Application for Licence

Division 3, Part V *Environmental Protection Act 1986*

Licence Number	L9089/2017/1
Applicant	Opalvale Pty Ltd
ACN	106 512 892
File Number	DER2017/001530
Premises	Salt Valley Road Class II Landfill Chitty Road, HODDYS WELL WA 6566 Part of Lot 11 on Deposited Plan 34937 Certificate of Title Volume 2535 Folio 391 As defined by the coordinates in Schedule 1 of the Licence
Date of Report	5 February 2019
Status of Report	Final

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Definitions of terms and acronyms

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

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
Applicant	Opalvale Pty Ltd
Application	the licence application submitted by the Applicant for the proposed operation of a Class II landfill.
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CS Act	*Contaminated Sites Act 2003* (WA)
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
Discharge	has the same meaning given to that term under the EP Act.
DIWA	Directory of Important Wetlands of Australia
DWER	Department of Water and Environmental Regulation As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER). DWER was established under section 35 of the *Public Sector Management Act 1994* and is responsible for the administration of the *Environmental Protection Act 1986* along with other legislation.
EFN	Environmental Field Notice
Emission	has the same meaning given to that term under the EP Act.
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986* (WA)
EPN	Environmental Prevention Notice
EP Regulations	*Environmental Protection Regulations 1987* (WA)
GCL	geosynthetic clay liner
HDPE	high density polyethylene
Landfill Definitions	means the document titled “Landfill Waste Classification and waste Definitions 1996” published by the CEO as amended from time to time.
Landfill Management Plan	means the document titled Opalvale Salt Valley Road Class II Landfill. Lot 11 Chitty Road, Toodyay. Landfill Management Plan. Prepared for Opalvale Pty Ltd, by IW Projects Pty Ltd. Final Rev 4. Dated 9 January 2019.
LLDPE	linear low-density polyethylene

Term	Definition
m^3	cubic metres
mbgl	metres below ground level
mg/L	milligrams per litre
Minister	the Minister responsible for the EP Act and associated regulations
NEPM	National Environment Protection Measure
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
Occupier	has the same meaning given to that term under the EP Act.
PM	Particulate Matter
PM_{10}	used to describe particulate matter that is smaller than 10 microns (µm) in diameter
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Primary Activities	as defined in Schedule 2 of the Issued Licence
Risk Event	As described in *Guidance Statement: Risk Assessment*
µg/m^3	micrograms per cubic metre
µg/L	micrograms per litre

1. Purpose and scope of assessment

The Salt Valley Road Landfill (the Premises) is located at 11 on Plan 34937 Chitty Road, Hoddy's Well WA 6566. Following construction of the landfill (under works approval W5800/2015/1), Opalvale Pty Ltd (the Applicant) has applied for a licence under the *Environmental Protection Act 1986* (WA) (EP Act) to operate a Category 64 Class II putrescible waste landfill at the Premises.

This Decision Report assesses the potential risks to the environment and public health from emissions and discharges during the operation of Cell 1 of the Class II putrescible landfill at the Premises.

1.1 Application details

On 25 August 2017, the Applicant submitted a licence application to the Department of Water and Environmental Regulation (DWER) for the issue of a new licence to operate a Category 64 putrescible landfill at the Premises. The application is limited to:

- Operation of Cell 1 landfill;
- Operation of Leachate Pond No. 1 and No. 2; and
- Operation of associated infrastructure (ablutions, internal roads and stormwater drainage).

The application was validated in late August. Supplementary information relating to the application was received in October 2017 and December 2018. It is noted that, as a result of amendments made to the works approval for the construction of Cell 1 of the landfill, this licence application assessment was placed on hold between January and October 2018.

The proposed licence Category, as defined by Schedule 1 of the *Environmental Protection Regulations 1987* (WA) (EP Regulations) is described in **Table 2**. Operation of the Stage 1 facilities, which include Cell 1, is proposed over 12 years, commencing as soon as is practicable on issue of the licence.

Table 2: Proposed Prescribed Premises Category

Classification of Premises	Description	Proposed Premises throughput capacity
Category 64	Class II or III putrescible landfill: (a) 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	150 000 tonnes per annual period

Table 3 lists the documents submitted by the Applicant during the assessment process, with full references provided in **Appendix 1**.

Table 3: Documents and information submitted during the assessment process

Document/information description	Date received
Application form and supporting information (IWP, 2017) including: • Groundwater Monitoring Reports (Stass, 2015; and Stass, 2016); • Technical Studies to support Landfill Design (Golder, 2014); • Landfill Management Plan; • Construction Specifications and CQA Plan; and • Environmental Noise Assessment (Herring Storer, 2014).	25 August 2017
Stass Environmental groundwater monitoring field notes	16 October 2017
Stass Environmental groundwater monitoring bore details, and data summary.	18 October 2017
Updated groundwater monitoring summary (Stass, 2018)	30 November 2018
Additional information including: • Company and premises lease information; • Supplementary surface water management information; • Liner integrity assessment (Golder, 2018); and • Confirmation of weighbridge location map.	6 December 2018 (with lease information further updated on 17 December 2018)

1.2 Stakeholder consultation

The application was initially advertised for public comment in early September 2017 for a period of 21 days. Following recommencement of the licence application assessment in 2018 (refer to Section 2 for details) the application was re-advertised in November 2018. Advertisement details for the two rounds of consultation are described in **Table 4**.

Table 4: Advertisement details for consultation

Advertisement Round	Advertisement forms	Advertisement Dates
Round 1	DWER website, and the West Australian and Avon Valley Advocate newspapers	4-6 September 2017
Round 2	DWER website, and the West Australian and Avon Valley Advocate newspapers	12 to 19 November 2018

All previous stakeholders that made submissions in regards to the works approval application were contacted with a direct interest letter on the 4 September 2017. These stakeholders, along with any new stakeholders who made submissions as part of the first round of advertising were re-contacted with a direct interest letter or email during the second round of advertising.

All submissions relevant to the scope of this assessment were considered as part of this assessment. A summary of all submissions received from stakeholders is included in **Appendix 2**.

2. Background

Lot 11, on which the Premises is located, is approximately 619 hectares (ha) in size, and forms part of a large farming property which is largely cleared of native vegetation. The Lot has been used historically for farming (animal grazing) and extraction of clay for the production of bricks and tiles. The landfill is constructed within Williamson's Pit, a clay extraction pit from which over 1,000,000 m^3 of clay has been removed over the period of use.

Stage 1 of the Class II landfill at Salt Valley Road Landfill was approved for construction under works approval (W5800/2015/1) and subsequent Amendments No. 1 and No. 2. Stage 1 of the landfill comprises six (6) Cells located in the eastern portion of the allocated landfill footprint. Cell 1 of Stage 1 was constructed in March 2016. Compliance to the works approval and Amendment No. 1 and No. 2 was assessed by DWER and was finalised on 6 December 2018 with assessment finding the Applicant in compliance with the conditions of the regulatory controls contained in the approval and subsequent amendments.

This licence application assessment is for the operation of Cell 1 only. Approval to operate future cells constructed under Stage 1 will be subject to licence amendments, following construction of additional cells under works approval W5800/2015/1 and associated Amendment Notices, for the Stage 1 facility. Prior to assessment of licence amendment for each cell, the Applicant will be required to demonstrate compliance with the conditions of the works approval (W5800/2015/1) and subsequent Amendments No. 1 and No. 2

3. Overview of premises

3.1 Premises location and boundary

The Premises is located on a small portion of Lot 11 on Plan 34937 Chitty Road, Hoddy's Well within the Shire of Toodyay. The landfill is sited within Williamsons Clay Pit, situated approximately 1.25 kilometres (km) to the east of Chitty Road and 3 km to the southeast of the site entrance at of Salt Valley Road.

The Premises boundary is defined by the coordinates in **Table 5** and shown on **Figure 1**. In **Figure 1**, the red line depicts the Premises Boundary and the pink line depicts the Lot boundary.

The Premises is located in the southeast corner of Lot 11 and is approximately 47.7 ha in size and includes the Stage 1 landfill area (10 ha) and associated operational areas (site access rods, and other infrastructure).

Table 5: Premises boundary coordinates

Point	Easting	Northing
1	449175.810	6496412.485
2	449650.350	6496595.722
3	449875.060	6496402.043
4	449996.452	6496319.074
5	450239.200	6496015.367
6	450163.157	6495798.196
7	449827.189	6495823.471
8	449576.119	6495911.384

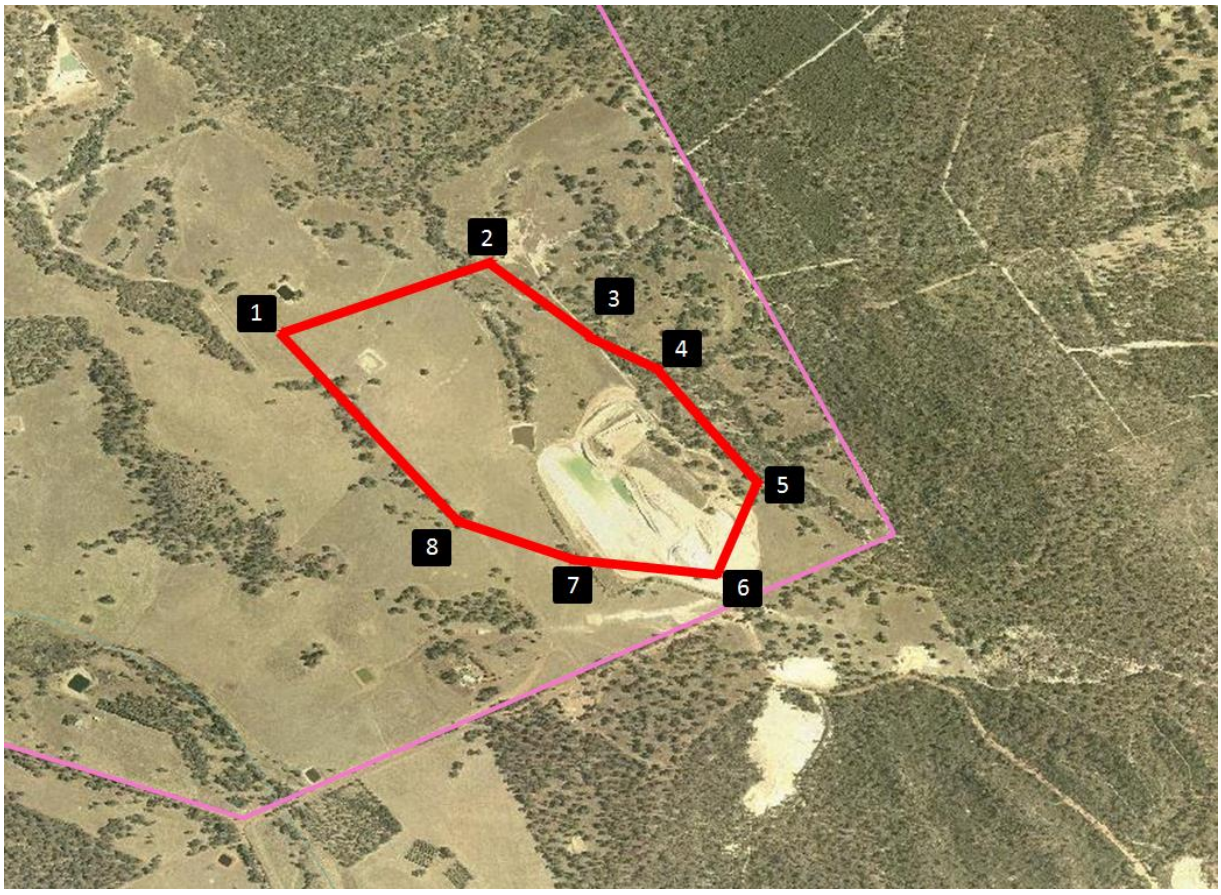


Figure 1: Premises boundary (red line) within Lot 11 (pink line)

3.2 Premises operations

The Applicant has proposed to operate a Class II putrescible landfill facility, receiving Class I and Class II waste material sourced from the Perth metropolitan area including:

- Commercial and Industrial waste;
- Construction and Demolition waste; and
- Municipal waste.

The landfill will be developed in two stages with each stage consisting of a number of individual landfill cells, each with capacity to contain 1 to 2 years of waste deliveries. Stage 1 of the landfill development occurs in the southeast portion of the existing clay pit with 1.5 million m^3 airspace. This stage consists of six (6) individual landfill cells, with two (2) separate leachate collection and extraction systems, and up to six (6) leachate ponds. Based on forecast input tonnage, Stage 1 is anticipated to have a lifespan of approximately 10 to 12 years.

Stage 2 will be developed to the northwest of Stage 1, in an area of current and future clay extraction. While Stage 1 is being developed and operated, Austral Bricks will continue with clay excavation and progressively create the landfill airspace for the development of the Stage 2 landfill.

Stage 2 is anticipated to be a similar size development to Stage 1; however, this Stage is only expected to last approximately 8 to 9 years, based on a constant waste throughput of 150,000 tonnes per annum (tpa) and no ramp-up of annual tonnage as experienced in Stage 1. The total lifespan of the facility is anticipated to be up to 20 years.

This licence application is for the operation of Cell 1, within Stage 1 of the landfill facility with associated operational areas (access roads, leachate and gas management areas) and internal buffer zones. Cell 1 is proposed to receive 50,000 tpa over the first year with an available airspace of 110,000 m^3. It is anticipated that the waste acceptance volume for Stage 1 will increase, as other cells are developed, to up to 150,000 tpa over 10 years.

3.3 Premises infrastructure

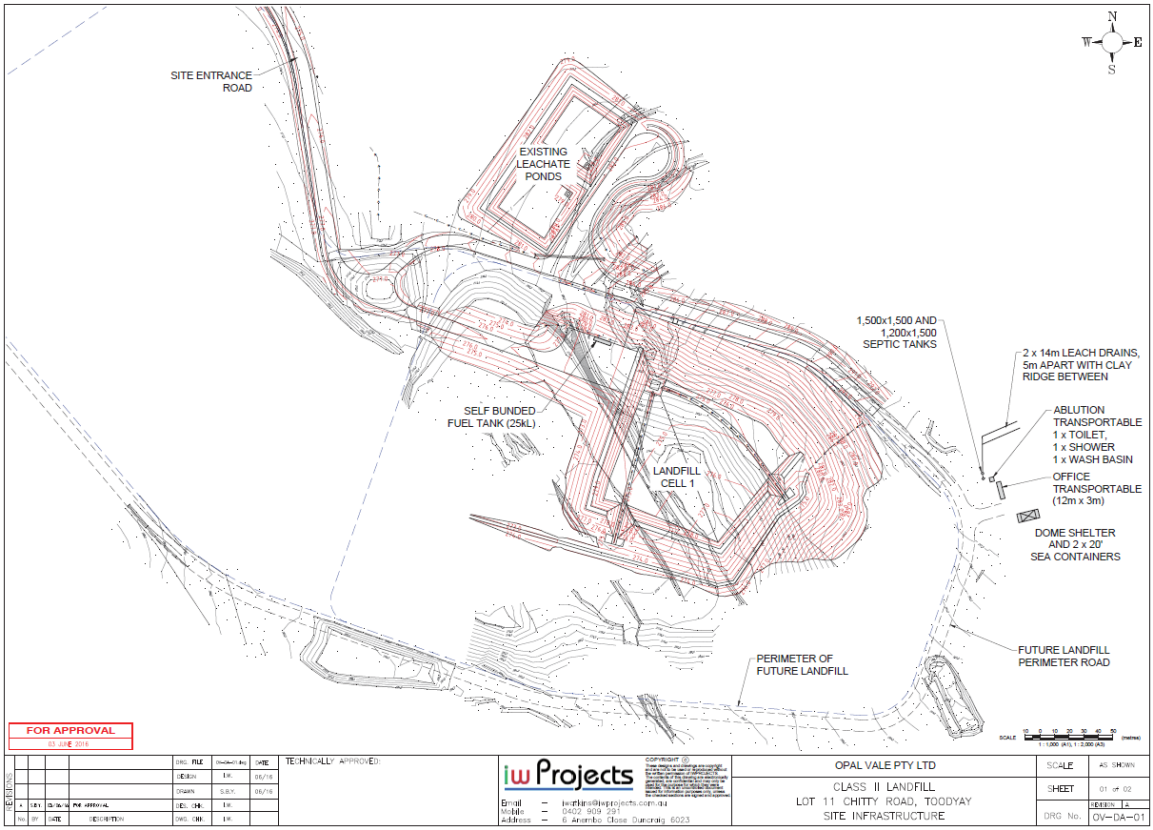
3.3.1 Infrastructure overview

The landfill facility infrastructure, as it relates to Category 64 activities, is detailed in **Table 6** and shown in part on **Figure 2**. It is noted that the surface water storage dam proposed in the application has not been constructed and will not be included in the assessment of the application.

Table 6: Landfill facility Category 64 infrastructure

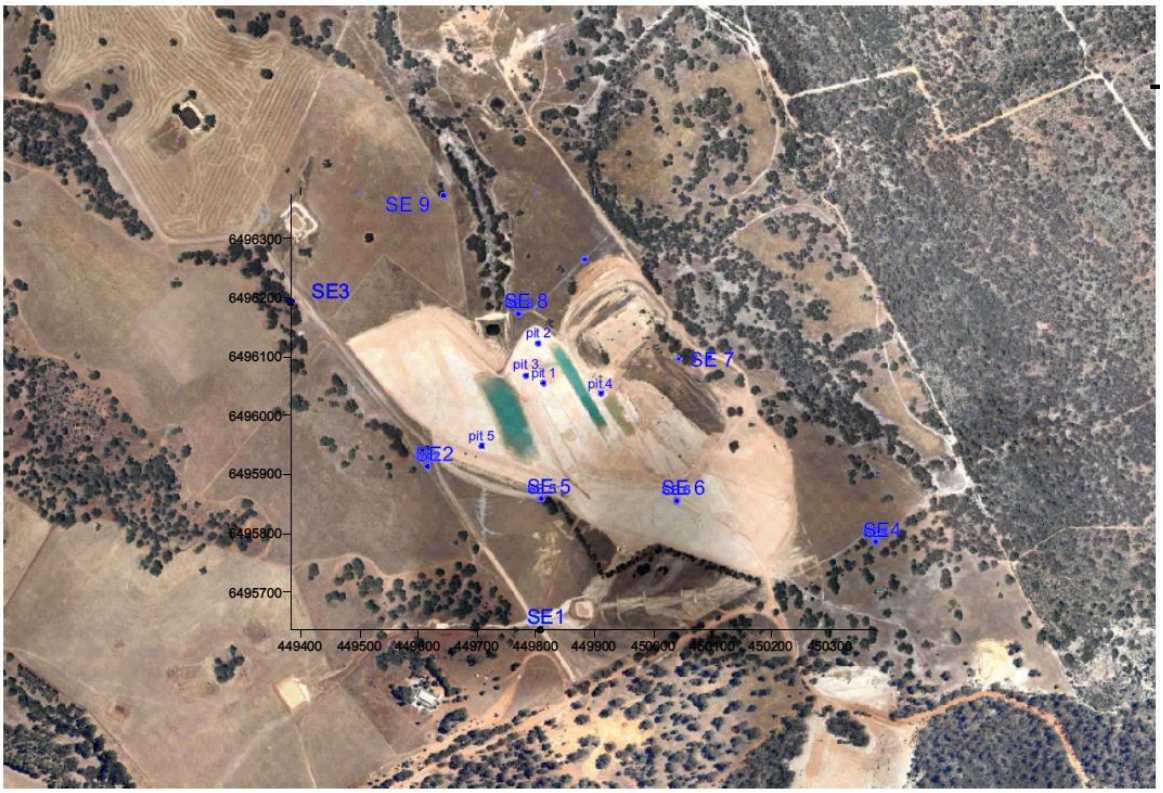
Infrastructure	Site Plan Reference (Figure 2) and Label
Prescribed Activity Category 64	
One (1) lined landfill cell including leachate collection pipes and sumps	Landfill cell 1
Two (2) Lined leachate storage ponds	Existing leachate pond
Stormwater diversion bunds and trenches	Not labelled on figure
Cell embankments	Not labelled in
Nine (9) deep groundwater monitoring wells	SE1 to SE9 in **Figure 3**
Six (6) in-pit monitoring wells (Cell 1)[1]	C1 to C6 in **Figure 9**
Weighbridge	Not labelled– will be located on site entrance road directly west of the southern-most leachate pond.
Directly related activities	
Self bunded fuel tank 25kL	Self bunded fuel tank
Other activities	
Entrance gate, site fencing and access roads	Site entrance road
Site office and staff amenities	Office Transportable Ablutions Transportable

Note 1: Locations and names of in-pit monitoring wells are subject to change throughout operation of Stage 1 due to the construction of Cells 2 to 6. It is understood that in-pit monitoring locations will be maintained to allow for monitoring of groundwater in the vicinity of the operational landfill areas.



Source: IWP, 2017

Figure 2: Site Plan



Source: (Stass, 2015)

Figure 3: Groundwater monitoring locations (temporary and permanent)

3.3.2 Limitations to the assessment

The current works approval and associated Amendment Notices permit the construction of Stage 1 of the landfill which comprises of Cells 1 to 6. The Applicant does not hold a works approval to construct Stage 2, which is intended to comprise of six additional cells.

The Applicant has constructed and provided compliance certifications for Cell 1 of Stage 1 to the satisfaction of DWER, and the Applicant is yet to construct any future cells under the works approval. Therefore this assessment and associated licence is for the operation of Cell 1 only.

Additionally, and in accordance with the requirements of the works approval, the following infrastructure was not constructed as part of the Cell 1 completion:

- Landfill gas collection and flare infrastructure; and
- Surface water storage dam.

The construction and operation of future cells, landfill gas management infrastructure and surface water containment infrastructure not already present on the premises will require further assessment and approval under future works approval or licence amendment applications made under Part V of the EP Act once the infrastructure has been constructed (refer to Section 7.5 for more information regarding the landfill gas infrastructure). It is noted that the Applicant has chosen to utilise the surface water pond already located in the northern area of the clay pit, which shall be referred to hereafter as the surface water storage dam.

The potential environmental impacts associated with clay extraction occurring within the boundary of Premises to create the landfill void prior to future cell construction is not included within the scope of operation of Cell 1 and is therefore excluded from this assessment.

Additionally, the following aspects are not regulated under a licence issued under Part V of the EP Act and as such, are not within the scope of this assessment and the associated licence:

- Traffic management outside of the premises boundary;
- Assessment of potential impacts to cultural heritage;
- Regulation of potable drinking water supply; and
- Enforcement of State Administrative Tribunal orders.

Key Findings:

1. The Delegated Officer finds that the current application is limited to the operation of Cell 1 only. The construction and operation of future Cells included in the Stage 1 landfill footprint, the landfill gas management infrastructure and surface water containment infrastructure is not assessed in this Decision Report and will be assessed in future licence amendments once the infrastructure is constructed.
2. The activities and potential environmental impacts associated with clay extraction is not included within the scope of operation of Cell 1 and as such is not assessed in this document.

4. Legislative context

Table 7 summarises the approvals, other than those required under the EP Act, that are relevant to the assessment.

Table 7: Relevant approvals other than EP Act

Legislation	Number	Approval
State Administrative Tribunal Act 2004 *Planning and Development Act 2005*	State Administrative Tribunal (SAT) Order, 27 February 2013	Planning approval by order of SAT – for the proposed landfill development at Lot 11 Chitty Road, Toodyay.
	Shire of Toodyay – Planning Approval Ref: 11CHI/A4273, 6 March 2015	Extension of existing planning approval issued by SAT on 27 February 2013; amendment to condition 5 of SAT Order. Condition 5 referred to the lapse of planning approval to be of no further effect unless a Works Approval had been issued by DER on the Works Approval application (W5800/2015/1) within two years of the date of the original approval (on or before 27 August 2015).
Rights to Water and Irrigation Act 1914	Not applicable	Groundwater extraction bore (not-potable use) sited for potential operational water requirements (currently not required as surface water volumes are sufficient for operational use. Bore is located within an area zones for unrestricted groundwater usage. No licence is required.

4.1 Part IV of the EP Act

The Salt Valley Class II Landfill development proposal was referred to the Environmental Protection Authority (EPA) by a third party (i.e. neither the Applicant nor DWER) in 2013. On 7 October 2013 the EPA determined that the proposal would not be subject to an environmental impact assessment process or setting of conditions by the Minister for Environment under Part IV of the EP Act.

This decision was appealed and on the 5 February 2014 the Minister dismissed the appeal.

4.2 Part V of the EP Act

This decision report and the issued licence has been informed by key documents and applicable legislation listed in **Appendix 1**.

4.2.1 Works approval and licence history

The Premises was constructed under works approval W5800/2015/1. Decisions pertaining to the construction and design of the landfill, including matters considered as a result of stakeholder consultation and public appeals, were made under the works approval assessment and decision-making process and are not re-assessed in this document. The works approval history for the Premises is provided in **Table 8**. A licence has not yet been issued for operation of the infrastructure at the Premises.

Compliance documentation pertaining to the construction of Cell 1 was received on 24 March 2016, which DWER determined did not demonstrate compliance with the works approval. Following submission of additional information and subsequent site visit, DWER amended the works approval by issue of Amendment Notice 1 on 17 August 2017.

This decision was appealed and on 5 September 2018, the Minister for Environment allowed the appeals in part, requiring Amendment Notice 2 to the licence.

Further review of compliance in to works approval W5800/2015/1 and Amendment Notice 1, following the Minister's decision, and issue of Amendment Notice 2 in October 2018, DWER requested additional information from the Applicant to finalise the compliance assessment. This information was received from the Applicant in November 2018, and the Compliance Assessment for works approval W5800/2015/1 and associated Amendment Notices was finalised on 6 December 2018.

At the time of deciding this assessment the premises infrastructure is deemed by DWER to have been constructed in accordance with the works approval.

Table 8: Works approval and licence history

Instrument	Issued	Nature and extent of works approval, licence or amendment
W5800/2015/1	27/08/2015	New works approval
W5800/2015/1	17/08/2017	Works approval Amendment Notice 1
W580/2015/1	12/10/2018	Works approval Amendment Notice 2

4.2.2 Clearing

No clearing of native vegetation is required for the operation of the facility. It is noted that clearing permit CPS 6549/1 was issued for clearing of 0.3 ha native vegetation to be cleared for the construction activities under works approval W5800/2015/1.

4.3 Other relevant approvals

4.3.1 Planning approvals

Lot 11 on Deposited Plan 34937 (768 Chitty Road, Hoddy's well) is freehold land owned by S. Farrell and M. Farrell of Longford Investments Pty Ltd (ACN 111 501 556). The Applicant has provided evidence of a lease agreement in place, which provides for the Applicant to occupy the leased area for the permitted use for a period of thirty (30) years from the approval date.

The clay pit is operated for clay extraction by Austral Bricks, it is intended that clay extraction take place within the Prescribed Premises boundary. An agreement in place between Austral Bricks, the landholder and the Applicant for the use of the area covered by the Application, including the Cell 1 landfill and associated infrastructure, and the existing and future clay pit (Williamson's Pit) for development of the Stage 1 and Stage 2 landfill footprint.

The Lot on which the premises is located is zoned for 'Special Use' by the Shire of Toodyay which means that use is not permitted unless local government grants a planning approval. A planning approval was sought and granted through the State Administrative Tribunal (SAT) process. As a result of the SAT findings, the landfill was granted planning approval in 2013, with orders noted under Matter Number DR 292 2012. The approval was extended in 2015 for construction of the facility (**Table 7**).

4.3.2 State Administrative Tribunal orders

Whilst DWER has no legislative requirement of power to enforce SAT orders, it is noted that some of the orders relate to operational conditions. DWER have noted the requirements and have implemented licence conditions that are consistent with the requirements of the orders. The relevant orders are summarised below:

- Fire and Mosquito management plans should be prepared by the Applicant;
- Lockable gates are to be installed at all entries to the Facility and are to be locked when the Facility is unmanned;

- 2 m high mesh fencing shall be erected for each landfill cell to act as a litter trap for waste item;
- Only waste conforming to requirements of Class II, Category 64 Landfill shall be disposed to the facility;
- Operating hours shall be within 0700 to 1800 hrs Monday to Sunday (excluding public holidays);
- Measures shall be undertaken to minimise dust generation from the premises;
- The facility must remain tidy, and all windblown waste shall be collected and disposed of by the Applicant; and
- Rehabilitation works shall be completed within the first winter months following re-establishment of the final contour levels and maintained for three years thereafter.

Key Findings:

3. The Delegated Officer has determined that the Applicant is the legal occupier of the Premises for the intended operation of Cell 1.
4. The Delegated Officer has determined that the premises infrastructure for operation of Cell 1 is deemed to have been constructed in accordance with the works approval and associated Amendment Notices.

5. Experience of operator

The Applicant is Opalvale Pty Ltd, a registered Australian Proprietary Company. An Australian Securities and Investments Commission Current Company Extract report was provided to DWER by the Applicant.

Opalvale Pty Ltd is affiliated with the following waste-related companies operating in Western Australia:

- Instant Waste management Pty Ltd;;
- Alkina Holdings Pty Ltd;
- Resource Recovery Solutions Pty Ltd; and
- New Energy Corporation Pty Ltd.

The assessment of the experience of the operator is limited to a summary of compliance records for the premises, and for other licensed Premises that are operated by the Applicant of affiliate companies. The relevant premises are as follows, a summary of compliance activities for each premises is provided in **Table 9**:

- Salt Valley Road Inert (Class I) landfill L8149/2003/3;
- Pinjarra Transfer Station L8515/2010/1;
- Bayswater Recycling and Transfer Facility L7742/1998/6; and
- Flynn Drive Waste Sorting and Transfer Facility (lease area 11 & 15) L8946/2016/1.

It is noted that the Occupier rectified Environmental Field Notices (EFNs) and notices within a reasonable timeframe. DWER conduct regular compliance related site inspections of all Premises. No compliance actions have resulted in prosecution or issue of Environmental Prevention Notices (EPN).

Table 9: Summary of compliance activities for Premises associated with the Applicant

Instrument	Nature and extent of compliance actions
L8149/2003/3	• Environmental Field Notices (EFN) issued in regard to receipt of waste not allowed to be received under operating licence, and report of suspected contamination. Actions were taken by the Occupier to rectify notices issued. • EFN issued for failure to submit AACR by due date. • Investigations regarding potential breach to landfill levy which found no evidence to support further action. • Letter of warning sent for potential breach of EP Act. • Regular Site inspections identifying minor issues that are usually resolved within a timely manner.
L8515/2010/1	• Failure to submit annual reports, resulting in a review and request for information. Information was provided by the Occupier. • Notice issued of missing signs form site entrance. Signage was re-installed by Occupier
L7742/1998/6	• Three administrative non-compliances relating to annual reporting that were rectified by the Occupier • Complaints related to dust and odour that did not result in any compliance action. • Compliance inspection identified potential non-compliances with licence conditions.
L8946/2016/1	None noted

Key Finding:

5. The Delegated Officer finds that compliance inspection results at other sites have not resulted in a prosecution. Non-Compliance matters in regard to the construction of the facility were appropriately considered in the amendment of W5800/2015/1.
6. The Delegated Officer considers that there were insufficient grounds to apply any further controls on the basis of the compliance performance. Standard controls will be required in the operating licence to require submission of reports, keeping of records, and reporting of incidents and complaints.

6. Location and siting

The Premises is located in the Shire of Toodyay approximately 65 km north east of the Perth CBD, and 13km south of the Toodyay town site. Access to the site is via Salt Valley Road, using an existing 3 km internal assess road previously used as part of clay extractions activities.

The surrounding land uses are predominately agricultural farm land (cropping and grazing) and native bushland. The Premises and the Lot on which the Premises is located for part of an extensive farming property comprising large areas of remnant native vegetation and cleared agricultural land.

Figure 4 shows the Premises location in relation to the Perth CBD.

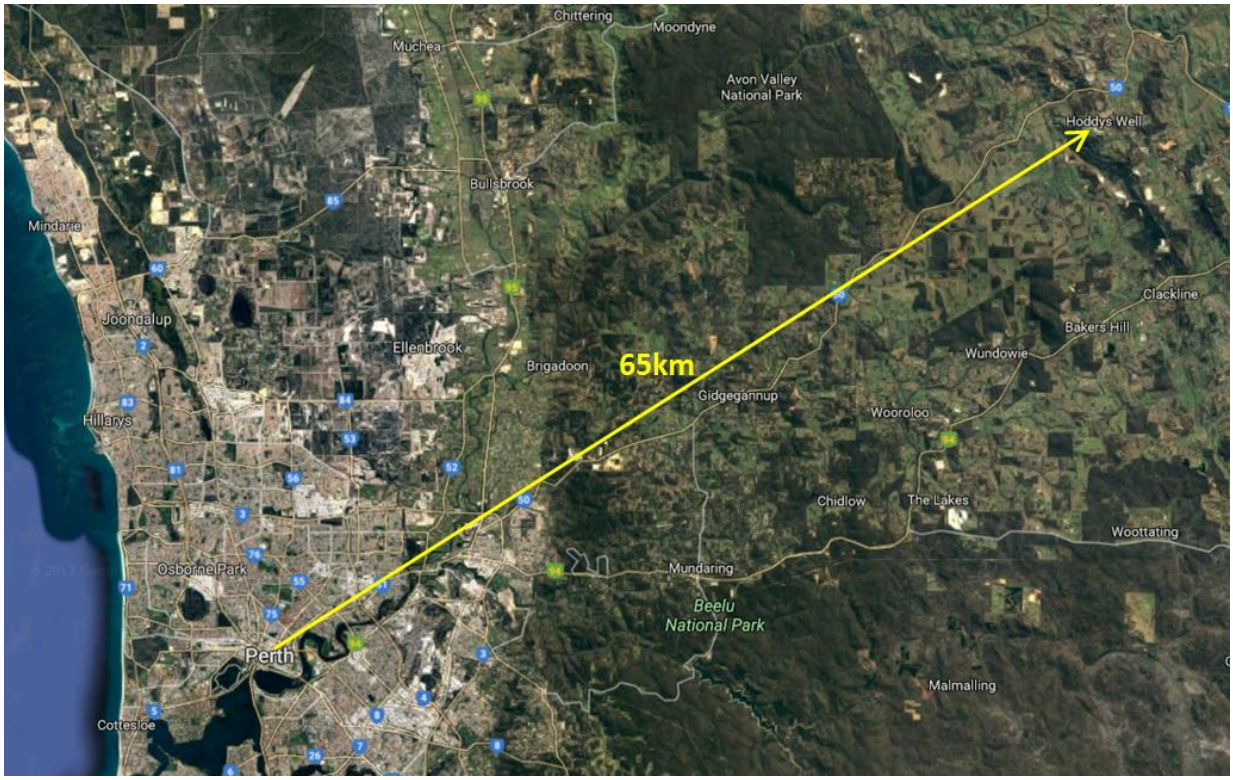
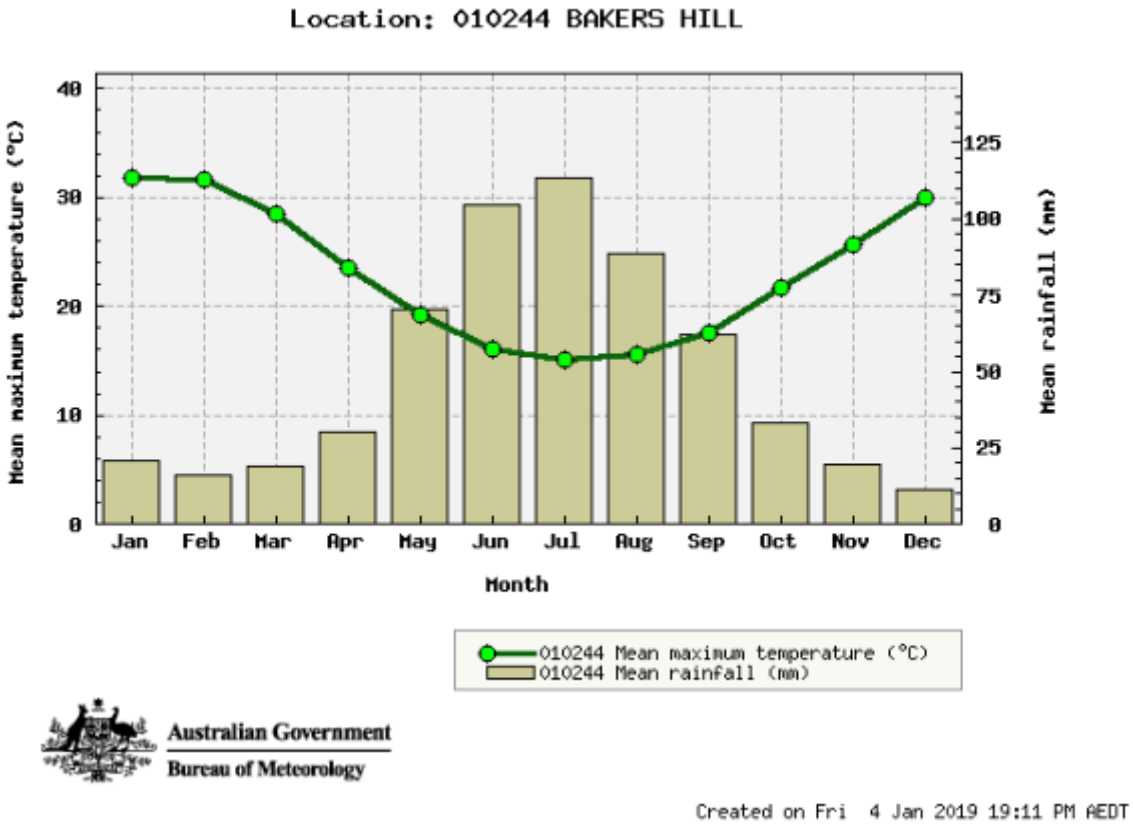


Figure 4: Premises locality

6.1 Climate

The Toodyay area is situated in a temperate climate (based on the Koppen climate classification) distinguished by distinctly dry and hot summers). Based on temperature and humidity, the area is characterised by warm to hot, dry summers and cool, wet winter.

The nearest Bureau of Meteorology (BoM) weather station site to the Premises is Bakers Hill (BoM site number 010244). Mean annual rainfall for the years 1964 to 2018 is 586.9 millimetres (mm), with majority falling between the months of May and September. The highest mean maximum temperature is recorded in January, while the lowest mean minimum temperature is recorded in August. Monthly mean rainfall and maximum temperature is shown on **Figure 5**.

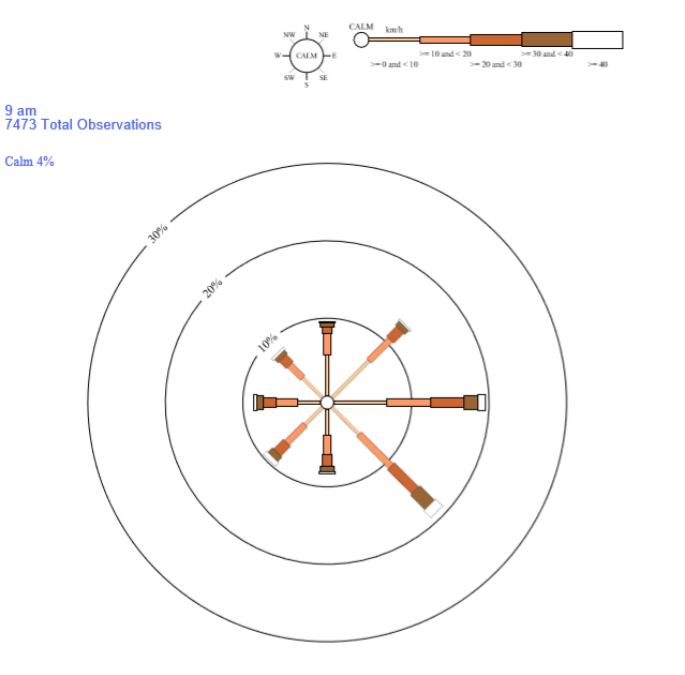


Data Source: www.bom.gov.au – Station ID 010244

Figure 5: Mean rainfall and maximum temperature for Bakers Hill

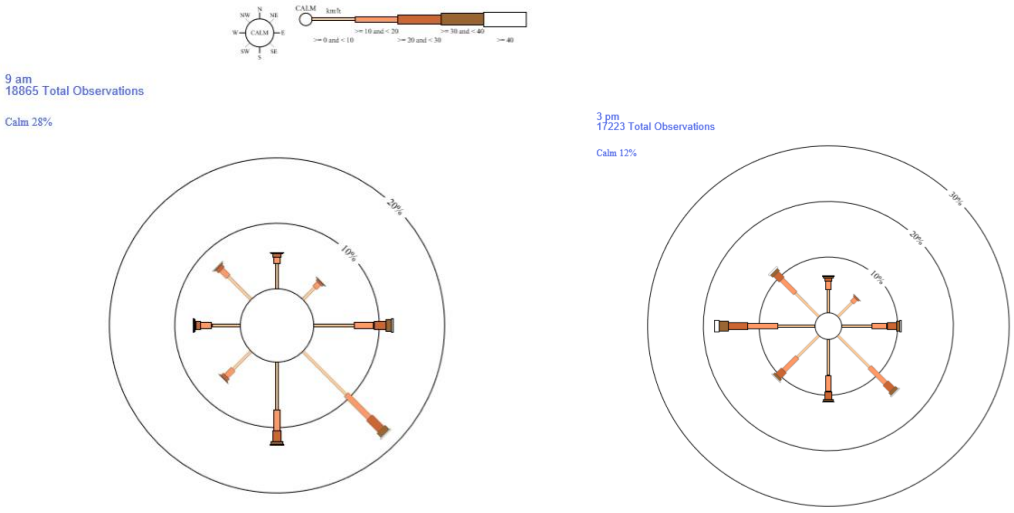
Technical studies (Golder, 2014) sourced Scientific Information for Land Owners (SILO) climate data for the site location comprising interpolated data (rainfall and evaporation) based on records spanning 1900 to 2014. The SILO data predicted average annual rainfall of 482 mm, with majority falling between May and September. With an average annual pan evaporation of 2,000 mm.

The average annual 9am wind rose for the nearest BoM site Bakers Hill (BoM site number 010244) is shown in **Figure 6**. Afternoon wind records are not available for the Bakers Hill weather station. Both morning (9 am) and afternoon (3pm) average annual wind roses for the nearby Northam weather station (BoM site number 010111) are provided in **Figure 7**. It is noted that morning wind conditions are stronger at the Bakers Hill site compared to the Northam site.



Data Source: www.bom.gov.au – Station ID 010244

Figure 6: 9 am Wind rose for Bakers Hill (Station ID 010244)



Data Source: www.bom.gov.au – Station ID 010111

Figure 7: 9 am and 3 pm wind roses for Northam (Station ID 010111)

6.2 Regional and local geology and soils

The regional geology of the area is characterised by Pre-Cambrian linear metamorphic belts including the Jimperding, Chittering and Balingup Metamorphic Belts. The metamorphic sequences comprise layered quartz-feldspar-biotite gneiss, enveloped by areas of migmatite and isolated rafts of earlier gneissic sequences. Intrusion of late Archaen granitiods within the metamorphic sequences typically post-dates metamorphism as well as regional faulting and folding (Stass, 2015).

The landfill site is located within the Jimperding metamorphic system which forms an elongate feature, extending from York to Clackline to Jimperding, containing inter-bedded schists, quartzites and minor metamorphosed volcanics. The metamorphic grade of the belt increases towards Jimperding, before becoming the higher metamorphic grade Chittering Belt at Chittering. In the vicinity of the clay extraction pits, the metamorphic schists are highly weathered (to >40 m below natural surface), and are likely to be steeply dipping at depth where weathering is less pronounced. Prolonged weathering of the metamorphic schists, quartzite and volcanic sequences has produced deep sequences of micaceous clays and sandy clays, with minor laterisation at depth (Stass, 2015).

The excavation of clays in the Williamson's Pit, along with drilling on and close to the premises has been used to describe the local geology (IWP, 2017). The geologic materials in proximity of the premises are silty clays with occasional sandy silts formed from weathering of basement schists. Remnant hydrothermal quartz veins intersect the exposed regolith within the clay pit, as massive white quartz, or fractured red-stained quartz, the latter of which typically contains clay/silt matrix infill within the fractures (Stass, 2015). Drilling undertaken by Austral bricks indicates that the weathered zone extends more than 15 m below the base of the pit (IWP, 2017), and underlying bedrock is expected to consist of moderately weathered schists and quartzite.

Examination of the clay pit walls, and total magnetic intensity (TMI) surveys of the region indicate that there is no significant faulting in the vicinity of the landfill site (Golder, 2014).

The soils overlying the weathered schists are thin (<0.5 m) and are described as a yellow gravelly loamy sand and loam, overlying sandy clay (Stass, 2015).

6.2.1 Landfill *insitu* subbase properties

Bore logs provided in the groundwater monitoring reports (Stass, 2015 and Stass, 2016) indicate the regolith (clay) geology underlying the constructed landfill is generally consistent with the regional geological descriptions. Particle size testing conducted on samples of the material within the pit in 1998 and 2014 characterised the material as clayey silty sand with minor gravel, and silty sand (Stass, 2015, and Golder, 2014).

During a site visit on 12 June 2014, DWER observed the material in the walls and base of the quarry to comprise of sandy clay to clayey sand, and dense clay derived from highly weathered, interbedded quartzites and mica schists with a strongly developed inclined plane of foliation. Weathered quartzite veins were exposed in some areas in the base of the quarry.

Various geotechnical tests have been conducted on the clay subbase materials, including USCS soil classification, particle size distribution, atterberg limit, particle density, permeability (insitu and compacted) and triaxial shear test. The tests found that the materials are low plasticity clays with low permeability and were suited to be used for construction of the design subbase for the Cell 1 (Golder, 2014).

6.3 Regional and local hydrogeology

The groundwater aquifers in the region are characterised by low permeability, fractured and deeply weathered basement rocks or metamorphic or granitoid origin, with localised shallow aquifers, where deeper sequences of sediments have been deposited by recent erosion. Groundwater in the region is inferred to flow to the north north-west based on the general topography and surface water bodies.

Regional groundwater quality is slightly acidic (4 to 5 pH units), with variable salinity ranging from 500 mg/L to 3000 mg/L TDS.

A search of DWER Water Information Database found no registered groundwater users within a 5 km radius of the Premises. Eight (8) groundwater monitoring wells are located within 5 km of the centre of the Premises. Most bores are screened within a combined fractured rock

aquifer and have been used to monitoring groundwater levels in the Swan Avon Catchment.

6.3.1 Local hydrogeology

The local hydrogeology was interpreted from drilling undertaken by Austral Brick and hydrogeological studies completed by Martinick and McNulty in 1998 (as summarised in Stass, 2015). In general, groundwater as not encountered during the 1998 drilling, with the exception of holes drilled into weathered granite bedrock, approximately 1 km north west of the clay pit. The depth of the drill holes is not known. Hydraulic testing (slug testing) undertaken by Martinick and McNulty found the clay within the pit had low to very low permeability with no defined and permanent groundwater table within the clays in the pit.

In 2014, Golder undertook permeability testing on materials samples in the clay pit prior to construction of Cell 1. Falling head permeability tests found that the *insitu* clays had low permeability (2.2×10^{-9} to 9.1×10^{-9} m/s). The permeability of weathered basement materials below the clays was higher than the clays, ranging from 1.3×10^{-7} to 5.9×10^{-7} m/s (Stass, 2015).

Standing water is often observed in the base of the pit. To test for the presence of shallow perched groundwater within the clays, the standing water at the northern end of the clay pit was pumped out of the pit in November 2014, and the pit walls examined for signs of water ingress or seepage. Based on the lack of seepage from the dry walls and the low permeability of the basal clays within the pit, the standing water is inferred to be surface water held within the pit following rainfall. No local perched groundwater table is inferred to be present within the clays, and the weathered clays beneath Cell 1 and within the clay pit are described as a confining aquitard.

Groundwater flow within the basement groundwater table is generally from the east of the clay pit to the south and north west, following the general line of topography, with a relatively steep hydraulic gradient. Based on the regional hydrogeological model, it is possible that groundwater ultimately discharges to Jimperding brook on a seasonal basis. Groundwater yields have not been tested; however, based on the characteristics of the geologic materials that make up the aquifer and aquitard, the aquifer is likely to be low yielding, with poor transmissivity, making it potentially unsuitable for use as a groundwater resource in the local area. Furthermore, the low transmissivity of the geologic materials indicates that groundwater travel times between the landfill footprint and down hydraulic-gradient surface water bodies are likely to be very slow.

6.3.2 Groundwater monitoring

Prior to construction of the landfill, a number of groundwater monitoring bores were installed to enable characterisation of the site-specific hydrogeology. They are summarised as follows:

- Nine (9) deep groundwater monitoring wells (SE1 to SE9) were installed outside of the clay pit in 2011 to monitor local hydrogeological conditions. Bores were installed between 18 and 58 metres below ground level (mbgl).
- Five (5) shallow groundwater monitoring wells (pit 1 to pit 5) were installed within the clay pit in 2013, to a depth of 10 mbgl to monitor shallow sub-surface water within the pit.
- Four (4) shallow boreholes (bore 1 to bore 4) were drilled within the Cell 1 footprint in November 2015, to depths of five (5) meters below the level of the proposed liner for Cell 1. All bores did not yield water and were backfilled.
- Six (6) groundwater monitoring wells (C1 to C6) were installed in June and July 2016 within the Stage 1 landfill footprint surrounding the constructed Cell 1, to depths of between 10 to 25 m, so that the wells were screened a minimum of five (5) metres

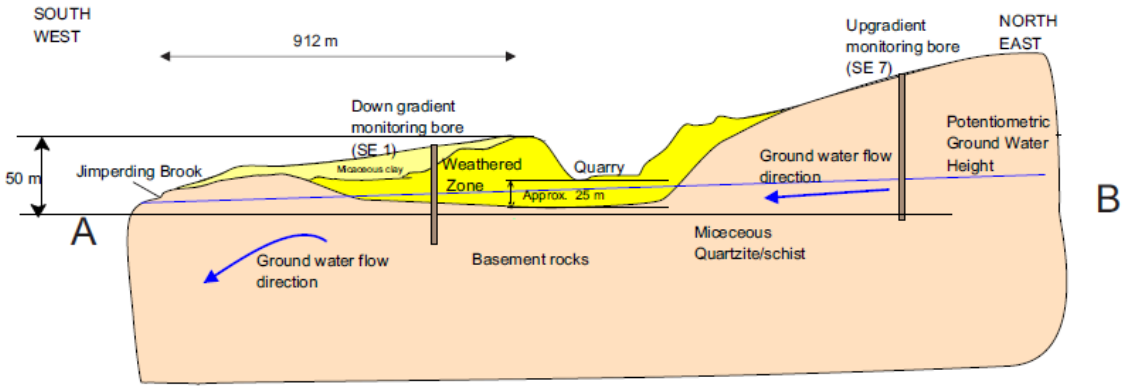
below the lowest point of the landfill liner.

The monitoring network is shown on **Figure 3** (excluding locations C1 to C6, which are shown on **Figure 9**) and is determined to be adequate for the definition of local aquifer characteristics and the ongoing monitoring of groundwater at the premises. Including bores located between landfill and down-hydraulic gradient surface water bodies.

Depth to groundwater was measured in the nine deep monitoring wells on 13 occasions between 2011 and 2014. Four of the wells (SE1 to SE4) were monitored on an additional 3 occasions (Stass, 2015). Groundwater monitoring summary data provided to DWER as part of the Works Approval assessment indicated that the deep monitoring wells were monitored over 17 occasions between September 2014 and September 2018. Depth to groundwater was measured in the five shallow monitoring wells (pit 1 to pit 5) on 3 occasions between 2013 and 2014, and some were monitored on an additional two occasions. Standing water level was monitored continuously using dedicated pressure transducers in the recent groundwater monitoring wells (C1 to C6) from July to September in both 2016 and 2017.

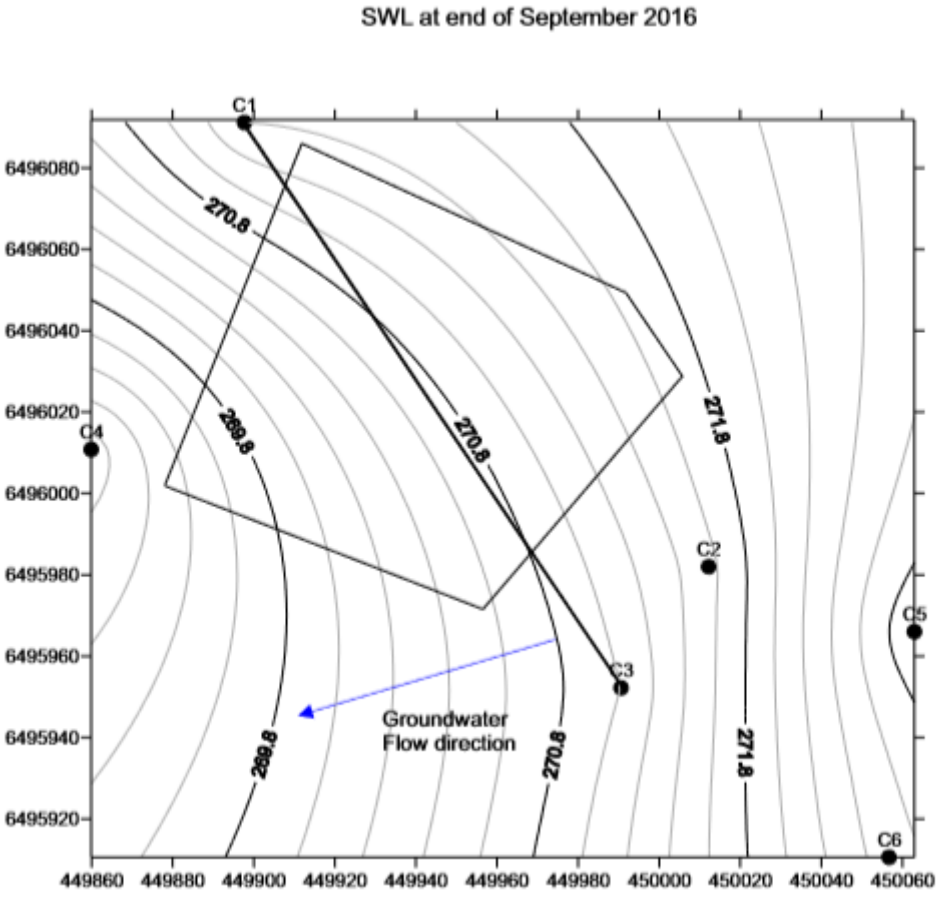
Based on the depth to groundwater measurements, the groundwater table is generally confined in the weathered basement beneath the clay aquitard, approximately 15 metres below the base of the clay pit. Groundwater flow is influenced by the excavation, and generally flows from the east towards the south west and north west. The inferred stabilised maximum groundwater level, based on measurements undertaken in monitoring wells C1 to C6, has been calculated at a minimum separation distance of 1.76 m below the base of the Cell 1 landfill sump. It is noted that the minimum separation distance between maximum predicted groundwater level and the base of the Cell liner (excluding the sump) is greater than 2 m.

Based on the groundwater monitoring conducted at the premises, a conceptual hydrogeological model is presented in **Figure 8**. The standing water level (measured in monitoring wells C1 to C6) in September 2016 is presented in **Figure 9**. Groundwater flow directing beneath Cell 1 is inferred to be to the west-south-west.



Source: Figure 7b, after Stass, 2015

Figure 8: Conceptual hydrogeological model



Source: Figure 5, after Stass, 2016

Figure 9: Standing water Level (bores C1 to C6) September 2016

6.3.3 Groundwater quality

Groundwater samples were collected from the deep groundwater monitoring wells on 5 occasions between 2013 and 2014. Samples were analysed for a range of parameters including pH, total dissolved solids, major ions, dissolved metals, and nutrients (nitrogen, nitrate, and nitrite). The sampling suite was chosen to characterise local groundwater quality prior to construction of Cell 1.

Based on the sampling events, groundwater quality down hydraulic-gradient of the landfill is brackish and had concentrations of some parameters (copper, manganese, nickel, lead and zinc) that were elevated compared to Australian Drinking Water Guidelines 2004 (ADWG). The quality is generally poor, and is indicative of prolonged mineral weathering of the basement geology. This is consistent with groundwater monitoring data from the previous Department of Water and Department of Agriculture and Food that indicates that groundwater in the region is generally saline and is generally only suitable for stock water supply. In contrast, groundwater up hydraulic-gradient of the premises was characterised with water quality indicators that are compatible with domestic and ecological water criteria (ANZECC, 2000), and likely to be indicative of fresh groundwater recharge.

Based on the quality of groundwater sampled from the groundwater monitoring wells at the site, groundwater beneficial uses include stock watering, and groundwater from upgradient of the premises may be suitable for non-potable groundwater use.

6.4 Topography and hydrology

Williamson's Clay Pit, in which the landfill is situated, is located on a topographic saddle between two surface water catchments at a maximum elevation of approximately 295 m (IWP, 2017). The land surrounding the saddle is gently undulating, with moderate slopes incised by small drainage lines.

6.4.1 Regional and local hydrology

The head waters of Jimperding Brook are located approximately 900 m south of the operational area. To the north of the operational area, an ephemeral drainage line, that flows only during and immediately following heavy rain, crosses the northern boundary of the premises and flows to the north west into Jimperding Brook approximately six (6) km downstream of the Premises boundary. This ephemeral creek is fed by a small tributary which commences just north of the clay pit.

Jimperding Brook is a non-perennial watercourse that flows to the north west until is converges with the Avon River, approximately 17 km downstream of the Premises. Surface water flows in the vicinity of the premises are heaviest during winter and following storm events, and water quality is generally fresh, becoming more saline as flows decrease in spring. The brooks have been known to flow following seasonal storm event throughout the remainder of the year.

There are no permanent, natural surface water features within the prescribed premises boundary. Stormwater received within the clay pit drains to an unlined surface water storage dam as is contained in the pit either to infiltrate slowly into groundwater or is lost to evaporation. Small surface water features, including a small disused farm dam, were removed during construction of the landfill. Internal catchments within the pit were modified to contain and control storm water in operational areas, this is described further in Section 8.7.5.

External to the clay pit, a diversion channel and diversion bunds were constructed to direct water from the north eastern corner of the premises, around the east edge of the pit and off the premises boundary into a farmer's dam for use in stock watering. To the north of the pit, a diversion drain directs run off to the west, through a culvert under the access road and into the ephemeral tributary that flows into the ephemeral creek north of the premises.

6.4.2 Regional and local catchment characteristics

The Premises is within the Avon Catchment and the Avon River Catchment Area which are listed under the *Waterways Conservation Act 1978* and within a proclaimed surface water area under the *Rights in Water and Irrigation Act 1914*. Furthermore, the Avon River Valley itself is a listed wetland of historical or cultural significance. As such the landfill is considered to be located within a sensitive surface water catchment area.

The habitat of the Jimperding Brook was assessed in 2008 as part of a foreshore and channel assessment survey conducted by the then Department of Water (DoW, 2008). The Brook is fed by 62 tributaries, including 10 major tributaries through agricultural land largely cleared for cropping or grazing, with one land holding used for commercial sand or clay extraction. All but one section of the Brook were found to be substantially altered, with high levels of bank erosion and gully erosion exacerbated by stock access and absence of lower and mid-storey vegetation (DoW, 2008). The overall environmental rating for Jimperding Brook ranged from very poor to excellent, with most sections rated at poor to moderate (DoW, 2008). Whist the catchment assessment was conducted some time ago, it is likely that, due to ongoing land use within the catchment that the environmental values of the Brook remain low to moderate.

The Avon River Valley is listed as a Directory of Important Wetlands of Australia (DIWA) Type B2 wetland (Inland wetlands – seasonal and irregular rivers and streams). The listing notes pressures as salinity, altered drainage, sedimentation, and pollution (agricultural). The landfill

site is not located in or surrounded by a wetland registered in the DIWA or other waterbodies. The closest waterbodies being Nanamullen Lake (3.5 km east of the premises) and Kojedda swamp (9.5 km south west of the premises), which are situated within a separate surface water catchments to the Premises. Black Swamp and Red Swamp are two surface water features located 13 and 16 km to the west of the Premises boundary respectively, and are also within a separate surface water catchment.

The ephemeral drainage line and a small tributary that is contained within the prescribed premise boundary, are lined with trees on the margins of the riparian zone, with sedges and remnant wood debris within the creek bed (Opalvale, 2018). The ephemeral nature of the surface water bodies indicates that water quality is likely to be good following rainfall, and that riparian habitat is not reliant of fresh water flows.

6.5 Residential and sensitive premises

The distances to residential and sensitive receptors are detailed in **Table 10**.

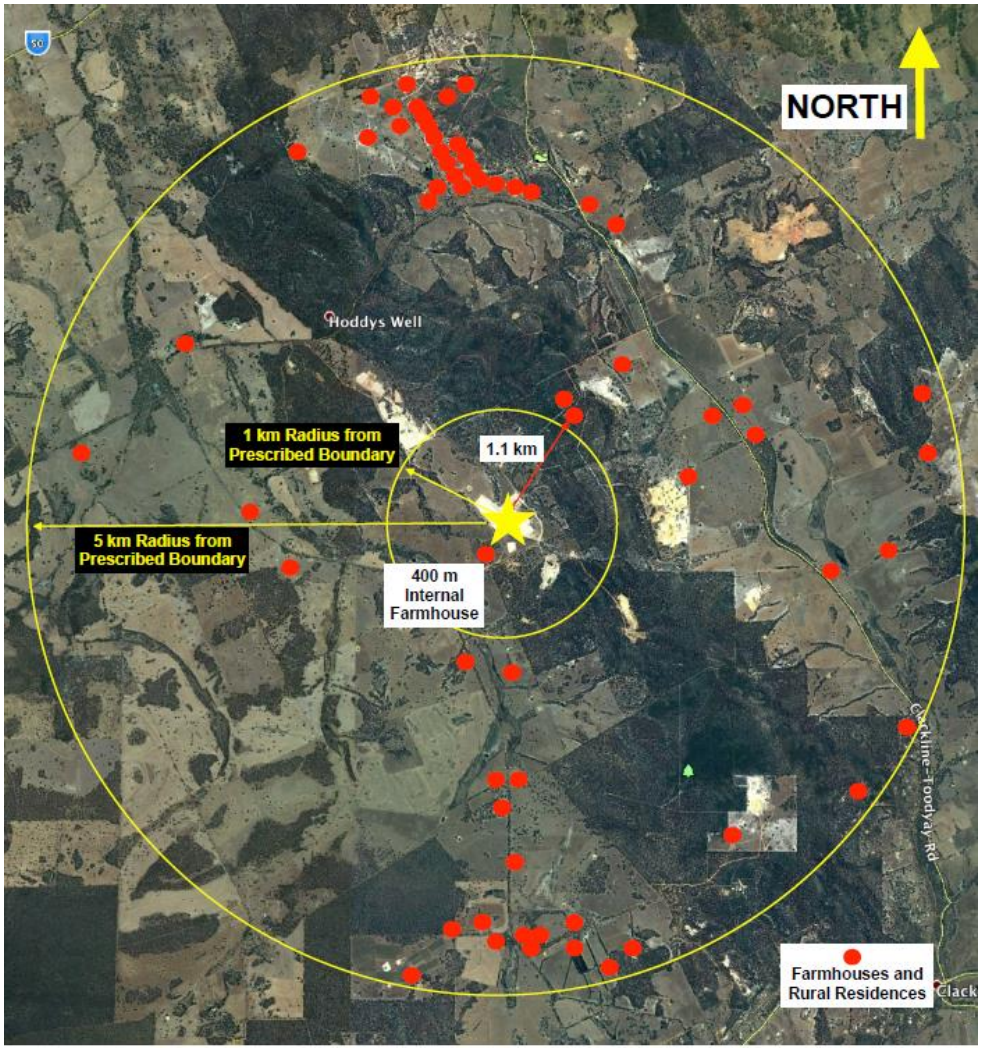
Table 10: Sensitive receptors and distance from activity boundary

Sensitive Land Uses	Distance from Prescribed Premises boundary
Privately owned farm land	Immediately adjacent (east and west)
Residential premises	Internal farmhouse, approximately 400 m south west (excluded as a sensitive receptor – see below)
	Approximately 1,100m north east (two properties to the north east of the premises.
	Approximately 70 houses within a 1-5km radius of the premises, predominately to the north and south as shown in **Figure 10**.

The Applicant has provided **Figure 10** showing the location of residential properties within 5 km of the Premises boundary in red points. The figure notes that the two closest residential properties (excluding the internal farmhouse) are 1.1 km from the Premises boundary, and are likely to have direct line of slight to the Premises. The estimated separation distance is more conservative to the distance of 1.3 km used in the previous works approval assessment.

The closest residential property is a farmhouse located approximately 400 m from the site and within the same lot as the site (Lot 11 on Plan 34937). The Application includes a letter of consent from the landowner of Lot 11 Chitty Road dated 10 November 2014, which states:

> '*As the landowner of Lot II Chitty Road, I consent to the development of a class II putrescible landfill on the site. In accordance with this development, I acknowledge the presence of the farmhouse that is approximately 400 m to the south west of the landfill footprint and accept that this dwelling can be ignored as a receptor when considering the environmental impact of the proposed development'*.



Source: (IWP, 2017)

Figure 10: Proximity of residential properties surrounding the Premises

Key finding:

7. Based on the correspondence received from the landowner, the Delegated Officer will not consider the property at Lot 11 Chitty Road as a sensitive receptor during assessment of potential impacts from activities at the Premises.
8. The Delegated Officer finds that the closest residential receptors are situated more than one (1) km from the Premises boundary.

6.6 Specified Ecosystems and environmental receptors

The farmland on which the Premises is located, and in the surrounding properties has been extensively cleared for agriculture (cropping and grazing) and extractive industry (clay extraction). Remnant native vegetation may support fauna habitat, but based on the disturbed nature of the land, significant fauna populations are unlikely to be impacted. Remnant native vegetation assemblages include established trees (*Eucalyptus marginata, Eucalyptus calophylla, Eucalyptus wandoo and Eucalyptus accedens*) with minor understory and native shrubs and grasses.

Specified ecosystems are areas of high conservation value, including groundwater and

surface water ecosystems, and environmental receptors of special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises. The distances to specified ecosystems are shown in **Table 11**.

Table 11: Specified ecosystems and environmental receptors

Specified ecosystems and environmental receptors	Distance from the Premises
Department of Biodiversity, Conservation and Attractions Managed Lands and Waters	Clackline nature reserve approximately 2.3 km south east Nanamoolan Nature Reserve 2.3 km east and north east.
Waterways Conservation areas	The Premises is within the Avon River Management Area.
Proclaimed surface water area	The Premises is within the Avon River Catchment Area.
Directory of Important Wetlands of Australia	Avon River Valley, approximately 17 km downstream from the closest feeding tributary to the premises. The Avon River is a registered type B2 wetland and provides high environmental value to public and the environment.
Threatened Ecological Communities and Priority Ecological Communities	A number of threatened ecological communities (wheatbelt woodlands) >5 km to the north east and south east
Groundwater	Low permeability fractured rock aquifer (confined) potentially suitable for domestic and non-potable use as well as stock watering. No registered users within 5 km of Premises.

7. Cell 1 engineering design and construction

The design of the landfill and associated infrastructure was previously assessed under the works approval (W5800/2017/1) and associated Amendment Notices. This section provides a summary of the information relevant to the operation of Cell 1.

7.1 Landfill and leachate pond design and construction

The landfill design has been based on the requirements of Best Practice Environmental Management (BPEM) *Siting design operation and rehabilitation of landfills* version current to August 2015 (EPA VIC, 2015). A combination of additional excavation of clay and filing within the clay pit was undertaken to achieve the proposed landfill and leachate pond design.

Separate to the construction of Cell 1 of the landfill, and the two leachate ponds, the following construction activites were undertaken as part of the approved work approval construction activites:

- Removal (by excavation and/or infilling and profiling) of existing in-pit and ex-pit surface water structures to enable management of surface water and diversion in accordance with the proposed surface water management plan;
- Decommissioning of groundwater monitoring wells within Cell 1;
- Excavation of surface water diversion drains, and 1 m high earthen bunds to divert surface water around the Cell 1 footprint;

- Construction of internal and external access roads; and
- Installation of temporary and permanent fencing.

Prior to completion of the final Construction Quality Assurance (CQA) report, damage to the surface separation geotextile occurred resulted in replacement of the textile. This was subsequently inspected in accordance with the construction CQA Plan.

A final CQA Plan and associated documentation supporting the assessment of compliance to the works approval and associated Amendment Notices was submitted to DWER, with all aspects of the works approval being found in compliance with on 6 December 2018.

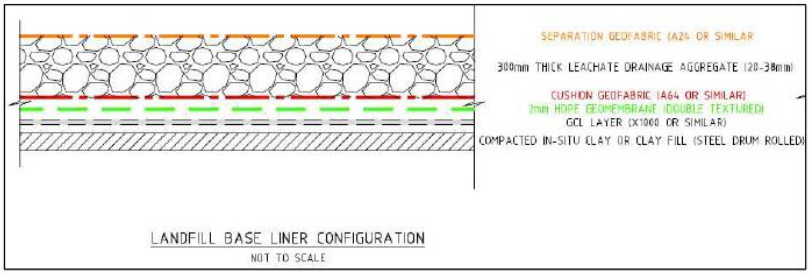
At the time of writing this decision report, the ongoing construction of internal access roads, and installation of the weighbridge were in progress.

7.2 Landfill and leachate ponds liner

7.2.1 Liner system

The following summarises the main components of the composite liner system installed in Cell 1 and the two leachate ponds:

- The *insitu* regolith landfill subbase comprises silty clay with sandy clay and occasional sand layers and weathered quartzite veins. Above this, a 500 mm thickness of engineered fill was placed and compacted to achieve a permeability of 5 x 10^{-8} m/s and minimum 95% of the Standard Maximum Dry Density as determined in accordance with Australian Standard AS 1289.5.2.1.
- The liner system consists of a geosynthetic clay liner (GCL) with a design hydraulic conductivity of ≤ 5 x 10^{-11} m/s (Golder, 2014), a 2 mm thick High Density Polyethylene (HDPE) liner, a geotextile cushion layer, a leachate collection layer (including collection pipes and aggregate) and a geotextile separation layer. **Figure 11** below illustrates the system components.



Source: (Golder, 2014)

Figure 11: Landfill liner system design

7.2.2 Assessed liner performance

Liner leakage rates were estimated based on the permeability characteristics of the composite liner system (including the GCL and HDPE liner). The compacted material under the engineered liner and underlying in-situ regolith were not included in the estimations to add conservatism to the estimate. The anticipated leakage rates through the liner are estimated to by 1.02 L/ha/day with good contact between the GCL and HDPE liners and 5.88 L/ha/day with poor contact between the GCL and HDPE liners (Golder, 2014).

7.2.3 Separation distance to groundwater

The base of the original landfill design included a minimum 2 m separation distance to the maximum potentiometric surface of the confined aquifer/aquitard. Following construction of the

liner in Cell 1 it has been determined that the separation distance between the base of the landfill liner and the maximum predicted groundwater levels was greater than 2 m, but that the separation distance between the base of the Cell 1 sump and the maximum predicted groundwater levels was 1.76 m.

A review of the separation distance as part of the works approval compliance assessment and associated Appeal Convenors report (refer to Ministers Appeal Determination, Appeal number 23-2017, 8 September 2017) found that:

- All areas of Cell 1, with the exception of the leachate sump achieve a separation distance of greater than 2 m between the maximum predicted groundwater level and the base of the Cell liner;
- In consideration of the revised separation distance of 1.76 m between the sump and groundwater, there is sufficient attenuation capacity for potential seepage given the constructed liner of the sump; and
- The anticipated maximum groundwater level is unlikely to intersect with the landfill liner to result in impact to liner stability or liner integrity.

7.3 Leachate collection and management

7.3.1 Leachate collection system

A leachate collection system has been installed within Cell 1 and includes the following design and operational components:

- Collection pipes (perforated), a collection sump and 300 mm drainage layer comprised of aggregate.
- Graded landfill base, allowing collection pipes to be installed with a minimum 1% grade towards the leachate collection sump. The grade of the cell and pipes will control the build-up of leachate head on the liner to a maximum 0.3m.
- Collection sump is constructed with composite liner, including a double GCL layer.
- A separation geotextile overlaying the aggregate to assist in the prevention of aggregate and pipe clogging.
- Leachate extraction points within the sump to allow leachate to be pumped out of the sump to either of the two leachate ponds; with the option of direct recirculation to Cell 1 landfill. One of these extraction pipes is a main pipe and the other two are contingency pipes, to be used if the main pipe becomes blocked or damaged.
- A submersible automated pumping system (including pump and associated pipework) is installed and will be operated to maintain a maximum leachate head of 0.3 m on the liner. This is achieved by automated pumping commencing when the leachate levels within the sump reach > 0.8 m (which equates to 0.3 m above the liner). The pumping system will have the capacity to pump an estimated 60 m^3 of leachate per hour.

7.3.2 Leachate production, storage and recirculation

A water balance assessment was undertaken by the Applicant using the United States of America Environmental Protection Agency (USEPA) Hydrogeological Evaluation of Landfill Performance (HELP) computer program to simulate the water balance for the landfill under a range of scenarios (Golder, 2014). A level of conservatism was factored into the model by considering leachate production took place after two successive wet years. This was determined to be approximately 1600 m^3/ha/year and was considered to be the maximum rate of leachate production that was likely to take place in the landfill.

Based on the anticipated leachate generation volumes for Stage 1 of the landfill (including Cell 1), two leachate evaporation ponds are are adequate for the management of anticipated leachate volumes for the first four years and in the fifth year a third leachate pond will be

required. This assessment is based on 25% of the generated leachate being recirculated onto or within the landfill waste mass.

Two leachate ponds have been constructed for operation of Cell 1. Each pond has a maximum evaporation area of 2,304 m^2 (48 m x 48 m) and retains a volume of 5,024 m^3 whilst maintaining an operational 500 mm freeboard. The ponds have been designed with a maximum operating depth of 2.5 m and an additional 500 mm freeboard, resulting in a total maximum depth of 3.0 m (excluding the 0.5 m leachate sump).

The Applicant has proposed to reduce the volume of leachate that will require management at the site using evaporation from the leachate ponds and leachate recirculation within the landfill cells; both are common practices used at several municipal landfills in Western Australia.

Between 20-40% of leachate is proposed to be recirculated onto active landfill tipping areas, and temporarily capped areas within the Cell 1 footprint only, using drip irrigation and/or low pressure spray. A water cart may also be used to spray leachate onto internal road surfaces within the Cell 1 footprint only.

The maximum head of leachate on the landfill liner during operations is proposed to be 0.3 m. It is noted that this equates to a 0.8 m leachate head at the landfill sumps (which are positioned below the base of the liner). An automated leachate extraction system will be used to transfer leachate from the landfill to the leachate ponds or recirculation pipe network. If needed, large volumes of leachate can be pumped directly into the incoming waste as it is being placed and compacted in the landfill. The dry incoming waste absorbs a significant volume of leachate and the waste placement activities mix the moisture evenly through the waste.

Key Findings:

9. The Delegated Officer has determined that the landfill and leachate ponds have been constructed in accordance with the required specifications to enable operation of a Class II landfill and associated leachate collection system.
10. The Delegated Officer has noted the findings of the Ministers Appeal Determination in relation to separation distance between Cell 1 groundwater and will consider the findings in their determination of risks to groundwater during operation of Cell 1.

7.4 Landfill technical assessments

Technical assessments on landfill subgrade settlement, landfill stability, liner integrity, GCL liner requirements, leachate generation modelling and water balance, and infiltration and seepage prediction were carried out prior to the construction of cell 1 (Golder, 2014). The assessment findings and aspects relevant to construction of Cell 1 are discussed within the Works Approval assessment. The aspects of the assessments that are relevant to operation of Cell 1 and associated infrastructure are summarised below.

Further to the studies completed prior to construction of Cell 1, an assessment of liner integrity was undertaken recently, at DWER's request, to determine if the liner function was impacted by prolonged exposure following construction.

7.4.1 Seismicity and stability

Golder Associates sourced information on the seismicity of the site location based on the 2013 Atlas of Seismic Hazard Maps of Australia. The atlas indicates that the peak ground acceleration for the 1 in 500 year return period earthquake is approximately 0.07 g close to the site. Based on this subgrade settlement and landfill stability assessment was undertaken to assess stability over the life of the landfill operations. The findings are summarised as follows (Golder, 2014):

- The subgrade differential settlement and liner tensile stress was assessed for the intended landfill construction parameters, with total waste mass present in Cell 1. Based on the assessment the liner tensile strains at the area with the predicted maximum settlement was acceptable for maintenance of integrity of the installed liner system throughout operations.
- The re-profiled pit slope, waste landform (incorporating Cells 1 to 6 under dry and semi-saturated conditions), and veneer stability for leachate aggregate on the pit wall slope were assessed for stability in an operational and post-closure state. Under modelled earthquake scenarios during operation and for the final waste landform, determined factors of safety were found to be acceptable. The exception was for veneer stability of the leachate aggregate, which was found to be unacceptable should the aggregate extend beyond 4.5 m above the base of the pit prior to waste placement. It is noted that the construction specifications (IWP, 2017) limit the installation of drainage aggregate to a maximum vertical height of 4.5 m prior to waste placement, and that the remainder of the aggregate will be installed as waste placement height increases.
- The final cap (veneer) stability was assessed to determine long-term stability of the capping system post-closure of the landfill. The assessment found that the stability was acceptable, but recommended that the final cap design incorporates intermediate anchoring to achieve acceptable factors of safety for the intended cover thickness (1 to 2 m).

As part of DWER's review of the stability assessment for the works approval, DWER commissioned an independent technical review of the Golder (2014) report. The independent review found that:

- The operational landform design is considered to be stable;
- The strength parameters assigned to the Municipal Solid Waste (MSW) appear to be the governing factor to the results of stability assessment;
- Once the final landform has been completed, a detailed design should be carried out based on the landfill geometry and geosynthetic materials available at the time;
- It is noted that Golder Associates considers that veneer stability of the final cap system to be acceptable based on knowledge of the materials at the time of production of their report; and
- No additional stability monitoring is recommended for the landfill assuming that it is constructed in accordance with the design.

7.4.2 Liner integrity

Golder Associates undertook an assessment of potential stresses in the lining system to inform the selection of appropriate geosynthetic materials to be used in the liner. This included operational landfilling scenarios, referring to the waste placement methods proposed by the Applicant. Golder Associates concluded that the risk of liner straining is limited and assessed tensile strains under waste placement operations are considered acceptable (Golder, 2014)

DWER requested the Applicant to provide a statement from a specialist engineer on the current integrity of the installed liner system, given the period of time that has lapsed between construction of the liner and this licence assessment. A desktop assessment was provided to DWER by the Applicant. The Cell 1 construction was completed in early 2016 and although the cell has not received any waste since construction, run-off from storm events, have reported to the lined area, requiring periodic operation of the sump. In October 2018, the separation geotextile was replaced on top of the leachate aggregate surface following damage due to ultraviolet light degradation and strong winds. The geotextile was replaced and re-

certified in accordance with the construction quality assurance plan outlined in the works approval (Golder, 2018).

It is noted that the installation of the liner during construction was undertaken in conformance with the works approval requirements. The specialist engineer was of the opinion that as the confined liner system (confined below the leachate drainage aggregate), including the compacted subgrade, GCL, HDPE membrane and cushion geotextile has not been exposed to ultraviolet light or weather, and has not been disturbed resulting in potential mechanical damage during the period in which Cell 1 has remained empty, it is still suitable for its intended use for containment of waste and leachate within the landfill (Golder, 2018). The re-installed separation geotextile was determined to be suitable for use as part of the final compliance assessment associated with the works approval.

The liner integrity assessment found that components of the unconfined liner system (sloped areas of Cell 1 not covered with leachate aggregate) – specifically the GCL – may have been impacted by prolonged expose to elements (downslope erosion of bentonite). While the integrity is unlikely to be impacted, the assessment recommended that the GCL should be tested prior to placement of waste to ensure that the liner still meets the required specifications, this can be undertaken without damage to the confined liner integrity, when waste height approaches this area (Golder, 2018).

It is noted that the current extent of aggregate placement covers the internal bunds, and up to an approximate Relative Level (RL) on 280 m along the northern slope of Cell 1 (as demonstrated in work approval compliance documentation). DWER notes that this provides sufficient airspace to commence waste placement within the confined liner area, and allow integrity assessment and any repair work required on the unconfined liner area prior to waste reaching the base of the unconfined liner area in Cell 1. The Applicant indicated to DWER that this testing would be completed prior to waste reaching the unconfined liner area.

Key Findings:

11. Based on the Technical assessment (Golder, 2014) and Independent Review the Delegated Officer considers findings and recommendations regarding stability of the constructed landfill appear to be appropriate for operation of the Cell 1 landfill and associated infrastructure.
12. Based on the outcomes of the Liner Integrity Assessment (Golder, 2018), the Delegated Officer considers that the confined liner is suitable for containment of Class II waste; however, further assessment is required to ensure the unconfined liner above the current level of leachate aggregate placement in Cell 1 is suitable for containment of Class II waste. The issued licence therefore requires assessment of liner integrity in accordance with the CQA requirements of the works approval, prior to waste placement reaching this level.

7.5 Landfill gas requirements

Based on the overall size of the landfill facility, and the type of waste proposed to be received, it is anticipated that the landfill will generate gas at quantities that require collection and management to prevent risk of off-site impacts. The landfill gas generation model (IWP, 2017) does not predict generation of gas until year three of operations.

Based on the operational life of Cell 1, landfill gas capture and management is not required as part of Cell 1 operations, but will be considered in the risk assessment in relation to potential for fugitive emissions to impact receptors in a post-closure setting.

It is proposed that the engagement of a specialist landfill gas management contractor will be undertaken within two years of commencement of waste receipt to capture and determine adequate gas management controls. Options include:

- Power generation;
- Intermittent use and off-time flaring;
- High-temperature flaring; and
- Low-calorific flaring.

The most likely option based on the maximum predicted gas generation volumes, is high-temperature flaring. As no landfill gas is predicted to be generated during operation of Cell 1, landfill gas monitoring will not be undertaken as part of operation of Cell 1 landfill.

7.6 Cell 1 closure requirements

The final waste profile will be achieved with a maximum pre-settlement slope of 1 in 5 (20%) to enable a landfill cap to be installed. The landfill will be closed and capped progressively as the individual cells reach the final waste profile.

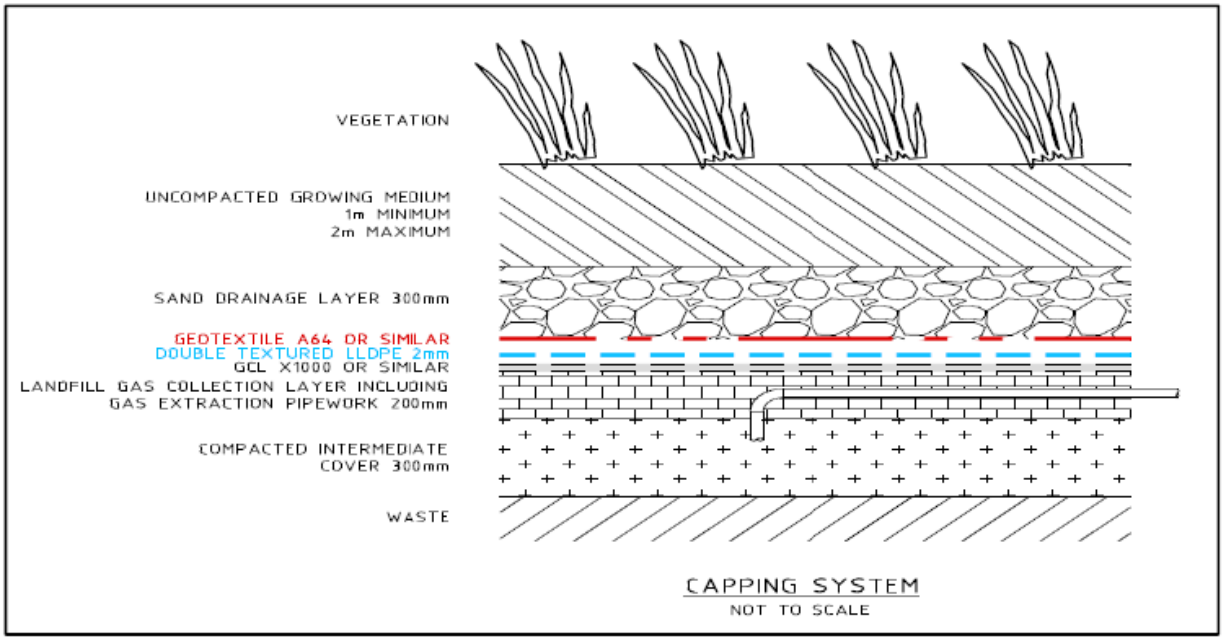
7.6.1 Capping and rehabilitation

The landfill cap proposed to be installed at closure of Cell 1 is designed to minimise infiltration into the waste mass, reduce leachate generation rates, prevent human and animal access to the waste, assist in controlling releases of landfill gas, and to aid a beneficial after use of the site after closure. The proposed capping design can be summarised as follows (summarised in **Figure 12**):

- A geosynthetic clay liner (GCL);
- A 2 mm thick, double textured, linear low-density polyethylene (LLDPE) liner;
- A geotextile cushion layer;
- A sand drainage layer; and
- A growing medium sourced from onsite materials (1 to 2 m thickness) and vegetation.

As required by the landfill design standard (EPA VIC, 2015), the modelled leakage rate through the cap is less than 75% of the modelled basal liner leakage rate. (Golder, 2014)

Golder Associates developed a seepage model (using SVFLUX software) to compare the expected flux through the cap to the basal leakage rate. The model results indicate that no flux occurs through the cap liner system as the net outflow due to evaporation (1,315 m^3/ha) exceeds the net inflow (1,300 m^3/ha) (Golder, 2014).



Source: IWP Drawing OV-WA-27 (IWP, 2017)

Figure 12: Landfill Capping Liner System

The Applicant has stated that once there is a reasonable area of completed waste placement (approximately 2 ha) a contractor will install the capping works in accordance with the works approval. This would equate to four campaigns for the Stage 1 landfill area (9 ha).

7.6.2 Landfill gas management

Landfill gas extraction wells will be installed on the surface of the final waste profile (20 m deep) at a spacing of 50 m, prior to the construction of the lined capping layer. A landfill gas collection layer is included within the landfill cap design to provide a corridor for the gas extraction wells and to enable collection and management of gas that may collect under the lined cap surface. The final design of the landfill gas extraction network and management approach will be determined by the landfill gas management contractor prior to closure of Cell 1.

Key Findings:

13. The Delegated Officer considers that a final Capping Plan is required prior to completed waste placement reaching approximately 2 ha in area (within the Stage 1 landfill), of on completion of Cell 1 waste placement, whichever is sooner.
14. The Delegated Officer considers that a landfill gas management contractor should be engaged within two years of commencement of waste placement in Cell 1.

8. Landfill Management

The Applicant has provided a Landfill Management Plan (*Opalvale Salt Valley Road Class II Landfill, Lot 11 Chitty Road, Toodyay, Landfill Management Plan, Revision 4, dated 9 January 2019*). The following section provides a summary of this plan, along with the proposed operational details of the landfill.

8.1 Waste acceptance

It is proposed to operate the landfill as a Class II putrescible landfill as described by DWER

Landfill Waste Classification and Waste Definitions 1996 (as amended April 2018). The wastes proposed to be accepted include:

- Clean fill and uncontaminated fill;
- Type 1 inert waste (Construction and Demolition);
- Putrescible waste (Class II only);
- Contaminated soil waste meeting waste acceptance criteria for Class II landfills only);
- Type 2 inert waste; and
- Type 1 and 2 special waste.

Initial waste acceptance volumes are anticipated to be 50,000 tpa, increasing up to 150,000 tpa.

The following wastes will not be accepted onto premises:

- Liquid waste;
- Hazardous, intractable and problematic waste;
- High hazard flammable waste; and
- Wastes classed as greater than Class II.

Initially wastes will be sourced only from a facility run by a company affiliated with the Applicant, where waste has been pre-sorted and all recyclable materials removed from the waste stream. The Applicant has stated that as business grows external customers will begin dropping off Perth metropolitan and local government waste material to the landfill. The landfill will not be open for general public waste drop off.

All vehicles carrying loads into the Premises from the affiliated facility will be weighed into the landfill site using an automated Driver Control Station (DCS) located at the weighbridge. As other customers begin to use the landfill they will be directed to the weighbridge and permitted into the Premises by a gate attendant. The weighbridge will be located on the internal site access road, directly west of the leachate ponds.

On arrival at the weighbridge the following information will be accepted either:

- Date and time of entry;
- Customer name;
- Vehicle registration;
- Waste type, including identification of asbestos; and
- Weight load weight

All loads are directed straight to the active tipping face, which will be manned at all times. The load will be visually inspected prior to placement at the active tipping area, either at the weighbridge or, under supervision to the side of the active tipping area. Any non-conforming waste will be rejected from the Premises and either removed by the customer's vehicle or quarantined within the landfill footprint, and removed from the Premises as soon as possible.

8.1.1 Asbestos waste acceptance

The Applicant has requested that the landfill be able to accept asbestos waste. Asbestos waste shall only be accepted onsite as appropriately wrapped and sealed packages. The received material will be deposited directly into an area of the landfill marked for burial of asbestos waste (this area shall be identified on the site map at all times once waste receipt commences).

The proposed asbestos handling procedure includes:

- Specifications for asbestos receipt, and burial;
- Requirements for immediate burial and covering;
- Requirement to maintain an asbestos register at the premises;
- Separation of asbestos from general waste loads; and
- Designation of a specific area for burial of asbestos within Cell 1.

8.1.2 Biomedical waste acceptance

The Applicant has requested that the landfill be able to accept biomedical waste. Only non-radioactive wastes will be received, and it is anticipated only small volumes of clinical and related wastes may be received. The wastes will only be received by prior arrangement from a licensed controlled waste carrier. The received material will be deposited directly into an area on the landfill designated for burial of biomedical waste (this area shall be identified on the site map at all times once waste receipt commences).

The proposed biomedical waste handling procedure includes:

- Specifications for receipt, including requirements for containment and labelling;
- Specifications for minimal handling, with regard to the Biohazard Waste Industry Code of Practice for the Management of Clinical and Related Waste (6th Ed), Waste Management Association of Australia, June 2010;
- Requirements to maintain a biomedical waste acceptance register at the premises;
- Separation of biomedical waste from general waste loads; and
- Designation of a specific area for burial of biomedical waste within Cell 1.

8.2 Waste storage, processing and burial

The landfill facility is proposed to accept only:

- Class I and II waste; and
- Asbestos waste.

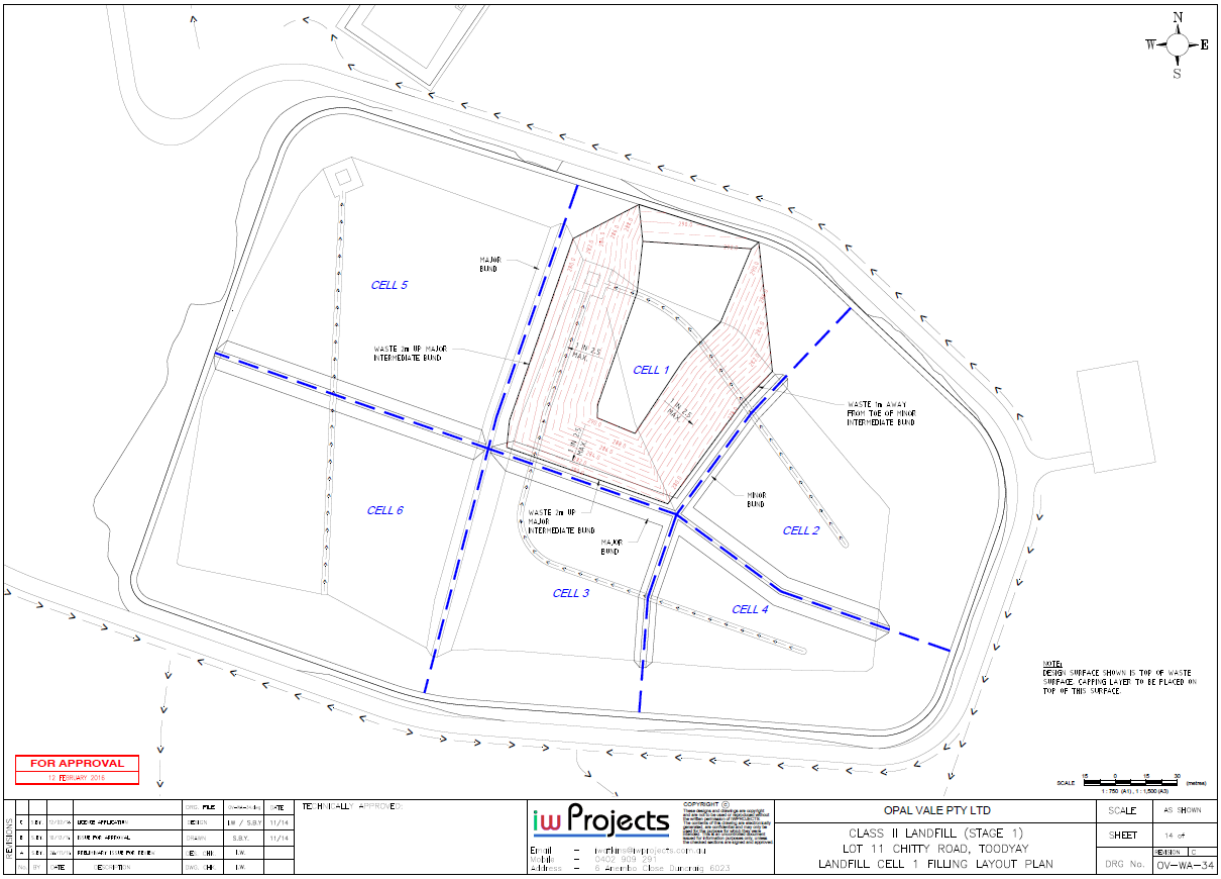
No treatment or processing of waste will occur on the premises. All waste will be buried within Cell 1. On arrival at the active tipping area, the waste delivery vehicle will stop on a trafficable area located close to the final waste disposal location and discharge its load. The tipping area will be manned allowing inspection of loads prior to tipping if required. The deposited waste will then be pushed into place by a dozer or waste compactor and then compacted, typically by a minimum of five passes of the compaction vehicle. Compacted waste will be covered at the end of each day, or when waste deliveries have ceased for the day.

The active waste tipping area is kept to a maximum width of 30 m and a maximum height of 2 m. Waste will be placed in benches of up to 2 m height.

This waste placement process is continued until the area of waste placement has reached its desired lift height or waste deliveries have ceased for the day. Thereafter, the compacted waste is covered with adequate daily cover material to cover all waste material.

The formation of the waste mass within each landfill cell is typically in accordance with the individual landfill cell filling plans. The maximum slope of the waste batters is 1 V in 2.5 H.

Figure 13 demonstrates the area to be filled and the anticipated final landform configuration for Cell 1.



Source: Drawing OV-WA-34; IWP, 2017

Figure 13: Proposed filling area for Cell 1

8.3 Cover requirements

A daily soil cover will be applied at the end of each day's landfill operations. The cover material will be placed to a depth of 150 mm over all exposed waste surfaces.

A 300 mm layer of intermediate cover will be placed over tipping areas that will not have waste placed over the daily cover for a period of longer than three months. This provides an improved cover to the Cell 1 waste mass over an extended period should active tipping not occur.

The amount of soil cover (daily and intermediate cover) required for Stage 1 operations has been estimated to be 105,000 m^3. All soil materials used for cover will be sourced as substandard soils (silty clay, clay or sand soil) excavated from clay extraction on the premises of on a neighbouring site. Other materials that may be used as alternative cover include suitable soils received at the premises (clean fill or uncontaminated fill), tarpaulins, chemical emulsions and papier-mache. Up to 60,000 tonnes/year of imported cover material can be sourced from Resource Recovery Solutions Bayswater recycling process if required.

Key Findings:

15. The Delegated Officer considers the proposed cover requirements for daily and intermediate cover of Class I and Class II waste to be sufficient and equivalent to other municipal landfills operating in Western Australia.

8.4 Hours of operation

The facility operating hours are proposed as follows:

- Monday to Saturday – 0700 to 1800 hours; and
- Sunday and Public Holidays – Closed.

The landfill site will be permanently staffed during all hours of operation. At the end of each day of operation, the site entry gate will be locked. The site will not left unattended while the entrance gate is unlocked.

Appropriate signage will be maintained at the Salt Valley Road main entrance to the site providing details to customers of the facility operating hours. The sign will include after-hours and emergency contact information as well as waste types permitted, speed limits.

8.5 Fencing

Fencing will be established around the landfill operational area to prevent stock access and uncontrolled vehicle access. A security gate will be installed at the site entrance and will be locked when the site is unattended. Other fencing around the premises includes:

- 2 m high chainlink fencing with barbed wire around the leachate ponds;
- 4 m high mobile litter screens will be placed adjacent to the active tipping area to contain windblown waste and
- A vegetated screen of fast growing trees will be planted along the existing ridgeline to the north of the landfill to provide a visual screen to separate the landfill operations from the residential properties to the northeast of the premises.

8.6 Record keeping

A Complaints Register will be maintained relating to all site activities. All complaints relating to the landfill operation will be entered into the Complaints Register. The Register will record, as a minimum, the following information:

- Date and time the complaint was received;
- How the complaint was received (by phone, email, in person, via DWER)
- The details of the complainant (if available);
- Details of the complaint including:
    - What is the complaint about?;
    - When did the incident occur?;
    - How often did the incident occur?; and
    - Was anyone else impacted by the incident?;
- Local weather conditions at the time of receiving the complaint that may be relevant to identify the cause of the complaint;
- Name of the person receiving the complaint;
- Action taken to investigate the complaint;
- Follow-up dealings with the complainant; and
- Outcome of the complaint investigation.

The Complaints register will be maintained at the weighbridge office. The register is maintained up to date, with all complaints being entered into the register before the end of the day on which the complaint is received.

8.7 Landfill management and monitoring plans

The Landfill Management Plan provides a working document to outline the requirements of operation of the landfill. It includes a number of specific management plans describing the approaches and concepts for management of impacts associated with operation of the landfill. Management Plans not expanded on in the following sections, but are discussed within the Risk Assessment section include:

- Asbestos management;
- Dust management;
- Windblown waste management;
- Odour management;
- Noise management;
- Vermin management;
- Pest and weed management (including mosquito and bird management); and
- Fire management.

Other management plans not included with the scope of DWER's risk assessment include: Chemical and fuel management

8.7.1 Site management and maintenance

Staff employed by Opalvale will be trained in the operation of the landfill in accordance with the Landfill Management Plan and procedures, and the issued operating licence. The site manager will be responsible for the day to day operation of the landfill and related activities including the ongoing monitoring, reporting and management of:

- Environmental incidents including those with the potential to impact groundwater or surface water quality;
- Leachate generation rates and correct function of leachate collection and conveyance systems;
- Landfill fires, including potential ignition sources;
- Unauthorised waste disposal;
- Odours and dust generation beyond the premises boundary;
- Litter washed on blown beyond the premises boundary;
- Maintenance of mobile equipment;
- Internal road accessibility, including maintenance with rock sheeting if necessary; and
- Maintaining stormwater diversion drains and structures.

8.7.2 Leachate management and monitoring

Leachate levels in the leachate collection system will be managed, using the automated leachate pumping system, to maintain a leachate head of no greater than 0.3 m on the landfill basal liner. Leachate levels in the sump will be monitored monthly (prior to commencement of leachate pumping, and after completion of pumping) using an electronic measuring device. A flow meter is installed on the leachate extraction pipes to monitor flow rate of leachate being pumped. Leachate volumes are to be managed using the following:

- Storage within leachate ponds (within operational volume capacity);

- Evaporation from leachate pond surface;
- Recirculation onto active waste surface or into waste mass using irrigation on injection points;
- Spray (using water tanker) over access road within the lined landfill area only; or
- Spray over leachate pond surface to enhance evaporation.

During operations, it is proposed that the following is monitored:

- Depth of leachate in sumps (daily initially);
- Volume of leachate pumped from leachate sumps (recorded weekly);
- Depth of leachate in leachate ponds, within minimum freeboard calculated (monthly);
- Volume of leachate pumped out of leachate ponds (recorded weekly); and
- Quality of leachate in the sump (no frequency proposed).

Contingency measures proposed in the event that the capacity of the leachate storage system is reached (leachate depth in the ponds reaches the freeboard height) are:

- Employ an additional staff member to manage leachate (as sole task);
- Apply temporary cover over inactive areas of the landfill to increase the retention of rainfall in the cover and minimise leachate production over active areas;
- Construct additional leachate pond; and
- Tanker excess leachate off-site for disposal.

8.7.3 Landfill gas management

Landfill gas generation is not predicted during the operation of Cell 1. A Landfill gas contractor will be engaged within 2 years on commencement of waste acceptance in Cell 1. Should Cell 1 still be operational at the time the contractor is engaged, fugitive emissions will be monitored and actioned in accordance with the landfill gas management plan.

8.7.4 Groundwater management

Protection of groundwater quality will be managed in accordance with the groundwater management plan, which requires the ongoing monitoring of groundwater bores located within and external to the Stage 1 landfill footprint.

Ongoing monitoring of groundwater will be undertaken by a specialist contractor. It is proposed that quarterly groundwater monitoring be undertaken including measurement of groundwater table elevation, and collection and analysis of groundwater samples from the groundwater monitoring network.

8.7.5 Surface water and stormwater management

The site will be managed so that uncontaminated stormwater is diverted around the Cell 1 footprint, and contaminated stormwater (that has come into contact with Cell 1 operation areas of the Cell) is retained within the lined Cell 1 landfill footprint.

A system of diversion bunds (minimum of 1 m height) and drains has been constructed around the active landfill area both within the clay pit, and external to the clay pit. Surface water will be managed in accordance with the surface water management plan, and supplementary information (Opalvale, 2018) which outlines further controls intended to be employed during

operations to prevent sediment loss and increased sediment loads in runoff flowing into surface water bodies.

Surface soils and clay soils within the pit are prone to erosion in run-off areas. During operations the bunds and drains will be maintained to ensure they are free from significant amounts of sediment and that they have not eroded following rainfall. All runoff generated within the clay pit (but outside of the Cell 1 landfill area) will be retained within the clay pit within the unlined surface water storage dam. All surface water received into the Cell 1 footprint will report to the leachate collection sumps and ultimately to the leachate ponds.

The surface water storage dam within the clay pit is estimated to have a storage capacity sufficient to contain winter rainfall within the dam. Water contained in this pond may be used for dust suppression on internal roads and as part of clay extraction not associated with the prescribed activities. Water may also be used to supplement stock watering on the neighbouring farm.

During operations, it is proposed that the following is monitored regularly:

- Sediment deposition in diversion drains to ensure they are operating efficiently;
- Inspection of all surface water diversion structures (permanent and temporary) and capped surfaces prior to onset of winter rains, and following significant rainfall events; and
- Six-monthly collection and analysis of samples from the in-pit surface water storage dam.

The proposed surface water management plan and supplementary information also provides information on contingencies and response in the event of unplanned spillages (hydrocarbons, leachate etc.) during operations. The Applicant has noted that ambient surface water monitoring in drainage lines is likely to impractical given the location of the premises in the landscape and the short-duration of flow events associated with storms.

8.7.6 Rehabilitation management

The Applicant has developed a Rehabilitation Management Plan to guide the closure of the landfill. The landfill will be progressively capped and rehabilitated as individual landfill cells reach their ultimate design profile.

The Applicant intends to achieve a pre-settlement waste profile at a maximum slope of 1 in 5 (20%). The landfill cap will consist of a geosynthetic lining system overlaid with a 1 m to 2 m layer of clayey material sourced from material at the Premises. It is intended that the geotechnical properties of the cap be assessed prior to installation, and that a final detailed design plan and specification be prepared, including construction quality assurance and reporting requirements, prior to closure of the landfill cells.

Following the closure of the landfill the Applicant intends to return the land to native bush and pasture. With landfill areas being rehabilitated and managed to prevent stock from accessing and grazing over capped surfaces.

9. Risk assessment

9.1 Determination of emission, pathway and receptor

In undertaking its risk assessment, DWER will identify all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires detailed risk assessment.

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through **Table 12**.

The identification of the sources, pathways and receptors to determine Risk Events are set out in **Table 12**.

Table 12: Identification of emissions, pathway and receptors

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Cat 64 ***Class II putrescible landfill site***	Acceptance, burial and decomposition of wastes including asbestos and Class II waste Collection, storage and management of leachate Ongoing management of premises	Landfill leachates	Beneficial users of groundwater	Seepage through liner	Contamination of waters or deterioration of local/regional groundwater quality. Amenity and health impacts to users (potential potable, non-potable and stock water uses)	Yes	See Section 9.4

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Cat 64 ***Class II putrescible landfill site***	Acceptance, burial and decomposition of wastes including asbestos and Class II waste Collection, storage and management of leachate Ongoing management of premises	Landfill leachates	Surface water ecosystems: Jimperding Brook 900m south of the Premises. Greater Avon River Valley catchment	Overland flow due to overtopping of leachate storage ponds Transported in groundwater	Contamination of waters or deterioration of local/regional surface water ecosystems	Yes	See Section 9.4
			Terrestrial ecosystems (soils and remnant native vegetation on and adjacent to premises)	Overland flow due to overtopping of leachate storage ponds	Contamination of soil Degradation of terrestrial habitat	Yes	See Section 9.4
			Sensitive terrestrial habitat: Clackline nature reserve Nanamoolan Nature Reserve	Seepage Overland Flow	Contamination of soil Degradation of terrestrial habitat	No	The receptor is located upgradient of the Premises and the potential pathways, therefore are unlikely to connect the source to the receptor.
		Dust	Nearest sensitive receptors located 1,100 m north east.	Dispersal via air	Air quality (adverse amenity and public health)	Yes	See Section 9.5
			Adjacent privately owned farmlands (>1 to 5 km)			Yes	See Section 9.5
			Recreational users of Clackline nature reserve and Nanamoolan Nature Reserve			No	Particulate matter is not considered likely to travel this distance or cause any distinguishable impacts from background concentrations

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Cat 64 ***Class II putrescible landfill site***	Acceptance, burial and decomposition of wastes including asbestos and Class II waste Collection, storage and management of leachate Ongoing management of premises	Dust	Terrestrial environment – native vegetation	Dispersal via air	Impact to vegetation health	No	Native vegetation is largely situated within nature reserves protected by significant distance from the premises. The potential dust impacts to remnant native vegetation surrounding the premises are unlikely to be distinguishable from impact related to previous industrial activity at the site (clay extraction). The potential impact related to the prescribed activites along with the proposed controls are considered to manage this risk to acceptable levels.
		Asbestos	Nearest sensitive receptors located 1,100 m north east.	Dispersal via air	Public health (adverse health)	Yes	See Section 9.6
			Adjacent privately owned farmlands and industrial sites (clay extraction)			Yes	See Section 9.6
			Recreational users of Clackline nature reserve and Nanamoolan Nature Reserve	Dispersal via air	Public health (adverse health)	No	Asbestos fibers are not considered likely to travel this distance.
		Odour	Nearest sensitive receptors located 1,100 m north east.	Dispersal via air	Amenity impacts	Yes	See Section 9.7
			Adjacent privately owned farmlands (no residential properties)			Yes	See Section 9.7
			Recreational users of Clackline nature reserve and Nanamoolan Nature Reserve	Dispersal via air	Amenity impacts	No	Odour is not considered likely to travel this distance or cause any distinguishable impacts from background concentrations

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
Cat 64 ***Class II putrescible landfill site***	Acceptance, burial and decomposition of wastes including asbestos and Class II waste Collection, storage and management of leachate Ongoing management of premises	Noise	Nearest sensitive receptors located 1,100 m north east.	Air	Amenity impacts	Yes	See Section 9.8
			Adjacent privately owned farmlands (no residential properties)			Yes	See Section 9.8
			Recreational users of Clackline nature reserve and Nanamoolan Nature Reserve	Dispersal via air	Amenity impacts	No	Noise is not considered likely to cause any distinguishable impacts at this distance.
		Fugitive landfill gas	Nearest sensitive receptors located 1,100 m north east.	Air	Amenity (odour) Public health (adverse health)	Yes	See Section 9.9
			Other adjacent privately owned farmlands (>1 km)	Air	Amenity (odour) Public health (adverse health)	No	Predicted volume of gas generation during operation of Cell 1 is negligible. Any fugitive landfill gas is likely to disperse given the distance from the premises, the undulating topography, and the limited built environment in the area.
			Recreational users of Clackline nature reserve and Nanamoolan Nature Reserve				
		Vermin/Pests	Nearest sensitive receptors located 1,100 m north east.	Direct contact	Amenity and public health (adverse health)	Yes	See Section 9.10
			Adjacent privately owned farmlands (no residential properties)			Yes	See Section 9.10
			Native flora and fauna	Direct contact	Degradation of native flora and fauna habitat	Yes	See Section 9.10

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
Cat 64 ***Class II putrescible landfill site***	Acceptance, burial and decomposition of wastes including asbestos and Class II waste Collection, storage and management of leachate Ongoing management of premises	Vermin/Pests	Recreational users of Clackline nature reserve and Nanamoolan Nature Reserve	Direct contact	Amenity and public health (adverse health)	No	Vermin, pest and weed extent is unlikely to extend to this distance.
		Windblown wastes/ Litter	Nearest sensitive receptors located 1,100 m north east.	Dispersal via air	Amenity	Yes	See Section 9.11
			Adjacent privately owned farmlands (no residential properties)			Yes	See Section 9.11
			Recreational users of Clackline nature reserve and Nanamoolan Nature Reserve	Dispersal via air	Amenity	No	The transport of windblown waste is unlikely to extend this distance from the Premises.
		Smoke (fire)	Nearest sensitive receptors located 1,100 m north east.	Dispersal via air	Amenity and public health (adverse health)	Yes	See Section 9.12
			Adjacent privately owned farmlands (no residential properties)			Yes	See Section 9.12
			Recreational users of Clackline nature reserve and Nanamoolan Nature Reserve			Yes	See Section 9.12

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Cat 64 ***Class II putrescible landfill site***	Acceptance, burial and decomposition of wastes including asbestos and Class II waste Collection, storage and management of leachate Ongoing management of premises	Unforeseen spills from hydrocarbon storage areas	Beneficial users of groundwater	Seepage from surface	Contamination of waters or deterioration of local/regional groundwater quality. Amenity and health impacts to users (potential potable, non-potable and stock water uses)	No	The storage of environmentally hazardous materials is not regulated by DWER. And as such, the Delegated Officer considers that risks are managed as requirements determined under other State legislation.
			Surface water ecosystems: Jimperding Brook 900m south of the Premises. Greater Avon River Valley catchment	Transport and discharge of groundwater	Contamination of waters or deterioration of local/regional surface water ecosystems		
			Terrestrial ecosystems (soils and remnant native vegetation on and adjacent to premises)	Direct discharge to ground	Contamination of soil Degradation of terrestrial habitat		
			Sensitive receptors including nearby residences, adjacent farmland and Recreational users of Clackline nature reserve and Nanamoolan Nature Reserve	Dispersal of vapours via air	Public health (adverse health)		

9.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in **Table 13** below.

Table 13: Risk rating matrix

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

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with **Table 14** below.

Table 14: Risk criteria table

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

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

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines.*
"onsite**"** means within the Prescribed Premises boundary.

9.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment **Table 15** below:

Table 15: Risk treatment table

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

9.4 Risk Assessment – Leachate and sediment emission impacts

9.4.1 Hazard characterisation and impact

Landfill leachate from a putrescible landfill (Class II waste) mainly consists of dissolved organic matter and inorganic compounds such as sulphates, chlorides and ammonium salts and other nitrogen and phosphorus-rich compounds. Leachate may also contain some heavy metals including lead, nickel, copper, hydrocarbons and synthetic organic compounds such as hydrocarbon, and pesticides.

There is no point source emissions of leachates to land, surface water or groundwater associated with the operation of the Premises. However, it is possible that leachate generated from the storage, degradation and compaction of wastes and the subsequent collection and management of leachate may cause unintended leachate emissions to groundwater and surface water.

Leachate generated from the facility is likely to have a high biochemical oxygen demand and contain nutrients such as phosphorus and nitrogen as well as synthetic organic chemicals or heavy metals.

Receptors that may be affected by leachate emissions include groundwater, surface water, on-site soil and adjoining land, and remnant native vegetation. The Premises contains remnant and highly disturbed native vegetation and the immediate area is a highly developed industrial setting with only remnant native vegetation within 1 km of the Premises.

Stormwater diversion structures and drainage structures have been constructed to manage surface water flow around the Premises. The surface soils and clay regolith within the pit are known to be erosive in areas interacting with run off. Sediment emissions may result from the management of on the Premises. In addition, surface water within the clay pit void may contain elevated salts (leached from clay within the void) and suspended solids.

Hazard to groundwater

The groundwater flow in the area is predicted to be in a south to south-westerly direction in the vicinity of Cell 1 (**Figure 9**). While there are no registered groundwater users within 5 km, down hydraulic gradient of Cell 1, groundwater values for stock watering and potential discharge to surface water are to be maintained. Potential contamination of groundwater with chemicals or metals may impact the beneficial uses of groundwater resources, and the health and biological diversity of species within the receiving environment.

The assessment of risk to the groundwater receiving environment considers the following aspect of Cell 1 operation:

- The assessment of estimated travel times is based on the low hydraulic conductivity of the confined aquifer and aquitard beneath Cell 1, and the thickness of clay regolith (aquitard) between the base of the landfill liner and the top of the aquifer.
- There are no registered groundwater users down hydraulic gradient of Cell 1;
- The distance to the nearest surface water discharge receptor (assuming contamination reaches groundwater and there is a direct linear travel pathway) is 900 m;
- The landfill liner system is designed to achieve a permeability of ≤ 5 x 10^{-11} m/s with an estimated conservative leakage rate of 1.02 L/ha/day;
- The leachate collection and management system is designed to maintain a maximum leachate head of 0.3 m on the landfill liner (noting that the head at the sump is 0.8 m);
- The minimum separation distance between the Cell 1 liner and the maximum predicted groundwater level beneath Cell 1 is greater than 2 m, with the exception of the 6 m x 6 m area beneath the Cell 1 sump; and

- And the leachate sump is constructed with a composite liner system including a double GCL layer.

Hazard to surface water

Surface water features in the vicinity of and down flowpath of the Premises as Jimperding Brook and associated tributaries. Jimperding Brook flows into the Avon River approximately 17 km downstream of the Premises.

Avon River Valley is an environmentally significant waterway requiring protection for environmental stressors (salinity, altered drainage, sedimentation, pollution (agriculture and industry). Surface water values requiring protection within the River are conservation, education, recreation, tourism, water supply, artifacts and stock routes.

Jimperding Brook is surrounded by lands used extensively for agricultural (cropping and grazing) and on one Premises, for clay extraction and industry. The ephemeral nature of flow within the Brook, coupled by the surrounding land use have impacted in the health of the surface water ecosystem (Section 6.4.2), resulting in a surface water ecosystem that is likely to be degraded.

There are no permanent water bodies on the premises. Within the prescribed premises boundary, excess surface water and stormwater will be contained within the Stage 1 landfill footprint inside the clay extraction void. This water will be used for dust suppression within the operation areas of the Premises and may be used for stock watering on the neighbouring farm land.

Outside of the Cell 1 footprint, all uncontaminated water will flow, via diversion drains, to the ephemeral creek to the north of the landfill, or to Jimperding brook to the south/farm dam.

Changes to water quality in local streams, resulting from unintended leachate emissions, or erosion of sediment, may result in increased turbidity, eutrophication and excessive growth of algae. Algae growth may impact the survival of existing organisms through light and oxygen restriction and along with increased sediment loads and chemical stressors associated with leachate emissions, can cause the degradation of the surface water value and beneficial use.

Other hazards

Degradation of soil quality, and remnant native vegetation is possible in the event of minor spillages of leachate (due to breakdown in infrastructure) or overtopping of the leachate ponds. It is noted that the terrestrial habitat on the Premises is disturbed due to prolonged agricultural and industrial use of the land prior to the landfill development.

9.4.2 Criteria for assessment

On the basis of the water quality parameters, the Delegated Officer considers that groundwater in the area down-hydraulic gradient of Cell 1 is potentially suitable for potable uses as well as non-potable use and stock drinking water. Surface water stored on and flowing downstream of the Premises may be used for stock watering. Any ecosystem in the surface water bodies immediately downstream of the premises is likely to highly degrade. The ANZECC guidelines for the listed beneficial uses and highly degraded surface water ecosystems (80% protection of species) are considered the appropriate criteria for assessing impacts to groundwater and surface water.

9.4.3 Applicant/Licence Holder controls

The applicant's controls are described in Section 7 of this Decision Report. In summary, the design comprises of an engineered liner (over Cell 1 and the two leachate ponds) and leachate collection and management system.

Proposed management controls for the protection of groundwater from leachate emissions

include:

- Implementation of the groundwater management plan and leachate management plan; and
- Regular monitoring of groundwater and leachate using the existing groundwater monitoring network monitoring both background groundwater quality and potential movement of leachate through any liner defects.

Proposed management controls for the protection of surface water from leachate and sediment emission include:

- Implementation of the surface water management plan and leachate management plan;
- Protection of drainage structures with bank riprap and riffles to reduce flow velocity and potential for scouring;
- Maintenance of surface water diversion structures to manage run off;
- Establish riffled in the natural drainage tributary to reduce stormwater flow speeds into the ephemeral creek;
- Establish a sediment trap upstream of culverts to reduce sediment transport in the diversion drains;
- Inspect and maintain surface water management and control structures after significant rainfall and prior to the onset of winter rains;
- Contain any unplanned spills within the premises; and
- Monitor surface water storage dam water quality.

9.4.4 Key findings

The Delegated Officer has reviewed the information regarding leachate emissions and has found:

16. There are three receptors present including groundwater, surface water and terrestrial habitat (soils and vegetation). Groundwater is considered both a pathway and receptor. For the purposes of this assessment, the beneficial uses of groundwater and surface water ecosystems are considered the receptors most affected by the potential leachate emission
17. The landfill has been designed to limit leachate movement through the liner and is appropriately designed and constructed for the environmental setting.
18. The existing groundwater monitoring network installed at the site is appropriately located and installed to monitor both background groundwater quality and potential movement of leachate though any liner defects.
19. Surface water management structures have been implemented and are designed to separate surface water from operational and non-operation areas of site, and to contain all stormwater that may come into contact with waste, within Cell 1.
20. Surface water flows are likely to be significant enough within nearby surface water drainage lines to allow for monitoring of ambient surface water during wet months of the year.

9.4.5 Consequence

Based on the nature of surface water ecosystems and terrestrial ecosystems, the potential beneficial use of the groundwater, and the expected travel times of any potential leachate emissions, the Delegated Officer has determined that leachate or sediment emission to groundwater or surface water could cause mid-level on site impacts with specific consequence criteria being exceeded. Therefore, the Delegated Officer considers the consequence of leachate emission impacts to be **Moderate.**

9.4.6 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of moderate leachate emissions would probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of Risk Events occurring to be **Unlikely.**

9.4.7 Overall rating of risk event

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix and determined that the overall rating for the risk of leachate emissions is **Medium.**

9.4.8 Acceptability of risk event

As per DWER's acceptability and treatment of Risk Events the Delegated Officer has determined that the risk event is tolerable, subject to regulatory controls.

9.4.9 Regulatory controls for leachate emission risk

The Applicant will be required to implement the following controls to manage the potential impacts from leachate emissions:

- Infrastructure controls including construction, testing and maintenance of liners for the Cell 1 and the leachate ponds;
- Infrastructure controls for the construction and maintenance of the leachate collection system and groundwater and surface water monitoring systems;
- Maintenance of surface water diversion and control structures;
- Operational controls including maintaining a 500 mm freeboard on the leachate ponds; and
- Limits on waste acceptance/waste processing/waste storage.

The Applicant will also be required to monitor the leachate level within the collection sump as well as undertake surface water monitoring and groundwater monitoring during operational activities.

These controls generally replicate the Applicants proposed controls which the Delegated Officer considers necessary in managing potential leachate impacts.

9.5 Risk Assessment – Dust emission impacts

9.5.1 Hazard characterisation and impact

Dust is primarily generated from the movement of vehicles over unsealed roads, and from earth moving activites undertaken during landfilling and general site maintenance. Potential sources of dust generated form prescribed activities include:

- Construction and maintenance of site infrastructure (e.g. diversion structures);

- Loads being delivered to site – dusty construction and demolition waste;
- Movement of mobile equipment and delivery trucks around the site; and
- Landfill tipping, and cover placement.

It is noted that clay extraction (not included within the prescribed activities covered by the operational licence) may also generate dust. Emissions will vary with the type of material, number of vehicles at any given time and the weather conditions.

Dust emissions have the potential to impact air quality and amenity at nearby residential properties.

9.5.2 Criteria for assessment

The relevant criteria for assessment of dust emissions as PM_{10} is 50 µg/m³ over 24 hours as specified in the National Environment Protection (Ambient Air Quality) Measure (NEPM). The NEPM is the relevant criteria for assessment in relation to human health and wellbeing.

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

9.5.3 Applicant controls

The Applicant has proposed continuous monitoring of dust emissions by site operations staff (visual basis) and the implementation of the following controls:

- Dust Management Plan Activation triggers and Corrective actions;
- A maximum site speed limit of 40 km per hour will be enforced. Appropriate signage will be utilised to indicate the maximum speed limit.
- Dust suppression, by wetting down of internal access road and the active tipping area.
- Restricted activities during strong wind;
- Restriction of dust generating activities to less windy times of day;
- Rejection or restriction of dusty waste loads; and
- Use of dust suppressant chemicals (Dustex).

The facility will also maintain a complaint register, and in the event that ongoing fugitive dust emissions occur beyond the premises boundary, complaints will be recorded and appropriate actions taken to identify any formal monitoring that may be required.

9.5.4 Key findings

The Delegated Officer has reviewed the information regarding dust emissions and has found:

21. There are two receptors present including a residential receptor 1,100 m north east and adjacent farmland. For the purposes of this assessment, the nearby residential receptors are considered the receptor most affected by the potential dust emission.
22. Nearby residential receptors are at a higher elevation compared to the Premises, and are not located down wind of dominant prevailing wind directions.

9.5.5 Consequence

Based upon the sensitivity of residential receptors the Delegated Officer has determined that

the impact of dust emissions during operation of Cell 1 will be minimal off-site impacts to amenity at a local scale. Therefore, the Delegated Officer considers the consequence to be **Minor.**

9.5.6 Likelihood of Risk Event

Based upon the Applicant's controls at the Premises the Delegated Officer has determined that minor impacts probably will not occur. Therefore, the Delegated Officer considers the consequence to be **Unlikely.**

9.5.7 Overall rating of risk event

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria and determined that the overall rating for the risk of dust emissions on sensitive receptors is **Medium.**

9.5.8 Acceptability of risk event

As per DWER's acceptability and treatment of Risk Events the Delegated Officer has determined that the risk event is acceptable, and will be subject to regulatory controls to maintain the acceptability.

9.5.9 Regulatory controls for dust emission risk

The Applicant will be required to implement the following controls to manage the potential impacts from dust emissions:

- A maximum site speed limit of 40 km per hour, implemented with signage;
- Operation and maintenance of a water tanker; and
- Wetting down of the tipping area during operation.

The Applicant will also be required to Implement and maintain a complaints register.

These controls generally replicate the Applicants proposed controls which the Delegated Officer considers necessary in managing potential impacts.

9.6 Risk Assessment – Asbestos emission impacts

9.6.1 Hazard characterisation and impact

During operation the Premises will be accepting Special Waste Type 1 (asbestos). Asbestos poses a significant health risk and may cause mesothelioma and other health impacts.

Release of asbestos fibres has the potential to impact on public health of occupiers of residential premises nearby to the site and workers on adjacent extractive industry worksites.

9.6.2 Criteria for assessment

The *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (May 2009)* specify criteria for assessment of dust and asbestos emissions.

9.6.3 Applicant/Licence Holder controls

The Applicant has developed an asbestos management plan which includes controls for the following:

- Receipt of ACM as appropriately wrapped, separate loads;

- Delivery of ACM to the site in accordance with site requirements;
- Acceptance of ACM and unloading to prevent release of fibres;
- Procedures for receipt and wrapping of sub-standard ACM loads received at the premises to minimise risk during unloading and burial (note that substandard loads will not be rejected from site to prevent public health impacts should the load be turned away at the gate);
- Burial in dedicated area direct from delivery vehicle, and with immediate placement of cover in accordance with the cover requirements;
- Identification of a Dedicated Asbestos Area (on site map available on site at all times, and signposted at the landfill area); and
- Maintenance of Asbestos Register on site at all times.

9.6.4 Key findings

The Delegated Officer has reviewed the information regarding asbestos emission risk and has found:

23. There are two receptors present including a residential receptor 1,100 m north east and adjacent farmland or worksites. For the purposes of this assessment, the residential receptor is considered the receptor most affected by the potential asbestos emissions.
24. The Delegated Officer considers the daily cover requirements proposed to be insufficient for burial of Special Waste Type 1 (Asbestos waste) and has included additional conditions within the operational licence to provide appropriate cover requirements.

9.6.5 Consequence

If asbestos emissions occur, the Delegated Officer has determined that the impact to public health could be adverse health effects or loss of life. Therefore, the Delegated Officer considers the consequence of asbestos emission impacts to be **Severe.**

9.6.6 Likelihood of Risk Event

The Delegated Officer has determined that the severe asbestos emission impacts will only occur in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood of asbestos impacts to be **Rare.**

9.6.7 Overall rating of risk event

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix and determined that the overall rating for the risk of asbestos emission impacts is **High.**

9.6.8 Acceptability of risk event

As per DWER's acceptability and treatment of risk events the Delegated Officer has determined that the risk event is tolerable, subject to regulatory controls.

9.6.9 Regulatory controls for asbestos emission risk

The Applicant will be required to implement the following controls to manage the potential impacts from asbestos emissions:

- Operational controls including waste acceptance and handling requirements and requirements to bury asbestos in a designated area; and
- Additional requirements for depth of cover required for management of burial of asbestos waste.

These controls are considered necessary by the Delegated Officer due to the high risk rating for asbestos emissions. These controls are in addition to the Applicant's controls and are considered necessary by the Delegated Officer in managing potential impacts.

9.7 Risk Assessment – Odour emission impacts

9.7.1 Hazard characterisation and impact

Odour may be generated from the acceptance of putrescible waste, and the collection, storage, management and re-circulation of leachate. The odours generated by wastes depend on the composition and quantity of waste in the landfill and the degree to which the waste has putrefied, as well as weather conditions.

Individual responses to odour emissions may vary depending on age, health status, sensitivity and odour exposure patterns. Perceived odour intensity may increase or decrease on exposure. Community response to odour can include annoyance, potentially leading to stress, and loss of amenity. Exposure to repeated odour events can create a nuisance effect.

9.7.2 Criteria for assessment

There are no set threshold or concentration criteria for odour assessment. Under section 49(5) of the EP Act, it is an offence to emit or cause to be emitted, an unreasonable emission from any premises.

Any unreasonable emission is defined in the EP Act (section 49(1)) as an emission or transmission of noise, odour or electromagnetic radiation which unreasonably interferes with the health, welfare, convenience, comfort or amenity of any person.

9.7.3 Applicant/Licence Holder controls

The Applicant has proposed to control potential odour emissions from waste by:

- Implementation of odour management and monitoring as per the odour management plan;
- Reduce the length of time between the waste being tipped and it being compacted into place;
- Minimising the distance between the waste disposal area and the waste tipping face;
- Rejecting excessively odourous waste streams, or managing delivery to minimise odour emissions (timed delivery and immediate burial);
- Applying daily cover material of at least 150mm to disposed waste; and
- In the event that a single odourous waste stream is to be accepted, the Applicant proposes to prepare a void where the odourous material is tipped and immediately covered with cover material.

The Applicant has proposed to control potential odour emissions from the leachate ponds and leachate recirculation system by:

- Regularly pumping small quantities of leachate into the pond rather than large quantities in a short period of time;
- Allowing fresh leachate to flow down the side of the pond liner instead of projecting into

the air;

- Maintaining the leachate pond maximum depth and surface area to promote aerobic conditions;
- Chemical dosing of the pond to alter pH level if necessary;
- Managing the rate and timing of leachate recirculation to account for wind speed and direction, and to occur when the waste surface is dry; and
- Spraying small quantities of leachate into the landfill as opposed to large volumes over a short time, and using low volume spray irrigation.

The Applicant proposes to implement the following controls when recirculating leachates:

- Recirculating when the waste surface is dry, and when there is sufficient waste to avoid accumulation on the surface;
- Regular spraying of small quantities of leachate as opposed to significant quantities in a short period of time; and
- Use of low volume spray irrigation in preference to large volume sprinklers.

The Applicant has also proposed to undertake continuous odour monitoring by operational staff, and to implement a complaints register. In the event of odour emissions being identified the Applicant proposes to undertake odour monitoring by an independent third party to determine the extent of any impact and propose appropriate odour management solutions.

9.7.4 Key findings

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

25. There are two receptors present including a residential receptor 1,100m north east and adjacent farmland. For the purposes of this assessment, the residential receptor is considered the receptor most affected by the potential odour emission

9.7.5 Consequence

Based on the sensitivity of residential receptors, the Delegated Officer has determined that the impact of will be low level impacts to amenity. Therefore, the Delegated Officer considers the consequence of odour emissions to be **Minor.**

9.7.6 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of odour emissions would probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of the Risk Event to be **Unlikely.**

9.7.7 Overall rating of risk event

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix and determined that the overall rating for the risk of odour emission impacts is **Medium.**

9.7.8 Acceptability of risk event

As per DWER's acceptability and treatment of risk events the Delegated Officer has determined that the risk event is acceptable and will be subject to regulatory controls to maintain the acceptability.

9.7.9 Regulatory controls for odour emission risk

The Applicant will be required to implement the following controls to manage the potential impacts from odour emissions:

- Infrastructure controls including aerators in leachate pond to be operated and maintained in accordance with the Landfill Management Plan;
- Operational controls including minimum amounts of cover material required and timeframes for when waste is to be covered and restrictions to size of tipping area;
- Limits/requirements on leachate recirculation; and
- Limits on waste acceptance/waste processing.

These controls generally replicate the Applicants proposed controls which the Delegated Officer considers necessary in managing potential impacts.

9.8 Risk Assessment – Noise emission impacts

9.8.1 Hazard characterisation and impact

Noise emissions during landfill operation arise from vehicles and operation of mobile plant on the premises, including dozers, delivery trucks, compactors and graders. Noise from vehicles can include reversing beepers. Other potential noise sources include landfill gas extraction systems and pumps associated with the leachate management systems. Noise from reversal tonal alarms can carry long distance and can cause nuisance impacts. Nuisance impacts on residential receptors may result in the amenity of residential receptors being impacted.

The Applicant has proposed to operate between the hours of 0700 to 1800 Monday to Saturday and closed on Sundays and Public Holidays. The landfill is proposed to be closed on Sundays.

Acoustic Assessment

An acoustic assessment was undertaken to assess predicted noise levels at the closest sensitive premises (assessed at approximately 1.3 km from the operational area of the premises). The equipment was assumed to consist of a small dozer and waste compactor, with up to three trucks present on site for waste unloading. A conservative assumption of +5 dB(A) was added to the model for tonality, although it was not predicted that the noise received at the residential premises would be tonal. Based on the hours of operation and the assigned L_{A10} noise level of a maximum of 45 dB(A) for the day period, the noise received at the neighbouring premises was likely to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations) (Herring Storer, 2014).

9.8.2 Criteria for assessment

The Criteria for assessment of noise emissions is the Noise Regulations and the premises activities will be subject to these regulations.

9.8.3 Applicant/Licence Holder controls

The Applicant has outlined the controls for noise management within the noise management plan. These include the reduction of vehicle speed on internal roads to less than 40 km/hr, and maintenance of equipment to prevent excessive engine noise. Operational staff will monitor noise conditions on a daily basis and maintain a complaints register.

The Applicant has also stated that in the event noise emissions are identified as presenting unreasonable impacts the Applicant will undertake an acoustic noise assessment and/or install low frequency beepers on mobile plant.

9.8.4 Key findings

The Delegated Officer has reviewed the information regarding noise emissions and has found:

26. There are two receptors present including residential properties and users of private farmland immediately adjacent (with no associated residential property). For the purposes of this assessment, the nearest residential property is considered the receptor most affected by the potential noise emission.
27. The noise assessment conducted appropriately considers the environmental noise emissions that may occur during operation of Cell 1.

9.8.5 Consequence

Based on the location and sensitivity of the residential receptor, the Delegated Officer has determined that the impact of noise emissions will be minimal impacts to amenity. Therefore, the Delegated Officer considers the consequence of noise emission impacts to be **Slight.**

9.8.6 Likelihood of Risk Event

The Delegated Officer has determined that noise emission impacts will probably not occur. Therefore, the Delegated Officer considers the likelihood of Risk Event occurring to be **Unlikely.**

9.8.7 Overall rating of risk event

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix and determined that the overall rating for the risk of noise emissions is **Low.**

9.8.8 Acceptability of risk event

As per DWER's acceptability and treatment of risk events the Delegated Officer has determined that the risk event is acceptable, and will not be subject to additional regulatory controls outside of those proposed by the Applicant.

9.9 Risk Assessment – Fugitive landfill gas emission impacts

9.9.1 Hazard characterisation and impact

Landfill gas is generated by the biodegradation of organic waste and consists of a mix of bulk gases such as methane, carbon dioxide, nitrogen, oxygen and hydrogen and many trace gases such as hydrogen sulphide, carbon monoxide, halogenated organics and aromatic hydrocarbons. The rate of landfill gas emissions is dependent on the conditions present within the waste mass, for example moisture and bacteria content.

Landfill gas can be passively vented to the atmosphere through the surface of the landfill where a low permeability cap or cover material has not been applied (fugitive landfill gas). It can also migrate through the subsurface and through features such as pipelines and service ducts in the gas and leachate collection systems. Potential impacts associated with uncontrolled releases of landfill gas include toxicity from inhalation, ecotoxicity, fire and explosion if gas collects in high enough concentrations, asphyxiation and unpleasant odour.

While it is anticipated that the size of the final Stage 1 landfill will generate landfill gas at quantities that need to be managed, there will be insufficient gas generation during the operation of Cell 1 alone to warrant the installation of a gas extraction system during the operation of the Cell 1 landfill (Section 7.5). Therefore, the potential emission from the

operation of Cell 1 is fugitive landfill gas emissions post-closure of Cell 1, once the waste landform is large enough to potentially generate gas volumes at a quantity requiring management.

The closest residential receptors are the farm house property (400 m south east) and two other residential dwellings, located approximately 1.1 km to the north east. It is noted that the farm house is not considered to be a sensitive receptor for the general purposes of risk assessment (Section 6.5). It is noted that predominant wind direction is from the south east.

9.9.2 Criteria for assessment

There are no set threshold or concentration criteria for fugitive landfill gas emission. Any unreasonable emission is defined in the EP Act (section 49(1)) as an emission or transmission of noise, odour or electromagnetic radiation which unreasonably interferes with the health, welfare, convenience, comfort or amenity of any person.

9.9.3 Applicant/Licence Holder controls

The applicant has not proposed any specific landfill gas controls during the operation of Cell 1 of the landfill. However, it is noted that a landfill gas contractor will be engaged prior to year two of waste receipt, to assess gas emissions and implement a landfill gas management plan, including any requirements for landfill gas infrastructure to be installed within Cell 1 as part of closure and rehabilitation works. Based on the operational life of Cell 1, this will occur prior to the completion of Cell 1 waste landform.

9.9.4 Consequence

The Delegated Officer has determined that the impact of fugitive landfill gas emissions during operation of Cell 1 would be minimal impacts to amenity, and specific consequence criteria for the protection of public health would be met. Therefore, the Delegated Officer considers the consequence of fugitive landfill gas to be **Slight.**

9.9.5 Likelihood of Risk Event

The Delegated Officer has determined that fugitive landfill gas emission impacts will probably not occur in most circumstances during the operation of Cell 1. Therefore, the Delegated Officer considers the likelihood to be **Unlikely.**

9.9.6 Overall rating of risk event

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix and determined that the overall rating for the risk of fugitive landfill gas emissions during operation of Cell 1 is **Low.**

9.9.7 Acceptability of risk event

As per DWER's acceptability and treatment of risk events the Delegated Officer has determined that the risk event is acceptable, and will not be subject to additional regulatory controls outside of those proposed by the Applicant. It is noted that the assessment of landfill gas management infrastructure will be assessed in accordance with the works approval (W5800/2015/1) and as part of future licence amendments once the infrastructure is constructed.

9.10 Risk Assessment – Vermin/Pest and weed impacts

9.10.1 Hazard characterisation and impact

Typical vermin that can be found on landfill sites include rats, mice, flies, mosquitoes, feral

cats, foxes, birds and cockroaches. If uncontrolled, these vermin can be a nuisance and affect public health and surrounding native ecosystems.

Non-native flora (weeds) may also establish on cleared ground and impact on surrounding native vegetation habitat.

Vermin may be transported in wastes received at the site, or may be attracted to the area due to the presence of waste (food source). Weeds may be transported on vehicles, and may establish due to the disturbed nature of the land around the premises. The presence of vermin may be a nuisance to residential premises and may impact on native ecosystem function.

9.10.2 Criteria for assessment

Amenity impacts and impacts to ecosystems from pests and vermin can be assessed against the general provisions of the EP Act.

9.10.3 Applicant/Licence Holder controls

The Applicant has proposed the following controls:

- Regular pushing up and compaction of waste;
- Application of adequate cover material;
- Progressive closure of completed landfill areas;
- No green waste received on the premises; and
- Regular site inspections.

Should vermin be identified on site, the appropriate eradication procedures are to be undertaken, this may involve baiting or trapping, or engaging professional pest controllers to control the presence of vermin and pests. Should weeds be identified on the site, weed eradication may be undertaken by landfill operational staff, or by a third party. Grazing of stock around the perimeter of the landfill premises will continue to control the presence of weeds in adjacent farmland.

Monthly inspections of the site will be undertaken by site operational staff, specifically to identify if there are any vermin, pests or weeds present on and around the landfill.

9.10.4 Key findings

The Delegated Officer has reviewed the information regarding vermin impacts and has found:

28. There are three receptors present including a residential receptor 1,100m north east and adjacent farmland, and native flora and fauna habitat. On the basis of the current disturbed nature of native vegetation on the Premises, for the purposes of this assessment, the residential receptor is considered the receptor most affected by the potential issues associated with vermin, pests and weeds.

9.10.5 Consequence

Based on the sensitivity of nearby residential premises the Delegated Officer has determined that the impact of vermin will be low level impacts to amenity offsite. Therefore, the Delegated Officer considers the consequence to be **Minor.**

9.10.6 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of minor vermin impacts occurring

will probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of consequence to be **Unlikely.**

9.10.7 Overall rating of risk event

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix and determined that the overall rating for the risk of vermin is **Medium.**

9.10.8 Acceptability of risk event

As per DWER's acceptability and treatment of risk events the Delegated Officer has determined that the risk event is acceptable, and will be subject to regulatory controls to maintain the acceptability.

9.10.9 Regulatory controls for vermin/pest risk

The Applicant will be required to implement the following controls to manage the potential impacts from vermin/pests:

- Regular pushing up and compaction of waste;
- Application of adequate cover material;
- Progressive closure of completed landfill areas;
- Maintain the leachate ponds clear of vegetation; and
- Monthly inspections of the site are undertaken specifically to identify if there are any vermin, weeds or pests present on and around the landfill. The monthly inspection is carried out by site operational staff.

These controls generally replicate the Applicants proposed controls which the Delegated Officer considers necessary in managing potential impacts.

9.11 Risk Assessment – Windblown waste impacts

9.11.1 Hazard characterisation and impact

Wastes stored at the Premises may be blown from the active tipping area or from vehicles bringing waste onto the Premises.

Windblown waste is expected to primarily consist of light items such as paper and plastic film. The volume of windblown waste will vary depending on the types of waste received and the ambient weather conditions.

Windblown waste may cause amenity impacts to nearby residents or recreational users of nature reserves.

9.11.2 Criteria for assessment

Litter deposited onto land or into waters may be an offence under the *Litter Act 1979*.

9.11.3 Applicant controls

The applicant has proposed to implement the following controls:

- Landfill Management Plan response actions to litter;
- All waste delivery vehicles will be covered or adequately tarped in accordance with road regulations;

- Installation of fencing (2 m high perimeter) and mobile screens (4 m high around active tipping area);
- Regular pushing up and compaction of waste;
- Application of adequate daily cover material and intermediate cover when required;
- Progressive closure of completed landfill areas; and
- Planting of vegetation screens around landfill to reduce wind impact.

The active tipping areas will be monitored for windblown waste daily (tipping areas screens and fencing), and the surrounding site will be monitored at a minimum of once a week.

9.11.4 Key findings

The Delegated Officer has reviewed the information regarding windblown waste and has found:

29. There are two receptors present including a residential receptor 1,100m north east and adjacent farmland. For the purposes of this assessment, the residential receptor is considered the receptor most affected by the potential emissions of windblown waste.

9.11.5 Consequence

Based on sensitivity of the residential receptor the Delegated Officer has determined that the impact of windblown waste will be minimal impacts to amenity Therefore, the Delegated Officer considers the consequence of windblown waste emissions to be **Slight.**

9.11.6 Likelihood of Risk Event

The Delegated Officer has determined that slight emission impacts will probably occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of windblown waste emission impacts to be **Likely.**

9.11.7 Overall rating of risk event

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix and determined that the overall rating for the risk of windblown waste emission impacts is **Medium.**

9.11.8 Acceptability of risk event

As per DWER's acceptability and treatment of risk events the Delegated Officer has determined that the risk event is acceptable, and will be subject to regulatory controls to maintain the acceptability.

9.11.9 Regulatory controls for windblown waste risk

The Delegated Officer has determined that the Applicant will be required to implement the following controls to manage the potential impacts from windblown waste:

- All waste delivery vehicles will be covered or adequately tarped;
- Compaction and cover of waste with 150mm of material on a daily basis;
- Temporary cover of 300mm on areas not being actively used;
- Progressive capping of the landfill as final contours are reached;

- Daily collection of windblown waste from the active tipping face and weekly collection from the greater Premises;
- Maintain a minimum of 2m high litter fence around the perimeter of the active landfill and 4m high mobile litter screens around the active tipping area.

These controls generally replicate the Applicants proposed controls.

9.12 Risk Assessment – Smoke emission and fire impacts

9.12.1 Hazard characterisation and impact

Normal operations are unlikely to cause fire and smoke emissions. Storage of waste at the premises provide a fuel source for a potential fire. In the event of a fire, smoke would be released this may cause amenity and public health impacts for workers in nearby industrial properties. The inhalation of particulate matter can cause respiratory distress. Burning of waste and vegetation surrounding the landfill can cause property damage and impact to terrestrial habitat.

9.12.2 Criteria for assessment

There are no specific criteria for smoke emissions. The general provisions of the EP Act make it an offence to cause or allow unreasonable emissions that unreasonably interfere with the health, welfare, convenience, comfort or amenity of any person.

9.12.3 Applicant controls

The Applicant has developed a fire management plan which includes the following controls to prevent fires and manage fire and smoke emission risk:

- Maintenance of firebreaks around the premises;
- Placement of signage advising the general public of actions to be taken in the event of an emergency;
- Adherence to the DWER waste acceptance criteria for Class II landfills (non-hazardous waste);
- Appropriate compaction and covering of waste;
- Appropriate storage of flammable fuel (for running on mobile plant and pumps etc.);
- Not placing significant quantities of flammable material in a single area with the landfill (piles of tyres);
- Collection of litter from litter fences (permanent and mobile);
- Maintenance of appropriate site security to reduce the likelihood of vandals entering the site;
- Storage and maintenance of firefighting equipment on site consisting of:
    - The water cart;
    - A 1,000L skid mounted water tank, pump and hose located on the landfill for immediate response;
    - Sufficient stockpiles of cover material will be maintained close to the active tipping area to facilitate rapid covering of the waste in the event of a fire;
    - Minimum 50 kL of water will be storage on site (in storage tank); and
    - The water cart will always be left full (or uncontaminated water) to be able to

react immediately to a fire.

Operational staff will be trained to respond to the event of a fire.

9.12.4 Key findings

The Delegated Officer has reviewed the information regarding smoke impacts and has found:

30. There are two receptors present including a residential receptor 1,100 m north east and adjacent farmland and worksites. For the purposes of this assessment, both receptors are considered to be affected by the potential emissions from smoke and fire.
31. Dominant prevailing wind directions are from the east and south east.

9.12.5 Consequence

The Delegated Officer has determined that the impact of smoke emissions could be low level or occasional medical treatment. Therefore, the Delegated Officer considers the consequence of smoke emission impacts to be **Moderate.**

9.12.6 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of moderate emission impacts occurring will probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of Risk Event to be **Unlikely.**

9.12.7 Overall rating of risk event

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix and determined that the overall rating for the risk of smoke emission impacts is **Medium.**

9.12.8 Acceptability of risk event

As per DWER's acceptability and treatment of risk events the Delegated Officer has determined that the risk event is acceptable, and will be subject to regulatory controls to maintain the acceptability.

9.12.9 Regulatory controls for smoke emission risk

The Delegated Officer has determined that the Applicant will be required to implement the following controls to manage the potential impacts from smoke or fire waste:

- Implementation of the fire management plan;
- No burning of waste;
- Maintaining security fencing;
- Infrastructure controls including maintaining water tankers/trucks in working order;
- Maintaining sufficient cover material; and
- Operational controls including the requirement to maintaining a minimum 50 kL of water onsite at any one time.

These controls generally replicate the Applicants proposed controls.

10. Determined Regulatory Controls

A summary of the risk assessment and the acceptability or unacceptability of the risk events set out above, with the appropriate treatment and control, are set out in **Table 16** . Controls are provided in **Attachment 1**.

Table 16: Risk assessment summary

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)	Regulatory Controls (Licence Condition(s))
	Emission	**Source**	**Pathway/ Receptor (Impact)**				
1	Landfill leachates	Acceptance, burial and decomposition of wastes in Cell 1 Collection, storage and management of leachate	Seepage through liner to groundwater (beneficial use of groundwater) Overland flow or transport through groundwater to surface water ecosystems, terrestrial ecosystems or groundwater dependant ecosystems (impact to ecosystem health and function) Overland flow and retention in soil (impact to soil quality)	Leachate management plan Groundwater and surface water management plans Surface water diversion, containment and control Site inspection and management practices Monitoring of leachate, groundwater and surface water	Moderate consequence Unlikely likelihood **Medium**	Acceptable subject to regulatory controls	Acceptance and throughput controls Infrastructure and equipment controls Operational controls Specified actions Monitoring requirements Record-keeping controls Reporting requirements
2	Dust	Disposal of waste in Cell 1 Vehicle movement on unsealed roads Maintenance of infrastructure	Dispersal via air to sensitive residential receptors and terrestrial ecosystems (impact to amenity and public health; impact to ecosystem health)	Dust management plan Speed limits Use of dust suppression and restriction of activities	Minor consequence Possible likelihood **Medium**	Acceptable subject to regulatory controls	Infrastructure and equipment controls Operational controls Record-keeping controls

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)	Regulatory Controls (Licence Condition(s))
	Emission	**Source**	**Pathway/ Receptor (Impact)**				
3	Asbestos	Acceptance and burial of Special Waste Type 1 in Cell 1	Dispersal via air to sensitive residential receptors and adjacent worksite (impact to public health)	Asbestos management plan Dedicated asbestos burial area	Severe consequence Unlikely likelihood **High**	Delegated Officer has determined risk is acceptable subject to regulatory controls – including specific cover requirements	Operational controls Record-keeping controls
4	Odour	Acceptance, burial and decomposition of wastes in Cell 1 Collection, storage and management of leachate	Dispersal via air to sensitive residential receptors (impact to amenity)	Odour management plan Application of cover Procedures for acceptance and burial of odourous waste Leachate management plan	Minor consequence Unlikely likelihood **Medium**	Acceptable subject to regulatory controls	Acceptance and throughput controls Infrastructure and equipment controls Operational controls Record-keeping controls
5	Noise	Vehicle and plant movement Maintenance of infrastructure	Dispersal via air to sensitive residential receptors (impact to amenity)	Noise management plan Equipment maintenance	Slight consequence Unlikely likelihood **Low**	Acceptable	Infrastructure and equipment controls Operational controls Record-keeping controls

	Description of Risk Event			Applicant controls	Risk rating	Acceptability with controls (conditions on instrument)	Regulatory Controls (Licence Condition(s))
	Emission	**Source**	**Pathway/ Receptor (Impact)**				
6	Fugitive landfill gas	Decomposition of waste in Cell 1	Dispersal via air to sensitive residential receptors (impact to amenity and public health)	Engagement of contractor to assess post-closure risk prior to closure	Slight consequence Unlikely likelihood **Low**	Acceptable	Specified actions
7	Vermin/Pests	Acceptance, burial and decomposition of wastes in Cell 1 Storage of leachate in Leachate Ponds	Direct contact (impact to amenity and public health; impact to native ecosystems)	Vermin, pest, mosquito and weed management plan Fencing and regular inspections Application of cover	Minor consequence Unlikely likelihood **Medium**	Acceptable subject to regulatory controls	Acceptance and throughput controls Infrastructure and equipment controls Operational controls Record-keeping controls
8	Windblown waste	Acceptance and burial of wastes in Cell 1	Dispersal via air to sensitive residential receptors (impact to amenity)	Landfill management plan Fencing and regular inspections Application of cover	Slight consequence Likely likelihood **Medium**	Acceptable subject to regulatory controls	Infrastructure and equipment controls Operational controls Record-keeping controls
9	Smoke (fire)	Combustion of flammable wastes in Cell 1	Dispersal via air to sensitive residential receptors (impact to amenity and public health)	Landfill and fire management plans Maintenance of firefighting equipment on the site Security measures	Moderate consequence Unlikely likelihood **Medium**	Acceptable subject to regulatory controls	Acceptance and throughput controls Infrastructure and equipment controls Operational controls Record-keeping controls

11. Appropriateness of Licence Conditions

The conditions in the issued Licence in Attachment 1 have been determined in accordance with the *Guidance Statement: Setting Conditions*.

The *Guidance Statement: Licence Duration* has been applied and the issued licence expires in 12 years from date of issue. The licence duration has been determined based on the estimated lifespan of the Stage 1 landfill infrastructure approved for construction under works approval (W5800/2015/1).

DWER notes that it may review the appropriateness and adequacy of controls at any time and that, following a review, DWER may initiate amendments to the licence under the EP Act.

12. Applicant's comments

The Applicant was provided with the draft Decision Report and draft issued Licence on 9 January 2019. The Applicant provided comments on 21 January 2019, which are summarised, along with DWER's response, in **Appendix 3**.

13. Conclusion

This assessment of the risks of activities on the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Decision Report (summarised in **Appendix 1**).

Based on this assessment, it has been determined that the Issued Licence will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Ed Schuller

Digitally signed by Ed Schuller
Date: 2019.02.05 13:43:50 +08'00'

Ed Schuller
A/DIRECTOR INDUSTRY REGULATION
REGULATORY SERVICES
Delegated Officer under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

Document title	Reference in text	Availability
Landowner's Letter of Exclusion, 10 November 2014	Not applicable	DWER records (A909491)
EPA notice under s38 – Chitty Road Public Advice 07 October 2013		DWER records (A1536285)
Ministers Appeal Determination, Appeal numbers 361-368 of 2013, 5 February 2014		Office of Appeals Convenor website (https://www.appealsconvenor.wa.gov.au
Works Approval W5800/2015/1 and Amendment No. 1 and Amendment No. 2		Available on DWER website
Ministers Appeal Determination, Appeal number 23-2017, 8 September 2017.		Office of Appeals Convenor website (https://www.appealsconvenor.wa.gov.au)
ANZECC, 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand, October 2000.	ANZECC, 2000	On website
DoW, 2008. Foreshore and channel assessment of Jimperding Brook. Department of Water, Water resource management series. Report No. WRM 48. February 2008.0	DoW, 2008	Available on DWER website.
EPA Victoria, 2015. Best Practice Environmental Management – Siting, design, operation and rehabilitation of landfills. Publication 788.3 August 2015.	EPA VIC, 2015	On EPA Victoria website
Golder, 2014. Opalvale Landfill – technical Studies to Support Design. Report prepared for Opal Vale Pty Ltd. Ref 1417287-001-R-Rev0. December 2014.	Golder, 2014	DWER records (A1512476)
Golder, 2018. Opal Vale Landfill – DWER Liner query dated 8 November 2018. Letter report prepared for Opalvale Pty Ltd. Ref 1895317-002-L-Rev1. 6 December 2018.	Golder, 2018	DWER records (A1746161)
Herring Storer Acoustics, 2014. Landfill Site, Lot 11 Chitty Road, Toodyay – Environmental Noise Assessment. Report prepared for IW Projects. Ref 18650-3-14269 Revision 2. December 2014.	Herring Storer, 2014	DWER records (A1512476)

Document title	Reference in text	Availability
IW Projects, 2017. Opalvale Salt Valley Road Class II Landfill. Licence Application Supporting Information. Report Prepared for Opalvale Pty Ltd. August 2017	IWP, 2017	DWER Records (A1512476)
Opalvale, 2018. Supplementary surface water management information for Opalvale Class II landfill application (L9089/2017/1). Letter report provided in electronic mail dated 6 December 2018.	Opalvale, 2018	DWER records (A1746161)
Stass Environmental, 2015. Report on: Groundwater Assessment, 11 Chitty Road, Toodyay, WA. Report prepared for Opalvale Pty Ltd. Version 2.5. July 2015.	Stass, 2015	DWER records (A1512476)
Stass Environmental, 2016. Groundwater Monitoring for Cell 1, July to September 2016, and Perimeter Bores Sept 2015 to Sept 2016. Report prepared for Opalvale Pty Ltd. Version 1.6. October 2016.	Stass, 2016	DWER records (A1512476)
Stass Environmental, 2018. Opalvale groundwater monitoring data 2014 to 2018. Electronic document – received via email on 30 November 2018.	Stass, 2018	DWER records (A1512476)

DWER Regulatory framework documents (available on DWER website)

- Best Practice Regulatory Principles (September 2018)
- Guidance Statement: Setting Conditions (October 2015)
- Guidance Statement: Land Use Planning (February 2017)
- Guidance Statement: Licence Duration (August 2016)
- Guidance Statement: Publication of Annual Audit Compliance Reports (May 2016)
- Guidance Statement: Decision Making (February 2017)
- Guidance Statement: Risk Assessments (February 2017)
- Guidance Statement: Environmental Siting (November 2016)

Appendix 2: Summary of public comments on application

The following table contains a summary of the concerns submitted by members of the public during the public submission period. The number relates to each submission received by the Department and may be an individual, community group or government agency.

Concern	Submitter	Summary of comments	DWER response
General objection	Round 1: 1, 2, 3, 4, 5, 9, 10, 11, 13, 14, 15, 16, 19 Round 2: 1, 3, 5, 8, 9, 12, 13, 14	These submitters stated that they object to the application and/or made general statements about concerns of impacts to the environment and community. One submitter stated that they object to Stage 2 and requested that the applicant return to DWER for a works approval and licence for further cells.	DWER's assessment of licence Applications takes into account the object and principles of the EP Act by regulating in accordance with the DWER Guidance Statement: *Regulatory best practice principles, September 2018*. DWER has undertaken a risk assessment of all potential emissions and impacts in accordance with G*uidance Statement – Risk Assessment.* The scope of this assessment and the associated licence is for the operation of Cell 1 on Stage one only. The construction and operation of future cells as part of Stage 1 and Stage 2 proposed infrastructure, landfill gas management infrastructure and surface water containment infrastructure not already present on the premises will require further assessment and approval under Part V of the EP Act.
Quality of the application	Round 1: 16, 17	These submitters are concerned about the lack of consultation, lack of clarity in the application including which stages of the landfill it applies to and waste acceptance procedures, and requested that the applicant resubmit a detailed risk analysis for all risk activities.	During the assessment DWER noted a number of items to clarify in the application and requested further information from the Applicant which was provided as requested (**Table 3**). DWER believes that sufficient information was provided to enable a risk assessment under the Risk Assessment Framework.

Concern	Submitter	Summary of comments	DWER response
Landfill design and environmental siting	Round 1: 2, 4, 8, 9, 14, 15, 16, 18, 19, 20 Round 2: 8, 10, 11, 12	These submitters raised concerns about the environmental siting and design of the landfill, in particular: • Location of the landfill due to the increasing local population, the tourism value of the area; • Seismic risks of the local area; • Unsuitability of the geology and hydrogeology of the area; • Liner integrity; and • Actions undertaken by the Applicant during and post-construction and associated works. The concerns were related to the potential social and environmental impacts associated with construction and siting of the landfill, and/or the inability to impose appropriate controls to address these matters. Concerns related specifically to operational controls have been noted elsewhere in this table.	The siting of the landfill with respect to the aspects raised was assessed as part of the work approval (W5800/2015/1) and associated Amendment Notices No. 1 and No. 2. It is noted that the scope of assessment undertaken included assessment of suitability of the design of Cell 1 (Stage 1) under both construction and operational scenarios. DWER believed that the assessment undertaken for that approval, along with the risk assessment undertaken as part of this Decision are sufficient to inform the controls set within the licence. Under Part V of the EP Act, DWER's assessment of the proposal is constrained to the environmental acceptability of potential emissions and discharges from operation of the Premises. This does not include civil matters. Other matters may be considered to be general Compliance and Enforcement matters and as such are not considered within the scope of this licence assessment.
Compliance with works approval	Round 2: 1, 9, 11, 13	The submissions raised concerns with the Applicant's demonstration of compliance to work approval (W5800/2015/1) and Amendment Notices No. 1. And No. 2.	Compliance to the works approval and Amendments No. 1 and No. 2 was assessed by DWER and was finalised on 6 December 2018 with the assessment finding the Applicant in compliance with the conditions of the regulatory controls contained in the approval and subsequent amendments.
Traffic and Vehicle movements on public roads	Round 1: 2, 4, 5, 11, 19, 20 Round 2: 5, 8, 12	These submitters raised concerns about an increase in vehicle movements on Toodyay Road, potential for accidents or congestion, damage to an already narrow and dangerous road and/or potential for waste to be spilt on the roadways. Compliance to Road Contribution Scheme required by the SAT was also raised as a concern	Under Part V of the EP Act, DWER's assessment of the proposal is constrained to the environmental acceptability of potential emissions and discharges from the Premises. This does not include wider traffic issues relating to the development or regulation of the Road Contribution Scheme.

Concern	Submitter	Summary of comments	DWER response
Waste reduction and avoidance and State's waste management strategy	Round 1: 2, 5, 9, 19 Round 2: 14, 19	These submitters requested the waste be disposed of in other locations in WA, or be managed through the use of renewable energy technologies or other systems. These submitters are also concerned that the application is not consistent with the Western Australian Waste Strategy (March 2012), in particular issuing a licence for 20 years. Concerns were raised about DWER's assessment process for other landfills or that incidents (liner failure and leaks) that have occurred at other landfills have the potential to occur at the proposed landfill.	Under Part V of the EP Act, DWER's assessment of the proposal is limited to the environmental acceptability of potential emissions and discharges from the Premises. DWER determines licence duration in accordance with *Guidance Statement - Licence Duration* which takes into account the risk of harm to public health or the environment posed by operation of the premises. The licence duration for this application has been determined to be 12 years (Section 11) All landfill operations are assessed and regulated under the EP Act and EP Regulations as Prescribed Premises. DWER undertake risk assessment of all potential emissions and impacts associated with construction and operation of a Prescribed Premises in accordance with G*uidance Statement – Risk Assessment.*
The Applicant	Round 1: 4, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19 Round 2: 5, 8, 10, 12, 13	These submitters are concerned about the nature of the private company operating the landfill and the ability for the company to honour their obligations, both environmental and financial during operations and post-closure of the landfill. The submitters raised concerns about the compliance history of the Applicant, their ability to operate the Premises in compliance with a licence and/or the issuing of a licence when the applicant was non-complaint with the works approval and SAT decisions. Submissions referred the operation of a nearby Premises owned and operated by the same Applicant and the failure to comply with operational conditions on that premises.	Landfill operations will be regulated under the licence granted for the premises. DWER will assess compliance with licence conditions. It is an offence to contravene the conditions of a licence issued under the EP Act. In addition, DWER can amend a licence to vary conditions or impose additional conditions if necessary. The licence issued for the Premises includes limitations on the types and volumes of waste permitted to be received at the Premises.

Concern	Submitter	Summary of comments	DWER response
Environmental management of the Premises	Round 1: 1, 3, 4, 5, 8, 10, 11, 13, 15, 16, 17, 19 Round 2: 7, 8, 10	These submitters are concerned about the Environmental Management documentation, including: Requirements for external certification; Obligations for management of potential contamination; Groundwater monitoring conducted to date; Ongoing groundwater and surface water monitoring requirements; Management of surface water on the premises; Waste placement (to maintain liner integrity); and Management of post-closure and rehabilitation.	Under Part V of the EP Act, DWER's assessment of the proposal is constrained to the environmental acceptability of potential emissions and discharges from the Premises. Requirements for external certification are not within the scope of landfill regulation practice at this time. Groundwater monitoring conducted to date was based on the requirements to provide information for the assessment of the works approval relating the previous and proposed land use. Conditions relating to groundwater monitoring requirements are included within the licence, and relate to monitoring the potential impact relating to operation of the premises. The conditions have been set to address potential risks identified in this assessment. Proposed surface water management approaches have been provided by the Applicant (Sections 8.7.5 and 9.4.3). Conditions have been set to address potential risks related to surface water management identified in this assessment. The acceptability of waste placement methods to achieve acceptable tensile strains is discussed in Section 7.4. Ongoing obligations for monitoring post-closure will be detailed as part of the operating licence in future amendments related to rehabilitation and post-closure activities. In the event of contamination, the Applicant has obligations under the *Contaminated Sites Act 2003* (CS Act).
Operational management of the Premises	Round 1: 6, 13, 14, 17	Submitters were concerned about the proposed operational management procedures including: Waste acceptance procedures; Cover and capping requirements; and Waste water treatment.	The licence contains conditions specifying the types of waste that may be accepted. Waste acceptance will be monitored by DWER compliance function. DWER's assessment of the proposed cover requirements is provided in the risk assessment. The treatment of waste water is not within the scope of the proposed activities and as such DWER has not assessed this aspect of operations.

Concern	Submitter	Summary of comments	DWER response
Climate data relied on	Round 1: 19	This submitter stated that the nearest BoM weather site is Baker's Hill, and winds in summer are predominately east.	DWER has reviewed data from Baker's Hill, where available for the assessment.
Surface water environment	Round 1: 2, 3, 8, 9, 10, 11, 14, 15, 17, 19 Round 2: 3, 6, 7	These submitters have concerns about potential impacts of operation of that landfill will have to surface water, specifically: Protection of sensitive surface water ecosystems; Surface water management in operational areas; and Flow characteristics of surface water receptors.	The description of the hydrological (surface water environment), including the Avon River Valley is provided in Section 6.4. The environmental values and surrounding catchment characteristics have been considered in the assessment of risk (Section 9.4) related to operation of the Premises. Proposed surface water management approaches have been provided by the Applicant and have been summarised and considered as part of this assessment (Sections 8.7.5 and 9.4.3)
Flora and fauna impacts	Round 1: 3, 5, 10	These submitters are concerned about impacts to flora and fauna from emissions from the Premises in particular potential dust impacts.	Dust emission impacts including impacts to flora and fauna have been considered in Section 9.5.
Assessment of heritage impacts	Round 2: 6, 7	Concerns were raised as to whether cultural heritage aspects of the environment have been considered	Under Part V of the EP Act, DWER's assessment of the proposal is constrained to the environmental acceptability of potential emissions and discharges from the Premises, and does not include requirements for the identification and assessment of Aboriginal Heritage impacts. It is noted that the presence of a heritage site was noted and assessed as part of the work approval assessment. The management of potential impacts associated with cultural heritage and any requirement for a survey to be conducted would be determined under legislation administered by the Department of Planning Lands and Heritage.
Potable drinking water supply	Round 1: 6	The submission raised concerns related to access to sufficient supply of potable water for the Premises.	Under Part V of the EP Act, DWER's assessment of the proposal is constrained to the environmental acceptability of potential emissions and discharges from the Premises. This does not include regulation of potable drinking water supply to the Premises.

Concern	Submitter	Summary of comments	DWER response
Compliance and enforcement	Round 1: 10, 13, 16, 17, 20	These submitters are concerned about how DWER will monitor and enforce licence conditions including waste acceptance requirements, and any potential fugitive emissions. A number of submitters requested that the applicant report complaints data to DWER on a monthly basis, that there be penalties for non-compliance with the licence and that failure to comply with conditions results in cancellation of the licence. Concerns were raised about disruptions to community caused by non-compliance to the proposed hours of operation	DWER undertakes compliance and enforcement activities independent of those proposed by the Applicant. Under the EP Act, it is an offence to contravene a condition of a licence. More information on how DWER conducts Compliance and Enforcement activites is available on the DWER website at https://www.der.wa.gov.au/our-work/enforcement Complaints or pollution incidents (including noise) can be reported to DWER at any time using the Pollution watch Hotline, or reporting page on the DWER website.
Planning matters	Round 1: 16, 19 Round 2: 2	These submitters raised concerns that the SAT planning approval is only valid for Stage 1 of the landfill and/or the previous activities occurring at the site were not undertaken in accordance with the relevant approval/s including extractive industry permits. A copy of the SAT orders were provided for information	DWER understands that the appropriate planning approvals are in place for operation of Cell 1. DWER has no legislative requirement of power to enforce SAT orders or approval for previous extractive industry permits.
Landfill gas flaring	Round 1: 17, 19	These submitters are concerned about whether the landfill gas flare complies with the Bush Fires Act 1954, and/or believe that the landfill gas flare should be installed at the commencement of operations and the possibility of power generation should be considered.	Landfill gas flaring is not included within the scope of operation of Cell 1 (refer to Section 7.5). It is noted that construction and operation of landfill gas management infrastructure will require further assessment and approval under Part V of the EP Act.

Concern	Submitter	Summary of comments	DWER response
Confidence in DWER's assessment process	Round 2: 5, 9, 11, 12, 13	The submissions raised concern regarding their confidence in DWER's decision making process relating to a potential conflict of interest existing in the employment of a former DWER staff member by the Applicant's organisation Another submission raised concerns that DWER has not followed its processes for the assessment of the application through the licensing process, or that the Department may be ignoring community concerns.	DWER's assessment of this Application has taken into account the object and principles of the EP Act by regulating in accordance with the DWER Guidance Statement: *Regulatory best practice principles, September 2018*. DWER considers its assessment and decision making to be consistent with this Guidance Statement. In September 2018, DWER became aware of a potential Conflict Of Interest (COI) when it became apparent that a former DWER employee had been engaged by a company associated with the Applicant. DWER implemented a formal COI procedure and a new Licensing Officer (who had not worked with the former employee) and Delegated Officer (the Director of Industry Regulation) were assigned responsibility for the assessment of the Application to prevent any actual or perceived conflict of interest from arising.

Appendix 3: Summary of applicant's comments on risk assessment and draft conditions

Item	Aspect	Summary of Licence Holder comment	DWER response
Licence comments			
Definitions	Annual period	Annual period to please align with calendar year (1/1 – 31/12)	Agreed and updated
	Updated Landfill Management Plan	Will be sent separately – Rev 4. Section updated includes: 11.2.5 – expanded to also include Special Waste Type 2 management. This will create further changes in the licensing conditions to cater for the acceptance of clinical waste.	Noted and Updated – changes made to relevant sections of decision document and licence. Condition 19 is inserted to reflect operational controls for acceptance of Special Waste Type 2.
General	Spelling and grammar	Spelling and grammatical errors noted within the document. Reference updates.	Noted and updated.

Item	Aspect	Summary of Licence Holder comment	DWER response
Table 6	Contaminated Solid Waste Receipt, handling and disposal by landfilling - Shall only be received with accompanying documentation proving that it meets the Waste acceptance requirements of Condition 2.	Requiring each consignment to have specific documentation proving the waste meets condition 2 criteria is excessive. Condition 2 already imposes limits waste types. As indicated previously in the supporting documentation, waste will primarily be arriving at affiliated company facilities (that also have similar waste acceptance criteria limitations). Unless each load is tested (which will never happen economically and does not happen at other landfills), there has to be an assumption that municipal wastes and general commercial and industrial wastes will meet the acceptance criteria. In our situation, it will mean that the site of origin will write Class II waste on the driver docket. This requirement will be problematic if we accept residential municipal waste in future from kerb-side collections. When external wastes are being delivered, Opal Vale will be seeking confirmation that the wastes meet specification, and if there is concern of non-conformance, validated testing will be required or the load will be rejected. Proposed: Contaminated Solid waste shall meet acceptance requirements of condition 2 (without requirement of supporting documentation each time)	The requirement to retain documentation relates to Contaminated Solid waste only, consistent with the LWCWD document. A definition for Contaminated Solid waste is added to Table 1, and the proposed condition change has not been accepted. It is noted that the LWCWD defines putrescible waste as including municipal, domestic and local council wastes among other wastes – the specification for receipt of this type of waste are noted in the row – “All waste types” within Table 6.
Table 6	Special Waste Type 2	Table to be expanded for processing requirements of SWT2	Noted waste type added to Table 3 and Table 6

Item	Aspect	Summary of Licence Holder comment	DWER response
Condition 8b	The active tipping area is wet down to minimise dust generation associated with vehicle movement and during waste and cover placement;	This requirement is unclear and vague. Is wetting down required before the placement of the load or after, or during (or is this at Opal Vale's discretion)? Should the condition perhaps not be more outcome focused – we are in an agricultural landscape and surrounded by clay extraction operators that generate dust. Proposed: It is proposed this condition be replaced with general wording, requiring dust management strategies be implemented to minimise dust generation. This puts the onus on us to manage the dust as that which is proposed by DWER may not work.	The control is proposed in the Applicant's Landfill Management Plan and Dust Management Plan the outcome of which is that dust is minimised and water is used as required. Proposed change is not accepted. Wording of condition 8(b) is only updated with the insertion of "as required"
Condition 8e	Rehabilitation of a cell or phase takes place within 6 months after disposal in that cell of phase has been completed.	While it may be possible to commence rehabilitation within 6 months, this may not be practical depending on the season of cell completion. Proposed: rehabilitation of cell or phases commences within 6 months of being completed.	Agreed. Wording of Condition 8(e) is updated with the insertion of "commences" It is noted that as part of Condition 23 a final capping plan is required to be developed and submitted and landfill gas infrastructure needs to be installed prior to commencement of earthworks.
Condition 11a	Erect and maintain suitable perimeter fencing (at least 2 m in height) to prevent unauthorised access to the operational areas of the Premises;	The use of word perimeter fence is of concern. The premises is enclosed by stock fencing and the entrance gate locked but the fence lines do not run along the premises boundary; some areas of the prescribed premises are still being farmed and we do not have full access to the premises. Austral Bricks is still actively mining a portion of the premises. Hence requiring a 2m high perimeter fence is unachievable. Bearing in mind, this premises is located within private property and is not directly accessible from a public road. A 2m high fence is placed around the operating landfill cell and leachate ponds in accordance with the SAT planning requirements. This condition replicates SAT requirements Proposed: wording be clarified to specify operational area to be fenced (i.e. leachate ponds and active landfill cell)	Noted and updated requiring perimeter fencing (without height specified) for Condition 11(a). Condition 11(d) is added to reflect requirements of the SAT planning decision.

Item	Aspect	Summary of Licence Holder comment	DWER response
Condition 12	4m high temporary fencing around active landfill area	While we do have 4m high movable panels which will be placed down-wind of delivery area for litter management, it be impractical to have the fence around (meaning enclosed, as likely to be interpreted by DWER compliance) the active landfill area. Active landfill area is assumed to be the tipping face. A condition (12(a)) furthermore exists requiring daily retrieval of litter within the cell and weekly retrieval of anything escaping the cell. Proposed: an outcomes based condition 4m high litter screens are to be used to capture wind-blown litter at the active landfill area. (This will allow for more strategic placement.)	Updated with wording change from 'fence' to 'panels'.
Condition 13	The Licence Holder shall undertake, at least monthly, and inspection of the Premises and record and instances of: Wastes stored outside of containment infrastrucutre	Typo – and should be an. Also uncertain of the intent to inspect and record waste being stored outside containment infrastructure when condition 5 requires storing / disposal burial within infrastructure and litter is to be recovered at least on a weekly basis. Opal Vale did not pick up on the rationale for this condition in the Decision Report. Proposed: condition 13(a) be removed as it is redundant	Agreed – condition removed
Table 12 / Condition 26	Daily measurement recorded weekly	Does not make sense to measure daily but record weekly. Depth of leachate in sump 1 is basically replicated in Table 13 as PM1. Proposed: Reconsider wording of condition 26 as it replicated what is being said in Table 12	It is noted that the Application supporting document indicates that leachate depth within the sump will be measured on a daily basis as part of operational procedures for the leachate pumping system. The Applicant has confirmed this, but noted that measurements may not take place on each day. The Delegated Officer considers it reasonable to expect that a record be kept each time it is measured, but that measurement and recording should take place at least once a week. Condition is updated to require recording at a "minimum of once a week"

Item	Aspect	Summary of Licence Holder comment	DWER response
Condition 28 and Table 14	Monitoring of ambient surface water quality	Opal Vale maintains that that surface water monitoring requirements are excessive. While it is accepted a commitment was made to undertake 6-monthly monitoring of water quality in the clay pit surface water storage pond, we consider this to have little value unless the water is to be discharged to the nearby farm dam; the commitment was made on the assumption water would be released to the farm dam; however, this is unlikely to happen as all available water will be needed for dust suppression. Stream monitoring requirements provides little window to collect samples as these in all likelihood will need to be collected during the rainfall event, or immediately after. All aspects of the landfill operation will be contained and ponds managed to not overflow. The greatest risk would be sediment loss if erosion controls are not maintained and requirements have already been imposed in relation to this. The downstream environment is already degraded prior to the operation of the landfill. The risk assessment focused on assessment criteria of DRF habitat (when in fact there is no DRF around), TEC's that are more than 5km away and not even in the pathway. The creeks have been identified as being degraded by past practices and it would be rare for any leachate to escape the premises unless there was a catastrophic failure of the ponds (for which structural integrity was assessed as suitable by a landfill engineer). Proposed: consider removal of condition as there are sufficient controls in place to minimise pollution, or re-evaluate the suite of parameters to be monitored. Monitoring of water in the surface water pond should only be required if the water is to be discharged to the environment.	Disagree – the condition is retained. The Delegated Officer considers that monitoring of operational surface water stored in the unlined pond (whether used outside of operational areas or not) provides an indication of outcomes of controls proposed by the Applicant to prevent impact from leachate and general operation of the landfill. It is recognised that ambient surface water monitoring points may not retain sufficient water to allow monitoring. But should sampling be possible, the information gained by monitoring would provide an indication of outcomes of controls proposed by the Applicant to prevent impacts to the receiving environment related to diversion and control of surface water drainage outside of operational areas. Parameters are chosen as primary indicators of relevant potential operational impacts and are consistent with operational water monitoring requirements imposed on other landfills. Regardless of potential for degraded nature of existing habitat, there is direct discharge of diverted water from the premises, and outcome is that operations have not further impact to surface water (which may be accessed for stock watering down stream). Should the absence of surface water restrict the ability for sample collection, this may be noted, with supporting evidence, in annual reports submitted for the relevant period.

Item	Aspect	Summary of Licence Holder comment	DWER response
Table 15	Requirement to monitor wells C1-C6	Ambient groundwater monitoring bores C1 to C6 monitoring bores are associated with works approval to verify separation distance to ground water prior to the establishment / construction of new cells. It should not be included in the licence as these get systematically decommissioned as the new cells get constructed. Data for C1-C6 will be collected and be presented in accordance with the works approval requirements for cell construction. Inclusion of these bores on the licence will otherwise prohibit further landfill cell development. It is therefore not possible to monitor these under the licence. Ambient groundwater levels are already being monitored SE1 – SE9 is provides adequate information on standing water levels and water quality. Opal Vale has noted that wells constructed during the landfill investigations are still listed on the infrastructure. These were decommissioned once the construction commenced. Comment has been provided in relation to this relating to Schedule 2 of the licence. Proposed: ambient groundwater monitoring requirements for the licence to include bores SE1-SE9.	Disagree – the requirement to monitor in-pit bores is retained, noting the following. It is understood that wells may be decommissioned as new cells are constructed, however, the requirement to maintain groundwater separation distance is most effectively monitored via in-pit monitoring wells. It is expected that, as new cells are approved and constructed, that licence amendments can be made to update currency of in-pit bore locations and names. Should monitoring well names and locations be modified, decommissioning and/or construction reports may be provided within the annual report submitted for the relevant period, as evidence of changes made. However, the outcome to maintain monitoring well locations to enable the depth and quality of groundwater in the immediate vicinity of operational landfill cells should be able to be achieved in any modifications made.
Condition 29 and 30	Sampling methodology and field quality assurance	Which conditions to these relate to? Ground and surface water monitoring. Is this a standard condition that has not been properly adapted to the situation. There appears to be no correlation between this requirement and the Decision Report	Noted – conditions related to standard conditions for minimum procedures required for the collection of water samples for environmental monitoring, consistent with Australian Standard requirements for groundwater monitoring, and National legislation for quality control procedures during environmental sampling. Condition 30 clarified with references to relevant monitoring conditions.

Item	Aspect	Summary of Licence Holder comment	DWER response
Condition 31	The licence holder must undertake groundwater monitoring reporting in accordance with the requirements specified in Schedule 3	Schedule 3 relates to monitoring reports of a reportable event. The definition of a reportable event (Definitions and Interpretation) means *an exceedance above the target limit specified in Column 4 of Table 6, in Schedule 3* None of this makes sense as there are no limits or targets – a cut and paste from another licence? Table 6 relates to waste processes. Proposed: delete, condition not relevant	Noted – definition of reportable event in Table 1 has been updated to reference correct condition (Record keeping)
Table 16	Topographical survey map	AER requires annual topographical survey. There is no justification that Opal Vale could find for this inclusion and it does not relate to any licence condition and has no bearing on emissions or discharges from the prescribed premises.. Levy aspects are dealt with by other legislation. Volumes received are to be reported in accordance with condition 24 and associated levy returns undertaken on a quarterly basis. Are you sure you want it in hardcopy when DWER is only going with electronic record-keeping? Proposed; The survey map not be required as a licence condition. If a map is still to be required, it should be provided in electronic form only.	Noted – Requirement for Topographical survey has been removed, and updated to requirements to provide an updated site plan. Hardcopy maps are not required to be provided.
Site Layout source	The applicant is required to supply a clear site layout map depicting the infrastructure listed in Schedule 2. It is noted that the drawing provided in the Application (OV-WA-22) did not include Cell 1 labelled, and has some infrastructure in the incorrect locations with respect to the constructed facilities.	Updated maps to be provided separately	Site Plan updated with provided figure

Item	Aspect	Summary of Licence Holder comment	DWER response
Groundwater monitoring bore map	The Applicant is to provide a single map depicting groundwater monitoring network infrastructure listed in Tables 13, 14 and 15 overlaid on a site map showing key infrastructure (Cell 1, Leachate ponds, access roads etc) – It is noted that the groundwater monitoring bore coordinates were presented in a map projection and grid system that was not able to replicated on the DWER mapping software available. Estimated/suggested locations for SW1, SW2 and SW3 are shown on the image below. Alternatively SW 2 may be located in Jimperding Brook if accessible to the Occupier	Updated maps to be provided separately. Two ambient water monitoring maps have been produced; one with one groundwater bores and another with ground and surface water (in case DWER changes mind on surface water monitoring) SW1, 2 and 3 labelling has changed. Please note in licence condition references. Opal Vale maintains there is little risk or value in monitoring the Jimperding Brook as the operations at the landfill will not impact the water course given containment, distance and separation by other farming activities which may impact (e.g. paddock fertilisation, plant oil spills, livestock manure, sediments etc).	Noted – Monitoring locations map has been updated with the provided map
Schedule 2, Table 20	Listing of infrastructure: groundwater monitoring network	Not all of the bores listed are relevant to the licence and would have been decommissioned during cell construction. Bore C1 to C6 relate to cell construction (works approval W5800) <u>Proposed</u>: Only the 9 deep groundwater monitoring wells would be relevant.	Disagree - C1 to C6 bores are retained in the Table until such time as decommissioning reports are produced and construction reports for new bores are provided (within Annual reporting documents or subsequent licence amendments)
Decision Report Comments			
General	Opalvale	Please note Opal Vale is actually 2 words. Community had an issue with the incorrect spelling previously. Suggest a spell check through DR.	No change - ACN extract indicates that it is one word. Applicant confirmed on 29 January that it is one word.
	Spelling and grammar errors noted	Instances of spelling or grammatical errors in document	Noted and corrected.

Item	Aspect	Summary of Licence Holder comment	DWER response
3.2 Premises operations (last paragraph)	Wording relating to waste volumes to be received is confusing.	The landfill will likely only receive up to 50,000 tonnes during the first year and potentially ramp up to the approved 150,000 tpa authorised capacity in due course (depending on economics and waste availability).	Noted and updated.
Table 6	Infrastructure table	References ambient groundwater bores that no longer exist – they were used in the initial studies and decommissioned. The shallow bores around the landfill cells will also change over time as cells get constructed. Similar comments made in the licence section. Relevant monitoring well infrastructure for the licence would be SE1-SE9.	Noted referenced to 'Pit' bores removed – based on similar comments, reference to Cells 1 to 6 is retained.
Section 5 Experience of the Operator	Full names of companies provided	Instant Waste management Pty Ltd Alkina Holdings Pty Ltd Resource Recovery Solutions Pty Ltd New Energy Corporation Pty Ltd	Noted and updated.
Page 27 (3rd para) Groundwater monitoring	The stabilised maximum groundwater level, based on measurement undertaken in monitoring wells C1 to C6, has been recorded at a minimum separation distance of 1.76 m below the base of the Cell 1 landfill sump.	The minimum inferred/predicted level as calculated by Golder in the April 2018 advice was 1.76m on the perception that physical measurements had not picked up the highest peak. 1.76m was not physically recorded; wording needs to be changed to reflect this.	Noted and updated.
Table 11 (and referenced in the assessment sections)	The Premises is located within the Environmental Protection South West Agriculture Zone Wetlands Policy 1998 (EPP) area.	Can I suggest it be confirmed whether this policy is still in effect. I recall a number of these policies being withdrawn a few years ago (advice from the EPA). I still gave Jarred Abrahams a copy of the letter before I left. I know the Swan Coastal Plain was withdrawn; not sure about this one.	Noted and revised – EPP is replaced by Directory of Important Wetlands of Australia (DIWA) information relevant to the Avon River Valley has been updated.

Item	Aspect	Summary of Licence Holder comment	DWER response
Table 11	Reference to Parks and Wildlife manage lands	Technically this is now DBCA managed lands. Parks and Wildlife are now only a division of the Department.	Noted and updated.
Table 11	Reference made to threatened flora habitat within the premises and adjacent.	Unless there is specific DRF species identified on the premises or vicinity (which should then be named), you cannot make a blanket call and say it is DRF habitat. If that were the case, no landscape disturbing activity (including farming) should be authorised in WA without approval from the C'wealth. I note reference is made in various sections of the risk assessment to the DRF habitat which I believe is incorrect and misleading. The plants species on the premises are common and well represented in the area.	Noted, the geospatial dataset has been updated since the WA assessment, flora specification has been updated to reflect as being remnant native vegetation. In regards to risk assessment, references have been updated to reflect vegetation as remnant – it is noted that the Delegated Officer's findings already consider the disturbed nature of the remnant vegetation.
8 Landfill management		Will need to update reference for updated landfill management plan	Noted and reference updated.
8.4 signage Page 43	Query of what signage is proposed	Signage will be installed at the main entrance. It will identify: landfill name; state that the landfill is not open to the public; no unauthorised entry; site and management after-hour, and emergency contact details; waste types permitted, speed limits, and no fires permitted.	Text updated to reflect information provided.
Pg 46 Surface water management	Application supporting documentation proposed 6 monthly monitoring	Opal Vale does not see the merit of this monitoring other than for data collection. While a commitment was made in the application to undertake 6 monthly monitoring, it was done on the basis that excess water could be released to the nearby farm dam. This discharge / release is unlikely to happen in future. Therefore, to protect the quality of the farmer's water, monitoring will be undertaken prior to any discharge to ensure it does not negatively impact the quality. If monitoring is retained, there is little value in measuring total suspended solids if it is not getting discharged.	As noted elsewhere in the table, the Delegated Officer has retained surface water monitoring requirements. Noting the nature of the in-pit storage dam catchment, total suspended solids has been removed from the monitoring parameters in condition, and metal analysis has been amended from dissolved to total metals.

Item	Aspect	Summary of Licence Holder comment	DWER response
Page 56 Hazard to surface water	Algal growth may impact the survival of existing organisms through light and oxygen restriction and along with increased sediment loads and chemical stressors associated with leachate emissions, can cause the degradation of the surface water value and beneficial use.	Hazards described assumes the existence of waterbodies in the area. These drainage lines are ephemeral. These hazards raised are over-exaggerated. Any surface water discharge from will travel pass multiple clay-pit operations in the vicinity of the waterway on the way to the Avon River.	No change proposed.
Pg 56 Criteria assessment	The Delegated Officer considers that groundwater in the area down-hydraulic gradient of Cell 1 is potentially suitable for potable uses as well as non-potable use and stock drinking water.	Please explain the rationale for this as this is not consistent with monitoring undertaken and admission in the assessment that the groundwater quality has been impacted by the natural geological degradation processes. The only bores to have shown greater quality characteristics are associated with recharge in the immediate area. A description of the local hydrogeology on page 26 substantiates the low yields and transmissivity making it unsuitable as a groundwater source in the area. There are no farm bores in that area because of water quality and yield issues; hence the reliance on dams across the landscape (which are not located in the valley floor). Bear in mind Salt Valley Road got its name because of the historical salinity that is present.	Text has been updated to reflect that the criteria for assessment has been based on existing water quality and potential beneficial uses of groundwater. While it is noted that groundwater yields are likely to be low, the potential for beneficial use is not precluded on this basis, as there are no exclusions of management areas in place restricting installation of private bores for domestic use.
Page 56 Other	Declared rare flora habitat threat	This threat cannot exist and there are no DRF in the pathway.	Updated based on previous comments
Page 58	Regulatory controls for leachate	Opal Vale is of the view the surface water monitoring requirements are excessive given the other controls already specified and provide adequate protection. The receptors have already been described as degraded and groundwater is not a suitable resource despite the delegated officer using this as an assessment criterion.	No change is proposed – the monitoring of ambient surface water is proposed to measure outcomes related to surface water diversion and retention, recognising that operation of the Premises should not alter existing condition of groundwater or surface water bodies down hydraulic-gradient of the Premises.

Item	Aspect	Summary of Licence Holder comment	DWER response
Page 60	Likelihood of dust event	The nearest receptor is over 1000m away and not in line with the prevailing winds. Opal Vale suggests that the probably is unlikely that impacts will be experienced at the receptors. Bearing in mind, EPA separation distances for crushing operations which would create more dust suggest a separation distance of 1000m. There is also a lot of vegetation between the landfill and the receptor to intercept any dust emissions. Despite this position of assuming a lower risk, Opal Vale accepts the controls imposed other than the requirement to wet down the active tipping area. An alternative outcome based condition as proposed in the relevant section above would be more suited.	Noted and likelihood has been updated. It is noted that the Medium risk still retained, therefore no change to conditions is proposed.
Page 61	Likelihood of asbestos exposure	The likelihood has been determined by the DO to be unlikely. While Opal Vale does not dispute the regulatory controls imposed, the likelihood of exposure by residents 1,100 m away (and not in the prevailing wind direction) surely would be rare given the controls. Asbestos is not likely to be a received in significant volumes.	Noted and likelihood has been updated. It is noted that the Medium risk still retained, therefore no change to conditions is proposed.

Attachment 1: Licence L9089/2017/1