

# **Works Approval**

# Environmental Protection Act 1986, Part V

# Works Approval Holder: Shire of Bridgetown Greenbushes

# Works Approval Number: W5677/2014/1

Registered office:	1-3 Steere Street BRIDGETOWN WA 6255
Premises address:	Bridgetown Class II Putrescible Landfill Boyup Brook Road BRIDGETOWN WA 6255 Being Lot 903 on Plan 189961 as depicted in Schedule 1.
Issue date:	Friday, 24 July 2015
Commencement date:	Monday, 27 July 2015
Expiry date:	Wednesday, 26 July 2017

The following category/s from the *Environmental Protection Regulations 1987* cause this Premises to be a prescribed premises for the purposes of the *Environmental Protection Act 1986*:

Category number	Category description	Category production or design capacity	Approved premises production or design capacity
64	Class II or III putrescible landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled "Landfill Waste Classification and Waste Definitions 1996" published by the Chief Executive Officer, as amended from time to time) is accepted for burial.	20 tonnes or more per year	5 000 tonnes per year

### Conditions

This Works Approval is subject to the conditions set out in the attached pages.

Officer delegated under section 20 of the *Environmental Protection Act* 1986



# **Works Approval Conditions**

### 1 General

#### 1.1 Interpretation

- 1.1.1 In the Works Approval, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.
- 1.1.2 In the Works Approval, unless the contrary intention appears:

'Act' means the Environmental Protection Act 1986;

'annual period' means the inclusive period from 1 January until 31 December in the same year;

'CEO' means Chief Executive Officer of the Department of Environment Regulation;

 'CEO' for the purpose of correspondence means; Manager Licensing (Waste South B) Department of Environment Regulation Locked Bag 33 CLOISTERS SQUARE WA 6850 Telephone: (08) 9333 7510 Facsimile: (08) 9333 7550 Email: industry.regulation@der.wa.gov.au;

**'Premises'** means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Works Approval;

'Schedule 1' means Schedule 1 of this Works Approval unless otherwise stated;

**'Works Approval'** means this Works Approval numbered W5677/2014/1 and issued under the *Act;* and

**'Works Approval Holder'** means the person or organisation named as the Works Approval Holder on page 1 of the Works Approval.

- 1.1.3 Any reference to an Australian or other standard in the Works Approval means the relevant parts of the standard in force from time to time during the term of this Works Approval.
- 1.1.4 Any reference to a guideline or code of practice in the Works Approval means the current version of the guideline or code of practice in force from time to time, and shall include any amendments or replacements to that guidelines or code of practice made during the term of this Works Approval.

#### 1.2 General conditions

1.2.1 The Works Approval Holder shall construct the works in accordance with the documentation detailed in Table 1.2.1:



Table 1.2.1: Construction Requirements <sup>1</sup>		
Document	Parts	Date of
		Document
Information for Works Approval Application – Eastern	All, including	April 2014
Extension – Cell 1 – Bridgetown Landfill Site for Shire of	Drawings and	
Bridgetown-Greenbushes, WML Consultants	Appendices	
WML Consultants Shire of Bridgetown-Greenbushes	All	5 July 2013
Hydrogeological Investigation for The Expansion of the		
Bridgetown Landfill		
Electronic document '5176 – Bridgetown Landfill – Water	All	Received 1
Balance Data.pdf		September 2014
Electronic mail – from Martin Cannon (Geotechnical	All, including	22 September
Engineer, WML Consultants) to Department of	attachments	2014
Environment Regulation dated 22 September 2014		
Shire of Bridgetown Greenbushes, Construction quality	All	Received 22
assurance plan for HDPE line for construction of a new		September 2014
leachate pond at Bridgetown landfill site, Bridgetown		(dated April 2014)
Shire of Bridgetown Greenbushes, Construction quality	All	Received 22
assurance plan for the earthworks and pipework for a		September 2014
new landfill cell and leachate pond at Bridgetown landfill		(dated April 2014)
site, Bridgetown		
Electronic mail – from Martin Cannon (Geotechnical	All	30 September
Engineer, WML Consultants) to Department of		2014
Environment Regulation dated 30 September 2014		
Letter from Tim Clynch (Chief Executive Officer, Shire of	All, including	December 2014
Bridgetown-Greenbushes) to Department of	attachment	
Environment Regulation, dated 12 December 2014		

Note 1: Where the details and commitments of the documents listed in condition 1.2.1 are inconsistent with any other condition of this works approval, the conditions of this works approval shall prevail.

1.2.2 The Works Approval Holder shall ensure that independent construction quality assurance of all Stage 2 landfill cell and leachate pond works is performed and recorded by a suitably qualified professional engineer in accordance with the works approval application documentation as stated in condition 1.2.1.

### 1.3 Premises operation

There are no specified conditions relating to Premises operation in this section.



# 2 Monitoring

#### 2.1 General monitoring

- 2.1.1 The licensee shall ensure that:
  - (a) all water samples are collected and preserved in accordance with AS/NZS 5667.1;
  - (b) all groundwater sampling is conducted in accordance with AS/NZS 5667.11; and
  - (c) all laboratory samples are submitted to and tested by a laboratory with current NATA accreditation for the parameters being measured unless indicated otherwise in the relevant table.
- 2.1.2 The Licensee shall ensure that quarterly monitoring is undertaken at least 45 days apart.

#### 2.2 Ambient environmental quality monitoring

2.2.1 The Licensee shall undertake the monitoring in Table 3.2.1 according to the specifications in Table 2.2.1.

Table 2.2.1: Monitoring of ambient groundwater quality					
Monitoring point reference and location	Parameter	Units	Averaging period	Frequency	
MB1 – MB5	Dissolved oxygen <sup>1</sup>	mg/L	Spot sample	Quarterly	
	Electrical conductivity <sup>1</sup>	µS/cm			
	Oxidation/ reduction potential <sup>1</sup>	mV			
	pH <sup>1</sup>	-			
	Standing water level <sup>1</sup>	m(AHD) and m(BGL)			
	Biochemical oxygen demand;	mg/L			
	Chloride, fluoride, potassium, sulfate;	mg/L			
	Total metals: aluminium, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, zinc;	mg/L			
	Total dissolved solids; Total nitrogen, nitrate- nitrogen, nitrite-nitrogen, ammonia-nitrogen; and Total phosphorus, phosphate.	mg/L			

Note 1: In-field non-NATA accredited analysis permitted.



# 3 Improvements

#### 3.1 Improvement program

3.1.1 The Works Approval Holder shall complete the improvements in Table 3.1.1 by the date of completion in Table 3.1.1.



# 4 Information

#### 4.1 Reporting

- 4.1.1 The Works Approval Holder shall submit a compliance document to the CEO, following the construction of the works and prior to commissioning of the same.
- 4.1.2 The compliance document shall:
  - (a) certify that the works were constructed in accordance with the conditions of the works approval;
  - (b) be signed by a person authorised to represent the Works Approval Holder and contain the printed name and position of that person within the company; and
  - (c) contain as constructed plans for the Stage 2 landfill cell and leachate pond including the leachate collection system.
- 4.1.3 The works approval holder shall submit to the CEO a Construction Quality Assurance Validation Report following the completion of construction and prior to commissioning of the Stage 2 landfill cell and leachate pond, that:
  - (a) is written and certified by a suitably qualified professional engineer;
  - (b) demonstrates compliance with condition 1.2.2; and
  - (c) demonstrates compliance with construction specifications in accordance with the works approval application documentation as stated in condition 1.2.1.



# Schedule 1: Maps

#### Premises map

The Premises is shown in the map below. The red line depicts the Premises boundary. The yellow lines depict the location of Stage 2 landfill cell and leachate pond works. The blue dots depict the groundwater monitoring bores.



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Stage 2 works construction plans: detail of landfill cell and leachate pond design.



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Stage 2 works construction plans: detail of landfill cell and floor contour design.



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Stage 2 works construction plans: detail of landfill cell and floor cross section design.



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# **Decision Document**

# Environmental Protection Act 1986, Part V

### Proponent: Shire of Bridgetown Greenbushes

### Works Approval: W5677/2014/1

Registered office:	1-3 Steere St BRIDGETOWN WA 6255
Premises address:	Bridgetown Class II Putrescible Landfill Boyup Brook Road BRIDGETOWN WA 6255 Being Lot 903 on Plan 189961 Boyup Brook Road as depicted in Schedule 1
Issue date:	Friday, 24 July 2015
Commencement date:	Monday, 27 July 2015

Expiry date: Wednesday, 26 July 2017

#### Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER) has decided to issue a works approval. DER considers that in reaching this decision, it has taken into account all relevant considerations.

Decision Document prepared by:

Elizabeth Whisson Licensing Officer

Peter van Schoubroeck Licensing Officer

Decision Document authorised by:

Caron Goodbourn A/Manager Licensing (Waste Industries)



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# **1** Purpose of this Document

This decision document explains how DER has assessed and determined the application for a works approval or licence, and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986*. Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.



# 2 Administrative summary

Administrative details				
Application type	Works Approval New Licence Licence amendme Works Approval ar	nt nendmo	<ul> <li>□</li> <li>□</li> <li>□</li> <li>□</li> <li>□</li> </ul>	
Activities that cause the premises to become	Category number(s)		Assessed design capacity	
prescribed premises	64: Putrescible Landfill		5 000 tonnes per annual period	
Application verified Application fee paid	Date: 13/05/2014 Date: 06/06/2014			
Works Approval has been complied with Compliance Certificate received	Yes No No	N// N//	A⊠ A⊠	
Commercial-in-confidence claim	Yes No			
Commercial-in-confidence claim outcome	Not applicable			
Is the proposal a Major Resource Project?	Yes No			
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the Environmental Protection Act 1986?	Yes No	Refe Man Asse	erral decision No: aged under Part V  □ essed under Part IV  □	
Is the proposal subject to Ministerial Conditions?	Yes No	Mini: EPA	sterial statement No: Report No:	
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the Environmental Protection Act 1986)?Yes□No⊠Department of Water consulted Yes□No ⊠				
Is the Premises within an Environmental Protection Policy (EPP) Area Yes No				
Is the Premises subject to any EPP requirements? Yes No				





### 3 Executive summary of proposal and assessment

#### **Overview of the Bridgetown Putrescible Landfill**

The Bridgetown Class II Putrescible Landfill (Landfill) is operated by the Shire of Bridgetown Greenbushes under Licence L6818/1997/11. The Landfill accepts up to 5 000 tonnes per annum of Class II waste, as specified in the document *Landfill Waste Classification and Waste Definitions 1996*, as amended from time to time. The Landfill is located approximately 260 km south of Perth, provides service to a population of approximately 4 000 people and has been operating for about 17 years.

The topography of the site slopes away from the central northern area (>290 m AHD) to the southwest (~270 m AHD) and more sharply to the south east (~260 m AHD). A ridgeline running north-south through the Premises partially divides the sites surface drainage. The geology at the site consists of a shallow lateritic profile over deeply weathered granite. A mottled layer of silt/ clay with varying amounts of sand and trace gravel extends to approximately 4-5 m below ground level (BGL). This overlies the Pallid Zone, comprising of white kaolin clay with minor sand which extends to approximately 12 m BGL. Below this is saprolite and granite bedrock.

The Landfill is located within the Blackwood River Basin, which drains into the Hardy Inlet near Augusta located approximately 100 km southwest of the Landfill. No surface water is present at the Landfill. Groundwater at the Landfill is present between approximately 17 and 21 m BGL. There are five groundwater monitoring bores existing at the Premises. Three of the bores were installed in 2013 while hydrogeological investigations were being undertaken at the Landfill. Shallow groundwater monitoring bores MW3, MW4 and MW5 are expected to remain dry unless elevated groundwater levels or potential leachate is present. There is at least 100 m of bushland surrounding the Landfill on all sides. More bushland is located to the west and north of the Premises. Agricultural land is located to the south and east of the Premises. The Premises is not located in a proclaimed groundwater area under the *Rights in Water and Irrigation Act 1914*;

Most of the current landfilling occurs west of the ridgeline. This proposal is for the construction of a new cell and leachate pond east of the ridgeline. The new cell will extend the Premises active landfill life by approximately three years. Any proposals to extend the landfill beyond this approval will be subject to a new application and assessment process.

#### Overview of the cell authorised under Works Approval W5677/2014/1

#### Overview of cell construction

Works Approval W5477/2014/1 has been issued for the construction of a Class II landfill cell and leachate pond (Stage 2). The cell will cover an area of approximately 0.3 ha and will be 40 m wide by 80 m long and excavated to an average depth of 5 m. The cell will be lined by local compacted clay sourced from the Pallid Zone which has an average re-compacted sample permeability of  $5 \times 10^{-9}$  m/s. Insitu permeability testing of the Pallid Zone ranged from 2.8 x  $10^{-8}$  to  $3.2 \times 10^{-9}$ . Leachate will be collected via a gravity fed drainage system installed at the base of the cell and diverted to a new HDPE lined evaporation pond. Leachate collection will be assisted by a 3% floor gradient to a central drainage contour; this should also reduce the leachate head across the cell. The leachate pond will be located southeast of the Landfill and has been sized based on a water balance assessment with contingency to contain a 1 in 50 year storm event. Previously constructed landfill cells did not include a leachate collection system.

DER has considered the Stage 2 proposal against industry standards described in the document Environmental Protection Authority Victoria *Best Practice Environmental Management guidelines siting, design, operation and rehabilitation of landfills*, October 2014 (landfill guidelines). Under the landfill guidelines the Premises meets the general requirements of a Type 3 low-risk rural landfill. The landfill cell and leachate pond will be subject to construction quality assurance (QCA) requirements.



The area of vegetation proposed to be cleared for Stage 2 is assessed under clearing permit application number 5233/1.

A description of the Stage 2 landfill cell and leachate pond construction specifications, potential sensitive receptors and emission risks is provided in Appendix A.

#### Emissions and Receptors

The main emissions associated with the construction of the Stage 2 works are expected to be dust and noise from machinery movement

Potential emissions from the operations of the Stage 2 works include:

- Dust from machinery and vehicle movement and dusty loads;
- Odour from the breakdown of putrescible material, landfill gas and odorous loads received;
- Potentially harmful landfill gas from decomposition of organic material;
- Litter becoming windblown beyond the Premises boundary;
- Noise from machinery and vehicle movements, specifically reversing beepers; and
- Leachate entering the environment if the Stage 2 landfill cell and leachate pond liners and insitu clay liners were to fail.

The Decision Table in Section 4 outlines each of the construction and operational emission risks, potential impact and how they will be controlled and regulated.

Potential sensitive receptors identified in the vicinity of the Landfill include:

- The nearest residences located about 450 m northeast, 300 m southeast and 200 m southwest of the Premises boundary and a sportsground is located approximately 250 m to the northwest are separated by bush and cleared land.
- Groundwater beneath the Landfill;
- A natural spring located about 240 m east of the Premises boundary;
- A series of private dams located approximately 250 m southeast of the Premises boundary; and
- The adjacent native bushland flora and fauna.

### 4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.



Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
General conditions	W1.2.1 and W1.2.2	<ul> <li>Construction         General conditions for this works approval include constructing this facility in accordance with the works approval supporting documentation.         Condition 1.2.2 has been included to ensure that construction quality assurance is performed according to the application supporting documentation and subsequently verified through the requirements of condition 5.1.3. Construction quality assurance requirements are specified within the documents:         <ul> <li>Construction quality assurance plan for HDPE line for construction of a new leachate pond at Bridgetown landfill site, Bridgetown; and</li> <li>Construction quality assurance plan for the earthworks and pipework for a new landfill cell and leachate pond at Bridgetown landfill site, Bridgetown</li> </ul> </li> <li>Operation         <ul> <li>The Licence will be amended as required to incorporate the operations associated with the Stage 2 works. No amendments to conditions in section 1.2 of the existing Licence are required as a result of the works.</li> </ul> </li> </ul>	Application supporting documentation Environmental Protection Authority Victoria Best Practice Environmental Management guideline Siting, design, operation and rehabilitation of landfills (October 2014) General provisions of the Environmental Protection Act 1986 L6818/1997/11
Premises Operation	N/A	<ul> <li>Construction         There are no specified conditions relating to premises operation in the works approval.         This Works Approval is for the construction phase of the new landfill cell and leachate         pond only.            Operation         Current operations at the Landfill are regulated through licence L6818/1997/11.          Operation of the new landfill cell and leachate pond has been considered as part of the         works approval process, including an assessment of whether the cell construction is         suitable for the proposed landfilling operation.         The licence will be amended to incorporate the operations associated with the Stage 2         works. Appendix A includes an assessment of the cell and leachate pond engineering         design in the context of potential emissions from operation of the Stage 2 works.     </li> </ul>	Application supporting documentation General provisions of the <i>Environmental Protection</i> <i>Act 1986</i> L6818/1997/11



DECISION TABLE			
Works Approval	Condition	Justification (including risk description & decision methodology where relevant)	Reference documents
/ Licence section	number		
	W = Works		
	Approval		
	L= Licence		
		Existing Licence conditions include:	
		<ul> <li>Condition 1.3.1 regulates the waste acceptance criteria;</li> </ul>	
		<ul> <li>Condition 1.3.2 regulates the landfilling operations; and</li> </ul>	
		<ul> <li>Conditions 1.3.4 and 1.3.5 regulate the risk of windblown waste;</li> </ul>	
		Additional Licence conditions will be required regarding:	
		<ul> <li>Defining the waste types and quantities that the Premises is authorised to accept for landfilling;</li> </ul>	
		<ul> <li>Defining the active landfill area where waste is authorised for burial;</li> </ul>	
		• The management of the leachate collection system and storage pond which shall include ensuring leachate collection pipeline remain free of blockage, the integrity of the leachate pond liner is maintained and a freeboard on the	
		leachate pond in maintained with no overflow to occur.	
Emissions general	W2.5.1 and L2.1.1	<b>Construction</b> Descriptive limits are set through Conditions 2.2.1 and 2.2.2. Condition 2.1.1 includes	General provisions of the Environmental Protection
5		recording and investigation requirements in the event limits or targets are exceeded.	Act 1986
		Operation	
		Existing Licence conditions, containing descriptive limits and targets, include condition	
		2.6.1 and 2.6.2 with regards to potential dust emissions and condition 2.7.1 with	
		regards to potential odour emissions. Condition 2.1.1 includes recording and	
Emissions	Ν/Δ	Construction	Application supporting
(noint source		No point source emissions to air, groundwater or surface water are expected to occur	documentation
emissions to air.		during construction of Stage 2 therefore no works approval conditions are required in	documentation
surface water or		these sections.	
groundwater)			
- ,		Operation	
		No point source emissions to air, groundwater or surface water are expected to occur	
		during operation of Stage 2, therefore no licence conditions are required in these	
		sections.	



DECISION TABLE			
Works Approval	Condition	Justification (including risk description & decision methodology where relevant)	Reference documents
/ Licence section	number		
	Approval		
Emissions		Construction	Application supporting
(to land)		No emissions to land are expected to occur during construction of Stage 2, therefore no works approval conditions are required in this section.	documentation
		<b>Operation</b> As part of the works approval application a pumped spray system will be installed to enhance solar drying of the leachate. No specifications of the potential timing, volume and distribution of the spray system were provided. To operate the spray system will require leachate to be present in the leachate storage pond; this will take some time to accumulate. Subsequently a condition in section 5 of the Licence will be required to ensure a notification and assessment process is undertaken before any pumped spray system for the leachate is operated. No other emissions to land are expected to occur	General provisions of the Environmental Protection Act 1986 L6818/1997/11
		during operation of Stage 2, therefore no licence conditions are required in this section.	
Emissions (fugitive)	L2.6.1 and L2.6.2	<ul> <li>Construction         Potential fugitive emissions during construction will be limited to dust. The risk of dust emissions has been assessed in conjunction with the risk of dust emissions during operation in Appendix A. No other fugitive emissions are expected to occur during construction of Stage 2     </li> <li>Operation         Potential fugitive emissions during operation of the stage 2 works include dust emissions, landfill gas and leachate from the landfill cell and from the leachate pond. The emission risks are assessed in Appendix A. Existing Licence conditions include for fugitive emissions. Odour emission can be regulated by the general provisions of     </li> </ul>	Application supporting documentation General provisions of the <i>Environmental Protection</i> <i>Act 1986</i> L6818/1997/11
		the Environmental Protection Act 1986.	
Odour	N/A	<b>Construction</b> No odour emissions are expected to occur during construction of Stage 2. All works will be undertaken over previously undisturbed soils, no previously buried waste will be disturbed as part of the works, therefore no works approval conditions are required in this section.	Application supporting documentation General provisions of the <i>Environmental Protection</i> <i>Act 1986</i>



DECISION TABLE	
Works ApprovalConditionJustification (including risk description & decision methodology where relevant)	Reference documents
/ Licence section number	
W = WOrks	
Approval	
L= Licence	
Operation Emission description:	6919/1007/11
Emission description.	20010/1997/11
Impact Interference with the health welfare, convenience, comfort of amenity of	
sensitive commercial and residential recentors, which are located between 200m and	
450m metres from the Premises boundary	
<i>Control</i> : Maintenance of the putrescible waste under normal operating conditions has	
proved effective to control odour emissions. Historically under normal operating	
conditions odour emissions have not resulted in complaints.	
Pick appagement:	
Consequence: Minor	
Likelihood: Unlikely	
Risk rating: Low	
Regulatory controls:	
Condition 1.3.2 in the current Licence relating to cover of deposited waste, requires	
operations to be undertaken in a manner to minimise the risk of odour emissions.	
Condition 2.7.1 in the current Licence requires odour generating activities to be	
managed appropriately by the Licensee. Odour emission can be regulated by the	
general provisions of the Environmental Protection Act 1980.	
Residual risk:	
Consequence: Minor	
Likelihood: Rare	
Risk rating: Low	
Noise N/A Construction and Operation	General provisions of the
Noise emissions generated at the Premises have not resulted in complaints or been	Environmental Protection
Identified as an issue. Noise emissions during construction are not expected to exceed	Act 1986
ambient levels form normal operating conditions at the landfill. Should noise emissions	Environmental Protection
anse from the construction of operation at the Premises they can be managed under	Environmental Protection
	(INDISE) REGULATIONS 1997



DECISION TABLE			
Works Approval	Condition	Justification (including risk description & decision methodology where relevant)	Reference documents
/ Licence Section	W - Works		
	I = Licence		
Monitoring	W2 1 1 and	Construction	Application supporting
general	W2.1.2	These Works Approval conditions require precision and accuracy during sample	documentation
5	L3.1.1 – L3.1.4	collection, analysis and reporting. Ambient quality monitoring of the groundwater	
		monitoring bores is required under Condition 3.2.1.	General provisions of the
			Environmental Protection
		Operation	Act 1986
		These Works Approval conditions require precision and accuracy during sample	
		collection, analysis and reporting. Ambient quality monitoring of the groundwater	L6818/1997/11
		monitoring bores is required under Condition 3.8.1 of the current Licence. Condition	
		3.8.1 will require amendment to include a full suite of standard monitoring parameters	
		for a rural putrescible landfill.	
Monitoring of	N/A	Construction	General provisions of the
inputs and		I here are no input and output monitoring requirements during construction at the	Environmental Protection
outputs		Premises that require licence conditions.	ACT 1986
		Operation	
		The Licence will need to be amended to include the requirement to monitoring the	
		volume and type of all waste accepted and rejected from the Premises is recorded.	
Process	N/A	Construction and Operation	General provisions of the
monitoring		There are no process monitoring requirements during construction or operation of	Environmental Protection
Ū		Stage 2 at the Premises that require licence conditions.	Act 1986
Ambient quality	W2.2.1 and	Construction	
monitoring	L3.8.1	Monitoring of potential impacts to groundwater:	
		Five groundwater monitoring bores are located close to the active landfill area (refer to	
		Schedule 1 of the licence for locations). The bores are located so that potential	
		seepage from the landfill entering groundwater can be detected. The adequacy of the	
		monitoring bore network and potential impacts of leachate from the landfill on	
		groundwater quality as a result of the Stage 2 works have been assessed in Appendix	
		A and regulatory controls under the improvement section have are subsequently	
		required. Condition 3.2.1 requires all five groundwater monitoring bores to be sampled	
		quarterly and includes and expanded monitoring parameter suite. A higher frequency sampling regime over the peet 3 to 5 years of existing and new bores should provide	
		sampling regime over the next 3 to 5 years of existing and new boles should provide	



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		adequate baseline date to allow long term trends in groundwater quality to indicate any potential leachate seepage from the Stage 2 works. <b>Operation</b> <u>Monitoring of potential impacts to groundwater:</u> OSC 3.8.1 in the current Licence requires two of the five existing groundwater monitoring bores to be monitored. OSC 3.8.1 will need to be amended to include the addition three existing groundwater monitoring bores and any additional monitoring requirements that are developed as part of the improvement conditions under the Works Approval.	
Meteorological monitoring		<b>Construction and Operation</b> There are no meteorological monitoring requirements at the Premises that require licence conditions.	General provisions of the Environmental Protection Act 1986
Improvements	W3.1.1	<ul> <li>Construction         Improvement requirements are based on the risk assessment process detailed within         Appendix A with regards to the potential for leachate seepage. There is currently a         network of five groundwater monitoring bores installed at the Landfill. The network         does not currently include any groundwater monitoring bores immediately down-         gradient of the proposed leachate pond. Subsequently improvement conditions IR1         and IR2 have been to:             <ul> <li>(IR1) requires a plan to be developed which how the groundwater monitoring             bore network relates to the conceptual plan and the objectives stated below.</li> <li>(IR2) requires a verification report to be developed which demonstrates that a             groundwater monitoring bore network has been implemented to achieve the             objectives stated below.</li> </ul> </li> </ul>	General provisions of the Environmental Protection Act 1986 L6818/1997/11 WML Consultants – Shire or Bridgetown Greenbushes – Hydrogeological Investigation For the Expansion of the Bridgetown Landfill – 5/7/2013.
		<ul> <li>Implementation of the improvement conditions should achieve the following objectives:</li> <li>allow any potential leachate seeping through the Stage 2 landfill cell and/ or leachate pond works to be identified;</li> <li>allow potential leachate seepage from the Stage 2 works and potential leachate from areas previously subject to landfilling to be differentiated; and</li> </ul>	



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<ul> <li>further inform the assessment of the hydrogeology at the Premises, specifically at the site of the Stage 2 works.</li> <li>It is necessary to identify any leachate moving out of Stage 2 in a timely manner so that additional leachate management measures can be enacted to control seepage.</li> </ul>	
		<b>Operation</b> No improvements are required for the operation of the Stage 2 works. The Licence will need to be amended to require a post closure management plan (PCMP) to be submitted. A PCMP will ensure a whole of life strategic approach is taken to the management of landfill operations. The PCMP needs to be developed in line with the standards set out in the landfill guidelines ( <i>Best practice environmental</i> <i>management siting, design, operation and rehabilitation of landfills</i> , published by the Environmental Protection Authority Victoria, October 2014) and any deviation from the standards must be adequately justified. Subsequently DER will review the PCMP, the basis for any deviations in the PCMP from the landfill guidelines and subsequently seek to authorise operations at the Premises in line with the commitments within the	
Information	W4.1.1 – W4.1.3	<ul> <li>endorsed PCMP.</li> <li>Construction</li> <li>Standard compliance document conditions are included in the Works Approval to ensure that commitments. Additional information conditions requirements are:         <ul> <li>Condition 5.1.2(c) requires the compliance document, required under condition 5.1.1 to include the as constructed plans for the Stage 2 works which will facilitate verification of the works completion.</li> <li>Condition 5.1.3 requires the submission of a Construction Quality Assurance Verification Report to DER. This is to ensure that the commitments of the construction quality assurance requirements are specified within the following documents are adhered to:</li> </ul> </li> </ul>	Application supporting documentation. General provisions of the <i>Environmental Protection</i> <i>Act 1986</i> L6818/1997/11



<b>DECISION TABLE</b>			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<ul> <li>Construction quality assurance plan for HDPE line for construction of a new leachate pond at Bridgetown landfill site, Bridgetown; and</li> <li>Construction quality assurance plan for the earthworks and pipework for a new landfill cell and leachate pond at Bridgetown landfill site, Bridgetown</li> </ul> Operation The operation of the pumped spray system for the leachate pond and potential emission risks have not been assessed, A Licence condition will be required to ensure that the Licensee notifies DER at least six months prior to any pumped spray system being commissioned for the leachate pond. This will trigger the assessment process for the activity. No other information conditions are required for the operation of the Stage 2 works.	
Works Approval duration	N/A	The Works Approval will be granted for the standard duration of three (3) years by which time the works will have been completed and the relevant amendments to the Licence will need to have been implemented.	General provisions of the Environmental Protection Act 1986



# 5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
16/06/2014	Application advertised in West Australian (or other relevant newspaper)	No comments received	N/A
23/06/2014	Application referred to interested parties	Concerns received from an interested party included stormwater water runoff and potential groundwater impacts on nearby property. An extract from the Department of Health, dated 1989, that stipulated that landfilling should occur only west of the watershed line was also provided.	The Stage 2 works are located wholly east of the ridgeline line. Leachate controls have are to be implemented in the form of liners and the landfill cell leachate collection system design. Groundwater monitoring bores are required through improvement conditions as a contingency to indicate if any seepage occurs. Stormwater and potential surface water contamination controls are to be implemented in the form of site design, contouring and waste separation. Clean stormwater drains and a sump will also be in place at the Premises.
23/06/2014	Application referred to Department of Water	Department of Water raised concerns that the current bores onsite may not be appropriate to monitor for any leachate escaping the proposed cell along the top of the Pallid Zone. Department of Water suggested that additional shallow bores should be drilled at each monitoring site.	<ul> <li>Controls for the potential of leachate seepage from Stage 2 works are to be implemented in the form of: <ul> <li>Landfill cell floor contouring;</li> <li>Leachate collection drainage layer and pipeline;</li> <li>Leachate collection pond;</li> <li>HDPE lining of the leachate collection pond.</li> </ul> </li> <li>Contingency controls are to be implemented through the improvement conditions which require: <ul> <li>Development of a conceptual site model and groundwater monitoring plan;</li> <li>Installation of addition down gradient groundwater monitoring bores to indicate any potential seepage, including preferential subsurface seepage along the top of the Pallid Zone.</li> </ul> </li> </ul>
08/07/2015	Proponent sent a copy of draft instrument	Clarification of monitoring bore details	Decision document now identifies the three shallow groundwater monitoring bores.

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# 6. Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table	1:	Emissions	Risk	Matrix
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Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High



# Appendix A:

#### **Operation: Potential for leachate seepage emissions**

#### Emission Description

*Emission:* Potential for leachate seepage through the base of the Stage 2 landfill cell or the leachate evaporation pond.

Impact: Potential for the contamination of groundwater to impact the receptors outlined below.

- Local groundwater quality which is slightly acidic, brackish water, with pH in the range of 5 to 6 and total dissolved solids <3 000 mg/L.
- A natural spring located approximately 240 m east of the premises boundary (used by private residence).
- Agricultural dams located approximately 250 m southeast of the premises boundary.
- The local surface water course located approximately 1 km southeast of the premises
- boundary which flows into the Blackwood River approximately 2.4 km downstream. *Controls:* 
  - The proposed landfill cell is to be constructed at a location due east of the existing cells with a vertical separation of approximately 16 m from the maximum seasonal water table. This exceeds the minimum two meter groundwater separation requirements of the landfill guidelines.
  - The base of the landfill cell is to be constructed using re-compacted naturally occurring clay within the Pallid Zone (comprising white kaolin clay with minor sand) with an average permeability of 5 x 10<sup>-9</sup> m/s. This does not meet the landfill guidelines standard of 1 x 10<sup>-9</sup> m/s however, the Works Approval holder has demonstrated that taking into account separation distance to groundwater and cation exchange capacity of the in situ soil, that the time taken for leachate to reach the highest seasonal groundwater level would be approximately 54 years compared to the landfill guidelines standard equivalent of 63 years. The risk presented by this deviation from the landfill guideline is further reduced by the cell base contour and leachate collection system controls described below.
  - The base of the proposed landfill cell will be constructed to form a v-shape, grading to the centreline of the cell at 3% to promote leachate drainage within the basal gravel drainage layer, with an overall fall of 1% to the southern end of the cell, for leachate collector pipe drainage. This complies with the landfill guidelines standard.
  - The sides of the landfill cell will be in the mottled zone (a silt/clay layer with varying amounts of sand and trace gravel) with an average permeability varying from 2 x 10<sup>-7</sup> m/s to 5 x 10<sup>-9</sup> m/s. The sides of the excavation will be steeply excavated, at 2V:1H, to minimise erosion of the batters and clogging of the gravel drainage layer from ingress of fine material. WML Consultants have the following response to the Department of Water's concern regarding that leachate may escape the proposed cell along the top of the Pallid Zone: "the system is designed to prevent any leachate build-up within the waste cell therefore the leachate level should not have the opportunity to pond above the mottled and Pallid Zone interface. The steep side walls and floor gradients are designed to prevent a hydraulic gradient developing across this upper strata".
  - The leachate collection layer overlying a low permeability re-compacted clay base is designed to control seepage to less than 1 000 L/ha/h/day. This complies with the landfill guidelines standard for a Type 3 landfill.
  - The proposed leachate evaporation pond has been constructed based on waste balance calculations. The pond will be 40 m x 20 m with an average depth of 5 m and will be built to contain a 1 in 50 year storm event. This exceeds the landfill guidelines recommendations of a 1 in 20 year storm event.
  - The proposed leachate evaporation pond will be lined with a 1.5 mm HDPE liner. This meets the landfill guidelines standard permeability requirements.



A construction quality assurance (CQA) plan for the earthworks and leachate collection pipeworks for the proposed cell and leachate pond has been developed. Another CQA plan has been developed for the HDPE liner for the leachate pond. The proposed leachate evaporation pond will have a vertical separation of at least 7 m from the maximum seasonal water table. This complies with the minimum groundwater separation requirements of the landfill guidelines.

Risk Assessment (landfill cell) Consequence: Moderate Likelihood: Unlikely Risk Rating: Moderate

Risk Assessment (leachate pond) Consequence: Moderate Likelihood: Unlikely Risk Rating: Moderate

Regulatory Controls

Works Approval condition 1.2.1 and 1.2.2 requires Stage 2 landfill cell and leachate pond to be constructed in accordance with the design specifications and construction quality assurance process. Works Approval condition 5.1.3 requires a construction quality assurance validation report to be submitted. The validation report requires the Works Approval Holder to demonstrate that the Stage 2 landfill cell and leachate pond works have been constructed in accordance with the construction quality assurance plans.

In addition implementation of the improvement conditions (improvement reference IR1 and IR2) should achieve the following objectives:

- allow any potential leachate seeping through the Stage 2 landfill cell and/ or leachate pond works to be identified;
- allow potential leachate seepage from the Stage 2 works and potential leachate from areas previously subject to landfilling to be differentiated; and.
- further inform the assessment of the hydrogeology at the Premises, specifically at the site of the Stage 2 works.

Residual Risk (landfill cell) Consequence: Moderate Likelihood: Unlikely Risk Rating: Moderate

Residual Risk (leachate pond) Consequence: Moderate Likelihood: Unlikely Risk Rating: Moderate



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

### **Construction and Operation: Potential dust emissions**

Emission Description:

*Emission:* Dust emissions from machinery and vehicle movements, earthworks and waste handling during construction and operation is possible if appropriate dust management procedures are not implemented

*Impact:* Reduced local air quality from airborne particulates is possible, particularly during the drier, summer months with potential annoyance from nearby sensitive receptors. Residences are located between 200 and 450 m form the Premises and buffered by native vegetation.

*Controls:* The proponent has committed to managing dust through visual monitoring, ensuring roads and working areas are covered or sealed and roads are sprayed by a water cart during high traffic and/ or dry periods.

<u>Risk Assessment:</u> *Consequence:* Insignificant *Likelihood:* Unlikely *Risk Rating:* Low

#### Regulatory Controls:

Fugitive (dust) emissions are regulated by the general provisions of the *Environmental Protection Act* 1986 therefore no conditions are specified within the works approval.

Licence condition 2.6.1 and 2.6.2 currently include the same regulatory requirement.

<u>Residual Risk</u> Consequence: Insignificant Likelihood: Rare Risk Rating: Low



#### **Operation: Potential landfill gas emissions**

#### Emission Description:

*Emission:* Landfill gas is formed as a by-product of organic waste decomposition under anaerobic conditions. Gas emissions can occur via advection or diffusion. The separation distance to groundwater (~16m) minimises the risk of dissolved phase transport. No monitoring has been undertaken which could inform the rate of landfill gas emission.

*Impact:* Gas emissions such as methane can result in odour, fire and explosion risks. Landfill gas such as hydrogen sulphide can also have toxic effects on the health and wellbeing of flora, fauna and human receptors. All residences are located more than 200 m from the landfill.

*Controls:* No gas emission specific controls are in place. Waste cover and stormwater diversion assist in controlling and limiting the rate of landfill gas release. No final low permeability capping has been placed over previously landfilled areas likely resulting in a heterogeneous and diffuse emission of landfill gas.

Risk Assessment:

Consequence: Minor Likelihood: Unlikely Risk Rating: Moderate

#### Regulatory Controls:

No regulatory controls are proposed for the management of landfill gas at the small rural landfill at this time. The risk posed by landfill gas emissions from the landfill over the life of operation should be assessed as part of the Post Closure Management Plan and progressive capping process identified under the landfill operation improvement section of the Decision Document.

#### Residual Risk:

*Consequence:* Minor *Likelihood:* Unlikely *Risk Rating:* Moderate