Air Quality and Greenhouse Gas Management Plan

For
Woodlawn Bioreactor

Document Code: PLA-NSW-XXX-XXX-1

Date: 24.07.2018

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Quality Information

Document Revision Register

Rev	Revision Details	Prepared by	Review By	Authorised By	Date
1	Initial draft for internal review	Stephen Bernhart NSW Resource Recovery Project Manager	Ramona Bachu NSW Environment Officer		30 March 2016
2	Final draft for submission to DPE	Stephen Bernhart NSW Resource Recovery Project Manager	Ramona Bachu NSW Environment Officer	Henry Gundry Woodlawn Facilities Manager	14 April 2016
3	Final Draft for submission to DPE	Harneet Puarr Woodlawn Environmental Officer	Amandeep Brar Environmental Planner		24 July 2018

Contents

Definitions/Abbreviations

%	Percent
°C	Degrees Celcius
Approved Methods	Approved methods and Guidelines for the Modelling and Assessment of Air Pollutants in NSW (DEC, 2005)
AEMR	Annual Environmental Management Report
AQGGMP	Air Quality and Greenhouse Gas Management Plan
BOD	Biological Oxygen Demand
CLC	Community Liaison Committee
COC	Conditions of Development Consent
DA	Development Application
DD	Depositional Dust
DECCW	Department of Environment, Climate Change and Water
DPE	NSW Department of Planning and Environment
EA	Environmental Assessment
ED1 ED	Evaporation Dam 1 Effluent Dam (also referred as ED1 Coffer Dam)
EMP	Environment Management Plan
EP&A	Environmental Planning and Assessment (Act and Regulations)
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
HDPE	High density polyethylene
GHG	Greenhouse Gas Emissions
$g/m^2/month$	Grams per metre squared per month
ha	Hectares
H_2SO_4	Sulphuric Acid
IMF	Intermodal Facility
km	Kilometre
LGE	Landfill Gas Engine
LEMP	Landfill Environment Management Plan
LTP	Leachate Treatment Plant
m^3	Cubic Metres
m/s	Metres per second
MBT	Mechanical Biological Treatment

mm	Millimetres
NHMRC	National Health and Medical Research Council
NIMS	Veolia's National Integrated Management System
NO	Nitrogen Oxide
NO_2	Nitrogen Dioxide
OEH	Office of Environment and Heritage
OU	Odour Unit
PA	Project Approval – Woodlawn Expansion Project (10_0012)
PM2.5, PM10	Particulate Matter
POEO	Protection of the Environment Operations (Act and Regulations)
ppm	Parts per million
RIVO	Incident and Compliance Management System
SHEQ	Safety, Health, Environment and Quality
SML20	Special Mining Lease 20
SO_3	Sulphur Trioxide
TADPAI	Tarago and District Progress Association Incorporated
TSP	Total Suspended Particulate
tCO_2-e	Tonnes of carbon dioxide equivalent
tpa	Tonnes per annum
µm	Micrometre / microns
v/v	Volume per volume
Veolia	Veolia Australia and New Zealand
WIP	Woodlawn Infrastructure Plan

Section 1 Introduction

1.1 Overview

Veolia Australia and New Zealand (Veolia) own and operate the Woodlawn Eco Project Site (the Eco Project Site), which is located in the Southern Tablelands of NSW, approximately 250 kilometres (km) South West of Sydney.

The Eco Project Site consists of two properties on approximately 6,000 hectares (ha) of land, namely Woodlawn and Pylara and includes the area of the Special (Crown & Private Lands) Lease 20 (SML 20), encompassing the Woodlawn Mine, a former lead, copper and zinc mine which ceased mining operations in 1998. The first stage of the Eco Project Site developed by Veolia was the Woodlawn Bioreactor (the Bioreactor), which commenced operations in September 2004 and is located in the void of the former Woodlawn Mine.

The Bioreactor has considerable capacity to receive putrescible waste generated from both Sydney and surrounding areas of regional NSW. On the basis of this, a modification application was sought by Veolia to remove the arbitrary annual waste input limits into the Bioreactor, and in response to the *Wright Corporate Strategies' Public Review – Landfill Capacity and Demand* (the Wright Review, 2009). The Wright Review was an independent review commissioned by the Minister for Planning to examine critical issues such as the continuing need for putrescible waste landfill capacity, regional disposal capacity and demand.

On 16 March 2012, the Department of Planning and Environment (DPE) granted approval for the Bioreactor to increase its annual maximum input rate from 500,000 tonnes per annum (tpa) to 1,130,000 tpa, referred to hereon as the expanded operations.

On 9 September 2016, DPE approved the long-term leachate management strategy (LTLM Strategy) (PA 10_0012 MOD 1 & DA 31-02-99 MOD 2) for improving the extraction and treatment of leachate from the waste mass by installing a new membrane bioreactor (MBR) treatment plant to treat leachate at a faster rate and produce a much higher quality effluent.

Modification of the PA 10_0012 MOD 2 & DA 31-02-99 MOD 3 for the construction and operations of the long–term leachate management strategy including the Leachate Treatment Plant was approved by DPE on 22 December 2017.

This Air Quality and Greenhouse Gas Management Plan (AQGGMP) has been prepared in accordance with the regulatory requirements pertaining the Bioreactor and LTP and details control strategies and monitoring procedures for air quality and greenhouse gas emissions. The AQGGMP supersedes previous versions of the Ambient Air Quality Monitoring Plan.

1.2 Scope and Objectives

The objective of the AQGGMP is to document how Veolia intend to manage air quality at the Bioreactor and LTP so that the generation of emissions is minimised along with the potential impact on the sensitive receptors.

The key goals of the AQGGMP are to:

- Facilitate compliance with the relevant State legislations, regulations and/or approvals.
- Detail the existing air quality environment conditions for odour, particulate matter and greenhouse gas emissions.
- Outline measures to minimise the potential for odour emissions to impact air quality from activities associated with the operation of the Bioreactor.
- Detail measures to minimise the potential for particulate matter to be generated from activities associated with the operation of the Bioreactor.
- Detail measures to minimine greenhouse gas emissions from activities associated with the operation of the Bioreactor and LTP.
- Outline how recommendations from independent odour audits will be adopted as mitigation measures
- Outline steps to be undertaken in the event a non-conformance event is identified.
- Outline a suitable monitoring program to detect and demonstrate that mitigation measures are effective.

The management strategies detailed within the LMP will be reviewed in accordance with condition 9 of schedule 7 of the conditions of the Woodlawn Expansion Project – Project Approval.

1.3 Legal and Other Requirements

The following regulatory framework applies to this AQGGMP:

- Project Approval – Woodlawn Expansion Project (10-0012) issued under the Environmental Planning and Assessment Act 1979 (PA)
- Project Approval –Woodlawn Expansion Project Modification Application MP 10_0012 MOD1
- Project Approval –Woodlawn Expansion Project Modification Application MP 10_0012 MOD2
- Environment Protection Licence 11436 issued under the Protection of the Environment Operations (POEO) Act 1997 and particularly conditions from the POEO (Clean Air) Regulation 2010 (EPL)
- Water Access Licence: Willeroo Borefield (# 40BL106422-106425)
- Licence to Operate an Onsite Sewerage Treatment Plant - Goulburn Mulwaree Council
- Development Consent (DA-31-02-99) issued under the Environmental Planning and Assessment Act 1979 (DA)
- Modification Application DA 31-02-99 MOD1
- Modification Application DA 31-02-99 MOD2
- Modification Application DA 31-02-99 MOD3

1.3.1 Project Approval 10-0012

The relevant conditions of consent (COC) from the PA are provided in Table 1.1.

Table 0.1– PA Conditions

Relevant COC	Requirement	AQGGMP Reference
Sch 4 Cond 4	**Landfill Gas Limits** The Proponent shall ensure that landfill gas engine (LGE) emissions at the Bioreactor comply with the requirements of the POEO (Clean Air) Regulation 2010.	3.1.6 3.2.4 5.1
Sch 4 Cond 5	**Greenhouse Gas** The Proponent shall implement all reasonable and feasible measures to minimise: (a) energy use on site; and (b) the greenhouse gas emissions produced on site, to the satisfaction of the Director-General	4.3
Sch 4 Cond 6	**Odour Discharge Limits** The Proponent shall not cause or permit the emission of offensive odours from the site, as defined under Section 129 of the POEO Act**.**	3.2.1 3.2.2
Sch 4 Cond 7	**Independent Odour Unit** Within 3 months of the date of this project approval, and annually thereafter, unless otherwise agreed to by the Director-General pursuant to Condition 8 of this Schedule, the Proponent shall commission and pay the full cost of an Independent Odour Audit of the project. This audit must be conducted by a suitably qualified, experienced and independent expert whose appointment has been endorsed by the Director-General. During the audit, this expert must: (a) consult with OEH and the Department; (b) audit the effectiveness of the odour controls on site in regard to protecting receivers against offensive odour; (c) review the Proponent's production data (that are relevant to the odour audit) and complaint records; (d) review the relevant odour sections of the Air Quality and Greenhouse Gas Management Plan for the project and assess the effectiveness of the odour controls; (e) measure all key odour sources on site including: i. consideration of wet weather conditions providing all raw sampling data used in this analysis; ii. consideration of (but not limited to) all liquid storage areas, active tipping faces, waste cover area, aged waste areas and recirculation of leachate onto waste in the void; and iii. a comparison of the results of these measurements against the predictions in the EA; (f) determine whether the project is complying with the requirements in this approval to protect receivers against offensive odour; (g) outline all reasonable and feasible measures (including a cost/benefit analysis, if required) that may be required to improve odour control at the site; and (h) recommend and prioritise (mandatory and non-mandatory)	3.1.1

<table>
<tr><th>Relevant COC</th><th>Requirement</th><th>AQGGMP Reference</th></tr>
<tr><td></td><td>recommendations for their implementation.</td><td></td></tr>
<tr><td>Sch 4
Cond 8</td><td>The Director-General may vary the frequency of the audit after 5 years depending on the performance of the project and demonstrated compliance with Condition 6 of Schedule 4. This condition is linked to condition 9 in Schedule 5.</td><td>Noted</td></tr>
<tr><td>Sch 4
Cond 9</td><td>Within 6 weeks of the completion of an odour audit, the Proponent shall submit a copy of the audit report to both OEH and the Department with a response to any recommendations contained in the audit report</td><td>Noted</td></tr>
<tr><td>Sch 4
Cond 10</td><td>Unless otherwise directed by the Director-General, the Proponent shall implement all the mandatory odour controls and recommendations of any Independent Odour Audit/s. Recommendations of the first Independent Odour Audit required under this approval shall be implemented prior to the commencement of expanded operations.
This audit must be documented in the Landfill EMP (see condition 3 in schedule 7).</td><td>3.1.1
4.1</td></tr>
<tr><td>Sch 4
Cond 11</td><td>Dust Limits
The Proponent shall ensure that dust generated by the project does not exceed the criteria listed in Tables 3 to 5 at any private residential receiver, or on more than 25 percent of any privately owned land surrounding the site.
Table 3: Long term criteria for particulate matter
<table><tr><th>Pollutant</th><th>Averaging period</th><th>[d]Criterion</th></tr><tr><td>Total suspended particulate (TSP) matter</td><td>Annual</td><td>[a]90 µg/m^3</td></tr><tr><td>Particulate matter < 10 µm (PM_{10})</td><td>Annual</td><td>[a]30 µg/m^3</td></tr></table>
Table 4: Short term criterion for particulate matter
<table><tr><th>Pollutant</th><th>Averaging period</th><th>[d] Criterion</th></tr><tr><td>Particulate matter < 10 µm (PM_{10})</td><td>24 hour</td><td>[a] 50 µg/m^3</td></tr></table>
Table 5: Long term criteria for deposited dust
<table><tr><th>Pollutant</th><th>Averaging period</th><th>Maximum increase in deposited dust level</th><th>Maximum total[1] deposited dust level</th></tr><tr><td>[c]Deposited dust</td><td>Annual</td><td>[b]2 g/m^2/month</td><td>[a]4 g/m^2/month</td></tr></table>
Notes for Tables 3 -5:
□ [a]Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to other sources);
□ [b] Incremental impact (i.e. incremental increase in concentrations due to the project on its own);
□ [c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method; and
□ [d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fire incidents or any other activity agree to by the Director-General in consultation with OEH.</td><td>5.2</td></tr>
<tr><td>Sch 4
Cond 12</td><td>Air Quality Monitoring, Management and Validation
The Proponent shall prepare and implement an Air Quality and Greenhouse Gas Management Plan for the Landfill to the satisfaction of the Director-General. This plan must:</td><td></td></tr>
</table>

Relevant COC	Requirement	AQGGMP Reference
	(a) be prepared in consultation with OEH by a suitably qualified and experienced expert whose appointment has been endorsed by the Director-General; (b) be approved by the Director-General prior to the commencement of expanded operations; (c) describe in detail the measures that would be implemented on site to manage the air quality (particularly odour) and greenhouse gas impacts of the project to ensure compliance with this approval and other relevant statutory controls; (d) include a program for monitoring the air quality impacts of the project, in particular: - LGE specifications and monitoring of LGE emissions against the requirements of the POEO (Clean Air) Regulation 2010 including measures that would be taken to ensure compliance with this regulation; (e) be revised to consider mandatory odour controls and recommendations of any Independent Odour Audit required by this approval; and (f) detail the remedial actions to be taken in the event that a non-compliance is identified. This plan must be documented in the Landfill EMP (see condition 3 in schedule 7).	1.4.1 Noted 4.1, 4.2, 4.3 5.1 3.1.1, 3.2.4 5.1 3.1.1, 4.2 5.3.1
Sch 4 Cond 22	**Meteorological Monitoring** During the life of the project, the Proponent shall ensure that there is a suitable meteorological station in the vicinity of the site that complies with the requirements in the latest version of Approved Methods for Sampling of Air Pollutants in New South Wales guideline.	3.1.4

1.3.2 Veolia's Statement of Commitments

The relevant statement of commitments for air quality and odour made by Veolia and incorporated into the PA consent are detailed in Table 1.2 below

Table 0.2 – PA Statement of Commitments

Mitigation Measure	AQGGMP Reference
Odour control and air quality management at the facility is to be carried out in accordance with the existing Ambient Air Quality Management Plan (AAQMP).	1.1
Veolia will maintain their established odour incident management system. Should any odour complaint be received, these would be recorded with the location, time, odour character and duration. Details of subsequent corrective action would be documented.	5.3
Truck speed and movements onsite would be minimised to reduce wheel generated dust emissions.	4.2
Traffic is restricted to designated sealed access roads within and around	4.2

Mitigation Measure	AQGGMP Reference
the site.	
Waste within the Bioreactor is covered at days end.	4.1
Water carts for dust suppression continue to be utilised as required	4.2
Existing monitoring and reporting requirements of the AAQMP will continue to operate	5.1
Provide odour diaries to local community members to assist in monitoring the occurrence of odour events on the site	1.4.3 4.1

1.3.3 Development Consent (DA-31-02-99)

The relevant COC from the development consent are provided in Table 1.3. Where conditions are similar to the PA, the PA takes precedence.

Table 0.3 – DA Conditions

Relevant COC	Requirement	AQGGMP Reference
29	All containers must be designed, constructed and maintained to prevent the emission of offensive odour and be water tight to prevent the leakage of leachate from waste containers during transport and handling activities. *(EPA GTA)*	Refer to PA (Sch 5, Cond 4)
30	All pressure relief valves on the containers must be designed to meet the environmental requirements of condition 29. *(EPA GTA)*	4.1.2
31	A Quality Assurance Program must be developed and implemented to ensure compliance with Condition 29. The program must include but need not necessarily be limited to the following: … (c) Performance of mechanisms to filter and remove odour where required including cleaning and performance testing;	4.1.2
41	The Applicant shall ensure to the maximum practical extent the quantity of landfill gas that is collected and treated.	3.1.7 4.1
42	The Applicant must ensure that any flare, power station or other proposed landfill gas treatment or beneficial re-use system is designed to provide a destruction efficiency of hydrocarbons, organic air toxics and odours of not less than 98%. *(EPA GTA)* *Note: Emissions of pollutants must comply with the standards of concentrations prescribed in the Clean Air (Plant and Equipment) Regulation 1997.*	3.1.6
43	The flare system must be designed, installed and operated so that hydrocarbons, organic air toxics and odours are destroyed in accordance with Condition 42. The system must be provided with automatic ignition system and automatic shut-off gas valve. Scrubbers or other suitable treatment must be provided if it is required to remove hydrogen sulfide in order to comply with Condition 42. The system must be installed progressively during the operation of the landfill. *(EPA GTA)*	3.1.6 3.1.7
45	The landfill gas extraction and utilisation system must be designed and installed to withstand forces created by the weight and settlement of waste in the landfill.	3.1.7

Relevant COC	Requirement	AQGGMP Reference
46	All pipe work carrying landfill gas adjacent to the haul road must be designed and installed so it is protected from damage as a result of haulage activities. *(EPA GTA)*	3.1.7
71	The sewage management system must be designed, installed and operated to meet the following criteria: … (e) Community Amenity. Unreasonable interference and nuisance to the public, due to odour, dust, insects, and noise above existing background levels and arising from the operation of the waste-water management system must be avoided.	3.1.8
113	There shall be no offensive odour emitted from the premises, in accordance with Section 129 of the Protection of the Environment Act 1997, nor emissions to the atmosphere from the landfill that may adversely affect the health or amenity of the community. *(EPA GTA)*	3.2.1 3.2.2
114	A meteorological station shall be installed and operated on the landfill site in accordance with the following Australian Standards: a. AS 2922-1987 Ambient air - Guide for the siting of sampling units; and b. AS 2923-1987 Ambient air - Guide for measurement of horizontal wind for air quality applications. The meteorological station shall measure and electronically log wind speed, wind direction, ambient temperature, sigma theta (standard deviation of the horizontal wind direction fluctuation), solar radiation. All parameters must be logged at 15-minute intervals to provide 1 hour average values and the station must be able to provide instantaneous wind speed and direction to assist in investigation of complaints. The meteorological station shall also measure rainfall and evaporation. (EPA GTA)	Refer to PA (Sch 4 Cond 22)
116	Activities occurring on the waste management facility site during the construction and operational phases must be carried out in a manner that will minimise emissions of dust from the premises. (EPA GTA)	4.2
117	The Applicant must take all practical steps to manage dust emissions during the construction and operational phase of the waste management facility to minimise off-site impacts of total suspended particulates, lead and dust deposition. (EPA GTA)	4.2
118	The LEMP must detail a system to prevent and suppress all dust emissions to meet the requirements in Conditions 116 and 117. (EPA GTA)	4.2
119	Trucks which are entering and leaving the premises and carrying loads must be sealed or covered at all times, except during loading and unloading. *(EPA GTA)*	4.1
120	All internal permanent roadways between the container transfer area and Collector Road must be sealed. *(EPA GTA)*	4.2
121	All sealed surfaces intended to carry vehicular traffic must be managed to minimise the quantity of wind blown dust emissions. *(EPA GTA)*	4.2
122	All unsealed roads must be treated so that there are no visible dust emissions. Details of treatment measures must be documented in the LEMP.	4.2
123	A progressive rehabilitation strategy must be prepared and implemented for any unsealed areas of the site to prevent both wind blown dust emissions and contaminated stormwater runoff. This strategy must be documented in the LEMP. *(EPA GTA)*	4.2.1

Relevant COC	Requirement	AQGGMP Reference
128	The Application must prepare and implement an odour monitoring plan. The plan must be developed in consultation with the EPA and documented in the LEMP.	Refer to PA (Sch 4 Cond 22)
129	The Applicant must prepare and implement an ambient air quality-monitoring plan. The ambient air quality-monitoring plan must be documented in the LEMP. The plan mist address but may not necessarily be limited to the following: (a) Monitoring methodologies and standards; (b) Monitoring for concentrations of total suspended particulates (TSP), lead and dust deposition rates; (c) Locations where monitoring will be carried out; (d) Detailed monitoring cycle and the duration of each monitoring cycle; and, (e) Reporting. Monitoring is to be carried out in accordance with Approved Methods for the Sampling and Analysis of Air Pollutants NSW December 1999, or other methods stipulated in the EPL.	Refer to PA (Sch 4 Cond 12)
130	The Applicant must prepare and implement a system of monitoring surface and subsurface landfill gas concentrations. Details of the surface and subsurface landfill gas monitoring system must be documented in the LEMP. At a minimum, landfill gas shall be monitored for methane, carbon dioxide, and oxygen. The EPL may require other substances to be monitored.	5.1

1.3.4 Environment Protection Licence

EPL 11436 stipulates the environmental obligations for Veolia under the POEO Act. The relevant conditions to the AQGGMP are provided in Table 1.4.

Table 0.4 – EPL Conditions

Relevant Condition	Requirement	AQGGMP Reference
P1.1	**Subsurface Gas Monitoring – EPA ID 1** GMBH1, as described in Appendix C of the Gas Management Plan in Section 8.10 of the LEMP dated August 2004. E734682 N6117145	5.1
P1.1	**Subsurface Gas Monitoring – EPA ID 2** GMBH2, as described in Appendix C of the Gas Management Plan in Section 8.10 of the LEMP dated August 2004. E734825 N6117674	5.1
P1.1	**Subsurface Gas Monitoring – EPA ID 4** GMBH4, as described in Appendix C of the Gas Management Plan in Section 8.10 of the LEMP dated August 2004. E733786 N6116790	5.1
P1.1	**Landfill Gas Input Monitoring – EPA ID 5** Gas Extraction Booster for Landfill Gas Engine identified in Appendix C of the Gas Management Plan in Section 8.10 of the LEMP dated August 2004. E733786 N6116790	5.1
P1.1	**Surface Gas Monitoring – EPA ID 6** Locations across the surface of the landfilled waste (30m x 30m grid)	5.1

<table>
<tr><th>Relevant Condition</th><th>Requirement</th><th>AQGGMP Reference</th></tr>
<tr><td>P1.1</td><td>Air Discharge – Landfill Gas Flare – EPA ID 7
Landfill Gas Flare. E735012 N6117421</td><td>5.1</td></tr>
<tr><td>P1.1</td><td>Air Discharge – Landfill Gas Engine – EPA ID 8
Landfill Gas Engine Exhaust Point (Module 1). E735002 N6117378</td><td>5.1</td></tr>
<tr><td>P1.1</td><td>Meteorological – EPA ID 9
Meteorological station located at the premises. E734922 N6117469</td><td>5.1</td></tr>
<tr><td>P1.1</td><td>Dust Monitoring – EPA ID 10
DG28 - Pylara, as shown on the map titled Mine Site Ambient Air Monitoring Locations Overall Site, Appendix A to the Ambient Air Quality Monitoring Plan in Section 8.13 of the LEMP dated July 2004. E737459 N6115805</td><td>5.1</td></tr>
<tr><td>P1.1</td><td>Dust Monitoring – EPA ID 11
DG22 as shown on the map titled Mine Site Ambient Air Monitoring Locations Mine Area, Appendix A to the Ambient Air Quality Monitoring Plan in Section 8.13 of the LEMP dated August 2004. E734956 N6116974</td><td>5.1</td></tr>
<tr><td>P1.1</td><td>Dust Monitoring – EPA ID 12
DG24 as shown on the map titled Mine Site Ambient Air Monitoring Locations Mine Area, Appendix A to the Ambient Air Quality Monitoring Plan in Section 8.13 of the LEMP dated August 2004. E733866 N6117237</td><td>5.1</td></tr>
<tr><td>L2.2</td><td>Air Concentration Limits – EPA ID 8
<table>
<tr><th>Pollutant</th><th>Units of measure</th><th>100 percentile concentration limit</th><th>Reference conditions</th><th>Oxygen correction</th><th>Averaging period</th></tr>
<tr><td>Hydrogen Sulfide</td><td>milligrams per cubic metre</td><td>5</td><td></td><td></td><td></td></tr>
<tr><td>Sulfuric acid mist and sulfur trioxide (as SO3)</td><td>milligrams per cubic metre</td><td>100</td><td></td><td></td><td></td></tr>
<tr><td>Nitrogen Oxides</td><td>milligrams per cubic metre</td><td>450</td><td></td><td></td><td></td></tr>
</table></td><td>3.2.4</td></tr>
<tr><td>L2.3</td><td>This condition does not authorise the pollution of air by any pollutant other than those specified in the above tables.</td><td>Noted</td></tr>
<tr><td>L2.4</td><td>The reference bases for the air pollutants specified in condition L2.4 for Point 8 are as follows:
a) For Nitrogen oxides (NO2 and/or NO): dry, 273 K, 101.3 kPa, 7% O2
b) For Sulphuric acid mist (H2SO4) and/or sulphur trioxide (SO3): dry, 273 K, 101.3 kPa.</td><td>Noted</td></tr>
<tr><td>L6.1</td><td>There must be no offensive odour emitted from the premises, in accordance with Section 129 of the Protection of the Environment Operations Act 1997, nor emissions to the atmosphere from the landfill that may adversely affect the health or amenity of the community.</td><td>3.2.1
3.2.2</td></tr>
<tr><td>L6.2</td><td>No condition of this licence identifies a potentially offensive odour for the purposes of Section 129 of the Protection of the Environment Operations</td><td>Noted</td></tr>
</table>

<table>
<tr><th>Relevant Condition</th><th>Requirement</th><th>AQGGMP Reference</th></tr>
<tr><td></td><td>Act 1997.</td><td></td></tr>
<tr><td>O3.1</td><td>All operations and activities occurring at the premises must be carried out in a manner that will minimise dust at the boundary of the premises.</td><td>4.2</td></tr>
<tr><td>O3.2</td><td>All operations and activities occurring at the premises must be carried out in a manner that will minimise off-site impacts of total suspended particulates, lead and dust deposition.</td><td>4.2</td></tr>
<tr><td>O3.3</td><td>Trucks which are entering and leaving the premises and carrying loads must be sealed or covered at all times, except during loading and unloading.</td><td>4.1</td></tr>
<tr><td>O3.4</td><td>All internal roadways between the container transfer area and Collector Road must be sealed, except roadways within the mine void.</td><td>4.2</td></tr>
<tr><td>O3.5</td><td>All surfaces intended to carry vehicular traffic must be managed to minimise the quantity of wind blown dust emissions.</td><td>4.2</td></tr>
<tr><td>O3.6</td><td>All unsealed roads must be treated so that there are no visible dust emissions.</td><td>4.2</td></tr>
<tr><td>O6.15</td><td>The licensee shall ensure that as much landfill gas as is practicable is collected and treated by flaring or beneficially used in the landfill gas fired power station.</td><td>3.1.7
4.1</td></tr>
<tr><td>O6.16</td><td>The flare system must provide a destruction efficiency of volatile organic compounds, air toxics and odours of not less than 98%. The flare must be at ground-level and shrouded. The flare must be provided with automatic combustion air control, automatic shut-off gas valve and automatic re-start system.
Note: The following combinations of minimum performance specifications will be deemed to have achieved a destruction efficiency of 98 per cent. Alternative minimum performance specifications must be justified by the licensee.
<table>
<tr><th>Temperature (K)</th><th>Residence time (seconds)</th><th>Reference</th></tr>
<tr><td>1273 (1000°C</td><td>0.3</td><td>UK Environment Agency Guidance on Landfill Gas Flaring (version 2.1)</td></tr>
<tr><td>933 (760°C)</td><td>0.6</td><td>US South Coast Air Quality Management District's Best Available Control Technology Guidelines (Landfill Gas Flare 17 August 2001)</td></tr>
</table></td><td>3.1.6</td></tr>
<tr><td>O6.17</td><td>The landfill gas fired power station must provide a minimum destruction efficiency of 98% for volatile organic compounds, air toxics and odours, and the discharge point(s) must be designed (ie. Stack height, diameter, discharge velocity etc.) to ensure that the design ground-level concentration criteria specified in the following tables are not exceeded at any location at or beyond the boundary of the premises.</td><td>3.1.6</td></tr>
</table>

<table>
<tr><th>Relevant Condition</th><th>Requirement</th><th>AQGGMP Reference</th></tr>
<tr><td></td><td>
<table>
<tr><th>Pollutant</th><th>Design Ground-Level Concentration Criteria (µg/m3)</th><th>Averaging Time</th><th>Percentile</th></tr>
<tr><td>Sulfuric acid</td><td>33</td><td>3 minute</td><td>99.9</td></tr>
<tr><td>Sulfur dioxide</td><td>571</td><td>1 hour</td><td>99.9</td></tr>
<tr><td>Nitrogen dioxide</td><td>246</td><td>1 hour</td><td>99.9</td></tr>
<tr><td>Hydrogen sulfide</td><td>See following table</td><td>Nose response time</td><td>99</td></tr>
</table>
Note: The hydrogen sulphide glc criteria shall be applied at the nearest existing or likely future off-site sensitive receptor.
<table>
<tr><th>Population of affected community</th><th>glc criterion (µg/m3)</th><th>Averaging Time</th><th>Percentile</th></tr>
<tr><td>Urban (>~2000)</td><td>1.38</td><td>Nose response time</td><td>99</td></tr>
<tr><td>~500</td><td>2.07</td><td>Nose response time</td><td>99</td></tr>
<tr><td>~125</td><td>2.76</td><td>Nose response time</td><td>99</td></tr>
<tr><td>~30</td><td>3.45</td><td>Nose response time</td><td>99</td></tr>
<tr><td>~10</td><td>4.14</td><td>Nose response time</td><td>99</td></tr>
<tr><td>Single residence (<~2)</td><td>4.83</td><td>Nose response time</td><td>99</td></tr>
</table>
</td><td></td></tr>
<tr><td>O6.18</td><td>Prior to installation, the licensee must provide manufacturer's performance guarantees for all plant and equipment, demonstrating to the satisfaction of the EPA that emissions of air pollutants from the flare and landfill gas fired power station will comply with the Protection of the Environment Operations (Clean Air) Regulation 2002 and with the design parameters specified in conditions O5.16 and O5.17. In addition, prior to installation of the landfill gas fired power station, the licensee must carry out dispersion modelling and prepare a report to the satisfaction of the EPA that demonstrates that the stack diameters and heights of the discharge points have been designed in an acceptable manner.</td><td>3.1.6</td></tr>
<tr><td>O6.19</td><td>Any landfill gas condensate must be collected and returned to the leachate recycling system</td><td>noted</td></tr>
<tr><td>O6.20</td><td>The landfill gas extraction and utilisation system must be designed and installed to withstand forces created by the weight and settlement of waste in the landfill.</td><td>3.1.7</td></tr>
<tr><td>O6.21</td><td>All pipework carrying landfill gas adjacent to the haul road must be designed and installed so it is protected from damage as a result of haulage activities.</td><td>3.1.7</td></tr>
<tr><td>M2.2</td><td>Monitoring parameters listed for subsurface gas monitoring – EPA ID 1, 2, 4</td><td>5.1</td></tr>
<tr><td>M2.2</td><td>Monitoring parameters listed for landfill gas input monitoring – EPA ID 5</td><td>5.1</td></tr>
<tr><td>M2.2</td><td>Monitoring parameters listed for surface gas monitoring – EPA ID 6</td><td>5.1</td></tr>
<tr><td>M2.2</td><td>Monitoring parameters listed for air discharge – landfill gas flare – EPA ID 7</td><td>5.1</td></tr>
<tr><td>M2.2</td><td>Monitoring parameters listed for air discharge – landfill gas engine – EPA ID 8</td><td>5.1</td></tr>
<tr><td>M2.2</td><td>Monitoring parameters listed for meteorological – EPA ID 9</td><td>5.1</td></tr>
<tr><td>M2.2</td><td>Monitoring parameters listed for dust monitoring – EPA ID 10</td><td>5.1</td></tr>
<tr><td>M2.2</td><td>Monitoring parameters listed for dust monitoring – EPA ID 11</td><td>5.1</td></tr>
<tr><td>M2.2</td><td>Monitoring parameters listed for dust monitoring – EPA ID 12</td><td>5.1</td></tr>
</table>

<table>
<tr><th>Relevant Condition</th><th>Requirement</th><th>AQGGMP Reference</th></tr>
<tr><td>M4.1</td><td>The licensee must undertake the following monitoring of meteorological parameters in accordance with the methods and frequencies specified in the table below.
Note: All meteorological monitoring done from EPA Point 9.
<table>
<tr><th>Parameter</th><th>Units of Measure</th><th>Averaging Period</th><th>Method</th><th>Frequency</th></tr>
<tr><td>Wind Speed @ 10m</td><td>m/s</td><td>1 hour</td><td>AM-2 & AM-4</td><td>Continuous</td></tr>
<tr><td>Wind Direction @ 10m</td><td>°</td><td>1 hour</td><td>AM-2 & AM-4</td><td>Continuous</td></tr>
<tr><td>Sigma Theta @ 10m</td><td>°</td><td>1 hour</td><td>AM-2 & AM-4</td><td>Continuous</td></tr>
<tr><td>Temperature @ 10m</td><td>K</td><td>1 hour</td><td>AM-4</td><td>Continuous</td></tr>
<tr><td>Temperature @ 2m</td><td>K</td><td>1 hour</td><td>AM-4</td><td>Continuous</td></tr>
<tr><td>Solar Radiation</td><td>W/m2</td><td>1 hour</td><td>AM-4</td><td>Continuous</td></tr>
<tr><td>Rainfall</td><td>mm</td><td>24 hours</td><td>AM-4</td><td>Continuous</td></tr>
</table></td><td>3.1.4</td></tr>
<tr><td>R2.3</td><td>The EPA must be notified within 24 hours if the landfill gas monitoring required by condition M2.1 indicates a methane gas concentration greater than 1.25% (v/v).</td><td>5.3</td></tr>
</table>

1.4 Stakeholder Consultation

Veolia is committed to meaningful stakeholder engagement and has worked in collaboration with relevant government agencies and the local community in the township of Tarago since the commencement of operations of the Bioreactor to resolve issues that impact local environmental amenity, as a result of operations at the Bioreactor.

1.4.1 Government Agencies

Veolia continues to liaise with the following government agencies in relation to air quality associated with the operations of the Bioreactor:

- NSW DPE; and
- NSW EPA.

1.4.2 Community Consultation

Veolia has formed a Community Liaison Committee (CLC), which acts as an interface between the residents of Tarago and Veolia to proactively resolve issues that potentially impact on local amenity from operations at the Bioreactor.

The key objectives of the community focused communication and consultation program include:

- Educating stakeholders regarding key aspects of the Bioreactor; and
- Informing community groups and neighbours to help Veolia understand concerns.

Community consultation activities include:

- A dedicated Veolia webpage, offering general information on the Bioreactor;

- A community telephone line to provide a central point of contact for community enquiries;
- Proving regular updates in the local newspaper, Tarago Times, which is non-profit community service, published monthly by the Tarago Sporting Association Inc. It is distributed throughout Tarago, Lake Bathurst, Mayfield, Boro, Taylors Creek and the surrounding district.
- Active participation in the Tarago and District Progress Association Incorporated (TADPAI), which is a community group aimed at promoting the district and assisting the community in the development and maintenance of a rural lifestyle.

1.4.3 Odour Diaries and Monitoring

Veolia has issued odour diaries to members of the community in order to gain feedback on the scale, frequency and intensity of odour impacts within the community. The diaries were an initiative by Veolia to enable a constant communication channel on this local issue.

The diaries are collected annually and interpreted as part of the independent annual odour audit at the site. The data, combined with targeted monitoring at the site provides a holistic odour analysis at the site. The report once finalised is uploaded to the Veolia website which is publicly available.

Section 2 Goals of AQGGMP

The goals of the AQGGMP is to:

- Detail the measures implemented on site to manage the air quality (particularly odour) and greenhouse gas impacts of the project to ensure compliance with this approval and other relevant statutory controls;
- include a program for monitoring the air quality impacts of the project, in particular:
  - LGE specifications and monitoring of LGE emissions against the requirements of the POEO (Clean Air) Regulation 2010 including measures that would be taken to ensure compliance with this regulation;
- be revised to consider mandatory odour controls and recommendations of any Independent Odour Audit required by this approval; and
- detail the remedial actions to be taken in the event that a non-compliance is identified.
- Detail air quality and greenhouse gas management measures relating to the relevant conditions from DA-31-02-99 and EPL 11436.

2.1 Roles and Responsibilities

Table 2.1 outlines the responsibilities of Veolia personnel with respect to soil and water management.

Table 0.5 – AQGGMP Responsibilities

Action	Responsibility
Overall implementation of the AQGGMP	Woodlawn Facilities Manager and Operational Personnel
Implement methodology for avoiding excessive emissions that may affect ambient air quality	Woodlawn Facilities Manager and Operational Personnel
Coordinate monitoring and compile reports	Woodlawn Environmental Officer
Maintain internal records of monitoring	Woodlawn Environmental Officer
Liaise with community and regulators on air quality	Woodlawn Facilities Manager and/or nominee
Collate and maintain records of complaints, respond to complainant	Woodlawn Facilities Manager and/or nominee
Identify non-conformances and notify Facility Manager/ Safety Health Environment Quality (SHEQ) Representative	Operational Personnel
Authorise and confirm the implementation of mitigation measures	Woodlawn Facilities Manager / SHEQ Representative

Section 3 Existing Environment and Operational Impacts

3.1 Existing Environment

The potential air quality impacts associated with operations of the Bioreactor are attributed to odour, dust, particulate matter and greenhouse emissions. Meteorological conditions can influence where these impacts occur.

3.1.1 Odour

The potential for activities undertaken at the Bioreactor and LTP to generate odour is significant:

Waste

The Bioreactor is eligible to receive up to 1.13 million tpa of waste from Sydney, local Councils and businesses and residual material from the Mechanical Biological Treatment Facility.

Waste is currently transferred in sealed containers until the point of unloading ain the Bioreactor. The waste is landfilled and covered with virgin excavate natural material and/or with an approved alternate daily cover at the end of each day.

Landfill Gas

Landfill gas is generated from the biological decomposition of waste within anaerobic conditions found within the Bioreactor. Odour from landfill gas is comprised from a range of volatile organics compounds, volatile fatty acids and ammonia. Pure landfill gas has been sampled during odour audits and is most significant odour source associated with the Bioreactor.

Landfill gas is collected through extraction from a network of wells, pipes and aggregate drainage layers. The collected gas is transferred for energy generation at the onsite power station or for emissions management through the flares. This process combusts the gas and destroys the odourous compounds.

Landfill gas emissions from the landfill surface occurs where the gas collection system is not optimised. Emissions are generally a fraction of the odour potential of pure landfill gas, although under certain climatic conditions can accumulate at the surface over a period of time before being released to atmosphere.

Landfill gas emissions are currently identified during surface gas monitoring and managed by optimisation of the gas extraction system and maintenance of cover material.

Leachate

Leachate is generated from liquid that comes in contact with the waste. Leachate within the Bioreactor contains high organic loads and high Biological Oxygen Demand (BOD), which results in a highly odourous liquid that needs to be managed appropriately. Raw leachate is the second most significant odour source at the Bioreactor.

Raw leachate is currently either stored within the Bioreactor or extracted for leachate treatment to minimise transmission of odours to atmosphere. Treated leachate is

treated to remove organic loading and reduce BOD so that odour is minimised prior to storing in evaporation ponds. No raw leachate is stored in evaporation ponds.

Veolia engaged The Odour Unit to undertaken an odour modelling assessment for the LTP .The purpose of the assessment was to determine the potential odour impact through continuous treatment of leachate through the MBR facility and storage in ED1.The results of the odour indicated that :

- The modelling projection results demonstrate compliance with the 6 ou odour performance criteria ground level concentration based on 1-hour averaging at the 99.0th percentile frequency at the nearest sensitive receptor
- There is minimal sensitivity to variations in leachate quality of 2, 5 and 10 times above the target design treated leachate quality parameters.
- Veolia is targeting a high quality treated leachate effluent for storage in ED1.
- Veolia's long-term leachate treatment solution (MBR treatment plant option) will not result in any significant increase to off-site odour impacts and will have negligible change on the existing surrounding off-site amenity

Hydrogen Sulphide

Hydrogen sulphide generation occurs due to the presence of sulphur within the Bioreactor, accumulated from runoff from mining activities and waste inputs. Sulphate reducing bacteria convert sulphur to produce hydrogen sulphide. The presence of hydrogen sulphide is variable at the Bioreactor and can be a significant contributor to odour from emissions from the landfill surface.

Hydrogen sulphide ismanaged by optimisation of the gas extraction system, monitoring of incoming waste streams, maintenance of cover material and periodic dosing of metal compounds within the Bioreactor.

Exhaust Emissions

Exhaust emissions relate to the air discharged from the landfill gas engines and flares at the power station. Ineffective operation of the engines can lead to incomplete combustion and discharge of partially combusted landfill gas to atmosphere leading to the emission of odour.

Annual emissions testing, engine tuning, oil changes and preventative maintenance programs are undertaken on the engines to ensure optimum combustion performance is maintained.

Odour Audits

Annual odour audits have been undertaken since 2012 in accordance with the PA. The audits indicate that despite the occurrence of odour complaints, Veolia is performing well in relation to implementing odour mitigation measures at the site. Each year the audit comprises the following:

- Consultation with NSW EPA and NSW DPE, where possible.
- Review of all relevant documentation and procedures to air quality and odour. The approved versions of the AQGGMP and Leachate Management Plan will be presented for the subsequent audit
- Review of odour control measures, landfilling operations, landfill gas management and leachate management processes

- Identification of potential odour sources at the Bioreactor
- Sampling of odour sources and emissions points
- Laboratory testing off odour samples and calculation of odour emission rates
- Comparison of odour emission rates to EA values
- Provision of mandatory and non-mandatory recommendations for Veolia to implement
- Preparation of a report detailing all of the above

Upon finalisation of the report, the report is submitted to EPA and DPE. The report is also publicly available on the Veolia website:

http://www.veolia.com.au/sustainable-solutions/community-development/woodlawn-bioreactor

3.1.2 Dust Deposition

Background dust deposition monitoring is conducted at the Woodlawn site at a number of locations since 2002 (i.e. prior to operations commencing on site in 2004). To determine the likely background dust levels under current operations at the Woodlawn Facility, dust deposition monitoring data from between January 2007 to January 2010 was analysed.

From February 2006 to February 2011, average insoluble matter (g/m^2/month) was 2.6 at “east void” to the east of the Bioreactor, 2.6 at “west void” to the west of the Bioreactor, and 3.9 at Pylara, a neighbouring property. These three locations were considered representative for the determination of ambient conditions across the site.

3.1.3 Particulate Matter

Particulate matter refers to airborne particles typically less than 50 microns (µm) in diameter and ranging down to 0.1µm in size. Particles less than 10 µm and 2.5 µm in diameter and referred to as PM_{10} and $PM_{2.5}$ particles respectively.

Background monitoring of PM_{10} has been conducted on a regular basis at the Pylara site since August 2004. The average concentration at Pylara between August 2004 and November 2007 was $9µg/m^3$.

Following consultation with the EPA, particulate monitoring was removed from the EPL due to the low concentrations recorded.

3.1.4 Meteorology

Meteorological data affects the ambient air quality surrounding the site and may contribute to impacts identified at sensitive receivers. A meteorological station is installed at the site and continuously monitors ambient climatic conditions. Servicing and calibration of sensors is completed quarterly to ensure data remains accurate. Parameters are logged in 15 minute intervals and are averaged and recorded on an hourly basis. Parameters recorded are:

- Average wind speed (Degrees)
- Average wind direction (Degrees)
- Standard deviation (Sigma theta) wind direction (Degrees)

- Maximum wind speed (m/s)
- Temperature at 10m (Kelvin and °C)
- Temperature at 2m (Kelvin and °C)
- Solar Radiation (W/m^2)
- Barometric Pressure
- Relative Humidity (%)
- Total Rainfall (mm)
- Total Evaporation (mm)

Rainfall and evaporation are also summed daily and provided within a daily records sheet.

The meteorological station will continue to operate while Bioreactor operations occur.

3.1.5 Greenhouse Gas Emissions

Greenhouse gas emissions are directly or indirectly contributed by landfill gas emissions, electrical consumption and fuel use. These figures are assessed based on the tonnes of waste received. Greenhouse gas figures for 2015 are summarised in Table 3.1.

Table 2.1 – Greenhouse Gas Impact Assessment (2015 data)

Source	Consumption	tCO_2-e	tCO_2-e/t waste*
Landfill Emissions 205	N/A	22,922	0.04
Diesel Fuel **	2,463 MWh	940	0.002
Electricity	345.6kL	2,070	0.004

* 576,172 tonnes of waste received in 2015

** Does not consider diesel use in trains

A GHG assessment for the leachate treatment plant found that emissions would be negligible with an estimated 420 kg CO2-emissions per year representing less than 0.0000003% of NSW' annual emission rate.

3.1.6 Equipment Specifications

The following equipment specifications are provided which demonstrate the features and standards in relation to air quality.

- The flares and engines are designed to achieve combustion of at least 98% of volatile organic compounds, air toxics (such as hydrogen sulphide) and odourous compounds. Refer to Appendix A-1 for engine specifications and Appendix A-2 for specifications of flares. Manufacturers performance guarantees will be provided to the EPA where alternative engine of flare models are installed to demonstrate the combustion efficiency.
- Veolia utilises 40 foot containers for transportation of waste from Sydney to Woodlawn. The specification of the containers, which provides details on the pressure relief hatch and carbon filter, is provided in Appendix B.

3.1.7 Design of Landfill Gas System

The design of the landfill gas system is to be progressively upgraded and expanded over the life of the Bioreactor operations. The Woodlawn Infrastructure Plan (WIP) documents the short term (generally 1-2 years) of infrastructure development at the Bioreactor. This plan is updated as required to ensure that the Bioreactor has sufficient planning and budget to implement the required landfill gas systems to maximise landfill gas capture.

Landfill gas extraction wells are comprised of steel, where they are planned to be permanent infrastructure. As the waste height rises, flowlines are disconnected and reconnected back over the surface to ensure that settlement and compaction does not impact on these wells.

Landfill gas engines and flares will be purchased in a staged manner to manage the volume of landfill gas extracted.

Main collection lines are trenched or buried under material and offset along haul roads to minimise the potential for damage.

3.1.8 Design of Sewage Management System

All sewerage is collected within a sewage management system. Quarterly servicing and maintenance of the system is carried out in accordance with the licence to ensure that the system is operating efficiently and is not causing odours.

The sewage treatment system is regulated by Goulburn-Mulwaree Council with inspections undertaken following notification. Any follow up actions identified by the Council Officer are addressed as soon as practicable.

The sewage management system is detailed in the Soil and Water Management Plan.

3.2 Predicted Air Quality Impacts

Air quality impacts associated with the Bioreactor were identified within the EA and subsequent independent odour audits are detailed in Table 3.2.

Table 3.2 – Air Quality and Greenhouse Gas Impact Assessment

Issue	Potential Impact	Source	Risk Ranking	Mitigation Measures
Air Quality and Greenhouse Gas emissions	Odour emissions from putrescible waste, landfill gas and leachate	The handling of large quantities of waste, power generation at the power plant using methane, flaring off excess methane gas, storage of the leachate at the facility has potential to result in the emission of odour if not properly managed.	High	Yes
	Methane emissions – Greenhouse gas	Landfill gas emissions releasing methane to atmosphere. Incomplete combustion at landfill gas engines and flares	High	Yes
	Odour	Leachate treated in LTD and LTP	Low	Yes

	emissions from LTP			
	Hydrogen Sulphide – Odour	Generated by sulphur reducing bacteria within anaerobic environments. Sulphur source provided by waste inputs and acid mine drainage waters. Odour and health risk if not managed appropriately	High	Yes
	Air pollutants emitted from vehicles accessing the Site and machinery operating on-site.	The operation of numerous vehicles on the Site including trucks, tipping platforms and other plant and equipment on site, has the potential to result in dust and pollutants reducing ambient air quality if not properly managed.	Low	Yes

3.2.1 Air Quality Criteria

Specific air quality and odour criteria data have been developed for the Bioreactor and are provided in Table 3.3.

Table 1.3 – Air Quality Goals

Parameter	Criteria
Odour	6 OU/m^3
TSP (annual)	90 µg/m^3
Dust Deposition - maximum total	4 g/m^2/month
Dust Deposition - maximum increase	2 g/m^2/month
PM_{10} (Annual)	30 µg/m^3
PM_{10} (24 hour)	50 µg/m^3

3.2.2 Odour Emissions Criteria

The impact of odour generated by the Bioreactor and LTP was calculated in accordance with the equation used by the NSW DECCW, as specified in the Approved Methods. Atmospheric dispersion modelling completed as part of the EA specifies the odour emission rates of the different odour sources identified at the Bioreactor. Odour emissions targets are for continuous improvement and to maintain an overall odour emission rate less than 6 OU/m^3 which indicated that offsite impacts were unlikely to occur.

3.2.3 Particulate matter criteria

The criteria for particulate matter generated by the Bioreactor was taken from:

- DECCW approved methods for PM10 (Annual 30 µg/m^3 or 24 hourly 30 µg/m^3) and Dust Deposition (Total 4 g/m^2/month or increase of 2 g/m^2/month)
- NHMRC at their 92nd session in October 1981 for TSP (90 µg/m^3)

Veolia is committed to achieving these targets on an ongoing basis.

3.2.4 Engine Emissions Criteria

Operation of the landfill gas power station requires management and maintenance of the engines to ensure that contaminants with the exhaust are within defined limits. Compliance limits are set within the EPL and summarised in Table 3.4.

Table 1.4 - EPL Generator Emissions Limits

Pollutant	Units	100% concentration limit
Hydrogen Sulphide	mg/m3	5
Sulfuric acid mist and sulphur trioxide (as SO3)	mg/m3	100
Nitrogen Oxides	mg/m3	450

3.2.5 Greenhouse Gas Criteria

The estimated greenhouse emissions for the project were assessed as part of the EA. The estimated greenhouse gas emissions are provided in Table 3.5.

Table 1.5 Estimated Greenhouse Gas Emissions

Scope	Parameter	Assumed Value (1,130,000 tpa)	Greenhouse Gas Emissions (t CO2-e)
Scope 1	Diesel Consumption	1,566,906 litres	4,228
	Petrol consumption	37,397 litres	89
	Methane contribution (80%)	1,130 ktpa	11,525
	Uncontrolled methane emissions (20%)	1,130 ktpa	226,000
	Oxidation of 10% of uncontrolled methane emissions	1,130 ktpa	2,260
		Subtotal	*244,102*
Scope 2	Electricity Consumption	3,336,721 kWh	2,969
		Subtotal	*2,969*
Scope 3	Diesel consumption on site	1,566,906 litres	322
	Petrol consumption on site	37,397 litres	7
	Diesel consumption in trucks	177,828 litres	36
	Diesel consumption in trains	7,084,800 litres	1,456
		Subtotal	*1,822*
		Total	**248,893**

Section 4 Air Quality and Greenhouse Gas Management Measures

Mitigation measures that have been incorporated into the operations of the Bioreactor to minimise the risk and consequences associated with the key air quality management issues and are summarised below:

- Planned infrastructure instalments within each waste lift;
- Continuous monitoring of leachate and gas extraction;
- Continuous improvement of odour control systems;
- Operation of an effective leachate treatment process;
- The implementation of operational management programs including: leachate management;
- The expansion of wells in the void for improved leachate recirculation and landfill gas extraction;
- Removal of excess sludge from the Leachate Aeration Dam as required;
- Awareness training for site personnel and contractors to ensure their actions contribute to the objectives of the AQGGMP; and
- Significant buffer distances to the nearest sensitive receptor (3km SE to Pylara residences).

4.1 Odour Control Measures

Control measures to minimise the generation of odour include:

- Undertake annual independent odour audits at the Bioreactor to consider and focus odour control measure, identify future control measures, drive continuous improvement with odour management and to identify and characterise odour sources.
- Adoption of mandatory recommendations from the odour audit as odour control strategies. All mandatory actions from the first, second and third odour audits have been implemented successfully and Veolia is actioning recommendations from the most recent audit. Any recommendation from future audits will be actioned appropriately.
- Continued issue of odour diaries to members of the community to assist in understanding of offsite odour emissions.
- An odour complaint logbook is maintained on-site. When odour complaints are received, a Site investigation will be conducted to identify any unusual odour sources within the Site boundary and appropriate action taken as required.
- A report detailing Veolia's response to each complaint is prepared and submitted to the EPA. This report is uploaded onto the Veolia website within 7 days of receipt of a complaint.
- Plan and document development of landfill gas infrastructure, leachate and gas drainage and tipping operations, throughout the life of the operations. This ensures that a plan for future infrastructure developments is aligned with filling to maximise landfill gas capture.

- Monitor and optimise the landfill gas wells to maximise landfill gas capture through the current network.
- Landfill gas and hydrogen sulphide is collected through a dedicated landfill gas extraction network, comprised of wells, pumps, pipes and moisture removal points. The collected gases are preferentially combusted for energy production at the onsite power station or flared where required. This process controls the release of fugitive emissions.
- Specifically allocate expenditure each year for implementation of odour control measures
- The wheel wash ensures that trucks leaving the site minimise the transport of material with the potential to generate odours into the surrounds.
- All waste loads are covered or contained until the tipping within the Bioreactor.
- The landfilled waste is covered daily with depths in accordance with the requirements of the EPL.
- Compaction of waste assists in suppressing the generation of odours.
- Awareness training for site personnel for techniques to minimise odour generation.
- Application of sulphate reducing measures, which may include chemical or metal dosing, screening and monitoring of local waste.

4.1.1 Leachate Treatment and Storage

Leachate treatment and storage is an integral odour management measure at the Bioreactor. The odour measures are detailed below and the operational process is described in further detail in the Leachate Management Plan.

- Operation of the LTP, which is capable of treating excess leachate extracted from the Bioreactor to a higher quality effluent, to minimise odour emissions from treated leachate stores
- The Sludge skid bins at LTP are covered to minimise odour emissions
- Frequent monitoring of the leachate treatment process to ensure treatment criteria are being achieved and maintained.
- Periodic assessment of odour emissions from treated leachate storages onsite
- No storage on untreated leachate occurs in onsite storage ponds
- Treated leachate stored onsite is equivalent to or less than the modelled odour emission rate identified in the EA.
- Open evaporation of leachate has only been undertaken for treated leachate

4.1.2 Container Maintenance

Containers are inspected at all key areas of Veolia's operations, including:

- During tipping at the Bioreactor;
- During unloading and loading at the Intermodal Facility; and
- During unloading, loading, storage or compacting at the Sydney Transfer Terminals.

Inspections and maintenance actions are detailed in Appendix C.

Where a container is suspected to be compromised at the Bioreactor, the following process will be followed:

- An incident is logged and recorded in Veolia's incident management system
- An action will be assigned to the relevant personnel to undertake the appropriate repairs the container.
- Temporary repairs or containment will be applied so that any waste can be emptied at the Bioreactor, if required
- The container is and then stored for cleaning and maintenance.

4.2 Particulate Matter Control Measures

The assessment of particulate matter emissions indicated that the scale of emissions generated during the operation of the Bioreactor facility are minor, and provided that reasonable dust controls are implemented and managed in an appropriate manner, there would not be any discernible effect at any off-site receptor above that for the existing levels. Control measures include:

- All trucks entering and leaving the premises carrying loads must be covered at all times, except during loading and unloading.
- Truck speed and movements on-site are minimised as much as practicable, with speed limits no greater than 40km/h.
- The sealed haul road within the Bioreactor is maintained to the waste surface and used as the main thoroughfare for traffic.
- A water cart is used on access roads to suppress and/or clear dust, as required.
- The wheel wash ensures that trucks travelling from the Bioreactor to the intermodal facility minimise the transport of particulate matter into the surrounds.
- Any construction works onsite have specific controls implemented to minimise the potential for generation of dust.
- Maintenance of plant and equipment, including the transfer trucks is undertaken routinely.
- Awareness training of site personnel for measures to minimise dust generation.
- Review of any complaints received relating to dust and reports from monitoring conducted as a result.
- Monthly toolbox meetings to discuss any safety and compliance issues, including dust, that have arisen since the previous meeting.

4.2.1 Unsealed Road Rehabilitation Strategy

The only unsealed road within the Bioreactor operational area extends from the top of the Bioreactor to evaporation dam 3. Due to transfer of materials using dump trucks and excavators sealing of this road is not feasible until operations have ceased. A rehabilitation strategy, where required, will be outlined in the closure plan for the site.

4.3 Greenhouse Gas Control Measures

Veolia commits to adopting the following energy saving measures, where feasible, for operation of the Woodlawn to minimise GHG emissions:

- Landfill gas collection is prioritised at the site and has a dedicated operational team to optimise collection.
- Plan and document development of landfill gas infrastructure, leachate and gas drainage and tipping operations.
- An appropriate budget for maintenance and implementation of the system is set on an annual basis.
- All landfill gas is preferentially directed to the onsite power station for the generation of green electricity.
- Undertake monitoring of emission pathways to determine effectiveness of landfill gas capture systems.
- Landfill gas generators are tuned and tested to demonstrate compliance with exhaust limit criteria.
- The transfer of waste by rail from Sydney, via the IMF, will continue as a more emission friendly waste transport option.
- All non-essential lighting at the site is switched off at the conclusion of each day of operations.
- Energy efficient lighting is considered for all new installatons
- Use of a hybrid excavator onsite focusing on loading activities to reduce fuel use.
- Energy efficiency ratings considered for major plant and equipment within Veolia's procurement processes
- Solar powered equipment are considered and adopted, if feasible, when purchasing new equipment.
- Replacement of infrastructure and equipment with more energy efficient items.

Section 5 Air Quality Monitoring and Reporting

Veolia undertakes monitoring in accordance with the requirements in EPL 11436 and PA 10_0012. Operational monitoring is also routinely undertaken.

5.1 Monitoring Program

5.1.1 EPL Monitoring Requirements

Monitoring required under EPL 11436 is detailed in Table 5.1

Table 1.6 – EPL Monitoring Schedule

Parameter	Monitoring Location(s)	Frequency
Methane (%) Carbon Dioxide (%) Oxygen (%)	GMBH1 GMBH2 GMBH4	Quarterly
Methane (%)	Landfill surface (surface emissions)	Quarterly
Carbon Dioxide Dry Gas Density Moisture Content Molecular Weight of Stack Gases Oxygen Temperature Volatile Organic Compounds Volumetric Flow Rate	Landfill Gas Extraction Booster	Annual
Temperature Residence Time	Landfill Gas Flare	Annual
Carbon Dioxide Dry Gas Density Moisture Content Nitrous Oxides Oxygen Hydrogen Sulphide Sulphuric Acid mist and/or sulphur trioxide Temperature Volatile Organic Compounds Velocity Volumetric flow rate Carbon Monoxide Molecular Weight of Stack Gases	Landfill Gas Engine 1 - Exhaust	Annual
Particulates – Deposited Matter	DG 22 – West Void DG 34 – Behind core shed (East void)	Monthly

	DG 28 – Pylara	

5.1.2 PA Monitoring Requirements

To demonstrate compliance with Schedule 4, Condition 11 an initial particulate matter program will be undertaken for a period of 3 months following the commencement of the expanded operations to demonstrate that the criteria are being met. Following this period, further particulate matter monitoring program consisting of TSP and $PM_{(10)}$ will be undertaken, if:

- Consecutive exceedances are detected in depositional dust monitoring; or
- Based on feedback from community meetings; or
- A dust related complaint is received.

Monitoring of TSP and $PM_{(10)}$ will be completed in accordance with:

- TSP – AS/NZS 3580.9.3:2003 (R2014); and
- $PM_{(10)}$ – AS/NZS 3580.9.6:2015

Each monitoring location (refer to Table 5.2) will be monitored in a monthly sequence. Every 6th day at the current location a sample will be collected, excluding non-operational days. Where the sampling day falls on a non-operational day, the next sample will be taken on the following day of operations.

Table 1.7 – PA Monitoring Schedule

Parameter	Monitoring Location(s)	Frequency
Odour Emission	As defined by Independent odour auditor	Annual
TSP $PM_{(10)}$ Particulates – Deposited Matter	Pylara Torokina	Every 6 days (operational days only)

5.1.3 Operational Monitoring

Operational monitoring is detailed in Table 5.3.

Table 1.8 – Operational Monitoring Schedule

Parameter	Monitoring Location(s)	Frequency
Methane (%) Carbon Dioxide (%) Oxygen (%) Hydrogen Sulphide (ppm) Carbon Monoxide (ppm)	Leachate/gas extraction wells, manifolds and collection lines	Weekly, or as required
Methane (%) Carbon Dioxide (%) Oxygen (%) Hydrogen Sulphide (ppm) (power station only)	Flare and Power Station	Continuous, while operating

Flow (m3)		

5.2 Performance Reporting and Review

All monitoring data collected is presented in a consolidated Annual Environmental Management Report (AEMR) which is submitted to DPE, EPA and other relevant stakeholders. Where performance reporting is required, the EPL stipulates that all relevant data and information pertaining to environmental monitoring must be recorded and maintained on site, including but not limited to:

- Sampling dates, times and name of sampler;
- Chain of Custody, analysis and results;
- Complaints received and corrective actions taken; and
- Copy of the EPL, development consent and other relevant approvals.

The monitoring data is used to review and identify any exceedances against the adapted goals with the appropriate corrective actions applied as discussed below.

5.3 Exceedances and Corrective Actions

All incidents are reported and investigated, and corrective actions assigned to prevent future occurrences. In the event that methane is detected in subsurface gas wells exceeding 1.25% (v/v), Veolia will notify the EPA within 24 hours.

An incident may involve any action or activity deemed to be in non-compliance with this AQGGMP or other management plans. All incident reporting will be recorded in RIVO, which forms part of Veolia's NIMS.

5.3.1 Remedial Actions

Where a non-compliance is identified, Veolia will:

- Prepare a written report for submission to the DPE and EPA outlining:
  - The date, time and duration of the incident;
  - A description of the nature of the odour;
  - The meteorological conditions prevailing at the time of the incident;
  - The location(s) of the place where the complainant was at the time of the incident;
  - The circumstances in which the incident occurred (including the cause, if known);
  - Time and date stamped photographs of the active landfill cell showing intermediate and daily cover (if relevant to complaint);
  - The action taken or proposed to be taken to deal with the incident, including follow-up contact with any complainants;
  - Details of any measures taken or proposed to be taken to prevent or mitigate against a recurrence of such an incident; and
  - The current level of leachate in each pond (if relevant to complaint).

Where a complaint is receive relating to air quality, then the report will be uploaded onto Veolia's website within 7 days of receipt of the complaint.

5.4 Publishing of Monitoring Data

Where required, Veolia publishes the results of any environmental monitoring required under the EPL on the following website:

http://www.veolia.com.au/sustainable-solutions/environmental-compliance/nsw-environmental-monitoring-data

References

1. AS/NZS 3580.9.3:2003 (R2014). *Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - Total suspended particulate matter (TSP) - High volume sampler gravimetric method*
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5. The Odour Unit (2012). *Woodlawn Bioreactor Expansion Project – Independent Odour Audit*
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10. The Odour Unit (2017). Woodlawn Bioreactor Expansion Project – Independent Odour Audit
11. URS (2010). *Environmental Assessment Woodlawn Expansion Project*
12. Veolia (2016). *Woodlawn Infrastructure Plan*
13. Veolia (2016) Long-Term Leachate Treatment Solution Submission Report

Appendices

Appendix A-1 – Engine Specifications

Appendix A-2 – Flare Specifications

Appendix B – Container Specifications

Appendix C – Container Inspection and Maintenance Actions