839337.00) DC					
253.	1.83451 (04042303) AT (325191.00, 5838664.00)	DC	293.		
1.74476 (04011002) AT (326141.00, 5838979.00) DC					
254.	1.83451 (04021204) AT (325191.00, 5838664.00)	DC	294.		
1.74274 (03112919) AT (325354.00, 5838667.00) DC					
255.	1.83031 (03120723) AT (326149.00, 5839255.00)	DC	295.		
1.73979 (04032420) AT (325935.00, 5838590.00) DC					
256.	1.82897 (04032524) AT (325637.00, 5839337.00)	DC	296.		
1.73893 (03120303) AT (325354.00, 5838667.00) DC					
257.	1.82518 (04021206) AT (325354.00, 5838667.00)	DC	297.		
1.73179 (04040820) AT (325637.00, 5839337.00) DC					
258.	1.82386 (04040419) AT (325637.00, 5839337.00)	DC	298.		
1.72606 (03110518) AT (325191.00, 5838664.00) DC					
259.	1.82248 (04020103) AT (325637.00, 5839337.00)	DC	299.		
1.72556 (04012105) AT (325354.00, 5838667.00) DC					
260.	1.82221 (03120801) AT (326141.00, 5838979.00)	DC	300.		
1.72556 (04012104) AT (325354.00, 5838667.00) DC					
261.	1.81637 (04082705) AT (325935.00, 5838590.00)	DC	301.		
1.71921 (03120723) AT (326198.00, 5838823.00) DC					
262.	1.81171 (04040701) AT (325637.00, 5839337.00)	DC	302.		
1.71895 (04031821) AT (325637.00, 5839337.00) DC					
263.	1.81075 (04082219) AT (326149.00, 5839255.00)	DC	303.		
1.71578 (04012120) AT (325637.00, 5839337.00) DC					
264.	1.80992 (03120721) AT (325354.00, 5838667.00)	DC	304.		
1.71361 (03120323) AT (325271.00, 5839264.00) DC					
265.	1.80643 (03120621) AT (325637.00, 5839337.00)	DC	305.		
1.71361 (04021203) AT (325271.00, 5839264.00) DC					
266.	1.80038 (03111422) AT (325935.00, 5838590.00)	DC	306.		
1.70974 (03111623) AT (325637.00, 5839337.00) DC					
267.	1.79979 (03112603) AT (325637.00, 5839337.00)	DC	307.		
1.70974 (03112504) AT (325637.00, 5839337.00) DC					
268.	1.79412 (03120803) AT (325935.00, 5838590.00)	DC	308.		
1.70754 (04082623) AT (326141.00, 5838979.00) DC					
269.	1.79092 (04040405) AT (325637.00, 5839337.00)	DC	309.		
1.70657 (04021421) AT (325271.00, 5839264.00) DC					
270.	1.78730 (04032822) AT (325354.00, 5838667.00)	DC	310.		
1.70140 (04012405) AT (325637.00, 5839337.00) DC					
271.	1.78403 (04090505) AT (325354.00, 5838667.00)	DC	311.		
1.70140 (04021003) AT (325637.00, 5839337.00) DC					
272.	1.78153 (03120323) AT (325637.00, 5839337.00)	DC	312.		
1.70140 (04041224) AT (325637.00, 5839337.00) DC					
273.	1.78153 (04021203) AT (325637.00, 5839337.00)	DC	313.		
1.70140 (03111101) AT (325637.00, 5839337.00) DC					
274.	1.78098 (04041002) AT (325637.00, 5839337.00)	DC	314.		
1.70140 (04012404) AT (325637.00, 5839337.00) DC					
275.	1.77844 (04021421) AT (325637.00, 5839337.00)	DC	315.		
1.70140 (04012403) AT (325637.00, 5839337.00) DC					
276.	1.77584 (04041420) AT (325354.00, 5838667.00)	DC	316.		
1.70140 (04040703) AT (325637.00, 5839337.00) DC					
277.	1.77469 (04021121) AT (325271.00, 5839264.00)	DC	317.		
1.70140 (03111102) AT (325637.00, 5839337.00) DC					
278.	1.77469 (04021402) AT (325271.00, 5839264.00)	DC	318.		
1.70140 (03111103) AT (325637.00, 5839337.00) DC					
279.	1.77178 (04090121) AT (326149.00, 5839255.00)	DC	319.		
1.70140 (04061120) AT (325637.00, 5839337.00) DC					
280.	1.76552 (04082701) AT (326198.00, 5838823.00)	DC	320.		
1.70140 (03111705) AT (325637.00, 5839337.00) DC					

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** THE MAXIMUM 999 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): VOL01 , VOL02 , VOL03 , VOL04 , VOL05 , VOL06 , VOL07 , VOL08 , VOL09 , VOL10 , VOL11 , VOL12 , VOL13 , VOL14 , VOL15 , VOL16 ,

** CONC OF ODOUR IN ODOURUNITS **

RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE		RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE	
321.	1.70140	(04061105) AT	(325637.00, 5839337.00)	DC	361.	1.64249	(04090505) AT	(325637.00, 5839337.00)	DC
322.	1.70140	(04061106) AT	(325637.00, 5839337.00)	DC	362.	1.64163	(03120801) AT	(326149.00, 5839255.00)	DC
323.	1.69756	(03111422) AT	(326141.00, 5838979.00)	DC	363.	1.64142	(04020723) AT	(326149.00, 5839255.00)	DC
324.	1.69640	(04082302) AT	(325935.00, 5838590.00)	DC	364.	1.63745	(03112819) AT	(325191.00, 5838664.00)	DC
325.	1.69342	(04012103) AT	(325271.00, 5839264.00)	DC	365.	1.62673	(04041905) AT	(325637.00, 5839337.00)	DC
326.	1.68146	(04041522) AT	(325271.00, 5839264.00)	DC	366.	1.62654	(03120304) AT	(325637.00, 5839337.00)	DC
327.	1.68038	(04082624) AT	(326141.00, 5838979.00)	DC	367.	1.62378	(04021321) AT	(325637.00, 5839337.00)	DC
328.	1.67690	(04012901) AT	(325637.00, 5839337.00)	DC	368.	1.62291	(03111724) AT	(325637.00, 5839337.00)	DC
329.	1.67690	(04021004) AT	(325637.00, 5839337.00)	DC	369.	1.61897	(04012901) AT	(325271.00, 5839264.00)	DC
330.	1.67690	(04062118) AT	(325637.00, 5839337.00)	DC	370.	1.61897	(04021004) AT	(325271.00, 5839264.00)	DC
331.	1.67690	(04033105) AT	(325637.00, 5839337.00)	DC	371.	1.61897	(04062118) AT	(325271.00, 5839264.00)	DC
332.	1.67690	(03111105) AT	(325637.00, 5839337.00)	DC	372.	1.61897	(04033105) AT	(325271.00, 5839264.00)	DC
333.	1.67690	(04062119) AT	(325637.00, 5839337.00)	DC	373.	1.61897	(04062119) AT	(325271.00, 5839264.00)	DC
334.	1.67690	(03111104) AT	(325637.00, 5839337.00)	DC	374.	1.61897	(03111105) AT	(325271.00, 5839264.00)	DC
335.	1.67690	(04090501) AT	(325637.00, 5839337.00)	DC	375.	1.61897	(03111104) AT	(325271.00, 5839264.00)	DC
336.	1.67690	(04061107) AT	(325637.00, 5839337.00)	DC	376.	1.61897	(04090501) AT	(325271.00, 5839264.00)	DC
337.	1.67690	(04090502) AT	(325637.00, 5839337.00)	DC	377.	1.61897	(04061107) AT	(325271.00, 5839264.00)	DC
338.	1.67690	(04090504) AT	(325637.00, 5839337.00)	DC	378.	1.61897	(04090502) AT	(325271.00, 5839264.00)	DC
339.	1.67690	(04090503) AT	(325637.00, 5839337.00)	DC	379.	1.61897	(04090504) AT	(325271.00, 5839264.00)	DC
340.	1.67628	(03112723) AT	(326149.00, 5839255.00)	DC	380.	1.61897	(04090503) AT	(325271.00, 5839264.00)	DC
341.	1.66952	(04082303) AT	(325935.00, 5838590.00)	DC	381.	1.61872	(04090319) AT	(325935.00, 5838590.00)	DC
342.	1.66483	(03112818) AT	(325637.00, 5839337.00)	DC	382.	1.61707	(04011304) AT	(326141.00, 5838979.00)	DC
343.	1.66347	(04082304) AT	(325935.00, 5838590.00)	DC	383.				

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1.60938 (03120422) AT ( 325637.00, 5839337.00)  DC
  344.        1.65285 (04021303) AT ( 325637.00, 5839337.00)  DC      384.
1.60274 (04032421) AT ( 325935.00, 5838590.00)  DC
  345.        1.65262 (03120722) AT ( 325191.00, 5838664.00)  DC      385.
1.59677 (03120703) AT ( 326141.00, 5838979.00)  DC
  346.        1.64918 (04032420) AT ( 326141.00, 5838979.00)  DC      386.
1.59660 (04041519) AT ( 325354.00, 5838667.00)  DC
  347.        1.64564 (04012405) AT ( 325271.00, 5839264.00)  DC      387.
1.59281 (04041521) AT ( 325637.00, 5839337.00)  DC
  348.        1.64564 (04021003) AT ( 325271.00, 5839264.00)  DC      388.
1.59050 (03112818) AT ( 325271.00, 5839264.00)  DC
  349.        1.64564 (04041224) AT ( 325271.00, 5839264.00)  DC      389.
1.58581 (04090505) AT ( 325271.00, 5839264.00)  DC
  350.        1.64564 (03111101) AT ( 325271.00, 5839264.00)  DC      390.
1.58011 (04040220) AT ( 325637.00, 5839337.00)  DC
  351.        1.64564 (04012404) AT ( 325271.00, 5839264.00)  DC      391.
1.57997 (03112602) AT ( 325637.00, 5839337.00)  DC
  352.        1.64564 (04040703) AT ( 325271.00, 5839264.00)  DC      392.
1.57972 (04090419) AT ( 325637.00, 5839337.00)  DC
  353.        1.64564 (04012403) AT ( 325271.00, 5839264.00)  DC      393.
1.57554 (04021422) AT ( 325637.00, 5839337.00)  DC
  354.        1.64564 (03111102) AT ( 325271.00, 5839264.00)  DC      394.
1.56368 (03111724) AT ( 325271.00, 5839264.00)  DC
  355.        1.64564 (03111103) AT ( 325271.00, 5839264.00)  DC      395.
1.56296 (03120304) AT ( 325271.00, 5839264.00)  DC
  356.        1.64564 (04061120) AT ( 325271.00, 5839264.00)  DC      396.
1.56159 (04090603) AT ( 325354.00, 5838667.00)  DC
  357.        1.64564 (03111705) AT ( 325271.00, 5839264.00)  DC      397.
1.56122 (03112721) AT ( 325637.00, 5839337.00)  DC
  358.        1.64564 (04061105) AT ( 325271.00, 5839264.00)  DC      398.
1.56071 (03120324) AT ( 325191.00, 5838664.00)  DC
  359.        1.64564 (04061106) AT ( 325271.00, 5839264.00)  DC      399.
1.55759 (04041207) AT ( 325637.00, 5839337.00)  DC
  360.        1.64503 (04042721) AT ( 325637.00, 5839337.00)  DC      400.
1.55750 (04021423) AT ( 326149.00, 5839255.00)  DC
♀ *** AERMOD - VERSION  12345 ***   *** Wollert Run 1
                         ***        03/07/14
                              *** RUN1
                        ***       15:47:50

                                  PAGE  15
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
                    NOCHKD



                          *** THE MAXIMUM  999   1-HR AVERAGE CONCENTRATION
 VALUES FOR SOURCE GROUP:  ALL      ***
                             INCLUDING SOURCE(S):     VOL01       , VOL02
   , VOL03       , VOL04       , VOL05       ,
               VOL06       , VOL07       , VOL08       , VOL09       , VOL10
   , VOL11       , VOL12       , VOL13       ,
               VOL14       , VOL15       , VOL16       ,

                                    ** CONC OF ODOUR    IN ODOURUNITS
                   **

 RANK        CONC    (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE    RANK
CONC    (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - -
  401.        1.55293 (04021121) AT ( 325354.00, 5838667.00)  DC      441.
1.46848 (03111705) AT ( 325354.00, 5838667.00)  DC
  402.        1.55293 (04021402) AT ( 325354.00, 5838667.00)  DC      442.
1.46848 (04061105) AT ( 325354.00, 5838667.00)  DC
  403.        1.54544 (04041121) AT ( 325637.00, 5839337.00)  DC      443.
1.46848 (04061106) AT ( 325354.00, 5838667.00)  DC
  404.        1.54197 (03120801) AT ( 326198.00, 5838823.00)  DC      444.
1.46756 (03112524) AT ( 325637.00, 5839337.00)  DC
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  405.       1.54026 (03120704) AT ( 326141.00, 5838979.00)  DC      445.
1.46438 (04021324) AT ( 326149.00, 5839255.00)  DC
  406.       1.53451 (04090905) AT ( 325935.00, 5838590.00)  DC      446.
1.46323 (04041522) AT ( 325354.00, 5838667.00)  DC
  407.       1.52965 (04032720) AT ( 325637.00, 5839337.00)  DC      447.
1.46299 (04012821) AT ( 325637.00, 5839337.00)  DC
  408.       1.52844 (04011923) AT ( 325354.00, 5838667.00)  DC      448.
1.46250 (04090421) AT ( 325637.00, 5839337.00)  DC
  409.       1.52428 (03110721) AT ( 325637.00, 5839337.00)  DC      449.
1.46135 (04090324) AT ( 325935.00, 5838590.00)  DC
  410.       1.51951 (04011922) AT ( 325354.00, 5838667.00)  DC      450.
1.45881 (04021504) AT ( 325354.00, 5838667.00)  DC
  411.       1.51927 (04032421) AT ( 326141.00, 5838979.00)  DC      451.
1.45856 (04032821) AT ( 325191.00, 5838664.00)  DC
  412.       1.51808 (03111721) AT ( 325637.00, 5839337.00)  DC      452.
1.45818 (04012023) AT ( 325271.00, 5839264.00)  DC
  413.       1.51579 (04012023) AT ( 325637.00, 5839337.00)  DC      453.
1.45812 (03111721) AT ( 325271.00, 5839264.00)  DC
  414.       1.51387 (03111422) AT ( 326149.00, 5839255.00)  DC      454.
1.45590 (04042601) AT ( 325935.00, 5838590.00)  DC
  415.       1.51142 (04012103) AT ( 325354.00, 5838667.00)  DC      455.
1.45362 (04041020) AT ( 325191.00, 5838664.00)  DC
  416.       1.51136 (04021422) AT ( 325271.00, 5839264.00)  DC      456.
1.45336 (04021423) AT ( 326198.00, 5838823.00)  DC
  417.       1.50497 (03110924) AT ( 325637.00, 5839337.00)  DC      457.
1.45116 (03111323) AT ( 326141.00, 5838979.00)  DC
  418.       1.50436 (04021701) AT ( 325637.00, 5839337.00)  DC      458.
1.44882 (04012106) AT ( 325637.00, 5839337.00)  DC
  419.       1.49520 (03120323) AT ( 325354.00, 5838667.00)  DC      459.
1.44386 (04020624) AT ( 325637.00, 5839337.00)  DC
  420.       1.49520 (04021203) AT ( 325354.00, 5838667.00)  DC      460.
1.44325 (04012001) AT ( 325354.00, 5838667.00)  DC
  421.       1.48834 (03120423) AT ( 325637.00, 5839337.00)  DC      461.
1.43495 (04090904) AT ( 325935.00, 5838590.00)  DC
  422.       1.48642 (04021320) AT ( 325637.00, 5839337.00)  DC      462.
1.43418 (04012901) AT ( 325354.00, 5838667.00)  DC
  423.       1.48581 (03102804) AT ( 325354.00, 5838667.00)  DC      463.
1.43418 (04021004) AT ( 325354.00, 5838667.00)  DC
  424.       1.48575 (04032420) AT ( 326149.00, 5839255.00)  DC      464.
1.43418 (04062118) AT ( 325354.00, 5838667.00)  DC
  425.       1.48116 (04090402) AT ( 326198.00, 5838823.00)  DC      465.
1.43418 (04033105) AT ( 325354.00, 5838667.00)  DC
  426.       1.48106 (04041219) AT ( 325637.00, 5839337.00)  DC      466.
1.43418 (03111105) AT ( 325354.00, 5838667.00)  DC
  427.       1.48100 (04082305) AT ( 325935.00, 5838590.00)  DC      467.
1.43418 (04062119) AT ( 325354.00, 5838667.00)  DC
  428.       1.47406 (04021421) AT ( 325354.00, 5838667.00)  DC      468.
1.43418 (03111104) AT ( 325354.00, 5838667.00)  DC
  429.       1.47281 (04041008) AT ( 326198.00, 5838823.00)  DC      469.
1.43418 (04090501) AT ( 325354.00, 5838667.00)  DC
  430.       1.46999 (04011604) AT ( 325637.00, 5839337.00)  DC      470.
1.43418 (04061107) AT ( 325354.00, 5838667.00)  DC
  431.       1.46848 (04012405) AT ( 325354.00, 5838667.00)  DC      471.
1.43418 (04090502) AT ( 325354.00, 5838667.00)  DC
  432.       1.46848 (04021003) AT ( 325354.00, 5838667.00)  DC      472.
1.43418 (04090504) AT ( 325354.00, 5838667.00)  DC
  433.       1.46848 (04041224) AT ( 325354.00, 5838667.00)  DC      473.
1.43418 (04090503) AT ( 325354.00, 5838667.00)  DC
  434.       1.46848 (03111101) AT ( 325354.00, 5838667.00)  DC      474.
1.41531 (04021202) AT ( 325637.00, 5839337.00)  DC
  435.       1.46848 (04012404) AT ( 325354.00, 5838667.00)  DC      475.
1.41531 (04021205) AT ( 325637.00, 5839337.00)  DC
  436.       1.46848 (04012403) AT ( 325354.00, 5838667.00)  DC      476.
1.41398 (03111422) AT ( 326198.00, 5838823.00)  DC
  437.       1.46848 (04040703) AT ( 325354.00, 5838667.00)  DC      477.
1.41299 (04042802) AT ( 326141.00, 5838979.00)  DC
  438.       1.46848 (03111102) AT ( 325354.00, 5838667.00)  DC      478.
1.41082 (04081524) AT ( 325191.00, 5838664.00)  DC
  439.       1.46848 (03111103) AT ( 325354.00, 5838667.00)  DC      479.
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1.41072 (04020920) AT (325637.00, 5839337.00) DC
440. 1.46848 (04061120) AT (325354.00, 5838667.00) DC 480.
1.41025 (04042303) AT (325935.00, 5838590.00) DC
♀ *** AERMOD - VERSION 12345 *** *** Wollert Run 1
*** 03/07/14
*** RUN1
*** 15:47:50

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** THE MAXIMUM 999 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): VOL01 , VOL02 , VOL03 , VOL04 , VOL05 ,
VOL06 , VOL07 , VOL08 , VOL09 , VOL10 , VOL11 , VOL12 , VOL13 ,
VOL14 , VOL15 , VOL16 ,

** CONC OF ODOUR IN ODOURUNITS **

RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE	RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE
481.	1.41025	(04021204) AT	(325935.00, 5838590.00) DC	521.	1.35327	(03110824) AT	(325637.00, 5839337.00) DC
482.	1.40882	(03120302) AT	(325637.00, 5839337.00) DC	522.	1.35274	(03120302) AT	(325271.00, 5839264.00) DC
483.	1.40729	(03111420) AT	(325271.00, 5839264.00) DC	523.	1.35097	(03120622) AT	(325637.00, 5839337.00) DC
484.	1.40647	(04012821) AT	(325271.00, 5839264.00) DC	524.	1.34656	(03112818) AT	(325354.00, 5838667.00) DC
485.	1.39788	(03110401) AT	(326141.00, 5838979.00) DC	525.	1.34585	(04090506) AT	(325637.00, 5839337.00) DC
486.	1.39556	(04032420) AT	(326198.00, 5838823.00) DC	526.	1.34383	(04041919) AT	(325637.00, 5839337.00) DC
487.	1.39504	(04041523) AT	(325191.00, 5838664.00) DC	527.	1.34308	(04090403) AT	(326141.00, 5838979.00) DC
488.	1.39174	(04010601) AT	(325637.00, 5839337.00) DC	528.	1.34148	(03103020) AT	(325191.00, 5838664.00) DC
489.	1.39081	(03110323) AT	(326149.00, 5839255.00) DC	529.	1.34067	(04020601) AT	(325637.00, 5839337.00) DC
490.	1.38814	(04012106) AT	(325271.00, 5839264.00) DC	530.	1.33820	(04012202) AT	(325637.00, 5839337.00) DC
491.	1.38656	(04041021) AT	(325354.00, 5838667.00) DC	531.	1.33593	(04012105) AT	(325191.00, 5838664.00) DC
492.	1.38528	(04082201) AT	(325935.00, 5838590.00) DC	532.	1.33593	(04012104) AT	(325191.00, 5838664.00) DC
493.	1.38484	(04082918) AT	(325354.00, 5838667.00) DC	533.	1.33403	(04042303) AT	(326141.00, 5838979.00) DC
494.	1.37988	(04081624) AT	(325191.00, 5838664.00) DC	534.	1.33403	(04021204) AT	(326141.00, 5838979.00) DC
495.	1.37405	(03111724) AT	(325354.00, 5838667.00) DC	535.	1.33392	(03120721) AT	(325191.00, 5838664.00) DC
496.	1.36871	(04032421) AT	(326149.00, 5839255.00) DC	536.	1.33328	(04091103) AT	(325935.00, 5838590.00) DC
497.	1.36773	(03111301) AT	(325637.00, 5839337.00) DC	537.	1.33267	(04032723) AT	(326141.00, 5838979.00) DC
498.	1.36679	(04012002) AT	(325354.00, 5838667.00) DC	538.	1.33182	(04032819) AT	(325354.00, 5838667.00) DC
499.	1.36632	(03112801) AT	(326141.00, 5838979.00) DC	539.	1.33159	(04090420) AT	(325637.00, 5839337.00) DC
500.	1.36412	(03120104) AT	(325637.00, 5839337.00) DC	540.	1.33055	(04021220) AT	(325637.00, 5839337.00) DC

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  501.       1.36344 (04011603) AT ( 325637.00, 5839337.00)  DC      541.
1.32891 (04081619) AT ( 325271.00, 5839264.00)  DC
  502.       1.36338 (03120204) AT ( 326141.00, 5838979.00)  DC      542.
1.32877 (04081821) AT ( 326149.00, 5839255.00)  DC
  503.       1.36326 (04082917) AT ( 325354.00, 5838667.00)  DC      543.
1.32851 (03112719) AT ( 325637.00, 5839337.00)  DC
  504.       1.36158 (04021206) AT ( 325191.00, 5838664.00)  DC      544.
1.32538 (04021222) AT ( 325637.00, 5839337.00)  DC
  505.       1.36081 (04090422) AT ( 325637.00, 5839337.00)  DC      545.
1.31418 (04090421) AT ( 325271.00, 5839264.00)  DC
  506.       1.35998 (04021202) AT ( 325271.00, 5839264.00)  DC      546.
1.31335 (04081819) AT ( 325271.00, 5839264.00)  DC
  507.       1.35998 (04021205) AT ( 325271.00, 5839264.00)  DC      547.
1.31335 (04081820) AT ( 325271.00, 5839264.00)  DC
  508.       1.35951 (04081821) AT ( 325637.00, 5839337.00)  DC      548.
1.31335 (04081821) AT ( 325271.00, 5839264.00)  DC
  509.       1.35796 (03120304) AT ( 325354.00, 5838667.00)  DC      549.
1.31335 (04081822) AT ( 325271.00, 5839264.00)  DC
  510.       1.35774 (04081722) AT ( 325637.00, 5839337.00)  DC      550.
1.31335 (04081823) AT ( 325271.00, 5839264.00)  DC
  511.       1.35773 (04090220) AT ( 325637.00, 5839337.00)  DC      551.
1.31335 (04090220) AT ( 325271.00, 5839264.00)  DC
  512.       1.35772 (04081822) AT ( 325637.00, 5839337.00)  DC      552.
1.31335 (04040924) AT ( 325271.00, 5839264.00)  DC
  513.       1.35772 (04081823) AT ( 325637.00, 5839337.00)  DC      553.
1.31335 (04090221) AT ( 325271.00, 5839264.00)  DC
  514.       1.35772 (04090423) AT ( 325637.00, 5839337.00)  DC      554.
1.31335 (04081722) AT ( 325271.00, 5839264.00)  DC
  515.       1.35772 (04040924) AT ( 325637.00, 5839337.00)  DC      555.
1.31335 (04081721) AT ( 325271.00, 5839264.00)  DC
  516.       1.35772 (04090221) AT ( 325637.00, 5839337.00)  DC      556.
1.31335 (04081620) AT ( 325271.00, 5839264.00)  DC
  517.       1.35772 (04090424) AT ( 325637.00, 5839337.00)  DC      557.
1.30830 (04041024) AT ( 325354.00, 5838667.00)  DC
  518.       1.35772 (04081619) AT ( 325637.00, 5839337.00)  DC      558.
1.30755 (03112704) AT ( 326149.00, 5839255.00)  DC
  519.       1.35772 (04081620) AT ( 325637.00, 5839337.00)  DC      559.
1.30742 (04012123) AT ( 325271.00, 5839264.00)  DC
  520.       1.35691 (04090422) AT ( 325271.00, 5839264.00)  DC      560.
1.30651 (03120724) AT ( 325637.00, 5839337.00)  DC
♀ *** AERMOD - VERSION  12345 ***   *** Wollert Run 1
                             ***        03/07/14
                                    *** RUN1
                            ***        15:47:50

                                       PAGE  17
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
                         NOCHKD



                              *** THE MAXIMUM  999   1-HR AVERAGE CONCENTRATION
 VALUES FOR SOURCE GROUP:  ALL      ***
                                 INCLUDING SOURCE(S):     VOL01       , VOL02
   , VOL03       , VOL04       , VOL05       ,
                    VOL06       , VOL07       , VOL08       , VOL09       , VOL10
   , VOL11       , VOL12       , VOL13       ,
                    VOL14       , VOL15       , VOL16       ,

                                      ** CONC OF ODOUR    IN ODOURUNITS
                        **

 RANK        CONC    (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE    RANK
CONC    (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - -
  561.       1.30516 (04040224) AT ( 325935.00, 5838590.00)  DC      601.
1.24220 (03120722) AT ( 325935.00, 5838590.00)  DC
  562.       1.30352 (04021422) AT ( 325354.00, 5838667.00)  DC      602.
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1.23913 (04083021) AT (325637.00, 5839337.00) DC
563. 1.30296 (04082202) AT (325935.00, 5838590.00) DC 603.
1.23627 (04021124) AT (326141.00, 5838979.00) DC
564. 1.30274 (04020520) AT (325637.00, 5839337.00) DC 604.
1.23305 (04091104) AT (325935.00, 5838590.00) DC
565. 1.30055 (04083124) AT (326149.00, 5839255.00) DC 605.
1.23297 (04041907) AT (325637.00, 5839337.00) DC
566. 1.30035 (03110518) AT (325935.00, 5838590.00) DC 606.
1.23239 (03110517) AT (325637.00, 5839337.00) DC
567. 1.29947 (04090219) AT (325271.00, 5839264.00) DC 607.
1.23037 (03112920) AT (325191.00, 5838664.00) DC
568. 1.29947 (04090506) AT (325271.00, 5839264.00) DC 608.
1.22919 (04011101) AT (325637.00, 5839337.00) DC
569. 1.29415 (04011904) AT (326141.00, 5838979.00) DC 609.
1.22867 (04041205) AT (325637.00, 5839337.00) DC
570. 1.29311 (04040307) AT (325637.00, 5839337.00) DC 610.
1.22697 (04060424) AT (325935.00, 5838590.00) DC
571. 1.29013 (04012622) AT (325637.00, 5839337.00) DC 611.
1.22528 (03110518) AT (326141.00, 5838979.00) DC
572. 1.28936 (04012202) AT (325271.00, 5839264.00) DC 612.
1.22514 (04041206) AT (325637.00, 5839337.00) DC
573. 1.28871 (04032719) AT (325637.00, 5839337.00) DC 613.
1.22448 (04012821) AT (325354.00, 5838667.00) DC
574. 1.28747 (04020601) AT (325271.00, 5839264.00) DC 614.
1.22263 (04082203) AT (325935.00, 5838590.00) DC
575. 1.28688 (03112822) AT (325354.00, 5838667.00) DC 615.
1.22249 (04082919) AT (325354.00, 5838667.00) DC
576. 1.28630 (03120303) AT (325191.00, 5838664.00) DC 616.
1.22098 (04011920) AT (325354.00, 5838667.00) DC
577. 1.28562 (04032421) AT (326198.00, 5838823.00) DC 617.
1.21687 (04021406) AT (325354.00, 5838667.00) DC
578. 1.28090 (04081803) AT (325935.00, 5838590.00) DC 618.
1.21452 (04090402) AT (326141.00, 5838979.00) DC
579. 1.28086 (03120820) AT (325354.00, 5838667.00) DC 619.
1.21276 (04041520) AT (325271.00, 5839264.00) DC
580. 1.28016 (03113004) AT (325354.00, 5838667.00) DC 620.
1.21231 (04021705) AT (325637.00, 5839337.00) DC
581. 1.27861 (04021604) AT (325637.00, 5839337.00) DC 621.
1.20179 (04082124) AT (325935.00, 5838590.00) DC
582. 1.27565 (03111004) AT (326149.00, 5839255.00) DC 622.
1.19977 (03120324) AT (325935.00, 5838590.00) DC
583. 1.27443 (04021021) AT (325637.00, 5839337.00) DC 623.
1.19967 (04042302) AT (325637.00, 5839337.00) DC
584. 1.27363 (04081902) AT (325935.00, 5838590.00) DC 624.
1.19964 (04021301) AT (325637.00, 5839337.00) DC
585. 1.27301 (04012023) AT (325354.00, 5838667.00) DC 625.
1.19874 (04021020) AT (325637.00, 5839337.00) DC
586. 1.27131 (04090621) AT (325354.00, 5838667.00) DC 626.
1.19820 (03112819) AT (325935.00, 5838590.00) DC
587. 1.26783 (03111719) AT (325354.00, 5838667.00) DC 627.
1.19711 (04042303) AT (326149.00, 5839255.00) DC
588. 1.26655 (04090524) AT (325354.00, 5838667.00) DC 628.
1.19711 (04021204) AT (326149.00, 5839255.00) DC
589. 1.26464 (03111721) AT (325354.00, 5838667.00) DC 629.
1.19572 (04090505) AT (325191.00, 5838664.00) DC
590. 1.26367 (04041520) AT (325637.00, 5839337.00) DC 630.
1.19425 (04012102) AT (326141.00, 5838979.00) DC
591. 1.25942 (04060501) AT (325935.00, 5838590.00) DC 631.
1.19190 (04082719) AT (325935.00, 5838590.00) DC
592. 1.25895 (04042605) AT (325637.00, 5839337.00) DC 632.
1.19086 (04012106) AT (325354.00, 5838667.00) DC
593. 1.25722 (03120724) AT (325271.00, 5839264.00) DC 633.
1.18929 (04081520) AT (325271.00, 5839264.00) DC
594. 1.25635 (03111421) AT (325271.00, 5839264.00) DC 634.
1.18161 (04021202) AT (325354.00, 5838667.00) DC
595. 1.24987 (03111319) AT (325637.00, 5839337.00) DC 635.
1.18161 (04021205) AT (325354.00, 5838667.00) DC
596. 1.24911 (04010321) AT (325271.00, 5839264.00) DC 636.
1.18133 (04041907) AT (325271.00, 5839264.00) DC

597. 1.24803 (04012704) AT (325637.00, 5839337.00) DC 637.
1.17934 (04090101) AT (326149.00, 5839255.00) DC
598. 1.24633 (04082624) AT (326198.00, 5838823.00) DC 638.
1.17803 (03110517) AT (325271.00, 5839264.00) DC
599. 1.24475 (04040307) AT (325271.00, 5839264.00) DC 639.
1.17268 (04041519) AT (325191.00, 5838664.00) DC
600. 1.24404 (04081704) AT (325354.00, 5838667.00) DC 640.
1.17257 (04021705) AT (325271.00, 5839264.00) DC
♀ *** AERMOD - VERSION 12345 *** *** Wollert Run 1 *** 03/07/14
*** RUN1 *** 15:47:50

PAGE 18
**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** THE MAXIMUM 999 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): VOL01 , VOL02
, VOL03 , VOL04 , VOL05 ,
VOL06 , VOL07 , VOL08 , VOL09 , VOL10
, VOL11 , VOL12 , VOL13 ,
VOL14 , VOL15 , VOL16 ,

** CONC OF ODOUR IN ODOURUNITS **

RANK CONC (YYMMDDHH) AT RECEPTOR (XR,YR) OF TYPE RANK
CONC (YYMMDDHH) AT RECEPTOR (XR,YR) OF TYPE
- -
641. 1.17240 (04040924) AT (325354.00, 5838667.00) DC 681.
1.14301 (04021420) AT (325271.00, 5839264.00) DC
642. 1.17238 (04081819) AT (325354.00, 5838667.00) DC 682.
1.14242 (04013024) AT (325637.00, 5839337.00) DC
643. 1.17238 (04081820) AT (325354.00, 5838667.00) DC 683.
1.14160 (04082204) AT (325935.00, 5838590.00) DC
644. 1.17238 (04081821) AT (325354.00, 5838667.00) DC 684.
1.13883 (04021002) AT (325637.00, 5839337.00) DC
645. 1.17238 (04081822) AT (325354.00, 5838667.00) DC 685.
1.13883 (04041301) AT (325637.00, 5839337.00) DC
646. 1.17238 (04081823) AT (325354.00, 5838667.00) DC 686.
1.13824 (03111818) AT (325354.00, 5838667.00) DC
647. 1.17238 (04090220) AT (325354.00, 5838667.00) DC 687.
1.13729 (04033103) AT (325637.00, 5839337.00) DC
648. 1.17238 (04090221) AT (325354.00, 5838667.00) DC 688.
1.13690 (04012405) AT (325191.00, 5838664.00) DC
649. 1.17238 (04090421) AT (325354.00, 5838667.00) DC 689.
1.13690 (04021003) AT (325191.00, 5838664.00) DC
650. 1.17238 (04090424) AT (325354.00, 5838667.00) DC 690.
1.13690 (04041224) AT (325191.00, 5838664.00) DC
651. 1.17238 (04081722) AT (325354.00, 5838667.00) DC 691.
1.13690 (03111101) AT (325191.00, 5838664.00) DC
652. 1.17238 (04081619) AT (325354.00, 5838667.00) DC 692.
1.13690 (04012404) AT (325191.00, 5838664.00) DC
653. 1.17238 (04081620) AT (325354.00, 5838667.00) DC 693.
1.13690 (04012403) AT (325191.00, 5838664.00) DC
654. 1.17238 (04081721) AT (325354.00, 5838667.00) DC 694.
1.13690 (04040703) AT (325191.00, 5838664.00) DC
655. 1.17238 (04090422) AT (325354.00, 5838667.00) DC 695.
1.13690 (03111102) AT (325191.00, 5838664.00) DC
656. 1.17238 (04090423) AT (325354.00, 5838667.00) DC 696.
1.13690 (03111103) AT (325191.00, 5838664.00) DC
657. 1.17228 (04082702) AT (326198.00, 5838823.00) DC 697.
1.13690 (04061120) AT (325191.00, 5838664.00) DC
658. 1.17158 (03120302) AT (325354.00, 5838667.00) DC 698.

1.13690 (03111705) AT (325191.00, 5838664.00) DC
  659. 1.17147 (03120921) AT (325354.00, 5838667.00) DC 699.
1.13690 (04061105) AT (325191.00, 5838664.00) DC
  660. 1.17072 (04012103) AT (325191.00, 5838664.00) DC 700.
1.13690 (04061106) AT (325191.00, 5838664.00) DC
  661. 1.17011 (03120722) AT (326141.00, 5838979.00) DC 701.
1.13604 (04040406) AT (325637.00, 5839337.00) DC
  662. 1.16948 (03111420) AT (325354.00, 5838667.00) DC 702.
1.13493 (03120324) AT (326141.00, 5838979.00) DC
  663. 1.16446 (04090206) AT (326141.00, 5838979.00) DC 703.
1.13300 (04012202) AT (325354.00, 5838667.00) DC
  664. 1.16360 (04012102) AT (326149.00, 5839255.00) DC 704.
1.13074 (04012406) AT (325637.00, 5839337.00) DC
  665. 1.16240 (04041122) AT (325637.00, 5839337.00) DC 705.
1.12364 (03111322) AT (326149.00, 5839255.00) DC
  666. 1.15994 (04082717) AT (325935.00, 5838590.00) DC 706.
1.12336 (04061102) AT (326149.00, 5839255.00) DC
  667. 1.15867 (04011924) AT (325354.00, 5838667.00) DC 707.
1.12318 (03112819) AT (326141.00, 5838979.00) DC
  668. 1.15855 (04061706) AT (325191.00, 5838664.00) DC 708.
1.12202 (04042303) AT (326198.00, 5838823.00) DC
  669. 1.15848 (03111918) AT (325354.00, 5838667.00) DC 709.
1.12202 (04021204) AT (326198.00, 5838823.00) DC
  670. 1.15847 (04021402) AT (325191.00, 5838664.00) DC 710.
1.11574 (04020601) AT (325354.00, 5838667.00) DC
  671. 1.15847 (04021121) AT (325191.00, 5838664.00) DC 711.
1.11194 (04012201) AT (325271.00, 5839264.00) DC
  672. 1.15710 (04012201) AT (325637.00, 5839337.00) DC 712.
1.10987 (03120323) AT (325191.00, 5838664.00) DC
  673. 1.15528 (04090718) AT (325354.00, 5838667.00) DC 713.
1.10987 (04021203) AT (325191.00, 5838664.00) DC
  674. 1.15491 (04090204) AT (326198.00, 5838823.00) DC 714.
1.10935 (04090102) AT (326149.00, 5839255.00) DC
  675. 1.15479 (03112624) AT (326149.00, 5839255.00) DC 715.
1.10864 (03120401) AT (325637.00, 5839337.00) DC
  676. 1.15462 (04090620) AT (325191.00, 5838664.00) DC 716.
1.10767 (04012703) AT (325637.00, 5839337.00) DC
  677. 1.15237 (04042302) AT (325271.00, 5839264.00) DC 717.
1.10736 (03112405) AT (325637.00, 5839337.00) DC
  678. 1.15155 (04090219) AT (325354.00, 5838667.00) DC 718.
1.10624 (03112919) AT (325191.00, 5838664.00) DC
  679. 1.14979 (04040923) AT (325637.00, 5839337.00) DC 719.
1.10110 (04041221) AT (325637.00, 5839337.00) DC
  680. 1.14509 (04012203) AT (326141.00, 5838979.00) DC 720.
1.10072 (04033106) AT (325637.00, 5839337.00) DC
♀ *** AERMOD - VERSION 12345 ***   *** Wollert Run 1
                          ***   03/07/14
                                   *** RUN1
                                ***   15:47:50

 **MODELOPTs: NonDFAULT CONC   FLAT
                       NOCHKD

                                *** THE MAXIMUM 999   1-HR AVERAGE CONCENTRATION
 VALUES FOR SOURCE GROUP: ALL   ***
                                   INCLUDING SOURCE(S):   VOL01   , VOL02
    , VOL03   , VOL04   , VOL05   ,
                VOL06   , VOL07   , VOL08   , VOL09   , VOL10
    , VOL11   , VOL12   , VOL13   ,
                VOL14   , VOL15   , VOL16   ,

                                      ** CONC OF ODOUR   IN ODOURUNITS
                           **

 RANK   CONC   (YYMMDDHH) AT   RECEPTOR (XR,YR) OF TYPE   RANK
CONC   (YYMMDDHH) AT   RECEPTOR (XR,YR) OF TYPE

- -
721. 1.10072 (04040704) AT (325637.00, 5839337.00) DC 761.
1.06060 (04021221) AT (325637.00, 5839337.00) DC
722. 1.09885 (03120724) AT (325354.00, 5838667.00) DC 762.
1.05948 (04033106) AT (325271.00, 5839264.00) DC
723. 1.09727 (04021002) AT (325271.00, 5839264.00) DC 763.
1.05948 (04040704) AT (325271.00, 5839264.00) DC
724. 1.09727 (04041301) AT (325271.00, 5839264.00) DC 764.
1.05790 (04041523) AT (325935.00, 5838590.00) DC
725. 1.09546 (04020523) AT (326141.00, 5838979.00) DC 765.
1.05655 (04012604) AT (325637.00, 5839337.00) DC
726. 1.09519 (04012901) AT (325191.00, 5838664.00) DC 766.
1.05557 (04032820) AT (325354.00, 5838667.00) DC
727. 1.09519 (04021004) AT (325191.00, 5838664.00) DC 767.
1.05401 (04012020) AT (325637.00, 5839337.00) DC
728. 1.09519 (04062118) AT (325191.00, 5838664.00) DC 768.
1.04945 (04033107) AT (325637.00, 5839337.00) DC
729. 1.09519 (04033105) AT (325191.00, 5838664.00) DC 769.
1.04858 (04020802) AT (325637.00, 5839337.00) DC
730. 1.09519 (04062119) AT (325191.00, 5838664.00) DC 770.
1.04811 (04041520) AT (325354.00, 5838667.00) DC
731. 1.09519 (03111105) AT (325191.00, 5838664.00) DC 771.
1.04634 (04021705) AT (325354.00, 5838667.00) DC
732. 1.09519 (03111104) AT (325191.00, 5838664.00) DC 772.
1.04583 (04040702) AT (325637.00, 5839337.00) DC
733. 1.09519 (04090501) AT (325191.00, 5838664.00) DC 773.
1.04545 (04011504) AT (325271.00, 5839264.00) DC
734. 1.09519 (04061107) AT (325191.00, 5838664.00) DC 774.
1.04446 (04020122) AT (325637.00, 5839337.00) DC
735. 1.09519 (04090502) AT (325191.00, 5838664.00) DC 775.
1.04322 (03110724) AT (325637.00, 5839337.00) DC
736. 1.09519 (04090504) AT (325191.00, 5838664.00) DC 776.
1.04177 (03120322) AT (325271.00, 5839264.00) DC
737. 1.09519 (04090503) AT (325191.00, 5838664.00) DC 777.
1.04160 (04012305) AT (325271.00, 5839264.00) DC
738. 1.09434 (04090618) AT (325354.00, 5838667.00) DC 778.
1.04160 (03120722) AT (326149.00, 5839255.00) DC
739. 1.09126 (03110518) AT (326149.00, 5839255.00) DC 779.
1.03968 (03110322) AT (325637.00, 5839337.00) DC
740. 1.08962 (04040307) AT (325354.00, 5838667.00) DC 780.
1.03853 (04012105) AT (325935.00, 5838590.00) DC
741. 1.08955 (04082418) AT (325354.00, 5838667.00) DC 781.
1.03853 (04012104) AT (325935.00, 5838590.00) DC
742. 1.08653 (04090717) AT (325354.00, 5838667.00) DC 782.
1.03270 (03111724) AT (325191.00, 5838664.00) DC
743. 1.08497 (03120322) AT (325637.00, 5839337.00) DC 783.
1.03138 (04060502) AT (325935.00, 5838590.00) DC
744. 1.08394 (04032322) AT (325637.00, 5839337.00) DC 784.
1.02702 (03112619) AT (325637.00, 5839337.00) DC
745. 1.08196 (04012406) AT (325271.00, 5839264.00) DC 785.
1.02577 (04021206) AT (325935.00, 5838590.00) DC
746. 1.08049 (04041522) AT (325191.00, 5838664.00) DC 786.
1.02500 (03111704) AT (325637.00, 5839337.00) DC
747. 1.07815 (04082703) AT (325935.00, 5838590.00) DC 787.
1.02500 (04061622) AT (325637.00, 5839337.00) DC
748. 1.07782 (04081603) AT (325354.00, 5838667.00) DC 788.
1.02500 (04061703) AT (325637.00, 5839337.00) DC
749. 1.07648 (04012523) AT (325637.00, 5839337.00) DC 789.
1.02465 (04090304) AT (325935.00, 5838590.00) DC
750. 1.07502 (04090221) AT (326198.00, 5838823.00) DC 790.
1.02454 (03120124) AT (325637.00, 5839337.00) DC
751. 1.07426 (04032621) AT (325637.00, 5839337.00) DC 791.
1.02231 (03120821) AT (325354.00, 5838667.00) DC
752. 1.07414 (04021421) AT (325191.00, 5838664.00) DC 792.
1.02149 (04091102) AT (325935.00, 5838590.00) DC
753. 1.07212 (04031522) AT (325637.00, 5839337.00) DC 793.
1.02082 (04021219) AT (325637.00, 5839337.00) DC
754. 1.07018 (04082819) AT (325354.00, 5838667.00) DC 794.

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1.01956 (03111419) AT ( 325271.00, 5839264.00)  DC
  755.       1.06940 (04090323) AT ( 325935.00, 5838590.00)  DC      795.
1.01846 (03110518) AT ( 326198.00, 5838823.00)  DC
  756.       1.06824 (03111419) AT ( 325637.00, 5839337.00)  DC      796.
1.01845 (03120324) AT ( 326149.00, 5839255.00)  DC
  757.       1.06519 (03120401) AT ( 325271.00, 5839264.00)  DC      797.
1.01684 (04021122) AT ( 325637.00, 5839337.00)  DC
  758.       1.06495 (04021224) AT ( 325637.00, 5839337.00)  DC      798.
1.01538 (04013124) AT ( 325637.00, 5839337.00)  DC
  759.       1.06485 (04090903) AT ( 325935.00, 5838590.00)  DC      799.
1.01373 (03112620) AT ( 325637.00, 5839337.00)  DC
  760.       1.06239 (04012605) AT ( 325637.00, 5839337.00)  DC      800.
1.01344 (04041907) AT ( 325354.00, 5838667.00)  DC
♀ *** AERMOD - VERSION  12345 ***   *** Wollert Run 1
                            ***        03/07/14
                                   *** RUN1
                           ***        15:47:50

                                      PAGE  20
 **MODELOPTs:  NonDFAULT CONC                                    FLAT
                         NOCHKD



                              *** THE MAXIMUM  999   1-HR AVERAGE CONCENTRATION
 VALUES FOR SOURCE GROUP:  ALL      ***
                                  INCLUDING SOURCE(S):     VOL01       , VOL02
   , VOL03       , VOL04       , VOL05       ,
                    VOL06       , VOL07       , VOL08       , VOL09       , VOL10
   , VOL11       , VOL12       , VOL13       ,
                    VOL14       , VOL15       , VOL16       ,

                                        ** CONC OF ODOUR    IN ODOURUNITS
                         **

 RANK        CONC    (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE    RANK
CONC    (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - -
  801.       1.01339 (03112718) AT ( 325637.00, 5839337.00)  DC      841.
0.97776 (03120102) AT ( 325637.00, 5839337.00)  DC
  802.       1.00926 (04081717) AT ( 325637.00, 5839337.00)  DC      842.
0.97641 (03120920) AT ( 325354.00, 5838667.00)  DC
  803.       1.00767 (04041822) AT ( 325637.00, 5839337.00)  DC      843.
0.97633 (04021122) AT ( 325271.00, 5839264.00)  DC
  804.       1.00716 (04020802) AT ( 325271.00, 5839264.00)  DC      844.
0.97431 (04012923) AT ( 326149.00, 5839255.00)  DC
  805.       1.00663 (04040702) AT ( 325271.00, 5839264.00)  DC      845.
0.97427 (03112701) AT ( 326149.00, 5839255.00)  DC
  806.       1.00376 (03110322) AT ( 325271.00, 5839264.00)  DC      846.
0.97384 (04082619) AT ( 326141.00, 5838979.00)  DC
  807.       1.00359 (04033107) AT ( 325271.00, 5839264.00)  DC      847.
0.97196 (03120722) AT ( 326198.00, 5838823.00)  DC
  808.       1.00302 (04020622) AT ( 325637.00, 5839337.00)  DC      848.
0.97008 (04042524) AT ( 326198.00, 5838823.00)  DC
  809.       1.00300 (04061102) AT ( 325637.00, 5839337.00)  DC      849.
0.96654 (04021206) AT ( 326141.00, 5838979.00)  DC
  810.       1.00231 (04042801) AT ( 326141.00, 5838979.00)  DC      850.
0.96642 (04012201) AT ( 325354.00, 5838667.00)  DC
  811.       1.00218 (04082924) AT ( 325354.00, 5838667.00)  DC      851.
0.96592 (04061102) AT ( 325271.00, 5839264.00)  DC
  812.       1.00013 (03120304) AT ( 325191.00, 5838664.00)  DC      852.
0.96482 (04020421) AT ( 325637.00, 5839337.00)  DC
  813.       0.99996 (03110517) AT ( 325354.00, 5838667.00)  DC      853.
0.96461 (04012701) AT ( 325637.00, 5839337.00)  DC
  814.       0.99976 (04042302) AT ( 325354.00, 5838667.00)  DC      854.
0.96440 (04081717) AT ( 325271.00, 5839264.00)  DC
  815.       0.99956 (03103021) AT ( 325354.00, 5838667.00)  DC      855.
0.96420 (04021002) AT ( 325354.00, 5838667.00)  DC
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  816.       0.99815 (04041523) AT ( 326141.00, 5838979.00)  DC      856.
0.96420 (04041301) AT ( 325354.00, 5838667.00)  DC
  817.       0.99733 (04011521) AT ( 325637.00, 5839337.00)  DC      857.
0.96333 (03120303) AT ( 325935.00, 5838590.00)  DC
  818.       0.99688 (04041020) AT ( 325637.00, 5839337.00)  DC      858.
0.96021 (04082817) AT ( 325354.00, 5838667.00)  DC
  819.       0.99629 (03111224) AT ( 325637.00, 5839337.00)  DC      859.
0.95911 (03113023) AT ( 325637.00, 5839337.00)  DC
  820.       0.99599 (04061705) AT ( 325354.00, 5838667.00)  DC      860.
0.95660 (04041020) AT ( 325271.00, 5839264.00)  DC
  821.       0.99577 (03120721) AT ( 325935.00, 5838590.00)  DC      861.
0.95588 (04013121) AT ( 325637.00, 5839337.00)  DC
  822.       0.99061 (03112819) AT ( 326149.00, 5839255.00)  DC      862.
0.95474 (04040903) AT ( 325637.00, 5839337.00)  DC
  823.       0.98912 (04061022) AT ( 325637.00, 5839337.00)  DC      863.
0.95474 (04062120) AT ( 325637.00, 5839337.00)  DC
  824.       0.98871 (04021403) AT ( 325637.00, 5839337.00)  DC      864.
0.95474 (04033104) AT ( 325637.00, 5839337.00)  DC
  825.       0.98819 (04060523) AT ( 325354.00, 5838667.00)  DC      865.
0.95456 (03120324) AT ( 326198.00, 5838823.00)  DC
  826.       0.98711 (03111704) AT ( 325271.00, 5839264.00)  DC      866.
0.95162 (04061022) AT ( 325271.00, 5839264.00)  DC
  827.       0.98711 (04061622) AT ( 325271.00, 5839264.00)  DC      867.
0.95109 (04042619) AT ( 325271.00, 5839264.00)  DC
  828.       0.98711 (04061703) AT ( 325271.00, 5839264.00)  DC      868.
0.94950 (03112818) AT ( 325191.00, 5838664.00)  DC
  829.       0.98512 (04042619) AT ( 325637.00, 5839337.00)  DC      869.
0.94904 (04021403) AT ( 325271.00, 5839264.00)  DC
  830.       0.98444 (04012105) AT ( 326141.00, 5838979.00)  DC      870.
0.94889 (04020404) AT ( 325271.00, 5839264.00)  DC
  831.       0.98444 (04012104) AT ( 326141.00, 5838979.00)  DC      871.
0.94849 (04082923) AT ( 325354.00, 5838667.00)  DC
  832.       0.98440 (04041622) AT ( 325637.00, 5839337.00)  DC      872.
0.94763 (03112717) AT ( 325637.00, 5839337.00)  DC
  833.       0.98433 (04032003) AT ( 326198.00, 5838823.00)  DC      873.
0.94745 (04021422) AT ( 325191.00, 5838664.00)  DC
  834.       0.98356 (04013021) AT ( 325637.00, 5839337.00)  DC      874.
0.94599 (04041622) AT ( 325271.00, 5839264.00)  DC
  835.       0.98343 (04012304) AT ( 325271.00, 5839264.00)  DC      875.
0.94545 (04012023) AT ( 325191.00, 5838664.00)  DC
  836.       0.98170 (04083022) AT ( 325637.00, 5839337.00)  DC      876.
0.94495 (04090401) AT ( 326198.00, 5838823.00)  DC
  837.       0.98155 (04040121) AT ( 326149.00, 5839255.00)  DC      877.
0.94443 (04040404) AT ( 325637.00, 5839337.00)  DC
  838.       0.98066 (03110921) AT ( 325637.00, 5839337.00)  DC      878.
0.94349 (04040924) AT ( 325191.00, 5838664.00)  DC
  839.       0.98011 (04020801) AT ( 325637.00, 5839337.00)  DC      879.
0.94203 (04083001) AT ( 325354.00, 5838667.00)  DC
  840.       0.98011 (04012101) AT ( 325637.00, 5839337.00)  DC      880.
0.94123 (04020801) AT ( 325271.00, 5839264.00)  DC
♀ *** AERMOD - VERSION  12345 ***   *** Wollert Run 1
                              ***       03/07/14
                             *** RUN1
                           ***         15:47:50

                                        PAGE  21
 **MODELOPTs:  NonDFAULT CONC                                      FLAT
                         NOCHKD


                                  *** THE MAXIMUM  999   1-HR AVERAGE CONCENTRATION
 VALUES FOR SOURCE GROUP:  ALL      ***
                                     INCLUDING SOURCE(S):     VOL01       , VOL02
    , VOL03       , VOL04       , VOL05       ,
                 VOL06       , VOL07       , VOL08       , VOL09       , VOL10
    , VOL11       , VOL12       , VOL13       ,
                 VOL14       , VOL15       , VOL16       ,
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** CONC OF ODOUR IN ODOURUNITS

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RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE		RANK
CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE			
881.	0.94123	(04012101) AT	(325271.00, 5839264.00)	DC	921.
0.90845	(04090221) AT	(325191.00, 5838664.00)	DC		
882.	0.94070	(03112007) AT	(325354.00, 5838667.00)	DC	922.
0.90845	(04090421) AT	(325191.00, 5838664.00)	DC		
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0.88540	(04021520) AT	(325637.00, 5839337.00)	DC		

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0.88380 (04012404) AT (325935.00, 5838590.00) DC
920. 0.90845 (04090220) AT (325191.00, 5838664.00) DC 960.
0.88380 (04012403) AT (325935.00, 5838590.00) DC

**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** THE MAXIMUM 999 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): VOL01 , VOL02 , VOL03 , VOL04 , VOL05 ,
VOL06 , VOL07 , VOL08 , VOL09 , VOL10 , VOL11 , VOL12 , VOL13 ,
VOL14 , VOL15 , VOL16 ,

** CONC OF ODOUR IN ODOURUNITS **

RANK CONC (YYMMDDHH) AT RECEPTOR (XR,YR) OF TYPE RANK CONC (YYMMDDHH) AT RECEPTOR (XR,YR) OF TYPE

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0.87025 (04021205) AT (325191.00, 5838664.00) DC
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0.86565 (04061622) AT (325354.00, 5838667.00) DC
973. 0.88011 (04090219) AT (325191.00, 5838664.00) DC 993.

0.86565 (04061703) AT (325354.00, 5838667.00) DC
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976. 0.87352 (04020802) AT (325354.00, 5838667.00) DC 996.
0.86189 (04090619) AT (325354.00, 5838667.00) DC
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0.86180 (04013122) AT (325637.00, 5839337.00) DC
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0.86170 (04090305) AT (325935.00, 5838590.00) DC
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0.86150 (04041605) AT (325354.00, 5838667.00) DC
980. 0.87313 (04041519) AT (325935.00, 5838590.00) DC

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
♀ *** AERMOD - VERSION 12345 *** *** Wollert Run 1
*** 03/07/14
*** RUN1
*** 15:47:50

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**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF ODOUR IN ODOURUNITS **

GROUP ID	AVERAGE CONC	DATE (YYMMDDHH)	NETWORK
RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID	
ALL	HIGH 1ST HIGH VALUE IS	9.51035	ON 04081720: AT (325637.00, 5839337.00, 0.00, 0.00, 0.00) DC
	HIGH 9TH HIGH VALUE IS	5.52194	ON 04081819: AT (325637.00, 5839337.00, 0.00, 0.00, 0.00) DC

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR
♀ *** AERMOD - VERSION 12345 *** *** Wollert Run 1
*** 03/07/14
*** RUN1
*** 15:47:50

PAGE 24
**MODELOPTs: NonDFAULT CONC FLAT
NOCHKD

*** Message Summary : AERMOD Model Execution ***

--------- Summary of Total Messages --------

```
 A Total of            0 Fatal Error Message(s)
 A Total of            4 Warning Message(s)
 A Total of            2 Informational Message(s)

 A Total of         8784 Hours Were Processed

 A Total of            0 Calm Hours Identified

 A Total of            2 Missing Hours Identified (  0.02 Percent)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 SO W317      83  SRCQA:Specified SRCID not included in any PSD/SRCGROUP:
BACKGROUND
 MX W394       1 METEXT:Met data may be from outdated version of AERMET:     No
NAD/ADJ
 MX W439    8913  METQA:Monin-Obukhov Length Out-of-Range.  KURDAT =
03110518
 MX W439   30593  METQA:Monin-Obukhov Length Out-of-Range.  KURDAT =
04010105

    ***********************************
    *** AERMOD Finishes Successfully ***
    ***********************************
```

Appendix B – EPA Discussion Broiler ERA

Broiler Farm Odour Environmental Risk Assessment

Discussion Paper

Publication number 1509 November 2012
Authorised and published by EPA Victoria, 200 Victoria Street, Carlton

Contents

1 Introduction

State planning and environment policy require the protection of beneficial uses from odour and the consideration of odour during land-use planning decisions. The *Victoria Planning Provisions* require that a planning permit be obtained to build or expand a broiler farm. In considering planning permit applications for broiler farms, responsible authorities (local councils) must have regard to the *Victorian Code for Broiler Farms 2009* (the Code).

As part of the planning assessment process for new or expanded broiler facilities, the Code may trigger the need for an Odour Environmental Risk Assessment (OERA). An OERA involves a site-specific assessment of the likelihood and potential impact of odour from a broiler farm on surrounding sensitive uses. This information is then used by the responsible authority to inform decision making on the proposal.

The type of applications that would trigger an OERA are those which are categorised in the Code as being 'special class farms' or 'farm clusters'.

Draft OERA guidelines published in 2009 were prepared by EPA Victoria to support the preparation of an OERA. However, no definitive guidance is provided as to how an OERA should be conducted.

The purpose of this discussion paper is to seek feedback and input from industry, government and community stakeholders to inform the development of a new broiler farm OERA guideline. The objective of the new guideline will be to provide greater confidence and certainty on how to approach odour modelling and how odour modelling will be assessed by EPA. The new guideline will also enable EPA to be more consistent in its advice and guidance.

EPA Victoria commissioned a background report (*Broiler Farm OERA – Background to Technical Guidance*) to inform the development of the new guidance. Throughout this discussion paper, reference is made to this background report for further information and detail where needed.

The background report can be found on EPA's website www.epa.vic.gov.au.

Table 1. Policy context

Policy	Significance
State Environmental Protection Policy for Air Quality Management (SEPP (AQM))	Protects beneficial uses of the atmosphere including local amenity and aesthetic enjoyment. Classifies odour as an indicator of local amenity and aesthetic enjoyment and establishes odour criteria for assessment modelling.
Victoria Planning Provisions Clause 52.31 – Broiler Farm	Requires a planning permit for the use or development of a new broiler farm, or expansion of an existing broiler farm. Planning applications must comply with the *Victorian Code for Broiler Farms 2009*.
Victoria Planning Provisions Clause 66.05 – Notice of Permit Applications	EPA must be given notice for the use or development of a new broiler farm, or expansion of an existing broiler farm that meets the requirements of a 'special class broiler farm' or 'farm cluster' as specified in the *Victorian Code for Broiler Farms 2009*.
Victorian Code for Broiler Farms 2009	Provides a basis for the planning, design, assessment, approval, construction, operation and management of broiler farms in Victoria. It presents an appropriate balance between the operational needs of the broiler farm industry and the protection of the environment, particularly the air environment, for people who live near broiler farms. Compliance with this Code is mandatory for the establishment of all new broiler farms and expansions in Victoria.
Public Health and Wellbeing Act 2008	Provides protection from nuisance, including emissions that are or are liable to be 'dangerous to health or offensive'. The Act states that the number of people affected should not be regarded when determining whether a nuisance is dangerous to health or offensive.

2 Odour Dispersion Modelling

A SEPP (AQM) requires dispersion modelling to predict the impacts of odorous emissions on the surrounding environment in cases where required concentrations are exceeded. Currently, approaches to dispersion modelling vary due to inconsistent use of data, including emissions estimates, meteorological data, varying source descriptions and selection of the dispersion model.

This section considers approaches to dispersion modelling that would provide a consistent approach and allow comparison of assessments.

2.1 Dispersion model selection

Dispersion modelling should be completed using a model that is capable of determining the impact of wind speeds less than 0.5 m/sec and is able to track emissions over multiple time periods. CALPUFF and TAPM are dispersion models commonly used in Australia and are capable of doing this.

EPA proposes the use of CALPUFF for dispersion modelling, with program support from TAPM.

For more detail refer to page 13 of the background report, section 3.2.1 Model selection.

Question 1: What impact, if any, would the proposed use of CALPUFF and TAPM have over the current regulatory model of AUSPLUME?

2.2 Emissions estimation

Given a lack of public data available on actual emissions generated by broiler farms over time, EPA proposes the use of a new emissions estimation database, based on a statistical model developed and contained in the background report.

Using a statistical analysis of public data published by Rural Industries Research Development Corporation (RIRDC) and the Poultry Cooperative Research Council (CRC), the background report concludes:

- there was no significant statistical relationship between OERA and ventilation rate, even when bird weight and season were controlled in the analysis
- there was a significant statistical relationship between OERA per bird to average bird weight
- a significant statistical relationship existed between OERA per bird to average bird age.

EPA proposes the use of Equation 3-3 in the background report for the development of a time-varying odour emission rate for each shed.

Previously, EPA odour emission rates were calculated using a database average derived from an investigational history of problematic broiler farms.

Table 2 provides a comparison of the previously used odour emission database and the proposed statistical odour emissions method.

Table 2. Comparison of odour emission rates (Odour units per minute (OU/min)) generated by the proposed odour emission method (Equation 3-3) and the EPA odour emission database for a 35,000 bird shed.

Week	EPA odour emission method (proposed)	EPA odour emission database (current)
1	36,806	10,000
2	153,657	50,000
3	452,699	100,000
4	894,078	750,000
5	1,294,145	2,100,000
6	1,655,986	2,100,000
7	1,949,120	2,100,000
8	2,155,908	2,100,000

For more detail refer to the background report pages 9-10, sections 3.1 Emission estimation, 3.1.1 Unified approaches to estimation of odour emissions through the growth cycle, and page 11, section 3.1.2 Comparison of the statistical analysis results to the EPA dataset.

Question 2: Given the lack of public data available, what alternatives are there for accurately depicting emission rates?

Question 3: Is the statistical data provided by RIRDC and the Poultry CRC acceptable? Is there more comprehensive data available?

Question 4: In your experience, how accurate is the proposed Emissions Database?

2.2.1 Shed cleanout

During shed cleaning, the broilers have been removed and therefore odour emissions are no longer considered a function of bird weight. Anecdotal evidence in recent broiler farm cases has indicated that shed cleanout can result in significant odour impacts to the surrounding community. It is therefore important that shed cleanout is considered in the dispersion modelling.

Based on data from CRC, an average factor of 352,140 OU/min was established for post-use shed cleaning and fumigation.

For more detail refer to page 11 of the background report, section 3.1.3 Shed cleanout .

Question 5: In your experience, how accurate is the established average OU/min factor for post-use shed cleaning and fumigation?

2.2.2 Composting

Composting of dead birds with spent litter has the potential to generate significant amounts of odour and create an environment that encourages the growth of pathogenic bacteria. As a result, composting activities, including the storage of spent litter for later off-site disposal, should be considered as a potential source of odour and included in the dispersion modelling for the OERA, as required by the SEPP (AQM).

For more detail refer to page 12 of the background report, section 3.1.4 Composting.

Question 6: How common is composting of dead birds within the industry? Is it appropriate to include this as a factor for dispersion modelling?

2.3 Meteorological modelling

EPA is currently working on guidance to inform the use of meteorological data for dispersion modelling. In the meantime, EPA proposes using the guidance for meteorological modelling produced by the New South Wales Office of Environment and Heritage.

Where site-specific modelling is not available, observational data from the Bureau of Meteorology (BoM) should be obtained at one or thirty minute intervals, and the hourly averaging completed manually. Averaging of wind speed and direction data should be completed using vector averaging. This method will address the limitation of the hourly averages provided by the BoM, which are derived from the value recorded in the last ten minutes of the hour.

For more detail refer to page 13 of the background report, section 3.2.2 Meteorological modelling.

Question 7: Are you aware of alternative meteorological guidance?

2.3 Source description

EPA proposes that emissions from tunnel-ventilated broiler sheds be conceptualised as a 'cone'. This concept depicts emissions as a jet source propelled by the forward momentum of the ventilation fan. As the emissions slow down over a distance, the emissions will widen. The angle of the cone shape is considered to be 22 degrees from the horizon of the jet stream. The emission stall point of the jet stream is considered to be 25 metres from the broiler shed fans. By dividing the diameter of the emission cone at 25 metres by four, the 'sigma y' and 'sigma z' required for the dispersion modelling can be calculated.

For more detail refer to page 14 of the background report, section 3.2.3 Source description.

Question 8: Do you think this source description is representative? Why or why not?

Question 9: How else should source descriptions be depicted in the dispersion modelling?

2.5 Application of emission rates

EPA proposes that the emission rates derived for each individual shed should be applied in a time-varying emissions file, with subsequent sheds on the farm or cluster being brought online and cycled as appropriate.

For more detail refer to page 14 of the background report, section 3.2.4 Application of emission rates.

2.6 Annual or multi-year dispersion analysis

SEPP (AQM) requires that an OERA use 99.9th percentile model results. To account for the high degree of variability resulting from 99.9th percentile model results, especially in close proximity to the source, EPA proposes using the approach used by EPA US, where a multi-year dispersion analysis of the last five years is used to determine the year of maximum impact.

Using the year of maximum impact, frequency analysis should be performed to determine the highest odour concentration and the frequency of exposure experienced at the identified sensitive receptor. The analysis result can then be placed within the risk assessment matrix.

For more detail refer to pages 14-17 of the background report, section 3.2.5 Annual or multi-year dispersion analysis.

Question 10: Do you think the proposed approach to dispersion analysis is adequate? Why or why not?

3 Risk Assessment Matrix

The assessment of risk requires consideration of the potential impact as a result of action or inaction. In terms of broiler farms, risk is the consideration of potentially offensive odours experienced by the surrounding population as a result of broiler farm operations.

A literature review was conducted to compare Australian and international odour assessment standards, and to consider literature assessing the impact of odour reported by surrounding residential populations.

EPA proposes the use of a risk assessment matrix to provide an indication of acceptable odour concentrations or frequencies as part of the OERA. The risk assessment matrix enables an integrated approach comparing concentration with frequency rather than the use of a single standard, for example 5OU at the boundary.

The risk assessment matrix counts impacts at all times of the day, including those at night time.

Using the most impacted receptor as the test case, proponents need to demonstrate how their proposal meets all low risk criteria.

For more detail refer to page 17 of the background report, section 4 Approach to risk assessment.
N.B. EPA has revised the matrix proposed in the background report to ensure it manages odour risks to the satisfaction of EPA Victoria.

Table 3.1 Proposed risk assessment matrix

Frequency		**Odour concentration (OU CEN)** *(Committé Européen de Normalisation)*			
Percentile	**Occurrences (3 min averaging time) per annum**	**15+ OU**	**10-14 OU**	**5-9 OU**	**1-4 OU**
99.9th	0-9	H	M	L	L
99.5th	10-44	H	H	M	L
98.0th	45-175	H	H	H	M
Outside 98.0th	>175	H	H	H	H

EPA proposes to use the following to determine whether a proposed broiler farm or expansion of an existing one has appropriate siting and scale:

- If a proposed farm is assessed as having a low odour concentration, then EPA recommends approval of the planning permission.
- If a proposed farm is assessed as having a medium odour concentration, then further mitigation strategies need to be implemented to reduce the overall risk of odour.
- If assessed as high, EPA recommends the proposed siting and scale of the farm be reconsidered or odour destruction technology is implemented.

For more detail refer to page 28 of the background report, section 4.3 Recommended approach.

Question 11: Please comment on the recommended approach to assessing risk.

4 Options for Mitigation

Where an environmental risk assessment indicates a high and medium risk of odour impact, the applicant should consider the implementation of mitigation measures before assessment is revisited.

A literature review identified mitigation measures that are either proposed or implemented worldwide within the broiler industry. The review indicated measures the industry could investigate where mitigation measures need to be considered to reduce odour releases and manage emissions.

For more detail refer to pages 32-50 of the background report, section 5 Options for mitigation.

Question 12: In your experience, what methods and technologies effectively reduce odour impact of broiler farms?

5 Community Engagement Strategy

Community engagement can help improve the relationship between broiler farm operators and the community by increasing the level of understanding. When combined with technical measures, engagement can be a highly effective way to resolve concerns about broiler farms.

EPA proposes the development of a community engagement strategy as part of the broiler farm risk assessment process. The engagement strategy will be assessed alongside OERA and should be considered in granting approval of planning permission.

Proponents will need to demonstrate how the operational plan of the proposal satisfies the following questions:

- How will you communicate clearly and regularly with your neighbours about things you are doing to improve noise and odour issues?
- What input will you seek from your neighbours about how to improve noise and odour issues?
- How will you respond to complaints from neighbours respectfully and in a timely fashion?
- How will you publicly acknowledge any noise and odour issues at the farm?
- How will you acknowledge areas where you can improve odour and noise issues?
- Will you invite the community to track your progress solving any problems? If so, how?
- How will you establish trust with people who are potentially affected by the farm?
- What opportunities are there for neighbours to benefit from the farm?

Question 13: In your experience, what engagement strategies have proven effective in promoting a positive relationship between the community and broiler farm operators?

6 The consultation process

Your views and recommendations on the questions in this discussion paper will be used to inform a new *Broiler Farm Odour Environmental Risk Assessment*.

We are seeking the submission of comments by Wednesday 19 December 2012 from all affected stakeholders, including local government, government agencies, industry associations, members of industry and the wider community.

EPA will be conducting a series of workshops to provide further information regarding this review, and to gain additional perspectives and input.

Comments and/or submissions can be emailed to matthew.gordon@epa.vic.gov.au.

Submissions can also be sent by mail to:

Matthew Gordon
Policy & Regulation Unit
EPA Victoria
GPO Box 4395
Melbourne 3001

All submissions and comments must be received by **Wednesday 19 December 2012.**

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		Name	Signature	Name	Signature	Date
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1	M.Asimakis	T.Pollock	Signed	D.Kovacs	Signed	08/04/14
2	M.Asimakis	T.Pollock		D.Kovacs		20/06/14

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