Government of Western Australia
Department of Water and Environmental Regulation

Amendment Notice 2

Licence Holder	A. Richards Pty Ltd
ACN	008 734 852
Licence Number	L7391/1999/9
File Number:	DEC3864
Premises	Amazon Soils and Landscaping Supplies 206 Wesco Road NOWERGUP WA 6032 Part Lot 12738 on Plan 193226
Date of amendment	9 February 2018

Amendment

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended the above Licence in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act), as set out in this Amendment Notice. This Amendment Notice constitutes written notice of the amendment in accordance with section 59B(9) of the EP Act.

Date signed: 9 February 2018

Ruth Dowd

Senior Manager Industry Regulation - Waste Industries

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA).

Amendment Notice

This amendment is made pursuant to section 59 of the *Environmental Protection Act* 1986 (EP Act) to amend the licence issued under the EP Act for a prescribed premises as set out below. This notice of amendment is given under section 59B(9) of the EP Act.

The following DWER Guidance Statements have informed the decision made on this amendment*:*

- *Guidance Statement: Regulatory Principles* (July 2015)
- *Guidance Statement: Setting Conditions* (October 2015)
- *Guidance Statement: Land Use Planning* (February 2017)
- *Guidance Statement: Decision Making* (November 2016)
- *Guidance Statement: Risk Assessment* (November 2016)
- *Guidance Statement: Environmental Siting* (November 2016)

1. Amendment Description

A. Richards Pty Ltd (the Licence Holder) was granted amended licence (L7391/1999/9) on 22 October 2015 to amend the waste acceptance criteria. It was again amended on 29 April 2016 to extend the licence expiry date to 5 October 2033 in accordance with DWER's Guidance Statement: *Licence Duration* (revised August 2016).

Amendment Notice 1 was granted on 17 November 2016 to reflect the correct waste types received at the premises and to amend the prescribed premises boundary.

This Amendment Notice 2 is the result of a Licence Holder initiated amendment to include category 61 to the licence. On 10 April 2017, the Licence Holder submitted an amendment application to request the acceptance of liquid waste (digestate from their Jandakot anaerobic digestion plant) for use in the composting process. Following a request from the Delegated Officer on 13 April 2017, supplementary information was received on 3 May 2017.

Table 1 outlines the Licence Holder proposed changes to the licence.

Table 1: Proposed throughput capacity changes requested in amendment

Category	Current Throughput Capacity	Proposed Throughput Capacity	Description of proposed amendment
61	N/A	15,560	Inclusion of category 61 (liquid waste facility)

DWER has also initiated amendments to include peat and sand onto the licence as authorised waste types accepted for the composting and soil blending activities.

The various changes to the licence in regards to both the Licence Holder and DWER initiated amendments are outlined in the 'Decision' and 'Amendment' sections of this document.

2. Other approvals

The Licence Holder has provided the following information relating to other approvals as outlined in Table 2.

Table 2: Relevant approvals

Legislation	Number	Approval
Town Planning and Development Act 1928 (now replaced by the *Planning and Development Act 2005)*	Application No. 6247; Letter No. 714421; File No. 30/1316	Granted to the Water Corporation (Land Owner) by the City of Wanneroo (City) on 18 July 1997 for the use of a biosolids and composting facility. This approval expires 30 June 2018 unless additional approval has been approved by the City.
Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974	Approval No. F-AA 11850	Granted by the Department of Health for unrestricted use until 1 May 2022.
Rights in Water and Irrigation Act 1914	Approval No. GWL166289(2)	Granted to the Licence Holder for the annual abstraction of 70,000kL water from the Wanneroo, Perth-Superficial Swan resource valid until 12 September 2023.

Biosecurity and Agriculture Management Act 2007

As the Premises is situated within the City of Wanneroo, it is subject to the *Biosecurity and Agriculture Management (Stable Fly) Management Plan 2016* which prohibits the storage and transport of poultry manure which has not been treated to AS 4454, or a measure approved under the *Biosecurity and Agriculture Management Act 2007*.

Advice from the Department of Primary Industries and Regional Development (DPIRD) indicates that no approval has been granted by DPIRD to accept this manure.

The Licence Holder has submitted an application to DPIRD for acceptance of untreated poultry manure and has ceased to accept any untreated poultry manure until DPIRD approval has been granted, or the manure has been treated by composting to AS 4454.

Contaminated Sites Act 2004

Given the elevated levels of nitrogen detected from a groundwater monitoring bore in close proximity to the Premises, this Premises and the adjacent Water Corporation biosolids storage facility have been referred to DWER's Contaminated Sites Branch for consideration.

3. Location, environmental siting and potential receptors

3.1 Sensitive land uses

Table 3 below lists the relevant sensitive land uses in the vicinity of the prescribed premises which may be receptors relevant to the proposed amendment.

Table 3: Receptors and distance from prescribed premises

Residential and sensitive premises	Distance from Prescribed Premises
Residential	Closest property is 1.5km west, south-west of the prescribed premises boundary

3.2 Environmental receptors

Table 4 below lists the relevant environmental receptors in the vicinity of the prescribed premises which may be receptors relevant to the proposed amendment.

Table 4: Environmental receptors and distance from prescribed premises

Environmental receptors	Distance from Prescribed Premises
Bush Forever Areas	Closest area is located 100m north-east of the prescribed premises boundary, located up hydraulic gradient.
Carnabys Cockatoo Confirmed Breeding Area	730m north-west of the prescribed premises boundary
Carnabys Cockatoo Roosting Area	1.8km south-east of the prescribed premises boundary

The Water Corporation is the landowner of the site and Amazon shares Lot 12378 with Water Corporation's licensed category 62 (solid waste depot) Nowergup Biosolids Facility (L7309/1997/10). DWER's GIS mapping system has provided confirmation that the Licence Holder holds a lease with the Water Corporation for this premises.

3.3 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 5.

Table 5: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental value
Priority 1 Public Drinking Water Source Area (PDWSA)	1.2km east of the prescribed premises boundary	Water is used for potable, domestic and agricultural purposes. The closest production bore within this PDWSA are located 4.8km from the Premises.
Priority 3 PDWSA	2.7km south-west of the prescribed premises boundary	Water is used for potable domestic and agricultural purposes.
Lake Neerabup	2.4km south-west (cross hydraulic gradient) of the prescribed premises boundary	This Lake is within Bush Forever site 383 - Neerabup National Park, Lake Nowergup (Neerabup) Nature Reserve and adjacent bushland (Parks and reserves of Yanchep and Neerabup, Management Plan 76, 212, published by the Department of Environment and Conservation). This lake is groundwater fed.
Lake Nowergup	2.5km west, north-west (cross hydraulic gradient) of the prescribed premises boundary	This lake is on the Register of the National Estate due to its ecological value and significant aquatic invertebrates. This Lake is within Bush Forever site 383 - Neerabup National Park, Lake Nowergup (Neerabup) Nature Reserve and adjacent bushland (Parks and reserves of Yanchep and Neerabup,

		Management Plan 76, 212, published by the Department of Environment and Conservation) This lake is groundwater fed.
Lake Pinjar	3.7km north, north-west of the prescribed premises boundary	Lake Pinjar is situated within Bush Forever Area (number not assigned). It is assumed to be groundwater fed.
Groundwater	Depth to groundwater encountered at approximately 34.5 mbgl. Bores are located immediately adjacent to the Premises. There are approximately 20 bores within a 1.5km radius and there are many additional bores located down gradient in the residential and agricultural areas (based on available GIS dataset –WIN Groundwater Sites).	Water is considered to be fresh and is used for domestic and agricultural purposes at market gardens and turf farms located 750m west of the Premises

DWER's online mapping system, Perth Groundwater Atlas (PGA), indicates that groundwater is located 39.5m below ground level (bgl) and may have a total dissolved solids (TDS) concentration between 250 – 500 mg/L, which is considered to be fresh and has a beneficial use for drinking water and irrigation. The inferred groundwater flow is west to south-westerly.

The premises is not within any Public Drinking Water Source Areas (PDWSA) however a Priority 1 PDWSA is located 1.2km east of the site (up hydraulic gradient) and a Priority 3 PDWSA is located 2.7km south-west (down hydraulic gradient) of the Premises.

A series of Water Corporation production bores are located within the Priority 3 PDWSA commencing approximately 4.7km west, south-west of the premises. Other groundwater bores for domestic and agricultural use are located within the vicinity of the Premises as identified in Table 5 above.

Groundwater monitoring undertaken as part of the Nowergup Biosolids Facility licence which is adjacent to the Premises identified groundwater between 19.82 mAHD (January 2015) and 22.06 mAHD (June 2015). This gives an indication that the maximum local groundwater levels are likely to lower than PGA's regional value of 25 mAHD. It is assumed to be approximately 34.5 mbgl.

Although no groundwater monitoring has previously been required to be undertaken at the Amazon premises, data obtained as part of the licence requirements for the neighbouring Nowergup Biosolids Facility indicates elevated levels of nitrogen (up to 24 mg/L compared to the trigger level of 2 mg/L recommended in the Department's *Assessment and management of contaminated sites, Contaminated sites guidelines,* December 2014 "Contaminated Sites Guideline") and phosphorus (up to 590 µg/L compared to recommended Contaminated Sites Guideline value of 200 µg/L) which may be indicative of leachate infiltration at either or both the Amazon and the Nowergup Biosolids Facility.

3.3.1 Technical Expert Report

DWER's Groundwater Expert prepared a Technical Expert Report regarding impacts to groundwater quality from the inclusion of digestate at the Premises (Groundwater Report).

The Groundwater Report considered the information provided as part of the licence amendment application, including supplementary information, as well as available groundwater monitoring data obtained by DWER as part of the Nowergup Biosolids Facility licence requirements.

The Groundwater Report is attached as Appendix 3 and is summarised by the key findings below. The Delegated Officer has considered the findings of the Groundwater Report as well as considering the leachate feedstock risk, soil type, groundwater classification and depth to groundwater as part of this Amendment Notice. The Delegated Officer considers that a hardstand of low permeability is equal to or less than 1 x 10^{-8} m/s.

Key findings

The Delegated Officer has reviewed the information regarding impacts to groundwater from the application of digestate and has found:

1. *The main contaminants likely to result from digestate are nitrogen (including ammonia) and phosphorus.*
2. *The permeability of the composting hardstand is considered moderate.*
3. *A low permeability concrete mixing area with bunding should be constructed as soon as possible.*
4. *Based on the limited available information for groundwater at the Premises, the estimated travel time for contaminants to reach groundwater, based on a worst case scenario, is approximately 46 days. Impacts to groundwater quality may not be identified for several months.*
5. *Three additional groundwater monitoring bores are to be installed down-gradient to detect any potential impacts from site operations.*
6. *Further integrity testing of the leachate pond may be considered once the data from groundwater monitoring has been provided.*
7. *Groundwater investigation levels for total nitrogen and total phosphorus could be set at 5.0 mg/L and 1.0 mg/L respectively.*

3.4 Surface Water

The nearest surface water bodies are located 2.4km (Lake Neerabup) and 2.5km north-west (Lake Nowergup) of the premises. These Lakes do not appear to be hydraulically down gradient of the site. The Indian Ocean is located approximately 8km west of the site.

4. Surface Geology

PGA identified the surface geology to be Tamala Limestone: predominantly calcarenite. The document *Perth Basin Geology Review and Site Class Assessment* (McPherson and A. Jones, 2005 Geosciences Australia) also details surface geology to consist of "Tamala Limestone: leached yellow sand/eolian calcarenite." This geology may contain karstic structures.

5. Wind direction and strength

The following wind roses (Figure 1) provide the annual wind direction and strength (km/h) for the periods 9am and 3pm between the years 1996 to 2010 (most recent data available) The Bureau of Meteorology (BoM) provides the 9am and 3pm wind speed and direction for the Gingin Aero station (station number 009178), which is the closest meteorological data station.

The region has a dominant annual wind direction consisting of easterly winds during morning and south westerly winds in the afternoon. The morning easterly winds may convey any odours from the composting facility to the nearest residence. It is important to note that these wind roses shows historical wind speed and wind direction data for the Gingin area and should not be used to predict future data.

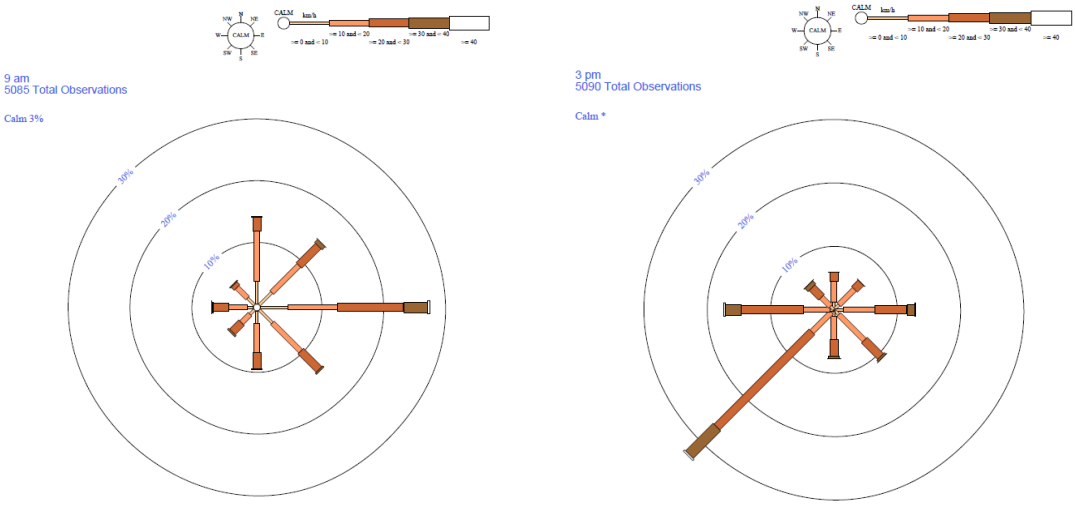


Figure 1: Wind rose for Gingin Aero at 9am and 3pm (1996 – 2010)

6. Premises Infrastructure

6.1 Composting hardstand

A permeability test was undertaken by Structerre Consulting Engineers in May 2014 at the request of the Department. Four boreholes were drilled to a depth of 2m for soil profiling and four in-situ percolation tests were undertaken to determine the permeability of soil within the upper 2m at the locations identified in Figure 2 below.

Figure 2: location of the permeability tests

The results of the testing are depicted in Table 6 below.

Table 6: soil profile and permeability results

Test Location	Testing Depth (m)	Soil Type	Permeability (m/sec)
Perc 1	2.0	LIMESTONE	6.9×10^{-6}
Perc 2	2.0	LIMESTONE	6.1×10^{-6}
Perc 3	2.0	LIMESTONE	1.8×10^{-5}
Perc 4	2.0	LIMESTONE	1.4×10^{-5}

The bore logs identified the soil profile as consisting of sand-gravel.

Based on the results of the soil profile and permeability test, the composting hardstand appears to be moderately permeable allowing for the drainage of liquids through the infrastructure.

6.2 Leachate pond

There is one leachate pond on the premises approximately 96m long, 40m wide and 2.6m deep from the uppermost embankment to the bottom of the pond. This equates to a capacity of 8,832m^3 while maintaining a 300mm freeboard as required under the Licence.

Based on information provided with this amendment application, the pond has been constructed with a synthetic liner underlain by 200mm of compacted gravel material and 400mm compacted fill (sand) material.

David Willis and Associates, consulting engineers, undertook an inspection of the pond in August 2014. The inspection identified that the pond is lined within a 1mm PVC liner which

David Willis and Associates stated “typically has a permeability of less than 10^{-9} m/s.” The inspection identified that some repairs above water level had been undertaken and there did not appear to be tears in the liner.

A leakage test was also undertaken between 29 April 2014 and 6 May 2014 by David Willis and Associates. The report states: *“no leaking is evident through the sump liner, and therefore the permeability of the liner is less than10^{-9} m/s.”*

The Licence Holder has an agreement with the Water Corporation to transfer excess leachate pond water from the Amazon site to the Nowergup Biosolids Facility leachate pond. Based on information provided with the amendment application, this has only occurred twice in the past 13 years. There have been no known integrity tests undertaken for this liner.

The approximate specifications of the Nowergup Biosolids Facility pond are as follows:

- 50m long;
- 26m wide;
- 2m Deep;
- 2,210m^3 maximum capacity (with 300mm freeboard)

The Nowergup Biosolids licence does not authorise the acceptance of the leachate pond water and acceptance may breach the conditions of the licence and the *Environmental Protection (Unauthorised Discharges) Regulations 2004* (Unauthorised Discharges Regulations). If it is the intent of both parties to receive leachate pond water, the Water Corporation will need to apply for a licence amendment to allow this liquid waste supported by documentation as required to mitigate risk from emissions.

7. Water Balance

A water balance has been undertaken as part of the amendment request and provided to DWER as part of the application supporting documentation. The water balance provided was undertaken for the 1.9 ha of the site proposed to be used for the application of digestate and storage of digestate blended green waste windrows. The calculations for the water balance were not provided.

DWER completed additional water balance calculations using the information provided by the Licence Holder as well as information determined as part of this amendment process. DWER’s water balance calculations for the digestate area and the whole of site are attached as Appendices 4 and 5. The main differences between the provided water balance data and DWER’s calculations are:

- Hardstand area: 1.9 ha for provided data (based on processing area for digestate application); DWER calculated 8.6 ha (whole of site including the digestate processing area);
- Annual rainfall: 14,612.76 m^3 provided however it is not clear how this data was used to calculate volume entering pond; DWER calculations have assumed an annual rainfall of 638.7mm (information provided by the Bureau of Meteorology (BOM)) which equates to 57,380.81m^3 over the pond and hardstand surface areas (depicted in Appendix 3);
- Evaporation: 5,900m^3 provided in application; DWER calculated 7,901.952m^3 which was based on information provided by BOM; and
- Inputs and water reuse based on DWER calculations.

DWER has assumed a ratio of 1kL of liquid needed per 0.6 tonnes (1 m^3) of compost produced to calculate the total volume of liquid needed for compost process. DWER has calculated that approximately 45,360 tonnes of compost will be produced annually, based on the feedstock volumes provided in the application supporting documentation, which equates to

approximately 65,000 tonnes/year (excluding digestate process) of feedstock with an output reduction by 30% (by weight). The total volume of liquid needed for existing operations equates to 75,600 kL for 45,360 tonnes of compost. This figure has been determined using the calculation of liquid needed for existing operations (75,600 kL liquid calculated in section 9 below).

The total amount of leachate reused equates to 63,420 kL per year when including the leachate reused in both the existing and proposed digestate blending operations (as per calculation of 10,500 kL in section 8 below).

Based on DWER's calculations (screenshot of Excel calculation provided in Appendix 4), more liquids are required for the composting processes than is currently available within the pond on an annual basis and that there is a deficiency of approximately 4,231.14 kL of water per year. Based on these estimated figures, it appears that the current leachate pond has sufficient capacity to service both the existing and proposed operations. However, it is noted that DWER's calculation does not incorporate the volume of bore water that is being pumped into the leachate pond.

DWER officers were advised during the site visit on 8 May 2017 that bore water needed to be pumped into the leachate pond to manage pressure from the artesian bore. This simplistic water balance assessment does not consider seasonal fluctuations which may result in reduced/insufficient pond capacity during winter months when rainfall is increased. This calculation is approximate in nature and has been determined using the information available at the time of the assessment.

It is noted that DWER does not have full water balance calculations from the Licence Holder for the whole of site operations. The Licence Holder has committed to undertaking a detailed water balance for the whole of the site within the next 3 to 6 months.

During site discussions between DWER officers and the Licence Holder's representative on 1 June 2017, DWER officers advised that the whole of site operations would need to be assessed in regards to impacts to groundwater. The discussion highlighted that results from groundwater monitoring and the whole of site water balance calculation would be used to determine what, if any, actions would be undertaken to address the risk of leachate emissions from the existing operations.

The Licence Holder has proposed the following measures for pond management:

- Depth marker installed in pond;
  Monthly measurements of pond capacity by onsite staff;
- Leachate extraction for use in operations;
- Discussions with Water Corporation to address DWER's concerns in regards to using the Nowergup Biosolids pond in the event of reaching pond capacity.

In the event that the pond is reaching capacity, the Licence Holder will be required to take proactive steps, such as organising offsite removal of the leachate or ceasing to accept digestate, to prevent pond overflow. The Unauthorised Discharges Regulations may apply for any overflow incidents.

8. Digestate required for process

The Delegated Officer has considered the liquid waste requirements for the standalone composting area for digestate which has been undertaken via a desktop assessment. This calculation was been undertaken to determine the required liquid inputs and not the nutrient input requirements. It is noted that digestate application can be used for both the nutrient and

moisture requirements of the compost however for the purposes of this assessment, only liquids have been considered.

The amendment application proposes to accept 14,560 tonnes/year of digestate and 18,200 tonnes/year of green waste to blend with the digestate. It is assumed that during summer, the moisture content of the green waste is 30% (by weight) and 40% (by weight) in winter, as provided by the Licence Holder. An average of 35% moisture content by weight has been used for this assessment to incorporate the varying moisture contents during the summer and winter periods. The licence amendment application has stated a moisture content of 95% for digestate.

It is assumed that 1 tonne of green waste received at the Premises = 0.35 tonnes moisture (at 35%) and 1 tonne of digestate = 0.95 tonnes moisture (at 95%). DWER has assumed that the optimal input of moisture content for green waste is 60% which has been determined in reference to the moisture content assigned at similar facilities, as well as published documentation for composting guidelines around Australia. It is assumed that 1 tonne of green waste = 0.6 tonnes moisture at the optimal level (60%).

In order to bring the moisture content of the green waste to the optimal level of 60% at the initial mixing phase, an additional 0.25 tonnes of moisture input is required per 1 tonne of green waste. DWER calculated that 0.263 tonnes of digestate is required for the additional 25% moisture content at the initial mixing phase. The daily input of digestate equates to 12.5 tonnes per 50 tonnes of green waste. This equals an annual input of 4,550 tonnes.

Based on the proposed weight of 40 tonnes per day of digestate as requested in the licence amendment application, there will be an excess of 27.42 tonnes/day (10,010 tonnes/year), resulting in oversaturation of the green waste. Oversaturation may result in leachate infiltration through the hardstand or from surface run-off, as well as generating offensive odours as excessive moisture content is likely to cause the green waste to become anaerobic.

In order to calculate water balance above in section 7, DWER has calculated the amount of leachate pond water and bore water required for the annual input of 18,200 tonnes of green waste. As advised by the Licence Holder and as used in similar composting facilities, the solid component of the feedstock will reduce by approximately 30% for the final composting product. Given that the digestate has a 5% solid component, as provided by the Licence Holder, the annual tonnage for the compost blend is approximately 18,427.5 tonnes, based on the 18,000 tonnes of green waste and 227.5 tonnes of solids from digestate (5% of 4,550 tonnes). Based on the proposed 18,427.5 tonnes/year of green waste/digestate mix, the amount of compost produced is approximately 12,900 tonnes/year.

DWER has assumed a ratio of 1kL liquid = 0.6 tonnes of compost produced. DWER has calculated that 21,500 kL of liquid is required to produce 12,900 tonnes of compost. Based on information provided as part of the licence amendment application, 30% of the total liquids used as part of the composting process is bore water after pasteurisation. The remaining 70% is comprised of digestate at the initial mixing phase and leachate during pasteurisation.

DWER has assumed that 1 kL = 1 tonne.
Of the total 21,500 tonnes/year of liquid needed for the whole process:

- 4,550 tonnes is digestate;
- 10,500 tonnes is leachate pond water; and
- 6,450 tonnes is bore water.

It is noted that the application refers to an additional volume of green waste (250,000m^3) that could be used for blending of a larger volume of digestate. Given the concerns with the hardstand integrity outlined above in ‘Premises Infrastructure’ and the risks posed by odour

and leachate emissions in sections 15 and 16 below, any increases in digestate above the calculated volume may increase the risk associated with leachate emissions to groundwater.

9. Liquid required for whole of site

DWER has calculated the total amount of liquids required as part of the whole of site water balance calculation. This has been estimated by first calculating the amount of liquids needed as part of the existing composting operations and then adding this to the volumes calculated for the proposed composting operations (section 8).

DWER has assumed an initial moisture content for all feedstock materials of 35% noting that each feedstock will vary in moisture content and some wastes such as manures, biosolids and food waste may be higher than this. DWER has assumed that the moisture content of liquid (leachate pond water and bore water) is 100%.

Based on the licence amendment application and supplementary information, the annual input for all solid feedstocks (not including the green waste blended with digestate) is 64,800 tonnes (177.5 tonnes/day) using the following annual input values:

- Clean fill - 18,000
- ASS/PASS – 10,000
- Biosolids - 15,000
- Green waste and sawdust – combined total of 19,800
- Food waste - 500
- Manure - 1,500

Using a conservative and estimated approach, it is assumed that 1 tonne of feed stock received at the Premises = 0.35 tonnes moisture (at 35%) and 1 tonne of liquid = 1 tonne moisture (at 100%). DWER has applied 60% moisture content as the optimal level at the initial mixing phase. It is assumed that 1 tonne of feedstock = 0.6 tonnes moisture at the optimal level (60%).

An additional 0.25 tonnes of moisture input is required per 1 tonne of feedstock to bring it up to the 60% moisture content. The daily liquid input at initial mixing phase equates to 44.34 tonnes liquid required each day based on 177.5 tonnes/day of feedstock. This equals to an annual amount of 16,197 tonnes of liquid required (initial mixing only).

Based on 30% reduction of feedstock to compost produced, it is expected that 45,360 tonnes of compost will be produced annually from 64,800 tonnes of feedstock. Assuming a ratio of 1kL liquid = 0.6 tonnes of compost produced, 75,600 kL of liquid is needed for the whole composting process (digestate process excluded).

Assuming that of the total amount of liquids needed, 30% is bore water after pasteurisation, the remaining 70% of the 75,600 kL of total liquid needed is 52,920 kL and DWER has assumed for the purposes of the water balance calculation in section 7, that all of this is comprised of leachate pond water. This equates to 4,410 kL/month of leachate water required for the composting process with 1,890 kL/month of bore water.

The total amount of leachate pond water reused each month in the whole of site composting process (including the digestate operations but not including the digestate component as an input) is 5,269.4 kL/month.

10. Proposed New Feedstocks

DWER has become aware that the Licence Holder receives Acid Sulfate Soils / Potential Acid Sulfate Soils (ASS/PASS) (predominantly peat) and clean fill for the purpose of blending in composting and soil conditioner products. As part of this amendment, DWER has initiated changes to allow these as authorised feedstocks. Given the inert nature of the clean fill, the storage and processing of this material is anticipated to have little to no risk to the environment and public health. The ASS/PASS may be high in sulfides.

11. Risk assessment

Table 7 below describes the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments*. Both tables identify whether the emissions present a material risk to human health or the environment, requiring regulatory controls.

Table 7: Risk assessment for proposed amendments during operation

Risk Event						
Source/Activities	**Potential Emissions**	**Potential Receptors**	**Potential Pathway**	**Potential Impacts**	**Continued to detailed risk assessment?**	**Reasoning**
Feedstock unloading (clean fill)	*Odour*	*Nearest residential property located 1.5km south-west of prescribed activities*	*Air / wind dispersion*	*Impacts to amenity and wellbeing*	*No*	*This feedstock poses little to no odour risk to the environment or public health*
Feedstock unloading including pre-treatment of feedstock (application of digestate to greenwaste and storage and processing of ASS/PASS)					*Yes*	*Risk Assessment – odour impacts on amenity and wellbeing (section 14)*
Composting process (formation windrows and turning operations)						
Leachate pond						
Feedstock unloading (clean fill)	*Leachate:* *Seepage through hardstand areas and ponds;* *Damage/rupture of pond liner.* *Uncontrolled run-off*	*Fresh groundwater located 34.5m bgl used for domestic and agricultural purposes*	*Seepage through soil* *Overland flow* *Transport through groundwater*	*Contamination of groundwater supply for nearby users*	*No*	*This feedstock poses little to no leachate risk to the environment or public health*
Feedstock unloading including pre-treatment of feedstock (application of digestate to		*Fresh groundwater located 34.5m bgl used for domestic and agricultural purposes*			*Yes*	*Risk Assessment – Leachate (section 15)*

Risk Event						
Source/Activities	**Potential Emissions**	**Potential Receptors**	**Potential Pathway**	**Potential Impacts**	**Continued to detailed risk assessment?**	**Reasoning**
greenwaste and storage and processing of ASS/PASS) Composting process (formation windrows and turning operations) Leachate pond	*from hardstands* *Leachate (continued)*	*Bush Forever area located 100m to the north-eastern boundary of the Premises*		*Impacts to vegetation within Bush Forever areas* *Contamination of land*	*No*	*This receptor is up-hydraulic gradient. Seepage is not considered likely to travel to this receptor (unlikely pathway)*
		Neerabup Nature Reserve 2.7km west of the Premises			*No*	*The receptor is located a significant distance from the premises (unlikely pathway).*
		Lake Nowergup 2.5km west, north-west of the Premises		*Contamination of surface waters at the point of groundwater expression*		*These receptors are located a significant distance from the premises and are not considered to be located down-hydraulic gradient. Seepage is not considered likely to travel to this receptor (unlikely pathway)*
		Lake Neerabup 2.6km south-west of the Premises				
		Lake Pinjar located 4km east, south-east of Premises				*This receptor is up-hydraulic gradient. Seepage is not considered likely to travel to this receptor (unlikely pathway)*
Feedstock unloading (digestate, clean fill and ASS/PASS) ***Composting process (formation windrows and turning operations)***	*Noise*	*Nearest residential property located 1.5km south-west of prescribed activities*	*Air / wind dispersion*	*Impacts to amenity and wellbeing*	*Yes*	*Risk Assessment – noise impacts on amenity and wellbeing (section 16)*

12. Risk Criteria

During the assessment the risk criteria in Table 8 below will be applied to determine a risk rating set out in this section.

Table 8: Risk Criteria

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the risk / opportunity occurring.		**The following criteria has been used to determine the consequences of a risk occurring:**		
			Environment	**Public Health* and Amenity (such as air and water quality, noise, and odour)**
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **on-site impacts**: catastrophic • **off-site impacts local scale**: high level or above • **off-site impacts wider scale:** mid-level or above • Mid to long term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **on-site impacts**: high level • **off-site impacts local scale**: mid-level • **off-site impacts wider scale**: low level • Short term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **on-site impacts**: mid-level • **off-site impacts local scale**: low level • **off-site impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **on-site impacts**: low level • **off-site impacts local scale**: minimal • **off-site impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **on-site impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for public health) met

^ Determination of areas of high conservation value or special significance should be informed by the *Guidance Statement: Environmental Siting.*

* In applying public health criteria, DWER may have regard to the Department of Health's, *Health Risk Assessment (Scoping) Guidelines* **"on-site"** means within the prescribed premises boundary.

13. Risk Treatment

DWER will treat risks in accordance with the Risk Treatment Matrix in Table 9 below:

Table 9: Risk Treatment

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk event will not be tolerated. DWER may refuse application.
High	Acceptable subject to multiple regulatory controls.	Risk event will be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled	Risk event is acceptable and will generally not be subject to regulatory controls.

14. Risk Assessment – odour impacts on amenity and wellbeing

General hazard characterisation and impact

Odour emissions may cause impacts to health and amenities and can vary significantly in response to the sensitivity of receptors and weather conditions.

The current licence authorises acceptance of odorous materials including biosolids, food waste and manure. Ten complaints related to sewerage type odours from the Premises have been received since May 2015. On investigation by DWER officers, none of the complaints were verified to have arisen from Amazon however the City of Wanneroo attended the complaint and were able to verify that one of these complaints had originated from Amazon. It is noted that there are several odour sources within the surrounding vicinity of the site such as market gardens and turf farms.

ASS/PASS is also proposed to be received onsite for the purpose of blending with soils and composts may contain high levels of sulfur, which have the potential to give rise to odour emissions.

Digestate intended to be applied on the outdoor composts windrows and leachate generated from the compost process will drain towards the pond will also contribute to odour emissions. The Licence Holder has one leachate pond.

Sources of odour include:

- Mixing of digestate and other odorous wastes with green waste (includes unloading of digestate directly for mixing to occur);
- Composting process;
- Leachate pond;
- Storage (up to 1,700 tonnes) and processing of ASS/PASS which contain odour generating sulfides.

Amazon's sister site, Richgro Garden Products, were blending digestate in outdoor uncovered windrows and odour complaints were being received by DWER from residences located within 1.2km of the premises.

DWER's odour expert has recommended that digestate is not applied before 9am as thermal inversions are likely to be present early in the morning causing odours to be trapped between the above warm layer of air and the cool air below the odour. Odour emissions are more likely to impact on sensitive residences during thermal inversions in the early morning.

Criteria for assessment

Amenity impacts can be assessed against the general provisions of the EP Act, specifically whether odour unreasonably interferes with the health, welfare, convenience, or comfort of any person.

Proponent controls

The Proponent's controls to reduce and manage odour emissions include:

- Digestate will not be applied to any products containing biosolids or ASS/PASS;
- Digestate will not be stored onsite;
- Ground green waste is proposed to be *"formed into an empty pond shape… digestate will be pumped out of the tanker and into the 'pond'... the digestate will be covered with a layer of garden organics once received on site and be absorbed into the mix";*
- Proposed purchase and installation of an aeration pump for the leachate pond. This is expected by June 2017;
- Digestate will only be used in the initial pre-treatment/wetting of the greenwaste and not in the ongoing composting process;
- ASS/PASS will be continually blended into windrows; and
- Development of a *Safe Work Practice: Environmental Odour Test* (SWP Odour Test) document which requires daily 'sniff' tests at Premises boundary with findings recorded and corrective actions undertaken at intensity of 3 or above.

Key findings

The Delegated Officer has reviewed the information regarding the odour impacts from the premises and has found:

1. *Odour emissions have the potential to impact the amenity and wellbeing of sensitive receptors.*
2. *The adjacent Water Corporation premises is also a potential source of odour from the acceptance and storage of biosolids.*
3. *The exposure of digestate to the atmosphere in the green waste wetting and mixing area may generate odours while being applied, mixed and turned.*
4. *Ten odour complaints have been received in regards to the Premises since 2015 which descriptions of sewerage type odours. DWER officers could not confirm the source of the odour given that there are many different sources of odour within the vicinity of the Premises. However, the City of Wanneroo has verified Amazon as the source of one odour complaint.*
5. *Residents are located 1.5km from the Premises. Odour complaints were received at the Jandakot premises up to 1.2km from the site when up to 80,000 kL/day of digestate was being applied in outdoor windrows however the Delegated Officer notes that different site conditions apply.*
6. *ASS/PASS will likely contain high levels of sulphides which can cause offensive odours.*

7. *Biosolids and manures are currently stored and used at the Premises which may cause cumulative odour impacts from the inclusion of digestate and ASS/PASS.*
8. *The application of digestate is proposed to be undertaken outdoors without odour treatment.*
9. *The SWP Odour Test does not provide information on the scale used in odour tests, provide information on what training staff are required to have or specify what corrective actions will be undertaken when required.*
10. *ASS/PASS is proposed to be continuingly blended in compost and soil blending activities however there is the potential for onsite storage of this material. Odours may be generated when the stored materials are used for site activities and the sulphides within the disturb stockpiles are exposed to the air.*

Consequence

ASS/PASS
Based upon the sensitivity of residential receptors, the Delegated Officer has determined that residences may experience low level impact to amenity from odour emissions. Therefore, the Delegated Officer considers the consequence of odour emissions from the acceptance and processing of ASS/PASS to be **minor**.

Digestate
Based upon the sensitivity of residential receptors, the Delegated Officer has determined that residences may experience mid-level impact to amenity from odour emissions. Therefore, the Delegated Officer considers the consequence of odour emissions from the application of digestate to be **moderate**.

Cumulative odours (ASS/PASS, digestate, manures and biosolids)
Based upon the sensitivity of residential receptors, the Delegated Officer has determined that residences may experience mid-level impact to amenity from odour emissions. Therefore, the Delegated Officer considers the consequence of cumulative odour emissions from the Premises to be **moderate**.

Likelihood of consequence

ASS/PASS
Based upon the Licence Holder's controls, proximity to residences, complaints history, prevailing wind direction and proponent's controls, the Delegated Officer has determined that the consequence of odour impacts ASS/PASS could occur at some time, given the occurrence of past odour complaints. Therefore, the Delegated Officer considers the likelihood to be **possible**.

Digestate
Based upon the Licence Holder's controls, proximity to residences, complaints history, prevailing wind direction and proponent's controls, the Delegated Officer has determined that the consequence of odour impacts from digestate could occur at some time, given the occurrence of past odour complaints. Therefore, the Delegated Officer considers the likelihood to be **possible**.

Cumulative odours (ASS/PASS, digestate, manures and biosolids)
Based upon the Licence Holder's controls, proximity to residences, complaints history, prevailing wind direction and proponent's controls, the Delegated Officer has determined that the consequence of odour impacts from cumulative odours could occur at some time, given

the occurrence of past odour complaints. Therefore, the Delegated Officer considers the likelihood to be **possible**.

Overall rating

ASS/PASS
The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 8) and determined that the overall rating for the risk of odour emissions on sensitive receptors during operation is **medium**.

Digestate
The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 8) and determined that the overall rating for the risk of odour emissions on sensitive receptors during operation is **medium**.

Cumulative odours (ASS/PASS, digestate, manures and biosolids)
The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 8) and determined that the overall rating for the risk of cumulative odour emissions on sensitive receptors during operation is **medium**.

Regulatory controls

The existing licence requires incoming wastes to not be stored for longer than 14 days before being added to the composting process and requires windrows to be regularly turned and moisture levels to be maintained between 40 to 65% to assist in retaining aerobic conditions. Aerobic conditions assist in reducing odour emissions and these conditions have been retained in this amendment.

The prolonged storage of manures, food wastes, digestate, ASS/PASS and biosolids may contribute to the cumulative impacts of odour emissions from the Premises as these wastes are likely to decompose due to the organic nature of the wastes. Given the medium risk rating for cumulative odour emissions, the Delegated Officer has included licence conditions to reduce the storage times for manures, food waste and biosolids to 72 hours to reduce the time that feedstocks are exposed to air and water which will assist in reducing odours from decomposition of the feedstock prior to incorporation into the composting process.

ASS/PASS will generally only emit odour emissions when disturbed. The Delegated Officer has authorised the storage of this feedstock for up to 14 days. Green waste and sawdust may also be only stored for up to 14 days which is consistent with the previous licence requirement.

A condition has been included on the licence to limit the volume of digestate to 12.5 tonnes per each 50 tonnes batch of green waste accepted daily. This equates to an annual authorised input for prescribed premises category 61 of 4,550. The amount of digestate has been determined by DWER as specified in section 8 ‘Digestate required for process’. Conditions also require the green waste-digestate mix to be incorporated within windrows by the end of each working day. The volume of digestate per batch and daily incorporation of material into windrows assists in preventing oversaturation of green waste which can create anaerobic conditions resulting in odours.

The Licence Holder’s commitments to not store any digestate onsite and to not blend digestate with biosolids and ASS/PASS have also been included as regulatory controls. The commitment to install an aeration system on the pond has also been included as a licence condition with the requirement to operate this 24 hours/day once installed.

The Delegated Officer has included the requirement to undertake an Odour Field Assessment (OFA) within three months of the amendment notice being granted to investigate the extent of any impacts from odour emissions as a result of digestate being accepted on the premises. The results of the OFA are required to be provided within one month after completion of the OFA and the outcome will demonstrate whether any impacts are occurring or are likely to occur as a result of the acceptance of ASS/PASS and digestate, as well as verify the risk assessment relating to the cumulative odour impacts from the premises. This condition has been included in consultation with DWER's odour expert.

The regulatory controls to limit the volumes of feedstock accepted annually at the premises also assist in reducing odour impacts as there is less odorous material being received onsite.

15. Risk Assessment – Leachate

General hazard characterisation and impact

Emissions of leachate may occur through seepage or overland flow to groundwater or adjoining land. Surface geology at the Premises is predominantly Tamala Limestone. As identified in the Structerre Consulting Engineers May 2014 report, the bore logs identified the limestone as consisting of sand-gravel however it is noted that these tests were undertaken within the composting hardstand.

Observations by DWER Officers during a site visit on 8 May 2017 identified depressions within the hardstand area creating small basins for leachate to pool in. Pooling increases the likelihood of infiltration occurring and the hardstand needs to be maintained to remove the depressions.

Supplementary information provided by the Licence Holder on 8 June 2017 advised that maintenance works would be undertaken immediately to infill the depressions to assist in reducing the likelihood of pooling, and that this type of maintenance would be ongoing as required.

The pathway for emissions to surface water may be via overland flow or within groundwater flow. Contaminated groundwater may be expressed within surface water and vegetation reserve areas.

The expression of contaminated groundwater in surface water bodies may result in eutrophication and the excessive growth of algae. Algae growth may impact the survival of existing organisms through light and oxygen restriction and cause the degradation of the surface water value and beneficial use. Indirectly, odours may be generated from the eutrophication of surface waters creating a public nuisance. Impacts of contaminated groundwater on flora may result in plant deaths.

DWER has not previously required the Licence Holder to undertake groundwater monitoring for this premises. There are two bores currently located on the Premises up-hydraulic gradient of the hardstand and leachate pond. DWER does not have monitoring data available for these bores and it is unclear if these bores have previously been monitored by the Licence Holder. The Licence Holder has advised in supplementary documentation provided to DWER on 8 June 2017, that two bores downgradient of the leachate pond are intended to be installed within 6 to 12 months. Based on the comments received 1 December 2017 in response to the proposed Amendment Notice, the Licence Holder has now committed to installing three additional bores pending the authorisation of digestate acceptance.

Sources

Emissions of leachate and digestate may occur from the following sources summarised in Table 10.

Table 10: Potential sources of leachate emissions

Source	Potential event
Feedstock unloading including pre-treatment of greenwaste with digestate application	• Contaminated surface runoff • Leaching through hardstand
Composting	
Leachate collection system	• Contaminated surface runoff • Leaching through hardstand • Overtopping of ponds • Liner damage/faults

Digestate from the Anaerobic Digestion plant poses a high leachate risk as it generally contains high levels of nutrients and is comprised of approximately 95% liquids, as advised by the Licence Holder, which can seep through hardstands or run over land surfaces. Manures and biosolids currently accepted at the premises pose a moderate to high leachate generation risk and are also high in nutrients. The digestate has been characterized by the Licence Holder and is regularly tested at the Jandakot premises where it is generated.

Leachate from ASS/PASS contains iron sulfides and poses a moderate risk of leachate generation. The leachate will generally be high in nutrients from the organic material and contain sulfuric acid from the decomposition of the iron sulfides.

Criteria for assessment

The Australian Drinking Water Guidelines (ADWG) developed by the National Health and Medical Research Council (NHMRC) are considered by the Delegated Officer to be the most appropriate assessment criteria given the Premises' proximity to market gardens and residences, and the groundwater's value as a beneficial resource for drinking water and irrigation.

Where the ADWG do not specify an assessment level, the ANZECC & ARMCANZ (2000) Guidelines for Fresh Waters (ANZECC) should be considered as an alternative assessment criterion to assess the potential impact on groundwater and surface water.

The ADWG specifies an aesthetic value of 0.5 mg/L for ammonia and the Contaminated Sites Guideline specifies an investigation level of 2000 µg/L (2 mg/L) for total nitrogen.

Proponent controls

The majority of the site is covered with a limestone hardstand area which is laid to a fall to drain into a PVC lined leachate pond. The permeability (based on four tests in May 2014) range from 1.4 x 10^{-5} m/s to 6.9 x 10^{-6} m/s. The Delegated Officer notes that limestone may have some capacity to attenuate phosphorous but little capacity to attenuate nitrogen that may be in leachate.

The leachate pond has been constructed with concrete open drainage channels which are situated at the base of the main composting hardstand area and along the eastern side of the leachate pond. During a site visit on 1 June 2017 DWER Officers identified that the hardstand was not sufficiently graded towards these drainage channels and the channels appeared to contain solid material which may prevent leachate run-off from entering the pond.

Supplementary information provided by the Licence Holder on 8 June 2017 advised that immediate maintenance would be undertaken to grade the hardstand towards the drainage channels and to clean the channels of solid material. These will be ongoing maintenance actions that will be undertaken by the Licence Holder as required.

The Licence Holder proposes to undertake greenwaste blending with digestate in the south-eastern corner of the premises which is situated on the limestone hardstand and up gradient of the leachate pond. The Licence Holder proposes to construct a bowl type structure out of green waste, pour the digestate into the centre of the bowl and then cover with additional green waste to blend with and absorb the digestate.

The Licence Holder has committed to constructing a concrete bunded area for the digestate application however this is currently being considered by the City of Wanneroo for Development Approval which is estimated to take between 3 to 6 months to obtain.

As an interim control, the Licence Holder intends to construct a processing area using the natural limestone base with a limestone (or similar material) bund. The temporary digestate processing area will be located in close proximity to the leachate pond and graded towards the drainage channel to minimise the travel distance of any leachate, reducing the likelihood of infiltration.

The Licence Holder intends to store and process ASS/PASS and existing waste streams on the existing limestone hardstand.

The leachate pond has been constructed with 1mm PVC liner underlain by 200mm of compacted gravel material and 400mm compacted sand material. Integrity testing of the pond by a third party in 2014 indicated that, according to the third party, the leachate pond was fit for purpose and did not identify evidence of seepage from liner damage. The Licence Holder has committed to maintaining a minimum freeboard of 500mm. The current licence specifies a minimum freeboard of 300mm is maintained.

Key findings

The Delegated Officer has reviewed the information regarding the leachate impacts from seepage from the premises and has found:

1. *The handling of digestate, ASS/PASS and leachate has the potential to impact groundwater if not appropriately contained.*
2. *The soil type at the premises is readily permeable however groundwater is located approximately 34.5 metres below ground level.*
3. *Groundwater beneath the site is considered to be fresh and have a beneficial use as drinking water and for irrigation at market gardens.*
4. *The composting and blending process areas are undertaken on a limestone hardstand. Permeability tests in 2014 identified that the permeability was more than 1 x 10^{-6} m/s which allows for some seepage of digestate and leachate through the hardstand. Limestone may have some capacity to attenuate*

phosphorous but little capacity to attenuate nitrogen that may be in leachate.

5. *There are many depressions within the hardstand area which cause the pooling of leachate. This increases the likelihood of infiltration through the hardstand as there is a longer residence time of leachate being settled on the hardstand surface.*
6. *The ASS/PASS material may result in acidic compounds within leachate however it is expected that the limestone hardstand and limestone surface geology would assist in neutralising any acidity in this leachate.*
7. *The leachate pond is lined and an integrity test undertaken in 2014 showed no signs of leaking.*
8. *The two groundwater monitoring bores at the premises are located up-hydraulic gradient of the hardstand and leachate pond which will not identify any impacts to groundwater from the site operations. Three additional downstream monitoring bores are recommended to be installed to monitor impacts to groundwater.*
9. *The requirements for groundwater bore installation and monitoring will assist DWER in determining the extent of impacts of any infiltration through the hardstand. This risk assessment indicates upgrades to infrastructure are required.*
10. *DWER's Technical Expert Report (Groundwater section above) indicates that the risk of leachate to groundwater from the short term use of digestate on the existing limestone hardstand poses a low risk to groundwater. The ongoing activity will require processing within a concrete bunded hardstand to mitigate risk on an on-going basis.*
11. *Given the uncertainties surrounding the water balance calculations, the Delegated Officer has determined that green waste or digestate input not be increased beyond the volumes calculated in the 'Digestate required for process' section above, until the infrastructure has been upgraded and environmental risk can be re-assessed taking into account groundwater monitoring results. This will assist in limiting additional infiltration.*
12. *Conditioning regulatory controls in the licence will be considered subject to the below risk assessment.*

Consequence

Based upon the fresh water quality of the groundwater and the beneficial use as a drinking water source and for irrigation, the Delegated Officer has determined that the impact to groundwater from leachate and digestate seepage could cause the specific consequence criteria to be exceeded and may pose mid-level impacts to health if contaminated groundwater is ingested. Contamination of this receptor may impact on amenity of residences surrounding the premises that may be prevented from using their bores for domestic use. Therefore, the Delegated Officer considers the consequence to be **major**.

Likelihood of consequence

Based upon the Licence Holder's controls, proximity to the receptor, surface geology, and readily available pathway, the Delegated Officer has determined that the major consequence of groundwater contamination from leachate seepage through the existing limestone hardstand (for a limited interim period) could occur at some time. Therefore, the Delegated Officer considers the likelihood to be **possible**.

Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 8) and determined that the overall rating for the risk of leachate seepage on the beneficial use groundwater supply is **high**.

Regulatory Controls

The Delegated Officer has determined that regulatory controls are required to require the ongoing maintenance of the existing hardstand area to prevent pooling and provide sufficient grading to direct runoff into the leachate pond. This control reduces the likelihood of leachate infiltrating through the hardstand.

The Licence Holder is required, within three months, to undertake a whole of site water balance assessment and survey to be calculated on a monthly basis. In the event that the water balance assessment identifies the need for greater capacity to store stormwater and leachate runoff, recommendations to address this are required. DWER may reconsider regulatory controls for pond capacity pending review of the water balance assessment.

The existing licence requirement to maintain a freeboard of 300mm will remain on the licence to reduce the risk of overflow. The amount of digestate authorised to be accepted onsite has also been limited through regulatory controls to reduce the volume of runoff entering the pond and reduce the infiltration through the hardstand.

A condition has been included on the licence to prevent the offsite discharge of leachate pond water in the event that the pond is reaching capacity. This condition requires the Licence Holder to contain all leachate/runoff onsite or disposed of to a facility authorised to accept the wastewater.

The Licence Holder is also required to undertake the storage and/or processing of higher risk (of leachate generation and impacts to groundwater) feedstocks/activities on a hardstand that achieves a permeability of not less than 1×10^{-8} m/s, within 18 months of this Amendment Notice being granted. This will assist in preventing infiltration of leachate through the hardstand from existing and ongoing composting operations. As identified by DWER's Technical Expert, limestone will have some capacity to attenuate phosphorous but limited capacity to attenuate nitrogen which will be a significant component of leachate from a composting premises. Limits to the authorised volumes and storage times of feedstock onsite also assist in reducing volumes of leachate generated onsite.

Before digestate is authorised to be accepted onto the site, the Licence Holder must construct a bunded temporary digestate processing bay adjacent to the leachate pond with grading towards the pond as a means of minimising infiltration to groundwater. The Licence Holder is required to construct a concrete processing bay and surface this area to meet a permeability of not less than 1×10^{-8} m/s within six months, given the high risk of leachate emissions posed by this feedstock.

The Licence Holder is required through additional regulatory controls to notify the CEO when the infrastructure specified in this Amendment Notice has been constructed.

Given that there is no available groundwater monitoring data for the premises, the Licence Holder is also required to install and monitor three down-gradient groundwater monitoring bores, and monitor both of the existing upstream bores. All parameters are required to be sampled on a monthly basis, with the exception of delta nitrogen and delta carbon which are sampled quarterly, for a period of 12 months to obtain a reliable data set on groundwater

quality which depicts seasonal variations.

In the event that the groundwater monitoring data does not verify the high risk to groundwater and demonstrates that the existing limestone hardstanding outside of the digestate application area is sufficient to mitigate risk to groundwater regulatory controls relating to site surfacing upgrades can be reviewed and amended to reflect the updated risk assessment.

16. Risk Assessment – noise impacts on amenity and wellbeing

General hazard characterisation and impact

Noise may be generated from the use of operational machinery, including reversing beepers, in the acceptance and receival, unloading of waste, turning of windrows, and movement of materials around the premises. Noise emissions have the potential to cause nuisance impacts on the amenity and wellbeing of the public.

No noise complaints have been received by DWER in regards to this Premises.

Criteria for assessment

The *Environmental Protection (Noise) Regulations 1986* (Noise Regulations) specify the maximum assigned noise levels authorised to be emitted from a premises in relation to the receiving receptors and siting.

The Noise Regulations L_{A10} assigned levels for a 'Noise sensitive premises: highly sensitive area', being an area used for a residential purpose, are applicable for noise emissions from Richgro and are specified as follows:

- 0700 to 1900 hours Monday to Saturday (referred to as day-time hours): 45 dB + influencing factor;
- 0900 to 1900 hours Sunday and public holidays: 40 dB + influencing factor;
- 1900 to 2200 hours all days: 40 dB + influencing factor; and
- 2200 to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays: 35 dB + influencing factor.

Proponent controls

The Licence Holder's controls to reduce and manage noise emissions include:

- No additional grinding of green waste is proposed as all green waste to be blended with the digestate will arrive on site in a shredded form.
- Deliveries of additional feedstock materials will be undertaken between the hours of 7am and 4pm when the assigned decibel levels are higher.
- A high ridge is located between the Premises and the closest residences which are located over 1km from the Premises.

Key findings

The Delegated Officer has reviewed the information regarding the odour impacts from the premises and has found:

1. No noise complaints have been received by DWER in regards to the Premises;
2. Residents are located 1.5km from the Premises;
3. Operations only occur during the day time hours specified in the Noise Regulations where assigned levels are higher.

Consequence

Based upon the sensitivity and distance of residential receptors, the Delegated Officer has determined that residences may experience low-level impacts to amenity from noise emissions. Therefore, the Delegated Officer considers the consequence of noise emissions from the Premises to be **minor**.

Likelihood of consequence

Based upon the Licence Holder's controls, proximity to residences, complaints history, prevailing wind direction and proponent's controls, the Delegated Officer has determined that the consequence of noise impacts would probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood to be **unlikely**.

Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria (Table 8) and determined that the overall rating for the risk of odour emissions on sensitive receptors during operation is **medium**.

17. Decision

The Delegated Officer has determined that an amendment is to be made to incorporate the acceptance of up to 4,550 tonnes of digestate per year to be blended with green waste prior to the composting process.

A summary of the amendments are detailed below:

- Updating the prescribed premises boundary GPS coordinates as the previous boundary incorrectly included the Nowergup Biosolids Facility's leachate pond which is not within the prescribed premises boundary of Amazon;
- Inclusion of prescribed premises category 61 (liquid waste facility) to incorporate the inclusion of digestate at the Premises. The amount of digestate requested by the Licence Holder has not been authorised and the approved volume is reflective of the Delegated Officer's calculations in section 8;
- Updating definitions to provide more clarity to terms within the Amended Licence and removing definitions that are no longer relevant;
- Inclusion of condition 1.2.5 and 1.2.6 in regards to infrastructure constriction requirements which have been considered by the Delegated Officer as necessary to mitigate the impacts of leachate emissions in regards to the acceptance of digestate as well as impacts from existing operations.
- Inclusion of conditions 1.2.6 and 1.2.7 regarding the submission of compliance documentation for the infrastructure construction and the requirement to undertake a whole of site water balance assessment.
- Amending the requirements of condition and Table 1.3.1 to address waste acceptance criteria such as feedstocks accepted onsite the site and any limits to those feedstocks including annual throughputs.
- Changes to Table 1.3.2 (and condition 1.3.3) to address the storage and processing requirements for all feedstock. This replaces condition 1.3.4 and Table 1.3.3 of the former licence which have been removed.
- Inclusion of condition 1.3.5 to 1.3.8 which addresses compost operational requirements, leachate pond and general leachate management, and the requirement

to undertake product testing. Conditions 1.3.5 and 1.3.6 predominantly replace Tables 1.3.2 and 1.3.3 of the previous licence.

- Changes to Table 2.1.1 'Monitoring of inputs and outputs' to include the requirement to monitor outputs to assist in determining the volume of compost and blended soils generated annually at the Premises;
- Inclusion of Condition 15 and Table 2.2.1 to require groundwater monitoring to monitor any impacts from the existing and proposed activities (refer to the risk assessment for leachate);
- Inclusion of Condition 2.2.2 to require additional groundwater monitoring in the event that the Groundwater Action Criteria is exceeded (refer to the risk assessment for leachate);
- Inclusion of Conditions 2.3.1 and 2.3.2 to undertake a Field Odour Survey for the Premises;
- Updating table 3.2.1 to include the requirement to report groundwater monitoring in the Annual Environmental Report; and
- Replacing the Premises Map in Schedule 1 of the licence to reflect the correct prescribed premises boundary.

18. Amendment History

Table 10 provides the amendment history for L7391/1999/9.

Table 10: Licence amendments

Instrument	Issued	Amendment
L7391/1999/9	19/12/2013	Licence renewal
L7391/1999/9	24/07/2014	Amendment to extend timeframes for improvement condition completion
L7391/1999/9	22/10/2015	Amendment to change authorised feedstocks
L7391/1999/9	29/04/2016	Amendment to extend licence duration
L7391/1999/9	17/11/2016	Amendment Notice 1: Changes to authorised feedstocks and prescribed premises boundary
L7391/1999/9	DRAFT	Amendment Notice 2: Changes to authorised feedstocks and monitoring requirements

19. Licence Holder's Comments

The Licence Holder was provided with the draft Amendment Notice on 27 June 2017. Comments received from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 2.

20. Amendment

1. The Global Positioning System coordinates of the Premises address is amended by the deletion of the text shown in strikethrough and the insertion of the red text in underline below:

Position No.	Latitude	Longitude
A	31° 38' ~~17.27~~ 16.60" S	115° 45' ~~42.77~~ 44.68" E
B	31° 38' ~~16.47~~ 17.75" S	115° 45' 47.~~02~~94" E
C	31° 38' ~~17.55~~ 19.36" S	115° 45' ~~49.61~~ 51.30" E
D	31° 38' 20.44~~87~~ S	115° 45' ~~54.60~~ 53.11" E
E	31° 38' ~~26.06~~ 27.70" S	115° 45' 58.~~62~~75" E
F	31° 38' ~~34.87~~ 33.70" S	115° 46~~5~~' ~~00.38~~ 55.02" E
G	31° 38' ~~33.93~~ 34.34" S	115° 45' 47.~~83~~19" E
H	31° 38' ~~28.63~~ 30.45" S	115° 45' ~~46.81~~ 49.46" E
I	31° 38' 24.~~65~~78" S	115° 45' ~~41.43~~ 44.74" E

2. The prescribed premises category table of page 1 of the licence has been amended by the insertion of the red text shown in underline below:

Category number	Category description	Category production or design capacity	Approved premises production capacity
61	Liquid waste facility: premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	100 tonnes or more per year	4,550 tonnes per annual period
67A	Compost Manufacturing and Soil Blending: premises on which organic material (excluding silage) or waste is stored pending processing, mixing, drying or composting to produce commercial quantities of compost or blended solids	1,000 tonnes or more per year	100,000 tonnes per annual period

3. Section 1.1 of the licence has been amended by the removal of the text shown in strikethrough and the insertion of the red text in shown in underline below:

'acid sulfate soils' includes both sulfidic soil materials as potential acid sulfate soil and sulfuric soil materials as actual acid sulfate soils.

'actual acid sulfate soils' also known as AASS are soils or sediments which contain iron sulfides and/or other sulfidic minerals that have undergone some oxidation. This results in low pH (i.e. pH < 4) and often a yellow and/or red mottling (jarosite/iron oxide) in the soil profile. AASS commonly also contain residual un-oxidised sulfide minerals (i.e. potential acidity) as well as existing acidity.

'AS 5667.1' means the Australian Standard AS 5667.1 Water Quality – Sampling – Guidance of the Design of sampling programs, sampling techniques and the preservation and handling of samples.

'AS 5667.11' means the Australian Standard AS 5667.11 *Water Quality – Sampling – Guidance on sampling of groundwaters.*

'ASS' means acid sulfate soils.

'clean fill' has the meaning defined in the Landfill Definitions.

~~*'code of practice for the storage and handling of dangerous goods' means document titled "Storage and handling of dangerous goods: Code of Practice" published by the Department of Mines and Petroleum, as amended from time to time.*~~

'Digestate' means the liquid waste produced from the biodegradation of feedstock within an Anaerobic Digestion plant.

~~*'environmentally hazardous material' means material (either solid or liquid raw materials, materials in the process of manufacture, manufactured products, products used in the manufacturing process, by-products and waste) which if discharged into the environment from or within the premises may cause pollution or environmental harm. Note: Environmentally hazardous materials include dangerous goods where they are stored in quantities below placard quantities. The storage of dangerous goods above placard quantities is regulated by the Department of Mines and Petroleum.*~~

~~*'fugitive emissions' means all emissions not arising from point sources.*~~

'Landfill Definitions' means the document titled "Landfill Waste Classification and Waste Definitions 1996" published by the Chief Executive Officer of the Department of Environment as amended from time to time.

'PASS' means potential acid sulfate soils.

'potential acid sulfate soils' are soils or sediments which contain iron sulfides and/or other sulfidic minerals that have not been oxidised. The field pH of these soils in their undisturbed state is more than pH 4 and is commonly neutral to alkaline (pH 7 to pH 9). These soils or sediments are invariably saturated with water in their natural state. The waterlogged layer may be peat, clay, loam, silt or sand and is usually dark grey and soft but may also be dark brown, or medium to pale grey to white.

'VDI 3940 Part 2' means the document VDI 3940 Part 2, 2006, Verein Deutscher Ingenieure – Measurement of odour impact by field inspection – Measurement of the impact frequency of recognizable odours.

'VDI 3940 Part 3' means the document, VDI 3940 Part 3 2010, Verein Deutscher Ingenieure – Measurement of odour impact by field inspection – Determination of odour intensity and hedonic odour tone.

4. Condition 1.2.5 and Table 1.2.1 have been included onto the licence as shown below:

1.2.5 The Licensee shall construct the infrastructure detailed in Column 1 of Table 1.2.1, in accordance with the construction requirements listed in Column 2 of Table 1.2.1 and within the timeframes specified in Column 3 of Table 1.2.1.

Table 1.2.1: Infrastructure construction requirements

	Column 1	***Column 2***	***Column 3***
	Infrastructure	***Requirements (Design and Construction)***	***Timeframe***
1	*Construction of temporary processing area*	- *Construction of a compacted temporary bunded limestone (or similar material) processing area;* - *The temporary processing area is to be constructed in the Digestate Processing Area depicted on the Premises Map in Schedule 1;* - *The processing bay must be graded to the leachate pond drainage sump; and* - *The bund shall be constructed to ensure there is no overflow of digestate, leachate or stormwater other than to the area graded to the leachate pond drainage sump.*	*Must be constructed and operational prior to the acceptance of Digestate onto the Premises.*
2	*Construction of concrete processing bay*	- *Construction of a concrete processing bay with hardstand and bunding to meet a permeability of less than 1 x 10^{-8} m/s;* - *The processing bay is to be constructed in the Digestate Processing Area depicted on the Premises Map in Schedule 1;* - *The processing bay must be graded to the leachate pond drainage sump; and* - *The bund shall be constructed to ensure there is no overflow of digestate, leachate or stormwater other than to the area graded to the leachate pond drainage sump.*	*Must be constructed and operational within six months from the date of this Amendment Notice.*
3	*Construction of groundwater monitoring bores*	- *Construction of three down-gradient groundwater monitoring bores at the locations marked MB3, MB4 and MB5 on the Premises Map in Schedule 1;* - *Bores shall be constructed according to the ASTM D5092-04(2010)e1 Standard practice for design and installation of groundwater monitoring wells; and* - *Bores shall be logged as per AS1726-1993 for the unified classification system for soils.*	*Must be constructed within two months and operational within three months from the date of this amended licence.*
4	*Resurfacing of hardstand area*	*Resurfacing of hardstand area within the 'Digestate Processing' area depicted in the Premises Map in Schedule 1 to meet a permeability of less than 1 x 10^{-8} m/s.*	*The resurfacing must be completed within six months from the date of this Amendment Notice.*
5	*Installation of pond aerator*	*Installation of an aeration system capable of maintaining aerobic conditions in the Leachate Pond depicted in the Premises Map in Schedule 1.*	*Must be installed and operational within one month from the date of this Amendment Notice.*

5. Conditions 1.2.6 and 1.2.7 have been included onto the licence as shown below:

1.2.6 *Upon completion of each of the infrastructure requirements specified in Table 1.2.1 and prior to use of the infrastructure, the Licence Holder shall submit a compliance document to the CEO which shall:*

(a) certify that the infrastructure was constructed in accordance with the conditions of licence;

(b) be signed by a person authorised to represent the Licensee and contain the printed name and position of that person within the company.

1.2.7 *The Licensee shall, within 3 months form the date of this amended licence, undertake and submit to the CEO a water balance assessment for the whole of the Premises which includes, but is not limited to, the following:*

(a) Monthly inputs (including rainfall, runoff, bore water, liquid waste);

(b) Monthly outputs (including evaporation, use of process water from pond);

(c) Size of catchment areas for whole of Premises;

(d) Capacity of pond;

(e) List of all relevant assumptions made during each stage of the assessment;

(f) Details on the amount of water required during composting process including a description and calculations to support the result;

(g) Outcome for pond capacity required for whole of site including a description and calculations to support this results; and

(h) Recommendations, if required, for capacity increases for pond storage.

6. Condition 1.3.1 of the licence has been amended by the deletion of the text shown in strikethrough and the insertion of the text shown in red and underline below:

~~*1.3.1 The Licensee shall only accept waste on to the Premises if:*~~

~~*(a) it is of a type listed in Table 1.3.1;*~~

~~*(b) the quantity accepted is below any quantity limit listed in Table 1.3.1; and*~~

~~*(c) it meets any specification listed in Table 1.3.1.*~~

1.3.1 The Licence Holder must only accept waste at the Premises if:

(a) it is of a type specified in Column 1 of Table 1.3.1; and

(b) it meets any specification or quantity limit specified in Column 2 or Column 3 of Table 1.3.1.

7. Table 1.3.1 of licence condition 1.3.1 has been deleted as shown in strikethrough and replaced with the inserted table shown in red and underline below:

~~***Table 1.3.1: Waste acceptance***~~		
~~***Waste type***~~	~~***Specification[1]***~~	~~***Quantity limit tonnes/ year (combined total)***~~
~~*Biosolids*~~	~~*Biologically treated wastewater sludge or biosolids.*~~	~~*100,000*~~
~~*Coarse Green waste*~~	~~*Includes jarrah bark and pine bark.*~~	
~~*Sawdust*~~	~~*None specified*~~	
~~*Food waste*~~	~~*None specified*~~	
~~*Manure*~~	~~*None specified*~~	

Table 1.3.1: Waste Types acceptance

	Column 1	***Column 2***	***Column 3***

	Material	Specification	Quantity Limit (tonnes/year)
Solid wastes			
1	Clean Fill	N/A	18,000
2	ASS/PASS	N/A	10,000
3	Biosolids	Biologically treated wastewater sludge or biosolids.	15,000
4	Coarse and shredded green waste	Includes jarrah bark and pine bark.	Combined total of 38,000
5	Sawdust	N/A	
6	Food waste	N/A	500
7	Manure	N/A	1,500
Liquid wastes			
8	Digestate	Limited to digestate from Richgro Garden Products Anaerobic Digestion facility	4,550

8. Condition 1.3.3 of the licence has been amended by the deletion of the text shown in strikethrough and the insertion of the text shown in red and underline below:

~~*1.3.3 The Licensee shall ensure that wastes accepted onto the Premises are only subjected to the processes set out in Table 1.3.2 and in accordance with any process limits described in that Table.*~~

9. *1.3.3 The Licence Holder must only store and process the materials specified in column 1 of Table 1.3.2 in accordance with the requirements specified in column 2 of Table 1.3.2.*

10. Table1.3.2 of licence condition 1.3.3 has been deleted as shown in strikethrough and replaced with the inserted table shown in red and underline below:

~~**Table 1.3.2: Processing of materials**~~		
~~**Waste type**~~	~~**Process**~~	~~**Process requirements**~~
~~As detailed in Table 1.3.1~~	~~Receipt, handling and storage prior to composting~~	~~(i) Waste shall not be stored for longer than 14 days before being added to the composting process.~~ ~~(ii) Mulched greenwaste shall be stored in windrows that are no larger than 8 metres wide, 60 metres long and 3.5 metres high.~~
	~~Treatment by composting~~	~~(iii) Windrows shall be turned regularly to ensure aerobic conditions are maintained.~~ ~~(iv) Moisture levels in the composting piles shall be maintained between 40 to 65 per cent.~~ ~~(v) Windrows shall not exceed 3.5 metres high, 8 metres wide and 120 metres long.~~ ~~(vi) Composting leachate is collected and returned to the composting process.~~ ~~(vii) Ensure that, as a minimum, compost meets physical and chemical requirements set out by AS 4454.~~

Table 1.3.2: Storage and processing requirements

	Column 1	***Column 2***
	Material	***Storage and Processing Requirements***
1	*Green waste*	*Stored and pre-treated on hardstand in the 'Green waste shredding and soil/mulch blending' area specified in the Premises Map in Schedule 1.* *Must not be stored for longer than one month before being incorporated into the composting process.* *Pasteurised, composted and matured on hardstand in the 'Composting Area' as specified in the Premises Map in Schedule 1, with these activities occurring on a hardstand that meets a permeability of 1 x 10^{-8} m/s, within 18 months from the date of this Amendment Notice.*
2	*Biosolids*	*Must not be stored for longer than 72 hours before being incorporated into the composting process.* *Stored, blended, pasteurised, composted and matured on hardstand in the 'Composting Area' as specified in the Premises Map in Schedule 1, with these activities occurring on a hardstand that meets a permeability of 1 x 10^{-8} m/s, within 18 months from the date of this Amendment Notice.*
3	*Sawdust*	*Stored and blended on hardstand in the 'Green waste shredding and soil/mulch blending' area and 'Product Storage' area specified in the Premises Map in Schedule 1.* *Must not be stored for longer than one month before being incorporated into the composting process.* *Pasteurised, composted and matured on hardstand in the 'Composting Area' as specified in the Premises Map in Schedule 1, with these activities occurring on a hardstand that meets a permeability of 1 x 10^{-8} m/s, within 18 months from the date of this Amendment Notice.*
4	*Food waste*	*Must not be stored for longer than 72 hours before being incorporated into the composting process.* *Stored, blended, pasteurised, composted and matured on hardstand in the 'Composting Area' as specified in the Premises Map in Schedule 1, with these activities occurring on a hardstand that meets a permeability of 1 x 10^{-8} m/s, within 18 months from the date of this Amendment Notice.*
5	*Manure*	*Must not be stored for longer than 72 hours before being incorporated into the composting process.* *Stored, blended, pasteurised, composted and matured on hardstand in the 'Composting Area' as specified in the Premises Map in Schedule 1, with these activities occurring on a hardstand that meets a permeability of 1 x 10^{-8} m/s, within 18 months from the date of this Amendment Notice.*
6	*ASS/PASS*	*Must not be stored for longer than 14 days before being incorporated into the composting process.* *Stored, blended, pasteurised, composted and matured on hardstand in the 'Composting Area' as specified in the Premises Map in Schedule 1, with these activities*

	Column 1	Column 2
	Material	Storage and Processing Requirements
		occurring on a hardstand that meets a permeability of 1 x 10^{-8} m/s, within 18 months from the date of this Amendment Notice.
7	Clean fill	No specifications
8	Digestate	Storage of Digestate is not authorised under this licence. Each batch is limited to the application of a maximum 12.5 tonnes digestate per 50 tonnes of green waste. Blended in the 'Digestate Processing' area as specified in the Premises Map in Schedule 1. Blending of Digestate with shredded green waste is limited to being undertaken within the temporary processing area described in Table 1.2.1 for a period not exceeding six months. Any Digestate blending activities past this period must be undertaken within a concrete processing bay as described in Table 1.2.1. Application of Digestate must not commence prior to 9am each day and is only authorised to be applied to shredded green waste. Digestate must only be applied to green waste at the initial mixing stage and prior to formation of windrows. Mixed digestate and green waste must be incorporated into windrows by the end of each working day. Digestate application must be controlled in a manner that diverts all runoff to the leachate pond and/or drainage channels and does not cause any pooling.
9	Green waste blended with Digestate	Pasteurised, composted and matured in the 'Digestate Processing' area as specified in the Premises Map in Schedule 1.

11. Condition 1.3.4 and Table 1.3.3 of licence have been deleted from the licence as shown in strikethrough below:

~~1.3.4 The Licensee shall ensure that waste is stored and/or contained within infrastructure in accordance with Table 1.3.3 and that the integrity of the containment infrastructure is maintained.~~

~~Table 1.3.3: Containment infrastructure~~		
~~Containment area/infrastructure~~	~~Material~~	~~Infrastructure requirements~~
~~Waste storage area~~	~~Waste types as detailed in Table 1.3.1 (feedstock)~~	~~Bunded hardstand area.~~
~~Composting area~~		~~Bunded hardstand area.~~
~~Lined leachate storage dam~~	~~Contaminated stormwater and leachate~~	~~1. Lined to achieve a permeability of less than 10^{-9} m/s or equivalent;~~ ~~2. A minimum top of embankment freeboard of 300mm is maintained~~ ~~3. Capacity to store a 72 hour duration, 1 in 10 year ARI critical rainfall event without overflow.~~

12. Condition 1.3.5 has been renumbered to condition 1.3.4 as shown in red and underline below:

1.3.5~~5~~4 The Licensee shall implement control measures to prevent infestations of pests, flies and vermin at the Premises.

13. Conditions 1.3.5 to 1.3.8 have been inserted into the licence as shown below:

1.3.5 The Licence Holder must manage the compost windrows such that:
- *(a) Windrows are turned regularly to ensure aerobic conditions are maintained.*
- *(b) Moisture levels in the composting piles shall be maintained between 40 to 60 percent.*
- *(c) Windrows shall not exceed 3.5 metres high, 8 metres wide and 120 metres long.*
- *(d) Windrows shall be separated by at least 0.5 metres of clear ground.*
- *(e) Ensure that, as a minimum, compost meets physical and chemical requirements set out by AS4454.*

1.3.6 The Licence Holder is to undertake the product testing in accordance with the requirements of Column 1 of Table 1.3.1, within the timeframe specified in column 2 of Table 1.3.1.

Table 13.1: Product assessment

	Column 1	**Column 2**
	Requirement	**Timeframe**
1	The Licence Holder shall prepare a report that assesses all compost and blended soils produced at the Premises against the processes and product parameters specified in AS 4454.	Report to be provided to the CEO within six months from the date of this Amendment Notice.
2	Where the processes and product parameters deviate from AS 4454 for a product, the Licence Holder must provide evidence, with reference to testing regimes and controls, to demonstrate how the product is suitable for its end use.	

1.3.7 The Licence Holder shall ensure that the Leachate Pond as depicted on the Premises Map in Schedule 1:
- *(a) is maintained with a liner that achieves a permeability of less than 10^{-9} m/s or equivalent;*
- *(b) is maintained with a freeboard of at least 300mm at all times; and*
- *(c) has continual aeration following the installation of the pond aeration system specified in Table 1.2.1.*

1.3.8 The Licence Holder must ensure that all leachate is contained within the boundary of the Premises or removed offsite to an appropriately licensed facility.

14. Table 2.1.1 of licence condition 2.1.1 has been amended by the deletion of the text shown in strikethrough and the insertion of the text shown in red and underlined below:

Table 2.1.1: Monitoring of inputs and outputs				
Input/Output	***Parameter***	***Units***	***Averaging period***	***Frequency***
~~Mass of each input listed in Table 1.3.1~~	*Waste types as detailed in Table 1.3.1*	*Tonnes*	*One year*	*Each load arriving at the Premises*

Waste Inputs				
Waste Outputs	Waste type as defined in the Landfill Waste Classification and Waste Definitions 1996 (as amended December 2009)	Tonnes	One year	Each load leaving or rejected from the Premises
Other outputs	Composts and blended soils	Tonnes	One year	Each load leaving the Premises

15. The licence has been amended by the inclusion of condition 2.2.1 and Table 2.2.1, and condition 2.2.2 and Table 2.2.2 outlined below:

2.2 Monitoring of ambient groundwater

2.2.1 The Licence Holder must undertake groundwater monitoring:
- *(a) for the parameters specified in Column 1 of Table 2.2.1;*
- *(b) at the locations specified in Column 2 of Table 2.2.1;*
- *(c) at the frequency specified in Column 4 of Table 2.2.1; and*
- *(d) using the methods specified in Column 5 and Column 6 of Table 2.2.1.*

Table 2.2.1: Monitoring of ambient groundwater

Column 1	***Column 2***	***Column 3***	***Column 4***	***Column 5***	***Column 6***
Parameter	***Location as shown on Site Plan***	***Groundwater Action Criteria***	***Frequency***	***Sample***	***Method***
Standing water level	*MB1, MB2 MB3, MB4 and MB5*	*N/A*	*Bores MB1 and MB2: Monthly for the first 12 months and then quarterly thereafter.* *Bores MB3, MB4 and MB5: Following construction and installation of the requirements for item 3 in Table 1.2.1, monthly for the first 12 months and then quarterly thereafter.*	*In-field measurement*	*AS 5667.1 AS 5667.11*
Temperature					
Electrical conductivity					
pH					
Redox potential					
Biological oxygen demand (BOD)				*Spot Sample*	
Total dissolved solids (TDS)					
Total nitrogen		*5.0 mg/L*			
Ammoniacal nitrogen	*MB1, MB2 MB3, MB4 and MB5*	*N/A*		*Spot Sample*	*AS 5667.1 AS 5667.11*
Nitrate (as nitrogen)					
Total phosphorus		*1.0 mg/L*			
Total organic carbon		*N/A*			
Bicarbonate + Carbonate		*N/A*	*Bores MB1 and MB2: Monthly for the first 12 months and then quarterly thereafter.* *Bores MB3, MB4 and*		
Calcium					
Chloride					

Column 1	***Column 2***	***Column 3***	***Column 4***	***Column 5***	***Column 6***
Parameter	***Location as shown on Site Plan***	***Groundwater Action Criteria***	***Frequency***	***Sample***	***Method***
Magnesium			*MB5: Following construction and installation of the requirements for item 3 in Table 1.2.1, monthly for the first 12 months and then quarterly thereafter.*		
Potassium					
Sodium					
Sulfate					
Delta nitrogen 15			*Following construction and installation of the requirements for item 3 in Table 1.2.1, undertake monitoring in all bores for one sampling round within six months from the date of this Amendment Notice.*		
Delta carbon 13					

2.2.2 In the event that the Groundwater Action Criteria as specified in Table 2.2.1 is exceeded, the Licence Holder must upon receipt of the exceedance, investigate the likely cause of the exceedance and within 28 days of receipt of the exceedance, provide the CEO in writing with the following information:

(a) Date of the exceedance;
(b) Bore location where the exceedance(s) was identified;
(c) Laboratory analysis data; and
(d) Results of investigations undertaken to determine the reason for the exceedance and any action taken to resolve the exceedance.

16. The licence has been amended by the inclusion of conditions 2.43.1 and 2.3.2 outlined below:

2.3 Odour emissions monitoring

2.3.1 *Within six months of this licence being granted, the Licence Holder must undertake an odour field survey (OFS), which:*

(a) Identifies and characterises all sources of odour on the Premises;
(b) includes downwind odour surveys at a minimum of five of the nearest sensitive receptors conducted by trained, independent personnel in Field Olfactometry;
(c) is undertaken in accordance with the methodology in the VDI 3940 Part 2;
(d) includes odour intensity level characterised according to the scale specified in the VDI 3940 Part 3;
(e) is undertaken during worst case operating conditions, including when digestate, biosolids and manures are present and being processed onsite; and
(f) include a minimum of three surveys undertaken during a range of meteorological conditions.

2.3.2 The Licence Holder must submit to the CEO the OFS specified in condition 2.3.1 within one month of the OFS being finalised. The submission must

document the operating conditions and meteorological conditions at the time of the OFS.

17. Table 3.2.1 of licence condition 3.2.1 has been amended by the insertion of the text shown in red and underlined below:

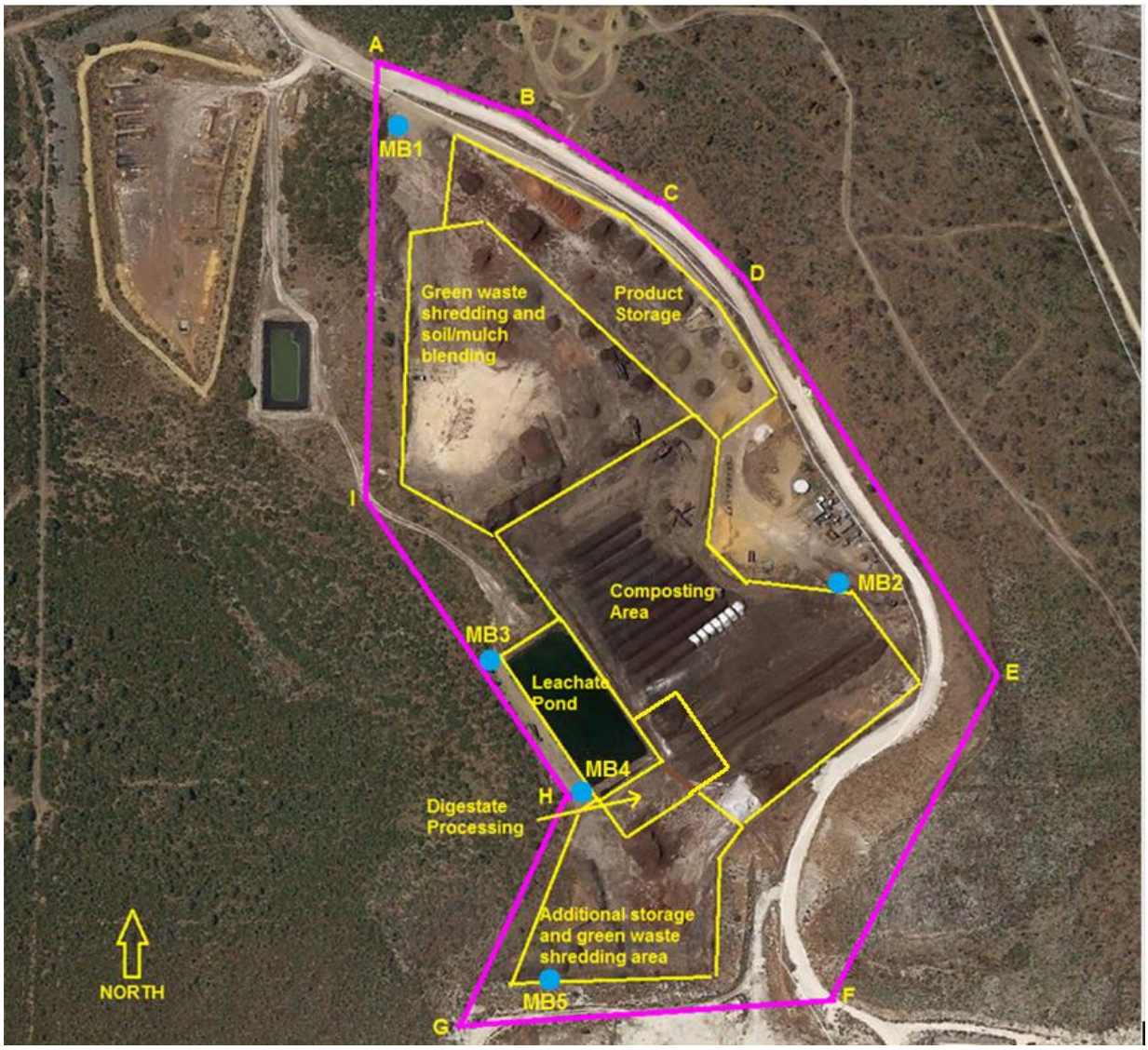
3.2.1 The Licensee shall submit to the CEO an Annual Environmental Report within 28 calendar days after the end of the annual period. The report shall contain the information listed in Table 3.2.1 in the format or form specified in that table.

Table 3.2.1: Annual Environmental Report		
Condition or table (if relevant)	*Parameter*	*Format or form1*
-	*Summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have occurred during the annual period and any action taken*	*None specified*
2.2.1	*Groundwater monitoring data including:* *(a) An interpretive summary and assessment of ambient groundwater quality monitoring results against relevant assessment levels for water as published in the Contaminated Sites Guidelines; and* *(b) An interpretive summary and assessment of ambient groundwater quality monitoring results against previous monitoring results. Trend graphs shall be provided in support of this assessment;* *(c) A report to the CEO for exceedances of Groundwater Action Criteria (as specified in Column 3 of Tables 2.2.1 and 2.2.2) which have occurred.*	*None specified*
3.1.3	*Compliance*	*Annual Audit Compliance Report (AACR)*
3.1.4	*Complaints summary*	*None specified*

Note 1: Forms are in Schedule 2

18. The 'Premises Map' in Schedule 1 of the licence has been replaced with the following image and text:

The Premises is shown in the map below. The pink line depicts the Premises boundary. The yellow lines depict the relevant infrastructure areas and the blue dots depict the locations of the groundwater monitoring bores.


A
B
C
D
E
F
G
H
I
MB1
MB2
MB3
MB4
MB5
Green waste shredding and soil/mulch blending
Product Storage
Composting Area
Leachate Pond
Digestate Processing
Additional storage and green waste shredding area
NORTH

Appendix 1: Key Documents

	Document Title	Availability
1	Licence L7931/1999/9	accessed at http://www.dwer.wa.gov.au
2	Licence Amendment Application Form	DWER records (A1410589)
3	Supporting documentation for licence amendment	DWER records (A1412531)
4	Updated Licence Amendment Application Form and supplementary documentation	DWER records (A1421575)
5	Addendum – Amazon Soils licence amendment application – Water Balance	DWER records (A1436206)
6	Additional supplementary information for licence amendment – tasks and timeline	DWER records (A1446271)
7	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	accessed at http://www.dwer.wa.gov.au
8	DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.	
9	DER, August 2016. *Guidance Statement: Licence duration.* Department of Environment Regulation, Perth.	
10	DER, November 2016. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	
11	DER, November 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.	
12	DER, December 2014. *Assessment and management of contaminated sites. Contaminated sites guidelines.* Department of Environment Regulation, Perth.	

Appendix 2: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amendment Notice on 27 June 2017 for review and comment. The Licence Holder responded on 1 December 2017. The following comments were received on the draft Amendment Notice.

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
Comments* on draft Amendment Notice **The comments provided refer to both Amazon and Richgro as making comments/commitments. It is assumed for the purposes of this document that where Richgro have been cited as providing the comment, this is the 'Licence Holder' making the comment.*			
1	**Condition 1.2.5 and Table 1.2.1 – resurfacing of hardstand area** • Justification is requested on the condition to resurface the whole site. • Justification is requested on the condition to resurface the whole site and the timeline imposed, especially in terms of having sufficient time to install bores and monitor groundwater, and report on assessments. • Reconsider this requirement after 18 months when water balance and groundwater monitoring data has been reviewed.	• The existing licence did not require any groundwater monitoring – baseline groundwater data should not be used to support resurfacing of hardstand areas. A minimum of two years groundwater data should be considered in relation to this requirement. • Consideration to historical land use of site and surrounding areas should be considered. • Resurfacing of hardstand would be expensive. • The May 2014 Structerre permeability testing states permeability results indicate that the upper 2m of encountered materials are of low permeability and that the area would have poor drainage / seepage characteristics. • The surrounding geology is Tamala Limestone.	• Section 15 of Amendment Notice, Risk Assessment – Leachate, provides the justification for this requirement. The Delegated Officer does not consider the proposed groundwater monitoring as baseline data. Baseline data is undertaken prior to activities commencing. The proposed monitoring will provide data that is reflective of any impacts to groundwater from the Premises operations. The Delegated Officer considers that a number of activities on the Premises represent a high risk to groundwater and that additional controls in the form of improved site surfacing is required to control risks to groundwater. • As stated in section 15, the Structerre report identified hardstand permeability of 1.4×10^{-5} m/s to 6.9×10^{-6} m/s. The Delegated Officer considers that this is moderate permeability (as opposed to a low permeability as quoted in the Structerre Report) and is insufficient to mitigate risk of seepage of leachate through the hardstand (and subsequent groundwater impacts) on an on-going basis. • Section 15 also states that although limestone has some capacity to attenuate phosphorous, it has little capacity to attenuate nitrogen that has been identified in the leachate generated at the Premises.

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
			• As stated in section 15, if groundwater monitoring data demonstrates that the existing hardstand is sufficient at mitigating impacts of leachate, the risk assessment can be reviewed. • The Delegated Officer has reconsidered the risk assessment for emissions of leachate and has determined that low risk feedstocks and/or activities, such as green waste storage and blending, short term storage of manures and food wastes, can continue to be undertaken on the existing hardstand area. The requirement to resurface the whole site has been removed however higher risk feedstocks and/or activities are required to be stored and/or processed on a hardstand that meets 10^{-8} m/s within 18 months. This modification allows the Licence Holder greater control and ability to design the site as necessary to meet this requirement. • The Delegated Officer considers that 18 months is a reasonable timeframe to meet this requirement given that groundwater monitoring data will be available within 3 to 4 months of the Amendment Notice being granted.
2	**Condition 1.2.5 and Table 1.2.1 – Construction of additional leachate pond(s)** • Justification to construct additional leachate pond(s) is required on the basis that: o A water balance has not yet been undertaken to determine if the current leachate pond has sufficient capacity; o DWER and the Licence	• Construction of additional leachate pond(s) is dependent on water balance outcome • The option to use the adjacent Water Corporation's leachate pond has not been considered.	Section 7 – Water Balance has been reassessed by the Delegated Officer and based on the revised calculations, the original findings that the pond had insufficient capacity appear to be incorrect. This requirement to construct additional leachate ponds has been removed from the Amendment Notice pending the outcomes of the whole of site water balance assessment.

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
	Holder's process water balance calculations differ which may impact on the outcome of determining pond capacity; ○ Topography, windrows, production area, processing operation and seasonality have not been considered in the risk assessment. • Condition should be reviewed in consideration of the water balance data and the use of Water Corporation's leachate pond.		
3	**Condition 2.2.1 and Table 2.2.1 – Monitoring of ambient groundwater** • Justification is required regarding the requirement to undertake monthly groundwater monitoring bores. • Proposed to undertake quarterly monitoring for all analytes except for Delta nitrogen and Delta carbon which are proposed to have bi-annual monitoring.	• "Monthly monitoring will not provide baseline data given the site has been as a biosolids facility prior to Richgro purchasing the site, and the potential impacts of historical land uses." • "Discussion with contaminated land experts has indicated that tests for Delta nitrogen and Delta carbon would not be required on a monthly basis to determine isotope values."	• Justification for the inclusion of these monitoring requirements is discussed in section 15, Risk Assessment – Leachate. The data is not being used for baseline data and is instead going to be used to identify any impacts the site operations are having on groundwater. • DWER does not have monitoring data for the up gradient bores onsite and the requirement to install and monitor from three downgradient bores will assist in providing data that identifies any impacts the activities on the premises are having on groundwater and to provide an overview of groundwater quality beneath the Premises. As per the Technical Expert Report in Appendix 3, contaminants may take only 46 days to reach groundwater therefore the results of groundwater monitoring are likely to be in response to current, rather than historical operations. However, the Delegated Officer is aware of other leachate sources in the vicinity of the site and groundwater monitoring data for both upstream and downstream bores will assist in clarifying

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
			the extent of current operations on water quality. • On review of this condition, the Delegated Officer has reduced the monitoring for Delta nitrogen and Delta carbon to a one off sampling event to be undertaken within six months of this amendment. The Amendment Notice only requires monthly monitoring of the other analytes for a period of 12 months and then reduced to quarterly. This requirement may be reviewed once groundwater monitoring data has been provided and assessed by DWER. No other changes have been made to this requirement given that the condition is risk-based and considered necessary for the control and mitigation of pollution and environmental harm.
4	**Condition 2.3 – Odour emissions monitoring** • Justification is required to clarify why an extensive field odour survey is required on basis that: o residents are located 1.5km away; o digestate unlikely source of odour at Jandakot premises; o only one verified odour complaint has been received; and o it is unlikely that digestate will be received daily. • Remove requirement to undertake field odour survey and replace with requirement to provide monitoring reports undertaken on the site when	Licence Holder will develop an Odour Monitoring Plan for the premises once amendment has been granted.	Justification for this condition is provided in section 14, Risk assessment – odour impacts on amenity and wellbeing. DWER's investigations into sources of odour at the Jandakot premises resulted in the identification of a link between the outdoor application of digestate and odour complaints. Odour from other composting facilities regulated by DWER has been known to travel over substantial distances (>8km). The Delegated Officer has reviewed the proposed odour monitoring and considers that it is not robust enough to rely on for the purposes of assessing odour emissions at the Premises. Regardless of how frequently digestate is received, odours can still be emitted from the unloading and application of digestate and the extent of these impacts will not be known until a field odour assessment has been undertaken. This condition remains on the Amendment Notice.

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
	digestate is received.		
5	**Section 6.1 – composting hardstand** • This section should be updated to reflect the wording of the Structerre report namely that: • Based on the results of the investigation and site conditions encountered, the following conclusions are made: ○ "The permeability results of the upper 2.0m were found to be consistent within boreholes BH1 to BH4; this would be attributed to the consistent materials (SandGravel of Limestone origin) found within the 4 holes. ○ The permeability results indicate that the upper 2m of encountered materials are of low permeability and that the area would have poor drainage / seepage characteristics."	Reflect findings of Structerre report.	• The Delegated Officer does not agree with the statement in the Structerre report that "The permeability results indicate that the upper 2m of encountered materials are of low permeability and that the area would have poor drainage / seepage characteristics." • The findings of the report indicate hardstand permeability of 1.4×10^{-5} m/s to 6.9×10^{-6} m/s which the Delegated Officer considers as medium to high permeability. The Delegated Officer considers low permeability to be a minimum of 1×10^{-8} m/s.
6	**Section 7 – Water Balance** Update/remove section as it cannot be determined if the pond has capacity or not.	A water balance assessment for the whole of site has not been undertaken and until it has been completed, it cannot be determined if the leachate pond has sufficient capacity or not.	• The Delegated Officer acknowledges that a whole of site assessment has not been undertaken which is why condition 1.2.7 has been included on the licence requiring a whole of site water balance assessment to be completed within three months. • Based on the information available to the Delegated Officer at the time of this assessment, a general water balance assessment for the leachate pond was

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
			undertaken to provide some information and consideration on whether the pond had sufficient capacity to accept the addition of digestate onto the premises. This has been revised and updated to acknowledge that the pond appears to have capacity on an annual mass water balance calculation however seasonal fluctuations, such as increased rainfall during winter, has not been considered in DWER's assessment. The pond may not have sufficient capacity during winter months and the result of the water balance assessment will assist in clarifying this. • The capacity of the pond will be reconsidered once the water balance assessment data has been provided.
7	**Section 8 - Digestate required for process** • Revise calculations in regards to the amount of digestate that can be processed onsite. • Include information to state how moisture contents were determined.	"The calculation of moisture content has not been derived based on the 'compost mix' and consequently DWER calculations pertaining to the amount of digestate and greenwaste need to be revised accordingly."	• A sentence has been added to advise that the moisture content figures were provided by the Licence Holder. • Based on information provided as part of the amendment application, during site visits the Licence Holder confirmed with DWER Officers that digestate would only be added at the initial mixing (pre-pasteurisation) stage indicated in section 3.5 of the supporting documentation provided 11 April 2017. • The Delegated Officer has undertaken calculations to determine the amount of digestate required to bring the compost mix to 60% moisture content at the initial mixing stage. Based on the content of the amendment application and from discussions with the Licence Holder, the Delegated Officer has assumed that no digestate is applied after this stage. • The Delegated Officer has reconsidered the calculations and has determined that the initial limits slightly exceeded the amount that can be applied. This section has been updated to reflect the correct figures to bring the green waste/digestate mix to 60% at the

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
			initial mixing stage. • The amount of digestate authorised to be accepted onsite is limited to the amount needed during the initial mixing stage which, based on the proposed 18,200 tonnes/year of green waste, equates to 4,550 tonnes/year which is detailed in section 8.
8	**Section 9 - Liquid required for whole of site** Section needs to be updated to reflect updated/revised digestate calculations as well as considering varying moisture contents of feedstock.	Moisture content varies based on rainfall and evaporation rates as well as the initial content of different waste types received onsite.	• This section has been revised and recalculated using the updated feedstock values. Comments have been included in this section to note that it is an estimated calculation based on information provided at the time of the assessment to give an estimated calculation on liquids used onsite each year to assist in determining the initial pond water balance assessment. • This section can be reviewed once the water balance assessment for the whole of site has been provided.
9	**Section 10 - Proposed New Feedstocks** • Provide justification for reduction to waste acceptance. • Update Table 1.3.1 to the following tonnes: o Clean Fill: 18,000 from 15,000 o ASS/PASS: 10,000 from 8,500 o Biosolids: no change o Coarse and shredded greenwaste and Sawdust: combined total of 38,000 from 28,200 (green waste) and 1,600 (pine bark). o Food waste: no change o Manure:1,500 from 1,200 o Digestate: 14,560 from 4,800	Update to reflect sales growth and to incorporate the approved premises production of 100,000 tonnes/annual period	Annual values provided in Table 1.3.1 were based on information provided by the Licence Holder. Based on the Licence Holder's comments to allow for sales growth, Table 1.3.1 has been updated as requested with the exception of digestate which has been reduced to 4,550 tonnes/year based on the calculations in section 8.

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
10	**Section 14 - Risk Assessment – odour impacts on amenity and wellbeing** <u>General hazard characterisation and impact</u> • Clarify that the 'several odour sources within the area' are in regards to surrounding land uses and not within the Amazon site. • Remove reference to the Richgro premises. <u>Proponent controls</u> • Update section to state: "The digestate will not be incorporated into products that are currently processed utilising biosolids, in line with Schedule 2, points 7 and 9 of the DOH F-AA 11850 Conditions of Approval." • Update to reflect that the Licence Holder "has not stated that digestate would not be used in conjunction with manures." <u>Key findings</u> • Finding 2 – update to reflect that adjacent Water Corporation site is used infrequently and would only be a limited source of odour. • Finding 3 – reword this to reflect that odours are predominantly generated from initial mixing and turning and not	<u>General hazard characterisation and impact</u> • Update to reflect surrounding land uses such as turf farms and market gardens. • Application should be considered on its own merits. <u>Proponent controls</u> • Reflect what the Licence Holder is proposing • As above <u>Key findings</u> • Reflect current operations at the Water Corporation's facility in regards to being a limited source of odour emissions. • Reflect where odour emissions are predominantly generated from. • "It is incorrect to say that five odour	<u>General hazard characterisation and impact</u> • Updated to refer to neighbouring land uses as odour sources. • Although the Delegated Officer acknowledges that Richgro is a separate facility, the findings from the outdoor application of digestate assist in providing context for this application and are directly relevant to this assessment. Therefore, this remains in the Amendment Notice. <u>Proponent controls</u> • The Licence Holder's request refers to documents that have not been published by the Department and refer to an approval from a separate decision making authority which DWER does not have regulatory jurisdiction over. This section already states that digestate will not be applied to products containing biosolids. Therefore, this request has not been actioned. • This control has been updated to remove the commitment to not use the digestate with manure products. <u>Key findings</u> • Regardless of the frequency that the Water Corporation site is used, it is currently licensed to accept up to 5,000 tonnes/year of biosolids and is considered as a potential source of odour, which is stated in this finding. Therefore, this finding is accurate and remains on the Amendment Notice. • Finding 3 has been updated to reflect Licence Holder's

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
	from absorption. • Finding 4 – update this to read: "Five odour complaints have been received in regards to potential odour emissions from the site, adjacent or surrounding land uses. One complaint has been verified by the City of Wanneroo as having being generated from the site." • Finding 5 – "Delete point 5 given the licence amendment is for Amazon Soils site, and there are different site conditions, location of sensitive receptors, political situations at the Jandakot site that do not allow for direct comparison." • Finding 8 - Update to state that odour management measure have been developed and a Safe Work Practices for monitoring of odour emissions at site boundary. • N/A <u>Regulatory controls</u> • "Update to processing time within 72 hours" for poultry manures, food waste and biosolids. • Update to reflect revised digestate	complaints have been received in regards to the Premises if the source of odours has not been confirmed, especially given surrounding land uses and the use of manures including poultry manures." • The Licence Holder "has committed to developing an 'Odour Monitoring Plan' for site operations. A Safe Work Practice has been developed for the Jandakot site, which will be modified for the Amazon Soils site on issuance of the licence amendment." • N/A <u>Regulatory controls</u> • This allows time "for schedule plant maintenance, possible breakdowns etc." • Revised digestate figures should be	request. • The five odour complaints received cited the Premises as the source of odour. It is incorrect to say that five odour complaints were received for the surrounding area as this was not the basis of the complaints which specifically noted the Premises as the source. As part of DWER investigations, this could not be verified and it was noted that there are different odour sources within the area of the Premises. This information is contained within this finding and therefore the request has not been actioned. This finding has however been updated to state that ten odour complaints have been received as an additional five complaints have been received since this document was drafted. • As noted above, the findings from the outdoor application of digestate at the Jandakot premises assist in providing context for this application. Additional information has been added to this finding to note that differing site conditions apply. • The Licence Holder's request to include this information is better suited as a proposed control and not a key finding which are based on the Delegated Officer's understanding of the proposal. This has been included as a proponent control. • A new finding has been included to specify that the Safe Work Practice document does not describe the scale used for odour tests or what corrective action will be undertaken to address odour emissions. <u>Regulatory controls</u> • The request to extend the storage time from 48 to 72 hours has been actioned in the Amendment Notice. Pending findings of the Field Odour Assessment, waste

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
	values. • Update "to state that digestate will not be blended with biosolids." which incorporates the action of manure being used in the process. • Remove requirement to undertake a Field Odour Assessment and provide further justification for this requirement. • Update section to reflect that further reducing feedstock values is not feasible. Provide justification for this requirement.	considered and updated in Amendment Notice. • Digestate may be blended with a percentage of manures. • Odour monitoring at the Jandakot facility "did not measure an offensive odour that would give rise to increased odour complaints" when digestate was being applied to outdoor compost windrows. Sensitive receptors are 1.5 km from Premises. Only one odour complaint has been confirmed. An Odour Monitoring Plan will be developed for the Premises. • "On current feedstocks received and processing operations, there has been one verified complaint from odour emissions investigated by the City of Wanneroo. The closest residential receptor to site is located 1.5Kms away, and is located closer to other sites that may be a source of odour emissions including turf farms and market gardens. Placing limiting conditions in terms of current (excluding digestate) organics accepted to site limits Richgro's capacity to meet production and planned growth. These limits have been placed with no evidence for justification from DWER for the Amazon Soils site."	storage times may be reviewed. • This section has been updated to reflect the digestate volumes calculated in Section 8. • This section has been updated as per Licence Holder's request. The requirement for this control is outlined in section 14 – Risk Assessment – odour impacts on amenity and wellbeing and is primarily required to verify the Department's risk assessment. This condition was included in consultation with DWER's Odour Expert. Additional information to this effect has been included however the requirement remains on the Amendment Notice. The Delegated Officer reviewed the proposed odour monitoring and considers that it is not robust enough to rely on for the purposes of assessing odour emissions at the Premises. • This section relates to the current limits placed on feedstock values as defined in Table 1.3.1 – waste types acceptance, and not on further limits. This has not been updated.

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
11	**Section 15 - Risk Assessment – leachate** <u>General hazard characterisation and impact</u> • Update section to acknowledge that permeability testing "of the composting pad were undertaken as per DWER requirements following discussions with Richgro Site Operations Manager." • Update to note that the Licence Holder has committed to installing three bores if digestate is authorised as a feedstock. • "Provide justification as to why the digestate would pose a high leachate generation risk" or review/update section to reflect controls to mitigate digestate. <u>Proponent controls</u> • Update section to reflect that a 300mm freeboard is maintained as per Licence requirements and Industry Standards. <u>Key findings</u> • Finding 2 - Provide justification of the	<u>General hazard characterisation and impact</u> • Provide further context for testing requirements. • Provide additional information in document • "Digestate will not be applied to the greenwaste following initial mixing and turning, and digestate is to be contained within a temporary and then more permanent bunded structure. Where digestate is to be mixed with greenwaste will be adjacent to the leachate pond with the pad being graded to ensure any leachate flows directly to the pond over a short distance. Aeration during composting and evaporation (especially during summer months) also serves to lessen the risk of high leachate generation." <u>Proponent controls</u> • Reflect what is being undertaken onsite. <u>Key findings</u> • "Combined with the classification of soils underlying the site as Tamala Limestone	<u>General hazard characterisation and impact</u> • Section 6.1 has been updated to specify that the testing was required by the Department. Section 15 has not been updated as this would be a duplication of information. • This section has been updated as per the Licence Holder's request however given the high risk of leachate from existing operations, the requirement to install three downgradient monitoring bores will remain on the licence regardless of whether digestate is being accepted onsite. • This section has been modified providing further clarification about the risk. The information regarding proponent controls is detailed in the relevant 'proponent controls' section and therefore has not been duplicated in this sentence. <u>Proponent controls</u> • Section 10.4 of the amendment application supporting documentation states that at least 0.5m freeboard has been incorporated at the Premises to mitigate leachate emissions. This section already states that the existing licence specified a freeboard of 300mm. this section has not been updated. <u>Key findings</u> • As per Point 1 above, the Delegated Officer does not agree with Structerre's comments regarding

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
	statement "The soil type at the premises is readily permeable…" given outcomes of investigations by Structerre. • Finding 11 – reword to "The Licence Holder will undertake a Water Balance across the site inclusive of processing operations within 3 to 6 months to provide data in terms of the leachate pond capacity." • Finding 12 – update section in regards to revised digestate figures. <u>Regulatory controls</u> • "Revise paragraph to state that: The Licence Holder will undertake a Water Balance across the site inclusive of processing operations within 3 to 6 months to identify the capacity of the leachate pond in terms of handling runoff from the site." • Update section in regards to comments in Points 1 and 2 above regarding hardstand resurfacing and groundwater bore monitoring.	and adjacent quarries would indicate that underlying site soils would not vary greatly from the bore hole investigations undertaken in 2014." • Update to state commitments made by Licence Holder. • "Note that the 50tns/day of greenwaste will absorb 40tns/day of digestate and is necessary to achieve a 60% moisture content in the 'compost mix'. The entire volume of the digestate would be used to initiate the composting process. Whilst the volumes differ to DWER calculations, digestate is used in the composting process." <u>Regulatory controls</u> • "The calculations undertaken by DWER do not include all aspects to be considered in a water balance, and therefore cannot be used to identify that the leachate pond has insufficient volume to contain the runoff from the premises." • As per comments in Points 1 and 2 above.	permeability. Based on the findings of the permeability tests, the Delegated Officer considers the hardstand to be of moderate permeability. Justification for this is provided in section 15. • This request relates to proponent commitments and not key findings. Finding 12 is valid and remains in the Amendment Notice. Section 7 – Water Balance, already states this commitment therefore it has not been duplicated in this section. • Digestate values revised in accordance with the Delegated Officer's calculations in section 8. <u>Regulatory controls</u> • As stated above, this request relates to proponent commitments and has already been stated in Section 7 – Water Balance. The section already refers to the requirement to undertake this assessment and therefore this request has not been actioned. • As per Point 1 above, the hardstand resurfacing requirement remains on the Amendment Notice. The requirement to monitor for delta nitrogen and delta carbon has been reduced to quarterly and this section has been updated to reflect this.
12	**Section 16 - Risk Assessment – noise impacts on amenity and wellbeing** <u>Consequence</u> • "Provide justification why the consequence has been rated as	<u>Consequence</u> • "No noise complaints have been received by DER in regards to this	<u>Consequence</u> • The Delegated Officer reconsidered the risk posed by noise emissions and agrees that the consequence of

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
	"moderate" - Revise consequence rating to "low"." <u>Overall rating</u> • "Revise overall rating to "minor"."	Premises" (section 15, pg.24). Proponent controls in place in terms of noise management. Operations occurring within the hours of 7am to 7pm. Proximity of closest residence at 1.5Km distance. Zoning of the area is "rural resource". <u>Overall rating</u> • "Note that noise monitoring undertaken for the Richgro Jandakot site found that all site operations inclusive of packing plants and loaders operating after 7pm met the noise regulations excepting the operation of the diesel Woodhog Grinder towards the front boundary of the premises. Operations at Amazon Soils are significantly less involved and residences are located considerably further from site operations."	noise emissions is minor and therefore this section has been updated. <u>Overall rating</u> • Based on the minor consequence and unlikely likelihood, the overall risk remains 'medium'. This outcome is shown in Table 8.
13	**Section 17 – Decision** • Update to reflect revised digestate volumes. • Update section to include words to the effect that the concrete blending bay in to be constructed for digestate acceptance. • Review decisions and update in regards to comments provided by the Licence Holder.	• Reflect correct figures for digestate. • Provide additional context for construction requirement. • Update to reflect any changes that have been undertaken to make this section more accurate.	• Digestate values updated as per the Delegated Officer's calculations in section 8. • Updated as per Licence Holder's request. • Other than the changes specified above, no additional changes are required to be made in this section.
14	**Table 1.2.1 – Infrastructure construction requirements**	• "Note that as previously advised, Development Approval will need to be	• At the time that this risk assessment was originally prepared, the Licence Holder advised that they were

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
	• Include the text “Pending timing of assessment of Development Approval by the City of Wanneroo” in regards to construction of the concrete blending bay. • Increase time for groundwater monitoring bores to operational within three months instead of two. • As per Point 1 above in regards to hardstand resurfacing requirements. • Include text to the effect that additional leachate pond(s) are only required to be constructed if the Water Balance Assessment identifies the need for this.	sought and granted from the City of Wanneroo for the construction of the concrete blending bay. City of Wanneroo Planning Services has advised pitt&sherry that approval timing is between 3 to 6 months, and in some cases longer. Richgro notes that it will not be possible to construct the bay within 6 months should the City of Wanneroo take 6 months or more to issue approval.” • “The licence holder will endeavour to organise construction of the bores within 2 months. Notes however that once constructed, groundwater flow to the bores needs time to ‘settle’ to facilitate effective and representative sampling to be undertaken. Industry practice is to allow the bores to ‘settle’ for a period of a month following construction. Consequently, the bores would not be operational for sampling for 3 months from the date of the amended licence.” • As per Point 1 above. • Update section to reflect that leachate ponds may only be required if Water Balance Assessment demonstrates this.	in discussions with the City of Wanneroo regarding planning approval for the concrete bay. It has been almost six months since the Licence Holder received a draft copy of this Amendment Notice which included the specified date of six months to construct this infrastructure. The Delegated Officer has assumed that during this time, the Licence Holder did not apply for relevant planning approval. Given the high risk of leachate emissions and concerns regarding the permeability of the hardstand, the Delegated Officer considers that the six month requirement is sufficient to construct this infrastructure and therefore this requirement remains on the licence. In the event that the Licence Holder has not obtained relevant approvals to construct the concrete bay by the specified date, they may apply for a licence amendment which will be considered by the Department. • As per the Licence Holder’s request and in consideration of this requirement through the Christmas and New Year period when contractor availability may be impacted, the Delegated Officer has agreed to allow an operational period of three months with the bores to be installed in two months. The Delegated Officer notes that the Industry Standard for bore construction and sampling is 7 days. • As per point 1 above, this requirement has been removed however Table 1.2.1 has been updated to incorporate that within 18 months, certain feedstocks are required to be stored/blended/processed/pasteurised/compost on a hardstand that meets a permeability of 1×10^{-8} m/s. • As per point 14 above, this requirement has been removed pending the outcome of the whole of site

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
			water balance assessment.
15	**Table 1.3.1 – Waste types acceptance** Update section to refer to correct feedstock throughputs accepted/proposed onsite.	Ensure section is accurate for operations and sales growth.	As per point 9 above.
16	**Table 1.3.2 – storage and processing requirements** • For green waste and sawdust "request revision of storage time to within 1 month". • For manure "request revision of storage time to no longer than 72 hours." • For ASS/PASS "request 28 days given the sometimes nature of delivery of this material." • Update values of digestate as per revised figures.	• There is "low environmental emissions potential in terms of odour and leachate." • To allow time for equipment failures etc. • "Volumes of ASS/PASS could be delivered in bulk to site and require blending on a continuous basis to other feedstocks for processing. This could mean that reduced volumes, from a bulk delivery, are on site over a period of longer than 14 days to allow for blending and composting." • Ensure correct figures are used.	• The Delegated Officer has allowed the storage and blending of these feedstocks to be undertaken on the existing hardstand and given that this hardstand does not meet the recommended 1 x 10^{-8} m/s permeability, the storage time is important in mitigating the risk of leachate emissions. This requirement was consistent with the requirements of the existing licence however upon review, the Delegated Officer has modified this requirement to specify a storage time of one month for green waste and sawdust storage and blending given that they pose a lower risk of leachate emissions. • This requirement has been amended to incorporate the Licence Holder's request however the storage time may change pending the outcomes of the Field Odour Assessment and groundwater monitoring results. The Delegated Officer considers that manures are a high risk feedstock, given their high nutrient content. Within 18 months, the manure must only be stored, blended, composted, pasteurised and matured on a hardstand that meets 1 x 10^{-8} m/s which the Delegated Officer considers necessary to reduce impacts to groundwater. As this amendment allows the manures to be stored and processed on the existing limestone infrastructure for up to 18 months, the storage time is critical in reducing the risk of leachate and odour emissions. • This timeframe was placed on the Amendment Notice based on the findings of the odour and leachate risk assessment. The Delegated Officer considers that ASS/PASS poses a moderate feedstock risk based on

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
			nutrient content. As per the above comment, this condition requires all storage, and processing to be undertaken on a hardstand that meets 1 x 10^{-8} m/s within 18 months. The Delegated Officer considers that a maximum of 14 days for storage time of this material is sufficient, given that it is authorised to be stored for up to 18 months on the existing hardstand which does not meet the recommended permeability and the time restriction assists in mitigating impacts from leachate. Therefore, this requirement has not been amended. The Licence Holder may specifically apply to amend this requirement and use the results of the Field Odour Assessment and/or groundwater monitoring results for consideration as part of any amendment. • As per point 9 above.
17	**Condition 1.3.5** • Part (c) – change wording to "windrows shall be constructed to allow for effective aeration and turning, composting of materials." • Part (e) – either delete this requirement or replace with "The licence holder will process digestate in accordance with quality practices and Standard Operating Procedures implemented for other composted products on site."	• "Prescription of how windrows to be constructed does not allow for effective composting processing to be undertaken. Windrows can be constructed to higher than 3.5 metres if they can be effectively aerated. Generally, in an open-air windrow operation the base is twice the height (but this is not a requirement). The length of a windrow is irrelevant and pertinent to infrastructure capacity as opposed to the compost process." • "AS4454 is a voluntary product standard. It is not a requirement to process to AS4454 or any other product standards. The NSW 'Environmental Guidelines: Composting and Related Organics Processing	• Part (c) has not been amended as the windrow sizes specify the maximum dimensions and not the exact dimensions of windrows which were included on the licence to mitigate fire risk. This is a requirement of the existing licence and the request to amend this condition was not made at the time that this licence amendment was submitted. The Licence Holder may apply for a licence amendment to change this requirement which will be assessed in regards to the relevant supporting documentation provided with the application. • As per the above, this is an existing requirement of the licence and a request to amend this has not been made outside of comments provided on the draft amendment therefore this condition remains on the licence. However, based on the Licence Holder's comments, a new condition (1.3.6) and Table (1.3.1) have been included on the licence requiring the

Ref. No	Comments received	Licence Holder rationale	DWER consideration of comment:
		Facilities' adopts contamination thresholds from products derived from organic wastes, compostable organic materials and biosolids that are current federally or in individual states. Note that there are no processing standards or guidelines for composting facilities in Western Australia. Notwithstanding, Richgro will continue quality processing practices for products processed in accordance with AS4454 on site, and process digestate in accordance with those practices, and Standard Operating Procedures (SOPs) implemented under DOH approval for the processing of biosolids"	Licence Holder to undertake an assessment of all compost and blended soil products against the AS and where processes/results deviate from the AS, provide evidence to demonstrate its suitability for end use with reference to what testing regimes and controls are in place to support the outcome.
18	**Table 2.1.1 – monitoring of inputs and outputs** Reword to include "To be provided in confidence to DWER"	The licence holder will provide this information to DWER in confidence on an annual basis given that this pertains to commercially sensitive sales information. Reporting of this information in the public domain would compromise Richgro's competitiveness as a business and provide its competition with specific sales data.	The Licence Holder can request at the time of submitting monitoring (or other) documentation that the information provided is exempt from publication. This is required to be addressed against the relevant provisions of the *Freedom of Information Act 1992* (FOI Act). As a result of the above, this condition has not been amended as requested.

Appendix 3: Technical Expert Report

Government of **Western Australia**
Department of **Environment Regulation**

REPORT

Technical Advice

Amazon Soils & Landscaping Supplies

Version: Final

May 2017

Infobase number

Licence: L7391/1999/9

Document control

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Date	Expert name / position	Version	Role
16/5/17	Dr Bill Richmond	Draft	Author
16/5/17	Andrew Miller	Final	Reviewer

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Questions regarding this report should be directed to:
Department of Environment Regulation
Locked Bag 33 Cloisters Square
PERTH WA 6850
Phone: +61 8 6467 5000
Fax: +61 8 6467 5562
Email: info@der.wa.gov.au
Web: www.der.wa.gov.au

Accessibility This document is available in alternative formats and languages upon request.

Contents

1. Purpose

The purpose of this report is to provide technical advice in relation to the Amazon Soils & Landscaping Supplies (Amazon) premises located at Part Lot 12738 Wesco Road in Nowergup. DER has received a licence amendment application to accept up to 40,000L/day of digestate produced from an Anaerobic Digestion (AD) plant at Amazon's sister site, Richgro Garden Products in Jandakot.

2. Documentation

In support of the request for technical advice, the following materials and documents were made available.

Document Title	Author, Date
Annual Environmental Report, Nowergup Biosolids Facility, 1 July 2014 – 30 June 2015	Water Corporation, July 2015
Investigation of Drainage Sump Water Level at Amazon Soils Site, Wesco Road, Neerabup	DWA, 16 May 2014
Permeability Test Report, Lot 206 Wesco Road Nowergup	Structerre, 16 May 2014
Amazon Soils Licence Amendment – Application for Receipt of Digestate	Richgro Garden Products, 2 May 2017

3. Advice request summary

Amazon proposes to accept 40,000 L of digestate which will be applied to shredded greenwaste daily. They also intend to increase the acceptance of greenwaste at the premises to 29,000 tpa. The green waste is proposed to be constructed to form a bowl with digestate tankered directly into the 'bowl' and then covered with additional shredder greenwaste for absorption. The Licence holder then proposes to move the digestate blended greenwaste (within 24 hours) to form composting windrows. Biosolid windrows will not receive digestate.

It is understood that Amazon has agreed to construct a concrete bay to mix the digestate with the green waste, although there may be a delay of 3 to 4 months to seek local government approvals and construct the bay prior to it being available for use on the premises. In the interim, digestate blending and composting activities are intended to be undertaken on a hardstand area consisting of compacted limestone which will drain towards a HDPE-lined leachate pond.

Specific advice has been provided addressing the limestone hardstand proposed to be used for the mixing of anaerobic digestate with green waste will provide a sufficient level of control to mitigate risks of nutrient transport to groundwater.

4. Advice

Key points:

- *The risk of nutrient impacts from digestate reaching groundwater by infiltration through the proposed limestone hardstand is considered to be low, provided that the proposed use of a limestone hardstand for mixing of digestate with green waste is applied as an interim measure only.*

4.1 Risks to groundwater from the proposed activities

4.1.1 Local hydrogeology

The site is underlain by aeolian calcarenite of the Tamala limestone. The Department of Water's Perth Groundwater Atlas identifies groundwater at approximately 39 m below ground level (25 m AHD), but monitoring results from bores at the adjacent Water Corporation biosolids drying facility suggests that the current depth to groundwater is approximately 44 m (~ 20 m AHD). Local groundwater flow is inferred to be in a generally south-westerly direction.

The limestone profile beneath the site has the potential for Karstic features, which are not uncommon in the area, Consequently there is the possibility that the limestone profile has a heterogeneous permeability, and infiltration may occur via preferred pathways in areas of low permeability.

4.1.2 Potential for seepage through limestone hardstand

Permeability coefficients of limestone underlying the 'windrow' area were measured by Structerre in May 2014 using in-situ percolation tests. The tests identified permeability coefficients in the range 1.4×10^{-5} to 6.9×10^{-6}.

It is assumed that the permeability of the proposed new limestone hardstand will be similar to that measured in the existing windrow hardstand. This permeability is considered moderate, and although a limestone base of this sort would be unsuitable to line a pond or dam, it is likely to be sufficient for the proposed mixing of digestate and green waste, provided its use for this purpose is limited to a period of a few months.

If the hardstand is suitably constructed and profiled to allow runoff of any excess digestate with minimal ponding on the limestone surface, then the volume of any digestate infiltrating through the hardstand would be very low, and likewise the risk of any impacts to underlying groundwater would be low.

4.1.3 Potential contaminants in anaerobic digestate

Analysis of the digestate shows that it contains a very high nutrient constant, with a total nitrogen concentration of 4800 mg/L. A significant portion of the nitrogen content is present as ammonia. Concentrations of transition metals in the digestate do not indicate any cause for concern in regard to potential contamination. Although only a

limited suite of metals has been analysed, there is no reason to suspect that the digestate would contain elevated concentrations of any other metals of environmental concern. Consequently the principal contaminants of potential environmental concern associated with the digestate are nitrogen and phosphorus.

Table 1: Analytical results for anaerobic digestate

Analyte	Concentration (mg/L)
Nutrients	
Total nitrogen	4800
Ammonia - nitrogen	2000
Total Phosphorus	500
Major ions	
Sodium	780
Potassium	1200
Calcium	600
Magnesium	35

4.1.4 Potential environmental or human health receptors

The nearest potential beneficial use of groundwater appears to be associated with rural properties (intensive livestock and market gardening) approximately 1.5 km downgradient of the site, which are likely to be accessing groundwater for irrigation purposes. A turf farm is located approximately 950 m north-west of the site.

Given the location of these properties at the outer fringe of the Perth metropolitan area, and their semi-rural setting it is also possible that groundwater is abstracted for domestic household use in this area.

The nearest freshwater receptors are located beyond the rural properties: Nowergup lake is situated 2.5 km north-west of the site, and some wetland/dampland areas are identified approximately 2.2 km south-west of the site.

Based on the above assessment, risks to groundwater quality should be considered in regard to the potential for nutrients to adversely impact the use of groundwater for domestic (drinking water) purposes.

4.2 Responses to specific issues

1. *Estimated travel time for contaminants within the digestate to reach groundwater if digestate is allowed to seep into the hardstand from the mixing and composting areas.*

   Given the limited information available, it is not possible to calculate a travel time for infiltrated digestate to reach groundwater, as the infiltration rate will depend on a number of factors, including the amount of digestate absorbed by the greenwaste, the moisture content (degree of saturation) of the underlying limestone profile, additional inputs from rainfall, and potential inhomogeneities in the underlying limestone of the unsaturated zone.

   A very broad approximation of a worst-case scenario can be guessed at by

assuming a saturated soil profile with a permeability of 1.0 x 10^{-5} m/sec, which is at the highest end of the range measured for the site, and a depth to groundwater of 40 metres. In this case, the minimum travel time for digestate to reach the water table would be approximately 46 days. Accounting for the effects of dilution and dispersion within the soil profile indicates that even with these very conservative assumptions, impacts to groundwater quality would not be evident for a period of many months. For this reason, the risk of digestate nutrient impacts reaching groundwater by infiltration through the limestone hardstand is considered to be low, provided the proposed use of limestone hardstand is applied as an interim measure only.

2. *Expected concentrations and estimated nutrient impacts from digestate on entering the groundwater.*

   As mentioned above, there are too many unknown factors to calculate expected nutrient concentrations in groundwater with any reliability. However, as mentioned above, any impacts to groundwater arising via infiltration though the limestone hardstand are unlikely to be apparent for a period of many months, even in a worst case scenario.

3. *Recommendations for locations of additional groundwater monitoring bores and recommendations in regard to the suite of parameters to be monitored and frequency.*

   Existing monitoring bores at the site are located up-gradient of potential on-site sources of contamination and are therefore unsuitable for detection of any impacts to groundwater that may arise from spills or seepage of digestate. The site feature posing the highest risk of groundwater impacts is the leachate storage dam on the south-west corner of the site. Leaks or seepage from this dam could be detected by placing two bores down-gradient near the corners of the dam. An additional bore should be placed on the south-western corner of the premises to detect any potential impacts from the proposed mixing area and additional windrows. Recommended bore locations are shown in the Figure below.

Figure 1: Suggested locations of additional monitoring bores

The following suite of chemical parameters could be considered for groundwater monitoring at the site:

Field measurements: Temperature, Electrical Conductivity, pH, Redox potential

Laboratory measurements: Total Dissolved Solids, Total Nitrogen, Ammoniacal Nitrogen, Nitrate (as nitrogen), Total Phosphorus, Biological Oxygen Demand, Calcium, Magnesium, Sodium, Potassium, Sulfate, Chloride.

4. *Recommendations for further actions/improvements including infrastructure to mitigate the risks from the premises.*

As discussed above, the use a compacted limestone pad for mixing of digestate with green waste is an appropriate interim measure, but a low-permeability concrete hardstand should be constructed as soon as feasible. Hardstand areas should be appropriately sloped and/or profiled to ensure that excess digestate does not pool on the surface, and that run-off is direct to the leachate dam with minimal opportunity for seepage or infiltration to underlying soils.

The Drainage Sump Water Level investigation (on the leachate dam) was carried out in 2014 using a water balance assessment method. As this measurement was carried out three years ago, it would be prudent to conduct another assessment of liner integrity in the leachate dam, and to ensure that periodic integrity tests a scheduled within any ongoing maintenance/management plan for the facility.

5. *Recommendations for ambient groundwater action levels for groundwater parameters.*

As discussed above, beneficial use of groundwater downgradient of the site for domestic use is likely, and trigger levels should therefore be sufficiently protective of groundwater quality to ensure that that use is not put at risk.

Australia Drinking Water Guidelines (ADWG) (2001) do not provide guideline values for total nitrogen or total phosphorus. However, background levels of total nitrogen in the aquifer are expect to be of the order of 2 – 5 mg/L based on results reported for the nearby Water Corporation Biosolids facility. Based on the those results, trigger levels of 5.0 mg/l for total nitrogen, and 1.0 mg/L for total phosphorus would be appropriate, with the proviso that further detail regarding valid background concentrations could justify some re-appraisal of these values.

Signatures

Author Name Bill Richmond	Signature
Position Contaminated Sites Officer	Date 12/6/17
Reviewer Name Andrew Miller	Signature
Position Senior Manager, Contaminated Sites	Date 12/6/17

Appendix 4: DWER Water Balance Calculations (whole of site)

Amazon water balance calculations - by DWER			
Rainfall and evaporation only			
Annual Inputs			
Rainfall (directly into ponds and runoff from hardstands)	57380.81	m3	
Annual Outputs			
Evaporation from ponds	7901.952	m3	
Net change	**49478.86**	**m3 or tonnes**	
At capacity for compost production (45360 tonnes per annum) - assuming no liquid waste accepted just for storage treatment in ponds			
Annual Inputs			
Rainfall (directly into ponds and runoff from hardstands)	57380.81	m3	Note - assumed 100% runoff
estimation for runoff entering ponds from the estimated volume of pond water and bore water applied to feedstocks for digestate operations	2150	m3	based on 12,900 tonnes compost produced for digestate operations and using DWER calculations for liquid needed
Estimation for runoff entering ponds from the estimated volume of pond water and bore water applied to feedstocks for current operations	7560	m3	Based on 45,360 tonnes compost produced for existing site and using DWER calculations for liquid needed
Annual Outputs			
Evaporation from ponds	7901.952	m3	
Estimation of re-use of pond water in composting (4410 x 12 calculated using DER cals)	63420	m3	tonnes/year
Net change	**-4231.14**	**m3 or tonnes**	
Storage capacity		**Units**	
All ponds (excluding freeboard)	**8832**	m3	With 300mm freeboard
Hardstand surface area (approximate estimation based on aerial imagery)	**86000**	m2	Includes DWER calculation of whole of site draining to Leachate Pond
Ponds surface area (information provided by Licence Holder)			
Pond 1	3840	m2	Note: 96m x 40m dimenions of pond
Total pond surface area	**3840**	m2	
Rainfall			
Annual rainfall (based on mean rainfall data for Tamala Park (Mindarie) 2004-2016 from BOM)	638.7	mm	From BOM data
	0.6387	m	
Evaporation			
Annual evaporation rate estimated from BOM figure of evaporation rates across WA (average of 1975-2005 data)	2057.8	mm	Includes 300mm freeboard from 2.6m depth
	205.78	cm	
	2.0578	**m**	
Total evaporation from pond surfaces	**7901.952**	m3	From BOM data
pond depth estimation			

	surface are	volume (m3)	depth (m)
pond 1	3840	9984	2.3