



12 December 2016

Nicky Foote  
Project Manager  
ACT Government - ACT NOWaste  
GPO Box 158  
CIVIC SQUARE ACT 2608

Our ref: 2125915-81449  
Your ref:

Dear Nicky

## **Mugga Lane RMC – Odour Assessment Odour Impact Assessment of Planned Expansions**

### **1 Introduction**

Following submission of design documentation for the planned expansions (Cells 1, 3 and 4 as well as a new leachate dam) for Mugga Lane Resource Management Centre (the site), ACT NOWaste (NOWaste) received the DA for the planned expansions (including a recent reconsideration) which includes a number of conditions that need to be satisfied in relation to these expansions. Specifically, Condition B9 states the following:

*Modelling is to be undertaken by a suitably qualified consultant to assess the potential odour impact of the planned expansions. The assessment must be submitted and be endorsed by the Environment Protection Authority prior to construction of the leachate pond.*

NOWaste has a responsibility under the ACT *Air Environment Protection Policy 1999* (AEPP) to meet national standard for air quality as well as minimise environmental harm from local emissions of air pollutants (including odour). Reducing odour at the Mugga Lane landfill will assist in minimising the potential for environmental harm occurring. The AEPP also requires that air quality meets the standards set by the National Environmental Protection Measure (Air Quality) (NEPM).

NOWaste engaged GHD Pty Ltd (GHD) to undertake a semi-quantitative odour assessment of the planned expansions to address Condition B9. The assessment included a review of existing site odour modelling and a semi-quantitative assessment (including an odour mass balance model) of how the planned expansions will influence the previously modelled odour predictions.

### **2 Purpose**

The purpose of this report is to summarise the results of a semi-quantitative odour assessment completed for the planned expansions at the site to address Condition B9 in DA for the planned expansions.

### **3 Scope of works**

This report outlines the approach we have taken to determine the odour contribution from the existing site and the planned expansions, and aims to demonstrate that the expansions will not significantly increase odour levels from the site.

Specifically, the following scope of works were undertaken:

- Review of existing background information, as well as relevant odour emission data from other similar sites
- Development of an inventory of source odour emission rates (OERs) for the facility
- Preparation of an odour mass balance model and dispersion modelling to assess whether the odour from the planned expansion is a significant contributor and comment whether it would have any noticeable odour impact
- Prepare a letter report on the analyses conducted above (this report).

### **4 Reliance**

In preparing this report, GHD has obtained, reviewed and relied upon the following documents:

- ACT PLA, Notice of decision on Reconsideration, DA No. 201528509, dated 28 April 2016 (henceforth referred to as the 'DA for the planned expansions')
- AECOM (2013), Mugga Stage 5 – Air Quality Impact Assessment (Draft)
- Environmental Authorisation No. 0375 for the landfill area (currently held by Remondis Australia Pty Ltd) dated 19 September 2016
- EPA Victoria Publication 788.3 (2015), Best practice environmental management — Siting, design, operation and rehabilitation of landfills (henceforth referred to as the 'Landfill BPEM')
- GHD (2009), Odour Impact Survey for SITA Brooklyn – Greenwaste Composting Facility
- GHD (2011), Wyndham Vale Buffer Study Dispersion Modelling Assessment
- GHD (2013), Mugga Lane Resource Recovery Centre – Landfill Cell Rehabilitation Plan
- GHD (2016), Castlemaine Landfill Odour and Buffer Assessment
- Holmes Air Sciences (2006), Odour Audit: Lucas Heights Waste and Recycling Centre
- NSW EPA (2016), Environmental Guidelines – Solid Waste Landfills (henceforth referred to as the 'NSW Landfill Guidelines')
- The Odour Unit (2016), Mugga Lane Resource Management Centre Odour Investigation

## **5 Basis of modelling and assessment**

### **5.1 Source areas**

The source areas for the assessment were based on the existing conditions and likely staging of the planned expansions, as discussed with NOWaste, including:

- Existing conditions: Filling occurring within the A2AC landfill cell, Cell 1 under construction
- Stage 1: Filling occurring in Cell 1, Cell 3 and 4 under construction, new leachate dam constructed and final capping occurring progressively (including capping of the existing south-eastern interim batter)
- Stage 2: Filling occurring in Cell 3 and 4, final capping occurring progressively.

### **5.2 Cover and capping profiles**

The cover and capping profiles for the existing areas was based on discussions with NOWaste and results of previous investigations, as described in Landfill Cell Rehabilitation Plan (GHD, 2013). Based on this data, it is understood that the existing western and southern batters which have reached final levels are nominally capped with a 0.6 m thick compacted clay layer ( $K = 10^{-9}$  m/s) overlain by a 0.3 m thick topsoil layer. The exception to this is the south-eastern batter, which is currently interim covered only.

It is assumed that future cells will have a cover and capping arrangement as per the requirements of the site Environmental Authorisation of the landfilling operations, including:

- Any waste-filled areas that have not been landfilled for more than 30 days have an intermediate soil cover a minimum 300 mm layer of VENM in the form of a fine-grained, largely cohesive soil, restricting the rainfall infiltration rate into the waste to 20% of the total rainfall
- The final capping of all new cells approved after 5 March 2012 is to meet the design criteria of the cell liner and comprise an evapotranspiration cap (also called phytocap) constructed to meet best practice requirements<sup>1</sup>
- The Authorisation holder shall maintain an active tipping face at less than 30 m x 30 m at all times unless otherwise approved by the Authority.

### **5.3 Odour emission rate data**

#### **5.3.1 General**

Odour modelling was previously completed for the site as part of the planning assessment works by AECOM (2013). Odour emission rate data was predominately sourced from this assessment however; these have been supplemented with odour measurements at other sites where considered appropriate, as described below.

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<sup>1</sup> It is assumed that this requires capping which meets the requirements of the Landfill BPEM

### **5.3.2 Active tipping face**

Our previous experience has shown that the use of isolated flux chambers (IFC) on a tip face does not capture all odours. GHD has recent experience with alternate odour sampling techniques, such as taking odour samples downwind of the tipping face (in order to capture the entire odour generated from waste being unloaded, moved around and compacted) has found odour levels can be significantly higher than a corresponding IFC measurement. Previous odour modelling completed by GHD (2011), that used the up and downwind transect method has been referenced for tipping face odour levels used in this assessment.

### **5.3.3 Green waste**

The green waste composting data provided by AECOM (2013) was observed to be low when compared to recent measurements undertaken on other composting sites, and with consideration to the recent odour investigation undertaken at the site by The Odour Unit (2016). The assessment identified that there have been 91 odour complaints between October 2015 and June 2016. The assessment found that the various odours could be ordered by perceived possibility of causing off-site odour impacts as follows:

- Green waste facility and landfill gas leakage from the Stage 4 uncapped area
- Municipal solid waste odour from the active tipping face and Hunter MRF

Data from a previous green waste composting odour study completed by GHD (2009) was used to estimate source odour emission rates for the compost windrows in the existing green waste facility. We believe this provides a more realistic odour inventory for the approved project, which any future proposal can be compared against. The average specific odour emission rate (SOER) of the four week composting process and maturation process has been used for this assessment. This is considered conservative as it is understood that only shredding and storage of green waste is occurring at the site, resulting in a lower SOER. Detailed green waste odour assessment was not carried out by AECOM (2013) and they assumed one unturned windrow and one garden mix (raw green waste) stockpile in their assessment.

### **5.3.4 New leachate dam**

Leachate in the existing Leachate Dam 2 is currently influenced by groundwater inflow, resulting in diluted leachate within the dam. The new leachate dam is expected to receive only concentrated leachate or a high percentage of predominately concentrated leachate, and may therefore have a higher potential to generate odours.

GHD has referenced odour levels from a previous study completed for a leachate dam at a small putrescible landfill in Victoria (GHD, 2016). This leachate dam is smaller than the proposed new dam however it is undiluted and considered representative for use in this assessment (factored in accordance with the relative size of the dams). The proposed odour levels used for the new leachate dam are more than double the odour levels measured on the existing Leachate Dam 2. It is noted these values assume that the new leachate dam will utilise aerators to control anaerobic conditions.

## 6 Results and discussion

### 6.1 Odour inventory

The existing conditions used for the purposes of this odour assessment is shown in Sketch 1 (Appendix A) and the odour inventory for the existing landfill is shown in Table 1. The emissions inventory prepared in the AECOM assessment is presented in Table 2 for comparative purposes, and includes the existing landfill, Stage 1 and Stage 10.

**Table 1 Site odour inventory (existing conditions)**

Source	Area (m <sup>2</sup> )	SOER OUv/m <sup>2</sup> /s	OER OUv/s	Source
Active tipping face (day)	900	23.00	20,700	GHD (2011)
Active tipping face (night)	900	0.03	27	AECOM (2013)
Daily cover	85,000	0.03	2,550	AECOM (2013)
Interim cover	83,500	0.03	2,505	AECOM (2013)
Interim cover (south-eastern batter)	112,000	0.06	6,720	AECOM (2013)
Final capping (clay)	258,000	0.02	5,160	AECOM (2013)
Leachate Dam 2	9,400	0.03	282	AECOM (2013)
Green waste windrow (unturned)	9,000	1.17	10,530	GHD (2009)
Garden mix	1,200	4.00	4,800	URS (2007)
<b>Total emissions (day)</b>	<b>559,000</b>		<b>53,247</b>	
<b>Total emissions (night)</b>	<b>559,000</b>		<b>32,574</b>	

**Table 2 Site odour inventory (AECOM, 2013)**

Source	Area (m <sup>2</sup> )	SOER OUv/m <sup>2</sup> /s	OER OUv/s	Source
Active tipping face (day)	2,500	1.48	3,700	AECOM (2013)
Active tipping face (night) <sup>2</sup>	2,500	0.03	75	AECOM (2013)
Intermediate cover	7,000	0.06	420	AECOM (2013)
Daily cover	3,000	0.03	90	AECOM (2013)
Capped cover existing	407,000	0.02	8140	AECOM (2013)
Capped cover stage 1	417,000	0.02	8340	AECOM (2013)
Capped cover stage 10	787,000	0.02	15740	AECOM (2013)
Leachate pond	6,000	0.03	180	AECOM (2013)
Green waste windrow (unturned)	9,000	0.26	2340	AECOM (2013)
Garden mix	1,200	1.14	1368	AECOM (2013)
<b>Total emissions (existing, day)</b>	<b>435,700</b>		<b>16,238</b>	
<b>Total emissions (existing, night)</b>	<b>435,700</b>		<b>12,613</b>	
<b>Total emissions (Stage 1, day)</b>	<b>445,700</b>		<b>16,438</b>	
<b>Total emissions (Stage 1, night)</b>	<b>445,700</b>		<b>12,813</b>	
<b>Total emissions (Stage 10, day)</b>	<b>815,700</b>		<b>23,838</b>	
<b>Total emissions (Stage 10, night)</b>	<b>815,700</b>		<b>20,213</b>	

<sup>2</sup> Although not specified it is assumed AECOM modelled the tip face area with daily cover during the night time period

Stages 1 and 2 as described in Section 3 are shown in Sketches 002 and 003 (Appendix A) and the odour inventory for these stages are shown in Table 3 and Table 4 respectively.

**Table 3 Site odour inventory (Stage 1)**

Source	Area (m <sup>2</sup> )	SOER OUv/m <sup>2</sup> /s	OER OUv/s	Source
Active tipping face (day)	900	23.00	20,700	GHD (2011)
Active tipping face (night)	900	0.03	27	AECOM (2013)
Daily cover	52,000	0.03	1,560	AECOM (2013)
Interim cover	114,000	0.03	3,420	AECOM (2013)
Final capping (clay)	370,000	0.02	7,400	AECOM (2013)
Final capping (BPEM)	37,000	0	0	Best practice with active LFG collection
Leachate Dam 2	8,000	0.03	240	AECOM (2013)
New leachate dam	6,000	0.069	414	GHD (2016)
Green waste windrow (unturned)	9,000	1.17	10,530	GHD (2009)
Garden mix	1,200	4.00	4,800	URS (2007)
<b>Total emissions (day)</b>	<b>598,100</b>		<b>49,064</b>	
<b>Total emissions (night)</b>	<b>598,100</b>		<b>28,391</b>	

**Table 4 Site odour inventory (Stage 2)**

Source	Area (m <sup>2</sup> )	SOER OUv/m <sup>2</sup> /s	OER OUv/s	Source
Active tipping face (day)	900	23.00	20,700	GHD (2011)
Active tipping face (night)	900	0.03	27	AECOM (2013)
Daily cover	76,500	0.03	2,295	AECOM (2013)
Interim cover	53,500	0.03	1,605	AECOM (2013)
Final capping (clay)	370,000	0.02	7,400	AECOM (2013)
Final capping (BPEM)	112,500	0.00	0	Best practice with active LFG collection
Leachate Dam 2	8,000	0.03	240	AECOM (2013)
New leachate dam	6,000	0.069	414	GHD (2016)
Green waste windrow (unturned)	9,000	1.17	10,530	GHD (2009)
Garden mix	1,200	4.00	4,800	URS (2007)
<b>Total emissions (day)</b>	<b>637,600</b>		<b>48,011</b>	
<b>Total emissions (night)</b>	<b>637,600</b>		<b>27,311</b>	

## 6.2 Predicted odour trends

The predicted site odour emission rates from the inventories described above are presented in Figure 1. The plot shows a decrease in odour levels for Stage 1 (nearly 8%) from existing levels and a decrease of approximately 10% in odour levels for Stage 2 compared to existing, that can be attributed to progressive landfill capping at the site over the course of the planned expansions. Both Stage 1 and 2 include the contribution of the new leachate dam. The proposed leachate dam, which although is a new odour source at the landfill, contributes 1-2% of the total odour emissions.

The odour assessment has found that the site odour contribution is predicted to reduce approximately 10% in Stage 2 of the planned expansions compared with the current levels. However, the odour emission inventory has a higher OER than the previous assessment undertaken by AECOM (2013), due to GHD taking a more conservative assessment of the odour emission rates of the active tipping area and the green waste composting. Whilst odour emissions are expected to reduce, the levels at which GHD has assessed may mean that the odour footprint of the site is larger than anticipated in earlier assessments. This is consistent with findings by The Odour Unit (2016) that identified odour was noticeable offsite from the green waste composting and active tipping face.

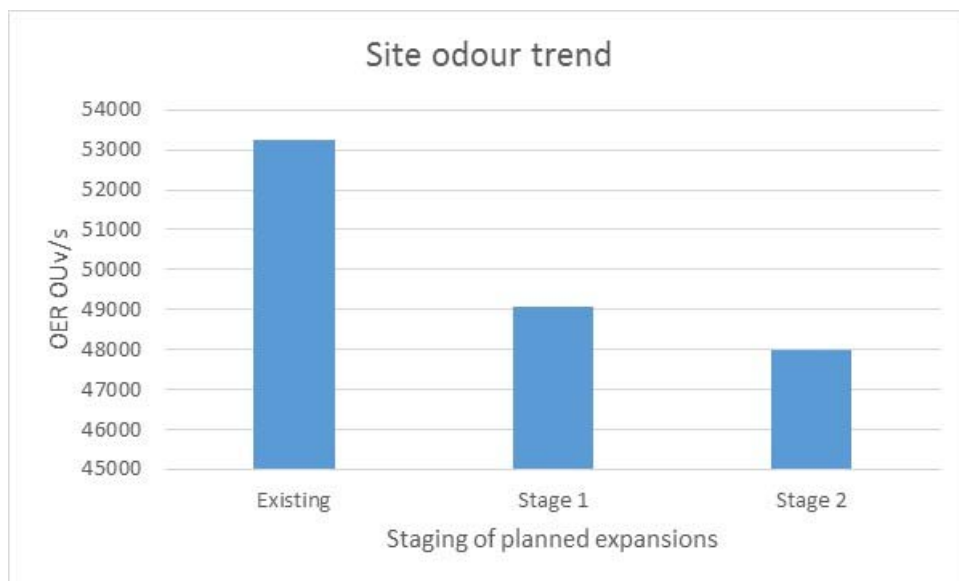


Figure 1 Predicted odour trend at the site (including new leachate dam)

## 6.3 Dispersion modelling

### 6.3.1 General

Dispersion modelling was undertaken of the site to predict maximum (99<sup>th</sup> percentile) odour concentrations at nearby receptor locations (AECOM, 2013). For this assessment, odour modelling has been undertaken in order to predict maximum (99<sup>th</sup> percentile) odour concentrations based on the updated staging and odour inventories.

Odour modelling was undertaken in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC, 2005). The CALPUFF dispersion model used in the assessment has the ability to model spatially varying winds and turbulence fields that are important in complex terrain and near calm conditions. A criteria of 2 Odour Units (OU) was used for the modelling, as this is the criteria chosen by the NSW EPA in relation to odour impact to built-up and residential areas.

### **6.3.2 Meteorology**

A site specific meteorological data file was synthesised from TAPM for 2011. This was used to allow direct comparison with the results provided by AECOM (2013), and is understood to be a representative year with regards to dispersion modelling. The TAPM meteorological grid was centred at the pump station location, with an outer grid spacing of 30 km by 30 km. Detailed TAPM parameters included:

- Number of vertical levels: 25
- Nested grid domains: 10 km by 10 km, 3 km by 3 km, 1 km by 1 km and 300 m by 300 m.

The TAPM meteorological file was used as an input into the CALPUFF meteorological pre-processor CALMET with a meteorological grid spacing of 9 km by 9 km centred at the pump station site. The grid resolution for the CALMET meteorological data processing was 400 m, with 11 vertical cell heights.

The synthesised CALMET data for 2011 is shown in Figure 2 . The wind rose is compared with the wind rose provided by AECOM in Figure 3. Both wind roses show similar trends, with dominant winds blowing from the north-west and south-east quadrants. This is also consistent with the meteorological data gathered at the nearby Canberra Airport BOM station. The differences between the wind roses are attributed to the different wind rose plotting locations.

### **6.3.3 Model configuration and parameter selection**

The following CALPUFF settings were used in the simulations:

- Model: CALPUFF Version 5.8
- Meteorology: Produced from CALMET, based on TAPM data
- The receptor grid was 6 by 6 km, with a 200 m grid resolution, centred around the site
- Three (3) nearby discrete receptors were identified
- Post-processing: Averaging time of 1 hour, Percentile: 99
- All CALPUFF settings were consistent with the Office of Environment and Heritage (OEH) (2011) recommendations

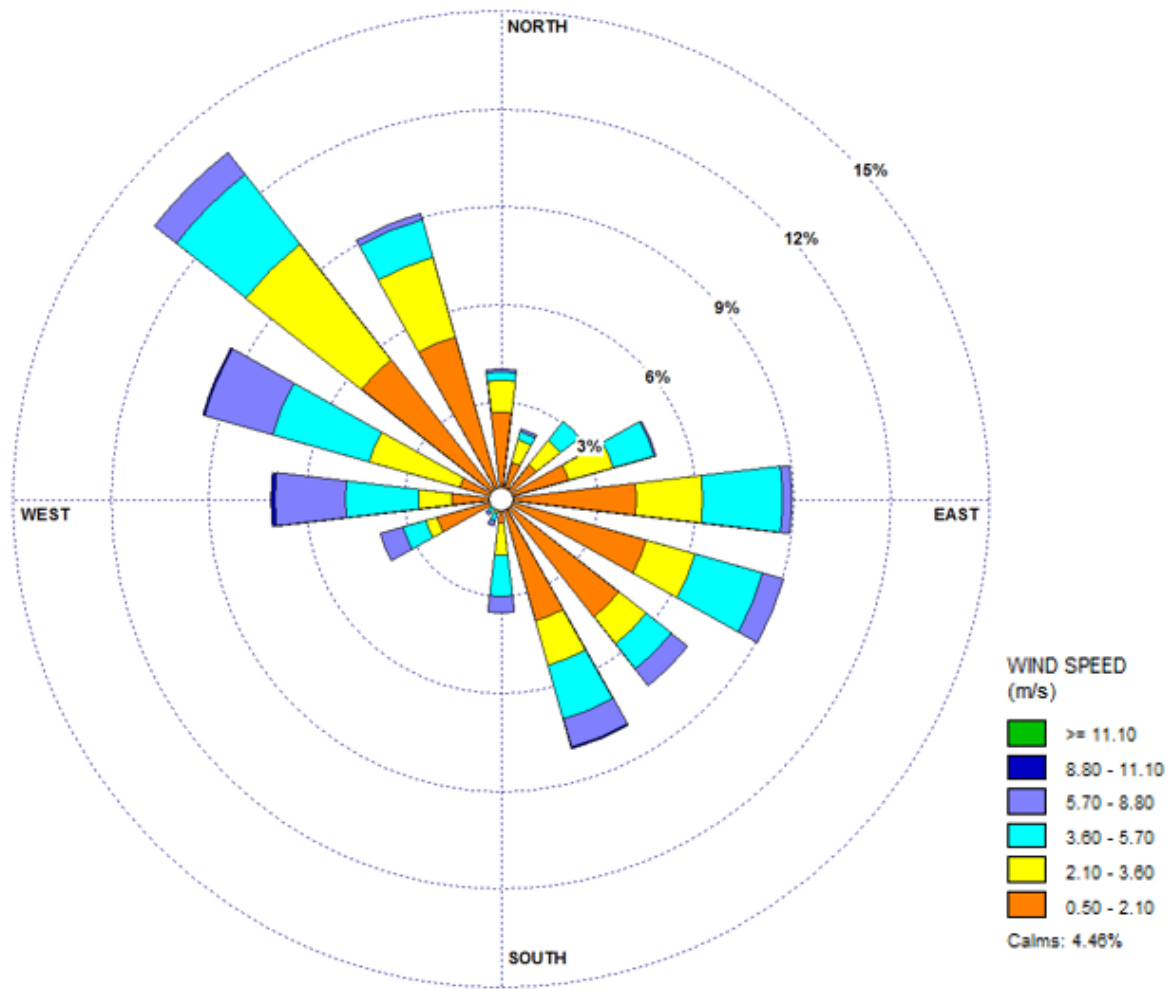
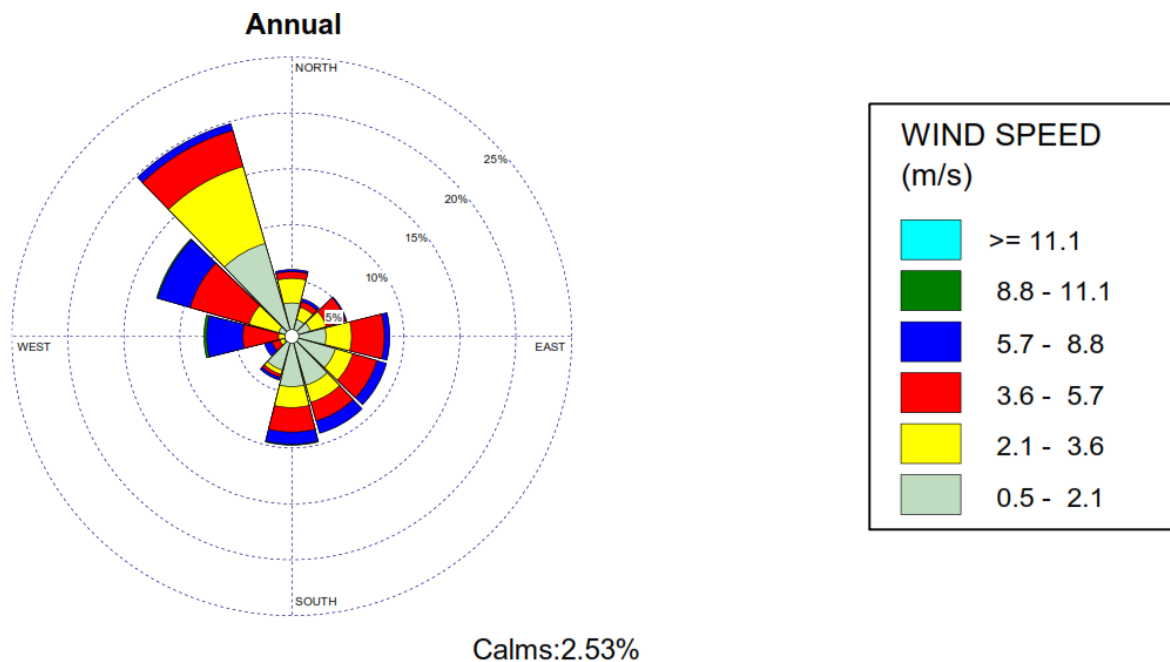


Figure 2 2011 annual wind rose synthesised by CALMET



**Figure 3 2011 annual wind rose presented in the AECOM (2013)**

### 6.3.4 Modelling results

Results of the odour modelling are shown in Table 5 and contour plots are attached in Appendix B. Results show that the maximum 1 hour (99<sup>th</sup> percentile) 2 OU contour extends beyond the site boundary for the existing and planned expansion scenarios.

**Table 5 Predicted peak odour concentrations**

Sensitive receptor	Peak 1-hour odour concentration (99 <sup>th</sup> percentile, OU)		
	Existing	Stage 1	Stage 2
1	4.35	4.36	4.35
2	1.0	1.41	1.1
3	0.73	0.84	0.65
Criterion	2	2	2

### 6.4 Discussion

The results show that the peak odour concentrations at Receptor 1 are generally consistent from the existing scenario to Stage 2. This is due to the green waste windrow and garden mix being located at the north of the site, nearest to Receptor 1. The predicted odour concentrations at Receptor 1 is above the 2 OU criterion, however it is not in any way a result of the planned expansions, and are likely to be manifesting within the existing conditions, which aligns with findings by The Odour Unit (2016).

Peak odour concentrations at Receptor 2 are predicted to increase by up to 10% between the existing and Stage 2, however the concentrations remain below the 2 OU criterion. The increase is due to the new landfill cells being constructed and operated in close proximity to this receptor.

Peak odour concentrations at Receptor 3 are predicted to slightly increase followed by a decrease by over 10% between the existing and Stage 2, with concentrations remaining below the 2 OU criterion. The increase is due to the new leachate dam being constructed in close proximity to this receptor.

The planned expansions would ultimately result in a reduction in the total odour emissions at the site with very minimal changes in predicted odour concentrations at nearby sensitive receptors.

## **6.5 Sensitivity analysis**

### **6.5.1 General**

Given the planned expansions are yet to be constructed, the values used throughout this assessment are predictive and were developed based on a number of assumptions. As such, GHD has conducted various sensitivity analyses as part of our assessment to understand the implications of some of these assumptions.

### **6.5.2 Leachate dam odour levels**

For the new leachate dam, GHD has referenced odour levels from a small putrescible landfill in Victoria (GHD, 2016). This leachate dam is smaller than the proposed new dam however it is undiluted and considered representative for use in this assessment (factored in accordance with the relative size of the dams). In order to review the sensitivity of the new leachate pond odour emission rate, GHD has reviewed data from other sites and has identified conservative values of up to 0.28 OUv/m<sup>2</sup>/s (Holmes Air Sciences, 2006), a value which is over four times the level used in this assessment. GHD has conservatively used 0.3 OUv/m<sup>2</sup>/s and conducted an analysis as to how this would impact the site odour levels, and found that this increases the contribution of the new leachate pond to the sites total odour contribution to approximately 4-6%. This is still considered a relatively low contribution and still indicates that the new leachate dam will not be a significant source of odour at the site. In addition, similar trends in total odour emissions were identified across the stages of the planned expansions, with a reduction during Stage 1 (approximately 5%) followed by a further decrease of approximately 7% in Stage 2 compared to existing.

### **6.5.3 Comparison with AECOM values**

As part of our assessment, we reviewed the AECOM odour emission inventory, and updated the odour emission rates for the active tipping face and green waste to more conservative values based on our previous experience and findings by The Odour Unit (2016).

For the sensitivity analysis, we considered the effects of maintaining the original values for the active tipping face and green waste by AECOM (2013) in modelling the planned expansions. Doing so increases the contribution of the new leachate pond to the sites total odour contribution to approximately 2-3%. This is still considered a relatively low contribution and still indicates that the new leachate dam will not be a significant source of odour at the site. In addition, similar trends in total odour emissions were identified across the stages of the planned expansions, with a reduction during Stage 1

(approximately 19%) followed by a further decrease of approximately 24% in Stage 2 compared to existing.

## 7 Conclusions

Based on our modelling and assessment, GHD makes the following conclusions

- AECOM (2013) may potentially have underestimated odour emissions from the site, particularly in relation to the active tipping face and green waste facility
- By adopting more conservative values, our results show that the odour emissions from the site may be significantly higher than estimated by AECOM (2013). However, these potential odour levels are directly related to the potential underestimates by AECOM (2013). They are not in any way a result of the planned expansions, and are likely to be manifesting within the existing conditions, which aligns with findings by The Odour Unit (2016)
- With consideration to the planned expansions, the scenarios considered by GHD all show a slight increase in total odour emissions at the site followed by a decrease in emissions over the life of the planned expansions
- Peak odour concentrations at Receptor 1 are generally consistent over the course of the planned expansions. This is due to the green waste windrow and garden mix being located at the north of the site, nearest to Receptor 1. The predicted odour concentrations at Receptor 1 is above the 2 OU criterion, however it is not in any way a result of the planned expansions, and are likely to be manifesting within the existing conditions, which aligns with findings by The Odour Unit (2016)
- Peak odour concentrations at Receptor 2 are predicted to increase by up to 10% over the course of the planned expansions, however the concentrations remain below the 2 OU criterion. The increase is due to the new landfill cells being constructed and operated in close proximity to this receptor
- Peak odour concentrations at Receptor 3 are predicted to slightly increase followed by a decrease by over 10% over the course of the planned expansions, with concentrations remaining below the 2 OU criterion. The increase is due to the new leachate dam being constructed in close proximity to this receptor
- Specifically, the new leachate dam was shown to contribute 1-2% of odour emissions from the site, or at most 4-6% with consideration to the highest potential odour emissions identified in the available reference data. Based on these results, the new leachate dam is not considered a significant odour source at the site.
- Overall, the planned expansions, operated as per the assumptions in this report, would be appropriate from a long-term odour perspective as it would eventually reduce the potential for odour impacts at nearby sensitive receptors and help meet obligations under the AEPP to minimise environmental harm from odour emissions.

## 8 Recommendations

Whilst the planned expansions, operated as per the assumptions in this report, are expected to reduce odour emissions from the site over time, proactive odour management is required in order to reduce the potential for odour complaints. With this in mind, GHD makes the following recommendations:

- Aerate the new leachate dam to control anaerobic conditions whilst avoiding times when the weather conditions assist poor dispersion in the direction of sensitive receptors
- Operate the active tipping face as per the Environmental Authorisation and keep the area minimised where practicable
- Operate the planned expansions in general accordance with the staging described in this report, with the impacts to odour emissions considered prior to approving any major changes to this staging
- Continue to prepare and implement an operational odour management plan for the site.

Sincerely  
GHD Pty Ltd

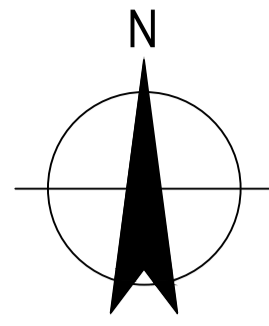


**Evan Smith**

Senior Environmental Engineer - Air and Noise Assessments  
+61 2 9239 7695

## Appendix A

# Sketches



CONSTRUCTION AND DEMOLITION WASTE FACILITY

GREEN WASTE RECYCLING AND COMPOSTING FACILITY

EXTENT OF LANDFILL EXPANSION

CELL 1 (UNDER CONSTRUCTION)

EXTENT OF SITE (EXCLUDING LANDFILL EXPANSION AREA)

MUGGA LANE

LEACHATE DAM 2

**LEGEND**

- EXISTING SITE CONTOURS (1m INCREMENT)
- LEACHATE DAM
- GREY WATER DAM
- CLEAR WATER DAM
- DAILY COVER AND ACTIVE TIPPING FACE
- INTERIM COVER
- FINAL CAP (EXISTING CAPPING PROFILE)
- FINAL CAP (LANDFILL BP EM COMPLIANT CAPPING PROFILE)

**NOTES**

1. SURVEY DATA AND AERIAL PHOTOGRAPHY SUPPLIED BY AVMAP DATED 20 AUGUST 2015 AND 30 JUNE 2016
2. ALL LOCATIONS ARE APPROXIMATE



**PRELIMINARY**

rev	description	app'd	date
A	INITIAL ISSUE	DG*	20.10.16

ACT NOWASTE  
MUGGA LANE RMC  
ODOUR ASSESSMENT  
EXISTING SITE LAYOUT

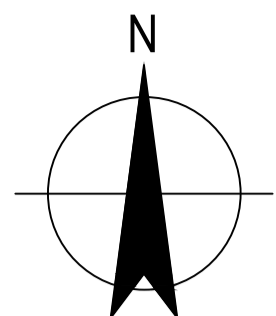


Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia  
T 61 2 9239 7100 F 61 2 9239 7199  
E sydmail@ghd.com W www.ghd.com

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approved (PD) ..... **SK001**



CONSTRUCTION AND DEMOLITION WASTE FACILITY

GREEN WASTE RECYCLING AND COMPOSTING FACILITY

EXTENT OF LANDFILL EXPANSION

CELL 3 AND 4 (UNDER CONSTRUCTION)

EXTENT OF SITE (EXCLUDING LANDFILL EXPANSION AREA)

NEW LEACHATE DAM

LEACHATE DAM 2



**LEGEND**

- 685 EXISTING SITE CONTOURS (1m INCREMENT)
- LEACHATE DAM
- GREY WATER DAM
- CLEAR WATER DAM
- DAILY COVER AND ACTIVE TIPPING FACE
- INTERIM COVER
- FINAL CAP (EXISTING CAPPING PROFILE)
- FINAL CAP (LANDFILL BPEM COMPLIANT CAPPING PROFILE)

**NOTES**

1. SURVEY DATA AND AERIAL PHOTOGRAPHY SUPPLIED BY AVMAP DATED 20 AUGUST 2015 AND 30 JUNE 2016
2. ALL LOCATIONS ARE APPROXIMATE



**PRELIMINARY**

B	REVISED FINAL CAP AREA	DG*	09.12.16
A	INITIAL ISSUE	DG*	20.10.16
rev	description	app'd	date

ACT NOWASTE  
MUGGA LANE RMC  
ODOUR ASSESSMENT  
STAGE 1

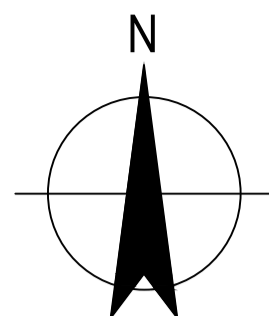


Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia  
T 61 2 9239 7100 F 61 2 9239 7199  
E sydmail@ghd.com W www.ghd.com

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scale | 1:5000 for A1 job no. | 21-25915  
date | DEC 2016 rev no. | B

approved (PD) ..... SK002



CONSTRUCTION AND DEMOLITION WASTE FACILITY

GREEN WASTE RECYCLING AND COMPOSTING FACILITY

EXTENT OF LANDFILL EXPANSION

CELL 5 AND 6 (UNDER CONSTRUCTION)

EXTENT OF SITE (EXCLUDING LANDFILL EXPANSION AREA)

NEW LEACHATE DAM

LEACHATE DAM 2



**LEGEND**

- EXISTING SITE CONTOURS (1m INCREMENT)
- LEACHATE DAM
- GREY WATER DAM
- CLEAR WATER DAM
- DAILY COVER AND ACTIVE TIPPING FACE
- INTERIM COVER
- FINAL CAP (EXISTING CAPPING PROFILE)
- FINAL CAP (LANDFILL BPEM COMPLIANT CAPPING PROFILE)

**NOTES**

1. SURVEY DATA AND AERIAL PHOTOGRAPHY SUPPLIED BY AVMAP DATED 20 AUGUST 2015 AND 30 JUNE 2016
2. ALL LOCATIONS ARE APPROXIMATE



**PRELIMINARY**

rev	description	app'd	date
A	INITIAL ISSUE	DG*	20.10.16

ACT NOWASTE  
MUGGA LANE RMC  
ODOUR ASSESSMENT  
STAGE 2



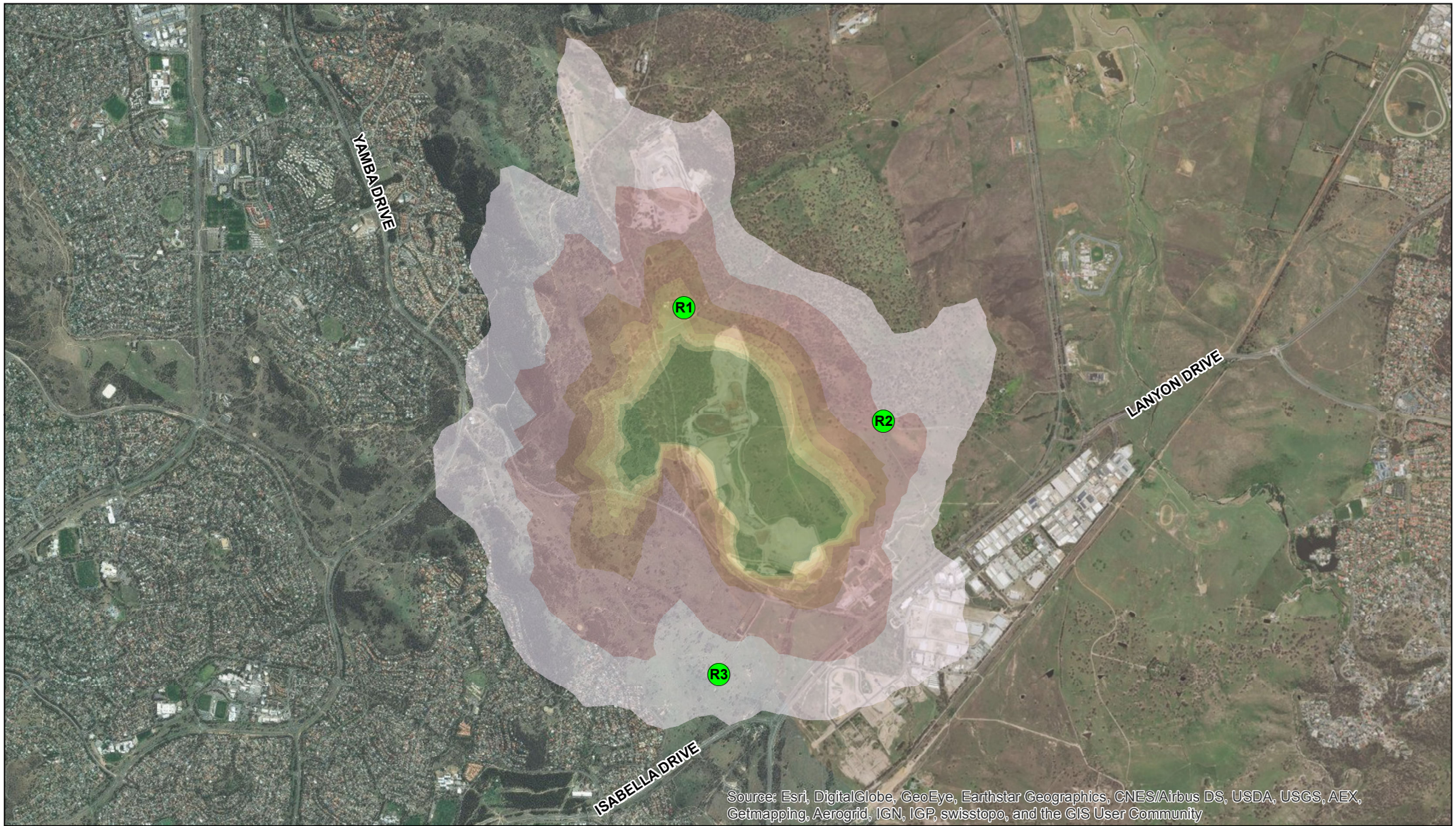
Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia  
T 61 2 9239 7100 F 61 2 9239 7199  
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date | OCT 2016 rev no. | A

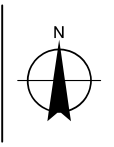
approved (PD) ..... SK003

Appendix B  
Dispersion modelling results



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size A4  
 0 150 300 600 900 1,200  
 Metres  
 Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 55



LEGEND

● Sensitive receptors	<b>Odour Units (Ou)</b>	2	5
	0.5	3	6
	1	4	7

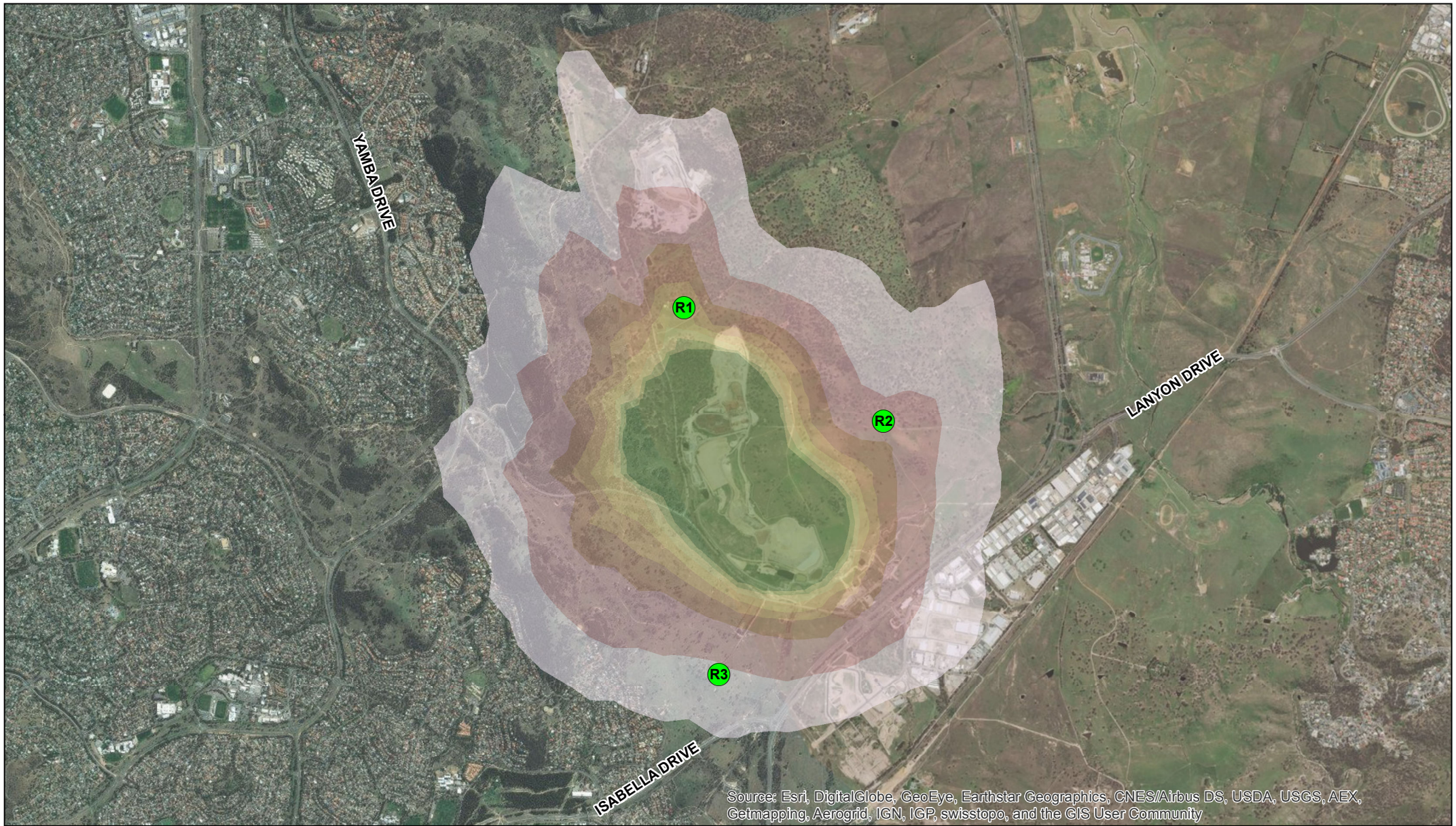


ACT NOWaste  
 Mugga Lane RMC – Odour Assessment

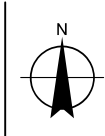
Job Number | 21-25705  
 Revision | A  
 Date | 07 Dec 2016

Predicted 99th percentile peak  
 odour impact – Existing

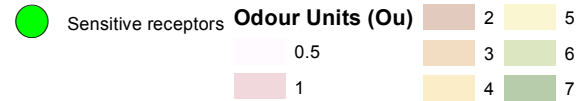
Figure B1



Paper Size A4  
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 Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 55



LEGEND

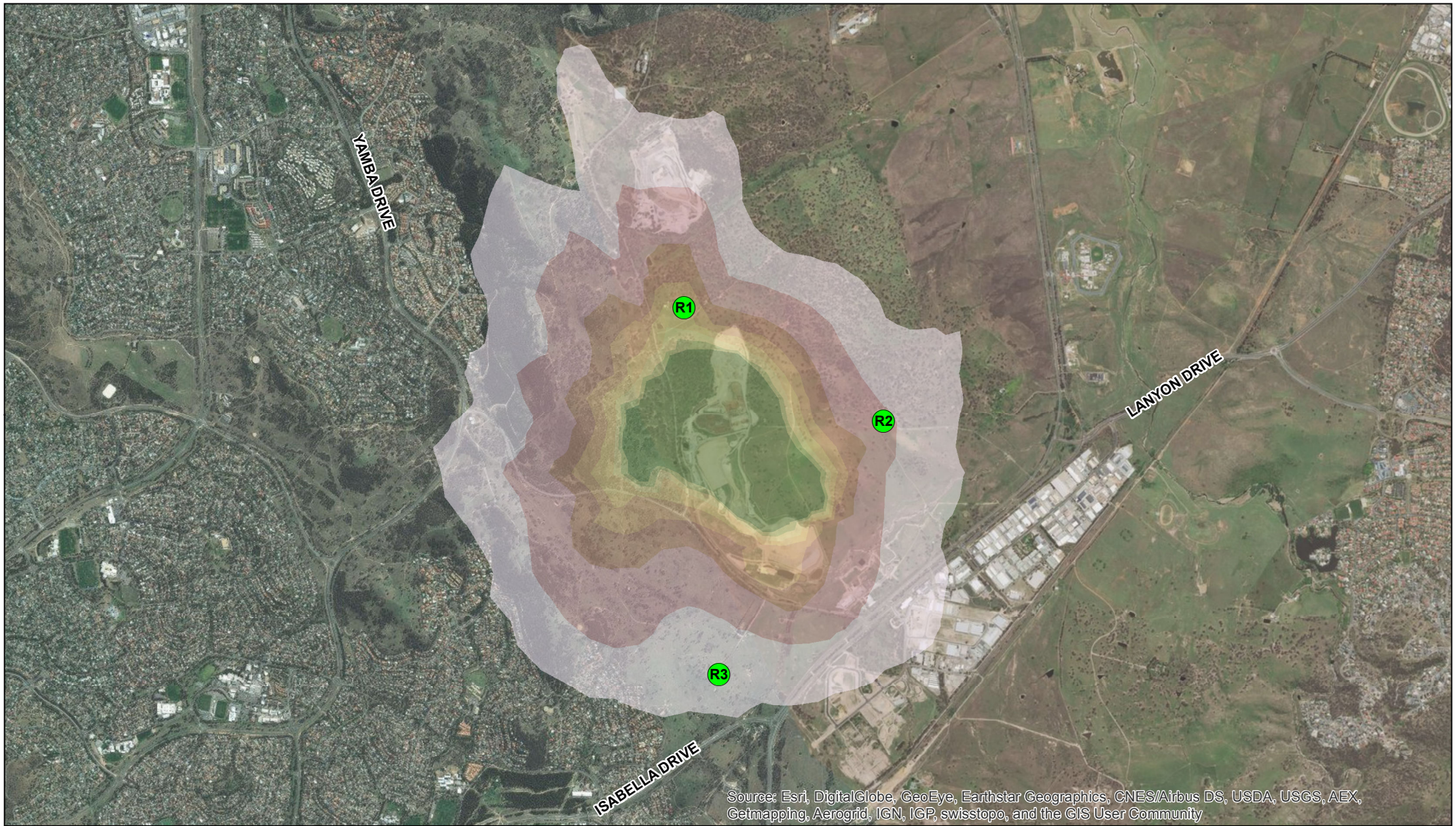


ACT NOWaste  
 Mugga Lane RMC – Odour Assessment

Job Number | 21-25705  
 Revision | A  
 Date | 07 Dec 2016

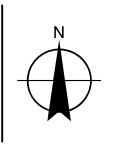
Predicted 99th percentile peak  
 odour impact – Stage 1

Figure B2











Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size A4  
 0 150 300 600 900 1,200  
 Metres  
 Map Projection: Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 55



LEGEND

	Sensitive receptors	<b>Odour Units (Ou)</b>		2		5
				3		6
				4		7
				1		
				0.5		



ACT NOWaste  
 Mugga Lane RMC – Odour Assessment

Job Number | 21-25705  
 Revision | A  
 Date | 07 Dec 2016

Predicted 99th percentile peak  
 odour impact – Stage 2

Figure B3