05 April 2018

Kim Ross
NSW Landfill Advisor
SUEZ Recycling and Recovery Pty Ltd
Lucas Heights Resource Recovery Park
New Illawarra Road
Lucas Heights NSW 2234 Australia

Our ref: 2126747-93444
Your ref:

Dear Kim

LHRRP Environmental Assessment for Consent Mod
Change in Operating Hours - Odour Assessment

1 Overview

This odour assessment relates to an application by SUEZ Recycling and Recovery (SUEZ) to modify the State Significant Development (SSD) 6835 consent (Appendix A), which granted approval for the Lucas Heights Resource Recovery Project (the Project).

The SSD 6835 consent allows for operation of the landfill between 6 am and 5 pm Monday to Friday and 8 am to 5 pm Saturdays and Sundays. SUEZ is seeking to modify the development consent (the modification) to allow for operation of the landfill between 5 am and 5 pm Monday to Friday and 6 am to 5 pm Saturdays (with no change to Sunday's operation hours). The modification is proposed in order to address existing and potential future queuing issues at the site entrance prior to the site opening at 6 am.

2 Purpose of this letter

This odour assessment has been prepared to assess the impacts arising from the modified operations. This assessment is based on findings and modelling methodology described in Environmental Impact Statement (EIS) for the Project (GHD 2016).

3 Proposed modification

SUEZ is seeking a modification to SSD 6835 to allow for extending the operating hours of the landfill to between 5 am and 5 pm Monday to Friday and 6 am and 5 pm Saturdays (with no change to the Sunday landfill operating hours). No changes are proposed with respect to the quantities of waste to be accepted or other site infrastructure. Landfilling activities will continue to be undertaken as described in the Environmental Impact Statement (EIS) for the Project (GHD 2016).

4 Odour emissions inventory

In order to assess potential odour impacts from the proposal GHD has prepared an odour inventory of the worst-case future operating scenario as defined in the EIS (GHD 2016). Phase 6 (as described in the

EIS) was found to be the worst-case scenario in regards to the highest predicted odour impact. The maximum odour emissions from site won't change, just the time of day that these can occur.

The proposed MOD means that the active tip face may be in operation for an additional hour of the day, which will have the potential for greater odour impacts at nearby receptors.

4.1 Future Phase 6 (2021) – scenario 3 and scenario 4

This scenario includes the proposed landfill reprofiling area for 2021 and the proposed western GO facility operating at 80,000 t/yr. The EIS identified that Phase 6 represents the worst-case odour generating scenario for the proposal.

The inventory shows that the odour from the landfill increases in the afternoon due to the tip face however when the landfill is non-operational in the night time odour emissions drop considerably. Emissions in the model for this assessment have included an extra hour of operations (5 am to 6 am seven days a week). This is considered conservative as the weekend operations are proposed to commence at 6 am on a Saturday and 8 am on Sundays).

The amount of waste likely to be deposited during the first three hours of operation (5 am to 8 am) has been considered in the odour assessment, The expected level of usage (based on truck movements and waste vehicle capacities) suggests that the waste tipping area would be filled over the first three hours of operation, rather than in the first hour (5 am to 6 am). This reduces the odour emission potential for each hour during the first three hour period.

Emissions for the 2021 landfill are presented in Table 1 and emissions for the proposed GO facility are presented in Table 2. By 2021 the proposed ARRT facility would potentially be operational and the estimated emissions are provided in Table 4.

The landfill is the significant source of odour onsite during the daytime period however at the night the ARRT facility and GO facility are the main contributors to odour emissions. Odour emissions from the ARRT facility are through a biofilter air discharge portal and would therefore be dispersed into the atmosphere much better than other odour emissions.

The character of the odour from the biofilter is also much different from landfill gas and green waste with characteristics similar to that of an 'earthy soil smell', but nevertheless this odour assessment conservatively assumes the three operations contributing to the total odour emission from the site.

Landfill

The SOERs used in the model for the Phase 6 (2021) landfill are presented in Table 1.

Table 1 Odour emissions for 2021 landfill

Source	Surface area (m^2)	SOER OUv/m^2/s	OER OUv/s	SOER Reference
Active tip face morning	2,500	26	65,000	Ektimo, 2014
Active tip face afternoon	2,500	40	100,000	Ektimo, 2014
Daily cover	2,500	0.03	100	Ektimo, 2014
Daily cover area	10,000	0.03	300	Ektimo, 2014
Leachate pond (quiescent)	3,550	0.26	923	Ektimo, 2014
Leachate pond (aerated) for 2 hours of the day	3,550	1.8	6390	Ektimo, 2014
Final cap	485,490	0	0	Ektimo, 2014
Intermediate cover	434,750	Intermediate cover without gas extraction – 0.05 Intermediate cover with gas extraction – 0.023	11,038	Ektimo, 2014
Stripped back area	2,500	1	2,500	Ektimo, 2014
total am			79,761	
total pm			114,761	
total no op			14,861	

Green waste composting

The SOERs used in the model for the green waste composting in 2017 are presented in Table 2. This data is conservative and assumes that the windrows are uncovered when in fact they would be covered.

Table 2 Odour emissions for proposed GO facility

Source	Surface area (m^2)	SOER OUv/m^2/s	OER OUv/s	SOER Reference
Receivals area	1,949	4	7,796	URS, 2007
Shredding	-	-	5,740	URS, 2008
Loading	5	8	40	URS, 2007

Source	Surface area (m^2)	SOER OUv/m^2/s	OER OUv/s	SOER Reference
Active composting week 1	1,500	1.95	2,925	GHD, 2009
Active composting week 2	1,500	1.12	1,680	GHD, 2009
Active composting week 3	1,500	0.97	1,455	GHD, 2009
Active composting week 4	1,500	0.89	1,335	GHD, 2009
Maturation	5,638	0.7	3,947	GHD, 2009
Finished compost	8,145	0.34	2,769	GHD, 2009
Screening	-	-	1,600	URS, 2007
Turning	713	1.18	841	URS, 2007
Leachate pond	6,818	0.145	989	Holmes Air Sciences 2006
Leachate pond (aerated) for 2 hours of the day	6,818	1.0	6,818	Holmes Air Sciences 2006
TOTAL			**31,117* (unaerated)**	

*The odour modelling took into account the aerated and unaerated state of the leachate pond.

The SOERs used in the model for the green waste composting in 2017 are presented in Table 3. This data is conservative and assumes a 90% odour reduction on the first four weeks of active composting by using breathable membrane covers.

Table 3 Odour emissions for proposed GO facility with breathable membrane covers

Source	Surface area (m^2)	SOER OUv/m^2/s	OER OUv/s	SOER Reference
Receivals area	1,949	4	7,796	URS, 2007
Shredding	-	-	5,740	URS, 2008
Loading	5	8	40	URS, 2007
Active composting week 1	1,500	0.20	293	GHD, 2009
Active composting week 2	1,500	0.11	168	GHD, 2009

Source	Surface area (m^2)	SOER OUv/m^2/s	OER OUv/s	SOER Reference
Active composting week 3	1,500	0.10	146	GHD, 2009
Active composting week 4	1,500	0.09	134	GHD, 2009
Maturation	5,638	0.7	3,947	GHD, 2009
Finished compost	8,145	0.34	2,769	GHD, 2009
Screening	-	-	1,600	URS, 2007
Turning	713	1.18	841	URS, 2007
Leachate pond	6,818	0.145	989	Holmes Air Sciences 2006
Leachate pond (aerated) for 2 hours of the day	6,818	1.0	6,818	Holmes Air Sciences 2006
TOTAL			**24,463* (unaerated)**	

*The odour modelling took into account the aerated and unaerated state of the leachate pond.

ARRT facility

The SOERs used in the model for the ARRT facilities in 2017 (and onwards) are presented in Table 4. The biofilter emissions are based on the air flow of the building and have been assumed to be emitted through a portal as detailed in the EIS. The biofilter emission rate is based on GHD's experience with a recommended odour level of 250 OU/m^3.

Table 4 Odour emissions for proposed ARRT facility

Source	Flow rate (m^3/s)	Biofilter emission rate OU/m^3	OER (OU/s)	SOER Reference
Biofilter	345	250	86,250	GHD

5 Updated results

Odour modelling has been undertaken as per methodologies used in the EIS. Results from the EIS and the predictions from the MOD1 odour modelling are shown in Table 5 below. The highest predicted level is at R6, which is a potential future residential area known as Gandangara. Odour contour plots are provided in Attachment A.

Table 5 Maximum predicted odour levels (99th percentile OU)

Scenario	R1	R2	R3	R4	R5	R6	R7
2015 EIS results							
Gore	0.9	1	1	1.7	1.4	2	1.3
No Gore	0.9	1.1	1	1.8	1.5	2.1	1.3
MOD 1 results							
Gore	0.9	1.0	1.0	1.7	1.4	1.9	1.3
No Gore	0.9	1.0	1.0	1.8	1.5	2.0	1.4
Difference							
Gore	0.0	0.0	0.0	0.0	0.0	-0.1	0.0
No Gore	0.0	-0.1	0.0	0.0	0.0	-0.1	0.1

6 Conclusion

GHD has undertaken odour modelling using odour emission data obtained from a comprehensive landfill odour sampling program at the LHRRP. Odour modelling undertaken in the EIS (GHD 2016) has been updated to include the site being open from 5 am onwards.

Odour emissions in the model for this assessment have included an extra hour (5 am to 6 am seven days a week) compared to the EIS. Predicted worst-case odour concentrations have marginally decreased due to refinements made to the model to account for the expected decrease in rate of filling of the tipping area due to the longer time frame. The results comply with the odour criteria as described in the Approved Methods.

Sincerely
GHD

Evan Smith
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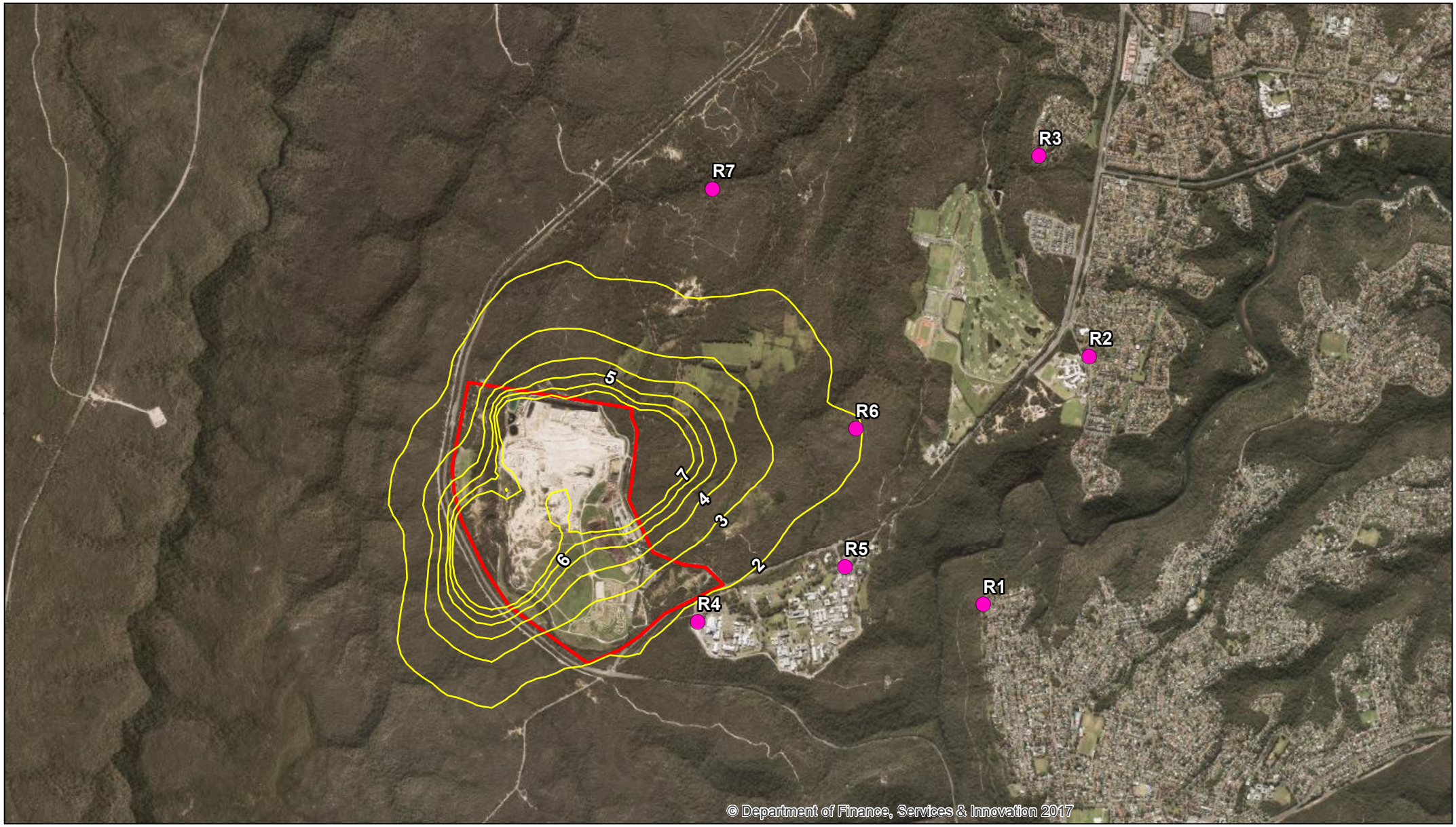
Attachment A – Odour Contour Plots



Paper Size A4

0 125 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Proposed Sensitive Receptors
- Predicted maximum 99th percentile (P/M60)
- Site Boundary

SITA Australia
Lucas Heights Resource Recovery Park

Job Number	21-26747
Revision	A
Date	05 Apr 2018

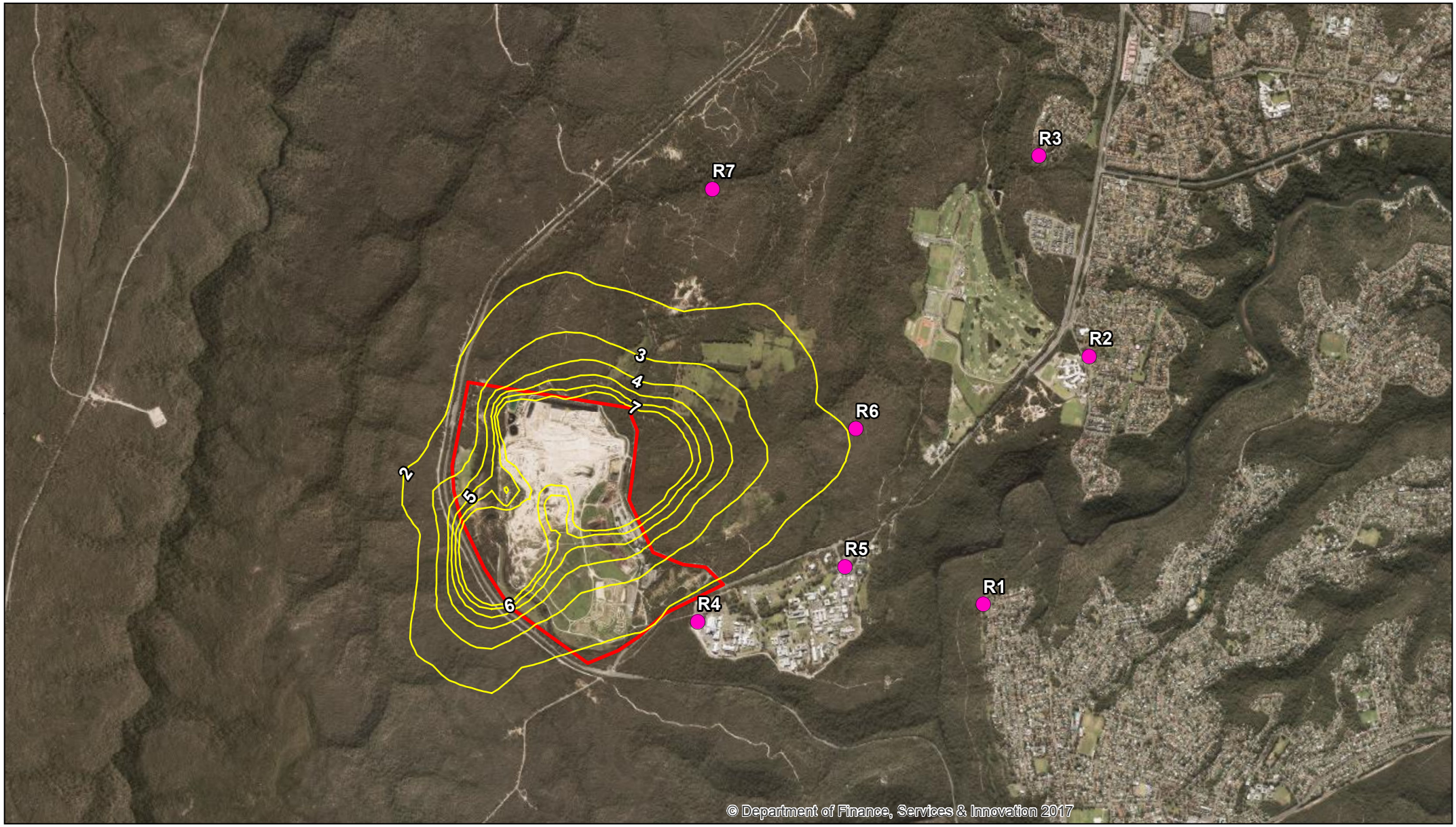
Predicted Odour Impact - Phase 6 Future

Figure 1

G:\21\26747\GIS\Maps\Deliverables\21_26747_Z001_NoGoreCountour.mxd

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

Data source: Imagery - Sixmaps. Created by:jrbacani



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Lucas Heights Resource Recovery Park

Job Number 21-26747
Revision A
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Predicted Odour Impact - Phase 6 Future - with breathable membrane covers

Figure 2

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

Data source: Imagery - Sixmaps. Created by:jrbacani