2 March 2018

Jacfin Pty Ltd C/O Allens
Deutsche Bank Place
126 Phillip St, Sydney NSW 2000
Attention Bill McCredie

Our ref: 21/27116/LTR__
Your ref:

Dear Mr McCredie

The Next Generation - Proposed Waste to Energy Facility (SSD 6236)

Odour Impact Assessment

1 Introduction

GHD was engaged by Jacfin Pty Ltd (Jacfin) to undertake a review of the Odour Assessment and Air Quality and Greenhouse Assessment both prepared by Pacific Environment (8 September 2017 and 20 November 2017). These two documents form part of a Response to Submissions (RtS 14 December 2017) to the amended application for a proposed waste to energy facility (The Next Generation, hereafter referred to as TNG) in western Sydney. GHD's review of the Air Quality and Greenhouse Gas Assessment is limited to assessing potential odour impacts. Documents used in this review are listed in Appendix A.

The objective of the review was to:

- Assess whether the RtS and supporting updated documentation in respect of the odour assessment had satisfactorily addressed the issues identified by GHD's technical review of the Odour Assessment contained in the Amended Environmental Impact Statement (November 2016).
- Assess whether there were any new issues resulting from the RtS and supporting amended documentation in respect of the odour assessment.

The facility as proposed in the Amended Environmental Impact Statement (November 2016) was to be fuelled by non-recyclable combustible waste material and have a design capacity to process up to 1,350,000 tonnes of residual waste material per annum. The recent RtS (14 December 2017) seeks approval only for Stage 1 of the facility with an engineering capacity of up to 675,000 tonnes annually but treating a planned 552,500 tonnes per annum of residual waste fuel:

- *"Unlike earlier iterations of this air quality assessment report, the current documents therefore assesses potential impacts associated with operation of two combustion lines reporting to a single stack. This is in contrast to previous versions of the air quality assessment that evaluated four combustion lines, two stacks, and treatment of 1,105,000 tonnes of residual waste fuel per annum*" (PEL, 2017, p.2).

The incinerator technology remains unchanged as a moving grate incinerator. The throughput tonnage has decreased to a planned approximate 552,500 tonnes per annum of residual waste fuel.

GHD Pty Ltd ABN 39 008 488 373
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

2 GHD 2017 Odour Assessments

GHD previously undertook on behalf of Jacfin a technical review of the Odour Assessment contained in the Amended Environmental Impact Statement (November 2016). GHD's technical review was included in Jacfin's 10 March 2017 submission to the Department of Planning and Environment on the amended EIS and is attached in Appendix B

GHD also undertook in August 2017 on behalf of Jacfin a further review of the Odour Assessment accompanying the Amended Environmental Impact Statement (November 2016). In undertaking this work GHD prepared an odour dispersion model in accordance with the EPA's Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2016). This further review (Odour Review Addendum (GHD, August 2017)) was included in Jacfin's 17 August submission to the NSW Parliamentary Enquiry on 'Energy from Waste' Technology and is attached in Appendix C.

Attached to this letter as Appendix D is a review of the GHD 10 March 2017 comments, whether they have been addressed, and whether the comments are still relevant. This review is based on the information provided with the RtS.

We have also reviewed our August 2017 odour dispersion modelling work with respect to the RtS and in Section 4 provide further commentary on it.

3 Summary of findings

The findings below identify inconsistencies, gaps and potential deficiencies in the applicant's revised odour assessment and indicate that the applicant has not adequately addressed the comments made by GHD in our technical review of 10 March 2017.

1. A cumulative assessment of the odour sources is required under the EPA's Technical Notes document (2006). The Odour Assessment (Pacific Environment 8 September 2017) takes into account to some extent the odour emissions from the existing Genesis Facility and the proposed TNG Facility. The odour sources included in the Odour Assessment (Pacific Environment 8 September 2017) however are limited to the following:
    - the tipping hall and odour escaping from the roller door for the proposed TNG;
    - the landfill but just its active tipping face, leachate tank (x 4) and leachate riser.

    The odour modelling inputs have not changed between the Odour Assessment (Pacific Environment 8 September 2017) and the earlier Odour Assessment (2016) other than changing of the meteorological file and terrain data used in the revised Odour Assessment (Pacific Environment 8 September 2017). Accordingly, the assessment is still deficient as it does not include all relevant odour sources which are listed below:
    - the receival of waste via conveyor and the removal of ash from TNG,
    - odorous emissions from the proposed TNG's stack;
    - Shutdown and upset conditions for the proposed TNG; and

- all the existing and approved sources at the Genesis Facility for example odour from the chute, areas of covered waste and the approved composting facility at the Genesis site (noting it is not operational but could be in the future).

Furthermore, the odour emission rates applied in the Odour Assessment (Pacific Environment 8 September 2017) are potentially underestimated as measurements using the Isolation Flux Chamber (IFC) method can underestimate odour emission rates. See item 3 in Appendix D for further discussion on this issue.

2. A site inspection was undertaken by Pacific Environment in May 2017 with a brief summary included in Section 5.4 of the updated Odour Assessment (Pacific Environment 8 September 2017). The site inspection was of the Genesis Facility waste receival hall and at the point where the chute discharges material known as chute residual waste into the landfill. These locations have similar non-putrescible waste streams as proposed for the energy from waste facility. The updated odour assessment stated that 'it was agreed there was minimal odour generated within the existing waste receival hall of the Genesis Facility', however noted that at the point where the chute discharges material there was a 'distinct odour'. This demonstrates that not all odour sources have been quantified. The comment that the distinct odour dissipated within tens of metres from the source does not take into account the weather conditions at the time as different conditions could result in this odour source being detectable at greater distances, particularly when combined with other odour sources.
3. In the earlier Odour Assessment (2016) it is stated "no odour emissions would be released from TNG stack and the odorous compounds would have undergone chemical decomposition". This was questioned by GHD in our 10 March 2017 review. This concern was acknowledged in the revised Odour Assessment (Pacific Environment 8 September 2017) which states "emissions of individual odorous compounds would also be expected to be released from the stack of the EfW". It considers odour from ammonia (NH3) hydrogen sulfide (H2S), phenol, toluene and xylene and concludes based on modelling the odour emissions only from the stack that the odour criteria would not be exceeded at any off-site receivers. However the modelling does not consider cumulatively any other odour sources and as such does not address the requirement for a cumulative odour assessment required by the EPA's Technical Notes document (2006).
4. In the Odour Assessment (Pacific Environment 8 September 2017), there is a reduced percentage of calms (when wind speeds are below 0.5 m/s) compared to the earlier Odour Assessment (PE 2016). During calm conditions, odour is less likely to disperse and reduce in concentration down wind, which can then lead to a greater spatial extent of high concentrations of odour (i.e. more calm conditions results in the likelihood of more odour impacts). The percentage of reported calms has dropped from 30.9% to 24.7%. Based on our review of the source data (St Marys OEH weather station 2013) this appears to be a correction, although we note that there is some inconsistentcy in the Pacific Environment report (8 September 2017), as the report still states on page 12 that there is a prevalence of calm winds in the area (30.9% in 2013). Based on the remodelling with reduced calms (Odour Assessment (Pacific Environment 8 September 2017)) it is expected that the spatial extent of the odour predictions would have reduced between the two odour assessment reports (which is not the case). Significantly compounding the lack of confidence in the odour predictions is the application

of the AERMOD model and the artificial setting of a minimum surface wind speed at 0.5 m/s. Any recorded 'calm' conditions are set to 0.5 m/s when in fact there are lower wind speeds and calmer conditions which have been ignored in the AERMOD model. This means that the AERMOD model would potentially under predict the spatial extent of odour emissions, as it does not consider the times of the year when peak odour impacts may occur which is generally when there are calm conditions (such as wind speeds less than 0.5 m/s).

The Approved Methods for the Modelling and Assessments of Air Pollutants in NSW (EPA, 2016) (Approved Methods), specifically Section 6.2 states that Gaussian plume models such as Ausplume (which AERMOD is a more recent Gaussian plume model) are not suitable in situations where there is a high frequency of stable calm night-time atmospheric stability conditions or a high frequency of calm wind conditions. It follows that AERMOD should not have been used for the assessment and potentially has under predicted the odour impacts. Calpuff is the NSW EPA's recommended atmospheric dispersion model at locations with a high frequency of calm meteorological conditions.

4 GHD Odour Predictions

The Energy from Waste Facility - Odour Review Addendum (GHD, August 2017) included additional odour modelling undertaken in accordance with the EPA's Approved Methods for the Modelling and Assessments of Air Pollutants in NSW (2016). The EPA approved Calpuff model was selected to account for mainly when there is the presence of high frequency of stable calm conditions. As part of this report a revised odour modelling scenario which included the following sources was modelled. The main difference between this new modelling scenario and what was previously undertaken in the Odour Review Addendum (GHD, August 2017) are the following:

- Removal of the AWT roller doors odour source from the Genesis Facility based on the site inspection undertaken by Pacific Environment in May 2017 who identified 'there was minimal odour generated within the existing waste receival hall of the Genesis Facility'.
- Inclusion odour from the proposed TNG stack which is based on the acknowledgement in the Odour Assessment (Pacific Environment 8 September 2017).
- Since the Odour Review Addendum (GHD, 2017) was undertaken, GHD has further refined the meteorological model used in Calpuff. Land use data at and surrounding the site has been updated to be of a higher resolution. Land use data influences the meteorology and also the pattern of dispersion for the pollutants assessed.

The odour sources considered in our updated Calpuff model include:

1. All Genesis Facility sources
   - Tipping face
   - Covered areas
   - Leachate riser
   - Leachate tanks
   - Leachate pond
2. Green waste sources

- Composting (active, maturation, matured)

3. TNG facility sources
   - Roller door
   - Conveyor
   - Stack (added in this review)

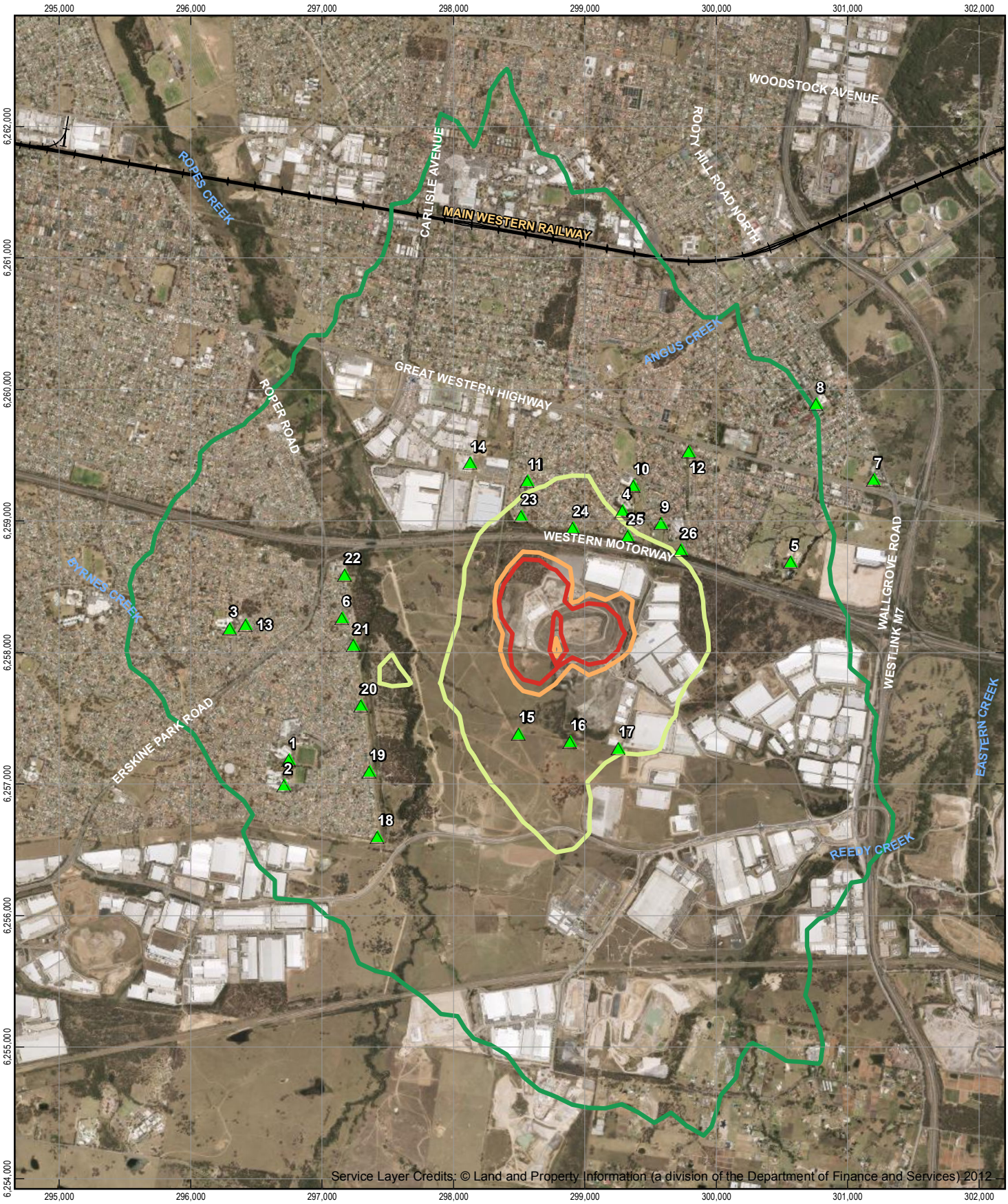
Details of the modelling that was undertaken are generally described in the Odour Review Addendum (GHD, August 2017) and further details of this updated Calpuff model can be provided upon request.

Preliminary findings of the odour modelling for the above scenario (known as Scenario 6) are presented in Figure 1 as a plot of the predicted 99th percentile odour impact and tabulated results in Table 4-1. The predicted odour concentrations show that the 2 OU assessment criterion is exceeded on the surrounding premises. For example, at Receptors 15, 16 and 17 which are south east of the proposed TNG on land owned by Jacfin and at Receptors 23, 24 and 25 which are in the residential suburb of Minchinbury.

Table 4-1 Predicted 99th percentile peak odour impact at sensitive receptors (OU)

Receptor	X (km)	Y (km)	Scenario 6
1	296.748	6257.187	1.2
2	296.709	6256.992	1.1
3	296.299	6258.187	1.3
4	299.287	6259.084	1.9
5	300.567	6258.692	1.2
6	297.153	6258.266	1.8
7	301.201	6259.319	0.8
8	300.761	6259.894	1.0
9	299.581	6258.986	1.9
10	299.370	6259.272	1.6
11	298.562	6259.310	1.9
12	299.792	6259.530	1.5
13	296.419	6258.212	1.4
14	298.128	6259.445	1.7
15	298.496	6257.386	**3.0**
16	298.889	6257.325	**2.6**

Receptor	X (km)	Y (km)	Scenario 6
17	299.257	6257.275	**2.0**
18	297.420	6256.601	1.3
19	297.361	6257.100	1.5
20	297.298	6257.603	1.7
21	297.241	6258.060	1.8
22	297.174	6258.595	1.7
23	298.516	6259.042	**2.2**
24	298.908	6258.953	**2.7**
25	299.327	6258.889	**2.1**
26	299.734	6258.785	1.9



LEGEND

Sensitive Receptors

Railway

Odour Levels

1 OU

2 OU

5 OU

7 OU

Paper Size A4

0 140 280 560 840 1,120

Metres

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

N

Allens

TNG EfW Facility - Updated Odour Assessment

Job Number 21-26680
Revision A
Date 01 Mar 2018

Scenario 6 – Predicted 99th percentile peak odour impact

Figure 1

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

N:\AU\Sydney\Projects\21\26680\GIS\Maps\Deliverables\21_26680_Z001_OdourFigures.mxd

Data source: Aerial Imagery: Sixmaps (NSW LPI 2017); General Topo: NSW LPI DTDB 2015. Created by:afoddy

5 Summary and conclusion

GHD has conducted a review of the revised Odour Assessment (Pacific Environment 8 September 2017). In summary GHD is of the opinion that the revised Odour Assessment (Pacific Environment 8 September 2017) is inadequate and there is potential for odour impacts from the proposed TNG Facility to be greater than the odour assessment criteria on surrounding land users, if it is approved and operational. Therefore, it is GHD's recommendation that the revised Odour Assessment (Pacific Environment 8 September 2017) should not be accepted by the Department of Planning and Environment as an adequate assessment of the Project.

6 Limitations

This report: has been prepared by GHD for Jacfin Pty Ltd and may only be used and relied on by Jacfin Pty Ltd for the purpose agreed between GHD and Jacfin Pty Ltd as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Jacfin Pty Ltd 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 assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Jacfin Pty Ltd 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.

Sincerely
GHD Pty Ltd

Evan Smith
Senior Environmental Engineer – Air and Noise Assessments
+61 2 9239 7695

Anthony Dixon
Principal Environmental Engineer
Service Group Manager Waste Management
+61 2 9239 7025

Appendix A

1. Pacific Environment Pty Ltd - *Energy from Waste Facility – Odour Assessment* (24 February 2015)
2. Pacific Environment Pty Ltd - *Energy from Waste Facility Odour Assessment NSW* (8 September 2017)
3. Pacific Environment Pty Ltd - *Energy from Waste Facility Air Quality and Greenhouse Gas Assessment* (20 November 2017).
4. Allens – *The Next Generation Energy Facility SSD 6236* (10 March 2017)
5. GHD – *Energy from Waste Facility – Odour Review* (10 March 2017)
6. GHD - *Energy from Waste Facility – Odour Review Addendum* (4 August 2017)
7. NSW Environment Protection Authority – Technical Notes *Assessment and Management of Odour from Statutory Sources in NSW* (2006)
8. NSW Environment Protection Authority – *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2016)
9. NSW Environment Protection Authority *Attachment F. Review of the Air Quality and Ozone Impact Assessment. Amended DA/EIS - Website Submissions - Govt, Agency & Org.*
10. Urbis - *Response to Submissions Report SSD6236: Energy from Waste, Eastern Creek* (14 December 2017)

Appendix B – GHD's 10 March 2017 technical review

10 March 2017

Michael Zissis
Senior Associate
Allens
GPO Box 50
SYDNEY NSW 2001

Our ref: 2126281-75302
Your ref:

Dear Mr Zissis

Energy from Waste Facility - Odour Review

1 Introduction

The Next Generation (NSW) Pty Ltd is seeking planning approval for the development of an energy from waste facility (the 'Project') at Eastern Creek.

As stated on the Department of Planning and Environment's Web site:

The Next Generation NSW Pty Ltd (the Applicant) has submitted an amended Environmental Impact Statement (EIS) for the proposed Energy from Waste Facility at Eastern Creek. The amended EIS includes a Response to Submissions report which addresses the issues raised in submissions received during the public exhibition of the Applicant's original EIS.

The amended proposal retains the same development description, being construction and operation of an energy from waste facility with an engineering design capacity to thermally treat up to 1.35 million tonnes of residual waste per year, including a boiler house, steam turbines for electricity generation and air emissions stacks.

The Project would be located on Pt Lot 1, Lots 2 and 3, in DP 1145808 on Honeycomb Dr, Eastern Creek. The Site forms part of a larger area of land which comprises the Genesis Xero Waste Facility (Genesis Facility) and landfill ('broader site'). The broader site is described as lots 1, 2 and 3 in DP 1145808 and Lot 8 in DP 1200048. It appears that a subdivision of the broader site has occurred since the development application was first submitted as the property descriptions have changed in the amended EIS.

The development application (Phase 1) is seeking approval to incinerate initially up to 552,500 tonne per annum (tpa) of residual waste and subject to obtaining a subsequent approval from the EPA (via potentially an amendment to the Environment Protection Licence) a further 552,500 tpa bringing the sought input capacity for incineration to 1,105,000 tpa. That is, the development application is seeking development consent for an input capacity of up to 1,105,000 tpa of waste.

The documentation also states that the Project has a design capacity to process up to 1.35 Million tpa.

The EIS documentation is based on assessing the Project assuming the Project receives and processes up to 1.35 million tpa, even though the development application is seeking approval to process up to 1,105,000 tpa of waste.

GHD was engaged by Allens Lawyers to undertake a technical review of the Odour Assessment of the EIS (Appendix L) on behalf of Jacfin Pty Ltd. Jacfin is the owner of Lot 20 in DP1206129, which is the land immediately south of the proposed Next Generation Energy from Waste Facility at Eastern Creek. Jacfin has previously made a submission in relation to the proposed development.

The objective of the engagement is to provide a review of the approach and key technical findings of the assessment in terms of potential impacts on the Jacfin property, with relation to odour.

GHD's review follows the key section headings in the Odour Assessment and conclusions are provided in this letter.

2 Overview of the facility

The Project is seeking to receive a range of non-putrescible waste types for incineration and energy recovery. Non-putrescible waste has generally a lower odour potential than putrescible waste. Some of the waste types which are proposed to be received may be derived from putrescible waste and as such may be more odorous than considered by the Odour Assessment. This issue is considered further in Section 8 below.

Section 2 states that waste material will be delivered to the Project directly via truck and also from the Genesis Facility via either truck or a covered conveyor belt. The details on how the trucks would be covered and the covering for the conveyor belt are not provided. This level of information is important to know in terms of assessing whether the modes of delivery of large volumes of waste may also be a source of odour which should be addressed in the Odour Assessment.

The assessment in Section 2 also states that the facility would be operational for 8,000 hours as an annual average. This assumes that there would be 760 hours in a year where the facility is not operating or approximately one (1) month a year. Also in the Air Assessment (Appendix K) upset conditions are identified to potentially occur up to 60 hours per year. The Odour Assessment does not consider the impact of the non-operational hours or upset conditions on the predicted odour emissions.

Comment

The exclusion of not assessing the proposed waste to be received at the site, possible waste delivery source emissions and the impact of the operational shutdown and upset conditions are significant deficiencies in the Odour Assessment. Accordingly, the Odour Assessment does not properly consider or quantify the impacts of the Project.

3 Local setting

No comment.

4 Legislative setting

The Approved Methods state that a sensitive receptor in NSW includes "a location where people are likely to work". An air quality assessment should also consider the location of known or likely future sensitive receptors. This would include the land surrounding the Next Generation site including Lot 20 in DP1206129, land owned by Jacfin.

The criterion to apply for an industrial site would depend on the number of staff/and type of occupancy. Furthermore, GHD understands the land immediately to the south of the subject site, which Jacfin intends to develop, is zoned General Industrial (IN1) and is able to be developed for landuses other than industrial. This, for example includes "*to provide for small-scale local services such as commercial, retail and community facilities (including child care facilities) that service or support the needs of employment-generating uses in the zone".*

The Odour Assessment in Section 4.1.2.2 suggests that any areas around the site which are "built up" would have an odour criterion of 2 OU, including any future commercial development on the Jacfin site.

Comment

The odour assessment criteria of 2 OU in the Odour Assessment for the Jacfin land is the lowest assessment criteria for odour impact assessment.

5 Existing environment

The dispersion meteorology section of the Odour Assessment discusses the various meteorological stations surrounding the site and determined that the NSW Office of Environmental Heritage (OEH) station at St Marys would be most representative for use in the dispersion modelling. The representative year was identified as 2013 from five years of data reviewed as required by the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW DEC 2005) ('the Approved Methods'). The report states that the percentage of calms (defined as wind speeds less than 0.5 m/s) are around 30.9% for 2013. The winter windrose provided in the report shows the percentage of calms is 40.5%. The number of calms at the site are therefore occurring for a large percentage of the time, an important factor that influences how odour from the site disperses and also the choice of dispersion model for use in the assessment.

Atmospheric stability (another factor which influences dispersion of odour) is discussed in the Air Quality Assessment (Appendix K)[1]. The Air Quality Assessment (Appendix K) states that stable and very stable conditions (which can result in odour impacts extending over a larger area) occur for about 50% of the time.

The NSW Approved Methods, specifically Section 6.2. states that Gaussian plume models such as Ausplume (which AERMOD is a more recent Gaussian plume model) are not approved in situations where there is a high frequency of stable calm night-time atmospheric stability conditions or a high frequency of calm wind conditions. It follows that AERMOD should not of been used for the assessment and may of provided erroneous results. Calpuff is the NSW EPA's recommended atmospheric dispersion

[1] We note that the Odour Assessment refers to an earlier version of the Air Quality Assessment dated February 2015 which we don't have access to or it may be a typo error.

model at site with these meteorological conditions and locations that have complex terrain, such as the Genesis Facility that has a deep void.

The Odour Assessment states in Section 5.2 that odour from the Genesis Facility would have a similar odour character to the Next Generation proposal. This enforces the need for any odour assessment to assess the total or cumulative odour in the project area. This section of the report identifies the most significant odour sources but does not provide any justification for ruling out other odour sources at the Genesis Facility. For example, it does not consider the odour coming from the Genesis recycling building, outdoor waste storage and processing areas, daily and intermediate covered waste, the waste chute delivering waste into the void and the approved composting operation.

Comments

The Odour Assessment is deficient in our view as it does not consider all odour sources (including the Genesis Facility as approved) and quantify them using the EPA Approved model for the meteorological conditions at Eastern Creek. As a result, the odour predictions and potential impact may have been underestimated.

6 Odour emissions

The Odour Assessment in Section 6 suggests that the Project will have a lower odour emitting potential than the currently approved Genesis Facility, but states this opinion is not quantified as part of the assessment. It bases this opinion on the odorous air from the waste would be mostly diverted through the thermal treatment process with the odours then being combusted and less waste going to landfill. Further comment on this on this is provided in Section 8 as it appears that the model predictions contradict this opinion.

This opinion is not backed up by a quantitative assessment as required by the EPA's Approved Methods and using representative odour emission data. An inventory of all the existing and potential odours sources should have been provided in the Odour Assessment and the odour emission rates should have been justified.

The Odour Assessment identifies that fugitive odour from the 'fast-response' roller doors to the waste receival hall is the main source of odour from the Project itself, as the high temperatures of the incinerator otherwise destroy odorous material. The facility will be under negative pressure (except when trucks accessing a 'fast-response' roller door).

An odour emission rate from the roller doors is assumed based on the odour measured from one sample of the active tipping face from the Genesis landfill. The use of this data is not justified in the Odour Assessment, nor is the assumed fugitive exit rate from the roller doors. Furthermore, no consideration is provided to the odour emission rate from the building during the 760 hours of the year when the facility may not be operational, or during the upset conditions.

As stated above, there is no inclusion of odour from the transport of waste to the Project which would potentially be a significant source over a large area. Conveyors are generally covered to keep rain off the conveyed material, to increase the life of the conveyor and reduce maintenance requirements. Covered conveyors are mostly not fully enclosed and airtight. In the case of conveying waste, wind stripping of

odour from the fast moving waste would occur. If the waste is transported by truck, significant odour can be generated by the loading, transport and unloading of waste. These odour sources are excluded, without justification from this assessment and therefore the total odour impact cannot be adequately assessed.

Similarly, potential odour emissions from the Genesis Building and outside waste storage and approved composting area has not been quantified to assess the odour contribution from these sources with regard to the odour predictions.

The odour emission rates utilised in the assessment are based on three odour samples undertaken by The Odour Unit at the Genesis Facility located adjacent to the site. No details are provided how the odour samples were taken. Odour samples in NSW need to be undertaken with the Isolation Flux Chamber (IFC) technique unless otherwise justified.

In GHD's experience, direct methods of odour emission rate (OER) measurement for large area sources (such as use of flow-through hoods and isolation flux chambers) may not accurately measure representative odour emissions from a landfill tipping face due to the following:

- the operations of delivering waste to the tipping face via a chute and the moving of waste to the tipping face by dozer and compacting is not capable of being measured by the approach used in the Odour Assessment; and
- the emitting surface is highly heterogeneous and uneven, making the placement and sealing of hoods or chambers difficult

Where a large area source is to be sampled, a greater number of samples should be taken to take into account the variability in the odour emission over the area. This should include more than one odour sample as was undertaken in the Odour Assessment for the landfilling area.

GHD notes that the original EIS air quality assessment (2008) used an Specific Odour Emission Rate (SOER) for the tipping face of 3.83 $OU.m^3/m^2/s$, a number more than 10 fold the emission rate used in this Odour Assessment of 0.3 $OU.m^3/m^2/s$. One odour sample was taken of the landill tipping face, and due to this lack of data and the potential variability of the source, this is another reason why there is a low level of confidence in the odour predictions.

A more substantial odour dataset is needed to adequately assess the odour impact of the Genesis Facility and the odour from the waste proposed to be received and emitted from the Project.

For example, it is unclear whether in future only ash from the Project would be landfilled in the Genesis Facility landfill, or a mixture of ash and currently landfilled waste. It is expected that it will be a combination of materials, particularly as the Project is stated as being potentially non-operational for on average one (1) month a year and the unburnt waste would be landfilled in this time. The Odour Assessment does not take this situation into account and the potential odour emissions from the combined landfilled waste.

Comments

A comprehensive odour sampling program in accordance with the Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (NSW DEC, 2006), namely OM-7 (AS4323.3-2001) and OM-8 (Odour sampling from diffuse sources USEPA (1986) EPA/600/8-8E/008), has not been undertaken.

Since the Approved Methods were published a new Australian Standard has been released (AS4323.4:2009 Stationary source emissions Method 4: Area source sampling – Flux Chamber technique). Further odour sampling using alternate techniques referred to in AS4323.4:2009 such as downwind sampling/modelling techniques has not been undertaken to verify the IFC data, including sampling of the following sources from the Genesis Facility:

- Existing landfill tipping face
- Emissions from the landfill waste delivery chute and movement of waste from the chute's exit to the active landfill face
- Daily cover and intermediate covered landfill surfaces
- Areas around the void where waste settles and odorous landfill gas could potentially escape
- Leachate infrastructure
- Existing receivals hall including waste unloading and loading
- Existing and approved waste stockpiles
- Approved composting operation

GHD have successfully undertaken indirect methods of odour measurement on landfill tipping faces by concurrently measuring odour up and down wind during operation. These odour measurements have been accepted by the NSW EPA as the odour levels were found to be greater than corresponding IFC odour measurements.

The Odour Assessment does not justify odour emission rates from the following sources from the Project:

- Waste being transported to the Project in trucks and on conveyors
- Receivals hall
- Odour sources during the 760 hours in the year on average when the Project would not be operational. For example, it is unclear where the waste is proposed to be stored in the receivals hall when waste is not being combusted and if the building would be kept at negative pressure. It is also unclear whether the air would still be treated to remove odour before being emitted from the building.
- During the 60 hours of upset conditions that are expected to occur annually.

The Odour Assessment does not discuss the following issues which may have a significant influence on the odour levels used in the assessment:

- We note that there are scrubbers and other processes to further remove contaminants of the flu gases after combustion. These processes may introduce odours to the air stream and has not been adequately described and justified as not being an odour source in final stack discharge.
- The odour assessment does not justify that the thermal processing facility has the capacity to combust all of the air that is drawn in from the waste receival building needed to keep it under negative pressure. There is no contingency measure proposed to treat this air before it is discharged, if this is not possible.

In the absence of having undertaken a robust program to quantify the odour emissions of the Genesis Facility and the proposed Project the odour predictions and potential impact may have been underestimated.

7 Modelling approach

GHD's comments on the modelling approach and our recommendations are addressed above in Sections 5 and 6.

8 Results

The odour contour plots (Figure 8-1 and 8-1 of the Odour Assessment) suggest that compliance would be achieved with the odour impact assessment criteria (2 OU) including at the Jacfin site, however these predictions cannot be relied upon given the deficiencies of the assessment identified above.

The Odour Assessment states that the Project would be the greatest contributor to offsite odour emissions, and not the existing Genesis Facility. This contradicts the opinion stated in Section 6 of the Odour Assessment.

It is important to note that the Genesis Facility and the Project combined would see an input rate of waste in the order up to 3.1 million tonnes to the broader site. Although this waste is proposed to be non-putrescible, non-putrescible wastes includes organic material some of which may be derived from putrescible waste (e.g. AWT fuel), which has the potential to be odorous. In such large quantities the Project presents a considerable risk of nearby sensitive receptors/premises experiencing excessive odour should the project be approved based on the current Odour Assessment.

9 Summary and conclusion

GHD has conducted a review of the odour impact assessment. In summary GHD is of the opinion that the current Odour Assessment is deficient and therefore should not be accepted by the Department of Planning and Environment as an adequate assessment of the Project.

Sincerely
GHD Pty Ltd

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

Anthony Dixon
Principal Environmental Engineer
Service Group Manager Waste Management
+61 2 9239 7025

Appendix C – GHD's August 2017 Odour Review Addendum

4 August 2017

Jacfin Pty Ltd
C/O Allens
GPO Box 50
SYDNEY NSW 2001

Our ref: 2126680-77019
Your ref:

Dear Sir/Madam

Energy from Waste Facility - Odour Review Addendum

1 Introduction

GHD was engaged on behalf of Jacfin to undertake a technical review of the Odour Assessment (Appendix L) of the Amended EIS for the Next Generation Energy from Waste facility[1] (the EIS Odour Assessment) on behalf of Jacfin Pty Ltd. GHD provided the result of its technical review in a letter dated 10 March 2017 (Ref: 2126281-75302) ('the Odour Review letter').

GHD has subsequently been engaged to undertake odour dispersion modelling to assess the EIS Odour Assessment results and provide an additional cumulative assessment of all approved odour sources on the Next Generation Energy from Waste site (the Next Gen site) and the operating Genesis Facility. This document is an addendum to the Odour Review letter and provides:

- An overview of the approach to the dispersion modelling
- A summary of the meteorological modelling undertaken
- Odour emissions rates and odour sources adopted for the modelling
- The results of the odour dispersion modelling.

This letter should be read in conjunction with the Odour Review letter.

Odour dispersion modelling overview

The EPA submission comments on the EIS Odour Assessment (Attachment F NSW Environment Protection Authority Review of the Air Quality and Ozone Impact Assessment, March 2017) state that that the choice of dispersion model AERMOD was not adequately justified, and that AERMOD does not explicitly treat calm conditions. To remedy this GHD has undertaken modelling using Calpuff, an EPA approved dispersion model for these situations: for use in complex terrains and when there is the presence of high frequency of stable night time conditions.

The modelling was undertaken in accordance with Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and

[1] Pacific Environment Limited (19 October 2016) 'Energy from Waste Facility – Odour Assessment: The Next Generation' (the EIS Odour Assessment)

GHD Pty Ltd ABN 39 008 488 373
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

Assessments of Air Pollutants in NSW, Australia' (Jennifer Barclay and Joe Scire Atmospheric Studies Group TRC Environmental Corporation, 2011). That document was prepared for the NSW Office of Environment and Heritage and provides recommended default settings to use in the modelling that are suitable for most modelling applications.

Two non-recommended Calpuff model settings were used in the assessment and are justified as follows:

- Compute kinematic effects (IKINE) – value of 1 was chosen in order to calculate terrain forced vertical velocity in the initial guess wind field
- Minimum turbulence velocities (SVMIN) – value of 0.2 was chosen as the site has significant calm wind and stagnation events

2 Meteorological modelling

The characterisation of local wind patterns generally requires accurate site-representative hourly recordings of wind direction and speed over a period of at least a year.

Existing observational data is located at approximately 5 km to the west-northwest at St Marys and 7.5 km to the east at Prospect. The St Marys and Prospect weather stations are operated by the NSW Offie of Environment and Heritage (NSW OEH). The following hourly meteorological parameters were available in the dataset provided by the NSW OEH:

- Average Relative humidity (%);
- Average Temperature (ºC);
- Average Wind Direction (º); and
- Average Wind Speed (º).

The NSW OEH weather stations do not gather the key parameters described below. These parameters can be sourced from the Bankstown Airport Bureau of Meteorology (BOM) weather station at approximately 20 km from the subject site.

- Cloud height (m);
- Cloud amount (tenths); and
- Surface level pressure (hPa).

Given the separation distance, neither weather station can confidently be classified representative of the expected conditions at the subject site. In order to produce a representative site-specific meteorological data set the following methodology carried out:

- Production of a 3D gridded dataset with the TAPM prognostic model TAPM.
- Utilising the TAPM 3D gridded dataset as an initial guess field for the CALMET meteorological model.
- Utilising data from St Marys and Prospect for surface level observations.
- Utilising data from Bankstown Airport for surface level observations including cloud and surface pressure.

The 2013 calendar year was selected as the modelling period for the assessment in line with the previous assessment conducted by Pacific Environment Limited (19 October 2016) (PEL).

3 Odour emission rates

In order to undertake a cumulative odour assessment, GHD has reviewed the potential odour contributions from the Next Gen site and the adjacent existing Genesis Facility.

Odour emission rates used in the assessment have been sourced from the EIS Odour Assessment, however the source odour contributions and areas have been amended as follows:

- Inclusion of waste conveyor that transfers waste from the Genesis Facility to the Next Gen site
- Waste outside the Genesis Facility has been excluded from the assessment as we understand that it will be aggregates with little to no odour potential, but the outdoor approved green waste composting was included as a potential odour contributor
- Inclusion of roller doors as an odour source from the Genesis Facility
- Inclusion of waste stockpiling in the Next Gen facility laydown areas
- Not all sources emit odour 24 hours a day. The following sources have been assumed to operate between the hours listed below:
    - Tipping face an odour source between 7am and 6pm
    - Genesis AWT roller door odour emissions between 7 am and 6 pm
    - Next Gen waste conveyor odour emissions between 7 am and 6 pm
    - Laydown areas to have odour emissions in the month of July only.

These times were selected based on the requirements in the environment protection licence for the Genesis Facility and for the laydown areas the one month duration is the period when the Next Gen site may be non-operational each year.

Waste conveyor

The waste conveyor that will transfer waste to be incinerated from the Genesis Facility to the Next Gen site has been included in the model. Although drawings in the EIS do not show the entire conveyor (it stops at the Genesis Facility void), the conveyor has been assumed to run between the two facilities, supplying the constant supply of waste needed to ensure the Next Gen site can run efficiently.

An odour emission rate of 0.3 $OU.m^3/m^2/s$ has been assumed, which is the value used in the EIS Odour Assessment for waste on the active daily tipping face which may be representative of the odour emission rate for the incoming waste. Waste travelling along a conveyor will be moving at speed, and potentially subject to wind stripping of odour which may have a higher odour emission rate than static waste on the tip face (assuming the conveyor is not fully enclosed).

It is noted that some waste from external sites will be delivered via road vehicles. It is assumed the loads will be covered and delivery will occur within the Next Gen facility building and therefore vehicles transporting waste have been excluded as an odour source in this assessment.

Greenwaste composting

The approved green waste composting operations at the Genesis Facility is currently not operational, however composting is an approved activity which can be commenced at any time. It has therefore been included in the model. The licence allows for up to 20,000 tonnes of green waste onsite at any one time.

The approved composting area is shown on Site Layout Plan Green Waste Containment Walls (Drawing A 101 – 5 / F) of the Light Horse Business Centre Environmental Assessment Report (2010, ThaQuarry Pty Ltd). The area is approximately 5000 m^2, and would include all phases of composting including active composting, maturation and matured product. This area of 5,000 m^2 was also modelled in the original EIS for the facility (Holmes Air Sciences, 2008). Modification 4 included the construction of concrete bay walls within the area designated for receipt and processing of green waste. The modification states that covers would be used at any given time to reduce the potential for odour and also reduce the generation of leachate. The modification also states "In this case however the Proponent intends using airblowers to ensure that biodegradation can occur more quickly and with much less odour than otherwise might be the case. Each active windrow will have at its base a slotted pipe through which air will be pumped for not less than 4 hours per day during the initial composting period. The windrow channel will be closed during this process to exclude unnecessary wetting, to contain odours and to accelerate the process."

The assessment does not provide any detail on if the covers will be on the compost stockpiles during aeration, and if so where or how the air will be discharged. In order to model this odour source, GHD has assumed that the most odorous active composting stage will be covered, and aerated. GHD has selected odour concentrations measured at a NSW composting site that includes, aerated windrows which were covered with a biocover, in lieu of having data for the unspecified cover in the modification documentation. In order to be conservative, odour emissions rates used for the active composting stage (assumed 1.09 $OU.m^3/m^2/s$) coincide with the average of an eight day old sample and a 19 day old sample, effectively 14 days old from covered, aerated piles. Exact timeframes of the approved composting method are not known, however the modelled levels would likely coincide with odour at the end of the active composting stage when odour levels have dropped off (decreased) significantly. The odour emission rates from the maturation stage (0.54 $OU.m^3/m^2/s$) are based on the average of 19 day old and 33 day old static maturation compost piles, which is an average of 26 days aged composting piles.

Raw green waste, both unshredded and shredded, are potentially a significant source of odour. This has not been included in this assessment, as the exact location, volumes and methods used are not known. Other odour sources in greenwaste composting can include turning and moving product, leachate and upset events that can occur. Not including these sources in the odour assessment mean that potential odour impacts may be higher.

The Next Gen facility laydown area waste stockpiles

GHD was instructed to consider the stockpiling of incoming waste at the three laydown pads at the Next Gen site.

An indicative layout for stockpiling of waste on the three laydown pads was developed to inform the odour modelling. The estimated plan areas for stockpiled waste and equivalent waste tonnages were calculated based on the following parameters/assumptions:

- Each laydown area contains trapezoidal stockpiles of waste, each 2 m high with a 1 m crest and 1:2 batters.
- Space is provided around the perimeter of each laydown area and a minimum of 5 m between each stockpile for manoeuvring plant and equipment and so that in the event of a fire there is space to relocate material and extinguish the fire
- The laydown areas are used for stockpiling for four weeks of the year (in winter)

Based on this, the estimated areas and volumes of the stockpiles on each laydown pad is shown in the following table. The total volume of stockpiles is estimated to be in the order of 38,600 m^3, which is equivalent to approximately 5,000 to 7,700 tonnes of the design fuel mix (an estimated 1 to 2.5 days of fuel input).

Table 1 Estimated laydown pad* stockpile areas and volumes

Parameter	Value	Units
Area of stockpiles on laydown pad no 2	8,640	m^2
Area of stockpiles on laydown pad no 4	8,640	m^2
Area of stockpiles on laydown pad no 3	17,280	m^2
Volume of stockpiles on laydown pad no 2	9,365	m^3
Volume of stockpiles on laydown pad no 4	9,365	m^3
Volume of stockpiles on laydown pad no 3	18,848	m^3
Total volume of stockpiles	37,579	m^3
Equivalent tonnage (low-end estimate)	4,975	t
Equivalent tonnage (high-end estimate)	7,659	t

*The laydown pad numbering matches that in the amended EIS.

Summary of potential odour sources

A summary of the potential sources of odour is presented in Table 2.

Table 2 Summary of odour emissions

Source	Area (m^2)	SOER ($OU.m^3/m^2/s$)	OER ($OU.m^3/s$)
Next Generation Facility			
Tipping hall	25	-	1,395
Laydown pad no 2	8,640	0.3	2,592
Laydown pad no 4	8,640	0.3	2,592

Source	Area (m^2)	SOER ($OU.m^3/m^2/s$)	OER ($OU.m^3/s$)
Laydown pad no 3	17,280	0.3	5,184
Waste conveyor	600	0.3	180
Genesis Facility			
Active tip face	1,344	0.3	403
Capped landfill	48,938	0.00051	25
Leachate riser	177	10.3	1,823
Leachate pond	811	0.2	162
Leachate tanks	4 x 50	0.2	40
AWT roller doors	3 x 150	-	8370
Approved active greenwaste composting	1,667	1.09	1,817
Approved greenwaste maturation	1,667	0.54	900
Approved greenwaste matured product	1,667	0.19	317

The evaluation of odour impacts requires the estimation of short or peak concentrations on the time scale of less than one second. To account for this, GHD has applied peak-to-mean factors to the above odour emission rates before inputting into the dispersion model Calpuff as documented in Section 6.6 of the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2016).

There are sources of odour that were identified in GHD's Odour Review letter that have not been incorporated into the odour modelling and assessment. A summary of these and why they were not incorporated is discussed below:

- Bottom ash from the incinerator has not been assessed as an odour source. The exact chemical composition of the ash is not known however is a potential odour source that needs to be described and justified.
- We note that there are scrubbers and other processes to further remove contaminants of the flue gases after combustion. These processes may introduce odours to the air stream and has not been adequately described and justified as not being an odour source in final stack discharge.
- The EIS Odour Assessment does not demonstrate vehicles coming in are contained vehicles and not going to be open vehicles that are potentially a source of odour. This is particularly in regards to refuse derived fuel that could be produced from municipal solid waste.

4 Odour dispersion modelling results

In order to compare predicted model results, a number of scenarios have been assessed as follows:

1. All Genesis Facility sources
   - Tipping face
   - Covered areas
   - Leachate riser
   - Leachate tanks
   - Leachate pond
   - AWT roller doors
2. Green waste sources
   - Composting (active, maturation, matured)
3. All Next Gen facility sources
   - Roller door
   - Conveyor
   - Laydown Area
4. Sources 1,2,3 combined
5. Sources 1,2,3 combined excluding laydown areas.

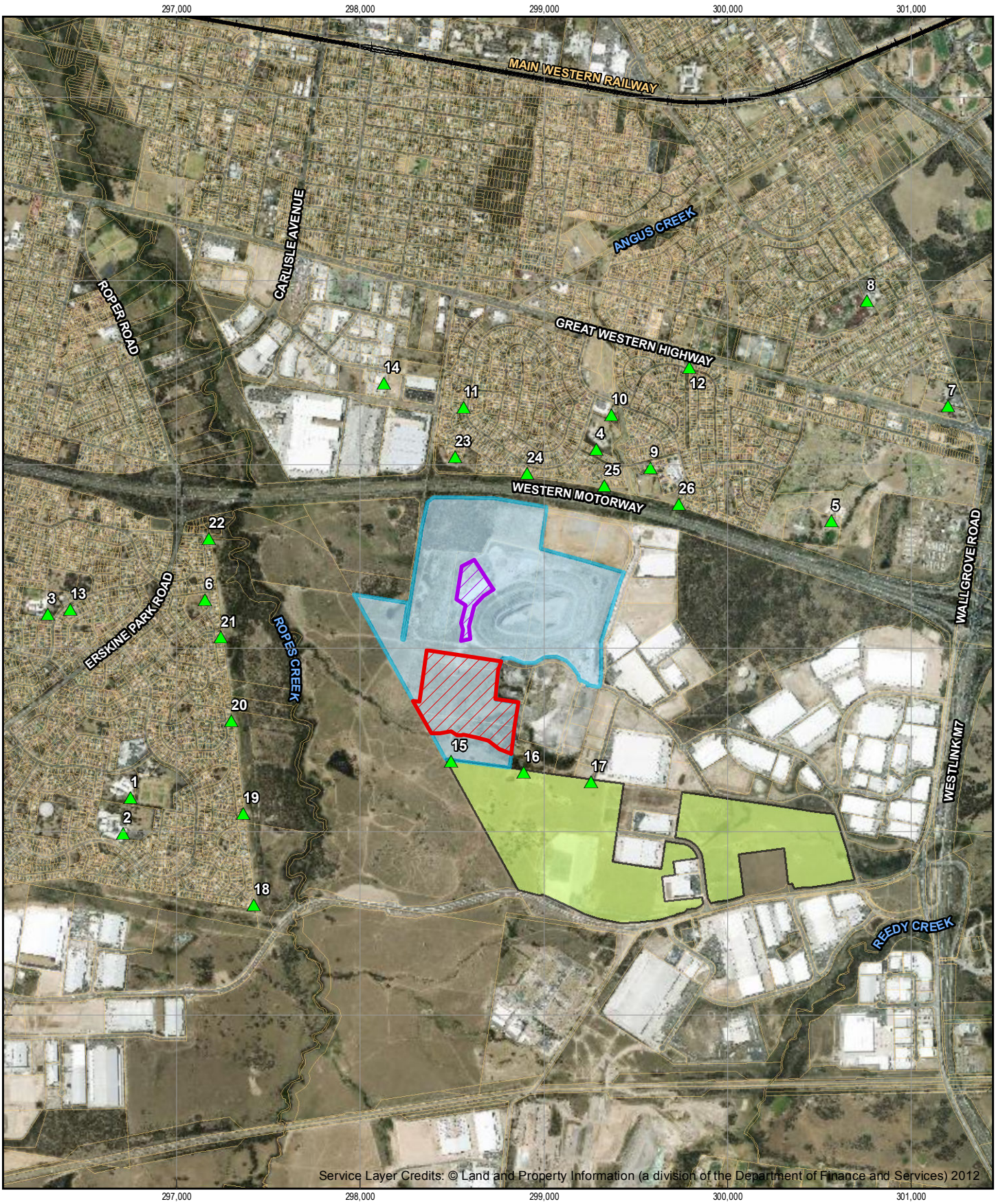
A map showing the location of the Next Gen Facility, Genesis Facility and sensitive receptors is shown in Figure 1. Additional receptors have been included in the model as the nearest receptors to the site which were not included in the EIS Odour Assessment.

Results of the modelling for the five assessed scenarios are presented in Table 3. Shaded results indicate a predicted exceedance of the NSW EPA odour criteria. Odour contour plots of each scenario are presented in Figure 2 to Figure 6, in Attachment A.

Table 3 Predicted 99th percentile peak odour impact at sensitive receptors (OU)

Receptor	X (km)	Y (km)	S1	S2	S3	S4	S5
1	296.748	6257.187	0.2	0.2	0.3	0.6	0.5
2	296.709	6256.992	0.1	0.2	0.2	0.5	0.5
3	296.299	6258.187	0.1	0.1	0.1	0.3	0.2
4	299.287	6259.084	1.2	1.3	1.3	2.4	1.8
5	300.567	6258.692	0.5	0.3	0.4	1.1	1.1
6	297.153	6258.266	0.2	0.2	0.3	0.6	0.5
7	301.201	6259.319	0.3	0.1	0.2	0.6	0.5
8	300.761	6259.894	0.4	0.3	0.3	0.9	0.8

Receptor	X (km)	Y (km)	S1	S2	S3	S4	S5
9	299.581	6258.986	1.3	0.9	1.1	2.1	1.7
10	299.370	6259.272	1.0	0.9	0.9	1.9	1.5
11	298.562	6259.310	0.7	0.8	0.7	1.8	1.6
12	299.792	6259.530	0.7	0.7	0.6	1.5	1.3
13	296.419	6258.212	0.1	0.1	0.1	0.3	0.2
14	298.128	6259.445	0.3	0.4	0.5	1.1	1.0
15	298.496	6257.386	0.8	1.1	6.1	7.2	2.7
16	298.889	6257.325	1.3	1.0	5.7	6.8	2.5
17	299.257	6257.275	1.1	0.6	1.1	2.2	1.6
18	297.420	6256.601	0.2	0.2	0.4	0.7	0.6
19	297.361	6257.100	0.2	0.2	0.4	0.8	0.7
20	297.298	6257.603	0.2	0.2	0.4	0.7	0.6
21	297.241	6258.060	0.2	0.2	0.3	0.7	0.5
22	297.174	6258.595	0.3	0.2	0.3	0.6	0.5
23	298.516	6259.042	1.0	1.2	0.9	2.4	2.3
24	298.908	6258.953	1.5	2.3	1.9	3.7	3.0
25	299.327	6258.889	1.5	1.5	1.5	2.9	2.1
26	299.734	6258.785	1.3	0.9	1.1	2.1	1.9



LEGEND

- Railway
- Sensitive Receptors
- Genesis Facility
- Next Gen Facility
- Broader Site
- Cadastral Boundaries
- Jacfin Property

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

Allens
TNG EfW Facility - Updated Odour Assessment

Job Number 21-26680
Revision A
Date 04 Aug 2017

Sensitive Receptors

Figure 1

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

N:\AU\Sydney\Projects\21\26680\GIS\Maps\Deliverables\21_26680_Z003_SiteLocation.mxd

Data source: Aerial Imagery: Sixmaps (NSW LPI 2017); General Topo: NSW LPI DTDB 2015; Cadastre: NSW LPI DCDB 2017. Created by:mking3

5 Summary and conclusion

GHD has undertaken odour dispersion modelling to assess the EIS Odour Assessment results and provide an additional cumulative assessment of the proposed odour sources on the Next Gen site, including the potential use of the laydown areas for waste storage and the approved odour sources from the operating Genesis Facility. Five scenarios were assessed. The results of the dispersion modelling indicate that the NSW EPA odour criteria will be exceeded under two scenarios:

- Scenario 2 – Green waste composting at residential receivers
- Scenario 4 – all odour sources combined at residential receivers
- Scenario 5 – all odour sources combined except the Next Gen laydown areas at residential receivers
- Impacts (over 7 OU) are also predicted at the Jacfin site to the south of the Next Gen site for Scenarios 3, 4 and 5. 7 OU is the highest reported impact assessment criteria in the NSW Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2016) (Approved Methods).

The Technical framework for the assessment and management of odour from stationary sources in NSW 2006 states, “In practice, ‘offensive’ odour can only be judged by public reaction to the odour, preferably under similar social and regional conditions. The nuisance level can be as low as 2 OU and as high as 10 OU for less offensive odours

An odour assessment criterion of 7 OU is likely to represent the level below which ‘offensive’ odours should not occur. Therefore, the Technical Framework recommends that, as a design criterion, no individual should be exposed to ambient odour levels of greater than 7 OU (99th percentile, nose response time average). The odour assessment criteria have been designed to take into account the range of sensitivity to odours within the community and to provide additional protection for individuals with a heightened response to odours. This is achieved by using a statistical approach, which depends upon population size. As the population density increases, the proportion of sensitive individuals is also likely to increase, indicating that more stringent criteria are necessary in these situations. The 7 OU criteria in the Approved Methods applies to one isolated residence, whereas 2 OU applies to an urban area.

There are a number of uncertainties in the Proponent’s odour impact assessment as detailed in GHD’s advice of 10 March 2017. The odour impact assessment undertaken by GHD follows the guidance in the EPA Approved Methods publication including considering a cumulative assessment of potential odour sources from the Genesis Facility and the proposed Next Gen Facility. The results presented in this letter provides an indication of the potential odour emissions which may be experienced at the receptors and based on this work GHD considers that the Next Gen Facility (if approved) would not achieve compliance with the odour impact assessment criteria.

It is recommended that before the development application (DA) for the Next Gen Facility is determined that the applicant address the matters discussed in GHD’s advice of 10 March 2017 and including undertaking a robust testing program to better quantify the odour emission rates from the existing operations at the Genesis Facility (and for the approved composting facility) and for the potential odour sources from the Next Gen Facility. This work should then be utilised by the applicant in undertaking odour dispersion modelling for all the existing and potential sources in accordance with the Approved

Methods to assess the odour impacts and be made available for consideration for the determination of the DA.

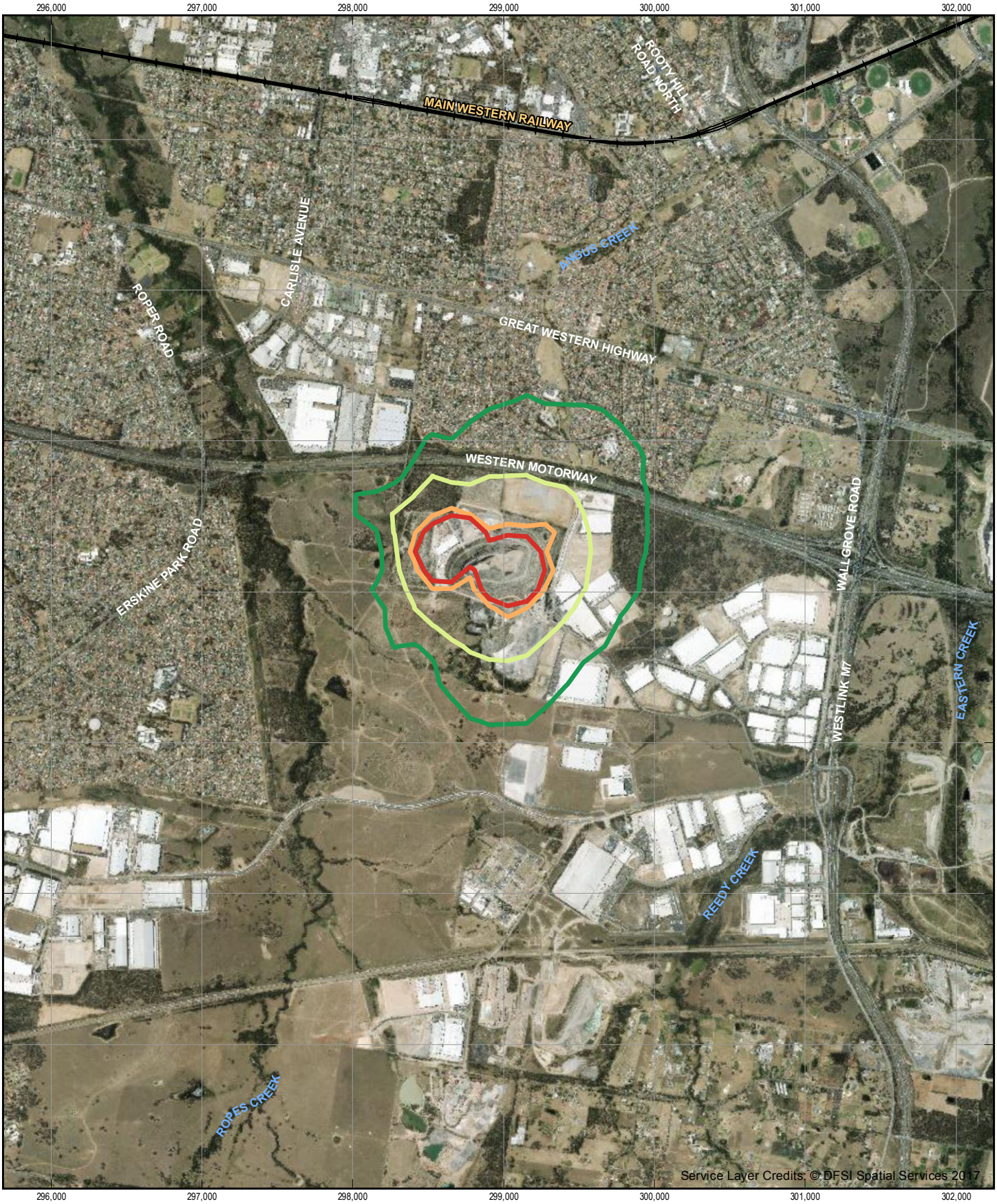
Sincerely
GHD Pty Ltd

Evan Smith
Senior Environmental Engineer – Air and Noise Assessments
+61 2 9239 7695

Anthony Dixon
Principal Environmental Engineer
Service Group Manager Waste Management
+61 2 9239 7025

Attachment A – Odour contour plots

Attachment A – Odour contour plots



LEGEND

Railway **Odour Levels**

- 1 OU
- 2 OU
- 5 OU
- 7 OU

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

Allens
TNG EfW Facility - Updated Odour Assessment

Job Number 21-26680
Revision A
Date 04 Aug 2017

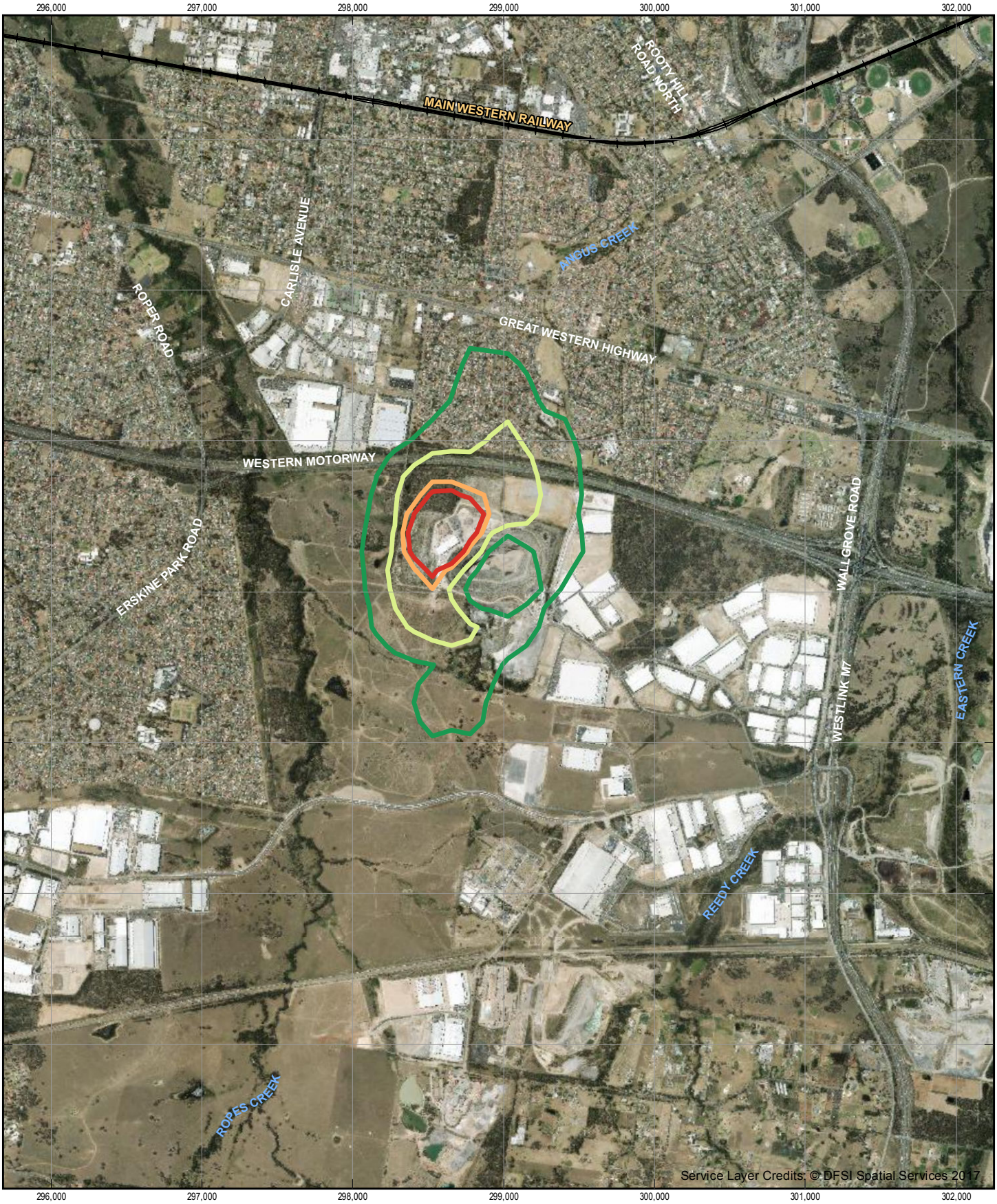
Scenario 1 – Predicted 99th percentile peak odour impact

Figure 2

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

N:\AU\Sydney\Projects\21\26680\GIS\Maps\Deliverables\21_26680_Z001_OdourFigures.mxd

Data source: Aerial Imagery: Sixmaps (NSW LPI 2017); General Topo: NSW LPI DTDB 2015. Created by:mking3



LEGEND

Railway **Odour Levels**

- 1 OU
- 2 OU
- 5 OU
- 7 OU

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

Allens
TNG EfW Facility - Updated Odour Assessment

Job Number 21-26680
Revision A
Date 04 Aug 2017

Scenario 2 – Predicted 99th percentile peak odour impact

Figure 3

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

N:\AU\Sydney\Projects\21\26680\GIS\Maps\Deliverables\21_26680_Z001_OdourFigures.mxd

Data source: Aerial Imagery: Sixmaps (NSW LPI 2017); General Topo: NSW LPI DTDB 2015. Created by:mking3

LEGEND

Railway **Odour Levels**

- 1 OU
- 2 OU
- 5 OU
- 7 OU

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

Allens

TNG EfW Facility - Updated Odour Assessment

Job Number 21-26680
Revision A
Date 04 Aug 2017

Scenario 3 – Predicted 99th percentile peak odour impact

Figure 4

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

N:\AU\Sydney\Projects\21\26680\GIS\Maps\Deliverables\21_26680_Z001_OdourFigures.mxd

Data source: Aerial Imagery: Sixmaps (NSW LPI 2017); General Topo: NSW LPI DTDB 2015. Created by:mking3

LEGEND

Railway **Odour Levels**

- 1 OU
- 2 OU
- 5 OU
- 7 OU

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

Allens
TNG EfW Facility - Updated Odour Assessment

Job Number 21-26680
Revision A
Date 04 Aug 2017

Scenario 4 – Predicted 99th percentile peak odour impact

Figure 5

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

N:\AU\Sydney\Projects\21\26680\GIS\Maps\Deliverables\21_26680_Z001_OdourFigures.mxd

Data source: Aerial Imagery: Sixmaps (NSW LPI 2017); General Topo: NSW LPI DTDB 2015. Created by:mking3

LEGEND

Railway **Odour Levels**

- 1 OU
- 2 OU
- 5 OU
- 7 OU

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

Allens
TNG EfW Facility - Updated Odour Assessment

Job Number 21-26680
Revision A
Date 04 Aug 2017

Scenario 5 – Predicted 99th percentile peak odour impact

Figure 6

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

N:\AU\Sydney\Projects\21\26680\GIS\Maps\Deliverables\21_26680_Z001_OdourFigures.mxd

Data source: Aerial Imagery: Sixmaps (NSW LPI 2017); General Topo: NSW LPI DTDB 2015. Created by:mking3

Appendix D

Item number	10 March 2017 Review Comment	RtS Review
1	The report failed to assess the proposed waste to be received at the site, possible waste delivery source emissions and the impact of the operational shutdown and upset conditions are significant deficiencies in the revised Odour Assessment. Accordingly, the revised Odour Assessment does not properly consider or quantify the impacts of the Project.	The revised Odour Assessment (8 September 2017) still does not assess the waste to be received at the site and possible waste delivery source emissions and operational shutdown and upset conditions (these are discussed but not quantitatively assessed). Further to the above, the 2017 Odour Assessment has stated that based on the site visit of the Genesis Facility in May 2017, non-putrescible waste streams (that are intended to be used as fuel) have a distinct odour when transported. This is stated “at the point where the chute discharges material there was a distinct odour”. Given that the waste when transported has a distinct odour this reinforces GHDs comment in 2017 as to why the transport of waste particularly via conveyor needs to be included in the model or assessment. We are unsure of the design of the proposed enclosed conveyor and how effective this would be to limit odour emissions. The revised Odour Assessment still does not properly consider or quantify the impacts of the Project.
2	The Odour Assessment is deficient in our view as it does not consider all odour sources (including the Genesis Facility as approved) and quantify them using a suitable EPA Approved odour dispersion model for the meteorological conditions at Eastern Creek. As a result, the odour predictions and potential impact may have been underestimated.	Comment not addressed satisfactorily. See further discussion in Section 3 of this report.
3	A comprehensive odour sampling program in accordance with the Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (NSW DEC, 2006), namely OM-7 (AS4323.3-	No additional odour sampling has been undertaken and therefore the comment has not been addressed. GHD is uncertain if all the air from the receival building under negative pressure could be processed via one of the two process lines when one is not

	2001) and OM-8 (Odour sampling from diffuse sources USEPA (1986) EPA/600/8-8E/008), has not been undertaken. Since the Approved Methods were published a new Australian Standard has been released (AS4323.4:2009 Stationary source emissions Method 4: Area source sampling – Flux Chamber technique). Further odour sampling using alternate techniques referred to in AS4323.4:2009 such as downwind sampling/modelling techniques has not been undertaken to verify the IFC data, including sampling of the following sources from the Genesis Facility: • Existing landfill tipping face • Emissions from the landfill waste delivery chute and movement of waste from the chute's exit to the active landfill face • Daily cover and intermediate covered landfill surfaces • Areas around the void where waste settles and odorous landfill gas could potentially escape • Leachate infrastructure • Existing receivals hall including waste unloading and loading • Existing and approved waste stockpiles • Approved composting operation (using proxy data) GHD have successfully undertaken indirect methods of odour measurement on landfill tipping faces by concurrently measuring odour up and down wind during	operational during shut down. Also we note that the potential odour emissions from the upset period of 60 hours a year has not been quantitatively assessed. These two issues create uncertainty in the odour model predictions. A site inspection was undertaken by Pacific Environment in May 2017 with a brief summary included in Section 5.4 of the revised Odour Assessment. The site inspection was of the Genesis Facility waste receival hall and at the point where the chute discharges material known as chute residual waste. These locations have similar non-putrescible waste streams as proposed for the energy from waste facility. The updated odour assessment stated that 'it was agreed there was minimal odour generated within the existing waste receival hall of the Genesis Facility', however noted that at the point where the chute discharges material there was a 'distinct odour'. Given the presence of a distinct odour, more detailed odour sampling should be conducted in accordance with the Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (NSW DEC, 2006) and taking into account AS4323.4:2009. No details are given in Section 5.4 of the updated Odour Assessment (8 September 2017) of the weather or operating conditions on the day of the site inspection. Given that odour was distinctly observed, GHD are concerned that emissions for the Waste to Energy facility (taking into account also the Genesis Facility) may have been significantly underestimated. This waste with a distinct odour is the same waste that will be transported from the Genesis to the proposed TNG facility and this has not been quantitatively assessed. In the earlier Odour Assessment (2016) it is stated "no odour emissions would be released from TNG stack and the odorous compounds would have undergone chemical decomposition". This was questioned by GHD in our 10 March 2017 review. This concern was acknowledged in revised Odour Assessment (PE 2017) which states "emissions of individual odorous compounds would also be expected to be released from the stack of the EfW". It considers odour from ammonia (NH3), hydrogen sulfide (H2S),

	operation. These odour measurements have been accepted by the NSW EPA as the odour levels were found to be greater than corresponding IFC odour measurements. The Odour Assessment does not justify odour emission rates from the following sources from the Project: • Waste being transported to the Project in trucks and on conveyors • Receivals hall • Odour sources during the 760 hours in the year on average when the Project would not be operational. For example, it is unclear where the waste is proposed to be stored in the receivals hall when waste is not being combusted and if the building would be kept at negative pressure. It is also unclear whether the air would still be treated to remove odour before being emitted from the building. • During the 60 hours of upset conditions that are expected to occur annually. The Odour Assessment does not discuss the following issues which may have a significant influence on the odour levels used in the assessment: • We note that there are scrubbers and other processes to further remove contaminants of the flu gases after combustion. These processes may introduce odours to the air stream and has not been adequately described and justified as not being an odour source in final stack discharge.	phenol, toluene and xylene and concludes based on modelling the odour emissions only from the stack that the odour criteria would not be exceeded at any off-site receivers. However the modelling does not consider cumulatively any other odour sources from the Genesis facility or the proposed TNG and as such does not address the requirement for a cumulative odour assessment required by the EPA's Technical Notes document (2006).

	• The odour assessment does not justify that the thermal processing facility has the capacity to combust all of the air that is drawn in from the waste receival building needed to keep it under negative pressure. There is no contingency measure proposed to treat this air before it is discharged, if this is not possible. In the absence of having undertaken a robust program to quantify the odour emissions of the Genesis Facility and the proposed Project the odour predictions and potential impact may have been underestimated.	
4	GHD's questioning of the modelling approach. The Odour Assessment is deficient in our view as the applied modelling software AERMOD is not the EPA Approved model for the meteorological conditions at Eastern Creek. (i.e. high frequency of calm meteorological conditions)	The odour modelling utilised for the proposed TNG facility applied the same meteorology and model selection as applied for the human health risk assessment. In the Odour Assessment (Pacific Environment 8 September 2017), there is a reduced percentage of calms (when wind speeds are below 0.5 m/s) compared to the earlier Odour Assessment (PE 2016). During calm conditions, odour is less likely to disperse and reduce in concentration down wind, which can then lead to a greater spatial extent of high concentrations of odour (i.e. more calm conditions results in the likelihood of more odour impacts). The percentage of reported calms has dropped from 30.9% to 24.7%. Based on our review of the source data (St Marys OEH weather station 2013) this appears to be a correction, although we note that there is some inconsistency in the Pacific Environment report (8 September 2017), as the report still states on page 12 that there is a prevalence of calm winds in the area (30.9% in 2013). Based on the remodelling with reduced calms (Odour Assessment (Pacific Environment 8 September 2017)) it is expected that the spatial extent of the odour predictions would have reduced between the two odour assessment reports (which is not the case). Significantly

		compounding the lack of confidence in the odour predictions is the application of the AERMOD model and the artificial setting of a minimum surface wind speed at 0.5 m/s. Any recorded 'calm' conditions are set to 0.5 m/s when in fact there are lower wind speeds and calmer conditions which have been ignored in the AERMOD model. This means that the AERMOD model would potentially under predict the spatial extent of odour emissions, as it does not consider the times of the year when peak odour impacts may occur which is generally when there are calm conditions (such as wind speeds less than 0.5 m/s). The Approved Methods for the Modelling and Assessments of Air Pollutants in NSW (EPA, 2016) (Approved Methods), specifically Section 6.2. states that Gaussian plume models such as Ausplume (which AERMOD is a more recent Gaussian plume model) are not suitable in situations where there is a high frequency of stable calm night-time atmospheric stability conditions or a high frequency of calm wind conditions. It follows that AERMOD should not have been used for the assessment and potentially has under predicted the odour impacts. Calpuff is the NSW EPA's recommended atmospheric dispersion model at locations with a high frequency of calm meteorological conditions.
5	The ash from the incinerator has not been assessed as an odour source.	Again this issue and potential odour source has not been quantitatively addressed in the odour assessment.