



# Works Approval

## ***Environmental Protection Act 1986, Part V***

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**Works Approval Holder: Shire of Donnybrook-Balingup**

**Works Approval Number: W5577/2013/1**

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**Registered office:** 1 Bentley Street  
DONNYBROOK WA 6239

**Premises address:** Donnybrook Putrescible Landfill Site  
Lot 555 Goodwood Road  
PAYNEDALE WA 6239  
Being State Forest 27 (Interim Tenancy Agreement 911/97)  
Forest Lease 911/40 – Lots n1 and n2  
As depicted in Schedule 1

**Issue date:** Thursday, 24 March 2016

**Commencement date:** Monday, 28 March 2016

**Expiry date:** Wednesday, 27 March 2019

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 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 and as amended from time to time) is accepted for burial | 20 tonnes or more per year             | 6,700 tonnes per annual period                  |

### **Conditions**

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

Date signed: 14 June 2016

.....  
**Caron Goodbourn**

A/Manager Licensing (Waste Industries)  
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*;

**'ASTM D5092-04(2010)e1'** means the standard ASTM D5092-04(2010)e1 *Standard practice for design and installation of groundwater monitoring wells*;

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

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

**'AHD'** means Australian Height Datum;

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

**'averaging period'** means the time over which a limit is measured or a monitoring result is obtained;

**'bgl'** below ground level;

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

**'CEO'** for the purpose of correspondence means;  
Chief Executive Officer  
Department Administering the Environmental Protection Act 1986  
Locked Bag 33  
CLOISTERS SQUARE WA 6850  
Email: [info@der.wa.gov.au](mailto:info@der.wa.gov.au)

**'extreme rainfall event'** means a 1 in 10 year, 72 hour duration storm event;

**'impermeable'** means having a hydraulic conductivity of  $\leq 1 \times 10^{-9}$  metres per second;

**'m'** means metres;

**'mg/L'** means milligram per litre;

**'NATA'** means the National Association of Testing Authorities, Australia;

**'NATA accredited'** means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis;

**'Natural ground level'** means the level of the surface of the ground prior to any development works occurring;



**'Phase 1 landfill area'** means the area as depicted in ASK Projects Drawings DWG:08 (rev.1) in Schedule 1.

**'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;

**'bTOC'** means below top of casing;

**'Works Approval'** means this Works Approval numbered W5577/2013/1 and issued under the Act;

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

**'µS/cm'** means microsiemens per centimetre.

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 and manage emissions and discharges from the construction 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 |
| Shire of Donnybrook-Balingup, Information for Works Approval Application, <i>Donnybrook Waste Management Facility</i> , September 2013 | Sections 3.3.1 to 3.3.5, 3.5.1, 5.2 to 5.11, 7.1 to 7.8, and 8.2 to 8.11 | September 2013   |

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 only construct the landfill cells within the boundary of the Phase 1 landfill area as depicted in Schedule 1.

1.2.3 Prior to commencing construction of the Phase 1 landfill area, the Works Approval Holder shall install groundwater monitoring bores at locations depicted in Schedule 1.

1.2.4 The Works Approval Holder shall construct the groundwater monitoring bores as required by condition 1.2.3, in accordance with ASTM D5092-04(2010)e1.

1.2.5 The Works Approval Holder shall construct each landfill cell so that:

- (a) the base is graded to an impermeable leachate sump for the collection of leachate generated in the cell; and
- (b) the leachate collection sump has the capacity to store leachate generated in the cell during an extreme rainfall event.

1.2.6 Following the construction of the Phase 1 landfill area, the Works Approval Holder shall appoint a suitably qualified Hydrogeologist to:



- (a) inspect the cell excavation to determine and document the presence of any shallow groundwater and the in-situ geology in all areas of the excavation; and
- (b) take representative soil samples from the base and inside walls of the excavation to determine the permeability of the in-situ soil.

## 2 Monitoring

- 2.1.1 The Works Approval Holder 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;
  - (c) all laboratory samples are submitted to and tested by a laboratory with current NATA accreditation for the parameters being measured
- 2.1.2 The Works Approval Holder shall ensure that all monitoring equipment used on the Premises to comply with the conditions of this Works Approval is calibrated in accordance with the manufacturer's specification.
- 2.1.3 The Works Approval Holder shall, where the requirements for calibration cannot be practicably met, or a discrepancy exists in the interpretation of the requirements, bring these issues to the attention of the CEO accompanied with a report comprising details of any modifications to the methods.
- 2.1.4 The Works Approval Holder shall undertake the monitoring specified in Table 2.1.1 according to the specifications in that table.

| Table 2.1.1 Monitoring of ambient groundwater level and quality          |   |                          |                  |   |
|--|---|--------------------------|------------------|---|
| Monitoring point reference and location                                  | Parameter                               | Units                    | Averaging period | Frequency   |
| Bores installed to comply with condition 1.2.3 as depicted in Schedule 1 | Standing water level (SWL) <sup>1</sup> | m bgl<br>m bTOC<br>m AHD | Spot sample      | Annually and at least once prior to the completion of the construction of Phase 1 |
|  | pH <sup>2</sup>                         | -                        |                  |   |
|  | Electrical conductivity                 | µS/cm                    |                  |   |
|  | nitrate-nitrogen                        | mg/L                     |                  |   |
|  | Total nitrogen                          |                          |                  |   |
|  | Total Potassium                         |                          |                  |   |
|  | Chloride                                |                          |                  |   |
|  | Total dissolved solids                  |                          |                  |   |
|  | Lead                                    |                          |                  |   |
|  | Manganese                               |                          |                  |   |
|  | Copper                                  |                          |                  |   |
|  | Chromium                                |                          |                  |   |
|  | Nickel                                  |                          |                  |   |
|  | Zinc                                    |                          |                  |   |
|  | cadmium                                 |                          |                  |   |
| Ammonia-nitrogen   |   |                          |                  |   |

Note 1: SWL shall be determined prior to collection of water samples

Note 2: In-field non-NATA accredited analysis permitted for pH measurement.



## **3 Information**

### **3.1 Reporting**

3.1.1 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.

3.1.2 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;
- (c) be accompanied by a report that:
  - i. is written and certified by a suitably qualified Hydrogeologist;
  - ii. details the findings of the investigation required by 1.2.6, identifies whether the excavated area is free of any groundwater ingress or perched groundwater, details the in-situ soils and assesses the suitability of the in-situ soils as a landfill containment system to effectively manage leachate migration to prevent groundwater contamination;
  - iii. provides the results from the permeability testing required by condition 1.2.6 (b);
  - iv. provides the results from the groundwater sampling required by condition 2.1.4; and
  - v. includes copies of results of surveys, drawings and photos of the final built Phase 1 landfill area.

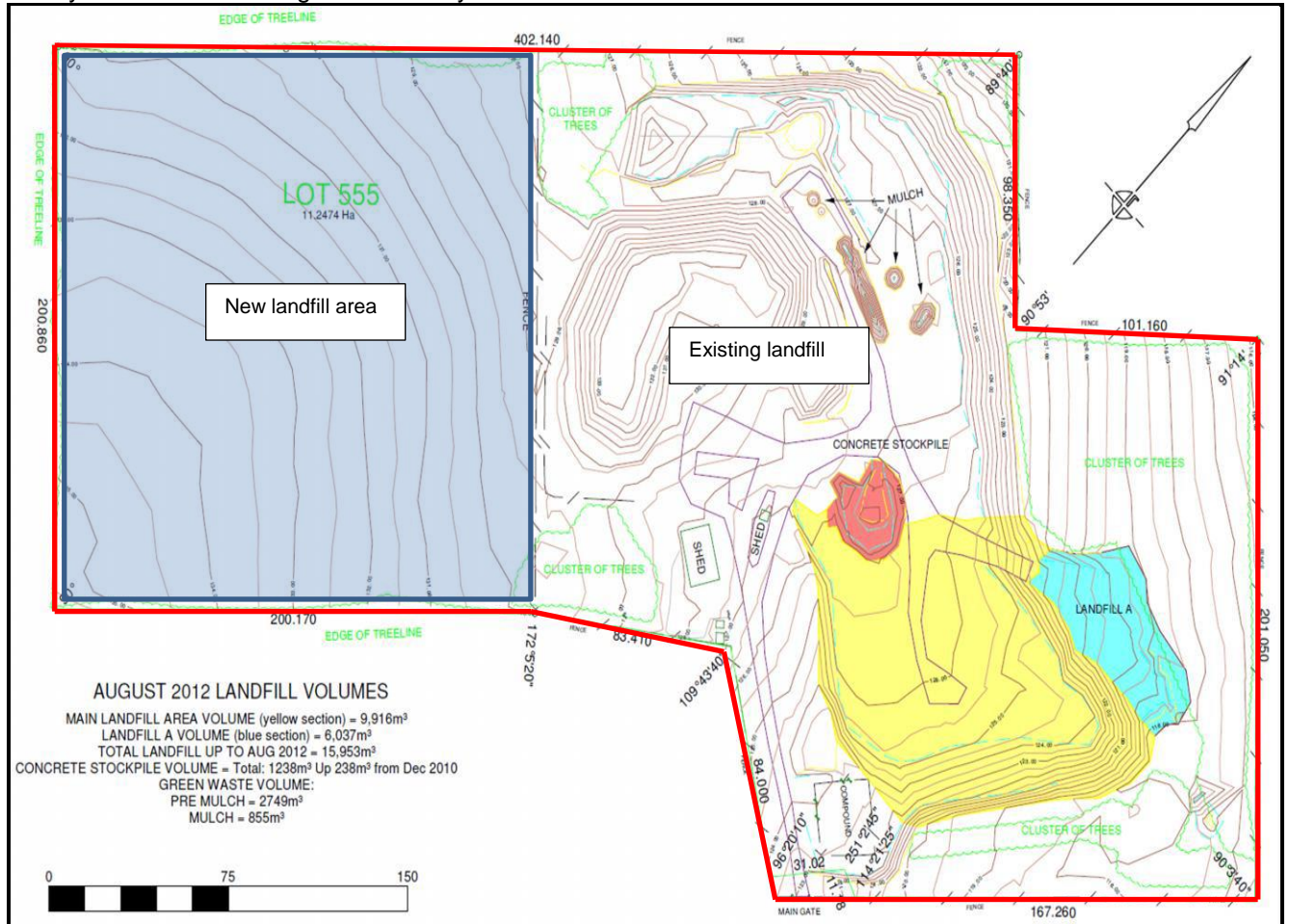


## Schedule 1: Maps

### Premises map

The Premises is shown in the map below. The red line depicts the location of the Premises boundary.

#### Donnybrook Waste Management Facility

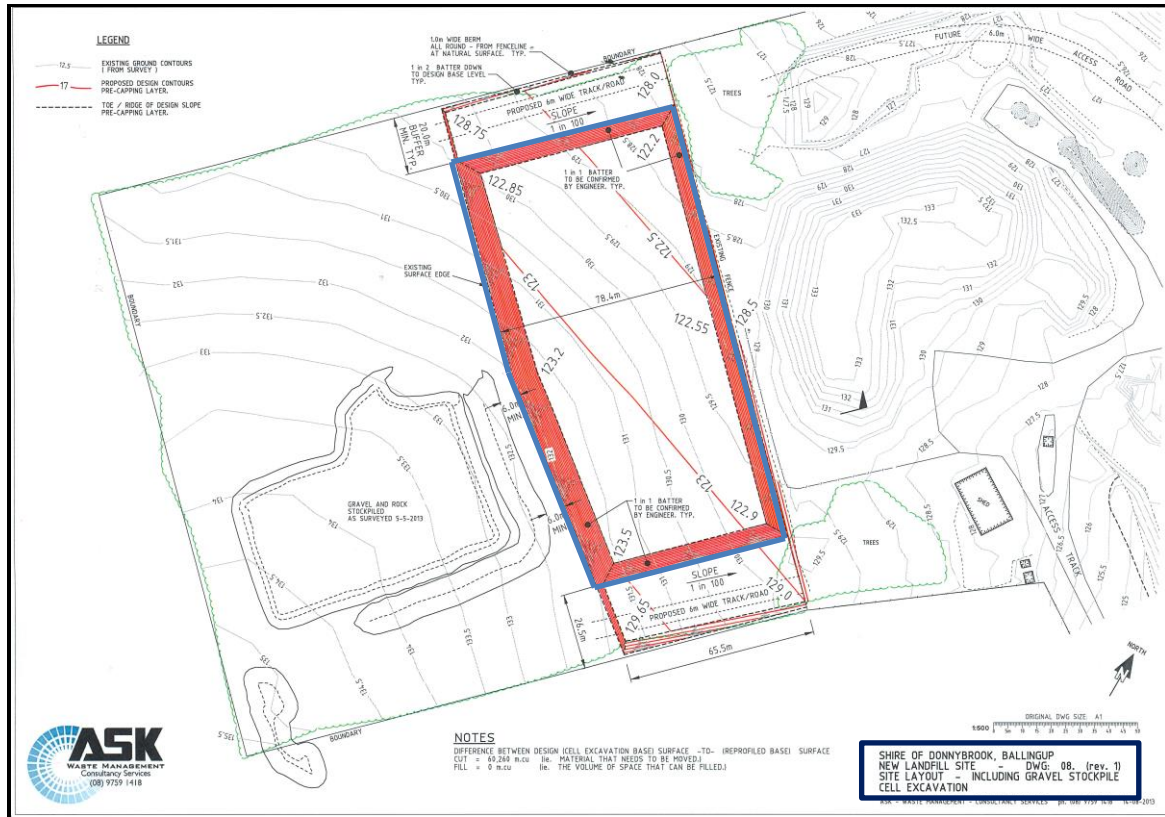






## Phase 1 landfill area.

The blue line depicts the location of the boundary for the Phase 1 landfill area.



## Location of new groundwater monitoring bores





# Decision Document

## *Environmental Protection Act 1986, Part V*

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**Proponent:** Shire of Donnybrook-Balingup

**Works Approval:** W5577/2013/1

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**Registered office:** 1 Bentley St  
DONNYBROOK WA 6239

**Premises address:** Donnybrook Putrescible Landfill Site  
Goodwood Road  
PAYNE DALE WA 6239  
Being State Forest 27 (Interim Tenancy Agreement 911/97)  
Forest Lease 911/40 – Lots n1 and n2

**Issue date:** Thursday, 24 March 2016

**Commencement date:** Monday, 28 March 2016

**Expiry date:** Wednesday, 27 March 2019

### **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 and legal requirements and that the Works Approval and its conditions will ensure that an appropriate level of environmental protection is provided.

Decision Document prepared by: Paul Anderson  
A/Senior Licensing Officer

Decision Document authorised by: Ruth Dowd  
Senior Manager – Waste Industries





## Contents

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## 1 Purpose of this Document

This decision document explains how DER has assessed and determined the application 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 <input checked="" type="checkbox"/><br>New Licence <input type="checkbox"/><br>Licence amendment <input type="checkbox"/><br>Works Approval amendment <input type="checkbox"/> |                                |
| Activities that cause the premises to become prescribed premises | Category number(s)  | Assessed design capacity       |
|  | 64: Putrescible landfill  | 6,700 tonnes per annual period |
|  | 62: Solid waste depot   | 500 tonnes per annual period   |
| Application verified   | Date: 31/12/2013  |                                |
| Application fee paid   | Date: 15/01/2014  |                                |
| Works Approval has been complied with                            | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>  |                                |
| Compliance Certificate received                                  | Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>  |                                |



|  |   |
|--|---|
| Commercial-in-confidence claim   | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>   |
| Commercial-in-confidence claim outcome   |   |
| Is the proposal a Major Resource Project?  | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>   |
| Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the <i>Environmental Protection Act 1986</i> ?  | <div>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></div> <div>Referral decision No:<br/>Managed under Part V <input type="checkbox"/><br/>Assessed under Part IV <input type="checkbox"/></div> |
| Is the proposal subject to Ministerial Conditions?   | <div>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></div> <div>Ministerial statement No:<br/>EPA Report No:</div>  |
| Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the <i>Environmental Protection Act 1986</i> )?                                       | <div>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></div> <div>Department of Water consulted Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></div>                           |
| Is the Premises within an Environmental Protection Policy (EPP) Area Yes <input type="checkbox"/> No <input checked="" type="checkbox"/><br>If Yes include details of which EPP(s) here. |   |
| Is the Premises subject to any EPP requirements? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>   |   |

### 3 Executive summary of proposal and assessment

The Shire of Donnybrook-Balingup (the Shire) operates the Donnybrook Putrescible Landfill Site (Landfill) at Lot 555 Goodwood Road, Paynedale, WA under *Environmental Protection Act 1986* Licence L7084/1997/15.

*Environmental Protection Act 1986* Works Approval W5577/2013/1 has been granted for the expansion of the Landfill by constructing additional Class II landfill cells on the adjoining cleared land to extend the operational life of the Landfill.

The Shire operate a three bin verge collection system in the Town of Donnybrook whereby putrescible wastes are sent for composting and paper and cardboard for recycling instead of burial at the landfill. Only residual wastes such as plastics and inert materials are landfilled.

Key aspects of the new landfill area includes extracting gravel for use as road base, reprofiling to optimise waste disposal operations, utilising excess soil for final capping and rehabilitation of the Landfill, and progressive excavation, filling and rehabilitation.

The new landfill area contains a 1.0 to 1.5 metre (m) horizon of gravel soil which is utilised by the Shire for road construction off-site. The start of the gravel lens is located up to one metre below ground level (bgl). The Shire has begun extracting and stockpiling gravel at the new landfill and anticipates all gravel will be removed by 2019.



The storage of gravel stockpiles at the new landfill area will initially prevent the utilisation of the entire area for landfilling purposes and therefore the Shire had planned to develop the landfill in two phases. These phases include:

- Phase 1 – short to midterm. Utilisation of approximately half of the new landfill (north east portion) for landfilling until the entire gravel stockpile is depleted (estimated at 2019); and
- Phase 2 – mid to long term. Utilisation of the whole of new landfill for landfill purposes once the gravel stockpiles have been depleted.

The Shire has advised DER on the 14 December 2015 that only the Phase 1 landfill area will be constructed as part of this Works Approval. It should be noted that approval for the construction of Phase 1 does not guarantee approval for Phase 2.

The landfill cells will be excavated to a depth of 6 m below the re-profiled surface levels following gravel extraction which gives a maximum excavation depth of 7.5 m below natural ground level. The existing in-situ soils following excavation will form the base of the cells with no synthetic or clay lining used.

The assessment of the Works Approval application is presented in Section 4 (Decision Table and supporting Appendix A). This includes but is not limited to an assessment of the suitability of containment provided by the cell design in the context of the proposed waste types and the sensitivity of the environmental setting.

Potential emissions associated with constructing a Class II landfill includes dust and noise. Although emissions to surface water and groundwater are generated during site operations (during and following waste placement), the risks are considered as part of landfill design and prior to construction. All of these emissions have been considered in the assessment of the landfill siting and design and associated potential risk to sensitive receptors.

Identified receptors in the vicinity of the new landfill have been described below:

- Five rural residences that are within one kilometre (km) to the south east of the new landfill area, the nearest being about 300 m away.
- The nearest surface water is Noneycup Creek which is located 500 m east of the new landfill area. The Noneycup Creek discharges into the Preston River, 3.5 km to the north.
- The new landfill area is located within the Donnybrook Water Reserve (a Protected Drinking Water Source Area- PDWSA). It is classified as a P3 water reserve under the Department of Water Priority Source Classification System.
- The new landfill area maybe above the Leederville Formation and Lower Leederville Formation aquifers, from which town water is abstracted at depths ranging from 15-64 m. A groundwater investigation (see Appendix A) undertaken by Engtech 2012, indicates that the depth to groundwater in the area of the landfill is approximately 60 m below ground level. Inferred groundwater flow direction is from the west to east.

It is considered that the landfill does not represent an unacceptable risk to public health.

It has been concluded that based upon the information provided in the Works Approval application, the design of the new landfill area may present an unacceptable level of risk to groundwater unless regulatory controls are imposed to mitigate that risk.



The regulatory controls imposed in the Works Approval include:

- reducing the size of the landfill extension area by approximately 50% to reduce the risk of the landfill extending into the contact point of the Leederville aquifer and the clayey regolith underlying the existing site;
- installing an additional two groundwater monitoring bores to ensure any baseline groundwater quality and downstream impacts from the landfill can be identified if they occur;
- requiring the installation of a leachate recovery sump in each constructed cell to allow extraction of leachate if volumes accumulate in the site to an extent that active extraction is necessary to mitigate risks to groundwater;
- requiring the Works Approval Holder to appoint a suitably qualified Hydrogeologist to conduct an investigation of the landfill extension area following excavation. The purpose of the investigation is to determine whether any shallow groundwater exists at the landfill that would increase leachate volumes and potentially provide a mechanism/pathway for leachate migration, and to verify whether the in-situ geology in the extension area is suitable to act as a landfill containment system as proposed in the works approval application.
- The Works Approval Holder is also required to provide to DER a report on the findings from the investigation. If the report identifies a hydrogeological setting/in-situ geology that suggest the new landfill area would not be suitable for the disposal of waste due to the risk presented to the environment, then a licence will not be granted to allow the acceptance of waste in the extension area unless further engineered mechanisms such as a landfill liner implemented by the Shire to mitigate this risk to acceptable levels. It should be noted that any change to the design of the landfill will need to be sought through an amendment to the works approval.
- Works Approval conditions for ambient groundwater monitoring and reporting requirements have also been included.

This decision has been made taking into account relevant DER published Guidance Statements. The decision is considered consistent with these documents as follows:

*Guidance Statement: Regulatory Principles* (October 2015): a risk based decision has been taken on this application consistent with this Guidance statement. Conditions have been set which are considered necessary to mitigate the risk to the environment to an acceptable level. Regulatory controls have been imposed to ensure there is sufficient evidence to demonstrate no unacceptable risk to the environment (ie the in-situ geology is suitable to contain landfill leachate) prior to authorising the disposal of waste.

*Guidance Statement: Setting Conditions* (October 2015): in accordance with this Guidance Statement, all conditions imposed on the works approval relate to the prevention, control, abatement or mitigation of pollution and environmental harm. Furthermore, all conditions are considered to meet the key requirements of conditions as set out in the Guidance Statement as being valid, enforceable, risk based, etc.

This amendment is a minor DER initiated amendment to correct the commencement date and expiry date.





## 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.

| DECISION TABLE                   |   |  |   |
|----------------------------------|---|--|---|
| Works Approval / Licence section | Condition number<br>W = Works Approval<br>L = Licence | Justification (including risk description & decision methodology where relevant)   | Reference documents   |
| General conditions               | W1.2.1-W1.2.6   | <p>Condition 1.2.1 requires the Works Approval Hold to construct the new landfill area in accordance with sections of the submitted documentation.</p> <p>Condition 1.2.2 allows the Works Approval Holder to construct all new landfill cells within the Phase 1 landfill area only. Following discussions between the Shire and DER in October 2015 it was agreed that in order to mitigate risk to the environment from potential emissions, the new landfill would be reduced in size from the original Works Approval application. The Shire confirmed on the 14 December 2015 that the new landfill would consist of the Phase 1 landfill area only.</p> <p>The Shire has identified in their application that an additional two more groundwater monitoring bores will be installed at the new landfill area. One groundwater monitoring bore will be installed upstream of the new landfill area with the other being installed downstream which is located in an easterly direction of the Premises (inferred groundwater flow direction). Condition 1.2.3 has been included in the Works Approval to ensure the Works Approval Holder constructs the two proposed groundwater monitoring bores. The two new bores are to be constructed before the placement of waste into the Phase 1 landfill area so background ambient groundwater samples can be taken and analysed. It is proposed to include the requirement for routine ambient monitoring of these bores during operation through a Licence amendment for the Landfill.</p> | <p>Application supporting documentation</p> <p><i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i></p> <p>Engtech Pty Ltd, Donnybrook Waste Management Facility – Groundwater Investigation, January 2012</p> <p>Cardno LanePiper Pty Ltd, Hydrogeological Assessment &amp; Bore Installation,</p> |



| DECISION TABLE                   |  |   |  |
|----------------------------------|--|---|--|
| Works Approval / Licence section | Condition number<br>W = Works Approval<br>L= Licence | Justification (including risk description & decision methodology where relevant)  | Reference documents  |
|                                  |  | <p>The Works Approval Holder is to construct the two new groundwater monitoring bores to a depth whereby representative groundwater samples can be taken for the purpose of analysis. This is required through condition 1.2.4 whereby the Works Approval Holder is to construct the bores in accordance the standard ASTM D5092-04(2010)e1 <i>Standard practice for design and installation of groundwater monitoring wells</i>;</p> <p>The anticipated depth is approximately 50- 60 mbgl where the clay soils meet bedrock.</p> <p>Condition 1.2.5 requires the Works Approval Holder to construct each landfill cell so the base of the cell is graded to an impervious (<math>\leq 1 \times 10^{-9}</math> metres per second) sump for the collection of leachates. The sump shall be designed with a capacity to store leachates generated during a one-off extreme rainfall event. Should the landfill licence be amended to allow the deposit of waste in the extension area it is likely that conditions will require the installation of a leachate monitoring bore in the extension area to allow monitoring of the leachate head in the site. An increasing leachate head can increase seepage through containment systems and needs to be effectively managed to ensure risks to groundwater do not increase. The sump is necessary to ensure leachate can be easily extracted from the landfill if required at a later date to mitigate risks to groundwater. As no leachate pond or other means of onsite leachate storage/evaporation has been proposed all excess collected leachate will need to be tankered offsite to a licensed liquid waste facility for disposal.</p> <p>Condition 1.2.6 requires the Works Approval Holder to employ the services of a suitably qualified hydrogeologist, following the excavation of the Phase 1 landfill area and prior to placing waste into that area, to</p> <p>(a) inspect the cell excavation to determine and document the presence of any shallow groundwater or any in-situ soil characteristics that would provide landfill leachate migration pathways off the site; and</p> <p>(b) take representative soil samples from the base and side walls of the excavation to determine the permeability of the in-situ soils.</p> | Donnybrook Waste Management Facility,<br>Goodwood Road,<br>Donnybrook,<br>September 2014 |



| DECISION TABLE                   |  |  |   |
|----------------------------------|--|--|---|
| Works Approval / Licence section | Condition number<br>W = Works Approval<br>L= Licence | Justification (including risk description & decision methodology where relevant)   | Reference documents   |
|                                  |  | Further details for the justification of these conditions are provided in Sections A3 and A4 of Appendix 1.  |   |
| <b>Emissions general</b>         | W - Not applicable                                   | <p><b>Emissions to groundwater and surface water</b><br/>Although these emissions are generated during site operations (during and following waste placement), the risks are considered as part of landfill design and prior to construction. The assessment of these emissions is presented in Sections A1 to A4 of Appendix A.</p> <p><b>Fugitive emissions</b><br/><br/>Consideration of any requirement for conditions relating to the control and/or monitoring of fugitive emissions during the operational phase of the site will be made when assessing the Licence amendment application for the Premises.</p> <p><b>Dust Emissions</b><br/><u>Emission description</u><br/><i>Emission:</i> Potential dust emissions from site preparation works, vehicle movement etc.<br/><i>Impact:</i> Fugitive dust emissions can impact on local air quality and cause nuisance to nearby residents located within 300 m from the Premises. Fugitive dust emissions can also adversely impact on adjacent vegetation (State Forrest) including any agricultural crops grown on land adjacent to the premises.<br/><i>Controls:</i> Access roads to be compacted, water cart to be used during dry periods and heavy traffic movements, speed limits on roads, daily assessment of dust generating risks and operations to be ceased in unfavourable conditions. Additionally, completed cells will be revegetated, thereby reducing soil that can generate dust in windy conditions.</p> | <p>Application supporting documentation</p> <p><i>Environmental Protection (Noise) Regulations 1997</i></p> <p><i>Environmental Protection Act 1986</i></p> <p><i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i></p> |



| DECISION TABLE                   |  |   |                     |
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| Works Approval / Licence section | Condition number<br>W = Works Approval<br>L= Licence | Justification (including risk description & decision methodology where relevant)  | Reference documents |
|                                  |  | <p><u>Risk Assessment</u><br/><i>Consequence:</i> Insignificant<br/><i>Likelihood:</i> Unlikely<br/><i>Risk rating:</i> Low</p> <p><u>Regulatory controls</u><br/>Fugitive dust emissions during the construction phase and operations can be sufficiently regulated under section 49 of the <i>Environmental Protection Act 1986</i>. No specified conditions for fugitive emissions have therefore been included in this Works Approval.</p> <p><u>Residual risk</u><br/><i>Consequence:</i> Insignificant<br/><i>Likelihood:</i> Unlikely<br/><i>Risk rating:</i> Low</p> <p><b>Odour Emissions</b><br/>No fugitive odour emissions are expected at the construction stage; therefore no conditions are required in the Works Approval.</p> <p><b>Noise Emissions</b><br/><u>Emission description</u><br/><i>Emission:</i> Noise emissions during landfill construction typically arise from vehicles on the premises undertaking earthworks. Noise from vehicles can include reversing beepers.<br/><i>Impact:</i> Nuisance noise to nearby residences.<br/><i>Controls:</i> Restricting the hours of the construction activities from 7am to 7pm Monday to Saturday. Ensuring all vehicles and equipment are regularly maintained.</p> <p><u>Risk assessment</u><br/><i>Consequence:</i> Minor</p> |                     |





| DECISION TABLE                   |  |  |                                      |
|----------------------------------|--|--|--------------------------------------|
| Works Approval / Licence section | Condition number<br>W = Works Approval<br>L= Licence | Justification (including risk description & decision methodology where relevant)   | Reference documents                  |
|                                  |  | <p><i>Likelihood: Unlikely</i><br/><i>Risk Rating: Low</i></p> <p><u>Regulatory controls</u><br/>No specific conditions are required in the Works Approval. The <i>Environmental Protection (Noise) Regulations 1997</i> apply.</p> <p><u>Residual risk</u><br/><i>Emission: Minor</i><br/><i>Impact: Unlikely</i><br/><i>Controls: Low</i></p>  |                                      |
| <b>Monitoring general</b>        | W2.1.1 to W2.1.4                                     | <p>Conditions 2.1.1 to 2.1.3 of the Works Approval are general requirements for undertaking monitoring.</p> <p>Condition 2.1.4 is included requiring the Works Approval Holder to undertake baseline groundwater monitoring. This is required to supplement the existing dataset in establishing the baseline groundwater quality prior to waste placement. Following the construction of the Phase 1 landfill area, the requirement for ongoing monitoring of these groundwater monitoring bores will be included in the Licence through a Licence amendment. The monitoring results will assist in identifying if impacts to groundwater have occurred from leachate emissions.</p> <p>The monitoring parameters applied through condition 2.1.4 includes metals, chloride, nitrogen, nitrate, pH, total dissolved solids and major ions, and have been established as standard indicators that leachate emissions from landfill operations may have impacted the groundwater.</p> | Application supporting documentation |
| <b>Information</b>               | W3.1.1- W3.1.3                                       | A condition for the submission of a compliance document at the completion of the works has been included in the Works Approval. The compliance document must be accompanied by a report following the construction of the Phase 1 landfill area. The report is to contain monitoring data required by condition 2.1.4, results of the testing required by  | N/A                                  |



| DECISION TABLE                   |  |  |                     |
|----------------------------------|--|--|---------------------|
| Works Approval / Licence section | Condition number<br>W = Works Approval<br>L= Licence | Justification (including risk description & decision methodology where relevant)   | Reference documents |
|                                  |  | condition 1.2.5, copies of surveys and photos of the constructed Phase 1 landfill area.  |                     |
| Works Approval Duration          | N/A  | The DER considers that the controls imposed within this Works Approval and the Shire's commitments will provide sufficient protection of the environment and that the risks can be appropriately managed. The Works Approval has been granted for a period of five years noting that gravel extraction may not be complete until 2019. | N/A                 |



## 5 Advertisement and consultation table

| Date       | Event   | Comments received/Notes   | How comments were taken into consideration   |
|------------|---|---|--|
| 20/01/2014 | Application advertised in West Australian (or other relevant newspaper) | None  | N/A  |
| 26/02/2014 | Application referred to Department of Water                             | Comment received 24/3/2014. DOW provided advice on groundwater and surface water considerations.  | Further investigation undertaken by the Shire of Donnybrook-Balingup and results provided to DER are outlined in this document.  |
| 31/3/2014  | DER meeting with DOW to discuss Works Approval application              | DoW remains of the view that to date, information provided by the proponent on the current status of / potential for leachate contamination from the Facility, and/or the extension, on the Donnybrook Water Reserve is inconclusive.   | Further investigation undertaken by Shire of Donnybrook-Balingup and results provided to DER are outlined in this document.  |
| 7/08/2015  | Application referred to Department of Water for further comment.        | Comment received 4/09/2015. DOW concluded that the following had not been adequately investigated: <ul style="list-style-type: none"><li>the presence (or not) of any shallow groundwater or surface water interactions, and</li><li>the permeability of the soils underlying the Facility.</li></ul> | Works Approval conditions imposed to require a Hydrogeologist is employed to undertake an inspection of the Phase 1 landfill area following excavation and prior to waste being deposited. The inspection is to determine the presence of any shallow groundwater or conditions that would allow migration of leachates off site, and permeability testing of the in-situ soils. If the report identifies hydrogeological settings (i.e. shallow ground water, gravel lenses) that suggest the new landfill area would not be suitable for the disposal of waste, then a licence will not be granted unless additional suitable engineered mechanisms are in |



| Date       | Event  | Comments received/Notes   | How comments were taken into consideration  |
|------------|--|---|---|
|            |  |   | place.  |
| 13/10/2015 | DER site visit with Shire of Donnybrook-Balingup   | Shire advised the landfill expansion area and the depth of the cell could be reduced to mitigate risk.  | Works Approval conditions authorised the construction of the Phase 1 landfill area only. DER has determined the reduction in depth of the cell is not necessary. Further explanation is provided in Appendix A of this document.  |
| 14/12/2015 | Phone conversation with Shire of Donnybrook-Balingup, Manager Development and Environmental Services Leigh Guthridge | The Shire of Donnybrook-Balingup has revised the planned works in the original Works Approval application and has decided to construct the Phase 1 landfill area only.  | Works Approval conditions authorised the construction of the Phase 1 landfill area only.  |
| 25/02/2016 | Proponent sent a copy of draft instrument  | <p>Comments received 21/03/2016</p> <ol style="list-style-type: none"><li>1. Lack of assessment criteria and thresholds for the Geohydro report</li><li>2. What depth of static head on the leachate in the sump would be considered acceptable, if the Shire have to pump the leachate from the cell, a leachate lagoon will need to be constructed?</li></ol> | <ol style="list-style-type: none"><li>1. The purpose of the investigation is to verify the assumptions in the application-that the environmental conditions are as described. If environmental setting is not consistent with the application then further engineering mechanisms may be required to be proposed in the licence application- no changes required.</li><li>2. The leachate sump is a contingency measure in the event leachate accumulates in the site there no static head limit is proposed at this stage. Should leachate accumulate in the cell at volumes that may present an unacceptable risk then a strategy for managing the leachate will need to be developed. This could</li></ol> |





| Date | Event | Comments received/Notes  | How comments were taken into consideration  |
|------|-------|--|---|
|      |       | <p>3. Increase the design capacity to 7,000tpa to reflect the annual quantities received.</p> <p>4. Add Cat 62 to licence.</p> <p>5. Interpretation-Annual period; change reporting year to 1 July-30 June as the Shire has to compile data for the annual survey.</p> <p>6. Condition 1.2.4-what maximum depth does the borehole need to be drilled and what advice if no water is found?</p> | <p>include the collection and tankered offsite disposal or onsite storage/evaporation pond. No changes required.</p> <p>3. Design capacity changed to reflect that on amended operating licence L7084/1997/1 being 6,700 tonnes per annual period for category 64.</p> <p>4. Category 62 was added to L7084 through an amendment on 4/2/2016. This works approval is relevant to the landfilling activity (Category 64) so only this category is on the cover page of the works approval. 62 added to decision document for clarity.</p> <p>5. The Annual Period on W5577/2013/1 is related to the frequency of monitoring in Table 2.1.1 .Annual Period has been changed to "Annually" for clarity purposes. The Annual Period relating to reporting is on operating licence L7084/1997/1 and is defined as 1 January until 31 December.</p> <p>6. Bores should be drilled to a depth of approximately 60mbgl to where the clay soil meets bedrock.If bores drilled to this depth do not</p> |



| Date       | Event                            | Comments received/Notes  | How comments were taken into consideration   |
|------------|----------------------------------|--|--|
|            |                                  | <p>7. Condition 1.2.5-leachate sump/s. Define impermeable, ie is this to be with a liner or compacted clay, what capacity, size etc?</p> <p>8. Condition 1.2.6-There is no specification about the permeability to be met.</p> | <p>encounter water intrusion, then they should be abandoned and closed in accordance with bore guidelines-no change required.</p> <p>7. In the definitions 'low permeability' means hydraulic conductivity of <math>\leq 1 \times 10^{-9}</math> metres per second. "low permeability" has been changed to "impermeable" for added clarity. The leachate sumps may be constructed of any material that is able to meet this permeability.</p> <p>8. Statement noted. 1.2.6 requires permeability samples of the insitu soil to be taken for verification purposes, no permeability specification is given for the base and sides of the landfill cells-only for the leachate sump. The info from the permeability tests will be used to determine whether the conceptual model put forward in the application is accurate. Where the results identify anomalies, the results will be used to assess the risk to the environment from leachate and whether engineering measures are required to mitigate the level of risk.</p> |
| 18/04/2016 | 21 day amendment package sent to | Signed waiver received 4/05/2016   |  |



| Date | Event     | Comments received/Notes | How comments were taken into consideration |
|------|-----------|-------------------------|--|
|      | proponent |                         |  |



## 6. Risk Assessment

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

**Table 1: Emissions Risk Matrix**

| 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    |





## 7. Appendix A

### A1 – New Landfill Infrastructure

The landfill area will be excavated to a depth of six metres below the re-profiled surface levels following gravel extraction. The existing soils following excavation are intended to form the base of the cells with no synthetic or clay lining of the cells proposed.

A site meeting was held between the Shire and DER on the 13 October 2015 to discuss the proposal. Discussions at the meeting included reducing the overall size of the landfill area and reducing the depth of the constructed cells to a depth of 4 m. The Shire has since advised DER on the 14 December 2015 that the reduced landfill area for the purposes of this Works Approval application will now consist of the Phase 1 landfill area only. The approximate dimensions of the Phase 1 landfill area is 200 m in length to 80 metres wide.

Further consideration has been given to reducing the depth of the Phase 1 landfill area, and based upon the submitted information in the application, the depth of the landfill area will remain as per the original Works Approval application at 6 m deep. This decision was based upon the inferred depth to groundwater at this Premises being greater than 50 m below ground level and the soils mainly consisting of clays commencing at about 2 m below ground level. Conditions requiring the inspection of the in-situ geology and presence of groundwater by a hydrogeologist will provide evidence of whether the cell is suitable for the disposal of waste with no further lining system.

Testing of the permeability of the clay soils at the new landfill area found  $1.4 \times 10^{-7}$  m/s and  $1.0 \times 10^{-6}$  m/s at two test sites, however these tests were only conducted at a depth of 300mm following the gravel extraction and may not represent the permeability of the soils at the base of the proposed cells.

The Phase 1 landfill area will be developed in three stages and progressively capped and rehabilitated.

The Phase 1 landfill area will have a raised bund constructed inside the fenced boundary to divert any off-site stormwater away from the facility. Cleanwater drains will be constructed around the perimeter of the new cells at the base of the re-profiled batter to direct stormwater falling on the re-profiled batters to the existing area's clean stormwater drains and ultimately diverted off-site.

The existing Landfill area currently has four groundwater monitoring bores that are monitored on an annual bases for a range of parameters but this is not currently a Licence requirement. The new landfill area has two shallow groundwater monitoring bores installed however these are not suitable for groundwater analysis as they do not intersect the local groundwater. The Shire has proposed two new additional deep groundwater monitoring bores at the new landfill area. The installation of these bores has been included as a Works Approval condition. The two new bores are to be constructed before the placement of waste into the Phase 1 landfill area so background ambient groundwater samples can be taken and analysed. A requirement for routine ambient monitoring of these bores during operation through will be imposed through an amendment to the landfill licence.



## A2 - Environmental Setting

### Human Populations

There are five semi-rural type properties within one km of the new landfill area with the nearest being approximately 300 m away. The area where these properties are located is zoned 'Priority Agriculture' under the Shire of Donnybrook – Balingup Local Planning Scheme No.7. The property owners were not contacted during the application process, however no comments were received by DER when the Work Approval application was advertised in the West Australian on 21 January 2014. Additionally, following improvements at the adjacent Landfill there has not been any complaints received by the Shire for the past 5 years.

### Surface Water

The nearest surface water is Noneycup Creek which is located 500 m east of the new landfill area. The Noneycup Creek discharges into the Preston River, 3.5 km to the north. According to the Department of Water (2009) the Noneycup Creek is considered to recharge the Leederville Formation which is used to supply water to the Town of Donnybrook.

There is a gradual slope across the new landfill area from the south-west to the north-east with the topography in this area continuing to slope north-east off-site towards Noneycup Creek. The natural topography of the new landfill area has been altered by clearing and gravel extraction however this area is not believed to intersect any drainage lines.

### Groundwater

A hydrogeological assessment of the Landfill (adjacent to the new landfill area) was undertaken by GHD in 2010 but was limited by the lack of water in the existing groundwater monitoring bores. Based on groundwater levels reported in off-site bores, GHD inferred that a perched water table may exist above the clay soil and anticipated that groundwater lies in the basement rock at approximately 35-55 m bgl and flows in a north-easterly direction with the topography across the area. GHD recommended the installation of new groundwater monitoring bores so a more detailed assessment of the area's hydrogeology could be undertaken.

Following GHD's recommendations, the Shire installed four new deep groundwater monitoring bores (depth to 60 mbgl) at the Landfill in December 2011 and engaged Engtech Pty Ltd (Engtech) to undertake a comprehensive groundwater investigation in 2012 based on the data from the new bores (Engtech 2012). However, the groundwater monitoring of these bores has yielded little information as most have been dry or contain insufficient water sampling volumes. Engtech did not consider shallow perched aquifers as part of this groundwater investigation. Engtech found through installation of the groundwater monitoring bores that the local geology of the specific site comprised of various clays down to 60 m bgl with small amounts of groundwater present at 60 m bgl.

This investigation of groundwater had not considered shallow perched aquifers and was considered inadequate to accurately understand surface water and groundwater interactions at the new landfill. Therefore at the request of the DER and the Department of Water (DoW), the Shire undertook a hydrogeological assessment and bore installation in 2014 (Cardno, 2014). Shallow groundwater bores were drilled to a depth of 7m (1m below the depth of the



proposed cells – DoW advised that this depth was sufficient to determine the presence of shallow/perched groundwater (personal communication, Brendan Kelly, Department of Water, 10 December 2014). DoW's advice to DER was the report demonstrated that there is little shallow groundwater present at the new landfill area. Given the absence of shallow groundwater it is considered by DoW that there is a low potential for landfill generated leachate to migrate within shallow sediments to the nearby surface water system.

### Advice from Department of Water (DoW)

On 4 August 2015 DoW responded to DER's request for further advice on the Works Approval application. A summary of DoW's advice is provided below:

- DoW noted that the Donnybrook Waste Management Facility is located within a priority 3 (P3) area of the Donnybrook Water Reserve, and is specifically detailed as a potential drinking water quality risk in the *Donnybrook Water Reserve drinking water source protection plan* (DoW, 2009);
- Being a Class II landfill it would normally be an incompatible land use as specified in the DoW's Water Quality Protection Note 25: Land use compatibility in Public Drinking Water Source Areas (DoW, 2004). However, DoW recognised the right of existing approved land uses to continue to operate within the water reserve that has been established to protect the underlying Leederville aquifer;
- DoW undertook a risk analysis of the proposed expansion, as covered under the Works Approval application. DoW concluded that the consequence of Donnybrook town water supply being contaminated would pose a significant threat to public health as such is a 'major' consequence. Due to the proximity of the facility to the towns water supply bores, contamination could occur at some time, and as such the likelihood was determined as 'possible'. The overall risk rating result in a 'high' risk and would require controls to be implemented to reduce the residual risk;
- Despite the facility being an incompatible land use and posing a high risk of contamination to underlying groundwater, DoW accepted that the expansion may be considered, if the design and implementation resulted in an improvement in the management of facility and reduced the risk to water quality from the overall operations;
- To be able to assess the risk posed by the facility with greater confidence DoW recommended, through its advice to the applicant, that further investigations in relation to the presence (or not) or any shallow groundwater/surface water interactions, and the permeability of the underlying geology;
- DoW reviewed the technical advice provided in DER's Technical Expert Report (August 2015), revisited previous technical reports, assessments and previous advice provided by DER in relation to the proposed landfill expansion. Based on this review DoW concluded that neither of the following matters have been adequately investigated or proven;
  - a) the presence (or not) of any shallow groundwater or surface water interactions; and
  - b) the permeability of the soils underlying the Facility.
- Based on the circumstances of the proposal, and the outcome of the above review DoW recommended that in order to mitigate the identified high risk rating, the following management measures should be considered in relation to the works approval application;



- a) the large expansion area be adequately lined, which may be achieved through installation of a manufactured liner or remoulding of the insitu clay to sufficient depth and consistency (as determined by DER); and
- b) a leachate collection, storage, treatment and management system (as determined by DER).

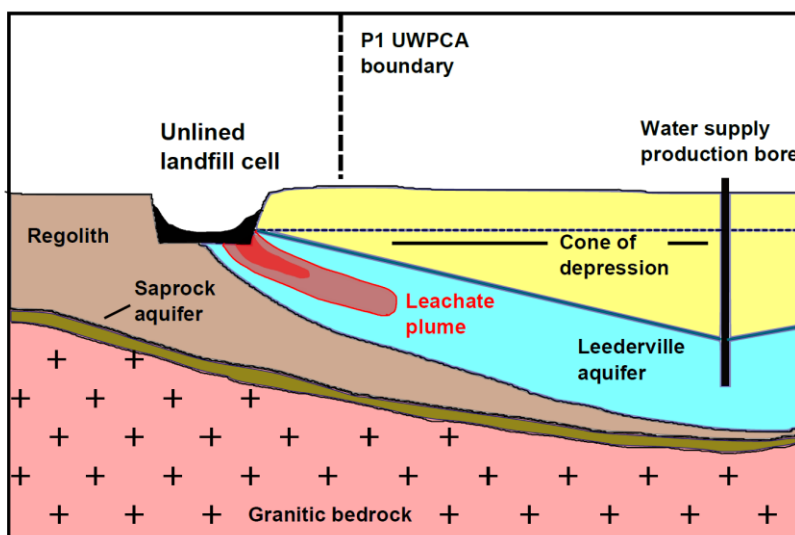
### DER's Technical Expert Report (August 2015): Hydrogeology and Groundwater

The Technical expert Report provided by DER's Principal Hydrogeologist identified the following:

Regional geological mapping (Wilde and Walker, 1982) indicates that although the landfill site is likely to be underlain by granitic bedrock, the site is located within close proximity (possibly within 100-200 metres) to subcrops of sediments of Cretaceous age that are likely to be of marine origin. These sediments consist of interbedded sandstones and shales and form an important aquifer (the Leederville aquifer) which provides the public water supply for Donnybrook within an area designated as a P1 Underground Water Pollution Control Area (UWPCA) by the Department of Water.

Figure 1 shows a schematic south to north geological cross-section from the landfill to the water supply production bores in the Donnybrook town site and suggests that the landfill site is essentially sitting on an ancient shoreline where the exact boundary between marine sediments that comprise the Leederville aquifer and the clayey regolith that overlies granitic bedrock is not known with a high degree of certainty.

Drilling that has been undertaken at the Donnybrook landfill site has shown that the current unlined cell is underlain by clayey regolith materials that comprise a weathered profile on granitic bedrock. Little groundwater has been detected in existing monitoring bores that have been constructed at the site, although it is likely that higher yields of groundwater will occur in partially weathered rock at the base of the weathered profile at this site (the saprock aquifer; see Fig. 1).





*Figure 1. Schematic south to north geological cross section showing the relationship between the location of the landfill site and water supply production bores within the Donnybrook town site in a scenario where there is direct hydraulic contact between a landfill cell and the Leederville aquifer.*

These observations together with an apparent absence of groundwater contamination by landfill leachate being detected in monitoring of the quality of the raw water (i.e. before treatment for water supply from the Donnybrook production bores) suggest that the existing landfill cell is wholly underlain by a granite weathered profile and that there is no hydraulic connection between this site and sediments of the Leederville aquifer. This is also supported by groundwater monitoring at the site that indicates that the direction of groundwater flow within clayey regolith beneath the current landfill site is to the south east, away from production bores in Donnybrook.

### **Groundwater Quality**

Groundwater monitoring results for the Landfill Licence L7084/1997/15 provide limited results of groundwater quality due to there being insufficient water to sample or no groundwater able to be brought to the surface. Only one bore was able to be sampled at the time due to there being insufficient water to sample in the other three bores. Of the groundwater sampled, the results indicated there was no evidence of impacts from the operations of the existing Landfill. This unlined facility has been in operation for over 50 years.

## **A3 - Emissions to Groundwater**

### Emission Description

Although this emission is generated during site operations (during and following waste placement), the risks are considered as part of landfill design and prior to construction. This is because leachate seepage to groundwater from landfilling operations may arise with the absence of a synthetic or clay liner and a leachate recovery system.

Landfill leachate from a putrescible landfill mainly consists of dissolved organic matter and inorganic compounds such as sulphates, chlorides and ammonium salts. Leachate may also contain some heavy metals including lead, nickel, copper, hydrocarbons and synthetic organic compounds.

### Impact

Potential contamination of groundwater receptors. This includes the Leederville aquifer which provides the public water supply for the Town of Donnybrook.

### Control

Two groundwater monitoring bores installed to a depth of 7 m at the new landfill area indicated an absence of shallow groundwater. Bore logs from the drilling also indicated that the final 5 m of the 7 m strata consisted of clay soils.

Field testing for hydraulic properties of the clays found at the landfill site following the surface gravel extraction indicate that these materials have a low hydraulic conductivity ( $1.0 \times 10^{-6}$  m/s to  $1.4 \times 10^{-7}$  m/s).





Deep drilling that has been undertaken at the adjacent Donnybrook waste management facility has shown that the area is underlain by clayey regolith materials that are up to 60 metres thick and it is inferred by the Shire in their application that the new landfill area has a similar soil structure.

The Shire operate a three bin verge collection system whereby putrescible wastes are sent for composting and paper and cardboard for recycling instead of burial at the landfill. Only residual wastes such as plastics and inert materials are received for burial. Therefore the likelihood of pollution occurring has been decreased by reducing the strength of the leachate produced at the landfill.

Progressive rehabilitation of each stage within the Phase 1 landfill area will take place. This includes capping of each completed cell to reduce the likelihood of leachate emissions.

#### Risk Assessment

*Consequence:* Major

*Likelihood:* Possible

*Risk Rating:* High

#### Regulatory Controls

The primary controls limiting leachate emissions to groundwater are the correct design and construction of the landfill cells (Conditions 1.2.1, 1.2.2, 1.2.5, 1.2.6 and 3.1.1 to 3.1.3 of the Works Approval). These regulatory controls have been developed in conjunction with DER's principal hydrogeologist.

Condition 1.2.2 of the Works Approval requires that all landfill cells are constructed within the boundary of the revised landfill area which is identified as the Phase 1 landfill area. This will reduce the size of the landfill area by approximately 50% from the original Works Approval application. This will reduce the size of the pollution source and therefore reduce risks to the environment and public health.

Conditions 1.2.3 and 1.2.4 of the Works Approval require the installation of groundwater monitoring bores during construction to determine the natural variability of groundwater quality near the proposed landfill site prior to the deposition of waste. A requirement for routine ambient monitoring of these bores during operation will be imposed through an amendment to the landfill licence. Establishing the background groundwater quality prior to waste disposal and then ongoing monitoring during operation will assist in determining if leachates are impacting on groundwater and whether future corrective actions are required.

Condition 1.2.5 requires the Works Approval Holder to construct each landfill cell so the base of the cell is graded to an impervious sump for the collection of leachates. The sump shall be designed with a capacity to store leachates generated during a one-off extreme rainfall event.

The strength of the leachates generated from the operation of the Landfill are expected to be significantly reduced as a consequence of the Shire operating a three bin verge collection system whereby putrescible wastes are sent for composting and paper and cardboard for recycling instead of burial at the landfill. However, minor amounts of putrescible wastes and other potentially contaminating types of wastes may still enter the landfill waste stream through accidental or intentional disposal.



Should the landfill licence be amended to allow the deposit of waste in the extension area it is likely that conditions will require the installation of a leachate monitoring bore in the extension area to allow monitoring of the leachate head in the site. An increasing leachate head can increase seepage through containment systems and needs to be effectively managed to ensure risks to groundwater do not increase. The sump is necessary to ensure leachate can be easily extracted from the landfill if required at a later date to mitigate risks to groundwater.

Condition 1.2.6 requires the Works Approval Holder to employ the services of a suitably qualified Hydrogeologist, following the excavation of the Phase 1 landfill area to:

- (a) inspect the cell excavation to determine the presence of any shallow groundwater or any hydrogeological settings that may allow for the migration of landfill leachates offsite; and
- (b) take representative soil samples from the base and inside walls to determine the permeability of the in-situ soil.

The Works Approval Holder is required to provide to DER a report (condition 3.1.3) on the findings from the investigation. If the report identifies hydrogeological settings that would allow movement of leachate off-site or the permeability of the in-situ soil is not suitable to act as a barrier to slow the migration of leachate offsite, a licence for the disposal of waste into this area will not be granted unless DER approved engineered mechanisms are installed by the Shire.

#### Residual Risk

*Consequence:* Major

*Likelihood:* Unlikely

*Risk Rating:* Moderate

## **A4 – Emissions to Surface Water**

### Emission Description

Although this emission is generated during site operations (during and following waste placement), the risks are considered as part of landfill design and prior to construction. This is because leachate seepage to surface water from landfilling operations may arise with the absence of a synthetic or clay liner and a leachate recovery system.

With the presence of deep clays under the Premises preventing infiltration of the leachate, the leachate may accumulate and move in a lateral direction towards the Noneycup Creek.

Landfill leachate from a putrescible landfill mainly consists of dissolved organic matter and inorganic compounds such as sulphates, chlorides and ammonium salts. Leachate may also contain some heavy metals including lead, nickel, copper, hydrocarbons and synthetic organic compounds.

### Impact

Potential contamination of surface water receptors. The nearest surface water is Noneycup Creek which is located 500 m east of the new landfill area. The Noneycup Creek discharges into the Preston River, 3.5 km to the north. According to the Department of Water (2009) the Noneycup Creek is considered to recharge the Leederville Formation which is used to supply water to the Town of Donnybrook.



### Controls

Two groundwater monitoring bores installed to a depth of 7 m at the new landfill area indicated an absence of shallow groundwater and it was considered by DOW (2009) that there is a low potential for landfill generated leachate to migrate within shallow sediments to the nearby Noneycup Creek.

Field testing for hydraulic properties of the clays found at the new landfill site following the surface gravel extraction indicate that these materials have a low hydraulic conductivity ( $1.0 \times 10^{-6}$  m/s to  $1.4 \times 10^{-7}$  m/s). These low permeable soils are expected to be present in the new landfill cell walls therefore reducing lateral flow of landfill leachates towards the Noneycup Creek.

The Shire operate a three bin verge collection system whereby putrescible wastes are sent for composting and paper and cardboard for recycling instead of burial at the landfill. Only general wastes like plastics and inert materials are received for burial. Therefore the likelihood of pollution occurring has been decreased by reducing the strength of the leachate produced at the landfill.

The new cell will initially be below ground (6 m deep) and provide self-containment for any waste contaminated run-off.

A raised bund constructed from low permeability soil (clay) will be constructed along the ridge of the batter down to the Phase 1 cells. This prevents clean stormwater discharging into the waste disposal area and diverts the uncontaminated stormwater run-off away from the premises.

Progressive rehabilitation of each stage within the Phase 1 landfill area will occur to reduce the likelihood of stormwater becoming contaminated through contact with wastes.

### Risk Assessment

*Consequence:* Major

*Likelihood:* Unlikely

*Risk Rating:* Moderate

### Regulatory Controls

The primary controls limiting leachate emissions to surface water are the correct design and construction of the landfill cells.

Condition 1.2.1 of the Works Approval requires the Works Approval Holder to construct the new landfill area in accordance with sections 3.3 and 3.5 of the Donnybrook Waste Management Facility Works Approval application (2013). A construction requirement of section 3.3 (Phase 1) is the cells will be excavated to a depth of 6 m which will provide self-containment for any contaminated stormwater therefore reducing the potential of any run-off discharging to surface waters located off-site. A requirement of section 3.5 is the construction of a raised bund along the ridge of the batter down to the Phase 1 cells. The bund is to prevent clean stormwater run-off discharging into the cells which could reduce the cell capacity and cause overtopping with contaminated stormwater which could discharge off-site. Also, preventing the entry of stormwater into the cells will reduce the quantity of leachate generated thereby reducing the pollution source.



Condition 1.2.6 requires the Works Approval Holder to employ the services of a suitably qualified Hydrogeologist, following the excavation of the Phase 1 landfill area to inspect the cell excavation to determine the presence of any shallow groundwater or any soil characteristics that may allow for the lateral migration of landfill leachates offsite to the Noneycup Creek.

This condition has been included in the Works Approval based upon DoW and DER expert advice which identified uncertainties of whether shallow groundwater maybe present and if there is a high permeability geology present that may act as pathways to transfer leachate from the Premises to the Noneycup Creek which is 500 m away.

The Works Approval Holder is required to provide to DER a report (condition 3.1.3) on the findings from the investigation and the suitability of the in-situ soils to manage leachate migration to prevent groundwater contamination.

Residual Risk

*Consequence:* Major

*Likelihood:* Unlikely

*Risk Rating:* Moderate

## A5 - References

Cardno LanePiper Pty Ltd, *Hydrogeological Assessment & Bore Installation*, Donnybrook Waste Management Facility, Goodwood Road, Donnybrook, September 2014

Engtech Pty Ltd (2012), *Groundwater Investigation – Donnybrook Waste Management Facility*, prepared for the Shire of Donnybrook-Balingup

WA Department of Water (DOW), Water resource protection series, *Donnybrook Water Reserve drinking water source protection plan*, Report No. 102, June 2009

Wilde, S.A. and Walker, I.W., 1982. *Explanatory Notes on the Collie Geological Sheet*. Geological Survey of WA 1: 250 000 Geological Series Explanatory Notes. The explanatory notes and associated geological map are available from web site [www.dmp.wa.gov.au](http://www.dmp.wa.gov.au)