Pacific Environment Limited

Consulting • Technologies • Monitoring • Toxicology

Report

ENERGY FROM WASTE FACILITY – ODOUR ASSESSMENT

THE NEXT GENERATION

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EXECUTIVE SUMMARY

The Next Generation NSW Pty Ltd (TNG NSW) propose to construct and operate an Energy from Waste (EfW) facility (the 'Project') on land adjacent to the Genesis Xero Waste facility, located at Honeycomb Drive, Eastern Creek, approximately 36 km west of the Sydney CBD.

The development involves the construction and operation of an Electricity Generation Plant, which will allow for unsalvageable and uneconomic residue waste from the Genesis Xero Material Processing Centre (MPC) and Waste Transfer Station (WTS) (referred to as the 'Genesis Facility') to be used for generation of electrical power.

In June 2014 Pacific Environment completed an air quality and greenhouse gas assessment for the Project (**Pacific Environment, 2014**) which provided a qualitative assessment of odour from the Project. The EPA has since requested that a stand-alone odour impact assessment is completed for the Project, of which is the purpose of this technical study.

Fuel (waste) is proposed to arrive to the facility in covered trucks or via an enclosed conveyor from the Genesis Facility. All waste storage and unloading is to take place within the tipping hall building, which is kept at negative pressure with air extracted from the building to be used as excess air in the boiler.

Odour emissions for the facility were based on odour monitoring that was completed for the Genesis facility in January, 2014. Cumulative odour emissions from the Genesis Facility were also investigated.

The results indicate that when the Project is considered both in isolation and combined with odour emissions from the Genesis Facility that the predicted 99th percentile odour concentrations would be below the 2 ou impact assessment criterion all of the sensitive receptors. The odour concentrations are predicted to be highest in the residential suburb of Minchinbury, but are anticipated to be just above the detection threshold (1 ou) and below the impact assessment criterion of 2 ou throughout the suburb.

In view of the dispersion modelling results it is anticipated that the operation of the Project would not result in an adverse impact on the local air environment in reference to odour.

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The Next Generation NSW Pty Ltd (TNG NSW) propose to construct and operate an Energy from Waste (EfW) facility (the 'Project') on land adjacent to the Genesis Xero Waste facility, located at Honeycomb Drive, Eastern Creek, approximately 36 km west of the Sydney CBD.

The development involves the construction and operation of an Electricity Generation Plant, which will allow for unsalvageable and uneconomic residue waste from the adjacent Genesis Xero Material Processing Centre (MPC) and Waste Transfer Station (WTS) (referred to as the 'Genesis Facility') to be used for generation of electrical power.

In June 2014 Pacific Environment completed an air quality and greenhouse gas assessment for the Project (*Energy from Waste Facility – Air Quality and Greenhouse Gas Assessment* **(Pacific Environment, 2015,** hereafter referred to as 'PE Air Report'). The PE Air Report provided a qualitative assessment of odour from the Project. The EPA subsequently requested that a stand-alone odour impact assessment is completed for the Project, which is the purpose of this technical study.

This assessment followed the procedures outlined in the NSW Environment Protection Authority's (EPA) document titled "Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW" (**EPA, 2005**).

2 OVERVIEW OF THE FACILITY

The facility will operate a well-established technology known as a moving grate furnace. Waste is gravity fed onto the incinerator grate. The grate is continually moving thus promoting continuous mixing of the waste with the combustion air, extracted from the tipping hall and introduced from beneath the grate into the heart of the fire. Further air is injected just above the fire to promote mixing and complete combustion of the gases.

The Facility will operate 24 hours a day, 7 days a week, with occasional offline periods for maintenance. Over the entire year, it is assumed that the facility would be operational for 8,000 hours as an annual average.

The technology of the Facility will have a design capacity to process up to 1,350,000 tonnes of residual waste material per annum. TNG NSW's proposed implementation will be to process up to 1,105,000 tonnes per annum, using a two phased approach:

- Phase 1 (lines 1 and 2) which will require 552,500 tpa as waste.
- Phase 2 (lines 1, 2, 3 and 4) which will require 1,105,000 tpa as waste.

The first phase will include the complete construction of the Tipping Hall and Waste Bunker and combustion Lines 1 and 2 comprising of two independent boilers, Flue Gas Treatment (FGT) systems, stack as well as one turbine and one Air Cooled Condenser (ACC) and all other auxiliary equipment. The second phase will comprise of installation of combustion lines 3 and 4 with again two independent boilers, FGT systems, stack as well as one turbine and one ACC and all other auxiliary equipment. This assessment addresses the EfW facility when all four lines are operational. Some wastes would be delivered directly to the facility (by truck) with the remaining transferred from the existing Genesis Facility either via a covered electrically powered conveyor or by truck. The following waste fuel types are considered as the main sources of fuel for the facility.

- Chute Residual Waste (CRW) from the Genesis MPC
- Commercial and Industrial (C&I)
- Construction and Demolition(C&D)
- Floc waste from car and metal shredding

- Paper pulp
- Glass Recovery
- Garden Organics (GO)
- Alternative Waste Treatment (AWT)
- Material Recovery Facility waste (MRF waste) residual.

A general arrangement for the facility is shown in **Appendix A**.

A detailed technical description of the Project is provided in the PE Air Report.

3 LOCAL SETTING

The proposed EfW Facility is located at Eastern Creek, approximately 36 km west of the Sydney CBD and surrounded by the residential areas of Minchinbury, Mt Druitt and Rooty Hill to the north, Erskine Park to the east and Colyton to the northwest (shown in **Figure 3-1**).

The site which is accessed off Honeycomb Drive at Eastern Creek is surrounded by land owned by the Corporate Group Alexandria Landfill Pty Ltd, ThaQuarry Pty Ltd, Australand, Hanson, Jacfin, the NSW Department of Planning and Environment and Sargents.

The site and surrounding land is identified as part of the '*State Environmental Planning Policy (Western Sydney Employment Area) 2009 (WSEA SEPP)*' to be redeveloped for higher end industrial and employment uses over the next decade. The site has a total area of approximately 56 hectares including the Riparian Corridor, with a specific development area circa 9 hectares.

Air quality impacts are assessed at the closest residential areas as shown, including particularly sensitive receptors such as schools and hospitals, as well as isolated semi-rural residential receptors off Burley Road to the southeast. The particularly sensitive receptors (schools, childcare centres), are listed in **Table 3-1**, and are located within the residential suburbs of Minchinbury and Erskine Park, shown in **Figure 3-1**.

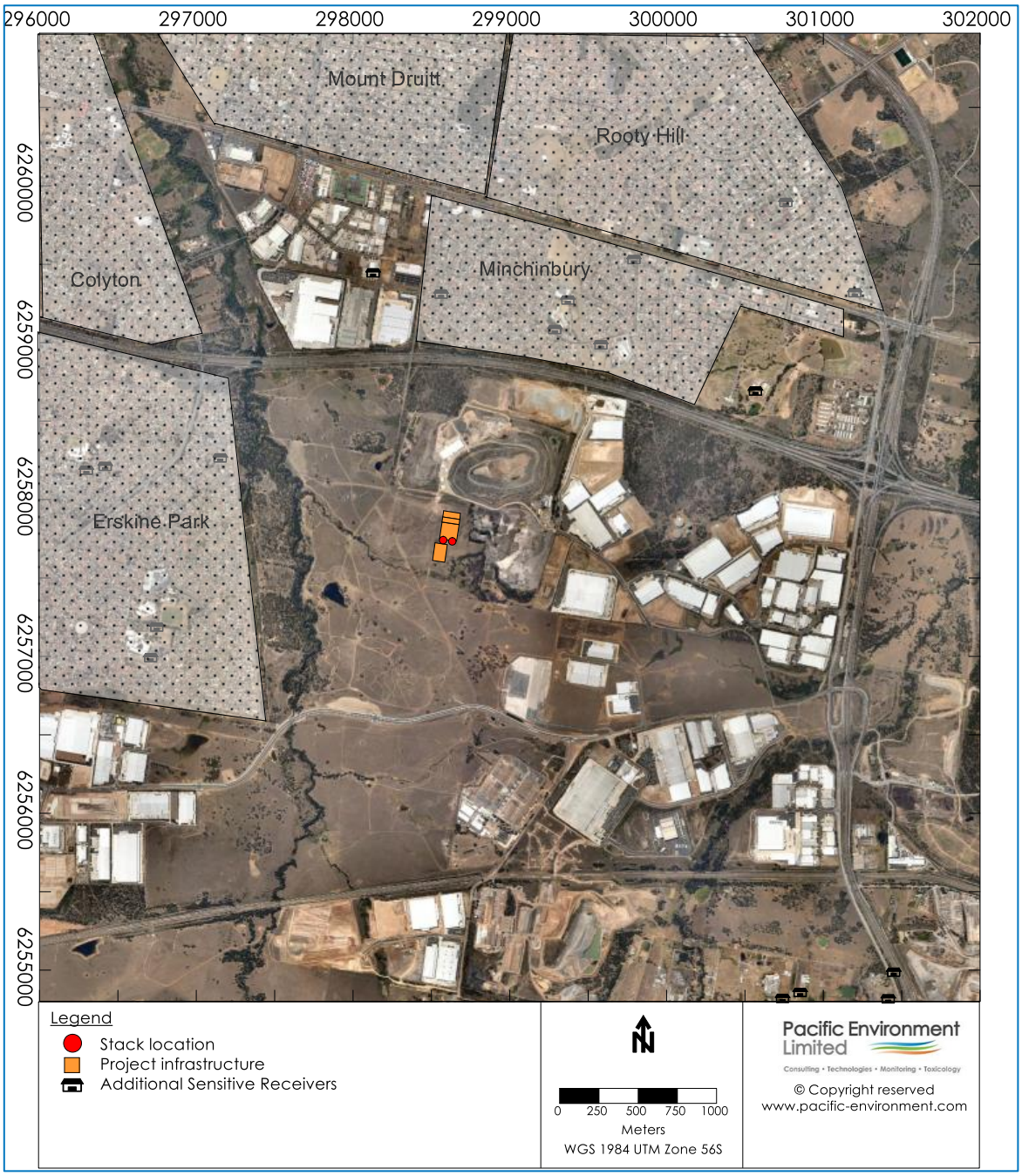


Figure 3-1: Local setting

Table 3-1: Sensitive receptor locations

Sensitive Receptor	Easting (m)	Northing (m)	Elevation (m)
James Erskine Primary School	296748	6257187	66
Erskine Park High School	296709	6256992	66
Clairgate Public School	296299	6258187	62
Minchinbury Public School	299287	6259084	64
Pinegrove Memorial Park Lawn Cemetery	300567	6258692	58
Sunny Patch Preparation School & Long Day Care Centre	297153	6258266	50
Eastern Creek Public School	301201	6259319	46
St Agnes Catholic High School	300761	6259894	74
All Areas Family Day Care Pty	299581	6258986	64
Maria Hawey Child Care Centre	299370	6259272	57
Jiminey Cricket Long Day Care	298562	6259310	54
White Bunny Child Care Centre	299792	6259530	68
LITTLESMARTIES	296419	6258212	58
Kidz Fun Factory	298128	6259445	46

4 LEGISLATIVE SETTING

4.1 Odour Assessment Criteria

4.1.1 Measuring Odour Concentration

There are no instrument-based methods that can measure an odour response in the same way as the human nose. Therefore "dynamic olfactometry" is typically used as the basis of odour management by regulatory authorities.

Dynamic olfactometry is the measurement of odour by presenting a sample of odorous air diluted to the point where a trained panel of assessors cannot detect a change between the odour free air and the diluted sample. The concentration is then doubled until the difference is observed with certainty. The correlations between the dilution ratios and the panellists' responses are then used to calculate the number of dilutions of the original sample required to achieve the odour detection threshold. The units for odour measurement using dynamic olfactometry are "odour units" (ou) which are dimensionless and are effectively "dilutions to threshold". The detectability of an odour (i.e. whether someone smells it or not) is a sensory property that refers to the theoretical minimum concentration that produces an olfactory response or sensation. However, we note that the panellists used for this work are specially selected based on a reference odorant, n-Butanol.

The theoretical minimum concentration is referred to as the "odour threshold" and is the definition of 1 odour unit (ou). Therefore, an odour concentration of less than 1 ou would theoretically mean there is no odour.

4.1.2 Odour Performance Criteria

4.1.2.1 Introduction

The determination of air quality criteria for odour and their use in the assessment of odour impacts is recognised as a difficult topic in air pollution science. The topic has received considerable attention in recent years and the procedures for assessing odour impacts using dispersion models have been refined considerably. There is still considerable debate in the scientific community about appropriate odour criteria as determined by dispersion modelling.

The EPA has developed odour criteria and the way in which they should be applied with dispersion models to assess the likelihood of nuisance impact arising from the emission of odour.

There are two factors that need to be considered:

1. What "level of exposure" to odour is considered acceptable to meet current community standards in NSW.

2. How can dispersion models be used to determine if a source of odour meets the criteria which are based on this acceptable level of exposure.

The term "level of exposure" has been used to reflect the fact that odour impacts are determined by several factors the most important of which are (the so-called FIDOL factors):

- The **F**requency of the exposure.
- The **I**ntensity of the odour.
- The **D**uration of the odour episodes.
- The **O**ffensiveness of the odour.
- The **L**ocation of the source.

In determining the offensiveness of an odour it needs to be recognised that for most odours the context in which an odour is perceived is also relevant. Some odours, for example the smell of sewage, hydrogen sulfide, butyric acid, landfill gas etc., are likely to be judged offensive regardless of the context in which they occur. Other odours such as the smell of jet fuel may be acceptable at an airport, but not in a house, and diesel exhaust may be acceptable near a busy road, but not in a restaurant.

In summary, whether or not an individual considers an odour to be a nuisance will depend on the FIDOL factors outlined above and although it is possible to derive formulae for assessing odour annoyance in a community, the response of any individual to an odour is still unpredictable. Odour criteria need to take account of these factors.

4.1.2.2 Complex mixtures of odorous air pollutants

The "*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*" (**EPA, 2005**) (Approved Methods) include ground-level concentration (glc) criterion for complex mixtures of odorous air pollutants. They have been refined by the EPA to take account of population density in the area. **Table 4-1** lists the odour glc criterion to be exceeded not more than 1% of the time, for different population densities.

The difference between odour criteria is based on considerations of risk of odour impact rather than differences in odour acceptability between urban and rural areas. For a given odour level there will be a wide range of responses in the population exposed to the odour. In a densely populated area there will therefore be a greater risk that some individuals within the community will find the odour unacceptable than in a sparsely populated area.

An odour criterion of 2 ou would apply to the built up areas around the facility in any further detailed assessment of proposed operations.

Table 4-1: Odour performance criteria for the assessment of odour

Population of affected community	Ground level concentration (ou)
≤ ~2	7
~10	6
~30	5
~125	4
~500	3
Urban (2000) and/or schools and hospitals	2

4.1.2.3 Peak-to-mean Ratios

It is common practice to use dispersion models to determine compliance with odour criteria. This introduces a complication because Gaussian dispersion models are only able to directly predict concentrations over an averaging period of 3-minutes or greater. The human nose, however, responds to odours over periods of the order of a second or so. During a 3-minute period, odour levels can fluctuate significantly above and below the mean depending on the nature of the source.

To determine more rigorously the ratio between the one-second peak concentrations and three-minute and longer period average concentrations (referred to as the peak-to-mean ratio) that might be predicted by a Gaussian dispersion model, the EPA commissioned a study by **Katestone Scientific Pty Ltd** (**1995, 1998**). This study recommended peak-to-mean ratios for a range of circumstances. The ratio is also dependent on atmospheric stability and the distance from the source. For this assessment we have assumed a peak-to-mean ratio of 2.5 and 2.3 for all stability classes for area sources and volume sources, respectively. A summary of the factors is provided in **Table 4-2**. The EPA Approved Methods take account of this peaking factor and the criteria shown in **Table 4-1** are based on nose-response time, which is effectively assumed to be 1 second.

Table 4-2: Factors for estimating peak concentrations on flat terrain

Source Type	Pasquil-Gifford stability class	Near field P/M60*	Far field P/M60
Area	A, B, C, D	2.5	2.3
	E, F	2.3	1.9
Line	A – F	6	6
Surface point	A, B, C	12	4
	D, E, F	25	7
Tall wake-free point	A, B, C	17	3
	D, E, F	35	6
Wake-affected point	A – F	2.3	2.3
Volume	A – F	2.3	2.3

*Ratio of peak 1-second average concentrations to mean 1-hour average concentrations

5 EXISTING ENVIRONMENT

5.1 Dispersion Meteorology

Air quality impacts are influenced by meteorological conditions, primarily in the form of gradient wind flow regimes, and by local conditions generally driven by topographical features and interactions with coastal influences, such as the sea breeze. The local dispersion meteorology for the site, in relation to wind speed and direction, have been reviewed based on the data available at nearby meteorological stations.

The Bureau of Meteorology (BoM) collects climatic information at the Horsley Park Equestrian Centre Automatic Weather Station (AWS), located approximately 6 km southeast of the site. The NSW Office of Environment and Heritage (OEH) operate a meteorological station at St Marys, located approximately 5 km west and at Prospect, located approximately 6 km east of the proposed EfW facility, respectively.

The closest site and most representative location in terms of land use and surface roughness is the OEH monitoring site at St Marys. A complete year of hourly meteorological data, collected at the St Marys station was used for modelling. The meteorological data for modelling are 98% complete.

Annual and seasonal wind roses for 2013 at St Marys are shown in **Figure 5-1**. The dominant annual winds are from the southern quadrant with a proportion also from the north-northwest. This pattern is similar in all seasons with summer also showing a proportion of winds from the southeast. The percentage calms (defined as wind speeds less than 0.5 m/s) are around 30.9%.

A detailed review of the year selected for modelling compared with five years of data, in addition to a long term trends analysis is provided in the PE Air Report **(Pacific Environment, 2015**).

Air dispersion models also require cloud cover and cloud height as input and the closest meteorological station recording these parameters is BoM Bankstown Airport AWS, located approximately 19 km southeast of the proposed EfW site.

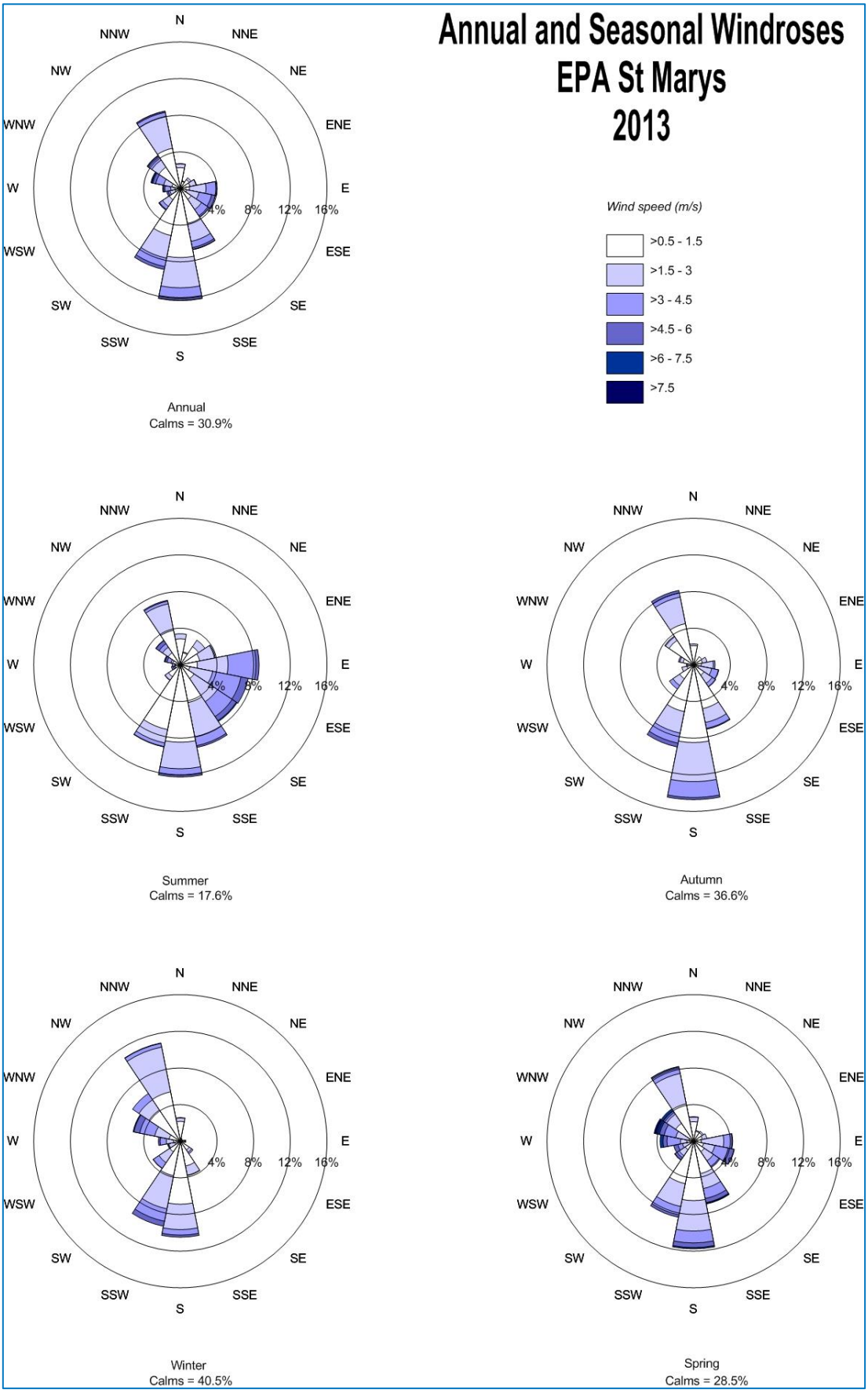


Figure 5-1: Wind roses for St Marys (2013)

5.2 Existing Air Quality

The adjacently located Genesis Facility will give rise to odour of similar character to the Project. In January 2014, Pacific Environment completed an Odour Impact Assessment for the facility (**Pacific Environment, 2014**), under a requirement of the site's EPL. The odour assessment reviewed potential odour sources and found the most significant odour sources to be the active tipping face within the landfill void, the leachate sump and riser and the leachate treatment and SBR tanks.

Odour monitoring on these sources (see **Appendix B**) found the leachate sump to be the most significant of these (50 times higher than the other sources). Dispersion modelling of the leachate sump found that the most stringent odour criterion of 2 ou is not exceeded beyond the site boundary and does not encroach within 500 m of the nearest residences.

The character of the odour emissions are summarised below:

- Active tip face – oily, dusty and garbage.
- Leachate tank – garbage.
- Leachate riser - oily, grease, onion, garbage and sulphide.

5.3 Odour complaints history

The Genesis Facility has provided records of logged complaints relating to odour since the commencement of operations in June 2012. The full odour complaints register is provided in **Appendix C**.

During this period the Genesis Facility has logged three odour complaints. Subsequent to further investigation and inspection, two complaints were found to not have originated from the Genesis Facility but from other known odour sources in the area. The odour complaint in February 2013 resulted in the review of leachate treatment practices at the facility.

6 ODOUR EMISSIONS

The facility will employ high speed roller doors for truck access to ensure fugitive odour emissions from within the building are minimised. All waste storage and unloading will take place within the tipping hall building, which is kept under negative pressure. Air extracted from the building is to be used as excess air in the boiler (i.e. potentially odorous air will ultimately be thermally oxidised). The primary air will be drawn from the tipping hall using a fan beneath the individual grate zones. It is anticipated that the primary air flow will range between 77,560 Nm^3/hour and 129,180 Nm^3/hour. The primary air flow will also be used to cool the grate. The air will then be drawn into the primary combustion zone and will ultimately undergo combustion and released via the stack. As a result, the odorous compounds within the primary air will breakdown to simpler compounds that will pass through the various scrubbers and process to further remove contaminants from the air stream.There is potential for the release of relatively small volumes of odorous air to escape during the opening and closing of the roller doors even though it will be under negative pressure. No odour emissions would be released from the stack and the odorous compounds would have undergone chemical decomposition.

As the waste for the Project will be supplied by the adjacent Genesis Facility, it can be assumed that the character of the odour from the active tip face and therefore applied to the Project.

The odour concentrations and emission rates for the proposed facility are presented in **Table 6-2**. It has been assumed that the area of the roller door will be 25 m^2. An exit velocity of 0.1 m/s was adopted to account for the small volumes of air that escape tipping hall when the doors are open, while acknowledging that the building is designed to operate under negative pressure (with extracted air used as a feed to the furnace).

An assumption that fugitive air volumes of (25 x 0.1)=2.5m^3/s would escape from an opening kept under negative pressure is considered conservative.

The cumulative odour emissions from the Project are based on the odour monitoring competed for the Genesis Facility (**Pacific Environment, 2014**) (see **Section 5.2**) and are also shown in **Table 6-2** and **Table 6-2** for volume and area sources, respectively The location of the modelled sources is shown in **Figure 6-1**. As it is the intention that the TNG EfW facility divert some of the waste stream currently being treated by the existing Genesis facility, it is anticipated that odour abatement through use of potentially odorous air in the the EfW combustion process will act to reduce potential odour sources in the local area. The extent to which that abatement would be achieved has not been quantified as part of this assessment.

A list of all adopted assumptions in this assessment is provided in **Appendix D**.

Table 6-1: Odour emission rate and model parameters for volume sources

	Odour Concentration (OU)	Odour Emission Rate for volume source (OU.m³/s)	Peak to mean ratio	Modelled Odour Emission Rate for volume source (OU.m³/s)
Tipping hall	558	1,395	2.3	3,209

Table 6-2: Odour emission rates and model parameters for area sources

	Odour Concentration (OU)	Specific Odour Emission Rate (SOER) (OU.m³/m²/s)	Source area (m²)	Peak to mean ratio	Modelled Specific Odour Emission Rate (SOER) (OU.m³/m²/s)
Active tip face	558	0.3	1,344	2.5	0.7
Leachate tank (x 4)	362	0.2	4 x 19.6		0.5
Leachate riser	19,500	10.3	177		25.8

There are no emission from the stack therefore building wake effects were not included in the modelling.

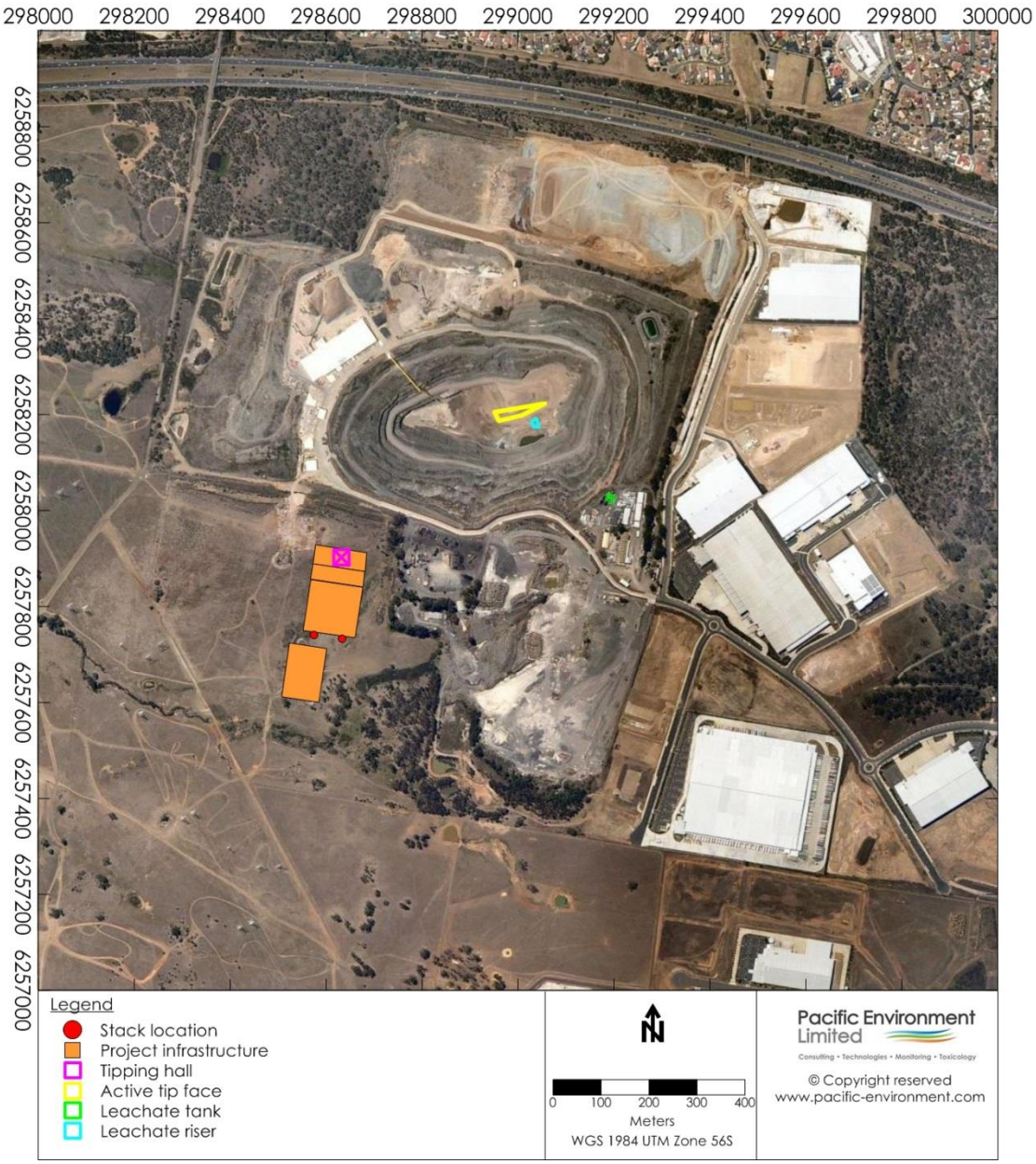


Figure 6-1: Location of modelled sources

7 MODELLING APPROACH

The overall approach to the assessment followed the Approved Methods using the Level 2 assessment methodology. The Approved Methods specify how assessments based on the use of air dispersion models should be completed. They include guidelines for the preparation of meteorological data to be used in dispersion models and the relevant air quality criteria for assessing the significance of predicted odour concentrations associated with the Project.

The air dispersion modelling conducted for this assessment was based on the advanced modelling system AERMET/AERMOD model.

7.1 Modelling System

AERMOD was chosen as a suitable dispersion model due to the source type, location of nearest receiver and nature of local topography. AERMOD is the US EPA's recommended steady-state plume dispersion

model for regulatory purposes. AERMOD replaced the Industrial Source Complex (ISC) model for regulatory purposes in the US in December 2006. Ausplume, a steady state Gaussian plume dispersion model developed by the Victorian EPA and frequently used in Australia for simple near-field applications is based on ISC, which has now been replaced by AERMOD.

A significant feature of AERMOD is the Pasquil-Gifford stability based dispersion is replaced with a turbulence-based approach that uses the Monin-Obukhov length scale to account for the effects of atmospheric turbulence based dispersion.

The AERMOD system includes AERMET, used for the preparation of meteorological input files and AERMAP, used for the preparation of terrain data.

Terrain data was sourced from NASA's Shuttle Radar Topography Mission Data (3 arc second [~90m] resolution) and processed to create the necessary input files.

AERMET requires surface and upper air meteorological data as input. Wind speed, wind direction, temperature, relative humidity and sea level pressure were source from the EPA St Marys meteorological station. Cloud cover and cloud height were sourced from the BoM Bankstown Airport AWS. In the absence of upper air sounding data for the area, upper air parameters were calculated using the upper air estimator within the Lakes Environment AERMOD View software package.

Appropriate values for three surface characteristics are required for AERMET as follows:

- Surface roughness, which is the height at which the mean horizontal wind speed approaches zero, based on a logarithmic profile.
- Albedo, which is an indicator of reflectivity of the surface.
- Bowen ratio, which is an indicator of surface moisture.

Values of surface roughness, albedo and bowen ratio were determined based on a review of aerial photography for a radius of 3 km centred on the EPA St Marys station. Default values for cultivated land and urban areas were chosen over two sectors across this area.

8 RESULTS

The dispersion modelling results for the 1 second (nose response) average 99th percentile odour ground level concentrations (GLCs) for the Project in isolation and in combination with odour emissions from the Genesis Facility are presented in **Table 8-1.** The results are presented for the predicted concentrations at the sensitive receivers detailed in **Table 3-1**.

The corresponding contour plots of the predicted 99th percentile odour concentrations are presented **Figure 8-1** and **Figure 8-2**.

The results indicate that when the Project is considered in isolation and combined with odour emissions from the Genesis Facility that the predicted 99th percentile odour concentrations would be below the 2 ou impact assessment criterion all of the sensitive receptors.

Review of the contour plots shows that the spread of the odour plume is greatest to the north, and to a lesser extent the south, of the Project. The odour concentrations are predicted to be highest in the residential suburb of Minchinbury, but are anticipated to be just above the detection threshold (1 ou) and below the impact assessment criterion of 2 ou throughout the suburb.

Comparison of the odour contours between the Project in isolation (**Figure 8-1**) and combined with the Genesis Facility (**Figure 8-2**) show that there is little difference between the predicted odour impacts and can be inferred that the Project would be the greatest contributor to offsite odour concentrations. It can be seen that the contributions from the Genesis Facility are centred at the pit and diminish quickly only a short distance from the pit. This is largely because the most significant existing odour sources that comprise the Genesis Facility are located within the pit with limited dispersion, resulting in the higher odour concentrations in this locality. Once the odour plume reaches ground level the odour plume is able to disperse more effectively.

Table 8-1: Summary of Predicted 99th percentile ground level concentrations of odour (ou)

Receptor	Project	Project + Genesis Facility
James Erskine Primary School	<1	<1
Erskine Park High School	<1	<1
Clairgate Public School	<1	<1
Minchinbury Public School	1	1
Pinegrove Memorial Park Lawn Cemetery	<1	<1
Sunny Patch Preparation School & Long Day Care Centre	<1	<1
Eastern Creek Public School	<1	<1
St Agnes Catholic High School	<1	<1
All Areas Family Day Care Pty	1	1
Maria Hawey Child Care Centre	1	1
Jiminey Cricket Long Day Care	1	1
White Bunny Child Care Centre	1	1
LITTLESMARTIES	<1	<1
Kidz Fun Factory	<1	<1

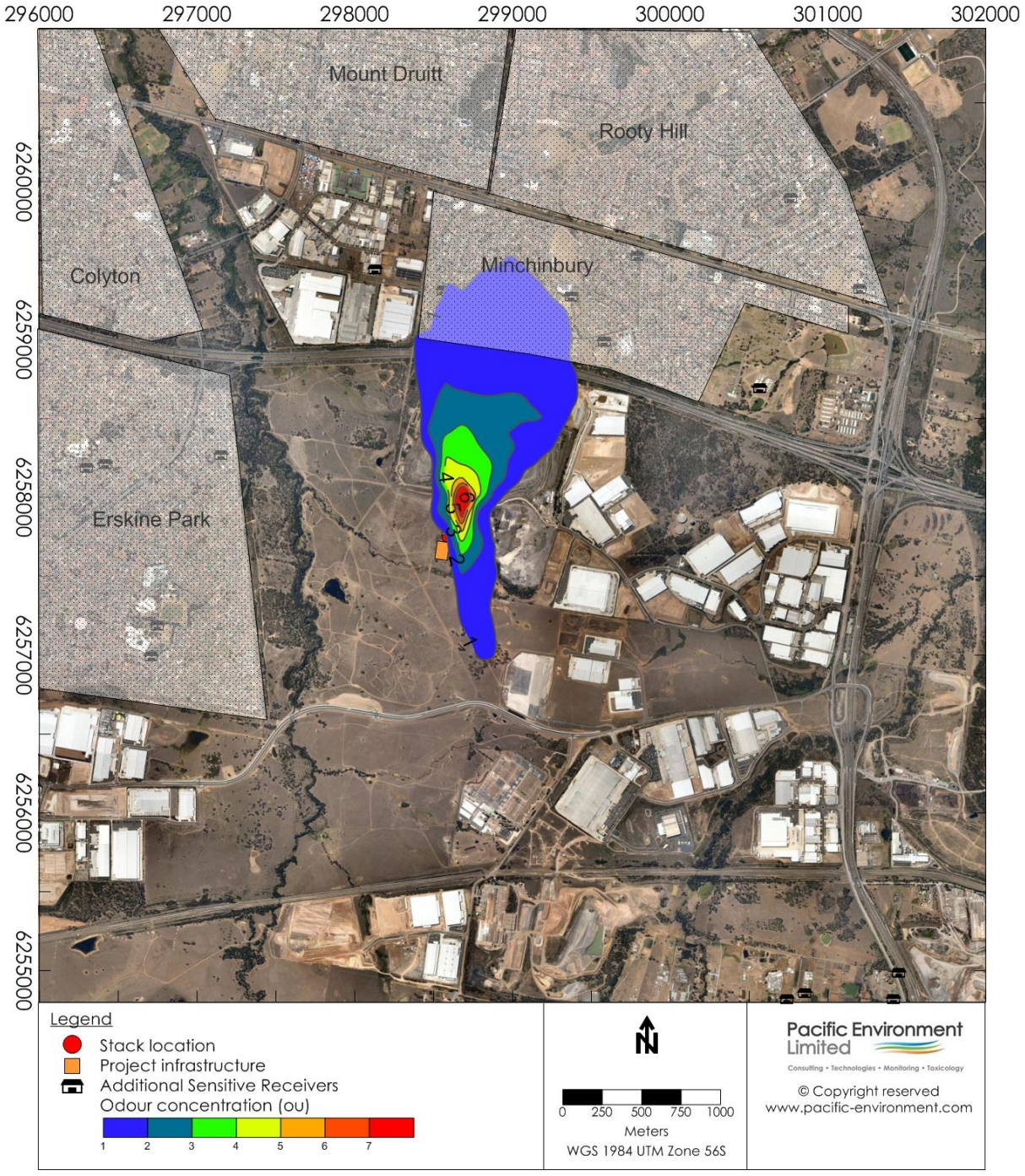


Figure 8-1: Predicted 1-hour average 99th percentile ground level odour concentrations from the Project

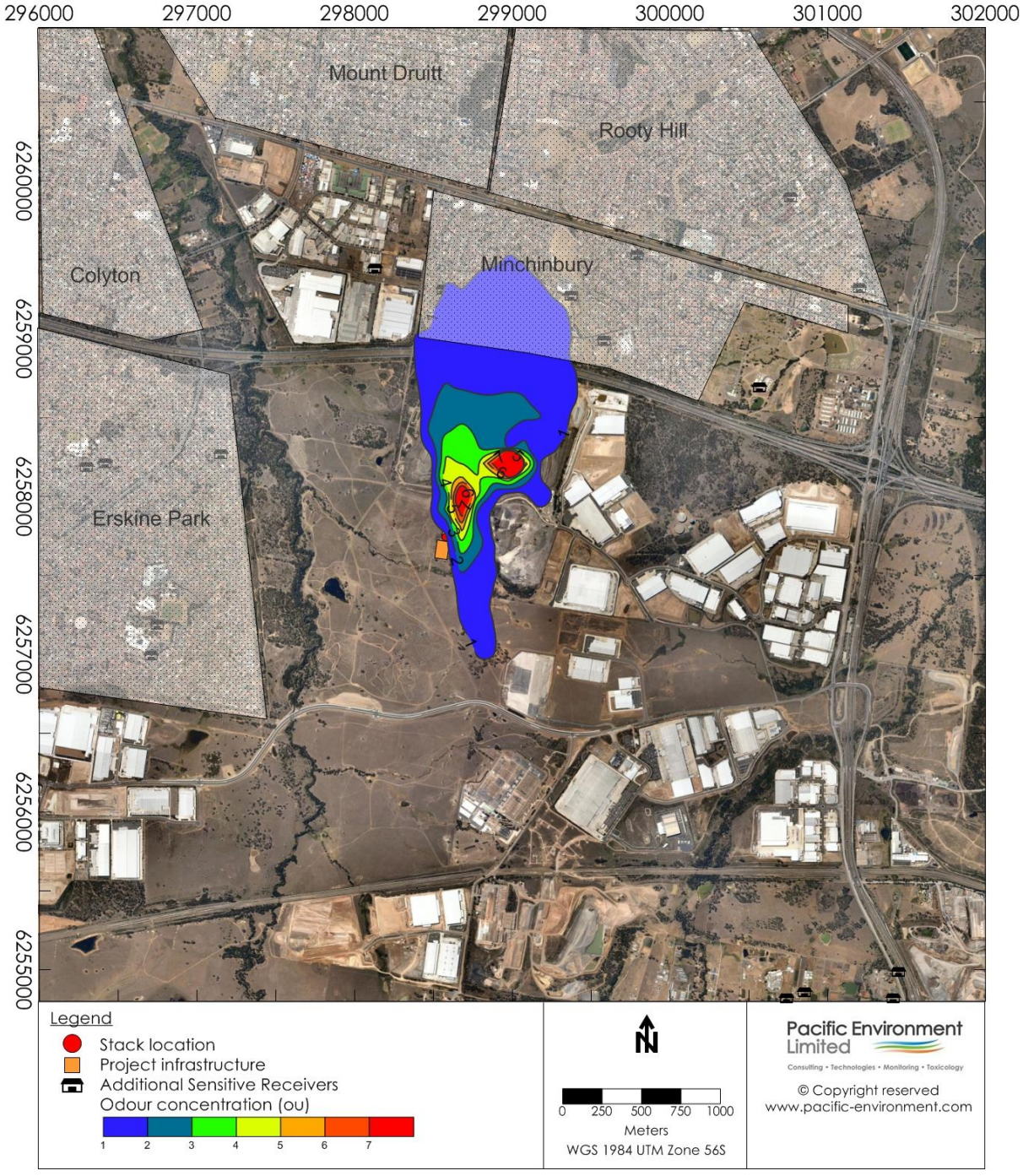


Figure 8-2: Predicted 1-hour average 99th percentile ground level odour concentrations from the Project in combination with odour sources from Genesis Facility

9 CONCLUSION

This odour assessment provides a quantitative assessment of potential odour impacts as a result of the proposed EfW facility. This report is an addendum to the PE Air Report (**Pacific Environment, 2015**).

Fuel (waste) is proposed to arrive to the facility in covered trucks or via an enclosed conveyor from the Genesis Facility. All waste storage and unloading is to take place within the tipping hall building, which is kept at negative pressure with air extracted from the building to be used as excess air in the boiler.

Odour emissions for the facility were based on recent odour monitoring that was completed for the Genesis facility in January, 2014. Cumulative odour emissions from the Genesis Facility were also investigated.

The results indicate that when the Project is considered in isolation and combined with odour emissions from the Genesis Facility that the predicted 99th percentile odour concentrations would be below the 2 ou impact assessment criterion all of the sensitive receptors. The odour concentrations are predicted to be highest in the residential suburb of Minchinbury, but are anticipated to be just above the detection threshold (1 ou) and below the impact assessment criterion of 2 ou throughout the suburb.

In view of the dispersion modelling results it is anticipated that the operation of the Project is not likely to result in an adverse impact on the local air environment in reference to odour.

10 REFERENCES

EPA (2005) "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW", published August 2005

Pacific Environment, 2014. Genesis Facility Odour Impact Assessment – Leachate Storage Management. 24 January, 2014.

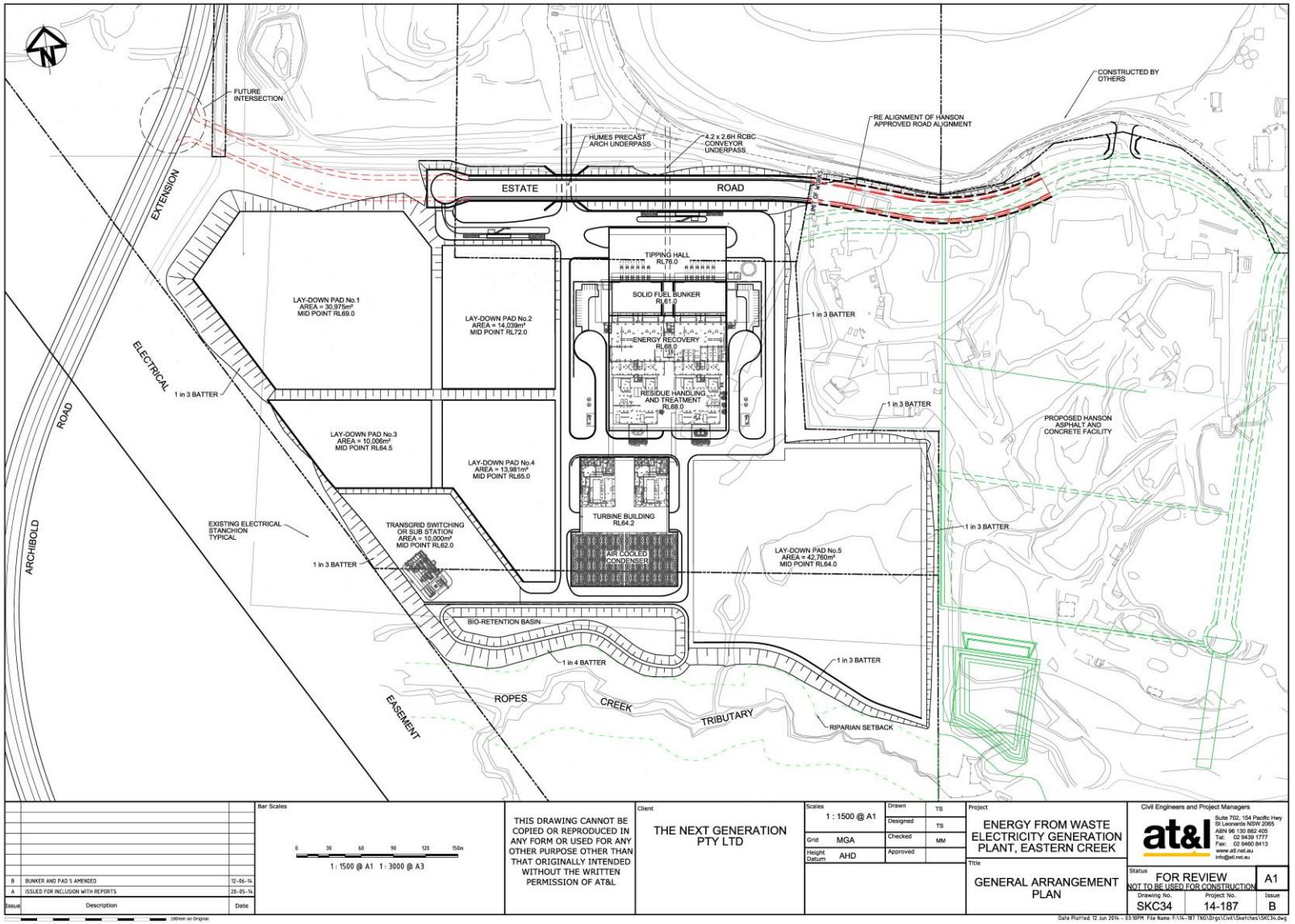
Pacific Environment, 2015. Energy from Waste facility – Air Quality and Greenhouse Gas Assessment. February, 2015.

Katestone Scientific, 1995. The Evaluation of peak-to-mean ratios for odour assessments, Brisbane: Katestone Scientific .

Katestone Scientific, 1998. Report from Katestone Scientific to Environment Protection Authority of NSW, Peak to Mean Ratios for Odour Assessments, Brisbane: Katestone Scientific.

Standards Australia, 2001. AS4323.3 Determination of Odour Concentration by Dynamic Olfactometry. Sydney: Standards Australia.

Appendix A: GENERAL ARRANGEMENT OF EFW FACILITY


FUTURE INTERSECTION
EXTENSION
ELECTRICAL
ROAD
ARCHIBOLD
HUMES PRECAST ARCH UNDERPASS
4.2 x 2.6H RCBC CONVEYOR UNDERPASS
ESTATE
ROAD
CONSTRUCTED BY OTHERS
RE ALIGNMENT OF HANSON APPROVED ROAD ALIGNMENT
TIPPING HALL RL76.0
SOLID FUEL BUNKER RL61.0
ENERGY RECOVERY RL68.0
RESIDUE HANDLING AND TREATMENT RL68.0
TURBINE BUILDING RL64.2
AIR COOLED CONDENSER
LAY-DOWN PAD No.1 AREA = 30,975m² MID POINT RL69.0
LAY-DOWN PAD No.2 AREA = 14,039m² MID POINT RL72.0
LAY-DOWN PAD No.3 AREA = 10,006m² MID POINT RL64.5
LAY-DOWN PAD No.4 AREA = 13,981m² MID POINT RL65.0
LAY-DOWN PAD No.5 AREA = 42,760m² MID POINT RL64.0
TRANSGRID SWITCHING OR SUB STATION AREA = 10,000m² MID POINT RL62.0
EXISTING ELECTRICAL STANCHION TYPICAL
1 in 3 BATTER
1 in 4 BATTER
PROPOSED HANSON ASPHALT AND CONCRETE FACILITY
BIO-RETENTION BASIN
ROPES CREEK TRIBUTARY
EASEMENT
RIPARIAN SETBACK
B BUNKER AND PAD 5 AMENDED 12-06-14
A ISSUED FOR INCLUSION WITH REPORTS 20-05-14
Issue Description Date
Bar Scales
0 30 60 90 120 150m
1 : 1500 @ A1 1 : 3000 @ A3
100mm on Original
THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L
Client
THE NEXT GENERATION PTY LTD
Scales 1 : 1500 @ A1
Drawn TS
Designed TS
Grid MGA
Checked MM
Height Datum AHD
Aproved
Project
ENERGY FROM WASTE ELECTRICITY GENERATION PLANT, EASTERN CREEK
Title
GENERAL ARRANGEMENT PLAN
Civil Engineers and Project Managers
at&l
Suite 702, 154 Pacific Hwy St Leonards NSW 2065
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9460 8413
www.atl.net.au
info@atl.net.au
Status FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION
A1
Drawing No. SKC34
Project No. 14-187
Issue B
Date Plotted: 12 Jun 2014 – 03:10PM File Name: F:\14-187 TNG\Drgs\Civil\Sketches\SKC34.dwg

Appendix B: ODOUR MONITORING RESULTS FROM GENESIS FACILITY

THE ODOUR UNIT

MEMORANDUM

TO: Ronan Kellaghan

COMPANY: Pacific Environment (Sydney)

CC:

FROM: Alex Schulz

DATE: 20 December 2013

COMPANY: The Odour Unit

JOB NO: N1867R

NO OF PAGES: 1

Including cover sheet

REPLY REQUIRED NO

ORIGINAL TO FOLLOW NO

SUBJECT: ODOUR CHARACTER RESULTS

Ronan,

Please find below the odour character results for the odour testing that was carried out 18/12/2013.

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Odour Character
Active Tip Face	SC13684	17/12/2013 13:15 hrs	18/12/2013 10:27 hrs	558	558	Oily, Dusty, Garbage
Leachate Tank	SC13685	17/12/2013 14:42 hrs	18/12/2013 10:55 hrs	362	362	Garbage
Leachate Riser	SC13686	17/12/2013 11:50 hrs	18/12/2013 11:21 hrs	19,500	19,500	Oily, Grease, Onion, Garbage, Sulphide

Appendix C: ODOUR COMPLAINTS HISTORY

GENESIS FACILITY, EASTERN CREEK
COMPLAINTS REGISTER (updated monthly)

Date of Complaint	Summary of Complaint Issues	Matter Investigated	Matter Resolved or Outstanding	Measures Taken	Date Measures Taken
31/08/2014	Nil	N/A	N/A	N/A	N/A
02/07/2014	**Odour** After hours call to EPA @ 22h00 advising of pungent smell like rotting food coming across the landfill site in eastern creek. The wind direction is South Easterly and caller alleged it appears to be coming from Dial-A-Dump.	Yes	Yes	On 7 July 2014 when Licence-holder was advised of complaint an investigation was undertaken which confirmed there has been no odour arising from the landfill. All dams, leachate tanks and the mulch area are routinely inspected daily. South East of our site is another waste facility that accepts food however on this day there was no odour coming across our site.	7/07/2014
30/06/2014	Nil	N/A	N/A	N/A	N/A
31/05/2014	Nil	N/A	N/A	N/A	N/A
30/04/2014	Nil	N/A	N/A	N/A	N/A
31/03/2014	Nil	N/A	N/A	N/A	N/A
28/02/2014	Nil	N/A	N/A	N/A	N/A
31/01/2014	Nil	N/A	N/A	N/A	N/A
31/12/2013	Nil	N/A	N/A	N/A	NA/
30/11/2013	Nil	N/A	N/A	N/A	N/A
4/10/2013	**Shuddering** A Minchinbury Representative advised several residents in Barossa Drive, Minchin Drive and side streets off those roads had experienced shuddering in their homes the previous two nights between 9.30 pm and 10.30 pm.	Yes	Yes	Licence-holder investigated complaint and confirmed no major or extraordinary activity was undertaken on the site. Possibility of seismic activity in the area as reported in the media.	4/10/2013
30/09/2013	Nil	N/A	N/A	N/A	N/A

DIAL A DUMP INDUSTRIES
KEEPING AUSTRALIA CLEAN

GENESIS FACILITY, EASTERN CREEK
COMPLAINTS REGISTER (updated monthly)

GENESIS XERO WASTE

Date of Complaint	Summary of Complaint Issues	Matter Investigated	Matter Resolved or Outstanding	Measures Taken	Date Measures Taken
31/08/2013	Nil	N/A	N/A	N/A	N/A
31/07/2013	Nil	N/A	N/A	N/A	N/A
30/06/2013	Nil	N/A	N/A	N/A	N/A
31/05/2013	Nil	N/A	N/A	N/A	N/A
11-12/04/2013	**Odour** Local residents complain of a 'chemical-like' / 'garbage-like' odour in the St Clair and Erskine Park area on evening of 9 April 2013. EPA contact a number of facilities to ascertain cause.	Yes	Yes	Licence-holder investigated complaint and confirmed (to EPA) that no odour of that description left the facility. Senior manager (local to the area) observed strong 'garbage-like' odours from another facility in the St Clair area on the evening of 9 April 2013 not in the vicinity of the licence-holder's facility.	11-12/04/2013
31/03/2013	Nil	N/A	N/A	N/A	N/A
18/02/2013	**Odour** A Minchinbury Resident advised they had noticed an odour from Sydney Water sewer vent pipes following a heavy rain event and had been advised that it may be sewage from Genesis.	Yes	Yes	Investigated incident and reviewed leachate treatment practices.	18/02/2013
31/01/2013	Nil	N/A	N/A	N/A	N/A
31/12/2012	Nil	N/A	N/A	N/A	N/A
30/11/2012	Nil	N/A	N/A	N/A	N/A
30/09/2012	Nil	N/A	N/A	N/A	N/A
31/08/2012	Nil	N/A	N/A	N/A	N/A
31/07/2012	Nil	N/A	N/A	N/A	N/A
30/06/2012	Nil	N/A	N/A	N/A	N/A
31/05/2012	Nil	N/A	N/A	N/A	N/A
30/04/2012	Nil	N/A	N/A	N/A	N/A
31/03/2012	Nil	N/A	N/A	N/A	N/A
29/02/2012	Nil	N/A	N/A	N/A	N/A
31/01/2012	Nil	N/A	N/A	N/A	N/A

GENESIS FACILITY, EASTERN CREEK
COMPLAINTS REGISTER (updated monthly)

Date of Complaint	Summary of Complaint Issues	Matter Investigated	Matter Resolved or Outstanding	Measures Taken	Date Measures Taken
31/12/2011	Nil	N/A	N/A	N/A	N/A
30/11/2011	Nil	N/A	N/A	N/A	N/A
31/10/2011	Nil	N/A	N/A	N/A	N/A
30/09/2011	Nil	N/A	N/A	N/A	N/A
31/08/2011	Nil	N/A	N/A	N/A	N/A
31/07/2011	Nil	N/A	N/A	N/A	N/A
30/06/2011	Nil	N/A	N/A	N/A	N/A
31/05/2011	Nil	N/A	N/A	N/A	N/A
30/04/2011	Nil	N/A	N/A	N/A	N/A
31/03/2011	Nil	N/A	N/A	N/A	N/A
09/02/2011	**Noise** Minchinbury Resident advised LHBC of single loud banging noise in the early morning, sounded like dump truck door banging.	Yes	Yes	Review of site daily reports regarding construction progress. • Premises best described as building site with concrete pouring of footings and laying of drain pipes. No construction work undertaken after 6.00pm each work day Monday to Friday. • Site is locked and secured when Site personnel not present. • No waste is being received at premises.	10 February 2011 Email to Resident, as we were unable to reach them by telephone.
01/01/2011	Nil	N/A	N/A	N/A	N/A
31/12/2010	Nil	N/A	N/A	N/A	N/A
30/11/2010	Nil	N/A	N/A	N/A	N/A
31/10/2010	Nil	N/A	N/A	N/A	N/A
30/09/2010	Nil	N/A	N/A	N/A	N/A
31/08/2010	Nil	N/A	N/A	N/A	N/A
31/07/2010	Nil	N/A	N/A	N/A	N/A
30/06/2010	Nil	N/A	N/A	N/A	N/A
31/05/2010	Nil	N/A	N/A	N/A	N/A

DIAL A DUMP INDUSTRIES
KEEPING AUSTRALIA CLEAN

GENESIS FACILITY, EASTERN CREEK
COMPLAINTS REGISTER (updated monthly)

GENESIS XERO WASTE

Date of Complaint	Summary of Complaint Issues	Matter Investigated	Matter Resolved or Outstanding	Measures Taken	Date Measures Taken
30/04/2010	Nil	N/A	N/A	N/A	N/A
31/03/2010	**Noise** Minchinbury Resident advised Dept. of Planning this has been ongoing since Christmas.	Yes	Yes	Stage 1 works recommenced on LHBC site on or about 4 March 2010 with Contractors working strictly within approved operating hours; limited works undertaken prior to this date. Other site works in the neighbourhood have been ongoing since the New Year.	1 April 2010 Offer to Dept. of Planning for Site Manager to meet with complainant and facilitate site visit.
28/02/2010	Nil	N/A	N/A	N/A	N/A
31/01/2010	Nil	N/A	N/A	N/A	N/A

Appendix D: ASSUMPTIONS

ASSUMPTIONS

General

The Facility will operate 24 hours a day, 7 days a week, with occasional offline periods for maintenance. Over the entire year, it is assumed that the facility would be operational for 8,000 hours as an annual average.

The facility will employ high speed roller doors for truck access to ensure fugitive odour emissions from within the building are minimised.

All waste storage and unloading will take place within the tipping hall building, which is kept under negative pressure with air extracted from the building to be used as excess air in the boiler.

The air will then be drawn into the primary combustion zone and will ultimately undergo combustion and be released via the stack.

Emissions

No odour emissions would be released from the stack and the odorous compounds would have undergone chemical decomposition through thermal oxidation.

It has been assumed that the area of the roller door will be 25 m^2.

An exit velocity of 0.1 m/s was adopted to account for the small volumes of fugitive air that may escape from the tipping hall when the doors are open and with the building operating under negative pressure.

As the waste for the Project will be supplied by the adjacent Genesis Facility, it is assumed that the character of the odour from the active tip face will be applicable to the Project.

Meteorology

A review completed within the PE Air Report **(Pacific Environment, 2015)** identified the calendar year 2013 as a representative year of meteorology for dispersion modelling with no anomalous wind patterns compared to the other years.

Modelling

AERMOD was chosen as a suitable dispersion model due to the source type, location of nearest receiver and nature of local topography.

Terrain data was sourced from NASA's Shuttle Radar Topography Mission Data (3 arc second [~90m] resolution) and processed to create the necessary input files.

Values of surface roughness, albedo and bowen ratio were determined based on a review of aerial photography for a radius of 3 km centred on the Office of Environment and Heritage St Marys automatic weather station. Default values for cultivated land and urban areas were chosen over two sectors across this area.

For this assessment we have assumed a peak-to-mean ratio of 2.5 and 2.3 for all stability classes for area sources and volume sources, respectively.

Results

An odour criterion of 2 ou is assumed to apply given that the site is located within the Sydney contiguous urban area.