Government of Western Australia
Department of Water and Environmental Regulation

Amendment Report

Licence Number	L8889/2015/1
Licence Holder	Eastern Metropolitan Regional Council
File Number:	DER2015/000777-1
Premises	Red Hill Waste Management Facility Legal description – Lot 1 Diagram 15239, Lot 2 on Diagram 68630 and Lot 11 on Diagram 69105 Toodyay Road Red Hill and Lot 12 on Plan 26468 Toodyay Road, Gidgegannup
Date of Report	26/06/2020
Status of Report	FINAL

1. Definitions and interpretation

Definitions

In this Amendment Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
AER	Annual Environment Report
Amendment Report	refers to this document
AS4454	means Australian Standard AS4454 Composts, soil conditioners and mulches, as amended from time to time
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department Administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup WA 6919 info@dwer.wa.gov.au
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of and during this Review
FOGO	Food Organics and Garden Organics
Green Waste	means waste that originates from flora and which does not contain or has not been treated or coated with, preserving agents, biocides, fire retardants, paint, adhesives or binders

Licence Holder	Eastern Metropolitan Regional Council
MAF	mobile aerated floor
Minister	the Minister responsible for the EP Act and associated regulations
MS	Ministerial Statement
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
OFA	odour field assessment
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Amendment Report applies, as specified at the front of this Amendment Report.
Revised Licence	the amended Licence issued under Part V, Division 3 of the EP Act, with changes that correspond to the assessment outlined in this Amendment Report.
Risk Event	as described in *Guidance Statement: Risk Assessment*

2. Amendment Description

This amendment has been informed by DWER's Regulatory Framework which is available at https://www.der.wa.gov.au/our-work/regulatory-framework.

2.1. Purpose and scope of assessment

On 14 April 2020, Eastern Metropolitan Regional Council (the Licence Holder) submitted an application to the Department of Water and Environmental Regulation (DWER) to amend L8889/2015/1. The Licence is for the Red Hill Waste Management Facility, a prescribed premises for the following categories:

- Category 12 – Screening etc of material
- Category 62 – Solid waste depot
- Category 64 – Class II or III putrescible landfill site
- Category 65 – Class IV secure landfill site
- Category 67A – Compost manufacturing and soil blending

The scope of the amendment application relates to the operation of an interim Food Organics and Garden Organics (FOGO) waste processing facility and installation of a landfill gas flare system at the premises. The interim FOGO facility is proposed to be sited across two locations, Stage 1 on Lot 11 in the west of the premises and Stage 2 on Lot 12 in the central north of the premises (Figure 1). New infrastructure proposed to be constructed at the Stage 1 location includes a new hardstand and leachate sump. No new infrastructure is proposed at the Stage 2 location, as FOGO composting will use the existing green waste processing hardstand and leachate pond.

Three enclosed ground landfill gas flares are proposed to be installed adjacent to the power generation plant in the north of the premises on Lot 11 (Figure 2).

Table 2 lists the documents and information considered in the amendment process and submitted as part of the assessment process.

Table 2: Application documents

Document description	Date received
Application (amendment) signed by Sandra Evans and Stephen Fitzpatrick, including attached supporting documentation: • Attachment 2 – figures • Attachment 3B – Description of MAF Process for System 1 and 2, Flowchart – FOGO Operations, Picture of MAF System with Unit 1 Full, Flare Compound Proposal, Flare Dimensions Example, LMS Biogas Flare WA spec sheet and LMS Flare Destruction Efficiency Philosophy. • Attachment 5 – Community Liaison Meeting Minutes (19/2/19), Community Survey Email, Letter – FOGO Community Survey (2/4/20), Letter – City of Swan – Proposed Developments Red Hill and Hazelmere and Report at the EMRC Ordinary Meeting of Council (7 and 21/3/19). • Attachment 6A – Desktop Odour Impact Assessment of Proposed FOGO Stage 1 (inc. Appendix A and B), FABCOM MAF Odour Emissions, Controls and Contingency Actions 2. • Attachment 8 – FABCOM MAF Compost Cover Specification, Stage 1 FOGO Hardstand on Lot 11 Cross Sections Details and Stage 1 FOGO Hardstand Scope of Works. • Attachment 9 – Proposed fee calculation.	14 April 2020
Email from Sandra Evans providing *FOGO Community Engagement Report* (Catalyse, 2020)	22 April 2020
Email from Sandra Evans providing City of Swan's response to proposed developments.	24 April 2020
Emails from Sandra Evans providing responses to DWER questions about the amendment	6 & 8 May 2020

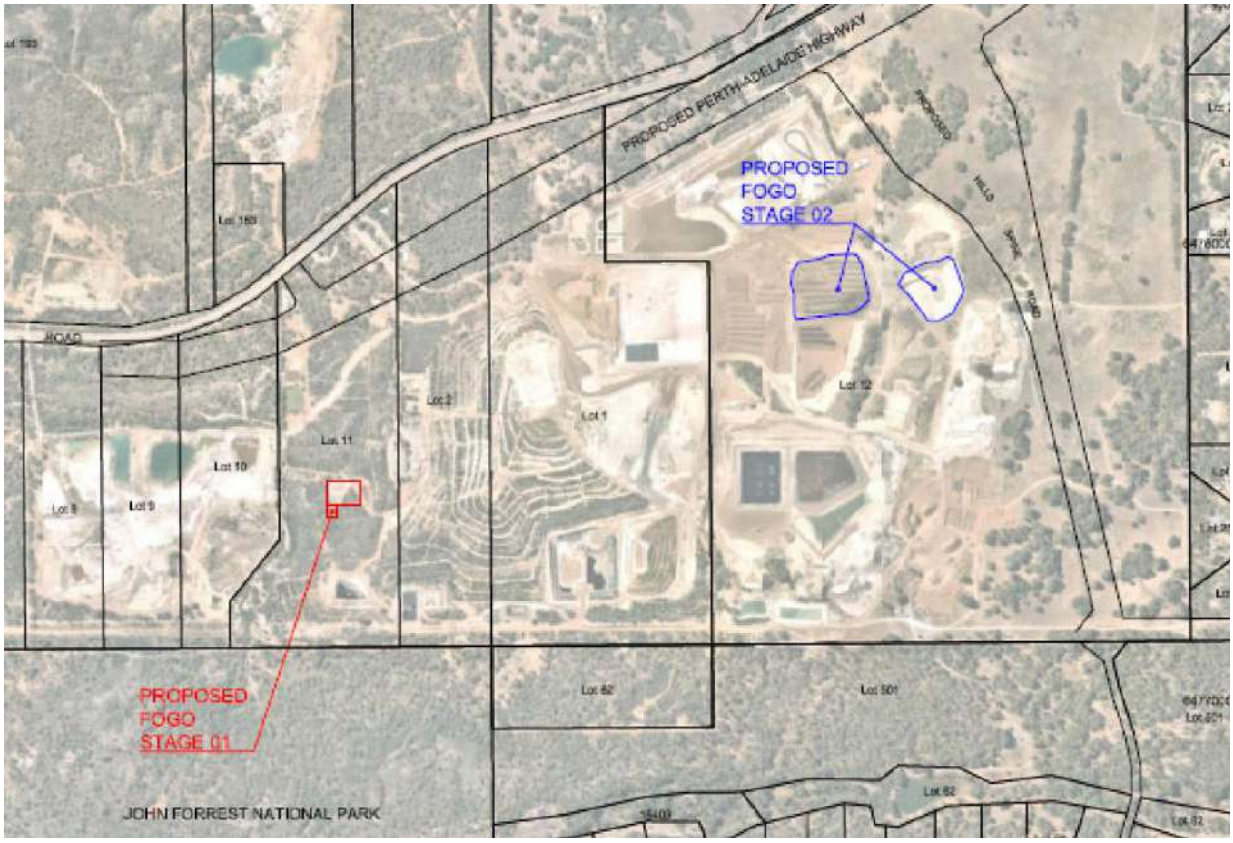

Figure 1: Stage 1 and 2 FOGO processing locations

Figure 2: Proposed landfill gas flare location

2.2. Overview of existing premises

The Licence Holder operates the premises as a waste management facility which includes the

following activities: Class III putrescible landfilling, Class IV secure landfilling, operation of a waste transfer facility, composting and screening and crushing of extracted material. These are prescribed activities under the EP Act and are licensed under L8889/2015/1.

The Premises operates from 7:00 am to 4:00 pm Monday to Friday, 8:00 am to 4:00 pm on Saturdays and 10:00 am to 4:00 pm on Sundays. These operating hours apply to all of the major aspects of site activities including receipt of kerbside collection truckloads, waste disposal at the tipping face, operation of the waste transfer station and composting operations.

The Licence Holder has conducted composting at the premises to recycle green waste into mulch and compost since 1999. These activities meet the description of a Category 67A composting and soil blending facility (Table 3). The premises currently processes green waste from council verge collections, green waste bins, transfer stations and commercial customers.

Green waste processing is currently undertaken in an area on Lot 12, comprising a 37,000 m^2 hardstand, drainage infrastructure and 7,255 m^3 leachate pond.

Table 3: Classification of premises and assessed design capacity

Category	Description	Assessed production capacity
Category 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 of blended soils.	50,000 tonnes per annual period

A separate organisation leases a portion of the premises and conducts landfill gas extraction and power generating activities. The power generation plant does not meet the definition of a Category 52 electric power generation prescribed premises because the production capacity is 4 MW, which is less than the 10 MW threshold applicable for fuels other than natural gas.

The power generation plant is not regulated as a directly related activity on the Existing Licence. There is currently no landfill gas flare in operation at the premises to combust excess landfill gas as a back up to the primary methane gas management infrastructure at the power generation plant.

2.3. Interim FOGO facility

2.3.1. Proposed activities

The Licence Holder proposes to compost up to 10,000 tonnes of FOGO waste per year. FOGO waste will be collected from residents within the Town of Bassendean and City of Bayswater. The Licence Holder did not request an increase to the total Category 67A production or design capacity of 50,000 tonnes per year.

The Licence Holder proposes to operate the interim FOGO facility across two locations as follows:

- Stage 0 and 1 on Lot 11 – FOGO will be received at this location and undergo the first three to six weeks of composting here. There is currently no infrastructure at this location and new infrastructure proposed for construction as part of this amendment application includes a new hardstand and leachate sump.
- Stage 2 on Lot 12 – FOGO will be transferred here after three to six weeks at Stage 1. No new infrastructure is required at this location because FOGO composting will occur on the existing green waste processing hardstand. The existing leachate drainage and green waste leachate pond will also be used.

The FOGO composting process is summarized in Figure 3. All stages of the composting process will use FABCOM® technology to undertake outdoor, covered aerobic composting. This system involves the use of mobile aerated floors (MAFs) which can operate in forward

and reverse aeration modes. Two MAFs will be located at the Stage 1 location and one MAF will be located at the Stage 2 location. Each MAF system comprises three units, each unit comprises one blower and four pipes. A synthetic permeable membrane will be used to cover windrows undergoing composting.

The Licence Holder proposes to compost material over a six to nine week period, comprising two stages (Stages 1 and 2) of at least three weeks each. FOGO irrigation water will be sourced from stormwater ponds at the premises.

A biofilter will be used to treat air extracted from FOGO waste when MAFs are operated in reverse mode. This will occur for one week on each MAF unit, as it is loaded with raw FOGO feedstock directly from waste collection trucks (Stage 0). The purpose of the biofilter is to mitigate odour emissions from freshly collected FOGO waste.

Compost will be screened twice, between Stage 1 and Stage 2 and again at the completion of the Stage 2 composting process. A 50 mm trommel screen will be used. This will remove oversized organic matter and residual physical contaminants. The Licence Holder does not plan to pick contaminants from feedstocks before or after composting, as it is anticipated that screening will deliver an adequately clean product.

The Licence Holder intends the final product to meet the requirements of *Australian Standard 4454-2012 Composts, soil conditioners and mulches* (AS 4454) and/or the *Australian Certified Organic Standard 2019*. The latter of these documents states that the composting process is *'ultimately aiming for the specification set out in AS 4454-2012'*.

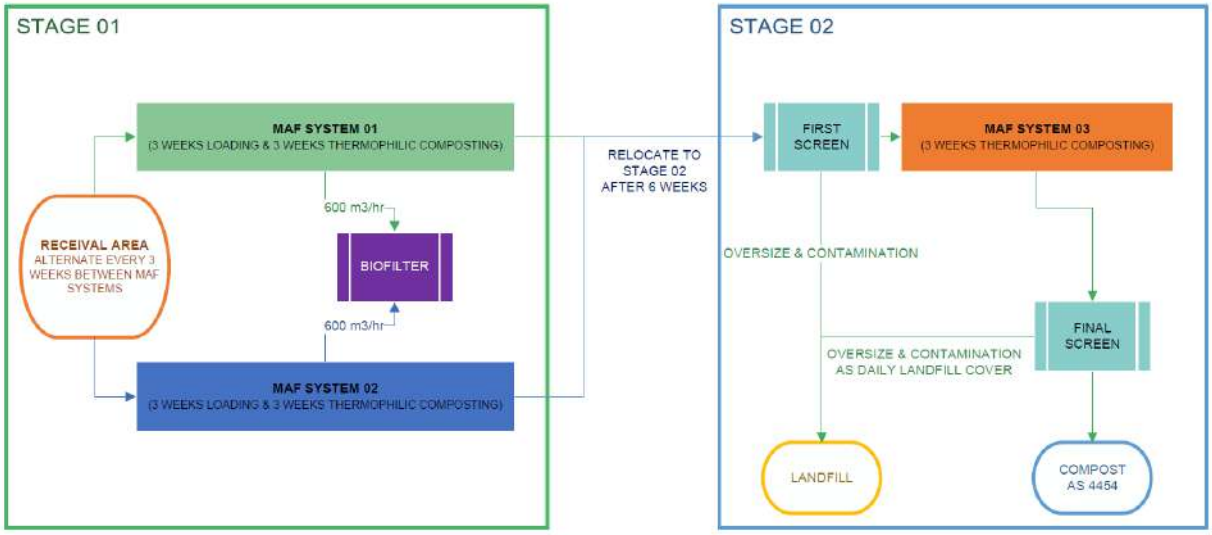

Figure 3: FOGO composting process flowchart

2.3.2. Equipment and infrastructure

Mobile aerated floors

Three mobile aerated floor (MAF) systems will be installed at the premises, two at the Stage 1 location (Figure 5) and one at the Stage 2 location (Figure 8). Each MAF system comprises three units, each unit comprises one blower and four pipes (Figure 4). The MAFs can operate in forward and reverse aeration modes.

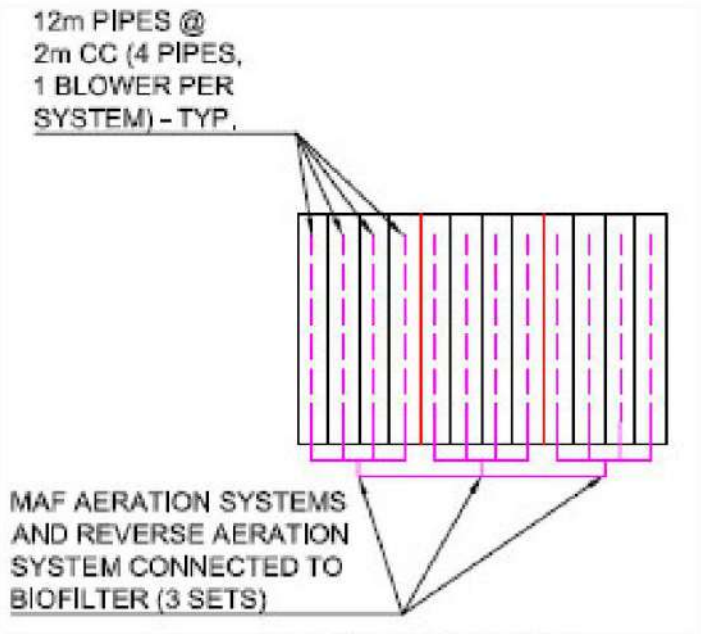

Figure 4: MAF system design

Key Findings:

1) The key function of the MAFs is to achieve continuous aeration of composting materials, eliminate odour generation caused during regular windrow turning and prevent anaerobic conditions taking hold in the FOGO waste.

2) The effectiveness of the MAFs to drawdown and contain odour emissions while in reverse mode is uncertain. Reverse mode will be used while MAF units gradually receive FOGO waste, during this time the pipework will be partially uncovered. The Delegated Officer considers that there is the potential for air to be preferentially drawn in from uncovered parts of the pipework rather than those parts beneath FOGO waste. There are currently no equivalent MAF systems installed in Western Australia using the reverse aeration mode function. This uncertainty was considered during completion of the risk assessment in Section 8.

Cover

A synthetic permeable membrane cover will be used to cover FOGO waste undergoing composting during Stages 0, 1 and 2. The intended applications of the cover are described by the supplier FABCOM as:

'insect exclusion, reduction of evaporation and transpiration, microclimate adjustments and shade over compost piles or windrows during composting of poultry litter, feedlot waste, FOGO and green waste. The covers facilitate a more homogenous environment in the compost piles to promote the composting process and extend the process towards the outer

layer. The covers promotes even moisture content and process temperature, prevent drying of outer layer, and reduces emission of potential odour compounds.'

The main specifications of the cover are summarized as follows:

- 25 m wide and 40 m long;
- made of high density polyethylene (HDPE) monofilament; and
- containing 2-3 mm apertures.

Key Findings:

3) The potential effectiveness of the cover to reduce and contain odour emissions from FOGO composting windrows is uncertain. The risk assessment in Section 8 was therefore completed based on the conservative assumption that the cover will provide negligible odour reduction effects. If during operation the cover is found to be operating more effectively the risk assessment may be revised.

Biofilter

A biofilter will be installed between the two MAF systems at the Stage 1 location (Figure 5). The biofilter will be used to treat air extracted from FOGO composting windrows during the initial feedstock receipt stage (Stage 0), expected to last about one week per unit. No biofilter will be installed at the Stage 2 location.

The Licence Holder expects that the biofilter will treat 600 m^3 of air per hour. It is likely that the biofilter will be contained within a converted 30 m^3 hook lift bin or a sea container with piping connections at the bottom for odorous air intake. The biofilter will have a plenum floor made from plastic crating and will be covered with a mesh of shade cloth to stop the biofilter medium from falling through into the plenum area. The biofilter medium will be comprised of woodchip and bark. The Licence Holder does not intend to install a waterproof cover initially, but will review whether there is a need for this after the first six months of operation.

The draft EPA Victoria document *Industry Guidance: Biofilter design and management* (EPA Victoria, 2020) provides guidance as to the sizing and design of biofilters. DWER considers that this guidance is appropriate to refer to for the use of a Biofilter at this Premises in the absence of WA specific guidance. The guidance in comparison to the proposed use of the biofilter is as follows:

- Assuming the air flow rate is evenly distributed across the surface area of the treatment bed, the specific load (SL) is calculated as the air flow rate (Q in m^3/h) divided by the treatment bed surface area (A in m^2). EPA Victoria recommends that biofilters work at a specific load lower than 100 $m^3/h/m^2$, ideally around 70-80 $m^3/h/m^2$.

  The biofilter at the premises will have an approximate surface area of 18 m^2 (based on the dimensions of a 30 m^3 hook lift bin). Assuming the air flow rate is evenly distributed over the whole surface area of the biofilter, the specific load on the biofilter will be 33 $m^3/h/m^2$.

- The empty bed contact time (EBCT) is used as an estimate of the velocity of the air through the depth of the biofilter and is calculated as the volume of the treatment bed (V in m^3) divided by the air flow rate (Q in m^3/s). The draft EPA Victoria guidance indicates that ideal EBCT depends on the size of the biofilter and the odour stream being treated but it is recommended to be 50 seconds or longer and no less than 30 seconds.

  Based on the expected biofilter air intake rate of 600 m^3/h, the volume of the treatment bed should be at least 10 m^3 to achieve an EBCT of 60 seconds.

The Licence Holder has indicated that they will conduct daily manual inspection of the biofilter surface for even decomposition (is it decomposing at the same rate, relatively) and checks for dry spots. Weekly spot checks of inlet temperature and relative humidity will be undertaken to ensure delivery airstream is humid and less than 45ºC. Back pressure will also be monitored.

Key Findings:

4) The Delegated Officer considers that the following design aspects are suitable for proper functioning of the biofilter:
   - Inclusion of a plenum floor which is a suitable method to transport air into the treatment bed media.
   - Inclusion of a shade cover.
   - The biofilter will be installed within close proximity of air source which will minimize length of ducts, increase fan efficiency and limit humidity condensation in ducts.
   - Appropriate sizing based on the expected air flow rate, noting that the volume of the treatment bed was not specified but an adequate volume should be able to be accommodated within the proposed vessel.

5) The Licence Holder did not provide the following information about operation of the biofilter:
   - Proposed method for watering the biofilter to maintain suitable moisture levels.
   - Proposed maintenance plan to achieve ongoing performance, for example 'refluffing'/mixing or replacement of the biofilter medium.

   These measures should be incorporated into the Licence Holder's operational planning for when the biofilter is used, but this information is not required to inform DWER's risk assessment of this application.

Trommel

The Licence Holder intends to use a 50 mm screening trommel to screen compost between Stages 1 and 2 and after Stage 2. The trommel will be located at the Stage 2 location, on the green waste processing hardstand.

Stage 1 hardstand

The Licence Holder proposes to construct a new hardstand at the Stage 1 location as there is currently no hardstand present. DWER understands that this location is above previously landfilled and capped Class III landfill cells.

The proposed specifications of the hardstand are summarised below and the design is shown in Figure 5 and Figure 6:

- total area of 3,500 m^2;
- clay leachate barrier with a minimum thickness of 500 mm;
- permeability ranging from $1.6x10^{-10}$ to $1.2x10^{-9}$ m/s;
- ferricrete cover 100-300 mm thick graded with a fall of 0.8-1% to the south; and
- ferricrete bunding 0.5 m high around the perimeter of the hardstand.

The scope of works proposed to construct this hardstand are described by the Licence Holder as:

- Clear vegetation and prepare subgrade for clay placement. The surface shall be smooth, free of debris, roots, sticks and sharp rocks. The subgrade shall be compacted using a sheepsfoot roller before any fill is placed.
- Fill shall be compacted to 95% of its maximum dry density in layers not exceeding 300 mm to the levels shown on the drawings (Figure 6).
- Ferricrete layer shall be placed on top of prepared hardstand and compacted with a smooth drum roller.
- Ferricrete bunds shall be placed around the perimeter of the hardstand to prevent any stormwater ingress.

The Licence Holder has indicated that the following quality assurance sampling will be conducted following construction of the hardstand pad:

- Upon completion of the fill placement the top 300 mm will be tested by a Nuclear Density Meter to confirm compaction and permeability. One in situ dry density/moisture test will be conducted per 500 m^3 of clay fill.
- One permeability test will be conducted on the hardstand.

Key Findings:

6) The proposed hardstand liner design provides a suitable leachate barrier to prevent infiltration of leachate. The grading and bunding design are acceptable controls to contain leachate within the hardstand and prevent contaminated stormwater or leachate runoff from the hardstand.

7) The Application Form and supporting documents provided contradictory information about the thickness of ferricrete to be used as a protective cover. The minimum stated thickness of 100 mm is acceptable for this function.

8) The size of the hardstand appears to be suitably designed based on the dimensions of the two MAF systems and provides some additional free space for vehicle movements and a staging area used before transfer to Stage 2.

9) The Delegated Officer considers that a fall of 0.8-1% may not provide sufficient drainage of leachate to the sump. To avoid pooling of leachate, the Delegated Officer considers that a grading of at least 2% would be more effective to prevent pooling of leachate.

10) The quality control samples are suitable for the proposed infrastructure.

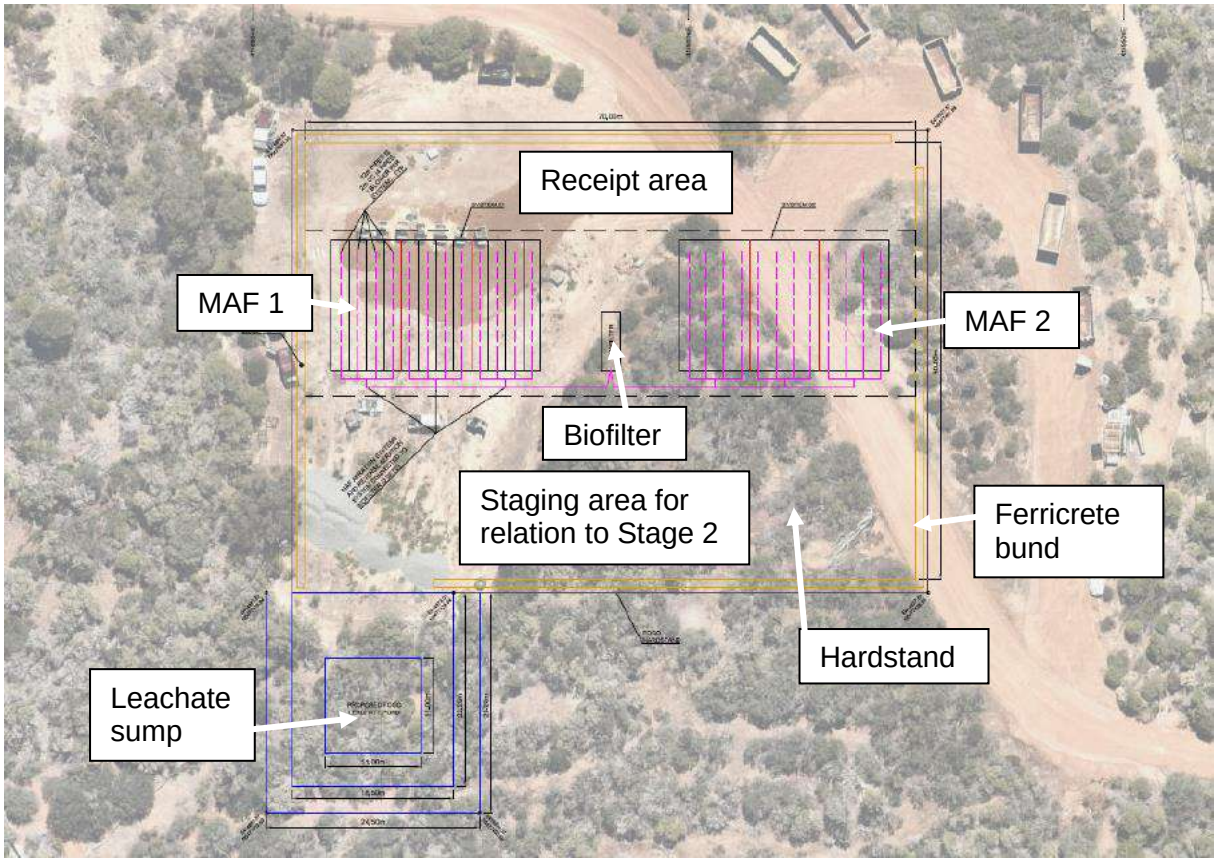

Figure 5: Stage 1 proposed infrastructure and equipment

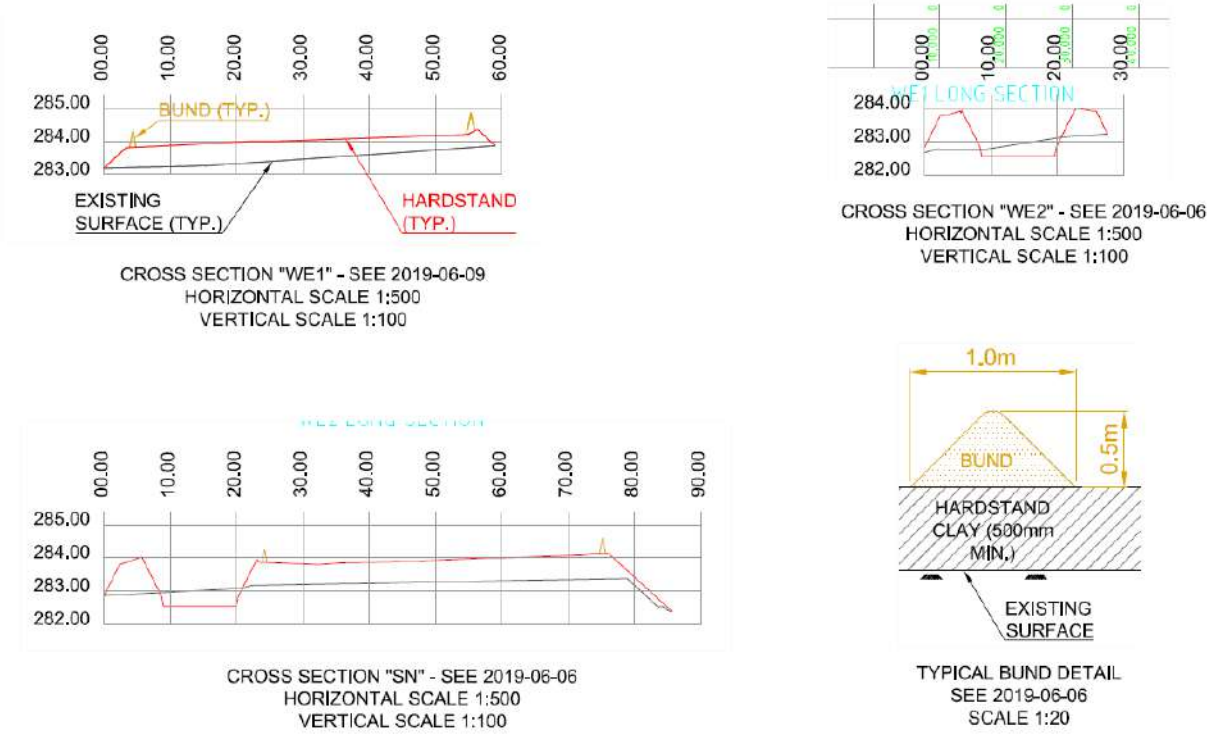

Figure 6: Stage 1 hardstand and leachate sump design cross-sections

Stage 1 leachate sump

The Licence Holder proposes to construct a new leachate sump at the Stage 1 location (Figure 5 and Figure 6) as there is currently no leachate storage infrastructure present. The purpose of the leachate collection sump is to capture leachate runoff from the Stage 1 hardstand and store it temporarily before it is transferred via pipes to the L9 leachate pond located approximately 135 m south of the Stage 1 location (Figure 7). From the L9 pond it may be transferred onwards to other leachate ponds if required.

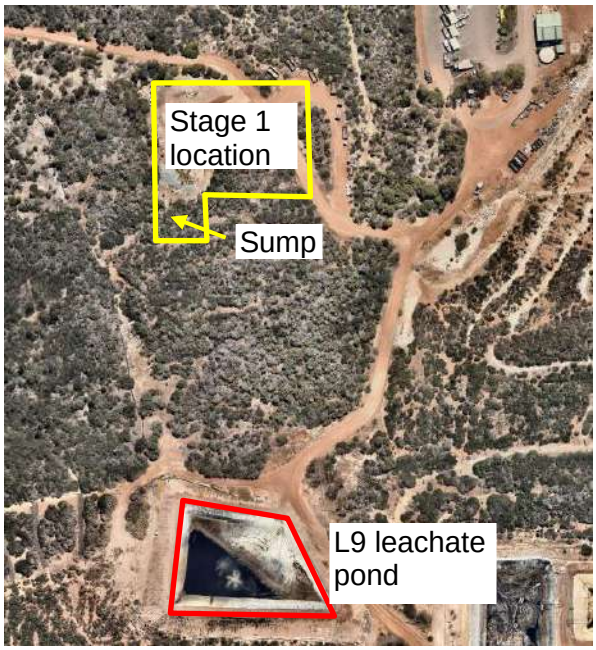

Figure 7: Stage 1 FOGO location and L9 leachate pond

The sump will be sized to handle a 24 hour 1 in 100-year storm event which will immediately be pumped to the leachate ponds on the premises. Pumping infrastructure will be in place in the sump and include a float system to automatically start and stop the pumps as levels in the sump rise and fall. The sump will be monitored every day rainfall occurs to ensure a 500 mm freeboard is maintained at all times. Leachate will be transferred to the L9 pond via 63 mm HDPE pipework laid on the ground.

The proposed specifications of the sump are summarised below:

- capacity of the sump will be 185 m^3;
- liner design will be a 300 to 500 mm clay liner with 2 mm welded HDPE;
- freeboard will be 500 mm;
- pond batter gradients will be 1(V):3(H); and
- compaction rates, density and permeability will be as above for Stage 1 hardstand pad.

A 24 hour 1% annual exceedance portability (AEP) rain event at the premises corresponds to 151 mm of rainfall in 24 hours (BOM, 2016). Based on the combined area of the hardstand and sump (approximately 4,120 m^2) and assuming that 100% of rainfall onto the hardstand would runoff into the sump, this size of rain event would be expected to generate approximately 620 m^3 of stormwater. This is about 3.5 times the capacity of the sump.

DWER conducted a monthly water balance for the proposed hardstand based on a 90th percentile wet year and average evaporation rates (applying a pan factor of 0.7). Climatic data were sourced from BOM weather station 009021 – Perth Airport (BOM, 2020). The calculations assumed that the composting feedstock would contribute negligible leachate

quantities to the water balance and 80% of rainfall onto the hardstand would runoff to the sump. Based on this water balance, the sump will receive approximately 2,670 m^3 of stormwater during a 90th percentile wet year which is approximately 14.5 times more than its capacity.

The Licence Holder has indicated that the following quality assurance sampling will be conducted following construction of the leachate sump:

- One in situ dry density/moisture test will be conducted per 500 m^3 of clay fill.
- One permeability test will be conducted on the sump liner.
- The leachate sump is 144 m^2 and all construction quality assurance testing will completed as per industry standard by the installer with verification provided. As a minimum, the installer will test welds and equipment as per Table 4.

Table 4: CQA protocols for Stage 1 leachate sump

Item	Property	Standards	Frequency per geomembrane type
Startup test weld	Welding equipment	None specified	Checked daily at start of works, and whenever the welding equipment is shut-off for more than one hour. Also after significant changes in weather conditions.
	Weld conditions		Test weld strips will be required whenever personnel or equipment are changed and/or wide temperature fluctuations are experienced. Minimum 1.5 m continuous seam.
Destructive weld testing	Onsite, hand tensiometer in peel mode	None specified	One tab from start to finish of each weld for fusion welds.
Non-destructive weld testing	Air pressure test	ASTM D5820 Vacuum box test, ASTM D5642	All seems over full length.
Visual inspection of geomembrane	Tears, punctures, abrasions, cracks, indentations, thin spots, or other faults in the material	None specified	Every roll

Key Findings:

11) The proposed sump liner design provides a suitable leachate barrier to prevent infiltration of leachate.

12) The proposed freeboard is consistent with the leachate infrastructure requirements in the Existing Licence.

13) The Delegated Officer understands that the sump is not intended to act as a leachate storage pond, and has therefore been sized for temporary storage with pumping equipment in place to transfer leachate to other leachate infrastructure on the premises. Based on the runoff load which could occur with potential heavy rain scenarios discussed above, pumping equipment will be essential to ensure the sump does not overtop. Regular maintenance and checks on the pumping equipment will be necessary control measures to ensure pumping equipment remains functional in readiness for sudden rain

events. The potential for overtopping of the sump in the case of pump failure will be considered in the risk assessment.

14) The quality control samples, visual observations and equipment checks are suitable for the proposed clay and HDPE geomembrane liner.

Stage 2 infrastructure

The Licence Holder intends to use existing infrastructure on Lot 12 of the premises for Stage 2 composting of FOGO (Figure 8). This infrastructure includes the green waste processing hardstand, leachate drainage and leachate pond. The Licence Holder currently processes green waste at this location using open air turned windrows. Once FOGO acceptance commences, the area will be dual use for turned windrow composting of green waste and MAF composting of FOGO. This infrastructure was previously assessed for the purpose of composting green waste under the licence amendment granted 30 March 2020.

During 2019, an additional hardstand area was constructed to the south of the green waste processing hardstand. The Licence Holder intended to use this area as a temporary laydown area for clean green waste and final compost products. During the previous licence amendment assessment, the Delegated Officer determined that this area was not suitable for the long term storage of green waste or final compost products because it was not designed to contain leachate/stormwater. The licence amendment issued 30 March 2020 approved storage of unprocessed green waste for up to 14 days at the temporary laydown area but did not approve the storage of final compost products in this area. The Licence Holder indicated in supplementary information to the application that they may use the temporary laydown area for storage of final compost products. However, they intend to sell products as soon as possible to reduce storage needs and would preferentially use the green waste processing hardstand for final product storage if space was available.

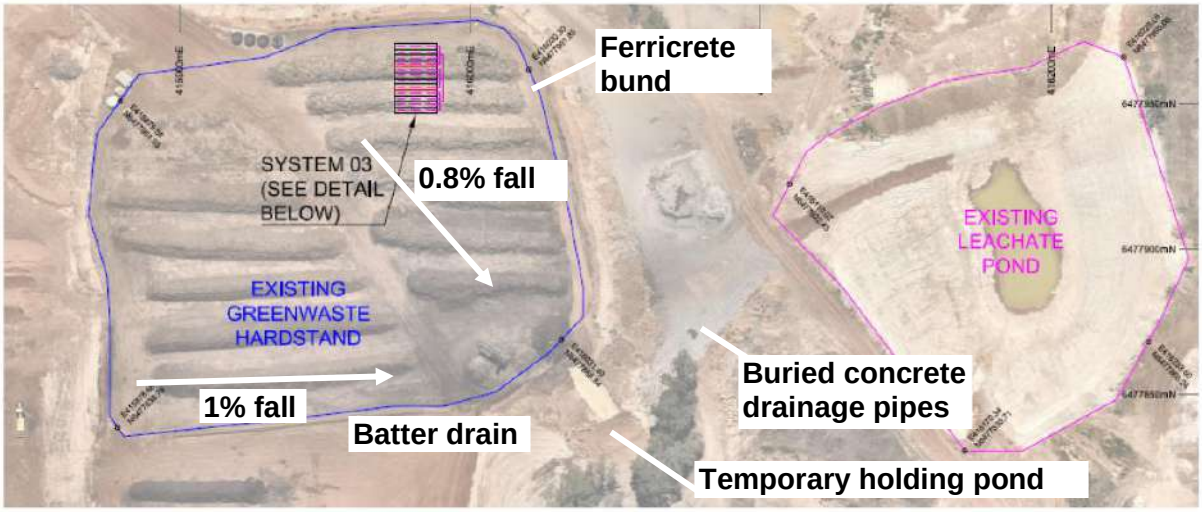

Figure 8: Stage 2 FOGO equipment and infrastructure layout

Key Findings:

15) The Stage 2 composting infrastructure was previously assessed as appropriate for composting of green waste, as outlined in the Amendment Report attached to the 30 March 2020 licence amendment. The Delegated Officer determined that the infrastructure design and operational controls were suitable to contain green waste leachate and prevent its discharge to the environment. The Delegated Officer considers that these controls are also suitable to contain and manage leachate from FOGO composting.

These controls are summarized as follows:

- Hardstand bunded to prevent stormwater ingress and leachate discharge;
- Hardstand lined with at least 500 mm clay to prevent leachate infiltration and 300 mm of ferricrete to prevent damage from heavy vehicles;
- Hardstand graded to drain to leachate pond;
- Drainage infrastructure and leachate pond lined to prevent leachate infiltration;
- Operational controls in place to prevent overtopping of leachate pond, including pumping infrastructure for transfer to other leachate ponds and weekly checks of freeboard by site personnel.

16) Aerial imagery of the premises shows the green waste processing hardstand was close to its maximum storage capacity on 8 March 2020 (Figure 8). However, the Licence Holder considers that there is sufficient space on this hardstand for Stage 2 FOGO composting and equipment including one MAF system and a trommel screen.

17) The temporary laydown area is not suitable for the storage of final compost products. The reasons for this determination were outlined in the Amendment Report dated 30 March 2020 and further discussion of this matter is provided in Section 5.1.2.

2.3.3. Corrective and contingency actions

The supporting information submitted by the Licence Holder included corrective actions and contingency actions to be implemented to manage upset conditions during FOGO processing. Corrective actions refer to actions implemented in case of process malfunction to bring the process back to normal operating conditions. Contingency actions refer to actions implemented if corrective actions are not successful.

The Licence Holder's proposed corrective actions and contingency actions mostly related to general operational issues and were not necessarily specific to odour concerns. They are presented in Table 5.

Table 5: Upset conditions, corrective actions and contingency actions

Upset condition	Corrective action	Contingency action
Failure of MAF power generator	Attempt to fix MAF generator. Service schedule maintained and operators prestart check prior to shift.	Replace generator with onsite backup; and/or Hire another generator if needed.
Front end loader breakdown	Utilise one of the other three on-site front end loaders until repair can be made. Service schedule maintained and operators prestart check prior to shift.	Three front end loaders available until primary repaired.
No water supply due to water cart mechanical failure	Utilise the backup water cart until the primary unit can be repaired. Service schedule maintained and operators prestart check prior to shift.	Second water cart available until primary repaired.

Upset condition	Corrective action	Contingency action
Adverse weather conditions (storm) such as high winds - dispersal of dust from the screening operation which may be experienced as odour.	Cease screening.	Cease all materials handling.
Adverse weather conditions (storm) such as high winds – general odour emissions.	Site personnel standing downwind at the nearest sensitive receiver if local winds are prevailing in that direction. Where odours are detected the 'sentry' will radio back to cease loader transfer until more favourable winds ensue. Lag time between odour emissions and 'sentry' informing loader operator to cease. Odour impacts under this uncontrolled process may be up to 10-minutes to allow for total dispersion. Maintaining dialogue with the disaffected receiver can placate the issue given it is a transient impact.	Total cessation of all loader transfers until prevailing winds shift to a no-risk vector.
Fire within FOGO waste.	Fire extinguishers in place and operators to have fire extinguisher training. Two watercarts available.	N/A

2.4. Landfill gas flare system

2.4.1. Proposed operations

The Licence Holder proposes to install a landfill gas flare system comprising three enclosed ground flares to operate in association with the current power generation plant in the north of Lot 11. One flare will be installed initially and additional units may be installed later if the volume of gas requires it.

The power generation plant has been in operation at the premises since June 1993 (EMRC, 1996). The plant is operated by a third party company, EDL Energy, who undertakes combustion of landfill gas extracted from capped landfill cells at the premises to generate power which is sold into the power grid.

EDL Energy have indicated to the Licence Holder that the flares will only be operated in an emergency situation such as enforced network outage or possibly if one of the gas engines needs maintenance. They have estimated that will result in the flares operating for 0.01% or less operation time, on an annual basis this translates to approximately 88 hours of flaring during one year.

DWER understands that the power generation plant has not had a flare system installed previously and under the existing design, landfill gas vents freely to the atmosphere during periods when the plant is shutdown.

Key Findings:

18) The Delegated Officer considers that the addition of a flare is a preferable measure for managing landfill gas during plant shutdown periods compared

to free venting.

2.4.2. Flare specifications

The biogas flare system proposed for the premises is supplied and manufactured by LMS Energy. The specific model proposed is the LMS 7000 Series Landfill Biogas Flare. The system is modularized on a 6 m shipping container and requires minimal onsite installation which can be completed in less than one day. The full specifications for the flare are provided in Appendix 2. The basic flare specifications are summarized in Table 6 and the flare installation design is shown in Figure 9 and Figure 10.

The specifications of the landfill gas flare model in relation to point source air emissions are discussed in Section 5.1.8.

The Licence Holder or the power station operator (EDL Energy) will implement the monitoring and maintenance schedule as outlined in the *LMS Standard Flare Destruction Efficiency Philosophy* (2014) if practical in terms of the flare operation, that is if the frequency of use is high, the weekly schedules will be followed, if not then as appropriate to maintain the integrity of the flare.

Table 6: Flare specifications summary

Component	Specifications
Flow capacity	50 to 1000 m^3/hour
Combustion temperature	760ºC or higher The combustion temperature will vary depending on flow rate and is expected to be 760ºC with a gas flow rate of 100 m^3/hour at 50% methane and over 1000ºC at flows greater than 300 m^3/hour.
Retention time	Variable depending on flow rate and temperature At 100 m^3/hour and 760ºC, the retention time exceeds 0.6 seconds. At 1000ºC the retention time exceeds 0.3 seconds. The relationship is dynamic, with higher temperatures requiring shorter retention times.
Dimensions	Length – 6 m, width – 2.4 m and total stack height – 8 m
Combustible methane range	20% to 95% by volume
Destruction efficiency	99%
Filtration	Stainless steel liquid knock out pot fitted with stainless steel demister pads and pre-gas entry filter.
Liner	50 mm ceramic wool of density 128 kg/m^3 lining the entire combustion chamber (stack).
Exclusion zone	EDL Energy recommended a 10 m exclusion zone in place around the flares.
Systems monitoring	Continuous with automated alarms and shut down. Remote access for data and systems control and restarting. Automated data to cloud. Emissions test ports for sampling.

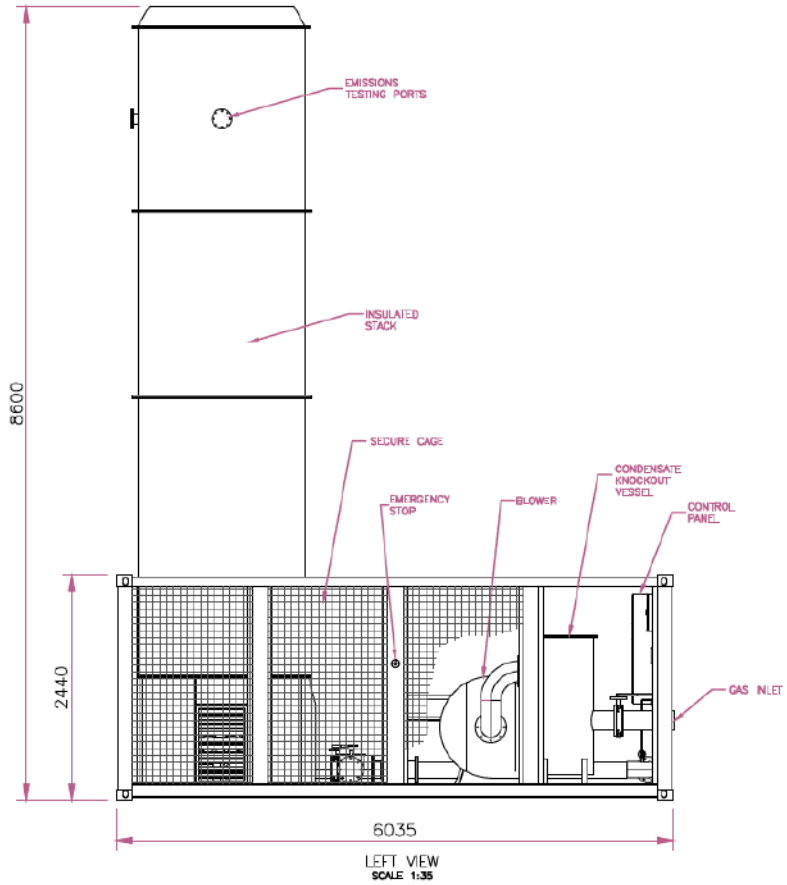

Figure 9: Landfill gas flare design diagram

Figure 10: Landfill gas flare installation plan

3. Other approvals

3.1. Native vegetation clearing

Implementation of the proposed changes requires clearing of two areas of vegetation on the premises:

- Approximately 2,400 m^2 at the proposed Stage 1 interim FOGO processing location (Figure 1 and Figure 5); and
- At least 400 m^2 at the proposed landfill gas flare site (Figure 2 and Figure 10). The landfill gas flare compound is 400 m^2 however a larger clearing area may be required to achieve the 10 m separation distance between stacks and vegetation for fire risk control.

Regulation 5, Item 1 under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* provides an exemption for a clearing permit in these circumstances because the clearing is to construct a structure. No separate clearing permit or assessment of clearing under this licence amendment is required.

If the structures were temporary and the area was to be left bare afterwards it may be detrimental to the environment. The Licence Holder has indicated that the proposed hardstand and sump structures will be permanent and will not be removed following the 2.5 year interim FOGO facility ceasing operation.

3.2. Planning approval

The Licence Holder has indicated that no planning approvals are required for the proposed amendment. The Licence Holder provided evidence of consultation to the City of Swan in relation to the proposed installation of landfill gas flares at the premises. The interim FOGO facility was not discussed in this correspondence.

The City of Swan confirmed to DWER on 6 May 2020 that, as per section 6 of the *Planning and Development Act 2005*, no Development Approval from the City of Swan is required as these are Public Works which are in line with the purpose and intent of the City's planning scheme that has effect.

3.3. Part IV of the EP Act

The premises is currently subject to five Ministerial Statements (MS) under Part IV of the EP Act. In regulating the premises under Part V, Division 3 of the EP Act, DWER will seek to avoid duplication of requirements imposed under Part IV. Pursuant to section 59B(7) of the EP Act, DWER will also not amend a Part V licence that is contrary to, or otherwise than in accordance with, an implementation agreement or decision.

A summary of the respective Ministerial Statements is provided below:

- MS 274 (15 July 1992) – Relates to the Red Hill Waste Management Facility Extension;
- MS 462 (21 November 1997) – Relates to the establishment of Class IV waste disposal cells at the existing Red Hill Waste Management Facility; and
- MS 976 (9 July 2014), MS 1092 (5 March 2019) and MS 1122 (20 January 2020) – Relate to the proposal to construct and operate a resource recovery facility within the existing Red Hill Waste Management Facility, for the processing of waste to produce energy, using either anaerobic digestion or gasification technology.

MS 274 and 462 are the main statements that relate to the construction, operation and post closure management of waste handling and landfilling aspects at the Red Hill Waste Management Facility. The proposed licence amendment does not propose to alter or duplicate

requirements covered under these existing Statements.

The scope of the amendment relates to MS 274 which was changed under section 45C of the EP Act on 26 June 2018. The changes approved the inclusion of Lot 12 within the authorised extent of MS 274 and construction and operation of Class III landfill cells and leachate ponds on Lot 12. The proposed Stage 1 and 2 FOGO composting infrastructure and landfill gas flare locations are encompassed within the authorised extent of MS 274.

MS 976 includes the following conditions which relate to odour impacts and controls at the premises:

6-1 *The proponent shall reduce the cumulative odour levels prior to operation of the anaerobic digestion or gasification facility. In order to demonstrate this, the proponent shall comply with the requirements of conditions 6-2 to 6-4.*

6-2 *The proponent shall prepare a Cumulative Odour Reduction Report.*

6-3 *The Cumulative Odour Reduction Report required pursuant to condition 6-2 shall:*

(1) investigate options and propose measures to reduce the cumulative odour impact from the Red Hill Waste Management Facility by management measures such as relocating the greenwaste windrows; and

(2) provide a re-rerun of the model (SLR Consulting Australia 2012 'Resource Recovery Facility: Odour Impact Assessment for Lot 8 (Site E) Toodyay Road' Report) to demonstrate that the chosen measures from 6-1(1) provides an overall improvement in predicted cumulative odour impacts,

to the satisfaction of the CEO on advice of the DER.

6-4 *Prior to operation of the anaerobic digestion or gasification facility the proponent shall implement management measures approved by the CEO to meet condition 6-1.*

4. Licensing history

Table 7 provides the amendment history for L8889/2015/1.

Table 7: Licence amendments

Instrument	Issued	Amendment
L8889/2015/1	19/05/2015	Licence granted
L8889/2015/1	29/04/2016	Notice of amendment and schedule of licences with amended expiry dates
L8889/2015/1	06/09/2017	Amendment Notice 1 – approval to accept and bury PFAS contaminated solid waste in existing Class III landfill cells (Farm Stage 1 and 2 and Stage 15).
L8889/2015/1	01/05/2018	Amendment Notice 2 – approval to accept and store paint wastes and updates to landfill acceptance criteria for PFAS impacted solid wastes (Special Waste Type 3).
L8889/2015/1	09/07/2018	Amendment Notice 3 – construction and operation of three leachate ponds (one holding pond and two evaporation ponds) to manage excess leachate currently being stored in the decommissioned Class IV cell.
L8889/2015/1	9/08/2018	Amendment Notice 4 – construction of an eastern green waste leachate storage pond for disposal of leachate by evaporation.

Instrument	Issued	Amendment
L8889/2015/1	01/11/2018	Amendment Notice 5 – increase of the capacity of the Class III leachate holding pond by deepening the pond by 3 m.
L8889/2015/1	06/05/2019	Amendment Notice 6 – extension to the licence duration
L8889/2015/1	30/03/2020	Revised Licence including: – approval for the operation of the mechanical evaporator to evaporate leachate from the Class III leachate ponds on Lot 12; – an increase to the Category 12 production capacity; – approval for the relocation of green waste processing activities to the new hardstand on Lot 12; and – amalgamation of Amendment Notices 1-6 into the Revised Licence.
L8889/2015/1	27/05/2020	Revised Licence based on DWER initiated amendment to correct minor omissions and errors in the March 2020 amended licence relating to contaminated solid waste processing, Class IV landfill cell and green waste windrows.
L8889/2015/1	26/06/2020	Revised Licence based to approve: - installation of landfill gas flare system at power generation plant; and - operation of an interim FOGO processing facility on Lot 11 and 12.

5. Emissions

5.1. Interim FOGO facility

5.1.1. Odour

Aerobic composting of FOGO waste has a high potential to generate offensive odours which may impact the amenity of sensitive receptors. The stage which has the highest likelihood of generating offensive odour emissions is the initial receipt of FOGO waste at the premises (Stage 0). FOGO waste is likely to become anaerobic during storage in domestic bins and transportation to the premises meaning that fresh FOGO feedstock is likely to be highly odorous. Another potential peak odour emission stage at the premises is the disturbance and transport of FOGO from Stage 1 to Stage 2 locations.

The main odour controls are summarized as follows:

- Siting of highest odour risk stages (Stages 0 and 1) at least 900 m from sensitive receptors and at a low terrain elevation. This aspect of the interim FOGO facility design was implemented to reduce the odour risk compared to completing the entire FOGO composting process at the Stage 2 green waste processing hardstand which is closer to receptors and in an elevated position on Lot 12.
- Installation of a biofilter to treat odorous air extracted during initial receipt of FOGO onto each MAF unit (Stage 0).
- Use of MAFs to maintain aerobic conditions in FOGO waste and remove the need to regularly disturb waste by turning windrows to achieve aeration.
- Odour complaints management, consistent with existing management practices at the premises.
- Application of odour control solutions as required.

Complaint and community survey

There is a history of odour complaints being made about the premises, both to DWER and via the Licence Holder's internal complaints management system. There are multiple potential odour sources at the premises and complaints are not always able to be attributed to a specific source. Based on the 2018 and 2019 AERs for the premises, 11 odour complaints were received by the Licence Holder during 2018 and 21 odour complaints were received during 2019. Most odour complaints were attributed to the active tipping face, green waste processing or the source was not identified. Other potential odour sources at the premises include landfill gas venting, cap rock blasting and leachate ponds (including mechanical evaporation).

The Licence Holder undertook a community survey of local residents and members of the Red Hill Community Liaison Group to inform the amendment application. The survey was carried out by Catalyse Pty Ltd and open from 1 to 17 April 2020. Letters informing residents of the survey were hand delivered to 32 households in close proximity to the premises. Members of the Community Liaison Group were notified of the survey by email.

Ten people responded to the survey. Of the respondents, four lived in Red Hill, three lived in Parkerville, two lived in Gidgegannup and one lived in Toodyay. The main results from the survey which are considered relevant to the assessment of this amendment application are summarised below:

- Respondents would like the Licence Holder to improve the effectiveness of its odour management. Odour management at the premises was given a mean effectiveness rating of 4.5 out of 10.
- Nine out of 10 respondents indicated that they support a FOGO trial being undertaken at the premises and one respondent indicated their opinion on this matter was neutral.
- One of the respondents who answered that they slightly support the FOGO trial stated their concern as '*We already have to put up with odour issues sometimes, so on that level I'm not keen'*.

Odour Impact Assessment

The Applicant submitted a Calpuff Odour Impact Assessment (OIA) in support of their application.

DWER considers that the submitted to support the application is 'criterion modelling' and should not be interpreted as accurately indicating the odour impact extent of the proposal. Tools such as complaints analyses and odour field studies involving the detection of odour with human noses are preferred tools for investigating odour impact extents of existing premises. Dispersion modelling can be useful in other contexts however, for example if undertaken in a comparative sense, or to demonstrate wind-flow patterns in complex terrain. The latter exercise has not been undertaken in detail in the modelling report.

Separate modelling of the existing operations and the proposed future FOGO processing operations suggests that that these two operations will have distinct areas of impact and cumulative impacts are likely to be reduced compared to the original co-located proposal.

Complaints records from the previous 12 months suggest that some odour impacts may be occurring from operations at the current site however it appears that no documentation has been provided to assess these impacts via field studies, complaints analyses or community surveys.

The relocation of the FOGO Stage 1 composting from Lot 12 to Lot 11 is likely to significantly reduce the risk of impacts at receptors to the north of the site owing to the greater distance to the nearest receptor and the lower elevation of Lot 11. The potential for the odour plume from the existing operations to combine with that of the FOGO composting operation is also reduced. A low ridge separating Lot 11 and the nearest receptor to the north is likely to

channel airflow away from a direct (i.e. linear) pathway to this receptor. A valley situated between the facility and receptors to the south is also anticipated to provide a barrier to odour plumes impacting these receptors.

The use of a well-managed biofilter is likely to reduce odour emissions during the waste receipt stage compared to passing the reverse flow air through the second stage windrows.

Key Findings:

19) Composting of FOGO waste has the potential to increase odour emissions at the premises due to the highly odorous nature of this waste.

20) The source characterisation described in the Calpuff OIA did not accurately reflect the proposed composting operation (location, stages, duration and mode of aeration), as described in other supporting documents to the application. The Calpuff OIA comprised criterion modelling which is not consistent with the *Guideline: Odour emissions* and is not considered to provide a reliable indication of the odour impact extent of the premises.

21) The Licence Holder remains subject to commitments 6-1, 6-2, 6-3 and 6-4 in MS 976. Acceptance of FOGO waste for composting at the premises will not reduce the cumulative odour impact of the premises.

22) The existing odour impact extent from current operations and the reliability of historical odour complaints relating to the premises are not known. The Existing Licence requires the completion of four odour field assessments (OFAs) by 30 September 2021. The Licence Holder was not able to complete an OFA prior to submission of this amendment application due to odour laboratories being shut down during COVID-19 restrictions. OFAs completed in the future will help to address this data gap, inform future amendment applications and demonstrate the Licence Holder's progress towards satisfying the conditions in MS 976.

23) The results of the community survey show that the Licence Holder's current effectiveness rating for odour management is poor. Despite this, survey respondents generally indicated their support for the FOGO trial. The Delegated Officer considers that this conflicting result may be because the potential for odours to increase as a result of the FOGO trial was not explicitly stated in the survey material. Respondents may not have been aware of the high odour risk associated with FOGO waste and it is therefore not clear if the survey results are a reliable reflection of community sentiment.

24) The interim FOGO facility is proposed to operate for a limited duration of two and a half years. This reduces the potential severity of odour impacts compared to a permanent and ongoing operation.

25) Due to its lower elevation and increased distance from receptors, the Stage 1 FOGO processing area may be better suited to high odour risk activities (FOGO receipt and early phase processing) than the Stage 2 location.

26) Appropriate biofilter management will be necessary to ensure that the biofilter achieves its intended function of effectively treating odorous air extracted from FOGO during the receipt stage.

5.1.2. Leachate

Leachate is generated during composting by the breakdown and decomposition of waste and through the interaction of rainfall and stormwater with waste and final compost products.

Contaminants which are expected to be associated with FOGO leachate include nutrients, metals, organic compounds (e.g. terpenes and phenols) and pathogens. Anaerobic conditions in stockpiles may also cause a high biological oxygen demand (BOD) in FOGO leachate.

Although final compost products may not generate significant volumes of leachate through decomposition and breakdown, they will interact with rainfall and stormwater during inclement weather. Liquid which has percolated through compost products should be managed as leachate because it is likely to contain potential contaminants from the waste, especially nutrients and metals which are not significantly reduced or 'treated' by the composting process.

DWER understands that the Licence Holder intends to capture and contain leachate from the Stage 1 and 2 areas used for FOGO composting activities. The infrastructure controls implemented to achieve this are outlined in Section 2.3.2.

The Licence Holder intends to sell final compost products as soon as possible, limiting the need for onsite storage. If storage of final compost products is required, it will occur on the Stage 2 green waste processing hardstand if space allows. Otherwise, the Licence Holder intends to store it on the temporary laydown area to the south of the green waste processing hardstand until sold. The Stage 2 green waste processing hardstand is designed to capture and contain leachate but the temporary laydown area is not.

Key Findings:

27) The Licence Holder proposes to capture and contain leachate generated during the FOGO composting process. The Delegated Officer considers that this is a suitable control measure which, if managed and implemented effectively, will prevent leachate discharge to the environment.

28) The Stage 2 green waste processing hardstand is a suitable storage location for final compost products because it is designed to capture and contain leachate.

29) The temporary laydown area was assessed and added to the Existing Licence as part of the licence amendment issued 30 March 2020. This area was considered to be suitable for temporary storage of unprocessed green waste for up to 14 days but did not allow it to be used to store final compost products. The Amendment Report stated that *"Should the Licence Holder wish to use the southern hardstand pad* [temporary laydown area] *for the storage of final compost products or longer term storage of green waste they should apply for a separate licence amendment and address the previously requested information as listed above."* This statement referenced the following information which had been requested by DWER during the assessment but was not provided by the Licence Holder:

    - A stormwater drainage plan showing stormwater pathways from the hardstand pad and relevant holding ponds and discharge points.
    - A proposed stormwater testing regime (location, frequency and analytes).
    - Confirmation of proposed discharge criteria if different from those referenced in the 2018 AER.
    - Leachate barrier design (material and thickness) – geotechnical testing results were provided but did not include permeability testing.
    - Protective cover design (material and thickness).

30) The Delegated Officer considers that the temporary laydown area is not a suitable storage location for final compost products because it is designed to

release stormwater to the environment via drainage off its south-eastern bank. If the Licence Holder requires this area for storage of final compost products they will need to reconfigure this infrastructure to capture and contain leachate/stormwater and seek a licence amendment to approve the use of this infrastructure for final compost product storage.

5.1.3. Dust

Dust emissions including bioaerosols may be generated during deposition of FOGO waste, screening and general vehicle and loader movements of FOGO waste and final compost products at the premises. Bioaerosols are airborne particulates and/or water droplets that may contain bacteria, fungi and fungal spores, pathogens or other microorganisms.

One of the main controls to prevent dust emissions is maintaining adequate moisture levels in FOGO waste. The Licence Holder did not propose any specific dust controls in the amendment application. Dust emissions at the premises are currently managed through the use of onsite water carts for dust suppression on unsealed roads and dusty wastes.

Key Findings:

31) The Delegated Officer considers that the general dust management practices at the premises are sufficient to manage potential dust emissions during FOGO composting.

32) There is also a risk of dust emissions from trucks arriving and departing the premises carrying FOGO feedstock or final compost products. This risk would be significantly reduced if truckloads delivering FOGO feedstock to the premises and removing un-bagged final compost product from the premises are covered. The control of trucks outside of the premises boundary is beyond the scope of this assessment. Requirements for adequate securing of loads are addressed under the *Litter Regulations 1981.*

5.1.4. Noise

Noise emissions may be generated through the use of mobile plant and equipment including the screener, loaders and vehicles. The Licence Holder's main controls for these noise emissions are the general operational time restrictions for the premises.

Key Findings:

33) The equipment proposed to be used as part of the FOGO composting operation is not expected to cause excessive noise.

5.1.5. Smoke from fire

There is the potential for FOGO waste to ignite and generate smoke emissions. The high moisture content in FOGO is considered to reduce the fire risk compared to pure green waste.

The Licence Holder proposes to prevent fire ignition through the following measures:

- Operator to conduct prestart and check all electrical cables and equipment for damage.
- Electrical cables are tested and tagged.
- Pathways for mobile plant to remain clear to reduce heat contact from exhaust.
- Hot work permit required as necessary.
- No smoking or open flames in FOGO processing areas.

The Licence Holder proposes the following control measures in response to a fire incident:

- Fire extinguishers in place and operators to have fire extinguisher training.
- Two water carts available for firefighting.

Key Findings:

34) The Delegated Officer considers that one of the main controls against fire in FOGO waste is maintaining the waste in a damp state which is also beneficial to the aerobic composting process.

35) Implementation of minimum separation distances between windrows on each MAF system and other combustible materials should provide sufficient firefighting access to emergency services in the event of a fire. This will also help to constrain the spread of any fires which start within the waste.

5.1.6. Final compost products

DWER understands that the Licence Holder intends to produce a saleable final compost product as a result of FOGO processing at the premises. Through the sale and removal of final compost products from the premises, members of the public will be exposed to compost and it will be discharged to land when used for domestic, commercial or agricultural purposes.

Final compost products derived from FOGO waste have the potential to contain biological, chemical and physical contaminants which present a risk to human health and the environment. The main control to mitigate this risk is compliance to AS 4454, which includes maximum concentration levels for common contaminants and specifies the minimum requirements for compost. AS 4454 defines compost as:

'An organic product that has undergone controlled aerobic and thermophilic biological transformation through the composting process to achieve pasteurization and reduce phytotoxic compounds, and achieve a specified level of maturity.'

The Licence Holder's proposed composting method is considered to meet the requirement of 'controlled aerobic and thermophilic biological transformation'.

Pasteurization

Pasteurization is an important part of the active composting phase during which the number of plant and animal pathogens (organisms responsible for diseases) and plant pests and propagules (viable regenerative plant materials or seeds) are significantly reduced.

AS 4454 specifies different pasteurization criteria for lower and higher risk materials. Higher risk materials include food wastes, therefore to meet the definition of pasteurized as set out in AS 4454, the Licence Holder would be required to achieve pasteurization requirements for higher risk materials. The higher risk materials pasteurization criterion is:

'The core temperature of the compost mass shall be maintained at 55ºC or higher for 15 days or longer, and during this period the composting mass shall be turned a minimum of five times, turning outer material to the inside of the composting mass, so the whole mass is subjected to the required temperature/process conditions.'

AS 4454 also specifies the following alternative pasteurization requirement:

'An alternative process that guarantees the same level of pathogen reduction as specified for Grade P1 within Guidelines for Sewage Systems Biosolids Management*. This process shall be confirmed by pathogen testing in accordance with Appendix D, Paragraph D5.4 The elimination of viable plant propagules shall be confirmed in accordance with the requirements in Appendix M.'*

DWER requested the Licence Holder to explain how their process would achieve the

pasteurization requirements in AS 4454. The Licence Holder's response is provided below:

'Whilst it is the aim for the product to achieve AS 4454, this is not a regulatory requirement, nor is it something that the EMRC needs to necessarily be held accountable to achieve. Having said that, the pasteurisation requirement only applies if the product is claimed to be pasteurised. It does not require pasteurisation to comply with AS4454. AS4454 allows for alternative treatments as long as compost is tested for pathogens/propagules (viable seeds) prior to dispatch to market. Aeration and good process conditions will kill pathogens just as effective, but harder to standardise as opposed to 3 days @ 55°C. In terms of pathogen destruction the technology and process design deals with this as follows:

1. *In stage one the FOGO will be on the Aero pipes for up to 6 weeks covered by the compost covers. This extends the heat core to the surface of the pile, since the hot air from the core is moved upwards to the surface both due to forced aeration and rising hot air (lighter than cold air) and the cover reduces excessive cooling from the surface. The process will easily achieve 3 days of 55°C, which the process will reserve for the last week of stage 1. This is done because the temperature of the composting process slows down severely, as all microbes are killed or deactivated by pasteurisation.*
2. *After stage 1, the fresh compost is screened and blended.*
3. *The screened compost is then moved to stage 2 curing phase. The screened compost processed in stage 2 will again increase to thermophilic temperature levels, which the process aims to achieve only in the last week.*
4. *On completion of Stage 2 the cured compost is stockpiled before or after screening over 10mm. Stockpiling of 10mm compost will again increase the temperature to pasteurisation levels.*
5. *No leachate will be irrigated over stage 2 and beyond compost.*

In the first 12 months at least, regular testing of product for pathogens will be conducted to verify and demonstrate compliance with pathogen/propagules destruction, as this is a critical quality aspect for marketing the product.'

Key Findings:

36) AS 4454 does not require that all products are pasteurized, but this is a minimum requirement for products classified as 'compost' or 'composted'.

37) As stated by the Licence Holder, it is not a regulatory requirement for them to achieve compliance with AS 4454. However, their intention to comply with AS 4454 has informed DWER's risk assessment of potential impacts to human health and the environment for off-site use of the final compost products. The aspects of AS 4454 which are most relevant to the assessment of risk (pasteurization and contaminant levels) are important considerations and may be implemented through regulatory controls in the Revised Licence.

38) The Licence Holder's proposed composting process will not meet the pasteurization requirements for higher risk materials as set out in AS 4454 because the composting process will involve a maximum of two turns rather than the required minimum of five turns. However, as discussed above, AS 4454 does consider alternative processes which achieve the required pathogen reduction as appropriate means of pasteurization.

39) The purpose of the turning requirements in AS 4454 is to ensure that the whole mass of compost undergoes pasteurization and material on the outer part of windrows is not excluded from this treatment. The Licence Holder

considers the forced aeration method and cover system will extend the heat core to the surface of the pile. The Delegated Officer is uncertain as to how effective this approach will be at ensuring the whole compost mass is pasteurized compared to regular windrow turning.

The key indicator for the effectiveness of the composting process to achieve pasteurization will be pathogen sampling of final compost products. The Delegated Officer considers that the product sampling and specification requirements could provide appropriate regulatory control to ensure that final compost products have undergone sufficient pasteurization. This will ensure that the pathogen concentrations are reduced to acceptable levels before final compost products are removed from the premises, but allows the flexibility in the method used to achieve pasteurization.

Contaminant levels

FOGO waste streams are associated with a high rate of physical contamination from other domestic rubbish such as glass, plastic and nappies. FOGO bins also receive a wide range of organic substances which may contribute chemical or biological contaminants to the compost. Experiences at other FOGO processing premises in Western Australia show that some level of contamination is likely to persist in FOGO waste streams over the long term.

The Licence Holder's main controls to reduce contamination levels include:

- Community education programs to inform residents of the City of Bayswater and Town of Bassendean of appropriate waste separation methods.
- Two stage 10 mm screening process to remove residual physical contaminants pre- and post-Stage 2 composting.
- No leachate will be irrigated over Stage 2 and beyond compost.

AS 4454 sets out maximum contaminant levels for physical and biological contaminants in Table 3.1(A) and chemical contaminants in Table 3.1(C). Compliance with these contaminant levels provides assurance that final compost products produced from FOGO waste at the premises are not likely to present an unreasonable risk to human health and the environment.

Key Findings:

40) The Delegated Officer considers that sampling and analysis of final compost products to check compliance with the maximum contaminant levels specified in AS 4454 is an appropriate regulatory control for the Revised Licence.

The Delegated Officer acknowledges that sampling and analysis of contaminant levels in compost and soil improver currently produced from green waste at the premises is not required on the Existing Licence. However, due to the high rate of contamination associated with FOGO waste streams and the diversity of organic wastes which may contribute to this waste stream, the Delegated Officer considers that there is sufficient justification to require sampling and analysis of final compost products produced from FOGO.

41) The Licence Holder intends to use stormwater as the main source of irrigation water for FOGO waste during composting. Stormwater is an appropriate water source for this purpose, as long as the Licence Holder manages activities on the premises in a manner which avoids it becoming contaminated by waste. Conditions in the Existing Licence require that stormwater which has come into contact with waste contaminated areas or wash water from vehicle wash down areas is directed to a leachate pond and

disposed by evaporation.

42) Supporting documents to the application indicate that leachate may also be used for irrigation of FOGO waste. Leachate which is solely derived from FOGO or green waste composting areas is also considered a suitable irrigation source during Stage 0 and 1. During Stage 2 however, irrigation with leachate may lead to the reintroduction of pathogens into the final composting stage and compromise the effectiveness of pasteurisation.

5.1.7. Vectors and vermin

FOGO waste is likely to attract and potentially harbour pests such as birds, flies and rodents which may act as vectors for pathogens, potentially causing health and amenity impacts to the closest sensitive receptors.

The main vermin control specific to FOGO processing proposed by the Licence Holder is the use of the synthetic permeable membrane covers during composting. The Licence Holder also implements a range of vermin control measures as part of general site operations, including but not limited to fence maintenance, spotlighting events, baiting and trapping.

Key Findings:

43) The Delegated Officer considers that covering FOGO waste during composting is a suitable measure to reduce access from vermin.

44) Residual physical contaminants may attract vector or vermin particularly in the Stage 2 green waste processing hardstand if they are not landfilled within 24 hours of being screened out of compost.

5.2. Flare

5.1.8. Point source air emissions

The intended purpose of the landfill gas flare system is to reduce emissions of landfill gas which currently vents freely to the atmosphere during power plant shutdowns. Many constituents of landfill gas are hazardous and pose potentially significant risks to human health and the environment (UK Environmental Agency, 2002). The reduction of landfill gas emissions by addition of a flare should provide significant improvement in the environmental performance of the landfill gas collection and power generation activities at the premises.

Landfill gas flares are a potential source of various gaseous emissions including landfill gas components and their combustion products generated in the flare. Key air pollutants associated with landfill gas flare emissions include residual methane (CH_4), carbon monoxide (CO) and oxides of nitrogen (NO_x). Additional trace species commonly include sulfur dioxide (SO_2), polycyclic aromatic hydrocarbons (PAHs), non-methane volatile organic compounds (NMVOCs), dioxins, furans and acidic gases such as hydrochloric acid (HCl), hydrofluoric acid (HF) and hydrobromic acid (HBr) (UK Environment Agency, 2002).

LMS indicates that their flare is designed specifically for the combustion of landfill gas and to achieve methane and NMVOC destruction efficiencies generally required by Australian and international regulators. The document *LMS Standard Flare Destruction Efficiency Philosophy* (LMS, 2014) was submitted to support the application and outlines the methodology LMS uses to ensure the destruction efficiency of the LMS standard flare is maintained at a level to achieve regulatory requirements.

Volatile organic compound (VOC) destruction efficiency within the LMS landfill gas flare is achieved by ensuring sufficient retention time, flame temperature, turbulent mixing of the gas stream components and available excess air (LMS, 2014). The LMS flare was designed and

tested to achieve suitable retention time according to the method from the UK Environment Agency Publication *Guidance on Landfill Gas Flaring* (2002). This method is used to provide an indicative calculation for assessing whether or not a flare will meet design performance criteria.

LMS (2014) presents a summary of past flare stack testing results from other sites collected during 2005 to 2013. LMS considers these data to show that their flares recorded consistently low concentrations in stack emissions. Based on this dataset, VOC emissions concentrations ranged from 0.06 to 5.39 mg/m^3 and non-methane hydrocarbon emissions concentrations ranged from <1 to 2.92 mg/m^3. These data were provided as evidence that across a wide range of operating conditions and variable gas qualities, the LMS flare is able to achieve emission performance requirements and destruction efficiencies required by regulators (LMS, 2014).

Regulatory context

There are currently no emission standards or performance requirements for landfill gas flares specified in Western Australia. Air emissions are governed by general provisions of the EP Act which make it an offence to cause or allow unreasonable emissions that unreasonably interfere with the health, welfare, convenience, comfort or amenity of any person or cause pollution which causes detriment or degradation of the environment.

A common performance standard specified in other Australian jurisdictions including Victoria, New South Wales and South Australia is the requirement that landfill gas flares achieve a 98% destruction efficiency of methane and VOCs (SA EPA, 2019; EPA Victoria, 2015; NSW EPA, 2016a).

Some jurisdictions also specify performance requirements relating to gas retention time and combustion temperature for landfill gas flares, for example:

- NSW EPA (2016a) – Gas retention time >0.6 seconds and combustion temperature >760ºC.
- UK Environment Agency (2002) – Gas retention time >0.3 seconds and combustion temperature >1000ºC. Alternative performance standards may be deemed more appropriate if compliance with the emission standard is suitably demonstrated.

The UK Environment Agency (2002) specifies emissions standards for landfill gas flare systems as follows[1]:

- CO – 50 mg/m^3
- NO_x – 150 mg/m^3
- Total VOCs – 10 mg/m^3

Key Findings:

45) The Delegated Officer is satisfied that the LMS flare has been appropriately designed to achieve a destruction efficiency of at least 98% as is commonly required in other Australian jurisdictions. This performance standard indicates that the flare will significantly reduce the concentration of landfill gas components emitted to the atmosphere compared to the current configuration in which untreated landfill gas is freely emitted to the atmosphere.

46) Achieving the 98% destruction efficiency performance standard on an ongoing basis will require an appropriate flare maintenance and monitoring schedule to be implemented. The Licence Holder specified in the Application

[1] These limits are based on normal operating conditions and load. Temperature: 0ºC (273K); pressure: 101.3 KPa; and oxygen: 3 percent (dry gas).

Form that they would ensure the safe and efficient operation of the gas flare as per the manufacturer's requirements. Subsequent correspondence from the Licence Holder clarified that the maintenance and monitoring schedule outlined in LMS (2014) would be followed if practical in terms of flare operation, that is if the frequency of use is high the weekly schedules will be followed. If the flare is not used frequently, monitoring and maintenance will be carried out as appropriate to maintain the integrity of the flare.

47) The Licence Holder has not provided information on the predicted concentrations of key air pollutants in flare emissions. The Delegated Officer was therefore not able to assess the flare emissions concentrations against emissions standards from other jurisdictions.

48) Data taken from verification monitoring on the first flare can be used to confirm that the flare emissions present a low risk. Temperature monitoring can also verify the combustion temperature is at least 760ºC when gas flow rates are at least 100 m^3/hour as indicated in the LMS specifications. Verification monitoring may not be required on potential second and third flares which could be installed at the premises, on the basis that these will be the same model as the first flare and should achieve the same level of performance.

49) The LMS flare design and dimensions does not permit flow rate measurements to be carried out in compliance with AS 4323.1-1995 *Stationary source emissions, Method 1: Selection of sampling positions* (LMS, 2014). LMS (2014) also indicates that flow rate monitoring at the designated sampling ports may not be accurate due to the turbulent nature of flow and extreme temperatures within the stack. The Delegated Officer has determined to exclude the stack emission flow rate from the verification monitoring parameters.

5.1.9. Odour

Some components of landfill gas are associated with offensive odours such as hydrogen sulfide, organosulfurous componds and NMVOCs (UK Environment Agency, 2002). Effective combustion in an appropriate flare (i.e. enclosed with adequate residence time and combustion temperature) can significantly reduce the concentrations of these compounds in emissions compared to untreated landfill gas. This is achieved through a combination of destructive oxidation and dilution with combustion air.

The combustion process in the flare can also generate odorous compounds such as NO_X, SO_2 and HF (UK Environment Agency, 2002). Although there is the potential for flares to generate nuisance odours, it is generally to a lesser extent than untreated landfill gas emissions.

Key Findings:

50) Based on the specifications of the proposed LMS landfill gas flare, there is the potential that it will have a net positive effect on odour emissions from the premises.

5.1.11. Noise

The flares will produce noise which will add to the cumulative noise impact of the premises. The Licence Holder has indicated that each flare has its own blower with sound levels at approximately 90 dBA at 1 m (each). LMS states in their flare specification sheet that the enclosed flare has the capability for low noise to ensure compliance with environmental regulations. This document also states the thermal insulation in the combustion chamber helps to reduce audible noise from the flare.

The landfill gas flare is proposed to be used on an intermittent basis as backup to the existing power generation plant in emergency and maintenance situations, estimated to be 0.01% or less of the time. Such infrastructure cannot be limited to set operating hours because it may be required at any time during the day or night. Operation of the flare during the day would add to cumulative noise impacts at the premises. During night time and outside of the premises operating hours, the flares would be expected to be one of the only significant noise sources at the premises, with the exception of the adjacent power plant.

Based on the intermittent nature of the flare noise source and its expected operating frequency of <0.01% of the time, the $L_{A\ max}$ assigned levels from the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations) are applicable. These are not to be exceeded at any time. The noise sensitive premises assigned levels are appropriate to represent the most sensitive receptor in the vicinity of the premises, a residential property. The residential boundary and residence are approximately 560 m and 860 m from the flare compound respectively.

Based on the factors above, the assigned levels most applicable to assessment of the flare are:

- Highly sensitive areas on noise sensitive premises:
    - Day time Monday to Sunday – 65 dBA (+influencing factor).
    - Night time – 55 dBA (+influencing factor).
- Other areas on noise sensitive premises:
    - 80 dBA (+influencing factor) at all times.

Key Findings:

51) The Licence Holder did not submit acoustic modelling or a noise screening assessment for the flare and other noise sources at the premises to support their application. Therefore, it is not possible for the Delegated Officer to assess compliance with the assigned levels in the Noise Regulations.

52) Based on the sound power levels and distance to receptors, the Delegated Officer considers that the addition of one landfill gas flare to the premises is unlikely to significantly contribute to noise emissions.

53) The addition of a second and third landfill gas flare to the premises presents a risk of potentially exceeding the assigned levels. Therefore, an Environmental Noise Assessment would be required after the installation of this equipment to verify that they do not cause an exceedance of the relevant assigned levels. If the Environmental Noise Assessment showed that the assigned levels were likely exceeded, the Licence Holder would be required to propose noise improvement measures specific to this equipment or general site activities at the premises.

5.1.12. Smoke from fire

Landfill gas flares have the potential to cause explosion and fires. Based on the proposed

siting of the landfill gas flare within approximately 3-5 m of surrounding vegetation, an explosion or fire could potentially ignite a bushfire, generating smoke emissions and posing a threat to nearby receptors. The Licence Holder indicated that EDL Energy have specified a 10 m exclusion zone should apply around the landfill gas flare stacks.

Some of the safety features on the proposed LMS flare which relate to fire and explosion risk include:

- gas supply line is fitted with a slam shut solenoid valve and an in line flame arrestor;
- equipped to operate remotely, providing continuous flame detection linked to advanced burner control hardware with automated dial out alarms;
- gas isolation valves;
- in line pressure gauges;
- refractory lined combustion chamber;
- flash back temperature sensor; and
- Hazardous Area Dossier.

Key Findings:

54) The Delegated Officer considers that a minimum separation distance between the flares and surrounding vegetation is a necessary control to reduce the risk of bushfire.

5.1.13. Condensate

As landfill gas cools in the extraction and flare system it condenses and generates landfill gas condensate. Any liquid condensed from the landfill gas should be handled in the same manner as leachate. Condensate is likely to contain elevated concentrations of landfill contaminants, have low pH and be odorous.

The LMS flare specifications indicate that its safety features include a condensate level indicator. The Licence Holder intends to dispose of collected condensate into the closest onsite leachate pond.

Key Findings:

55) The Delegated Officer considers that disposal of condensate to leachate ponds is a suitable management control.

6. Environmental siting

In accordance with *Guidance Statement: Risk Assessment,* the Delegated Officer has excluded employees, visitors and contractors of the Licence Holder from its assessment.

Table 8 below lists the relevant sensitive land uses in the vicinity of the premises which may be receptors relevant to the proposed amendment. Figure 11 shows the locations of these receptors.

Table 8: Receptors and distance from activity boundary

Residential and sensitive premises	Distance from Prescribed Premises
Residential premises	To the south of the premises, multiple lots approximately:

Residential and sensitive premises	Distance from Prescribed Premises
	• 920 m or more from the Stage 1 FOGO location; • 1180 m or more from the Stage 2 FOGO location; and • 1,370 m or more from the landfill gas flare. These lots are separated from the premises by a vegetation buffer (approx. 350-440 m wide) located on Lot 501 on Plan 40105 and Lot 82 on Plan 18309, Parkerville (owned by the Licence Holder) and a conservation reserve (approx. 50-125 m wide) on Lot 62 on Plan 23731 and Lot 15403 on Deposited Plan 40033, Parkerville (vested in the Department of Planning, Lands and Heritage and located in the Shire of Mundaring). Immediately to the east of the premises, Barbarich Estate comprising multiple lots approximately: • 550 m or more from the Stage 2 FOGO location; • 1,860 m or more from the Stage 1 FOGO location; and • 1,950 m or more from the landfill gas flare; and Immediately to the north, north-west and north-east of the premises, multiple lots approximately: • 680 m or more from the Stage 2 FOGO location; • 860 m or more from the landfill gas flare; and • 1,130 m or more from the Stage 1 FOGO location. These lots are separated from the premises by Toodyay Road.
Recreational users of John Forrest National Park	The national park is adjacent to the southern boundary of the premises, 290 m south of the Stage 1 FOGO location, 740 m south of the landfill gas flare and 980 m south-west of the Stage 2 FOGO location.
Workers at the Marvel Loch Mine	The Marvel Loch Mine is operated by Hanson Construction Materials Pty Ltd. Active sections of the site are located approximately 1,250 m west of the landfill gas flare, 1,400 m north-west of the Stage 1 FOGO location and 2,350 m from the Stage 2 FOGO location.
Visitors to the Red Hill Auditorium venue	The Red Hill Auditorium is an events venue located 1,640 m east of the Stage 1 FOGO location, 1,650 south-east of the landfill gas flare and more than 2,700 m east of the Stage 2 FOGO location.

Table 9 below lists the relevant environmental receptors in the vicinity of the premises which may be receptors relevant to the proposed amendment.

Table 9: Environmental receptors and distance from activity boundary

Environmental receptors	Distance from Prescribed Premises
Parks and Wildlife Management Lands and Waters	John Forrest National Park: adjacent to the southern boundary of the premises, 290 m south of the Stage 1 FOGO location, 740 m south of the landfill gas flare and 980 m south-west of the Stage 2 FOGO location.

Environmental receptors	Distance from Prescribed Premises
Groundwater	There are two distinct water bearing layers underlying the site: • The upper layer comprises of a perched water table associated with shallow lateritic sediments mainly on low lying areas which had developed above pallid zone clays (impermeable layer of kaolinitic clays). Perched aquifers are reported to be limited in their lateral extent and considered ephemeral during and post winter. • The lower layer comprises the regional groundwater table within granite bedrock (fracture systems) or within extensive saprolite grits (porous, weathered bedrock) often semi confined by pallid zone clays. The premises is not located within a *Rights in Water and Irrigation Act 1914* proclaimed Groundwater Area. Further information about groundwater pathways is provided in Section 0.
Surface water	Christmas Tree Creek • 680 m south of the Stage 1 FOGO location, 1,050 m south of the Stage 2 FOGO location and 1,150 m south of the landfill gas flares. • Flows in a westerly direction parallel to the southern boundary and is a tributary to the Jane Brook and Swan River. Susannah Brook • 1,260 m north of the landfill gas flares, 1,510 m north of the Stage 2 FOGO location and 1,700 m north of the Stage 1 FOGO location. • Ephemeral stream which drains from the Darling Scarp into the upper reaches of the Swan River. Strelley Brook • 230 m south-west of the landfill gas flares, 300 m north-west of the Stage 1 FOGO location and 1,250 m west of the Stage 2 FOGO location. • Small tributary of Jane Brook. The premises is located within the *Rights in Water and Irrigation Act 1914* proclaimed Surface Water Area for the Swan River System.
Threatened and Priority Ecological Communities	Buffer for the Central Granite Shrublands (Priority 4) located 990 m west of the premises boundary.
Threatened/Priority Fauna	The following species were identified within 2,000 m of the premises boundary: • Two endangered species (Baudin's cockatoo and Carnaby's cockatoo) • One vulnerable species (forest red-tailed black cockatoo) • One species of migratory bird protected under an international agreement (fork-tailed swift) • One Priority 4 species (quenda) • One species of special conservation interest (south-western brush-tailed phascogale)
Green Growth commitment areas	• Quenda habitat 350 m south and 820 m north-west of the premises boundary. • Vegetation complexes present on the premises and within 2 km of the premises boundary including Dwellingup, Helena 2, Murray 2, Yarragil 1 and Darling Scarp. • Regionally Significant Natural Areas Parks and Wildlife Conservation Program – Phase 2 conservation area 830 m north-west of the premises boundary.

Environmental receptors	Distance from Prescribed Premises
Ramsar Sites Important Wetlands Geomorphic Wetlands Bush Forever sites Western Swamp Tortoise Habitat Regional Parks Waterways Conservation Areas Threatened/Priority Flora Public Drinking Water Source Areas	None within 2 km of the premises boundary

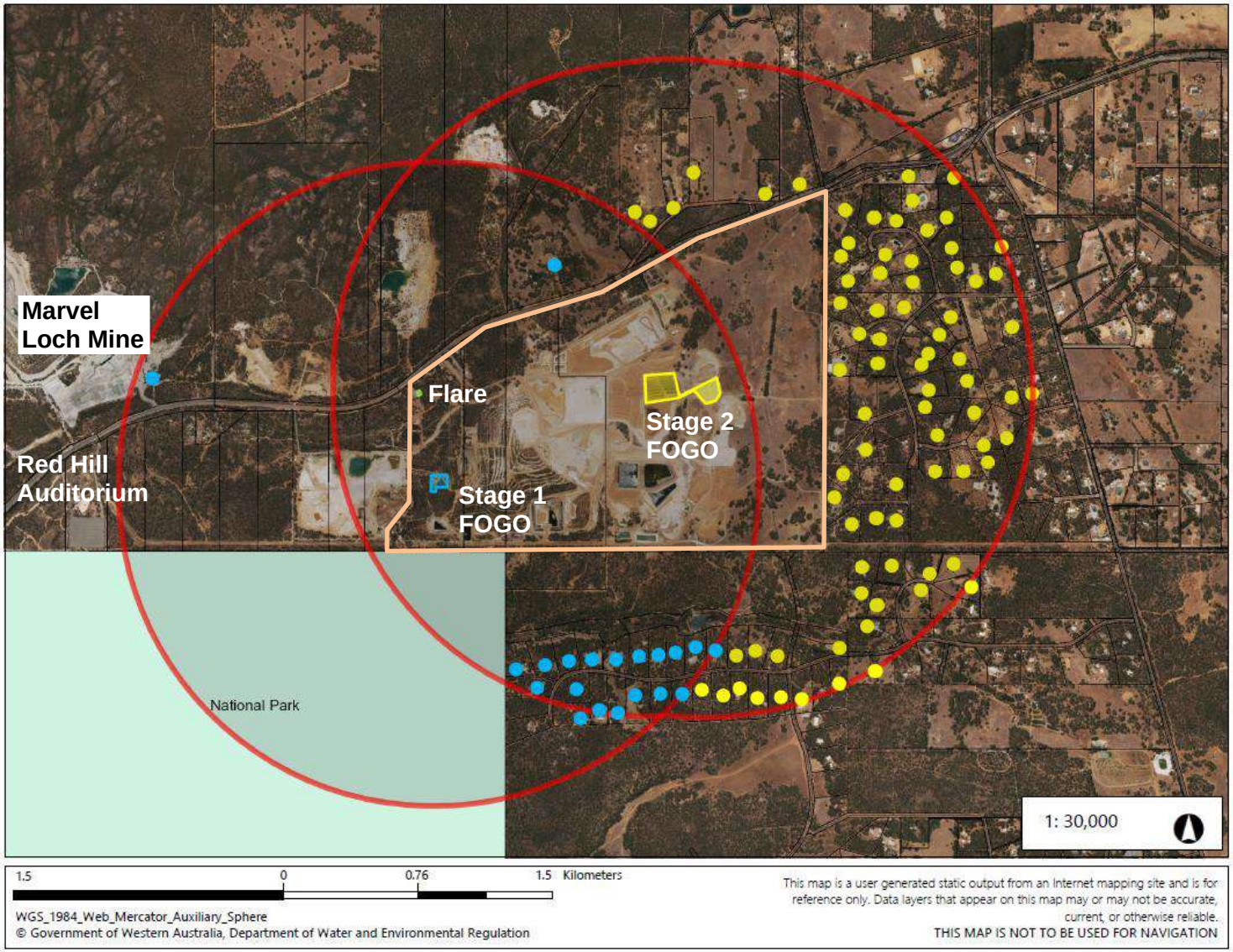

Figure 11: Sensitive receptors to Stage 1 FOGO, Stage 2 FOGO and flare. The red circles depict 1.5 km buffer distances from FOGO infrastructure and the receptors within these areas (blue for the Stage 1 FOGO and yellow for the Stage 2 FOGO).

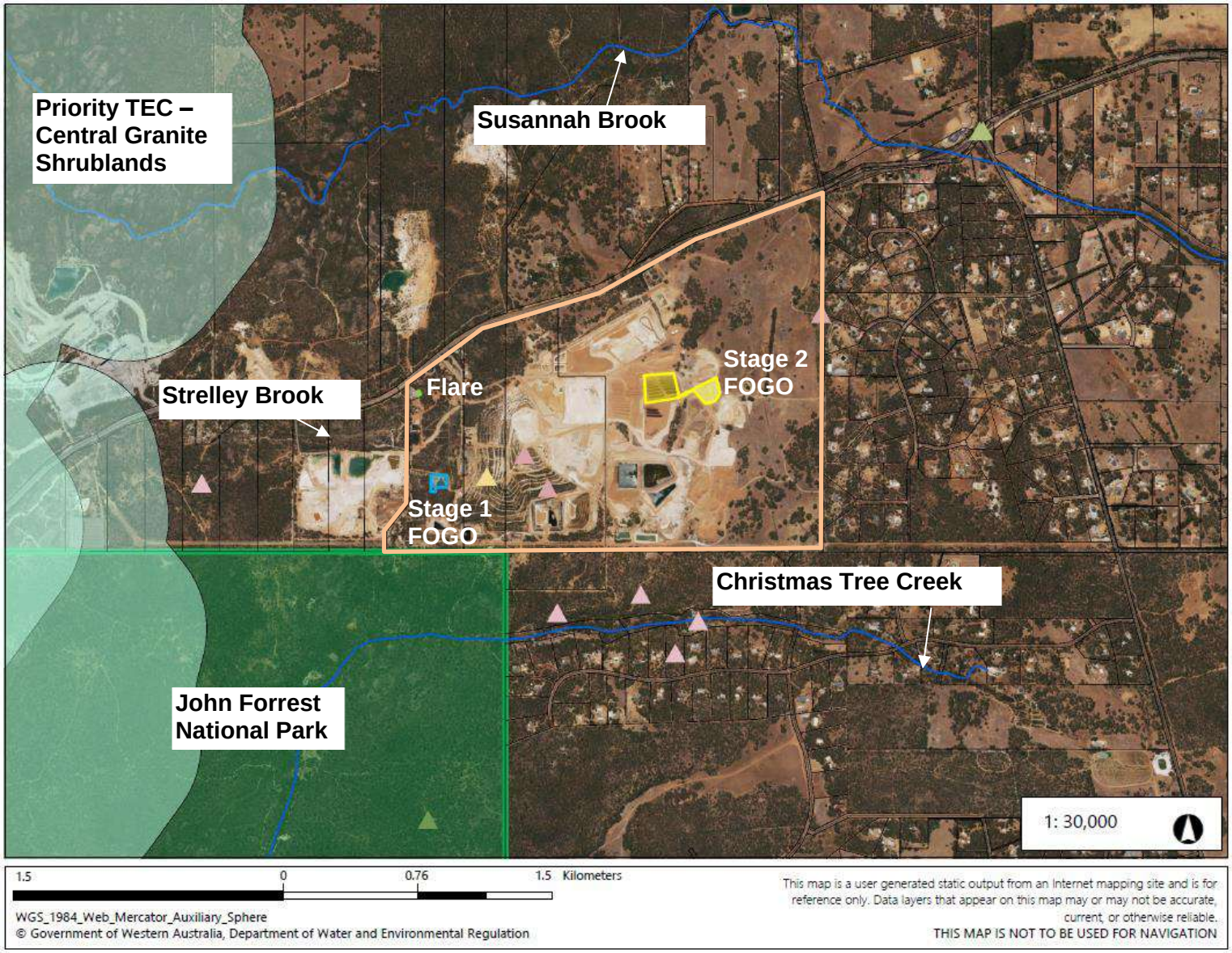

Figure 12: Environmental receptors to Stage 1 FOGO, Stage 2 FOGO and flare. Triangles denote Threatened/Priority fauna.

7. Pathways

7.1. Wind

Wind and air dispersion are the main pathway for odour, point source air emissions, dust, noise and smoke and are relevant to the landfill gas flares and interim FOGO facility. Information on the prevailing wind direction was obtained from the closest available Bureau of Meteorology weather station – Perth Airport (No. 009021). Based on the climate data for Perth Airport station (May 1944 to August 2019), the prevailing wind direction is easterly to north-easterly in the morning and westerly to south-westerly in the afternoon. Morning and afternoon wind roses for the Perth Airport station are shown in Figure 13.

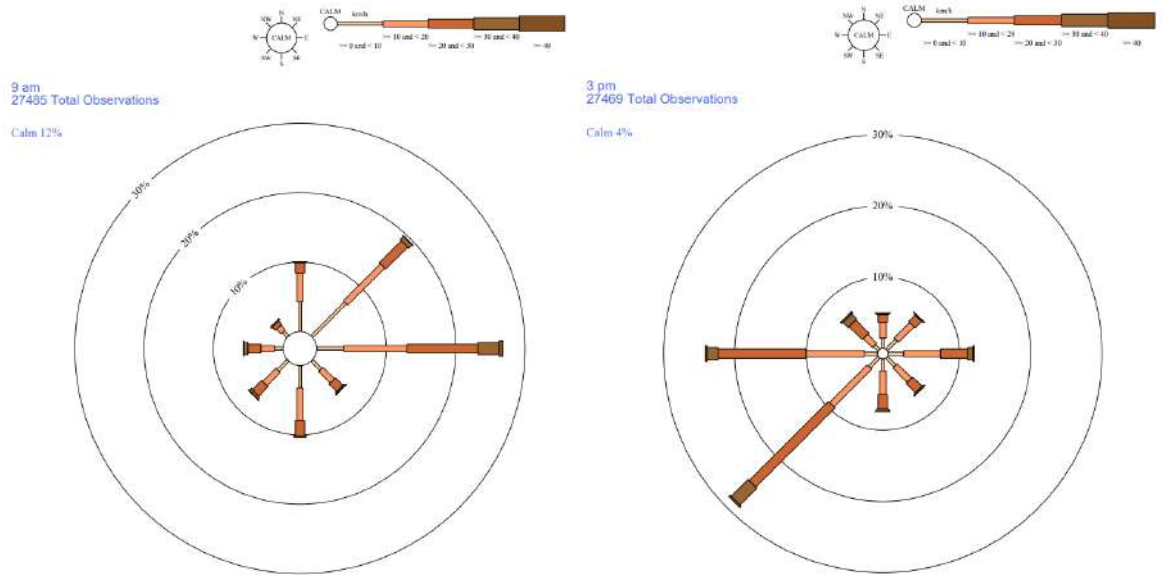

Figure 13: 9 am and 3 pm wind roses for the Perth Airport station May 1944 to August 2019

Due to the complex and uneven terrain present within the vicinity of the premises, the dispersal of emissions via wind is also likely to be influenced by the local topography. A topographic map of the premises is shown in Figure 14.

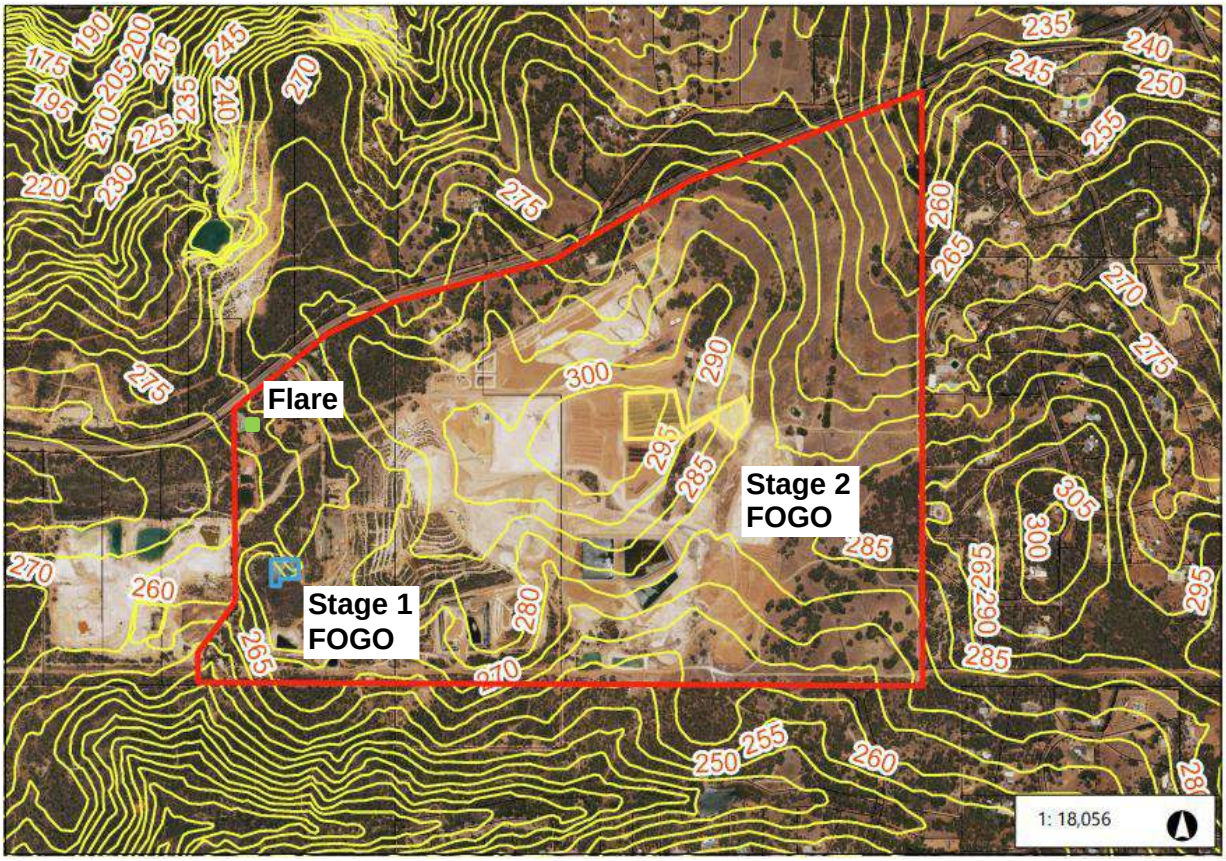

Figure 14: Topographic contour map

7.2. Land and water

Land and water pathways are relevant to the interim FOGO facility which has the potential to generate leachate emissions which disperse via these pathways. The geological profile present at the premises may be briefly described as a weathered granitic profile of lateritic sediments, overlying saprolitic weathered granite, overlying fractured granite bedrock.

Stage 1 FOGO

As discussed above, the Stage 1 location is sited above former Class III landfill cells. DWER understands that these cells have been capped but the thickness and type of the capping layer used are not known. DWER understands that a 'natural wetland' was also present at this location from at least 1995 to 2010, but appears to have been filled in during 2010 (Crisalis, 2014). The nature of fill material used for this purpose is also not known.

Construction of the sump will involve excavating to approximately 0.4 m below the existing ground surface (Figure 6). DWER is not aware of whether this will affect the capping layer or only require excavation of shallow fill materials.

Since the cells were completed and capped, it is likely that there has been a general equilibration between the leachate head within the cells and the regional groundwater table beyond the cells.

Based on January 2020 groundwater contours presented in the 2019 AER, groundwater flow beneath the Stage 1 FOGO location was inferred to be towards the west and south-west. This groundwater flow direction is generally consistent with the predominant topography in the area. In January 2020, the regional groundwater table at this location was inferred to be located at approximately 272 m AHD. The proposed base of the hardstand and leachate sump liners are 10.5-11 metres higher at 283 m AHD and 282.5 m AHD respectively.

If leachate is discharged from the Stage 1 location, either from leakage through a liner, breach of the perimeter hardstand bund or overtopping of the leachate sump, it would be expected to disperse as overland flow or infiltrate directly into soil and groundwater. The extent to which infiltration into the waste mass below would occur is unclear as the condition of the capping layer is unknown. FOGO leachate which infiltrated to the leachate table in the waste mass would mix with landfill leachate and migrate further down-gradient due to the unlined natured of these cells. If FOGO leachate was prevented from infiltrating into the waste mass due to an intact clay capping layer it would be expected to accumulate within the upper part of the capping layer.

Stage 2 FOGO

The Stage 2 green waste processing hardstand and leachate pond are inferred to be located in the vicinity of a groundwater divide. Based on survey cross sections previously provided by the Licence Holder, the depth to the groundwater table below the base of the Stage 2 green waste processing hardstand was inferred to be a minimum of 13 m.

If leachate is discharged from the Stage 2 hardstand or pond, through one of the same mechanisms discussed above for Stage 1, it would be expected to disperse as overland flow or infiltrate directly into soil and groundwater.

8. Risk assessment

Table 10 and Table 11 below describe 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 public health or the environment, requiring regulatory controls.

Table 10: Risk assessment for proposed amendments during construction/installation

Risk Event				Consequence rating[1]	Likelihood rating[1]	Risk[1]	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities	**Potential emissions**	**Potential receptors, pathway and impact**	**Applicant controls**					
Construction of Stage 1 FOGO hardstand and leachate sump Installation of biofilter and MAFs	Dust	Air/windborne pathway causing amenity impacts to closest sensitive receptors, residences approximately 920 m south-east and 1,130 m north-east of the Stage 1 area.	• Undertake dust suppression with onsite water cart.	Slight	Unlikely	Low	The Licence Holder's dust controls provide adequate mitigation of dust emissions. The Delegated Officer considers that there will be only minimal impacts to amenity. This risk event will probably not occur in most circumstances.	No additional conditions
	Noise		None	Slight	Unlikely	Low	The potential noise emissions from construction activities are generally consistent with standard site operations (truck movements, earthworks etc). The Delegated Officer considers that there will be only minimal impacts to amenity. This risk event will probably not occur in most circumstances.	Compliance with the Noise Regulations
	Landfill gas and odour (due to breach in Class III cell capping layer during excavation)		None	Slight	Unlikely	Low	If landfill gas were released from the historical Class III cells in the vicinity of the Stage 1 leachate sump excavation site, it would be expected to be brief event. If a breach in the capping layer occurs, it will be resolved shortly after when the leachate sump lining (including a minimum thickness of 300 mm clay) is installed. The Delegated Officer considers that there will only be minimal impacts to amenity. This risk event will probably not occur in most circumstances.	Condition 44 – construction requirements for Stage 1 leachate sump
Installation of the landfill gas flare	Noise	Air/windborne pathway causing amenity impacts to closest sensitive receptors, residences approximately 860 m north-east of landfill gas flare.	• Modularised flare within minimal onsite installation required. • Onsite installation less than one day per flare unit.	Slight	Unlikely	Low	The brief installation period for each flare means there will be minimal impacts to amenity. This risk event will probably not occur in most circumstances.	Compliance with the Noise Regulations

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Department's Guidance Statement: Risk Assessments (February 2017)

Table 11: Risk assessment for proposed amendments during operation

Risk Event				Consequence rating[1]	Likelihood rating[1]	Risk[1]	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities*	**Potential emissions**	**Potential receptors, pathway and impact**	**Applicant controls**					
Truck/loader movements delivering FOGO waste, moving it around, and removing final compost product from the premises	Noise	Air/windborne pathway causing impacts to health and amenity of closest residences immediately adjacent to the northern, eastern and southern boundaries.	• Operational time restrictions for the premises.	Minor	Unlikely	Medium	This noise source is generally consistent with existing operations at the premises and the Licence Holder's existing noise controls are suitable. The Delegated Officer considers that there could be low level impacts to amenity. This risk event will probably not occur in most circumstances.	No additional controls
	Dust (including bioaerosols)		• Standard control measure for the premises is to undertake dust suppression with onsite water carts.	Minor	Unlikely	Medium	This dust source is generally consistent with existing operations at the premises and the Licence Holder's existing dust controls are suitable. The Delegated Officer considers that there could be low level impacts to amenity and minimal impacts to health. This risk event will probably not occur in most circumstances.	Condition 5 – waste processing requirements for FOGO
	Odour		• Odour complaint management protocol includes remedial actions to reduce odours where possible; and • Corrective and contingency actions should adverse winds affect transfer activities.	Moderate	Possible	Medium	Vehicle movements will be a transient odour source. However, fresh feedstock received at the premises is likely to be highly odorous and disturbance of material during transfer from Stage 1 to Stage 2 may also generate offensive odours. Based on these factors, the Delegated Officer considers that there could be mid level impacts to amenity. This risk event could occur at some time.	Condition 1 – FOGO waste acceptance specification and quantity Condition 4 – infrastructure and equipment requirements for Stage 1 hardstand and green waste processing hardstand (including limited duration of approval for FOGO processing) Condition 5 – waste processing requirements for FOGO Condition 27 – existing OFA requirements
Receipt of raw FOGO feedstock and composting of FOGO at Stage 1 location Storage of leachate in sump, pumping to leachate ponds	Odour	Air/windborne pathway causing impacts to amenity of closest sensitive receptors, residences approximately 920 m south-east and 1,130 m north-east, and recreational users of John Forrest National Park, 290 m to the south of the Stage 1 location.	• Siting of FOGO receipt further from receptors than Stage 2 location; • Raw FOGO feedstock to be placed directly onto MAFs operating in reverse mode and pumping to biofilter; • FOGO composting to be conducted using MAFs to prevent anaerobic conditions; • Odour complaint management protocol includes remedial actions to reduce odours where possible; • Odour monitoring at down-wind receptors in response to complaints; and • Application of odour treatment solution as required.	Major	Possible	High	The Licence Holder's proposed controls should significantly reduce the potential odour emissions from these activities. However, due to the highly odorous nature of FOGO feedstock, there remains a residual risk that high level impacts to amenity could occur at the local scale. This risk event could occur at some time. The Delegated Officer considers that this risk is acceptable, subject to regulatory controls, based on the following considerations: • The interim facility will be a temporary FOGO processing solution with a limited duration of 2.5 years from 1 July 2020. • The Licence Holder has revised their original design for the interim FOGO facility by adding additional odour controls and altering the siting of Stage 0 and 1 composting. • There is uncertainty in relation to the effectiveness of some of the proposed odour controls. The interim facility will provide the Licence Holder and DWER with the opportunity to assess these controls during operation to inform future planning and FOGO assessments. • There is uncertainty in relation to the existing odour impact extent of the premises, however the Existing Licence requires the Licence Holder to undertake four Odour Field Assessments (OFAs) by 30 September 2021 to help address this data gap.	Condition 1 – FOGO waste acceptance specification and quantity Condition 4 – infrastructure and equipment requirements for Stage 1 hardstand and (including limited duration of approval for FOGO processing), leachate sump, biofilter and MAFs Condition 5 – waste processing requirements for FOGO Condition 27 – existing OFA requirements Conditions 44, 45 and 46 – construction requirements for Stage 1 hardstand and leachate sump

Risk Event				Consequence rating[1]	Likelihood rating[1]	Risk[1]	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities*	**Potential emissions**	**Potential receptors, pathway and impact**	**Applicant controls**					
	Leachate	Leachate generated during decomposition of FOGO waste discharging to surface water or infiltrating to groundwater. Potential deterioration of surface water and groundwater quality and impacts to freshwater and terrestrial ecosystems.	• Construction of clay lined hardstand and clay and HDPE lined leachate sump; • Hardstand graded to drain to leachate sump and surrounded by perimeter bunding to prevent stormwater discharge; and • Automatic pump in leachate sump to direct leachate to other leachate ponds on the premises.	Minor	Possible	Medium	The Licence Holder intends to capture and contain leachate generated at the Stage 1 location. However, there is the potential that an emission could still occur from leakage through a liner, breach of the perimeter hardstand bund or overtopping of the leachate sump. Groundwater in the vicinity of this infrastructure is expected to be contaminated by leachate from the unlined Class III cells, and may therefore be of lower quality than leachate from FOGO operations. Based on these factors, the Delegated Officer considers that there is a risk of low level onsite impacts and minimal offsite impacts to the environment. This risk event could occur at some time.	Condition 4 – infrastructure and equipment requirements for Stage 1 hardstand and leachate sump Condition 5 – waste processing requirements for FOGO Condition 6 – leachate management Conditions 44, 45 and 46 – construction requirements for Stage 1 hardstand and leachate sump Surface and groundwater monitoring requirements under MS 274
	Dust (including bioaerosols)	Air/windborne pathway causing impacts to health and amenity of closest sensitive receptors, residences approximately 920 m south-east and 1,130 m north-east and recreational users of John Forrest National Park, 290 m to the south of the Stage 1 Location.	• Siting of FOGO receipt further from receptors than Stage 2 location; and • FOGO composting to be conducted using MAFs which reduces the need to disturb the waste by turning.	Minor	Unlikely	Medium	The composting technique means the disturbance of waste is not required to maintain aerobic conditions. Based on this, the distance to receptors and the moist nature of FOGO waste, the Delegated Officer considers that there could be low level impacts to amenity and minimal health impacts. This risk event will probably not occur in most circumstances.	Condition 5 – waste processing requirements for FOGO
	Noise		• Siting of FOGO receipt further from receptors than Stage 2 location.	Slight	Unlikely	Low	The Delegated Officer considers that the noise emissions from composting on MAFs will cause minimal impacts to amenity. This risk event will probably not occur in most circumstances.	No additional controls
	Smoke from fire		• Prestart checks; • Electrical cables are tested and tagged; • Pathways clear for mobile plant; • Hot work permit required as necessary; and • No smoking or open flames in FOGO processing areas; and • Onsite water carts and fire extinguishers available to fight fire.	Minor	Unlikely	Medium	The Licence Holder's proposed controls are suitable to prevent and respond to a fire incident. The Delegated Officer considers that there could be low level impacts to amenity from a potential fire in the FOGO waste. This risk event will probably not occur in most circumstances.	Condition 5 – waste processing requirements for FOGO Conditions 15, 16 and 17 – existing fire controls on the licence
	Vectors/ vermin	Attraction and harbouring of pests which may act as vectors for pathogens, potentially causing health and amenity impacts to closest sensitive receptors.	• General site pest controls; and • Use of synthetic permeable membrane cover to limit pest access to FOGO waste.	Minor	Possible	Medium	The Licence Holder's proposed controls are suitable. The Delegated Officer considers that there could be low level impacts to amenity. This risk event could occur at some time.	No additional controls

Risk Event				Consequence rating[1]	Likelihood rating[1]	Risk[1]	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities*	**Potential emissions**	**Potential receptors, pathway and impact**	**Applicant controls**					
Screening and composting of FOGO at Stage 2 location Storage of final compost product at Stage 2 location Collection and storage of leachate.	Odour	Air/windborne pathway causing impacts to amenity of closest sensitive receptors, residences approximately 550 m east and 680 m north-west of Stage 2 location. Based on the prevailing wind direction and topography, the residential receptor to the east is most likely to be impacted.	• FOGO composting to be conducted using MAFs to prevent anaerobic conditions; • Odour complaint management protocol includes remedial actions to reduce odours where possible; • Corrective and contingency actions during strong winds, including odour monitoring at down-wind receptors in response to complaints and cessation of screening activities.	Moderate	Possible	Medium	FOGO waste which will be handled at the Stage 2 location presents a lower risk of odour emissions due to it having already undergone between three and six weeks of aerobic composting at the Stage 1 location. However, screening will disturb the waste and may encourage odour generation. Based on these factors, the Delegated Officer considers that there could be mid level impacts to amenity. This risk event could occur at some time.	Condition 1 – FOGO waste acceptance specification and quantity Condition 4 – existing infrastructure and equipment requirements for green waste processing hardstand and leachate pond Condition 5 – waste processing requirements for FOGO Condition 27 – existing OFA requirements
	Leachate	Leachate generated during decomposition of FOGO waste discharging to surface water or infiltrating to groundwater. Potential deterioration of surface water and groundwater quality and impacts to freshwater and terrestrial ecosystems.	• Use of existing clay lined hardstand and leachate pond; • Hardstand graded to drain to leachate pond and surrounded by perimeter bunding to prevent stormwater discharge; and • Operational controls in place (i.e. pumping to Class III leachate ponds) to maintain 500 mm freeboard and prevent overtopping of the leachate pond.	Minor	Unlikely	Medium	The proposed controls and conditions in the Existing Licence in relation to green waste processing are suitable. The Delegated Officer considers that there is a risk of low level onsite impacts and minimal offsite impacts to the environment. This risk event will probably not occur in most circumstances.	Condition 4 – existing infrastructure and equipment requirements for green waste processing hardstand and leachate pond Condition 5 – waste processing requirements for FOGO Condition 6 – existing leachate management Surface and groundwater monitoring requirements under MS 274
	Dust	Air/windborne pathway causing impacts to health and amenity of closest sensitive receptors, residences approximately 550 m east and 680 m north-west of Stage 2 location. Based on the prevailing wind direction and topography, the residential receptor to the east is most likely to be impacted.	• Corrective and contingency actions during strong winds, including cessation of screening activities.	Minor	Possible	Medium	Dust generation is most likely to occur during screening, when the waste is disturbed. Based on the distance to receptors and the moist nature of FOGO waste, the Delegated Officer considers that there could be low level impacts to amenity and minimal health impacts. This risk event could occur at some time.	Condition 4 –infrastructure and equipment requirements for trommel screener Condition 5 – waste processing requirements for FOGO
	Noise		• Operation of the trommel screen will be restricted to usual operation hours for the premises.	Minor	Possible	Medium	The Delegated Officer considers that the noise emissions from composting on MAFs and screening could cause low level impacts to amenity. This risk event could occur at some time.	Condition 4 – infrastructure and equipment controls for trommel screener
	Smoke from fire		• Prestart checks; • Electrical cables are tested and tagged; • Pathways clear for mobile plant; • Hot work permit required as necessary; and • No smoking or open flames in FOGO processing areas; and • Onsite water carts and fire extinguishers available to fight fire.	Minor	Unlikely	Medium	The Licence Holder's proposed controls are considered suitable to prevent and respond to a fire incident. The Delegated Officer considers that there could be low level impacts to amenity from a potential fire in the FOGO waste. This risk event will probably not occur in most circumstances.	Condition 5 – waste processing requirements for FOGO Conditions 15, 16 and 17 – existing fire controls on the licence
	Vectors/ vermin	Attraction and harbouring of pests which may act as vectors for pathogens, potentially causing health and amenity impacts to closest sensitive receptors.	• General site pest controls; and • Use of synthetic permeable membrane cover to limit pest access to FOGO waste.	Minor	Possible	Medium	The Licence Holder's proposed controls are suitable. The Delegated Officer considers that there could be low level impacts to amenity. This risk event could occur at some time.	Condition 5 – waste processing requirements for FOGO

Risk Event				Consequence rating[1]	Likelihood rating[1]	Risk[1]	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities*	**Potential emissions**	**Potential receptors, pathway and impact**	**Applicant controls**					
Storage of final compost product at temporary laydown area	Leachate	Leachate generated during decomposition of FOGO waste discharging to surface water or infiltrating to groundwater. Potential deterioration of surface water and groundwater quality and impacts to freshwater and terrestrial ecosystems.	• Final product will be sold as soon as possible; • Perimeter bunding to prevent stormwater ingress to hardstand pad; and • Discharge of stormwater/leachate from the south-eastern bank of the hardstand pad into the environment via existing stormwater structures.	Minor	Possible	Medium	Based on the infrastructure in place, the Delegated Officer considers that low level on-site impacts could occur. This risk event could occur at some time. In line with DWER's Guidance Statement: Risk Assessments this risk is acceptable, generally subject to regulatory controls. Details of additional controls were not provided in the application for this amendment, or as part of a request for information dated 30 March 2020. Therefore the Delegated Officer has determined that storage on the laydown area cannot be permitted in the absence of any control measures. Should the applicant provide information regarding additional controls the storage on the laydown pad may be reviewed.	Condition 5 – waste processing requirements for FOGO (final compost product storage is not allowed on the temporary laydown area)
Sale of final compost product to public	Contamination or poor quality of products	Private and commercial compost users becoming exposed to contaminants (e.g. pathogens and metals) in poor quality products. Discharge of contaminants to land by application of poor quality products.	• Community education program for members of the public providing FOGO waste stream; • Two phase screening pre- and post-Stage 2 to remove residual physical contaminants; • Compliance with AS 4454; and • Irrigation of Stage 2 compost with stormwater, not leachate.	Moderate	Possible	Medium	FOGO wastes commonly contain chemical, physical and biological contaminants and generally present a higher risk of contamination than composts produced from pure green waste. The Licence Holder has proposed suitable controls to remove physical contamination from the final product and intends to produce a compost product which complies with AS 4454. Based on these factors, the Delegated Officer considers that there could be low level health impacts or minimal impacts to the environment at the wider scale. This risk event could occur at some time. This risk could be further reduced through appropriate quality sampling and analysis of final compost products. Conditions in the licence will be added to specify product sampling, analysis and specification requirements to achieve compliance with maximum contaminant levels in AS 4454.	Condition 1 – FOGO waste acceptance specification and quantity Condition 5 – waste processing requirements for FOGO Conditions 20, 21 and 22 – product specifications Conditions 30 and 31 – product sampling and analysis
Operation of landfill gas flare	Point source air emissions	Air/windborne pathway causing impacts to health and amenity of closest sensitive receptors, residence approximately 870 m north-east of the flare, recreational users of John Forrest National Park 740 m south of the flare and workers at the Marvel Loch Mine 1,250 m west of the flare.	• Low overall operation time of 0.01% or less; • Installed to treat existing landfill gas emissions by combustion inside the flare; • Designed to achieved destruction efficiency of 98%; • Minimum combustion temperature of 760ºC when gas flow rates are at least 100 m^3/hour; • 8 m high emissions stack; and • Monitoring and maintenance.	Minor	Unlikely	Medium	The net effect of installing an efficient and appropriately designed flare should be to reduce air emissions from the premises and associated human health and environmental risks. However, there are some air pollutants which form in landfill gas flares and may present a risk to the environment and human health. The Delegated Officer considers there is a low level risk to the environment and minimal risk to human health. This risk event will probably not occur in most circumstances. As there is limited information currently available about the potential air emissions concentrations and flow rates, validation monitoring will be required post-installation to verify that the performance standards outlined in LMS (2014) are met..	Condition 4 – infrastructure and equipment requirements for landfill gas flare system Conditions 33 and 34 – verification monitoring and reporting requirements for landfill gas flare emissions Condition 44 – installation requirements for landfill gas flare system
	Odour		• Low overall operation time of 0.01% or less; • Installed to treat existing landfill gas emissions by combustion inside the flare; • Designed to achieved destruction efficiency of 98%; • Minimum combustion temperature of 760ºC when gas flow rates are at least 100 m^3/hour; • 8 m high emissions stack; and • Monitoring and maintenance.	Slight	Unlikely	Low	The net effect of installing an efficient and appropriately designed flare should be to reduce odour emissions from the premises. However, there are some odorous compounds which form in landfill gas flares which may present a risk to amenity. On balance of these factors, the Delegated Officer considers that there will be minimal impacts to amenity and this risk event will probably not occur in most circumstances.	Condition 4 – infrastructure and equipment requirements for landfill gas flare system Condition 44 – installation requirements for landfill gas flare system

Risk Event				Consequence rating[1]	Likelihood rating[1]	Risk[1]	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities*	**Potential emissions**	**Potential receptors, pathway and impact**	**Applicant controls**					
	Noise		• Low overall operation time of 0.01% or less; and • Flare design and insulation specifications.	Moderate	Possible	Medium	The level of noise emissions from the potential installation of three flares is uncertain. The manufacturer LMS claims that the flares are capable of achieving low noise levels. However, there are a number of noise sources at the premises and the flare will add to the cumulative noise impact to receptors. Based on the potential installation of three flares, the Delegated Officer considers that there could be mid-level impacts to amenity. This risk event could occur at some time. Based on the uncertain potential cumulative noise impacts, the Revised Licence includes conditions requiring an Environmental Noise Assessment to be undertaken after installation of the third landfill gas flare. If only one flare were to be installed, the Delegated Officer considers that there could be low-level impacts to amenity and the risk event would probably not occur in most circumstances. In these circumstances, an Environmental Noise Assessment would not be required.	Conditions 35, 36, 37 and 38 – Environmental Noise Assessment Condition 44 – installation requirements for landfill gas flare system Compliance with the Noise Regulations
	Smoke from fire/explosion		• 10 metre exclusion zone around each stack; • In built fire and explosion prevention measures within flare; and • Remote monitoring and alarm functionality.	Major	Unlikely	Medium	The controls proposed by the Licence Holder are suitable to mitigate the risk of fire. If a fire or explosion occurred at the landfill gas flare system, it would be likely to spread into the surrounding vegetation and could develop into a bushfire. The Delegated Officer considers that the potential smoke emissions could cause high level impacts to amenity. Based on the design of the landfill gas flare system, this risk event will probably not occur in most circumstances.	Condition 4 – infrastructure and equipment requirements for landfill gas flare system Condition 44 – installation requirements for landfill gas flare system
	Condensate	Condensate will be collected within the flare and require appropriate management. If discharged outside of containment infrastructure, condensate could cause soil contamination, impact surface water or infiltrate to groundwater. Potential deterioration of surface water and groundwater quality and impacts to freshwater and terrestrial ecosystems.	• Condensate collection within flare and disposal to onsite leachate ponds.	Slight	Unlikely	Low	The proposed containment and disposal methods for landfill condensate which accumulates in the flares are appropriate. The Delegated Officer considers that a spill of condensate would cause minimal onsite impacts. This risk event will probably not occur in most circumstances.	Condition 4 – infrastructure and equipment requirements for landfill gas flare system

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Department's Guidance Statement: Risk Assessments (February 2017)

9. Consultation

Table 12: Summary of consultation

Method	Comments received	DWER response
Application advertised on DWER website (27/4/2020)	None received	N/A
DoH advised of proposal (1/5/2020)	The DoH replied on 13/5/2020 confirming that they had no objection to the proposed amendments, providing the operations are in accordance to submitted management plans.	None required.
DMIRS advised of proposal (1/5/2020)	The Building and Energy Division of DMIRS replied on 18/5/2020 to provide comment on the relevance of the *Gas Standards Act 1972* (GS Act) to the landfill gas flare system. They confirmed that the Building and Energy Division does not have an approval role for such an installation as proposed. The GS Act applies to cases where gas is supplied and that gas meets the gas quality specifications necessary to meet gas related safety standards. As the proposed installation is in relation to biogas the installation does not need to conform to the GS Act. By and large biogas cannot comply with the current regulations: *Gas Standards (Gasfitting and Consumer Gas Installations) Regulations 1999* and *Gas Standards (Gas Supply and System Safety) 2000*. The *Gas Standards (Gasfitting and Consumer Gas Installations) Regulations 1999* regulate appliance approvals and consumer installations. Conventional appliance would not be approved for use on biogas that potentially have varying but generally lower Wobbe indices compared to Natural Gas, high moist content and corrosive compounds. The *Gas Standards (Gas Supply and System Safety) Regulations 2000* include gas quality specifications such as: odorant requirements, maximum limits of Sulphur and the standards for general purpose Natural Gas (AS4564 Specification for general purpose natural gas). AS4564 sets other parameters including Wobbe ranges. Biogas cannot generally meet AS4564 unless it is extensively processed. DWER should ensure an engineering assessment of the installation design has been carried out and that appropriately qualified gas fitters are employed to carry out the installation.	The landfill gas flare will be supplied by LMS Energy and is purpose designed and built for combustion of landfill biogas. The Delegated Officer is therefore satisfied that the proposed flare is suitable for the intended purpose. The Revised Licence has been amended to require that the installation of the landfill gas flares is conducted by a mechanical engineer and qualified gas fitter with at least three years undertaking or supervising the installation of landfill gas flares.

Method	Comments received	DWER response
Local Government Authority advised of proposal (1/5/2020)	The City of Swan replied on 6/5/2020 confirming that as per section 6 of the *Planning and Development Act 2005* no Development Approval from the City of Swan is required as these are Public Works which are in line with the purpose and intent of the City's planning scheme that has effect. The City recommended conditions regarding stormwater disposal and odour nuisances be placed on the operation, which can be readily enforced, should it be appropriate in those circumstances where surrounding properties are unreasonably affected. Possible Conditions: 1. An Environmental Management Plan is to be prepared by a suitably qualified consultant addressing odour emissions, to demonstrate compliance with the *Environmental Protection Act 1986* and which can quantify: • odour monitoring parameters needing to be implemented & actions required to address breaches; • exhaust ventilation requirements & mechanical treatment & filtration of exhaust emissions required; • whether the operation will pose an odour problem to surrounding neighbours & to what extent; & • what industry proven solutions can be implemented to mitigate odour emissions, where likely, to ensure neighbours are not unreasonably affected. 2. All stormwater must be contained and disposed of on-site at all times.	**Odour management** The Existing Licence requires the Licence Holder to undertake four odour field assessments (OFAs) by 30 September 2021. The Delegated Officer considers that the outcomes of the OFAs are required to inform the next steps in odour management at the premises. If the results of the OFAs provide evidence that current operations at the premises are causing unreasonable odour emissions, DWER will determine appropriate improvement measures. The Delegated Officer considers that it would be premature to require an Environmental Management Plan to address odour emissions before the OFAs have been completed. This Amendment Report summarises DWER's assessment of the odour risk from the interim FOGO facility and flare installation. It also outlines the odour control measures proposed by the Licence Holder for these activities. **Stormwater** The current regulatory approach to stormwater management is risk-based. The Existing Licence includes a number of conditions in relation to stormwater management. The intent of these conditions is to i) prevent stormwater from entering active areas and becoming contaminated by waste materials, ii) contain stormwater which has become contaminated by waste or vehicle wash down activities and iii) permit appropriate reuse of 'clean' stormwater. Stormwater management requirements are also specified in the commitments in MS 274 and MS 462. In particular, the Ministerial Statements specify limitations on stormwater discharge to the environment.

Method	Comments received	DWER response
		It is not likely to be feasible for the Licence Holder to contain and dispose of all stormwater on the premises, especially during the winter period. The Delegated Officer considers that the current risk-based approach provides a suitable level of regulatory control and if stormwater is managed in compliance with the Existing Licence and Ministerial Statements, potential risks to the environment and human health will be mitigated.
Local resident listed as Direct Interest Stakeholder in DWER Industry Licensing System	No comments received	N/A
Applicant referred draft documents (2/6/2020)	Detailed comments received – refer to Appendix 3.	Refer to Appendix 3.

10. Decision

Based on the assessment in this Amendment Report, the Delegated Officer has determined that a licence amendment will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

As discussed in Sections 5.1.1 and 8, the Delegated Officer considers that there is the potential for high risk odour emissions from the premises from the interim FOGO facility. One of the main regulatory controls which addresses this risk event is the requirement for four OFAs to be conducted at the premises. This control is on the Existing Licence and its intent is to provide an objective assessment of current odour impacts and sources at the premises and verify the risk assessment presented in the March 2020 Amendment Report and this Amendment Report.

Based on the findings of the OFAs, the Licence Holder may choose to prepare an odour improvement plan for the premises. Following submission of the four OFA reports, DWER will assess whether they provide evidence that current operations at the premises are causing unreasonable odour emissions. Based on this assessment, DWER may require the Licence Holder to implement odour improvement measures. An appropriate licensing pathway to implement potential improvements will be determined by DWER at the relevant time.

The steps above will ensure that the odour impacts of the premises (existing and following this amendment) are investigated in accordance with the *Guideline: Odour emissions*. The outcome of these assessments can then be used to inform the Licence Holder's future odour management decisions and DWER's future regulation of odour emissions and sources at the premises.

10.1. Summary of amendments

Table 13 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 13: Licence amendments

Condition No.	Proposed amendments
1	Waste acceptance table amended to include FOGO as accepted waste type with up to 10,000 tonnes accepted per annual period. Reduction of green waste acceptance from 50,000 tonnes to 40,000 tonnes per annual period to accommodate FOGO within the Category 67A production capacity.
4	Infrastructure and equipment table amended to include requirements for: - Stage 1 FOGO hardstand (FOGO processing permitted at this location until 31 December 2022); - Stage 1 FOGO leachate sump; - green waste processing hardstand (FOGO processing permitted at this location until 31 December 2022); - compost trommel screener; - mobile aerated floors; - biofilter; and - landfill gas flares.

Condition No.	Proposed amendments
5	Waste processing table amended to include: - Green waste windrow requirements previously listed in the definitions moved to this table, separation distance reduced from 5 m to 4.5 as requested by the Licence Holder. - New FOGO waste processing requirements including: • Receipt, handling and storage requirements for FOGO, including the approved delivery location, outlining the processing phases (Stage 1 and 2), requirements for FOGO waste to be stored on MAFs, windrow dimensions and separation distances. • Composting requirements for FOGO including requirements to maintain in an aerobic state by aeration from the MAFs, be kept damp and irrigated with specified water sources. • Requirement for residual physical contaminants removed from compost during screening to be disposed to the Class III landfill cells within 24 hours of separation from compost.
6	Leachate and wastewater management requirements added for the Stage 1 FOGO hardstand and leachate sump. Leachate from these sources is suitable for transfer to other leachate ponds or reuse during Stage 0 and Stage 1 composting.
20	New condition requiring that composting products produced from FOGO waste achieve pasteurization as defined in AS 4454. The Licence Holder's proposed composting method will not meet the specific pasteurization requirements of Section 3.2.1 (b) in As 4454 for higher risk materials. However, based on their proposed method, the Delegated Officer considers that the requirements of Section 3.2.1 (c) in As 4454 should be achievable, subject to appropriate pathogen and plant propagule testing.
21	New condition requiring that composting products produced from FOGO waste meet the maximum chemical, physical and biological contaminant concentrations from AS 4454.
22	New condition requiring that composting products produced from FOGO waste remain on the premises until monitoring results verify compliance with condition 21.
30 and 31	New conditions outlining monitoring requirements during composting and for final composting products produced from FOGO waste. Temperature monitoring is required during composting to assist in the documentation of pasteurization processes. The quantity of composting products and quality of composting products is required to verify compliance with condition 21 and the Category 67A throughput.
32	New condition outlining ongoing landfill gas flare monitoring. Monitoring of the duration of flaring and cumulative flow volumes is required to verify the assumptions in this risk assessment and inform future assessments relating to the flare and power generation plant.
33 and 34	New conditions outlining verification monitoring for the first landfill gas flare to be installed and associated reporting requirements. The required monitoring parameters capture four common emissions from landfill gas flares. The stack temperature monitoring will be used to verify that the minimum combustion temperature of 760ºC, as indicated by LMS, is achieved.
35, 36, 37 and 38	New conditions requiring Environmental Noise Assessment and associated reporting requirements. These conditions will only apply if three landfill gas flares are installed on the premises.
39	Annual Environmental Report requirements amended to include: - summary of composting product quality monitoring; and - summary of landfill gas flare operations.

Condition No.	Proposed amendments
42	Books requirements amended to include: - biofilter process monitoring results; - composting product monitoring results; - landfill gas flare monitoring results; and - noise validation monitoring results.
44 and 45	New conditions outlining the requirements for works to be carried out in relation to new infrastructure and equipment on the premises. These include the Stage 1 FOGO hardstand, Stage 1 FOGO leachate sump, biofilter, MAFs and landfill gas flare system.
46	New condition outlining the quality assurance requirements for the Stage 1 FOGO hardstand and leachate sump liners.
47 and 48	New conditions outlining the requirements for the Environmental Compliance Report to be submitted following the completion of works.
Definitions	Updated to include definitions for the following: - standards and methods referenced in conditions in the licence; - composting products; - suitably qualified persons for certification as required in condition 47; - Environmental Compliance Report; - FOGO; - HDPE; - MPN (most probable number); and - Residual physical contaminants. Definition of windrows removed and detail relocated to waste processing table in condition 5.
Figure 2 in Schedule 1	Updated to show the following additional features: - landfill gas flare system; and - Stage 1 FOGO hardstand and leachate sump.
Figure 4 in Schedule 1	Added to show the approved layout of Stage 1 FOGO infrastructure.
Figure 5 in Schedule 1	Added to show the approved layout of the landfill gas flare system.

Melissa Chamberlain
A/MANAGER WASTE INDUSTRIES
REGULATORY SERVICES

An officer delegated by the CEO under section 20 of the EP Act

Appendix 1: Key documents

	Document title	In text ref	Availability
1	Licence L8889/2015/1 Red Hill Waste Management Facility	L8889/2015/1	accessed at www.dwer.wa.gov.au
2	Ministerial Statements 274, 476, 962, 1092 and 1122	MS 274 MS 462 MS 976 MS 1092 MS 1122	accessed at www.epa.wa.gov.au/
3	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	DER 2015a	accessed at www.dwer.wa.gov.au
4	DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.	DER 2015b	
5	DER, November 2016. *Guidance Statement: Environmental Siting.* Department of Environment Regulation, Perth.	DER 2016	
6	DER, February 2017. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	DER 2017	
7	DWER, June 2019. *Guidance Statement: Decision Making*. Department of Water and Environmental Regulation, Perth.	DWER 2019a	
8	DWER, June 2019. *Guideline: Odour Emissions.* Department of Environmental Regulation, Perth.	DWER 2019b	
9	DWER, October 2019. Draft *Guideline: Air Emissions.* Department of Water and Environmental Regulation, Perth.	DWER 2019c	
10	Australian Organic, 2019. *Australian Certified Organic Standard 2019 version 1.*	Australian Organic 2019	accessed at https://aco.net.au
11	BOM, 2016. *Design Rainfall Data System.* Bureau of Meteorology, Australia.	BOM 2016	accessed at www.bom.wa.gov.au
12	BOM, 2020. *Climate Data Online – Perth Airport 009021.* Bureau of Meteorology, Australia.	BOM 2020	
13	Crisalis, 2014. *Detailed Site Investigation Red Hill Waste Management Facility Lot 1 & Lot 11 Former Landfill.*	Crisalis 2014	DWER records (A810811)
14	EMRC, 1996. *Red Hill Landfill Facility*	EMRC 1996	DWER records

	Document title	In text ref	Availability
	– Toodyay Road, Red Hill.		(DWERDT271534 -page 352)
15	EPA Victoria, 2015. *Siting, design, operation and rehabilitation of landfills.* Environmental Protection Authority Victoria, Melbourne.	EPA Victoria 2015	accessed at www.epa.vic.gov.au
16	EPA Victoria, 2020. *Industry Guidance: Biofilter design and management.* Environmental Protection Authority Victoria, Melbourne.	EPA Victoria 2020	
17	Fletcher, LA, Jones, N, Warren, L and Stentiford, EI, 2014. *Understanding biofilter performance and determining emission concentrations under operational conditions.* Project Number ER36.	Fletcher *et al.* 2014	accessed at www.organics-recycling.org.uk
18	NSW EPA, 2016. *Environmental guidelines – solid waste landfills*. New South Wales Environment Protection Authority, Sydney.	NSW EPA 2016a	accessed at www.epa.nsw.gov.au
19	NSW EPA, 2016. *Approved methods for the modelling and assessment of air pollutants in New South Wales*. New South Wales Environment Protection Authority, Sydney.	NSW EPA 2016b	
20	SA EPA, 2019. *Environmental management of landfill facilities.* South Australian Environment Protection Authority, Adelaide.	SA EPA 2019	accessed at www.epa.sa.gov.au
21	United Kingdom Environment Agency, 2002. *Guidance on Landfill Gas Flaring,* Bristol.	UK Environment Agency 2002	accessed at www.sepa.org.uk

Appendix 2: Biogas flare specifications

LMS BIOGAS FLARE Specifications

MODEL	LMS 7000 Series Landfill Biogas Flare
FLOW CAPACITY	Multi Stage – 50m³/hour – 1,000m³/hour (20:1 turndown)
COMPLIANCE	Clean Energy Regulator (carbon credit generation) AS/NZS 5601 (Type B Gas Device) AS/NZS 2430.3.1:2004 (Hazardous zoning) AS60079 IECEx (electrical equipment) AS/NZS 3000:2018 (wiring) EPA (>98% destruction efficiency)
COMBUSTION	Retention inspirators Combustible methane range 20% to 95% by volume Maximum energy combustion 18,000MJ/hour Combustion Temperature >760 C
FLUE STACK	Insulated stainless steel (7 metres)
TRANSPORT	Modularised on a 6 m shipping container platform
INSTALLATION	Less than 1 Day
MONITORING	Continuous with automated alarms and shut down Remote access for data and systems control and restarting Automated data to cloud
GAS FEED	Centrifugal blower incorporating variable speed drive control 1,000m³/hour maximum delivery (dependent gas quality and volume available) Maximum suction pressure, minimum discharge pressure combined 15kPa Methane analyser with built in alarms In line gas flow meter
FILTRATION	Stainless steel liquid knock out pot fitted with stainless steel demister pads and pre-gas entry filter.
POWER SUPPLY	415v3 phase
SAFETY ENGINEERING	Hazardous Area Dossier Automated slam shut and manual isolation valves Flame detection incorporating auto shut down Remote PLC automation Flame arrestor 3 mm (min) stainless steel pipe work Gas isolation valves In line pressure gauges Condensate level indicator Flash back temperature sensor Self-contained and lockable Filter in intake manifold Lockable electrical control panel/cabinet Refractory lined combustion chamber
DIMENSIONS	Length – 6 metres Width – 2.4 metres Total height at stack – 8 metres

LMS ENERGY Pty Ltd
79 King William Rd, Unley SA 5061
T +61 (08) 8291 9000
www.lms.com.au info@lms.com.au

© Copyright LMS 2020

Appendix 3: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amendment Report on 2 June 2020 for review and comment. The Licence Holder responded on 15 June 2020 waiving the remaining comment period (until 23 June 2020). The following comments were received on the draft Licence and Amendment Report.

Condition	Summary of Licence Holder comment	DWER response
Condition 4, Table 2 Approved timeframe for FOGO processing at the Stage 1 FOGO hardstand and green waste processing hardstand	The EMRC requests the statement relating to the storage and processing of FOGO waste at the Stage 1 FOGO hardstand and green waste processing hardstand on page 7 and page 8, "Storage and processing of FOGO waste at this location is permitted until 31 December 2021" be amended to 31 December 2022. This would provide an appropriate buffer to accommodate any potential delays associated with the current situation of COVID19 and the EMRC's current application with the EPA requesting a change to Ministerial Statement 274 under s.45C of the *Environmental Protection Act 1986* to increase the Site's authorised extent to incorporate the proposed development of a permanent FOGO processing facility and liquid waste management facility within Lots 9 and 10. It could be extremely detrimental if there are delays in the EPA approval process, resulting in a gap where the EMRC would be unable to accept and process FOGO waste from the rest of its member Councils and other potential customers.	The Delegated Officer reviewed the risk assessment to consider the potential risks from an additional year of interim FOGO facility operations. The risk ratings for the risk events associated with this activity did not change as a result of this review and therefore the proposed timeframe extension is considered acceptable. The condition has been edited to approve interim FOGO operations until 31 December 2022.
Condition 4, Table 2 Stage 1 FOGO leachate sump	The EMRC requests the statement requiring 'weekly inspection by site personnel to assess and record compliance with the freeboard requirement' be changed to similar wording as that applied to the greenwaste leachate ponds where 'the leachate levels in all ponds are monitored daily and a 500mm freeboard maintained at all times'. The requirement to record this data is onerous, administrative and serves no purpose. Infrastructure will be in place to ensure that any excess leachate will automatically be pumped to landfill leachate evaporation ponds which negates the need to record compliance with the freeboard requirement as the freeboard will automatically be maintained at the required levels.	The Delegated Officer determined that the requirement to record compliance with the 500 mm freeboard on a weekly basis can be removed. The condition has been edited to require weekly checks of freeboard but because the sump will have an automatic pump there is no need for the results of these checks to be recorded.

Condition	Summary of Licence Holder comment	DWER response
Condition 4, Table 2 Compost trommel screener	The EMRC requests the requirement for FOGO and Greenwaste to be wetted down before screening to be amended to include 'when required to minimise dust generation' or' 'when the compost is extremely dry to minimise dust generation'. Dust generation during screening is a function of moisture content. Under normal circumstances it is not necessary, but in extremely dry compost it is worth wetting it down with process water and/or ODOROV solution or equivalent which also acts as a coagulant and reduces very fine dust particles.	The condition has been edited to remove the requirement for FOGO and green waste to be wetted down before screening. The Delegated Officer has replaced this with the requirement for FOGO and green waste to be damp before screening. This wording is more readily enforceable than that proposed by the Licence Holder but allows more flexibility than the original wording in the draft licence.
Condition 4, Table 2 Landfill gas flares	The EMRC has sought advice from a gas flare provider who are likely to install the gas flares at the Red Hill Waste Management Facility and their advice is that provided there are gas flows greater than 100 m^3/h, the flare will achieve a minimum 760 degrees C. The EMRC therefore requests that this condition is amended to reflect this qualification.	The condition has been edited to include the qualification that the minimum combustion temperature of 760ºC is only relevant when gas flow rates are at least 100 m^3/hour.
Condition 4, Table 2 Biofilter	The EMRC requests reference to "woodchip and bark" be changed to "woodchip and bark or mulch and compost".	Compost and mulch can be suitable biofilter treatment media, especially because of their moisture holding capacity, nutrient capacity and microbial content. The condition has been edited to allow Composting Products (as defined in the licence) to be used for up to 50% of the treatment bed. This will allow compost and mulch produced from composting of green waste and FOGO at the premises to be used in the treatment bed. The Delegated Officer determined to cap the proportion of Composting Products to be used because having at least 50% of the treatment bed comprised of woodchips and bark should help maintain porosity to promote adequate airflow through the treatment bed.

Condition	Summary of Licence Holder comment	DWER response
Condition 4, Table 2 Biofilter	We also query the need for the cover over the biofilter to be waterproof and shade cover". We propose to install a shade cover initially and with the proposed monitoring of the biofilter as per Table 2. We will review the need for a waterproof cover after 6 months operation.	This control was set based on the Licence Holder's proposal as set out in the Application Form. The Delegated Officer has determined to remove the requirement for the cover to be waterproof. A shade cover should provide some level of protection from heavy rain events. It will be the Licence Holder's responsibility to ensure the treatment bed does not become saturated due to rainfall, to achieve compliance with the 45% to 65% moisture content requirement in this condition.
Condition 4, Table 2 Biofilter	The EMRC requests the statement 'Process settings are adjusted to maintain air intake temperature between 25ºC and 40ºC and relative humidity of at least 85% be amended to 10ºC and 40°C with a minimum relative humidity of 70%. The rationale behind this is that during winter, water will condense in the air supply pipe resulting in the temperature potentially being lower than 10ºC. Please note that this is not a composting stage but a receival & MAF loading stage when high compost temperatures are not prevalent.	The minimum relative humidity in the air intake to the biofilter will not be reduced as it is required to achieve effective biofilter performance and odour treatment. Lower relative humidity levels are likely to start compromising the performance of the biofilter by impacting on the living conditions of the bacterial population. If the Licence Holder thinks the relative humidity requirement will not be achieved by the current biofilter design, they should consider improvements such as adding a humidifier to the biofilter intake. To change this relative humidity requirement in the future, the Licence Holder would need to submit a licence amendment application and provide evidence that lower relative humidity levels will not compromise biofilter performance. The proposed air intake temperature range of 10ºC and 40°C is acceptable. Although the biofilter is likely to perform better within the original temperature range of 25ºC and 40°C, previous studies have shown that lower temperatures can still maintain viable biofilter bacterial populations (Fletcher *et al.*, 2014). The Delegated Officer has determined to allow the proposed edit as it provides some flexibility to the Licence Holder and takes into consideration seasonal effects on biofilter operation.

Condition	Summary of Licence Holder comment	DWER response
Condition 5, Table 3 Green waste windrow separation distances	The EMRC requests the requirement to separate the windrows of greenwaste by at least 5 metres of clear ground from any other row or from any other combustible waste is amended to 4.5 metres. The area dedicated to windrows may not be able to accommodate the anticipated volumes of FOGO waste if there is insufficient demand, resulting in a backlog of product to be stored. This still allows vehicular movement between windrows and given the ongoing temperature monitoring, the likelihood of a fire resulting from the windrows is low and if this were to happen, there are appropriate measures in place to supress this from spreading, such as water tanks, water cart with fire hose and sprays.	The condition has been edited to reduce the required separation distance from 5 m to 4.5 m. This reduced distance is considered to provide a sufficient control to mitigate and prevent the risk of fires by ensuring separation between windows and vehicle access in the event of a fire.
Condition 5, Table 3 FOGO waste separation distances	The EMRC requests the statement 'Windrows are no more than 5 metres high, 10 metres wide and 25 metres long' be changed to 'Windrows are no more than 5 metres high, 16 metres wide and 30 metres long'. The FABCOM MAF FOGO Piles have a maximum footprint of 16m x 30m and 3.5m high (we can commit to no higher than 5m).	The condition has been edited to allow a longer windrow length of 30 m and wider width of 16 m. In combination with the other controls in the licence, these dimensions are considered to provide a sufficient control to mitigate and prevent the risk of fires in FOGO windrows.
Condition 5, Table 3 FOGO waste separation distances	The EMRC requests the word 'within' be changed to 'between' in the dot point 'Windrows within each mobile aerated floor are separated by at least 1 metre of clear ground and windrows are separated from other combustible materials by at least 5 metres of clear ground.'	After being provided with clarification about the meaning of this condition during a phone conversation on 17 June 2020, the Licence Holder agreed that no change to the wording was required.

Condition	Summary of Licence Holder comment	DWER response
Condition 20 Composting product quality – pasteurization	The EMRC requests the requirement to achieve pasteurization as defined in AS4454, be changed to include and/or Organic Certification.	Section 4.3.10.1 of the *Australian Certified Organic Standard 2019 version 1* (https://aco.net.au/downloads/ACOS_2017_V1.pdf) states that 'Physical turning combined with appropriate moisture application shall ensure over the period of time of composting that the compost process effectively completes its cycle, ultimately aiming for the specifications set out in AS 4454-2012.' The Delegated Officer considers that adding reference to the Organic Certification in this condition would duplicate the existing requirement to achieve pasteurization as defined in AS 4454. Therefore, no edits have been made to this condition.
Condition 22 Composting product quality – timing of analysis	The EMRC requests that this condition be amended to enable the end user to purchase product prior to monitoring results being received. In this scenario, the EMRC would declare that the product has not yet been certified to be compliant with AS4454 and it is up to the end user to decide on whether to purchase the product or not. This is what currently occurs when results for mulch products are tested and do not necessarily meet all of the AS4454 criteria. The purchaser is informed and is able to purchase the product with this knowledge in mind.	The Delegated Officer has considered the comments on Conditions 22, 31 and 39 together because they all relate to how DWER regulates compost products produced at Category 67A premises. The use of contaminated composting products has the potential to cause environmental and human health impacts. Furthermore, if compost produced on a premises has not been pasteurised and does not meet a suitable end-use standard, it may still be considered a waste. The discharge of waste to land meets the definition of an emission under the EP Act.
Condition 31, Table 9 Composting product quality monitoring	With Table 9 and the compost product monitoring, the EMRC queries why these parameters are incorporated in the licence.	

Condition 39 Records and reporting – Composting product monitoring summary	With Table 12, the EMRC requests this condition is removed from the reporting requirements as it is of a commercial nature and irrelevant to the site licence. As long as emissions and leachate monitoring requirements are met, the product quality is not something that should be regulated by DWER. Does the Department require such details from other composting operations in WA that may or may not meet AS 4454 product quality?	DWER regulates final compost product quality by setting requirements for pasteurization and specifications for physical, chemical and biological contamination. Suitable regulatory controls for composting products, such as product specifications, testing and reporting, from Category 67A premises are determined on a case by case basis. This process takes into account factors such as feedstock types, contamination risk, composting processes and product end use. Similar controls to those in the Revised Licence are in place on other Category 67A licences issued by DWER. FOGO waste has a high likelihood of contamination and comprises a diverse range of organic wastes. DWER's risk assessment for the use of the finished compost product was based on it complying with the specifications in AS 4454, as indicated in the amendment application. The Delegated Officer considers that the licence conditions setting product quality specifications (20, 21 and 22) and testing requirements (30 and 31) are necessary to mitigate and prevent potential risks from the use of composting products derived from FOGO waste. The reporting condition (39) will allow DWER to monitor the Licence Holder's compliance with these requirements. If the Licence Holder proposes to produce FOGO compost products to achieve an alternative specification than that outlined in AS 4454, they will need to apply for a licence amendment to have this specification assessed and approved by DWER. The off-site sale or distribution of FOGO compost which does not meet the product quality specifications in Conditions 20, 21 and 22 of the Revised Licence would be considered a licence non-compliance, even if the purchaser/receiver was prior informed. No edits to Conditions 22, 31 or 39 have been made as a result of the Licence Holder's comments.

Condition	Summary of Licence Holder comment	DWER response
Condition 33 Landfill gas flare monitoring	The EMRC requests that the requirement to retain the services of a person qualified in the areas of emissions monitoring by 31 August 2020 and submission of a report by 30 September 2020 be amended with the removal of the hard date and left open to enable flexibility for the timing of the gas flare installation or alternatively changed to 31 December 2020.	The Delegated Officer has determined to edit the condition to have the verification monitoring conducted within 60 days of the first landfill gas flare being installed. An additional 60 day period has been allowed for the preparation of the report.
Condition 45 Landfill gas flare specification	The EMRC requests that the reference to the installation of LMS 7000 Series Landfill Biogas Flares in Table 13 be amended to enable flexibility and add the words 'or equivalent'. This enables the EMRC to choose a flare that is fit for purpose based on availability, costing, specification, applicability and other variables to the project.	DWER's risk assessment for emissions from the landfill gas flares was based on the specifications provided for the 7000 Series Landfill Biogas Flare, for example its destruction efficiency, noise emissions and safety features. Condition 45 of the Revised Licence allows departures from the works approved in Condition 44, where the departure does not increase risks to public health, public amenity or the environment and all other conditions in the licence are still satisfied. If the Licence Holder wishes to install a different flare model to that specified by Condition 44, they should seek advice from DWER as to whether the proposed flare meets the requirements in Condition 45. DWER can then review the specifications of the proposed flare to determine whether it would increase risks to public health, public amenity or the environment. No edits to this condition have been made in response to the Licence Holder's comments.

Condition	Summary of Licence Holder comment	DWER response
N/A Section 2.3.1 in the Amendment Report Proposed activities	DWER requested: 'Licence Holder to confirm that the descriptions in Table 4 and Table 5 are correct and this level of detail is appropriate to be in a publicly available document. These were based on the descriptions provided in the Application Form and 'Description of MAF Process for System 1 and System 2' document. The Desktop OIA and 'FABCOM MAF Odour Emissions, Controls and Contingency Actions 2' provided a different description of the timeline and stages of FOGO processing and for clarity these have been excluded from this Amendment Report.' With reference to the bolded statement below in the Amendment Report, the EMRC confirms Table 4 and Table 5 are correct, however the information in the tables is not appropriate to be in a publicly available document. The EMRC requires Tables 4 and 5 of the Amendment Report to be left out and not be made available to the public because it is the intellectual property of the contractor and presents a commercial risk with competitors. In addition, it could be misinterpreted by project critics who may also look for noncompliance issues with reference to the tables. The licence is held with DWER who has access to the information for the assessment purposes and should not be divulged to the public. In relation to the comment that there is a different description of the timeline and stages of FOGO processing, please refer to Table 4 and 5 [in the attached annotated Amendment Report] for the latest and correct information as the project has since evolved.	The Delegated Officer is satisfied with this response and has amended the level of detail provided in Section 2.3.1 accordingly. The amendments to Table 4 proposed by the Licence Holder were minor in nature and did not affect the outcome of DWER's assessment.
N/A Section 2.3.1 in the Amendment Report Proposed activities	The Licence Holder also suggested other minor rewording of the process description in this section.	Proposed rewordings were considered by the Delegated Officer and generally adopted to provide additional context to the process description.

Condition	Summary of Licence Holder comment	DWER response
N/A Section 2.3.2 in the Amendment Report Equipment and infrastructure	The Licence Holder requested that the following text be added to Key Finding (2) 'The function is designed to mitigate odour emission, in comparison to positive aeration, where air is immediately passed through the material and emitted, carrying odour compounds from the fresh FOGO waste. It is not designed nor claimed to be equivalent to negatively pressured shed.' The Licence Holder also suggested other minor rewording of the key findings in this section.	The Delegated Officer has determined not to change the wording of Key Finding (2) because discussion of positive aeration and comparison to a negatively pressured shed is not considered relevant to DWER's assessment. Other proposed minor rewordings were adopted if they were considered consistent with the Delegated Officer's findings.