61736 M04 Banksia Rd Odour Rev 0

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Banksia Road Landfill – Odour Assessment

1. Introduction

Cleanaway Solid Waste Pty Ltd (Cleanaway) operates the Banksia Road Landfill (the site). The site is a putrescible landfill and liquid waste facility operated under *Environmental Protection Act 1986* (EP Act) licence L8904/2015/1[1] (the licence) granted by the Department of Water and Environmental Regulation (DWER). The site accepts general (household and commercial) waste and tailings[2].

Construction of the current landfill commenced in 2000. Nine approved cells have been commissioned, with the tenth approved cell currently under construction. Associated with the ongoing use of the site, Cleanaway intends to develop three additional landfill cells (Cells 9, 10 and 12A) within the existing boundary of the site.

Following consultation with stakeholders and considering ongoing concerns raised by the Dardanup community, Cleanaway referred the construction and operation of Cells 9, 10 and 12A (the proposal) to the Environmental Protection Authority (EPA).

On 5 August 2021, the EPA decided to assess the proposal and set the level of assessment as "[Assessment on] *Referral Information* [ARI] *with additional information required under section 40(2)(a) of the Environmental Protection Act 1986 (4 weeks public review)*".

Additional information required by the EPA included an assessment of impacts on air quality from odour. The EP Act (section 49(1)) defines an unreasonable emission 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. Therefore, it is required that odour from the premises does not unreasonably interfere with the health or amenity of persons, not on the premises.

2. Background

The site is located at Lot 2 on Plan 65861, Crooked Brook in the Shire of Dardanup, approximately 10 km south-east of Bunbury and 3.8 km south-east of the town of Dardanup. The site covers a total area of approximately 121 ha. Landfill operations at the site include active solid waste cells, drainage infrastructure, stormwater collection dams and leachate collection ponds. The layout of the site is presented in Figure 2.1.

Cleanaway proposes to construct and operate the new landfill cells to enable operations to continue as existing cell capacity becomes exhausted. No change in the type of waste accepted at the site is proposed, and the assessment is based on landfilling at a maximum rate of 350,000 tonnes per year.

1 Issued 28 October 2021

2 Cleanaway is currently authorised to accept and store tailings from mineral sands processing within defined cells

Legend

- Site boundary
- Proposal footprint
- Cadastral boundary
- Minor road

strategen JBS&G

Job No: 61736	
Client: Cleanaway Solid Waste Pty Ltd	
Version: A	Date 12/08/2022
Drawn By: ianandagoda	Checked By: CT
Scale 1:9,000 at A4	

0 100 200
metres

Coor. Sys. GDA 1994 MGA Zone 50

Banksia Road Landfill
Dardanup,WA 6236

SITE LAYOUT

FIGURE 2.1

File Name: W:\Projects\1)Open\Cleanaway\61736 Banksia Rd Cell 9,10,12A ERD\GIS\Maps\R01_Rev_A\61736_02_1_SiteLayout.mxd
Image Reference: www.nearmap.com© - Imagery Date: 06 April 2022.

3. Odour Report

3.1 Screening Analysis

An odour screening analysis has been carried out using the template provided by DWER in the Guideline: Odour Emissions (DWER 2019; the Odour Guideline), with results shown in Table 3.1.

The site has sensitive receptors (residences) located within the 1,000 m screening distance recommended in the Odour Guideline for a Category 64 putrescible landfill (see Figure 3.2).

Given the proximity of the receptors, the site does not pass the screening stage and, therefore, according to the screening process for existing premises (see the Odour Guideline for proforma and flow chart [Figure 3.1]), a detailed odour analysis is required, including an operational odour analysis (OOA) and site assessment.

Table 3.1: Screening analysis for existing premises

Q1. Description of odour emissions	
Activity / odour source	**Description, including proposed controls.**
Acceptance, movement and disposal of waste at existing facility	Existing activity – subject to conditions of existing licence. Waste is accepted via trucks travelling on public roads. All waste loads accepted at the site must be completely covered. Dispose of highly odorous waste by immediate burial (EP Act licence condition 34). Activity unchanged; however, active landfill area will be relocated to new cells to east of current active cells.
Exposed areas of the land fill including active tipping surface	Existing activity – subject to conditions of existing licence. Landfill cells require covering in accordance with licence requirements for different waste types (EP Act licence condition 19). Active tipping area is limited to an area no greater than 1,800 m^2 (EP Act licence condition 19). Activity unchanged; however, active landfill area will be relocated to new cells to east of current active cells.
Landfill gas	Existing activity –subject to conditions of existing licence. Landfill gas may be a source of odour due to presence of gases such as hydrogen sulfide. Emissions maybe fugitive or result from ineffective control via engines and flaring. Flaring is used to reduce potential odour impacts by destruction of odorous compounds. Activity modified - connection of additional gas extraction wells and collection infrastructure in Cells 3, 4, 4B, 12, 6, 7 and 8 to occur in line with dates and timeframes specified in EP Act licence condition 15.
Leachate/ leachate storage ponds	Existing activity –subject to conditions of existing licence. Leachate storage ponds and disposal via evaporation and leachate trucking (to tip face for dust suppression) could become a source of odour should anaerobic conditions occur. Activity unchanged.

<table>
<tr><th colspan="2">Q2. Identification of current odour impacts</th></tr>
<tr><td rowspan="2">Have odour impacts occurred as a result of the current operational configuration and / or practices? Please tick all applicable boxes:
☒ Complaints
☐ Odour diaries
☐ Field odour assessments
☐ Community feedback
☐ Other.__________________________</td><td>☒ YES or Can’t determine: Go to flowchart.</td></tr>
<tr><td>☐ NO: Go to Question 3.</td></tr>
<tr><th colspan="2">Q3. Changes to emissions</th></tr>
<tr><td rowspan="2">Are there proposed changes to the existing premises that are likely to increase the odour emissions, or change the configuration of any source in the facility?</td><td>☒ YES or can’t determine: Go to Question 4.
Sources will be in slightly different on-site location</td></tr>
<tr><td>☐ NO: Go to flowchart.</td></tr>
<tr><th colspan="2">Q4. Screening distance</th></tr>
<tr><td colspan="2">Screening distances for Categories 5, 61 and 64 are as follows</td></tr>
<tr><td>Option 1:
A 1,000 m screening distance is listed in Appendix 2 for Category 64:
Screening distance (A) = 1,000 m
Sensitive receptor distance (B) = 500 m</td><td>☒ B < A: Go to flowchart.

☐ B ≥ A: Go to Question 5.</td></tr>
<tr><td>Option 3:
There is no entry for this industry category in Appendix 2.</td><td>☐ Industry category not listed:
Go to flowchart.</td></tr>
<tr><th colspan="2">Q5. Special case factors</th></tr>
<tr><td>Are there special case factors that might increase odour impacts beyond the screening distance shown in Question 2?
Please tick all applicable special case factors:
☒ Odour impacts from nearby sources
☐ Presence of an existing elevated odour background
☐ Complex terrain
☐ Unusually large and / or complex facility when compared with other Australian operations
☐ Unusual configuration of odour sources or technology compared with other Australian operations
☐ The proposal is located in a Strategic Industrial Area (SIA)
☒ Multiple industry categories that emit odour are present on the same site</td><td>☒ YES or can’t determine: Go to flowchart.
OR
☐ NO: Go to flowchart.
Justification should be provided to support a ‘NO’ response.</td></tr>
<tr><td colspan="2">Special case factors – justification for ‘NO’ response. N/A</td></tr>
<tr><td colspan="2">Additional comments: Nil</td></tr>
</table>

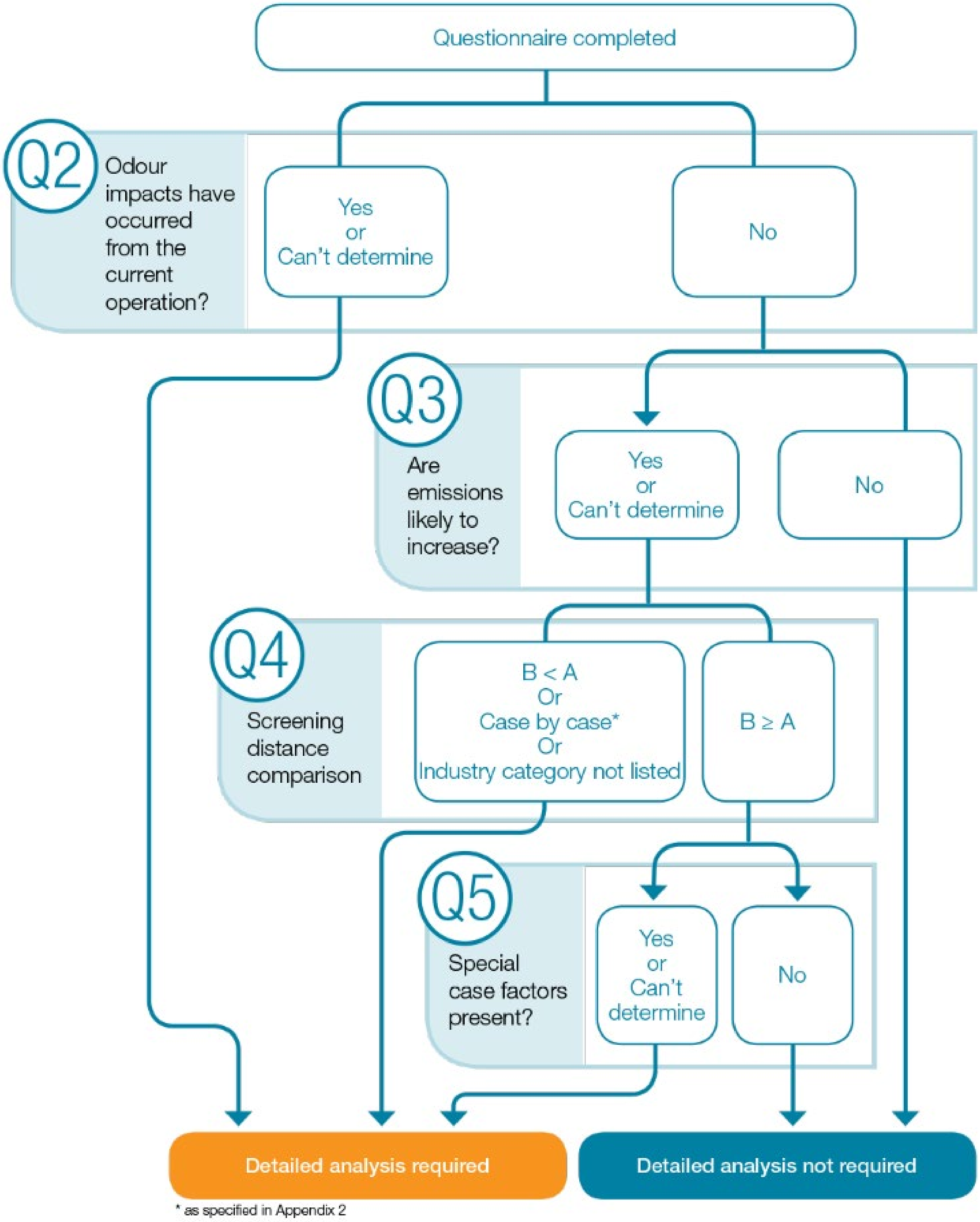


Figure 3.1: Odour screening analysis for existing premises (DWER 2019)

3.2 Detailed Odour Analysis

The detailed odour analysis comprises three steps:

1. Undertake an operational odour analysis and location review.
2. Undertake further analysis using selected tools from Table 1 of the Odour Guideline as required.
3. Compile additional information to support the detailed analysis.

The Odour Guideline provides a checklist for tools to be used for the detailed odour analysis. This checklist with responses provided in relation to the project is shown in Table 3.2.

Table 3.2: Detailed odour analysis checklist

Detailed analysis tools	Tick if used	Comments
Emission source		
Operational odour analysis (OOA) (priority tool)	☒	See section 3.1.4
Odour source assessment (OSA)	☐	Not required
Pathway and receptor		
Location review (”highly recommended”)	☒	See section 3.1.3
Odour field assessment (OFA)	☐	Not required; no evidence that unacceptable odour impacts at nearest sensitive receptors are expected.
Complaints data analysis	☒	See section 3.1.8
Community surveys	☐	Not required
Comparative dispersion modelling	☐	Not required
Comparison with similar operations	☐	Site operations to be as per the existing facility. The odour assessment has been informed by current operations; therefore, further comparison with a similar operation is unnecessary.

Two of the detailed analysis tools have been used for the detailed odour analysis, being the OOA (priority tool) and location review (highly recommended tool). Complaints data for the existing facility are also discussed.

3.3 Location Review

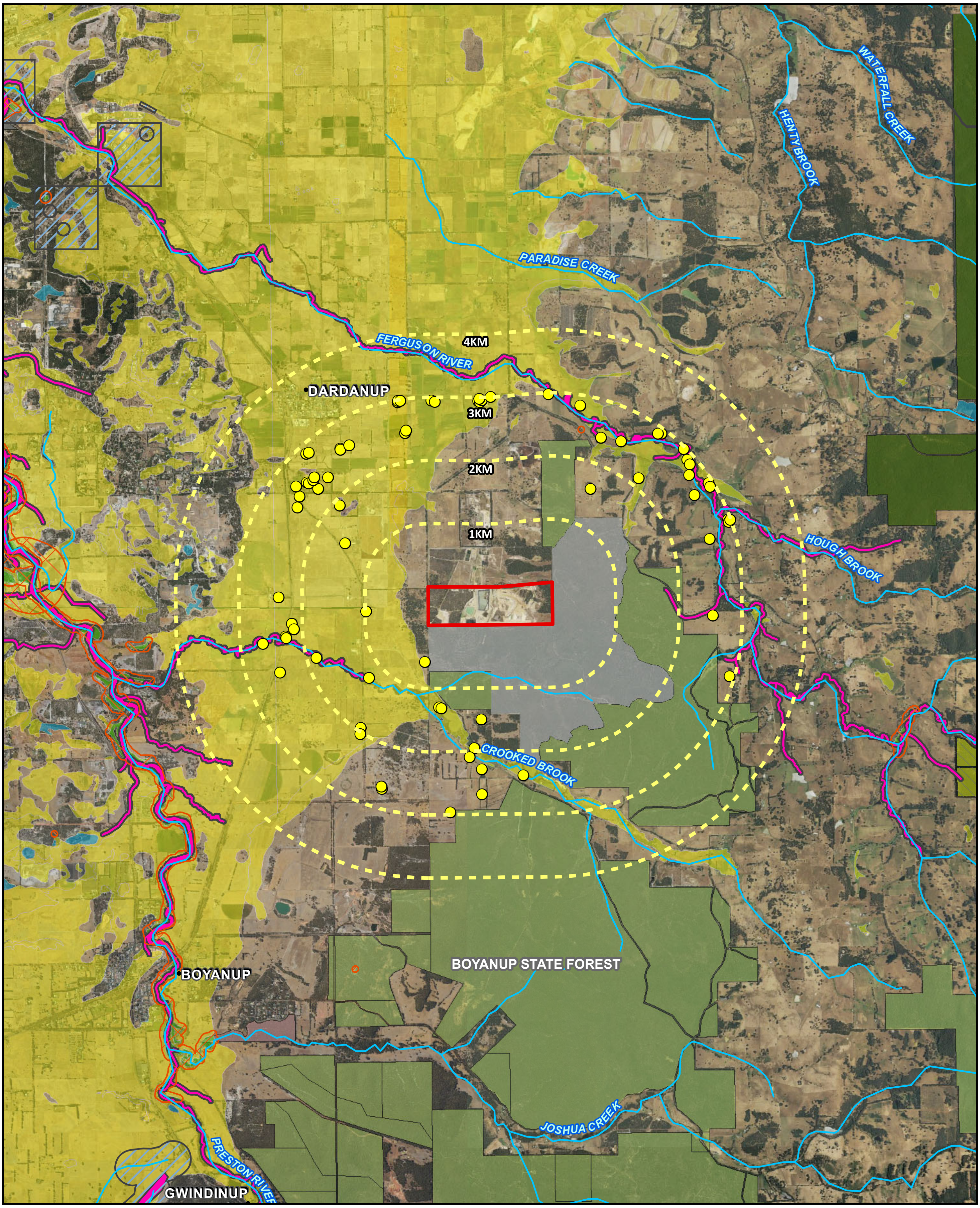
3.3.1 Sensitive Receptors

The Odour Guideline provides an odour screening distance for Category 44 putrescible landfills of 1,000 m. The site is shown in Figure 3.2, illustrating the environmental setting and sensitive receptors.

Receptors sensitive to the amenity impacts of odour are those residences closest to the site. These lie within the screening distance, approximately:

- 500 m south of the south-west corner of the site boundary, separated by the Dardanup Conservation Park and Boyanup State Forest;
- 900 m due west of the site boundary; and
- 1,000 m west-southwest of the south-west corner of the site boundary.

The Dardanup Conservation Park and Boyanup State Forest are immediately adjacent to the site boundary, and recreational users could be potentially subject to amenity impacts from odour emissions from the site.



- Premises boundary
- 1km intervals

Aboriginal Heritage Places (DPLH-001)

- Registered Site
- Other Heritage Place

Geomorphic Wetlands (DBCA)

- Conservation
- Resource enhancement
- Multiple use
- Watercourses

- Environmentally sensitive areas (DWER)

Legislated Lands and Waters (DBCA)

- National Park
- Section 34A Freehold
- Section 5(1)(h) Reserve
- Nature Reserve
- State Forest
- Other Reserves
- Sensitive receptor - residence

Scale 1:80,000 at A4

0 1 2
Kilometres

Coord. Sys. GDA 1994 MGA Zone 50

Job No: 61736

Client: Cleanaway

Version: A

Date: 18-Jan-2022

Drawn By: ianandagoda

Checked By: JB

Banksia Road Landfill
Crooked Brook, WA 6236

ENVIRONMENTAL SETTING AND SENSITIVE RECEPTORS

FIGURE 3.2

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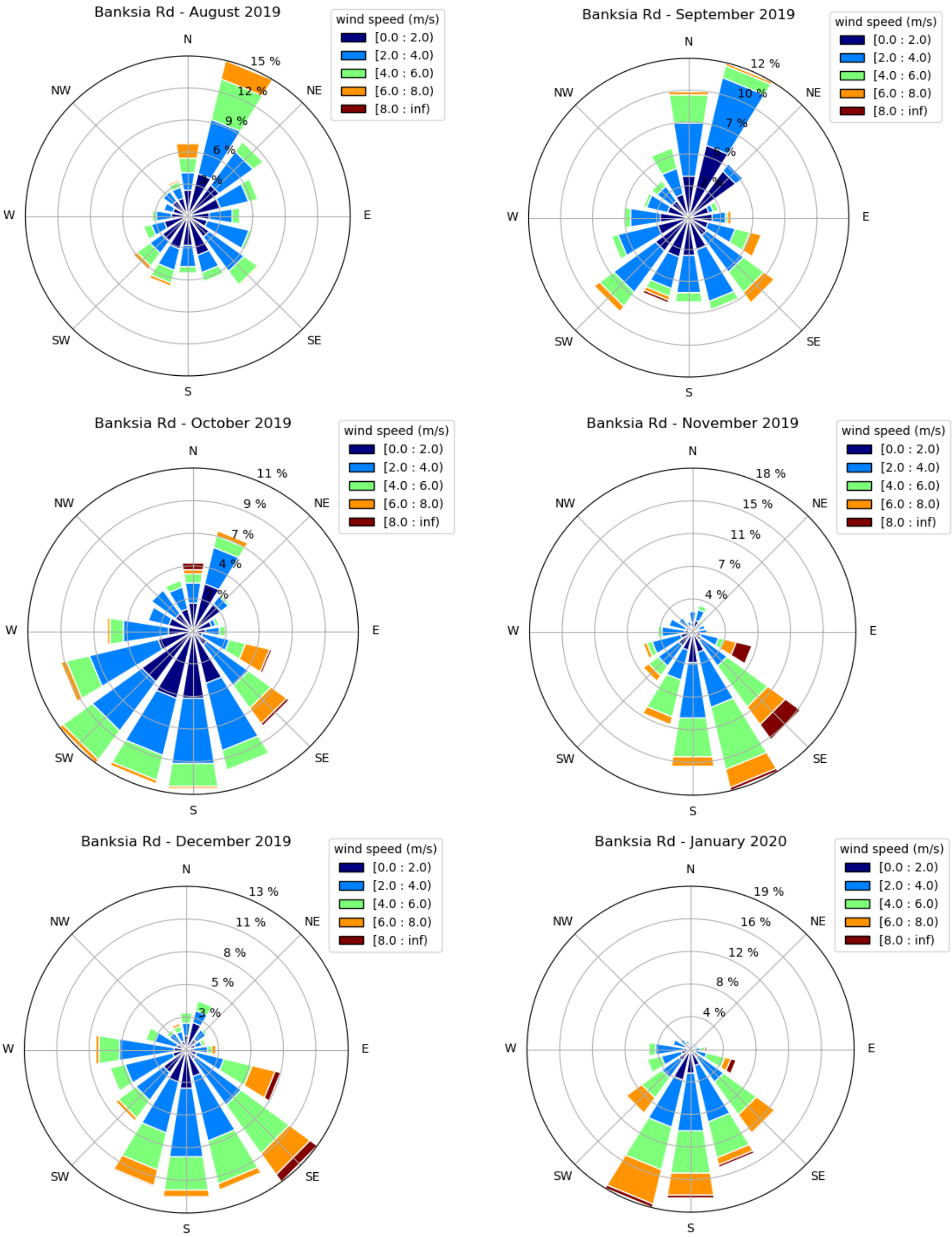
Image Reference: SLIP Public Services Locate 2020.

3.3.2 Meteorology

In order to characterise the local wind influences at the site, monitoring of the meteorology on-site commenced at the end of June 2019. Monthly wind roses recorded across a 12-month period (2019) are below (Figure 3.3).



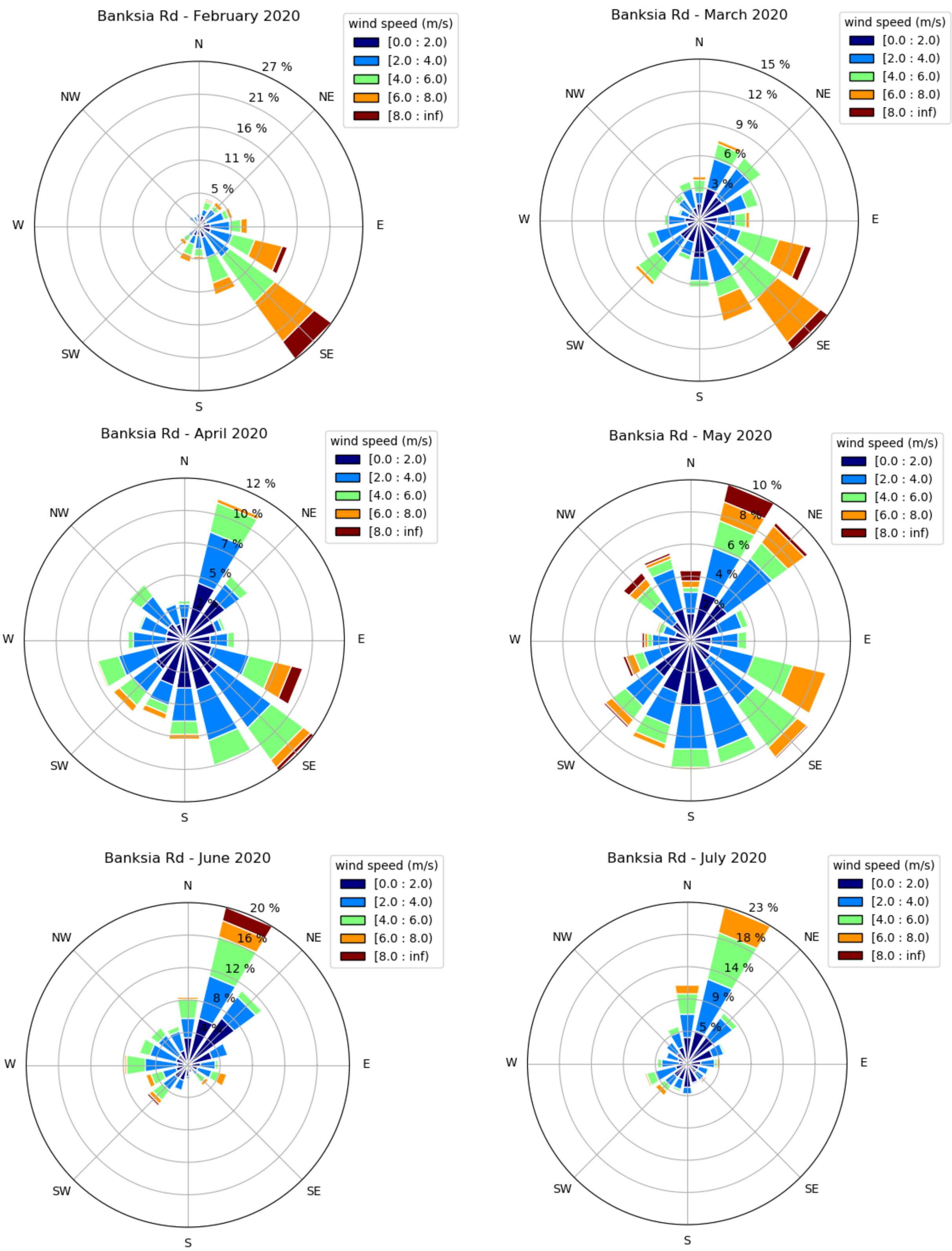


Figure 3.3: Monthly wind roses for on-site weather station

Analysis of the annual wind patterns reveals that the prevailing winds come from the north-east quadrant during the winter months. During the drier summer months, the strongest winds come from the south-east quadrant.

The periods with the highest potential for any emissions from the site to reach a receptor would occur during periods of light winds (0.5 – 5 m/s) from a north-easterly direction. These conditions are most likely to occur during the cooler months and, if coincident with inversion conditions, would represent a worst-case dispersion scenario.

During the warmer months, prevailing winds are from the south-east, thus, could carry odours towards the receptors to the north-west. However, winds are typically stronger than 4 m/s during the summer; therefore, dispersion of any odours combined with a greater separation distance to receptors reduces the likelihood of odour impacts at the northeast receptors.

3.4 Operational Odour Analysis

Operations with the potential to emit odour are identified via an odour emission operations review. Operational elements with the potential to be odour sources have previously been identified via an odour emission operations review conducted by DWER for the site (DWER, 2021). The proposal concerns the relocation of the active waste disposal to new cells with no changes to the operations.

Activities with the potential to emit odour will continue to be:

- Movement of waste;
- Waste disposal;
- Leachate management; and
- Landfill gas management.

There are no abnormal operations foreseen for the site.

Details of the OOA for each of these operations are described in the following tables (Table 3.5 to Table 3.8).

Table 3.3: Odour emission operation review – movement of waste

Aspect	Response
Operation	Trucks carrying waste are received at the weighbridge then transported within the site prior to unloading. Solid waste is unloaded by tipping at the active tipping face.
Odour sources and emissions	<u>Sources:</u> • Potential odour emissions from un-sealed waste trucks. • Unloading of odorous wastes. <u>Odorous emissions:</u> • Ammonia, hydrogen sulfide and VOCs. <u>Frequency of emissions</u>: • Intermittent fugitive emissions during transfer of odorous wastes.
Process controls	• Enclosed trucks/vessels for transport of odorous waste • Weighbridge inspection for cover[3] on loads and observation of any odour emissions.
Triggers and corrective actions	<u>Triggers</u>: • Detection of odour in vicinity of delivery truck at the weighbridge. <u>Corrective actions</u>: • Examination of integrity of enclosures. • Reject of loads not effectively contained and notification to vehicle owner to ensure future loads are adequately covered.
Corrective action evaluation	The efficacy of corrective actions will be determined from on-site observations of odour in the vicinity of the delivery trucks.
Contingency actions	If corrective actions are unsuccessful and unacceptable odour impacts are experienced at sensitive receptors , then the receipt operations will suspend delivery of waste material from that transporter. An investigation will be carried out to identify and mitigate causes of odour emissions which have resulted in unacceptable impacts at sensitive receptors.

[3] Cover is a requirement of the dust and asbestos management plans

Table 3.4: Odour emission operations review – disposal of waste

Aspect	Response
Operation	The deposited waste is spread in layers no greater than 500 mm thick using a bulldozer, tracked loader or compactor, and then compacted by a compactor, which makes several passes over each layer. The waste is compacted and covered with inert material or approved alternate materials at the end of each working day. The cover material is also placed in a progressive manner through the day on the side slopes and top deck areas.
Odour sources and emissions	<u>Sources:</u> • Odorous waste during tipping and compacting. • Decomposition of previously deposited waste in un-capped or exposed operational areas of the landfill, including the active tipping face. <u>Odorous emissions:</u> • Ammonia, hydrogen sulfide and VOCs. <u>Frequency of emissions</u>: • Intermittent from odorous wastes. • Potential to be a continuous emission source if previously deposited waste is continuously disturbed.
Process controls	• Minimisation of the active tipping area to 1,800 m^2 or to two areas no greater than 1,800 m^2 each for periods of up to three months when transitioning between cells. (EP Act licence condition 33) • Immediate coverage of odorous wastes (EP Act licence condition 34) • Timely handling, compaction and coverage of deposited waste (EP Act licence condition 19). • Minimal disturbance of previously deposited waste materials. • No depositing waste in to standing water.
Triggers and corrective actions	<u>Triggers</u>: • Odour detected in the vicinity of the tipping face. <u>Corrective actions</u>: • Ensure active face size is being minimised, odorous wastes are immediately and adequately covered and previously deposited waste is not being disturbed.
Corrective action evaluation	The efficacy of corrective actions will be determined from on-site downwind observations of odour.
Contingency actions	If corrective actions are unsuccessful and unacceptable odour impacts are experienced at sensitive receptors an investigation will be carried out to identify causes of odour emissions which have resulted in unacceptable impacts at sensitive receptors.

Table 3.5: Odour emission operations review – leachate management

Aspect	Response
Operation	Leachate extracted from the existing landfill is stored in ponds, circulated via pond sprinklers to aid evaporation and recirculated onto the active landfill area for dust suppression (irrigation from water cart onto tip face).
Odour sources and emissions	<u>Sources:</u> Should the leachate pond environment become anaerobic potential odour sources are: • Leachate pond surfaces and sprays. • Leachate being recirculated on landfill liner and used for dust suppression. <u>Odorous emissions:</u> • Ammonia, hydrogen sulfide and VOCs. <u>Frequency of emissions</u>: • Not expected (rate) but could occur.
Process controls	Leachate ponds designed to maintain aerobic environment.
Triggers and corrective actions	<u>Triggers</u>: • Odour detected in the vicinity of the leachate ponds. <u>Corrective actions</u>: • Ensure active leachate recirculation is being conducted.
Corrective action evaluation	The efficacy of corrective actions will be determined from on-site downwind observations of odour.

Aspect	Response
Contingency actions	If corrective actions are unsuccessful and unacceptable odour impacts are experienced at sensitive receptors an investigation will be carried out to identify causes of odour emissions which have resulted in unacceptable impacts at sensitive receptors. Active aeration to maintain aerobic in-pond conditions could be explored in the event odours could not be adequately controlled.

Table 3.6: Odour emission operations review – landfill gas

Aspect	Response
Operation	Landfill gas capture and flaring
Odour sources and emissions	Sources: • Landfill gas from anaerobic decomposition of waste deposited within landfill. Odorous emissions: • Ammonia, hydrogen sulfide and VOCs. Frequency of emissions: Dependent on waste composition but with potential to be a continuous if: • Not effectively controlled resulting in lateral migration of landfill gas leading to fugitive landfill gas emissions. • Flares undersized or not operating efficiently.
Process controls	• Operation of a flare at a minimum 400 m^3/h (EP Act licence condition 54). • Progressive installation of landfill gas management system to direct gas to flare (EP Act licence condition 15). • Assessments of the ongoing suitability of the landfill gas flare to manage the landfill gas generation volumes and flow rates from connected Cells via annual assessment (EP Act licence condition 65).
Triggers and corrective actions	Triggers: • Odour detected in the vicinity of the flare or previously closed landfill cells. Corrective actions: • Ensure flare is operating optimally. • Inspect landfill gas system integrity.
Corrective action evaluation	The efficacy of corrective actions will be determined from on-site observations of odour.
Contingency actions	If corrective actions are unsuccessful and unacceptable odour impacts are experienced at sensitive receptors an investigation will be carried out to identify causes of odour emissions which have resulted in unacceptable impacts at sensitive receptors.

3.5 Odour Control Performance

Odour impacts on surrounding receptors were raised by six submissions during stakeholder consultation during the 2021 licence review. Odour complaints have also been received, including complaints directly to DWER[4]; however, subsequent investigation following a large number of complaints identified the site was not the primary odour source, which was attributed to another facility in the Dardanup waste precinct (DWER, 2021). This conclusion concurs with that reported by DWER as presented from the Shire's Principal Environmental Health Officer.

3.6 Residual Odour Impact Potential

The following table details the impact potential from the OOA (Table 3.11). Should an odour emissions event occur (odour emissions crossing boundary), a low-level impact to off-site amenity at a local scale could occur. Following the DWER Guideline: Risk Assessments (DWER 2017), the consequence of an odour emission event is, therefore, assigned minor.

A likelihood of rare was assigned to odour emissions from on-site active waste management impacting sensitive receptors. Operations with odour potential are subject to specific odour controls (specified in the EP Act licence), and any impacts from fugitive odour emissions that do result are

[4] https://www.wa.gov.au/service/environment/environment-information-services/dardanup-waste-precinct.

expected to be localised. Following the application of controls, a likelihood of rare was also assigned to odours from leachate and landfill gas reaching sensitive receptors.

Furthermore, the meteorological conditions during which odour emissions, should they occur, could be carried towards the nearest receptor are expected to be most likely to occur during light winds in the cooler months when emissions of volatile compounds are expected to be at lower levels than warmer months (EnRisk, 2016).

Overall, following the application of the mitigation measured specified by the EP Act licence, the potential risk of impact at a residential receptor is concluded to be low for all operations and sources (Table 3.9).

Table 3.7: OOA residual odour impact potential

Operation/odour source	Consequence	Likelihood	Impact potential
Waste acceptance	Minor	Rare	Low
Waste disposal	Minor	Rare	Low
Leachate management	Minor	Rare	Low
Landfill gas emissions	Minor	Rare	Low

These risks were determined by DWER to be tolerable in a review of the EP Act licence (DWER 2021). Given the movement of activities to new cells does not significantly increase the potential for odour emissions from the site, it is considered that the risk of odour from the proposal is acceptable.

4. Summary

Based on the desktop odour assessment and preliminary risk assessment, it is concluded that the site poses a tolerable risk from an odour perspective. This is concluded due to the implementation of established demonstrated effective odour controls. An acceptable odour outcome is subject to the appropriate operational and management controls being in place.

References

DWER. (2017). *Guideline Risk Assessments*. Department of Water and Environmental Regulation, Government of Western Australia.

DWER. (2019). *Guideline Odour Emissions*. Department of Water and Environmental Regulation, Government of Western Australia.

DWER. (2021). *Banksia Road Licence Review Decision Report DER2015/001648-1*. Department of Water and Environmental Regulation, Government of Western Australia.

EnRisk. (2016). *Air Emissions from Non-Hazardous*. Victoria: Environment Protection Authority.