Government of Western Australia
Department of Water and Environmental Regulation

Amendment Report

Application for Licence Amendment

Part V Division 3 of the *Environmental Protection Act 1986*

Licence Number	L8904/2015/1
Licence Holder	Cleanaway Solid Waste Pty Ltd
ACN	120 175 635
Application Number	APP-0026994
File number	DER2023/000550~4
Premises	Banksia Road Putrescible Landfill Banksia Road CROOKED BROOK WA 6236 Legal description – Part of Lot 2 on Deposited Plan 65861 As defined by the coordinates in Schedule 2 As defined by the coordinates in Schedule 1 of the revised licence
Date of Report	23 April 2025
Decision	Revised licence granted

Adam Harbeck

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MANAGER WASTE INDUSTRIES
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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1. Decision summary

Licence L8904/2015/1 is held by Cleanaway Solid Waste Pty Ltd (licence holder) for the Banksia Road Putrescible Landfill (the premises), located at Banksia Road, Crooked Brook.

This amendment report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the operation of the premises. As a result of this assessment, revised licence L8904/2015/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

2.2 Application summary

On 24 December 2024, the licence holder applied to the department to amend licence L8904/2015/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- Alter the description of category 64 to include acceptance of Special Waste Type 3 (solid waste, including soils and other solid wastes impacted by Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)) material at the facility. This includes the addition of Special Waste Type 3 to the waste types accepted in Table 1 of L8904/2015/1 and waste types processing specifications in Table 4 of L8904/2015/1.

This amendment is limited only to changes to Category 64 activities from the existing licence. No changes to the aspects of the existing licence relating to Category 5 and 61 have been requested by the licence holder.

Table 1 below outlines the proposed changes to the existing licence.

Table 1: Proposed design capacity changes.

Category	Current design capacity	Proposed design capacity	Description of proposed amendment
5: Processing or beneficiation of metallic or non-metallic ore: premises on which: (a) metallic or non-metallic ore is crushed, ground, milled or otherwise processed; (b) tailings from metallic or non-metallic ore are reprocessed; or (c) tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam.	350,000 tonnes per annual period	350,000 tonnes per annual period	No change proposed.

Category	Current design capacity	Proposed design capacity	Description of proposed amendment
61: Liquid waste facility - Premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	3,000 tonnes per annual period	3,000 tonnes per annual period	No change proposed.
64: Class II or III putrescible landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled "Landfill Waste Classification and Waste Definitions 1996" published by the Chief Executive Officer and as amended from time to time) is accepted for burial.	350,000 tonnes per annual period	350,000 tonnes per annual period	Inclusion of Special Waste Class 3 in waste acceptance table to facilitate burial of PFAS impacted soils and wastes. No proposed change to permitted waste design capacity.

The application was accompanied by a copy of the *Banksia Road Landfill Licence Amendment Supporting Document* prepared by Talis consultants. The document contains a LandSim Risk Assessment for Banksia Road Landfill including Future Cells, Crooked Brook, WA. Following a review of the application and supporting documentation, a request for further information was issued to the licence holder on 30 January 2025, seeking additional information and documentation in order for the delegated officer to assess the requested amendment. In response, the following documents were submitted on 17 February 2025.

- Cleanaway Solid Waste PTY LTD - Dardanup Landfill Emergency Management Plan
- WSP Cleanaway Solid Waste PTY LTD - Dardanup Landfill Leachate Management Plan
- Cleanaway Solid Waste PTY LTD - Dardanup Landfill *Waste Acceptance Process Flow*
- Cleanaway Solid Waste PTY LTD - *Banksia Rd Landfill Waste Disposal Application*
- *JBS&G* - Banksia Road Landfill Cleanaway Solid Waste Pty Ltd - *Dust Management Plan* JBS&G 61783 | 142,832 (Rev 6.1) 29 July 2024
- SLR Consulting Australia - *Groundwater monitoring event at Cleanaway Banksia Waste Disposal Site 2024* - W6855/2023/1 Banksia Waste Disposal Site - Cleanaway Sold Waste Pty Ltd
- SLR Consulting Australia - *Addendum groundwater monitoring event report for Cleanaway Banksia Waste Disposal Site* - Cleanaway Sold Waste Pty Ltd

The above documents set out the existing management and monitoring activities at the premises which will inform the assessment of the potential risks associated with the receipt and burial of PFAS impacted material to existing and future Class III lined landfill cells.

2.3 Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

PFAS are manufactured chemicals that have been used for more than 50 years. PFAS makes products non-stick, oil- and water-repellent, and fire, weather- and stain-resistant. PFAS have been used in a range of consumer products, such as carpets, clothes, food packaging and paper, and have also been used in firefighting foams, pesticides and stain repellents.

PFAS are known to be persistent, bio-accumulative, and toxic. Due to their persistence in the environment and moderate solubility, PFAS can be transported long distances in water and air, as well as transfer between different media (for example soil, sediment, surface water and groundwater).

In Australia, PFAS have been used for a long time in a wide range of consumer products and industrial applications. There are now PFAS-contaminated sites around Australia resulting from these various uses. Over time, the chemicals have worked their way across and through the soil to contaminate surface waters and groundwater, and have migrated into adjoining land areas. PFAS are also present in waste streams, including landfills and wastewater treatment facilities, as well as more broadly in the environment due to ongoing industrial discharges.

As a result, low levels of PFAS are found in most environmental settings. Additionally, landfill facilities across Australia are expected to contain low levels of PFAS contaminated wastes because of historic waste acceptance.

2.4 PFAS contaminated waste acceptance

The department has assessed the suitability of the existing premises, including infrastructure in place at the premises, for the acceptance of PFAS contaminated wastes for disposal to landfill. The assessment is informed by supporting documentation submitted by the licence holder and guidance outlined within the PFAS National Environmental Management Plan Version 3.0 2025 (PFAS NEMP), which is produced by the National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA) and provides nationally agreed guidance on the management of PFAS contamination in the environment, including prevention of the spread of contamination.

The assessment is detailed as follows.

2.4.1 Suitability of landfill siting

Subsection 14.6 of the PFAS NEMP states that the following points relating to environmental siting should be considered in determining whether a landfill will be suitable to accept PFAS contaminated wastes:

- ensuring the landfill is not located on a vulnerable groundwater system (see Australian Government (2013) and Appleyard (1993)), and
- depending on the landfill liner design, whether the landfill is located within 1000 m of a surface water body that supports an aquatic environment (including groundwater dependent ecosystems), or within 1000 m of a surface water drain that is connected to groundwater and/or discharges directly into an aquatic environment (including groundwater dependent ecosystems) or a water body that supports fish or other fauna species that may be caught and consumed

The licence holder commissioned Golder to prepare the *LandSim Risk Assessment for Banksia Road Landfill Including Future Cells, Crooked Brook (September 2023)* (LandSim model). The LandSim model was submitted as a supporting document to this application. Hydrogeological characteristics of the underlying premises area are provided in the LandSim model as follows:

- The underlying geology comprises sandy clays, clayey sands, silts, clays, and sand lenses,
- The unsaturated zone beneath the site is a minimum of 16m thick, and is over 40 m thick in places,
- The aquifers beneath the site comprise the unconfined Superficial Aquifer present in the western portion of the site and up to 15 m thick, and the confined Leederville Aquifer which is up to 200 m thick in places. A thinner mixing zone at the surface of the aquifers has been recognised in the conceptual model,

- Groundwater flow direction is to the west or west-north-west and the top of the regional aquifer is located at approximately 30 m AHD to 50 m AHD; and
- The hydraulic gradient is variable across the site ranging between approximately 0.019 and 0.026.

These characteristics have been previously determined by investigation works undertaken by 360 Environmental to inform the *Banksia Road Waste Facility, Crooked Brook WA, Hydrogeologic Risk Assessment and Groundwater Monitoring Program Review (March 2021.)* This indicates that the landfill is not located on a vulnerable groundwater system when the guidance across Australian Government (2013) and Appleyard (1993) (as cited in the PFAS NEMP) are applied.

The LandSim model was prepared to achieve the following outcomes:

- Assesses the potential concentration of contaminants, arising from leachate emissions from the landfilling and tailings disposal activities at the premises, at receptors over time, including both the operational and closure phases of the premises,
- Compares predicted contaminant concentrations at receptors with relevant environmental quality criteria and assesses potential impacts to receptors from leachate emissions from the landfilling and tailings disposal activities at the premises, during both the operational and closure phases of the premises,
- Considers the degradation of engineering lining and management systems over time,
- Considers the current and proposed specification of interim cover and capping for each cell,
- Includes a sensitivity analysis, including for leachate heads across landfill cell liners and TDS cell liners, and
- Includes the use of site-specific data where available in any modelling or calculations and specifies and justifies any assumptions made and any subsequent uncertainties in the assessment.

Results from the LandSim model are summarised as follows:

- The LandSim model assumes that there are a small number of defects in the HDPE liner of the Class III cells that will further degrade over time, assuming that it will take 100 years for the number of defects to double and that degradation of the HDPE will begin after 150 years.
- Receptors have been selected to account for protective areas in down and cross hydraulic gradient directions of groundwater flow.
- Results indicating contaminant concentrations within groundwater at the designated receptors have been compared to selected groundwater criteria, including groundwater criteria outlined in the PFAS NEMP.
- The model demonstrates that landfill operations are unlikely to impact groundwater, with the exception of Chloride, which is expected to travel through groundwater and reach receptors in >3,000 years.
- The model is conservative as the retardation and biodegradation of contaminants has not been considered.

It is noted that the landfill is located within 1000 m of a surface water body. However, given the slow movement of contamination through the aquifer as demonstrated by the LandSim model, and the lined landfill design, it appears unlikely that any surrounding surface water receptors will be negatively impacted by landfill operations.

Landfill liner design is discussed in further detail in Section 2.4.2 below.

2.4.2 Suitability of landfill cell design

The licence holder is proposing to dispose of accepted PFAS contaminated wastes into the Class III cells at the premises. The Class III cells at the premises encompass cells 3, 4A, 4B, 5, 12, 6, 7 8, and 12A, which have been constructed with lined landfill bases and side walls incorporating leachate collection and extraction systems, leachate ponds, associated access roads, and associated stormwater managements systems both on and off the landfill cell forms. Putrescible landfill cells 1 and 2 have a clay lined base and will not accept PFAS contaminated waste.

Class III landfill cells currently operational at the premises are limited to cells 3, 4A, 4B, 6, 7, 8, 12, and 12A and as such, the licence holder is seeking approval for these cells to receive PFAS contaminated wastes. The construction and time limited operation of Cell 12A for waste burial was approved under works approval W6855/2023/1. Additionally, the licence holder has also requested that Cells 9 and 10 (Class III cells authorised for construction under works approval W6855/2023/1) which are yet to be constructed, are approved for future PFAS contaminated waste disposal. Construction quality assurance documentation submitted for constructed Class III cells has been reviewed by the department. The Class III cells have been constructed in line with Class III cell specifications and contain no known material defects. Cells 9 and 10 will be subject to the same construction quality assurance documentation submission and review requirements prior to being permitted to receive any waste (including PFAS contaminated wastes) for disposal.

Section 14 of the PFAS NEMP details the permanent disposal of PFAS-containing waste to landfill. Subsection 14.6 sets out the criteria which apply to the disposal of solid PFAS-contaminated materials to landfill. Landfill acceptance criteria for total concentration have been capped at 50 mg/kg total concentration. The table below (extracted from the PFAS NEMP) sets out the landfill acceptance criteria for various types of landfills. As a Class III composite geosynthetic/ HDPE lined landfill, the premises is suitable for the receipt of PFAS impacted soils or organic waste up to the ASLP leachable and Total concentration limits assigned for Clay/single composite lined landfills.

Table 2: Landfill acceptance criteria (derived from the PFAS NEMP)

Landfill type		**Interim landfill acceptance criteria** [a, b]		**Comments**
		Sum of PFOS + PFHxS[c]	**PFOA**	
Unlined	ASLP leachable concentration (µg/L)	0.07 µg/L	0.56 µg/L	Drinking water x 1 (Department of Health 2017)
	Total concentration (mg/kg)	20 mg/kg	50 mg/kg	Soil – Human health industrial/commercial × 1 Total concentration for PFOA (including related substances) of 50mg/ kg based on a proposed Basel Convention LPCL
Clay/single composite	ASLP leachable concentration (µg/L)	0.7 µg/L	5.6 µg/L	Drinking water x 10

Landfill type		Interim landfill acceptance criteria [a, b]		Comments
		Sum of PFOS + PFHxS[c]	PFOA	
lined				(Department of Health 2017)
	Total concentration (mg/kg)	50 mg/kg	50 mg/kg	Soil – Human health industrial/commercial × 10 Total concentration for PFOS + PFHxS and PFOA (including related substances) of 50mg/kg based on the Basel Convention's LPCLs
Double composite lined	ASLP leachable concentration (µg/L)	7 µg/L	56 µg/L	Drinking water x 100 (Department of Health 2017)
	Total concentration (mg/kg)	50 mg/kg	50 mg/kg	Soil – Human health industrial/commercial ×100 Total concentration for PFOS + PFHxS and PFOA (including related substances) of 50mg/ kg based on the Basel Convention's LPCLs
Note: Where the criteria refer to the sum of PFOS and PFHxS, this includes PFOS only, PFHxS only, and the sum of the two.				

a. **Waste concentrations must be less than both the relevant leachable concentration and the total concentration values for the type of landfill.**

b. **Where significant PFAS are present beyond PFOS, PFOA, and PFHxS, these solid PFAS contaminated materials may not be acceptable for landfill disposal. This should be discussed with the environmental regulator.**

c. **Where the criteria refer to the sum of PFOS and PFHxS, this means concentrations of PFOS only, PFHxS only, and the sum of the two, including their respective related compounds.**

The licence holder has confirmed that PFAS contaminated waste will only be accepted to the premises for disposal if the ASLP leachable and total concentration limits assigned for Clay/single composite lined landfills under the PFAS NEMP are met. Non-conforming loads of PFAS contaminated wastes will be rejected from the premises.

2.4.3 Suitability of leachate collection system and monitoring

Subsection 14.3 of the PFAS NEMP states that 'Leachate should be collected in a sump and pumped to a storage location (usually a suitably engineered/lined evaporation/storage pond or tank). Before treatment, disposal or reuse of the water, it should be analysed for PFAS'.

Leachate management at the premises entails the collection of leachate in the base of the landfill cells, where it is extracted via pumps and sent to HDPE lined leachate collection ponds. Construction quality assurance documentation submitted for Class III cells incorporated information surrounding the construction of associated leachate collection systems. The department has reviewed these documents and has confirmed that the Class III and associated leachate collection infrastructure have been constructed in line with Class III cell specifications and contain no known material defects.

The premises contains four leachate collection ponds for landfill leachate. Each pond is lined

within 1.5 mm HDPE and is designed to contain run off from a 1% AEP rainfall event. Construction quality assurance documentation submitted for the leachate ponds has been reviewed by the department, with the findings being that the leachate ponds have been constructed in a manner that will adequately contain leachate and contain no known material defects.

Leachate monitoring is undertaken at the premises, with the depth of leachate within the ponds monitored daily, the volume of leachate recovered from the landfill cells monitored weekly, and the leachate quality monitored 6 monthly. Leachate quality monitoring includes an extended suite of PFAS analytes.

Leachate quality monitoring results have been provided in the *2024 Groundwater Monitoring Report J-G-AU0010-001-P-Rev0 (Geocontam Risk Management Pty Ltd - 14 March 2025)* (Groundwater monitoring report) which was submitted to the department under annual reporting requirements for the premises conditioned within the Licence. The department has reviewed the leachate quality monitoring results for PFAS congeners to support this amendment, which are discussed in Section 2.5 below.

The licence holder is currently authorised to recirculate landfill leachate within the internal walls of the leachate ponds and within the active tipping face of the landfill cells, to assist with dust suppression, evaporation and the settlement of deposited wastes. The licence holder is not authorised for the use of landfill leachate outside of an engineered containment system.

2.4.4 Operational controls

Subsection 14.2 of the PFAS NEMP states that the following operation practices of the landfill should be reviewed and strengthened where necessary when considering landfill acceptance of PFAS contaminated wastes:

- waste acceptance, handling and placement – landfill operators should consider the appropriate handling of the material once accepted onto the landfill site, including leachate collection and management systems. If possible, consideration should be given to offloading PFAS contaminated material directly into the receiving landfill cell, where it can be moved and worked within the cells for final waste placement;
- waste cover – placement of daily cover over wastes is an essential part of landfilling operations; and
- dust controls – handling and placement of PFAS-contaminated material may require dust suppression measures.

The licence holder has advised that there is no proposed storage of PFAS contaminated waste at the premises, and any received PFAS contaminated wastes would be placed directly onto the active face of the landfill and covered as per existing licence requirements for Contaminated Solid Waste as outlined in existing licence conditions – ‘covered with a 150 mm covering of Inert Waste Type I or Clean Fill applied as soon as practicable and not later than the end of the working day that the waste was deposited’.

The licence holder has indicated that dust emissions will be managed as per existing controls in place as conditioned on the premises licence. These are detailed in Section 3.1.1 below. The licence holder has also submitted their Dust Management Plan in support of the application, with assurance that dust mitigation measures outlined in the Dust Management Plan will continue to be adhered to through PFAS waste acceptance to the premises.

The department has also considered results previous submitted within the *Dust Sampling and Analysis Monitoring Program 2022,* which was prepared in accordance with conditions 61 and 62 of the licence.

Results of the sampling and analysis undertaken indicated that particulate concentrations

recorded were typically influenced by particulate levels in the airshed rather than a site source close to the monitoring locations. The monitoring program also concluded that the composition of dust generated at the site does not pose a high risk if it were to leave the site and reach nearby sensitive receptors.

2.4.5 Closure and capping of Class III landfill cells

Subsection 14.5 of the PFAS NEMP states that closure of the landfill should consider ongoing containment strategies, including leachate management and maintenance of capping and groundwater management systems. Monitoring of landfill gas condensate should consider PFAS as some, such as fluorotelomer alcohols, are volatile.

Closure and capping of all landfill cells at the premises is due to occur within 12 months of achieving the final top of waste design profile. Class III landfill cells will be capped with synthetic liners, overlaid with a minimum 1.3 m thick soil growing medium to promote and sustain the development of a well-vegetated capped surface, and incorporate stormwater management. Capping requirements are conditioned within the current premises landfill for rehabilitation stages 2,3 and 5 (as depicted in the current licence) which reflect these requirements. It is intended that the same capping specifications will be required for the capping of all Class III landfill cells at the premises.

The landfill currently has an operational lifespan predicted to end in 2050. The premises will continue to be regulated under Part V of the EP Act during its operational life, with requirements for ongoing leachate management, groundwater monitoring, landfill gas monitoring and capping system maintenance. On closure of the premises, closure and remediation of the premises will be managed under a Closure Management Plan under the EP Act, and the *Contaminated Sites Act 2003.* Ongoing groundwater, leachate, landfill gas and cap maintenance monitoring will be a requirement post closure of the premises, with the required duration of post closure monitoring to be determined based on the ongoing risk to the environment at the time of closure.

The vacuum collection of landfill gas causes piped warm, moist gas from the interior of the landfill to encounter lower air temperatures, resulting in the condensation of water vapor to a liquid form or condensate. This landfill gas condensate then accumulates in the landfill gas collection and control system, along with true landfill leachate from the waste mass which also collects in gas wells.

Existing licence conditions 14 and 78 outline the respective landfill gas collection and management systems and landfill flare design and construction / installation requirements for the premises. Condition 14 requires that all captured condensate from the gas collection and management system is returned to the leachate ponds. In this regard, it is considered that all condensate potentially contaminated with PFAS will be removed from landfill gas infrastructure.

2.5 Groundwater monitoring data

Subsection 14.1 of the PFAS NEMP states that the performance of the landfill liner and leachate management systems should be considered regarding the suitability of existing landfills to receive PFAS contaminated wastes. To determine the suitability of these two systems, consideration will be given to historical groundwater monitoring data submissions and results for the premises, submitted to DWER under current licence annual reporting requirements.

The suitability of the groundwater monitoring bore network was reviewed through the assessment of works approval W6855/2024/1 for the premises, which authorises the construction of three additional landfill cells. Through this assessment, it was determined that additional monitoring bores were required to be installed to ensure potential emissions to groundwater from the operation of the new landfill cells would be reflected in groundwater monitoring results. The construction of five additional monitoring bores was therefore authorised under this works approval.

Bore construction has been completed with a well construction report having been submitted and reviewed by the department, confirming that all bores have been constructed in line with *ASTM D5092/D5092M-16: Standard practice for design and installation of groundwater monitoring bores.*

The licence holder has submitted their most recent groundwater monitoring results as a part of annual reporting requirements conditioned in the premises current licence. Monitoring results for PFAS congeners within the *2024 Annual Groundwater Monitoring Report J-G-AU0010-001-P-Rev0 (Geocontam Risk Management Pty Ltd - 14 March 2025)* (groundwater monitoring report) have been reviewed to support this application, noting that this report contains a comparison with 2023/2024 monitoring results against results from previous years. Results from the *Groundwater monitoring event at Cleanaway Banksia Waste Disposal Site 2024* and *Addendum groundwater monitoring event report for Cleanaway Banksia Waste Disposal Site* documents submitted in support of this application have also been considered.

Additionally, the groundwater monitoring report contains leachate quality monitoring results, which are also required to be submitted to the department under annual reporting requirements within the licence. The department has also reviewed the leachate quality monitoring results for PFAS congeners to support this amendment.

Groundwater monitoring results can be summarised as follows:

- PFAS congeners were reported above the Limit of Reporting (LOR) in a few superficial aquifer monitoring wells March and/or September 2024, being:
    - SE3S-R reported the sum of PFAS at a concentration of 0.16 µg/L in March.
    - SE4S-R reported the sum of PFAS at a concentration of 0.18 µg/L in March.
    - SE6S reported the sum of PFAS concentrations ranging from 0.11 µg/L (March) to 0.14 µg/L (September).
    - GW7S reported the sum of PFAS at a concentration of <1 µg/L, and.
    - GW13S reported the sum of PFAS at a concentration of 0.55 µg/L in September.
- The only Leederville aquifer monitoring well that reported PFAS congeners above the LOR was GW7DR (March 2024), which reported 6:2 FTS at a concentration of 0.14 µg/L.

Leachate quality monitoring results can be summarised as follows:

- Several PFAS analytes were reported above the Limit of Reporting (LOR) in the Primary Leachate Pond (PLP), Leachate Evaporation Pond 1 (LEP1) and Leachate Evaporation Pond 3 (LEP3) in March and September 2024, being;
    - PFOS concentrations across all three ponds ranged from 0.17 µg/L (LEP1, September) to <8 µg/L (raised LOR) (PLP, September) and exceeded the NPUG in the PLP;
    - PFOA concentrations across all three ponds ranged from 0.49 µg/L (LEP1, September) to 8.9 µg/L (LEP1, March) and exceeded the NPUG in all three ponds during one monitoring event;
    - PFHxS concentrations across all three ponds ranged from 0.39 µg/L (LEP1, September) to 14 µg/L (LEP1, March) and exceeded the NPUG in LEP1 in March 2024;
    - The sum of PFHxS and PFOS ranged from 0.56 µg/L (LEP1, September) to 14 µg/L (LEP1, March) and exceeded the NPUG in PLP, LEP1 and LEP3 during at least one monitoring event;
    - Sum of PFAS in PLP was reported at 79 µg/L (March) and 29.07 µg/L (September).

- Sum of PFAS in LEP1 was reported at 1029.9 µg/L (March) and 29.07 µg/L (September).
- Sum of PFAS in LEP2 was reported at 299 µg/L (March) and 44.53 µg/L (September).

Additionally, the following information (Table 3) is provided within the groundwater monitoring report, comparing guideline exceedances between the groundwater monitoring and leachate quality monitoring results.

Table 3: Comparison of PFAS exceeding assessment criteria - groundwater and leachate ponds

Analyte	Groundwater	Leachate ponds
PFOA	None	*Australian Drinking Water Guidelines (ADWG)* and *Non-Potable Use Guidelines (NPUG)*: PLP, LEP1 and LEP3
PFOS	None	*Australian Drinking Water Guidelines (ADWG)* and *Non-Potable Use Guidelines (NPUG)*: PLP
PFHxS	None	*Australian Drinking Water Guidelines (ADWG)* and *Non-Potable Use Guidelines (NPUG)*: LEP1
Sum of PFHxS and PFOS	None	*Australian Drinking Water Guidelines (ADWG)* and *Non-Potable Use Guidelines (NPUG)*: PLP, LEP1 and LEP3

Based on the above, the Delegated Officer has determined the following:

- PFAS congeners were identified in the leachate ponds (PLP, LEP1 and LEP3) with concentration sums above the ADWG and NPUG, however higher concentrations of PFAS within landfill leachate are expected given assumed and unintentional historical PFAS waste acceptance to landfill;
- Concentrations observed above the LOR in superficial aquifer monitoring wells were below the assessment criteria.
- PFAS congeners were only reported above the LOR in Leederville aquifer monitoring well GW7D-R in March 2024 but were below the assessment criteria.
- In consideration of the 2024 and groundwater and leachate pond analysis, compared with monitoring data from previous years, the minor assessment criteria exceedances are considered more likely to be representative of background conditions as opposed to representative of impacts from landfill leachate migration.
- There is insufficient evidence to suggest that the landfill operations have impacted the underlying groundwater aquifer.

Whilst the above summarises the findings of the results of PFAS congeners only, monitoring for other parameters has similar findings when considering concentrations of contaminants within leachate versus concentrations of contaminants within groundwater. These findings also support that at this stage, there is insufficient evidence to suggest that the landfill operations have impacted the underlying groundwater aquifer.

Based on the above findings, it appears the at the performance of the landfill liner and leachate management systems are suitable to prevent emissions and discharges from landfill operations impacting underlying groundwater.

2.6 Stormwater management infrastructure

Subsection 14.1 of the PFAS NEMP states that existing stormwater management controls should be reviewed regarding the suitability of existing landfills to receive PFAS contaminated wastes.

The licence holder was issued works approval W6745/2022/1 on 19 April 2023 to upgrade the existing stormwater management infrastructure at the premises. The upgrades were sought to facilitate the use of additional stormwater ponds, so that a freeboard of 0.5m in Stormwater Pond 2 would no longer need to be maintained. To inform the assessment of the works approval, the licence holder provided a stormwater management prepared by Golder, which concluded that the current site infrastructure was sufficient to contain stormwater resulting from a 1% AEP stormwater event. Whilst construction works for the new infrastructure are ongoing, the licence holder has demonstrated that the current infrastructure is sufficient when considering containment for run off from storm events.

Historical and existing landfill cells have been constructed so as to divert stormwater away from the tipping face to within dedicated drainage lines at the perimeter, where stormwater is discharged to Stormwater Ponds for reuse across the premises as a dust suppression measure. Construction quality assurance documentation submitted for Class III cells incorporated information surrounding the construction of associated stormwater drainage. The department has reviewed these documents and has confirmed that stormwater drainage around the landfill cells is sufficient to avoid contamination.

The licence holder has undertaken quarterly quality monitoring of the two Stormwater Ponds at the premises, with results submitted in the *2024 Annual Groundwater Monitoring Report J-G-AU0010-001-P-Rev0 (Geocontam Risk Management Pty Ltd - 14 March 2025)* (groundwater monitoring report). The department has reviewed the results of this monitoring for PFAS congeners to support this amendment application. The results indicate that a few PFAS congeners were reported above the LOR in both ponds in March and September 2024, however concentrations of all PFAS congeners were below all adopted assessment criteria.

When comparing results for PFAS congeners with results of other parameters tested for in stormwater, most contaminants were also below the LOR with exceedances of adopted assessment criteria (ANZG and NPUG) for Iron and Aluminium.

Results from stormwater monitoring indicate that the current infrastructure in place is sufficient to mitigate contamination resulting from landfill activities.

It is noted that a Licence amendment application will be required to authorise the ongoing use of the upgraded stormwater infrastructure at the premises once construction works are completed and the time limited operations period authorised on the works approval expires.

2.7 Part IV of the EP Act

Ministerial Statement 1213 was made in relation to the premises on 21 November 2023. The statement appertains the construction and operation of landfill cells 9, 10, and 12A and associated infrastructure at the premises. This statement is not applicable to the acceptance of PFAS contaminated wastes proposed under the current amendment application.

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk assessments* (DWER 2020).

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.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathways during premises operation which have been considered in this Amendment Report are detailed in Table 4 below. Table 4 also details the proposed control measures the licence holder has proposed to assist in controlling these emissions, where necessary.

Table 4: Licence holder controls.

Emission	Sources	Potential pathways	Proposed controls
Landfill leachate containing PFAS	Receipt and disposal of PFAS contaminated organic materials and soils in line with PFAS NEMP version 3.0	Infiltration to groundwater, and extraction by surrounding groundwater users.	Existing landfill cell containment and leachate management systems. The landfill cells have been designed with a separation distance to groundwater of approximately 20 m. The licence holder's groundwater monitoring regime continues to monitor the depth to groundwater and potential impacts to groundwater during operations. The primary landfill leachate pond and landfill leachate evaporation ponds 1, 2, and 3 are constructed and maintained in accordance with the below licence requirements: • 1.5mm HDPE lined to achieve a permeability of at least <1x10-9 m/s or equivalent, • Designed to contain leachate and stormwater produced as a result of a 1% AEP rainfall event • Leachate ponds 1, 2 and 3 must have a total storage capacity of at least 8,500 kL, and • A freeboard of 500 mm must be maintained on all ponds at all times. The existing groundwater monitoring network and monitoring regime facilitates the identification of any loss of containment from waste cells, and the potential to intersect and remediate contaminated groundwater plumes.
	Spray drift of recirculated landfill leachate contaminated with PFAS when used for dust suppression	Air/windborne pathway causing impacts to health and amenity	Landfill leachate will only be recirculated via spray onto the internal walls of the leachate ponds and the active tipping area of the active landfill cell, as permitted under the existing licence. Recirculation of leachate for the leachate ponds must not result in discharge beyond the pond embankment liners, as permitted under the existing licence. Landfill leachate is therefore only used for dust suppression on areas of the premises which contain liner systems suitable for the containment of PFAS contaminated wastes, which include the Class III landfill cells at the premises and the leachate ponds.

Emission	Sources	Potential pathways	Proposed controls
Dust	Handling and deposition of PFAS contaminated wastes	Air/windborne pathway causing impacts to health and amenity	Existing landfill cell dust management measures as required under the existing licence conditions. Specifically: • The use of stormwater and leachate as dust suppression (leachate restricted use); • ensuring waste is levelled and compacted as soon as practicable after it is discharged and at a minimum by the end of the working day; • the undertaking of targeted wetting down of Dusty Wastes during disposal and burial at the active tipping area during operational hours; The licence holder has submitted their Dust Management plan in support of the application, which will be adhered to during landfilling activities.
Landfill fire	Smoke arising from PFAS contaminated wastes	Air/windborne pathway and deposition to surrounding properties.	Landfill fires will be managed at the premises through existing controls in place, including: • Maintaining an operational and full water cart with a storage capacity of at least 15 kL on the premises, • Maintaining a minimum of 50 kL of water within Stormwater Pond 1 and Stormwater Pond 2 (combined) which can be used for firefighting, and • Maintaining a supply of cover material and applying that cover to the active tipping area to a minimum depth of 150 mm, in the event that a fire within the Dardanup Conservation Park and/or Boyanup State Forest presents a material risk to the premises. Existing controls in place at the premises have been informed through a review of the premises Emergency Management Plan, which includes fire / hotspot response protocols adopted at the premises. This review was undertaken under a previous amendment application assessment. It is noted that a new Fire Management Plan will be submitted to DWER by 31 July 2025, and implemented at the premises on submission. The requirements for inclusion in the Fire Management Plan are outlined in Condition 42 and, when implemented, will ensure a higher degree of regulatory control is in place to mitigate fire risk.

Emission	Sources	Potential pathways	Proposed controls
Potentially contaminated stormwater	Potentially contaminated stormwater arising from contact with PFAS contaminated wastes	Infiltration to groundwater, and extraction by surrounding groundwater users.	Contaminated stormwater will be managed through the existing stormwater management infrastructure at the premises. The current site infrastructure is sufficient to contain stormwater resulting from a 1% AEP stormwater event. Stormwater infrastructure is also currently being upgraded to increase retention capacity within stormwater ponds under works approval W6745/2022/1.
Landfill gas	Decomposition of PFAS contaminated wastes within landfill cells	Air/windborne pathway and deposition to surrounding properties	Landfill gas management infrastructure, including landfill gas extraction wells and landfill gas management system (flare) are already in place at the premises for capped cells. Progressive installation of the landfill gas management system as the landfill develops. All captured condensate from the gas collection and management system is returned to the leachate ponds.

3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020), the Delegated Officer has excluded employees, visitors and contractors of the licence holders from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 5 below provides a summary of potential human and environmental receptors that may be impacted because of activities upon or emission and discharges from the prescribed premises *(Guideline: Environmental siting* (DWER 2020)).

Table 5: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Residential Premises	• 0.54 km south of the southwest corner of the premises, separated by the Dardanup Conservation Park. • 0.92 km due west of the premises. • 1 km west southwest of the southwest corner of the premises. • 1.2 km southwest of the southwest corner of the premises. • 1.5 km due south of the premises, separated by the Dardanup Conservation Park and Boyanup State Forest. • 1.5 km northwest of the northwest corner of the premises. • 1.5 km northeast of the northeast corner of the premises, separated by the Dardanup Conservation Park and Boyanup State Forest. • 1.75 km east northeast from the eastern boundary of the premises separated by the Dardanup Conservation Park and Boyanup State Forest.

Dardanup Aeromodellers Society, 270 Panizza Rd, Crooked Brook	Approximately 1.3 km north of northern premises boundary.
Environmental receptors	**Distance from prescribed activity**
Dardanup Conservation Park	Adjacent to southern and eastern boundaries of the premises
Boyanup State Forest	Approximately 0.7 km south, and 1 km east of the premises.
Priority Ecological Community (PEC) – Dardanup Jarrah and Mountain Marri woodland on laterite (P1)	Three occurrences of this PEC occur within the Dardanup Conservation Park. The closest occurrence is mapped within 15 m of the premises eastern boundary
Priority Ecological Community/Threatened Ecological Community (TEC) – Banksia Dominated Woodlands of the Swan Coastal Plain	An occurrence of this PEC/TEC is mapped adjacent to the southern boundary of the premises, and to the west of the premises on the opposite side of Banksia Road.
Geomorphic wetland: Multiple use Palusplain and Dampland (flat, seasonally waterlogged)	Approximately 400 m southwest through to the northwest of the premises boundary.
Crooked Brook (significant stream)	Located approximately 1100 m south/southwest of the premises boundary flowing in a generally east/west direction. Crooked Brook flows into Preston River approximately 5km downstream.
Preston River	Approximately 5 km west of the premises. Groundwater from the superficial aquifer discharges into the Preston River.
Groundwater	It is understood that the superficial aquifer is present within the Yoganup geological formation between 20 m to 30 m below ground level. It is also possible that further isolated perched aquifers occur under the premises 15 – 20 m below ground level. The permanent, confined Leederville aquifer has been encountered at the site between 35 mbgl and 40 mbgl Groundwater flows in a northwest direction.
Beneficial users of groundwater	Approximately 41 bores are located within 3 km of the premises. Water abstracted from these bores are used for such purposes as: • Stock watering. • Dairy purposes. • Irrigation of pasture. • Domestic use.

Dardanup Water Reserve	The Priority 1 groundwater protection zone for Dardanup Water Reserve is located approximately 2.5 km northwest of the premises.
Priority Flora	• Priority 3 flora species – adjacent to the southeast corner of the premises and approximately 180 m south of the premises. • Priority 4 flora species - approximately 160 m east of the premises.
Fauna - Baudin's black cockatoo (*Zanda baudinii*), Carnaby's black cockatoo (*Zanda latirostris*) and the forest red-tailed black-cockatoo (*Calyptorhynchus banksii naso*)	The remaining vegetation on the eastern side of the premises contains areas of potential black cockatoo breeding habitat as well as foraging and roosting habitat

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for those emission sources which are proposed to change and considers potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the licence holder has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the licence holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the licence holders' controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 6.

The revised licence L8904/2015/1 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises i.e. Class II or III putrescible landfill site.

The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 6. Risk assessment of potential emissions and discharges from the premises during operation.

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence holder's controls sufficient?	Conditions[2] of licence	Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence holder's controls**				
PFAS contaminated waste acceptance and disposal to landfill	Seepage of landfill leachate from landfill cells or leachate ponds	**Pathway:** Infiltration to groundwater, and extraction by surrounding groundwater users. **Impact:** Human health	Groundwater underlying the premises Residential Premises	Refer to Section 3.1	C = Severe L = Rare **High Risk**	Y	Conditions 1, 5, 6, 10, 12, 19, 51, 53, 54, 55, 58, 63, 71 and 72	Refer to Section 3.5
	Spray drift of recirculated landfill leachate	**Pathway:** Air/windborne pathway and deposition to surrounding properties. **Impact:** Human health	Residential Premises	Refer to Section 3.1	C = Major L = Rare **Medium Risk**	Y	Condition 13 **Condition 13**	The Delegated Officer considers that the use of PFAS contaminated leachate for dust suppression only within areas of the premises which are adequately constructed to contain PFAS contaminated wastes (i.e. Class III landfill cells and leachate ponds) is appropriate. However, there is still potential for spray drift to migrate in the event that leachate recirculation for dust suppression is undertaken during adverse weather. The Delegated Officer has therefore amended Condition 13 within the Licence to restrict the use of leachate as dust suppression on the active tipping area of the landfill during winds predicted to be above 63 km/h. This is consistent with the Bureau of Meteorology's definition of 'damaging winds'. The licence holder will still be permitted to use stormwater for dust suppression at these times, to prevent dust lift-off from the active tipping face of the landfill.

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence holder's controls sufficient?	Conditions[2] of licence	Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence holder's controls**				
	Dust	**Pathway:** Air/windborne pathway and deposition to surrounding properties. **Impact:** Human health	Residential Premises	Refer to Section 3.1	C = Possible L = Slight **Low Risk**	Y	Conditions 13, 19, 25 and 26	N/A The Delegated Officer considers that the current controls in place at the premises are sufficient to manage dust emissions. It is noted that the dust emission profile for the premises will not increase, as no increase to waste acceptance volumes is being sought under this amendment application. Outcomes of historical monitoring undertaken through the *Dust Sampling and Analysis Monitoring Program 2022* are still considered relevant to inform this assessment, as no increase to the dust emission profile for the premises will occur as a result of PFAS waste acceptance.
	Landfill fire – smoke	**Pathway:** Air/windborne pathway and deposition to surrounding properties. **Impact:** Human health	Residential Premises	Refer to Section 3.1	C = Major L = Rare **Medium Risk**	Y	Conditions 41, 42, 43, 44, and 74	N/A Existing controls in place at the premises are sufficient to minimise the likelihood of landfill fires occurring, and mitigate emissions and discharges resulting from landfill fires should they occur. Conditions have been informed through a review of the premises Emergency Management Plan, which includes fire / hotspot response protocols adopted at the premises. This review was undertaken under a previous amendment application assessment. It is noted that a new Fire Management Plan will be submitted to DWER by 31 July 2025, and implemented at the premises upon submission.

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence holder's controls sufficient?	Conditions[2] of licence	Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence holder's controls**				
								The requirements for inclusion in the Fire Management Plan are outlined in Condition 42 and, when implemented, will ensure a higher degree of regulatory control is in place to mitigate fire risk.
	Potentially contaminated stormwater	**Pathway:** Infiltration to groundwater, and extraction by surrounding groundwater users. **Impact:** Human health	Groundwater underlying the premises Residential Premises	Refer to Section 3.1	C = Minor L = Medium **Medium Risk**	Y	Conditions 12, 16, 35 and 36 Conditions within Works approval W6745/2022/1	N/A Current controls in place at the premises for stormwater management are sufficient to ensure emissions and discharges from contaminated stormwater are mitigated. A review of groundwater monitoring data and stormwater quality monitoring data has confirmed that stormwater is unaffected by landfilling activities at the premises.
	Landfill gas	**Pathway:** Air/windborne pathway and deposition to surrounding properties. **Impact:** Human health	Residential Premises	Refer to Section 3.1	C =Low L = Possible **Low Risk**	Y	Conditions 14, 15, 59, 60, 71, 78 and 79.	N/A Current controls in place at the premises for landfill gas are sufficient to mitigate emissions and discharges to the environment. Existing controls ensuing condensate from the gas collection and management system is returned to the leachate ponds ensures that condensate potentially contaminated with PFAS is returned to infrastructure at the premises designed to prevent seepage of PFAS contaminated waste to the environment. The PFAS NEMP states that 'Research is underway to determine effective ways to characterise and quantify PFAS in landfill gas and emissions'. The Delegated Officer will consider any

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence holder's controls sufficient?	Conditions[2] of licence	Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence holder's controls**				
								future revisions to the PFAS NEMP relating to the monitoring of PFAS within landfill gas for future inclusion on the licence, when a greater understanding of the potential of PFAS within landfill gas / the monitoring of PFAS within air emissions is available to the scientific community.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk assessments* (DWER 2020).

Note 2: Proposed licence holder's controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

3.3 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 14 below.

Table 7: 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 15 below.

Table 8: 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 *Guideline: 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.

3.4 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment table 16 below:

Table 9: 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.

3.5 Risk assessment – Leachate

3.5.1 Leachate characterisation and impact

Landfill leachate is formed from the decomposition of accepted wastes, infiltration of water through the landfill cells, and the moisture content of the buried waste. Leachate generated from a putrescible landfill may contain dissolved and decomposing organic matter, inorganic compounds (such as sulfates, chloride, and ammonium salts), nutrients, hydrocarbons, metals and metalloids, pesticides, synthetic organic compounds, and other miscellaneous contaminants including PFAS.

The quantity and quality of leachate will be influenced by the waste types, management of waste within the landfill cells, the integrity of landfill liners, the management of leachate head on the landfill liners, any recirculation and reinjection of leachate into the waste mass, the control of stormwater, and ambient meteorological conditions.

The Delegated Officer considers the receptors most likely to be at risk from PFAS contaminated leachate are groundwater users and groundwater dependent ecosystems. Leachate seepage to groundwater from the landfill cells (closed and active) and/or the leachate ponds may arise if defects occur during placement and/or over time in the operation of the cell or leachate management system, including leachate storage ponds. Landfill liner systems cannot be made completely impermeable, and all liners will therefore experience a certain level of leachate seepage over their operational life. The failure to manage leachate levels within the landfill cell can impact the rate of seepage through the liner system. Leachate emissions may also occur because of overtopping of leachate storage infrastructure, or failure of leachate conveyance infrastructure. Leachate emissions may also result from fire damage to lining systems and firefighting washwater infiltration and liner system failure, which may occur as a result of basal or side slope instability, seismic activity, poor installation and construction practices, poor waste placement practices, or other activities that compromise the structural integrity of the landfill subbase.

3.5.2 Criteria for assessment

The guidelines which are considered appropriate for the known and potential beneficial uses of groundwater in the vicinity of the premises include:

- Australian Drinking Water Guidelines (ADWG) – NHMRC and NRMMC 2011 on the basis that the Leederville aquifer serves as the primary domestic water supply for the Dardanup area,
- Long-term Irrigation Water Guidelines (LTIG) and Stock Water Guidelines (SWG) - ANZECC and ARMCANZ 2000. The land use to the west of the site is predominantly agricultural, including crop and livestock farming. The presence of elevated water storage tanks and windmills indicate that groundwater is abstracted by landowners for livestock water and irrigation purposes,
- Non-potable Groundwater Use Guidelines (NPUG) - DoH 2014. Abstracted groundwater from surrounding land users may also potentially be used for non-potable use, and
- PFAS National Environmental Management Plan 3.0 (2025). Applicable for the assessment of human health and ecological risks associated with PFAS compounds.

3.5.3 Licence Holder controls

The licence holder has indicated that the following controls will be in place at the premises to prevent emissions of leachate.

Table 10: Licence holder controls - leachate

Emission	Sources	Potential pathways	Proposed controls
Landfill leachate containing PFAS	Receipt and disposal of PFAS contaminated organic materials and soils in line with PFAS NEMP version 3.0	Infiltration to groundwater, and extraction by surrounding groundwater users.	Existing landfill cell containment and leachate management systems. The landfill cells have been designed with a separation distance to groundwater of approximately 20 m. The licence holder's groundwater monitoring regime continues to monitor depth to groundwater and potential impacts to groundwater during operations. The primary landfill leachate pond and landfill leachate evaporation ponds 1, 2, and 3 are constructed and maintained in accordance with the below licence requirements: • 1.5mm HDPE lined to achieve a permeability of at least <1x10-9 m/s or equivalent, • Designed to contain leachate and stormwater produced as a result of a 1% AEP rainfall event • Leachate ponds 1, 2 and 3 must have a total storage capacity of at least 8,500 kL, and • A freeboard of 500 mm must be maintained on all ponds at all times. The existing groundwater monitoring network and monitoring regime facilitates the identification of any loss of containment from waste cells, and the potential to intersect and remediate contaminated groundwater plumes.

3.5.4 Suitability of landfill siting

The Delegated Officer has considered the guidance outlined in Subsection 14.6 6 of the PFAS NEMP against the findings of the LandSim model submitted by the licence holder in support of this application, as outlined in Table 11 below.

Table 11: Suitability of landfill siting in line with the PFAS NEMP

Siting requirement as outlined in the PFAS NEMP	Demonstration of consideration to siting requirement
The landfill is not located on a vulnerable groundwater system (see Australian Government (2013) and Appleyard (1993))	The Delegated Officer has reviewed documentation provided within the LandSim model and the *Banksia Road Waste Facility, Crooked Brook WA, Hydrogeologic Risk Assessment and Groundwater Monitoring Program Review (March 2021.)* which indicate that the premises is not located on a vulnerable groundwater system.
Depending on the landfill liner design, whether the landfill is located within 1000 m of a surface water body that supports an aquatic environment, or within 1000m of a surface water drain that is connected to groundwater and/or discharges directly into an aquatic environment, or a water body that supports fish or other fauna species that may be caught and consumed	The landfill is not located within 1000 m of a relevant surface water body or drain. Additionally, the LandSim model has demonstrated that any contamination present within the aquifer will be extremely slow moving (>3000 years before contamination will reach the premises boundary). This is under the assumption that landfill liners will begin to degrade within 150 years. The model is also considered to be highly conservative as the retardation and biodegradation of contaminants has not been considered. The Delegated Officer therefore considers that it is unlikely that unlikely that any surrounding surface water receptors will be negatively impacted by landfill operations, especially considering the Class III cell liner system currently in place at the premises.

With regards to Table 11, the Delegated Officer considers that, in line with guidance outlined in the PFAS NEMP, the landfill cells at the premises are appropriately sited for the receival for PFAS contaminated wastes.

3.5.5 Suitability of infrastructure

The Delegated Officer notes that there are no minimum standards relating to landfill construction for PFAS waste acceptance to landfill outlined in the PFAS NEMP. Instead, the PFAS NEMP outlines landfill acceptance criteria, with PFAS limits associated with different landfill types.

The licence holder has indicated that PFAS contaminated wastes will only be accepted into existing and future Class III landfill cells at the premises, with acceptance to future cells contingent on the department's review and approval of relative construction and quality assurance documentation relevant for each new landfill cell. Class III landfill cells are the equivalent of 'clay/single composite lined' cells as outlined in the PFAS NEMP.

The Delegated Officer considers the following:

- DWER's review of construction quality assurance documentation for existing Class III cells at the premises demonstrates that these cells have been constructed as per relevant specifications and with no known material defects.

- DWER's review of construction quality assurance documentation for leachate collection infrastructure within the Class III cells, and the leachate ponds at the premises demonstrate that all infrastructure has been constructed as per relevant specifications and with no known material defects.
- The licence holder is proposing to accept PFAS contaminated wastes which do not exceed the landfill acceptance criteria limits for Class III landfill cells as outlined in the PFAS NEMP.
- Subsection 14.3 of the PFAS NEMP states that 'Leachate should be collected in a sump and pumped to a storage location (usually a suitably engineered/lined evaporation/storage pond or tank).' This is the methodology in place within Class III cells at the premises for leachate management.

Based on the above, the Delegated Officer considers that the Class III landfill cells at the premises, including associated leachate collection infrastructure and the leachate ponds, have been constructed to be able to adequately contain PFAS contaminated wastes accepted with concentrations of PFAS below the landfill acceptance criteria limits for a clay/single composite lined cell, as specified within the PFAS NEMP.

3.5.6 Groundwater monitoring results

The Delegated Officer notes that subsection 14.1 of the PFAS NEMP states that the performance of the landfill liner and leachate management systems should be considered regarding the suitability of existing landfills to receive PFAS contaminated wastes, and that historic groundwater monitoring results will provide the necessary information to inform this consideration.

The Delegated Officer has undertaken a review of historical groundwater monitoring data submitted by the licence holder for the premises and considers the following:

- The groundwater monitoring bore network was reviewed and upgraded under works approval W6855/2024/1 for the premises, which authorises the construction of three additional landfill cells. Construction quality assurance documentation submitted for the new bores indicates they have been constructed as required by the necessary specifications. The current groundwater bore network is sufficient for ongoing monitoring of potential contamination at the premises, including PFAS.
- Whilst some PFAS congeners were reported above the LOR in a few superficial aquifer monitoring wells for March and/or September 2024, and one Leederville aquifer monitoring well reported PFAS congeners above the LOR in March 2024, no assessment criteria were exceeded for any monitoring events for PFAS.
- Minor assessment criteria exceedances are seen across the monitoring bore network for other measured parameters. However, no exceedances appear to be significant and reflective of increasing trends.
- Exceedances with the LOR and assessment criteria were observed much more frequently within leachate monitoring results compared to groundwater monitoring results for PFAS, which is consistent with results for other measured parameters.
- When compared across historical data, the minor assessment criteria exceedances are considered more likely to be representative of background conditions as opposed to representative of impacts from landfill leachate migration.

Based on the above, the Delegated Officer considers that results from groundwater and leachate monitoring data indicate that there is insufficient evidence to suggest that the landfill operations have impacted the underlying groundwater aquifer.

As there is no demonstration that the aquifer has been impacted by landfilling operation, the Delegated Officer can assume that the performance of the landfill liner and leachate management systems are suitable to prevent emissions and discharges from landfill operations impacting underlying groundwater, including the acceptance of PFAS contaminated wastes.

3.5.7 Consequence

If the seepage of landfill leachate contaminated with PFAS to groundwater occurs, then the Delegated Officer has determined that the impact of PFAS contamination to groundwater, and subsequently down gradient users of groundwater will be significant to human health and environmental values. Therefore, the Delegated Officer considers the consequence of leachate emissions to be **Severe.**

3.5.8 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of seepage of landfill leachate contaminated with PFAS to groundwater occurring will only occur in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood of leachate emissions to be **Rare**.

3.5.9 Overall rating of leachate

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 10) and determined that the overall rating for the risk of leachate emissions is **High** and therefore acceptance subject to regulatory controls.

3.6 Licence controls

The following controls will be in place on the revised licence for the premises to ensure emissions and discharges arising from the acceptance of PFAS contaminated wastes will be adequately mitigated.

3.6.1 Leachate

Condition 1 sets out the landfill acceptance criteria for Special Waste Type 3.

Condition 5 sets out the waste processing specifications for Special Waste Type 3.

Condition 6 limits the excavation of landfilled waste.

Condition 10 sets out infrastructure specifications for the Class III landfill cells.

Condition 12 sets out infrastructure specifications for the leachate containment infrastructure.

Condition 19 sets out Special Waste Type 3 cover requirements.

Condition 51 defines input and output monitoring requirements.

Condition 53 defines leachate management system monitoring requirements.

Condition 54 defines leachate quality monitoring requirements.

Condition 54 defines leachate head monitoring requirements.

Condition 58 requires the implementation of the Leachate Plan required by Condition 57.

Condition 63 defines groundwater monitoring requirements.

Condition 71 defines annual reporting requirements.

Condition 72 outlines groundwater monitoring reporting requirements.

3.6.2 Spray drift

Condition 13 sets limits for the use of leachate for dust suppression.

3.6.3 Dust

Condition 13 authorises the use of leachate for dust suppression.

Condition 19 sets out Special Waste Type 3 cover requirements.

Condition 25 sets out dust mitigation measures for the active tipping area of the landfill.

Condition 26 sets out specifications for Dusty Wastes disposal to mitigate dust emissions.

3.6.4 Landfill fire

Condition 41 sets out fire control measures to be implemented at the premises.

Condition 42 requires the preparation and submission of an updated fire management plan for the premises.

Condition 43 requires the implementation of the fire management plan required by Condition 42.

Condition 44 requires that the fire management plan is tested annually.

Condition 74 sets out fire reporting requirements in the event of a fire.

3.6.5 Potentially contaminated stormwater

Condition 12 sets out infrastructure specifications for the leachate containment infrastructure.

Condition 16 sets out infrastructure specifications for stormwater management infrastructure.

Condition 35 defines stormwater management system requirements.

Condition 36 requires the inspection of a boundary drain.

Conditions within works approval W6745/2022/1 outline construction and time limited operations specifications for new stormwater management infrastructure.

3.6.6 Landfill gas

Condition 14 sets out infrastructure specifications for landfill gas collection and management infrastructure.

Condition 15 sets out landfill gas infrastructure installation specifications.

Condition 59 defines landfill gas monitoring requirements.

Condition 60 defines landfill gas collection trigger levels.

Condition 71 defines annual reporting requirements.

Condition 78 sets out landfill gas flare station construction specifications.

Condition 79 requires the submission of an Environmental Compliance Report on completion of landfill gas flare station construction.

4. Consultation

Table 12 provides a summary of the consultation undertaken by the department.

Table 12: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website (7 March 2025)	40 public submissions were received in relation to the amendment application between 7 March 2025 and the advertising closing date of 3 April 2025. Comments within public submissions have been summarised into relating themes and addressed by the department in Appendix 1.	Refer to Appendix 1
	The Bunbury Harvey Regional Council (BHRC) submitted comment in support of the application on 28 March 2025 and outlined that: • This support recognises a responsible management solution to the ongoing presence of these chemicals in industrial, residential and ultimately waste materials. • Without appropriate solutions, there is a higher risk that these materials will not be disposed of effectively and the general impact of environmental contamination increases. • There are limited facilities licenced to accept this material and are in metropolitan locations, making responsible handling in more remote areas challenging. Access to appropriate disposal options will continue to be challenging unless responsible long-term management of this material is undertaken. A regional facility with appropriate infrastructure and management plans with capacity for ongoing operation means treating PFAS materials can be safer and more transparent.	The Department notes BHRC's support of the application.
Shire of Dardanup advised of proposal (7 March 2025)	The Shire of Dardanup submitted a formal objection to the application on 2 April 2024. The formal objection contained a peer review of the licence holders supporting documentation conducted by MBS Environmental. The Shire of Dardanup's justification for objection, with consideration to comments from within the MBS Environmental peer review, are provided and addressed by the department in Appendix 1.	Refer to Appendix 1
Dardanup Environmental Action Group (DEAG) advised of proposal (7 March 2025)	DEAG submitted a formal objection to the application on 3 April 2025. Comments within DEAG's submission have been summarised and addressed by the department in Appendix 1.	Refer to Appendix 1

Consultation method	Comments received	Department response
Licence holder was provided with draft amendment on 11 April 2025	The licence holder responded on 14 April 2025 clarifying an information request on the active cells in the amendment report.	The Delegated Officer has updated the amendment report confirming the current active cells.

5. Conclusion

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

5.1 Summary of amendments

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

Table 13: Summary of licence amendments.

Condition no.	Proposed amendments
Premises details	Incorrect reference to premises being defined by coordinates provided in Schedule 2 corrected to “As defined by the premises map provided in Schedule 1”
1, Table 1	Special Waste Type 3 inserted into Table 1: Types of solid waste authorised to be accepted onto the premises.
5, Table 4	Special Waste Type 3 inserted into Table 4 along with specific process limits/specification
19, Table 12	Special Waste Type 3 inserted alongside Special Waste types 1 and 2 in row 2.
Condition numbering 62 - 95 (90)	Formatting and condition number error corrected.
Table 28	Definition of Special Waste Type 3 inserted.
Appendix 4	Landfill acceptance criteria for Special Waste Type 3 provided

References

1. Department of Environment Regulation (DER), 2015. *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Health, Western Australia (DoH), 2014. *Non-potable Groundwater Use Guidelines (NPUG).*
3. Department of Water and Environmental Regulation (DWER), 2020. *Guideline: Environmental Siting*, Perth, Western Australia.
4. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
5. Heads of EPA Australia and New Zealand (HEPA), 2025. *PFAS National Environmental Management Plan 3.0.*
6. National Health and Medical Research Council, National Resource Management Ministerial Council (NHMRC, NRMMC), 2011. *Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy.* National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

Appendix 1: Summary of comments on amendment application provided through public consultation period

Comment number	Summary of submission	Department's response
Public submissions		
1.	Concerns surrounding the proximity of the premises to the Dardanup town site.	The proximity of landfill facilitates to town sites are a planning concern and as such, this matter falls outside of DWER's regulatory scope. The Delegated Officer has considered the suitability of the siting of the premises to sensitive receptors in DWER's risk assessment, as outlined in Section 3 of this Amendment Report.
2.	Concerns relating to the location of the premises over the groundwater aquifer.	The Delegated Officer has considered the LandSim model, the adequacy of existing premises infrastructure, and historical groundwater monitoring data in undertaking the risk assessment as outlined in Section 3 of this Amendment Report. When compared to the siting considerations outlined in the PFAS NEMP, the Delegated Officer considers that the risk to the aquifer can be adequately mitigated through existing controls in place at the premises.
3.	Concerns with past non-compliance with licence conditions by the licence holder.	Past non-compliances with licence conditions have been considered by the Delegated Officer when these non-compliances have occurred. Where relevant, this has resulted in the imposition of additional regulatory controls to those licence to mitigated potential emissions resulting from non-compliances. DWER's Assurance branch has seen a notable increase in compliance with regulatory controls at the premises over the past 5 years.

Comment number	Summary of submission	Department's response
4.	Concerns with the duration of landfill cell liner integrity.	The Delegated Officer has considered the LandSim model in undertaking the risk assessment as outlined in Section 3 of this Amendment Report. The LandSim model uses the assumption that landfill cell liners will being to degrade in 150 years and concludes that contamination will not reach the premises boundary from the landfill cells for >3000 years. Additionally, this model is conservative as retardation and biodegradation of contaminants has not been considered. The use of HDPE liner systems with leachate collection incorporated is considered best practice landfill design.
5.	Concerns with the duration of the operational life of the landfill facility.	The licence for the premises will be in effect for the entirety of its operational life. On closure, ongoing management of the facility will be undertaken under a closure notice (Part V of the EP Act) and under obligations outlined through the *Contaminated Sites Act 2003.*
6.	Concerns that the operator of the landfill is not trustworthy.	Refer to the Delegated Officer's response to comment Number 3.
7.	Concerns with the safety of the acceptance of PFAS contaminated wastes to the premises.	The Delegated Officer considers that the proposed acceptance and burial of PFAS impacted waste is in accordance with the specifications outlined in the PFAS NEMP. Risks to sensitive receptors have been considered in DWER's risk assessment, as outlined in Section 3 of this Amendment Report.
8.	There are other landfills that can accept PFAS contaminated wastes north of Crooked Brook (being the Millar Road Landfill facility and the Red Hill Waste Management Facility).	The application received pertains to the receipt and burial of PFAS impacted waste at the premises. DWER does not impose restrictions on where PFAS impacted wastes are buried. Each application is independently risk assessed based on location, proximity to receptors, potential pathways and proposed or practicable emissions controls.

Comment number	Summary of submission	Department's response
9.	There has been no mandate given by State or Federal Governments for all PFAS contaminated materials to be retrieved and stored in such facilities – therefore there is no predicted increase for such materials to be stored in Western Australia – therefore the existing sites adequately can provide for PFAS contaminated materials.	DWER does not consider another existing site capacity to accept a waste type in its risk assessment for other premises. The application has been assessed on its own merit, as DWER does not limit the activities that a licence holder can seek authorisation for.
10.	The need for the PFAS contaminated material currently stored on a neighbouring premises to be disposed of to landfill is not a sufficient reason of convenience to approve a further licence for such storage of PFAS contaminated materials in another landfill.	DWER does not consider logistical or commercial aspects in its risk assessments. The application has been assessed on its own merit and does not consider the provenance of the PFAS impacted waste.
11.	Concerns that the premises is unsightly.	The impact of a premises on the visual amenity of the community is outside of DWER's regulatory scope. Land use and zoning is a local government planning matter. Further, this is an existing premises, and the application relates solely to the receipt of an additional waste type for burial onsite within existing landfill cells.
12.	Concerns with revegetation works currently undertaken on existing capped landfill cells.	Capping of existing closed landfill cells falls outside of the scope of this amendment.
13.	Concerns that the acceptance of PFAS contaminated materials will create additional dust emissions.	There is no increase to waste acceptance volumes sought under this amendment application. As such, the Delegated Officer considers that the dust emission profile from the premises will not change because of this amendment. Dust has been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report.
14.	Concerns with PFAS contamination within dust.	Dust has been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report.
15.	Concerns with impacts of PFAS contamination to the aquifer.	Refer to the Delegated Officer's response to comment Number 2.

Comment number	Summary of submission	Department's response
16.	Concerns with impacts of PFAS contamination to users of groundwater and groundwater bores - neighbours to the Cleanaway facility on Banksia Rd rely on underground water for themselves, their stock, and their vegetable gardens.	The risk to users of groundwater has been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report. It should be noted that the Department of Health has issued guidance on the use of domestic bore water and advises that 'Testing by an accredited laboratory is required to confirm the quality of the water, which may require treatment, depending on the intended use'. A Standard Drinking Water Test should be undertaken by a NATA-accredited laboratory on bore water supplies to determine suitable uses.
17.	Concerns that the landfill liner systems are not adequate to contain PFAS contaminated wastes.	The licence holder is proposing to accept PFAS contaminated wastes which do not exceed the landfill acceptance criteria limits for Class III landfill cells as outlined in the PFAS NEMP. The suitability of the landfill liner system for the acceptance of PFAS contaminated waste has been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report.
18.	Concerns with the impacts of PFAS contamination to human health.	The risk of PFAS to human health has been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report.

Comment number	Summary of submission	Department's response
19.	There is evidence that PFAS contaminated waste has already been disposed of to the facility, which is a breach of licence conditions. As such, the amendment application is to retrospectively accept PFAS waste to facility and the assessment should not progress until the existing PFAS contamination is thoroughly investigated by DWER.	In Australia, PFAS have been used for a long time in a wide range of consumer products and industrial applications. There are now PFAS-contaminated sites around Australia resulting from these various uses. Over time, the chemicals have worked their way across and through the soil to contaminate surface waters and groundwater, and have migrated into adjoining land areas. PFAS are also present in waste streams, including landfills and wastewater treatment facilities, as well as more broadly in the environment due to ongoing industrial discharges. As a result, low levels of PFAS are found in most environmental settings. Additionally, landfill facilities across Australia are expected to contain low levels of PFAS contaminated wastes because of historic waste acceptance. The amendment application has not been submitted to retrospectively approval PFAS waste acceptance; rather, the amendment application has been submitted to authorise the ongoing acceptance of PFAS contaminated wastes at concentration levels suitable for disposal into existing landfill cells.
20.	Concerns with the adequacy of the LandSim model. The groundwater modelling undertaken has not given adequate consideration to sensitive receptors.	The Delegated Officer considers the provided LandSim model sufficient for the purposes of risk assessment. Receptors used within the LandSim model have been selected to account for protective areas in down and cross hydraulic gradient directions of groundwater flow. As such, the Delegated Officer considers that receptors have been adequately considered.
21.	No consideration has been given to dispersion modelling to adequately assess the impacts of airborne contaminants (whether PFAS or other) on the nearby sensitive receptors.	The Delegated Officer has considered the results of the *Dust Sampling and Analysis Monitoring Report 2022* in undertaking the risk assessment as outlined in Section 3 of this Amendment Report. The findings of this report indicate that that particulate concentrations recorded were typically influenced by particulate levels in the airshed rather than a site source close to the monitoring locations. The monitoring program also concluded that the composition of dust generated at the site does not pose a high risk if it were to leave the site and reach nearby sensitive receptors. This monitoring is still considered relevant to this amendment application as no increase to waste acceptance volumes are being sought for the premises.

Comment number	Summary of submission	Department's response
22.	Concerns with the adequacy of current dust monitoring conditions at the premises.	Dust has been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report.
23.	Concerns with the use of PFAS contaminated leachate as dust suppression.	Current licence conditions limit the use of landfill leachate for dust suppression activities to within the footprint of active landfill cell and leachate ponds, which have been assessed as suitable to receive PFAS contaminated wastes. Additionally, the Delegated Officer has imposed additional limits on the use of landfill leachate for dust suppression, as outlined in DWER's risk assessment in Section 3 of this Amendment Report.
24.	Concerns that if a landfill fire was to occur, the fire would not burn hot enough to eliminate PFAS from smoke, releasing PFAS into the environment.	The Delegated officer has considered potential landfill fires in DWER's risk assessment as outlined in Section 3 of this Amendment Report. The PFAS NEMP states that 'Research is underway to determine effective ways to characterise and quantify PFAS in landfill gas and emissions'. The Delegated Officer will consider any future revisions to the PFAS NEMP relating to the monitoring of PFAS within landfill gas and ambient air for future inclusion on the licence, when a greater understanding of the potential of PFAS within landfill gas / the monitoring of PFAS within air emissions is available to the scientific community.
25.	Concerns with the expose of fire fighters to PFAS contaminated wastes if a landfill fire was to occur.	The safety of fire crews and premises staff to PFAS containing smoke emissions in the event of a fire is regulated by WorkSafe.
26.	PFAS has been detected in groundwater beneath other facilities.	DWER cannot consider emissions occurring at other premises within the risk assessment for this premises, as risk assessments are undertaken on a case-by-case basis. The application has been assessed on its own merit. Impacts to groundwater have been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report.

Comment number	Summary of submission	Department's response
27.	Concerns that clayey soils can facilitate the movement of PFAS to the aquifer and to the Swan Coastal Plain.	The prepared LandSim model demonstrates that given the lined landfill design and slow movement of contamination through the aquifer, it appears unlikely that any surrounding surface water receptors will be negatively impacted by landfill operations. Impacts to groundwater have been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report.
28.	Concerns that the landfill is not purpose built to contain toxic waste such as PFAS contaminated waste.	The licence holder is proposing to accept PFAS contaminated wastes which do not exceed the landfill acceptance criteria limits for Class III landfill cells as outlined in the PFAS NEMP. The suitability of the landfill for the acceptance of PFAS contaminated waste has been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report.
29.	The dust management plan submitted as a supporting document needs updating.	Dust has been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report.
30.	All monitoring on the site is insufficient. (Dust, water, air, noise and safety).	The Delegated Officer considers that the monitoring requirements imposed under the conditions of the amended licence are adequate to identify and, where necessary, respond to emissions from the premises.
31.	The PFAS Contaminated waste in Western Australia should be sent to the Tellus Hazardous Waste site at Sandy Ridge.	The application received pertains to the receipt and burial of PFAS impacted waste at the premises. DWER does not impose restrictions on where PFAS impacted wastes are buried. Each application is independently risk assessed based on location, proximity to receptors, potential pathways and proposed or practicable emissions controls.
32.	Concerns with the size of the landfill facility.	The Delegated Officer considers that controls in place at the premises are sufficient to prevent emissions and discharges to the environment, regardless of the size of the premises.

Comment number	Summary of submission	Department's response
33.	New, dedicated facilities away from populated, sensitive, and economically important areas like the Dardanup / Ferguson Valley region need to be developed for long-term waste management.	The application received pertains to the receipt and burial of PFAS impacted waste at the premises. The Department does not impose restrictions on where PFAS impacted wastes are buried. Each application is independently risk assessed based on location, proximity to receptors, potential pathways and proposed or practicable emissions controls.
34.	No linear graph evidence has been produced to prove that the groundwater readings are not rising. Water result reports only identify if the sample is in tolerance levels so could be rising but no correlation to previous report.	The Delegated Officer has reviewed historical groundwater data for the premises and has concluded the sufficient information has been submitted to inform the risk assessment. Additional graphs are not required.
35.	Concerns with how contamination levels within wastes are going to be measured.	Licence conditions contain a requirement that laboratory testing results are provided to the licence holder prior to waste acceptance to ensure that the deposited waste complies with the specifications set out in the licence waste acceptance table.
36.	Concentrations of PFAS reported in the monitoring wells installed hydraulically up gradient of the Cleanaway facility may be the result of radial groundwater flows resulting from localised infiltration within leachate ponds, rather than representing up-gradient or ambient sources.	The Delegated Officer has reviewed historical groundwater data for the premises and has concluded that at this stage, PFAS concentrations up hydraulic gradient of the premises within groundwater are more likely to be representative of background concentrations than resulting from infiltration from landfill activities.
37.	The Site is classified as "possibly contaminated – investigation required" pursuant to the *Contaminated Sites Act 2003*, indicating there is uncertainty regarding the nature and extent of contamination at the site and the risks posed to receptors. Cleanaway must address the actions required by DWER in relation to existing contamination risks before it is granted approval to amend its licence or expand its operations in any way.	Section 11 of the *Contaminated Sites Act 2003* requires the reporting of a known or suspected contaminated site to DWER. As landfill operations have the potential to result in contamination, all landfill facilities should be reported to DWER. The classification of 'possible contaminated – investigation required' is assigned to a premises once notification is received. Should DWER receive evidence to suggest that landfill activities are resulting in contamination, an update to the classification may be required, as well as additional investigations to determine the extent of contamination that may have occurred. Results from groundwater and leachate monitoring data indicate that there is insufficient evidence to suggest that the landfill operations have impacted the underlying groundwater aquifer.

Comment number	Summary of submission	Department's response
38.	The Australian NHMRC drinking water guidelines for PFAS are soon to be revised and will include a PFOS guideline value that is an order of magnitude lower than the current value (i.e., 0.004 ug/L compared to the current 0.07 ug/L). The existing PFAS contamination data requires evaluation in the context of the revised guidelines prior to decision-making on this licence amendment and the current dataset is insufficient for this purpose. Groundwater monitoring for PFAS needs to be conducted using a lower laboratory limit of reporting (LOR) than that used to date.	Noted. Is it expected that groundwater monitoring is undertaken in a manner that is consistent with current guidance. The adequacy of groundwater monitoring processes and result interpretation will be reviewed on the submission of groundwater monitoring data to DWER.
39.	The current groundwater monitoring network is not adequate for the nature and sensitivity of receptors identified. An expanded monitoring well network is required to better understand the spatial extent of existing and future groundwater impacts associated with the landfill, including multi-level and multi-aquifer assessment.	The groundwater monitoring network at the premises with reviewed and upgraded under works approval W6855/2023/1 for the premises. The Delegated Officer considers that the current bore network is adequate to monitoring emissions to groundwater that may arise from landfilling operations.
40.	Consideration has not been given to how any groundwater impacts from the proposed receipt of PFAS impacted waste will be differentiated from the existing impacts. This has implications for monitoring of landfill cell integrity, changes in the risk profile down-gradient of the landfill and triggers for implementation of contingency measures	The existing PFAS monitoring suite will continue to be monitored for in groundwater through the receipt of PFAS contaminated wastes. Any fluctuations in PFAS concentrations in groundwater may be indicative of seepage of leachate to groundwater.
41.	The current Landfill Leachate Management Plan does not identify any contingency measures to be implemented in the event that PFAS concentrations capable of impacting beneficial groundwater use are identified. Landfill liners are not immune to losses of integrity and contingency measures must be identified.	Consideration to the loss of integrity of the landfill liners is given within the LandSim model, which concludes that if the liners begin to degrade in 150 years, contamination will not reach the premises boundary from the landfill cells for >3000 years. Additionally, this model is conservative as retardation and biodegradation of contaminants has not been considered. The results of this modelling, along with the assessed competence of containment infrastructure and licence holder controls, indicate to the Delegated Officer that additional contingency measures are not required.

Comment number	Summary of submission	Department's response
42.	Concerns that this proposal does not fit with the PFAS National Environmental Management Plan 3.0.	Consideration to the specifications within the PFAS NEMP is outlined through DWER's risk assessment as outlined in Section 3 of this Amendment Report. The Delegated Officer considers that the proposed acceptance and burial of PFAS impacted waste is in accordance with the specifications outlined in the PFAS NEMP.
43.	Given the known pervasive, persisting, mobile, and transformational characteristics of PFAS compounds, the practicable solution today is to limit as much as possible the deliberate concentration of known contaminants in the vicinity of water catchments, potable underground aquifers, intensive agricultural areas and regions with a rapidly expanding human population. In the medium to long term, this will be the cheaper option in comparison to future decontamination and public health costs.	The PFAS NEMP is Australia's national guide for managing PFAS disposal and contamination in the environment. The Delegated Officer considers that the proposed acceptance and burial of PFAS impacted waste is in accordance with the specifications outlined in the PFAS NEMP.
44.	Research into geo-textiles is suggesting that some constituents of landfill liners also contain PFAS compounds.	Noted.
45.	Where is the scientific evidence that the aquifers beneath the site are absolutely confined and no sandy lenses are present beneath the waste cells that could act as conduits between them.	Hydrological modelling undertaken at the premises has been reviewed to inform this assessment, as well as the LandSim model - *Banksia Road Waste Facility, Crooked Brook WA, Hydrogeologic Risk Assessment and Groundwater Monitoring Program Review (March 2021.)* This information demonstrates that the premises is not located on a vulnerable groundwater system, which is what is required to demonstrate the suitability of premises siting under PFAS NEMP specifications. A review of aquifer connectivity and sandy lenses is not required for the purposes of the PFAS NEMP.

Comment number	Summary of submission	Department's response
46.	Concerns with the potential of PFAS within landfill gas emitted from the premises. Methane gas flares have not been demonstrated to be effective for PFAS treatment. Flare temperatures are often too low and residence times too short. Rather than destruction, flares can facilitate transformation into yet other PFAS compounds and PICS.	The PFAS NEMP states that '*Research is underway to determine effective ways to characterise and quantify PFAS in landfill gas and emissions'*. The Delegated Officer will consider any future revisions to the PFAS NEMP relating to the monitoring of PFAS within landfill gas and ambient air for future inclusion on the licence, when a greater understanding of the potential of PFAS within landfill gas / the monitoring of PFAS within air emissions is available to the scientific community. The PFAS NEMP also states that 'monitoring of landfill gas condensate should consider PFAS'. This has been considered by the Delegated Officer in DWER's risk assessment as outlined in Section 3 of this Amendment Report.
47.	The Fire Plan submitted with the Cleanaway application does not consider how local residents would be informed immediately in the case of a significant fire at the waste facility**.**	Emergency notifications, including fires, are disseminated by DFES.
48.	Would acceptance of PFAS contamination include Activated Carbon material be included within the terms of the licence amendment.	Activated carbon waste contaminated with PFAS may be accepted as Special Waste Type 3 on the basis that the concentration of PFAS therein conform with the limitations imposed in the amended licence's Wate Acceptance Table.
49.	The Banksia Road Waste Facility is privately owned and under lease to a commercial operator. Where does responsibility for PFAS remediation lie in 100 years when ownership has changed, and operator long gone.	Refer to the Delegated Officer's response to comment Number 5.
50.	Concerns with impacts to surrounding fauna utilising water ways.	The risk to groundwater, which may be hydraulically connected to surface water bodies (and associated fauna) has been considered by the Delegated Officer in DWER's risk assessment as outlined in Section 3 of this Amendment Report. The landfill is not located within 1000 m of any relevant surface water body, which is a requirement for consideration under the PFAS NEMP regarding siting suitability.

Comment number	Summary of submission	Department's response
51.	Whilst the overall tonnages won't exceed 350,000 tonnes annually and as there won't be a cap on the tonnages of PFAS contaminated waste how can we be guaranteed that most of this 350,000 tonnes won't be PFAS contaminated waste and if a large proportion of this waste is PFAS contaminated where is the modelling to support the increased tonnages of PFAS contaminated waste and the effect this may have on the liners or the dust emanating.	The proportion of waste types accepted to the premises within the permitted 350,000 tonnes per annum throughput capacity is an operational decision of the licence holder and therefore outside of DWER's regulatory scope. The amount of PFAS waste accepted to the premises does not alter DWER's risk assessment findings, as outlined in Section 3 of this Amendment Report. There is no anticipated effect on the landfill liners resulting from PFAS waste acceptance. The dust emission profile of the premises will not increase as waste acceptance volumes are not proposed to increase under this amendment.
52.	Major lawsuits around the world have resulted in billions of dollars in compensation for affected communities. In Australia, the Federal Government settled a $212 million class action with residents in Oakey (QLD), Katherine (NT), and Williamtown (NSW), after PFAS from firefighting foam contaminated water and soil near Defence bases. In the United States, chemical manufacturers DuPont and 3M have paid out over $10 billion to communities whose health and water supplies were impacted by PFAS. These cases recognise the real harm PFAS causes to land values, health, and livelihoods, and show that companies and governments can be held liable for contamination. The same risks now threaten the Dardanup community and must be taken seriously before irreversible damage occurs.	Refer to the Delegated Officer's response to comment Number 26.

Comment number	Summary of submission	Department's response
Shire of Dardanup (with consideration to MS Environmental Peer review).		
53.	The high clay content of the site and depth to groundwater reduce rapid migration risk but monitoring and cell design are crucial. Superficial aquifer's water table is relatively deep (20-50 mbgl). However, potential for perched groundwater exists.	Refer to the Delegated Officer's response to comment Number 45.
54.	More detailed groundwater data, including specific PFAS concentrations and bore information, is needed. 2023 groundwater monitoring detected low PFAS concentrations below assessment criteria at 10 out of 26 sites. However, PFAS compound concentrations were not provided. As such, more detailed groundwater data, including specific PFAS concentrations and bore information, is needed.	The Delegated Officer has reviewed the *2024 Groundwater Monitoring Report J-G-AU0010-001-P-Rev0 (Geocontam Risk Management Pty Ltd - 14 March 2025* which contains a comparison with historical groundwater data for the premises. The Delegated Officer and has concluded the sufficient information has been submitted to inform the risk assessment. Risk to groundwater resulting from PFAS waste acceptance have been considered by the Delegated Officer in DWER's risk assessment as outlined in Section 3 of this Amendment Report.
55.	Additional monitoring bores near the source (e.g. proposed cell 12) are recommended for better detection of potential seepage [from the cell].	Refer to the Delegated Officer's response to comment Number 39.

Comment number	Summary of submission	Department's response
56.	Insufficient groundwater data and monitoring results are provided by the proponent. In particular: - More data and logs are needed to assess potential impacts. And to support the assertion of no current impact. - Recent monitoring results are missing. Current licence requires quarterly and six-monthly monitoring, but recent results were not provided. - Additional monitoring bores are recommended, especially near potential source areas. For better detection of seepage.	Refer to the Delegated Officer's response to comment Number 54 and 55.
57.	The site marginally meets NEMP criteria for minimum distance to surface water, with Crooked Brook and a wetland just outside the 1000m minimum distance. This proximity to waterways still creates a risk [which needs to be suitably managed/mitigated].	Refer to the Delegated Officer's response to comment Number 50.
58.	No flood mapping provided to confirm if the site is within a >0.01 AEP floodplain.	A review of the Western Australian floodplain mapping confirms that the site is not within a >0.01 AEP floodplain.
59.	Surface water management system is designed to handle a 1% 7-day AEP rainfall event, but no supporting calculations were provided.	The premises contains four leachate collection ponds for landfill leachate. Each pond is lined within 1.5 mm HDPE and is designed to contain run off from a 1% AEP rainfall event. Construction quality assurance documentation submitted for the leachate ponds has been reviewed by DWER, with the findings being that capacity to contain run off from a 1% AEP has been demonstrated, and the leachate ponds have been constructed in a manner that will adequately contain leachate and contain no known material defects.

Comment number	Summary of submission	Department's response
60.	Additional documentation is required to demonstrate the design and construction plan for capping landfill cells used for Special Waste Type 3 at closure.	The design and adequacy of capping proposed at the premises has been considered in Section 2.4.5 of this Amendment Report, in line with considerations of the PFAS NEMP. Capping of landfill cells will need to be assessed and approved under Licence amendments to the premises when the capping of cells is required.
61.	MBS comments on the Leachate Management Plan: - Current site conditions show leachate head heights exceeding Best Practice Environmental Management (BPEM) levels. - Additional leachate volumes from multiple open cells [as proposed] may require off-site removal. - Maintenance of pumps, pipes, and level readers is necessary for the leachate management plan to be achievable. - Lack of detailed trigger and threshold criteria for leachate monitoring. - It is recommended that the proponent demonstrate the effectiveness of the leachate management plan before accepting Special Type 3 (PFAS) waste. (Overall, while the plan is sound in principle, it requires current site maintenance and additional measures to ensure effectiveness).	The suitability of leachate containment infrastructure has been reviewed to inform DWER's risk assessment relating to seepage of leachate to groundwater, as outlined in Section 3 of this Amendment Report. The review considers specifications within the PFAS NEMP, which request that historical groundwater monitoring data be reviewed to determine the suitability of containment infrastructure at preventing emissions. The Delegated Officers review of historical groundwater and leachate monitoring data indicates that there is insufficient evidence to suggest that the landfill operations have impacted the underlying groundwater aquifer. As there is no demonstration that the aquifer has been impacted by landfilling operation, the Delegated Officer can assume that the performance of the landfill liner and leachate management systems are suitable to prevent emissions and discharges from landfill operations impacting underlying groundwater, including the acceptance of PFAS contaminated wastes.
62.	Need for DWER to establish PFAS trigger and threshold criteria for groundwater monitoring.	PFAS monitoring results submitted to DWER will be compared to the ecological water quality guidelines for PFOS set by the Heads of EPA Australia and New Zealand (HEPA), and any relevant emerging guidance containing appropriate assessment criteria.

Comment number	Summary of submission	Department's response
63.	Landfill waste disposal application should specify acceptable PFAS concentration values for Special Waste Type 3.	Special Waste Type 3 accepted onsite for burial must conform to the concentration limits set out in the PFAS NEMP 3.0. These requirements have been captured in the waste acceptance table set out in the amended licence.
64.	Overall, the information provided does not fully meet the requirements for accepting Class III Special Waste Type 3 (PFAS) within lined cells, particularly regarding dust management and monitoring. As such, the information provided by the proponent is insufficient for approving PFAS waste disposal. The key issues being: ○ The DMP follows Classification 3 site guidelines. ○ Visual dust monitoring is inadequate. ○ Quantitative dust monitoring (dust meters) is needed due to PFAS sensitivity. ○ Discrepancies exist in dust suppression agent usage. ○ Lack of current groundwater PFAS data. ○ Need for additional ground water monitoring bores. (While dust inhalation is a minor PFAS exposure, dust can still contaminate groundwater through leaching.	The Delegated Officer considers that the information submitted in support of the application is sufficient to inform the Department's risk assessment. Risk assessment outcomes relating to dust, spray drift form leachate recirculation, and seepage of leachate to groundwater are outlined in Section 3 of this Amendment Report.
65.	The DWER license lacks specific quantitative dust monitoring requirements.	Dust has been considered in DWER's risk assessment as outlined in Section 3 of this Amendment Report.
66.	PFAS is a controlled waste under WA regulations, requiring tracking and logging for transport and acceptance.	Controlled waste tracking obligations are prescribed under the *Environmental Protection (Controlled Waste) Regulations 2004* (as amended).

Comment number	Summary of submission	Department's response
Dardanup Environmental Action Group (DEAG)		
67.	PFAS are reported to persist in the environment for 1000+ years. DEAG would suggest that if HDPE liners have an expected operational life span of just 200 years, they are not suitable for storing waste that can persist for thousands of years.	Refer to the Delegated Officer's response to comment Number 4.
68.	The presence of subsurface clay, not matter how thick, does not mean that it can be concluded that contamination of groundwater is not possible	Noted.
69.	There is potential for HDPE liners to be physically damaged (torn), during placement/spreading of materials	The liner system in place as the premises incorporates a protection later comprising a cushion geotextile, 300 mm aggregate layer, and separation geotextile atop the 2.0 mm High-Density Polyethylene (HDPE) and Geosynthetic Clay Liner (GCL). Construction quality assurance documentation for the Class III cells and leachate collection ponds have been submitted and reviewed, with no known material defects being located.
70.	Longer term, the cell or capping HDPE liner is at risk from damage by tree roots. The landfill is surrounded by tall forest including Eucalyptus and Corymbia tree species which are very well adapted to the conditions and their seeds transported by birds. It's not a stretch to suggest that deep rooted tree species could establish in the landfill capping when the site is no longer operational, and is not being routinely inspected and managed (perhaps 50 or 100+ years from now).	Refer to the Delegated Officer's response to comment Number 5 and 60.

Comment number	Summary of submission	Department's response
71.	There appears to be no understanding of the expected PFAS concentration in leachate and how re-use of leachate in dust suppression (within cells) might increase the concentration of subsequent leachate (due to evaporation and concentration).	PFAS concentrations within recovered leachate are currently being monitored at the premises, with results considered within this risk assessment. The Delegated Officer considers that the concentration of PFAS within leachate is therefore well understood. It is anticipated that there will be an accumulation of PFAS within the landfill cells and leachate ponds over time. However, the Delegated Officer considers that this containment infrastructure is sufficient to contain PFAS contaminated wastes to prevent emissions and discharges to the environment. In the event of pond desludging (when required) residues will be required to be tested for PFAS. If Class III landfill acceptance criteria are exceeded, the licence holder will be required to seek disposal of this material to a suitably licenced facility.
72.	The impact and operation of the Leachate recirculation system appears to have been overlooked. It is our understanding from the current licence that this will occur on or just below the surface on rehabilitated cells, from which stormwater can be directed to the stormwater ponds (and environment).	Leachate recirculation via injection into the tipping face of the landfill is not permitted under licence conditions. The tipping face is designed to contain contaminated stormwater (i.e. in contact with waste) and divert uncontaminated stormwater to the stormwater management infrastructure.
73.	Concerns raised with the adequacy of the LandSim modelling.	The Delegated Officer considers the provided LandSim model sufficient for the purposes of risk assessment.

Comment number	Summary of submission	Department's response
74.	PFAS are not naturally occurring, so if PFAS is detected even at low concentrations in groundwater this means the source needs to be confirmed before a statement of "no direct impact" can be made with confidence. As the landfill site is surrounded by native forest and is up-hydraulic gradient of other potential polluters, it's most likely that the Banksia Road Landfill is the source of the pollution. Putrescible landfill cells containing household waste would be expected to have some level of PFAS contamination (from textiles, plastics, rubber, cookware, water repellent sprays, food packaging, personal care products) and may not be adequately lined to prevent seepage. (particularly Cells 1 & 2 and possibly Cells 3,4 & 5)	Refer to the Delegated Officer's response to comment Number 36.
75.	Without a groundwater monitoring well positioned up-hydraulic gradient of the Banksia Road Landfill cells (i.e. outside the facility perimeter fence), it is unreasonable to state that the detected contaminants are "representative of background conditions" (meaning the pollution source is external and pre-existing). The separation distance between operational cells and the up-hydraulic gradient well, needs to account for potential impacts to groundwater up-hydraulic gradient of cells in the event of groundwater mounding caused by cell seepage.	Refer to the Delegated Officer's response to comment Number 39.
76.	Why were the 2024 groundwater monitoring results not included or discussed? And understanding of these results is important, especially given the 2023 monitoring results showed increasing concentration trends and exceedances of criteria, dismissed as "erroneous results" and regarded as "insufficient evidence". If the evidence is "insufficient" then there is scientific uncertainty and the precautionary principle should be applied	Refer to the Delegated Officer's response to comment Number 54.

Comment number	Summary of submission	Department's response
77.	The supporting document concludes that "there is limited connection between the leachate ponds and the groundwater" – if there is no seepage occurring, there shouldn't be any connection between the leachate ponds and groundwater.	Noted. Despite the low coefficient of permeability, limited seepage of leachate though the liner system is expected. The Delegated Officers review of historic groundwater and leachate monitoring data has determined that insufficient evidence to suggest that the landfill operations have impacted the underlying groundwater aquifer.
78.	Trigger and threshold criteria for PFAS has been revised – new (lower) criteria is defined in the 2025 PFAS National Environmental Management Plan 3.0 (HEPA, 2025).	Noted.
79.	The interpretation of groundwater monitoring results should give regard to recent changes in parameters to be tested (only comprehensive testing since 2024 Licence amendment), and the installation of a number of new groundwater monitoring wells. The results pre and post the 2024 amendment are hardly comparable. DEAG suggest that DWER consider if the 2023 results detected higher concentrations of analytes (compared with historical data) because a wider range of analytes are now being tested and the groundwater monitoring wells are more appropriately located with more shallow/deep combinations.	Noted. Moving forward, groundwater monitoring reports prepared in accordance with licence conditions will incorporate the required analytes.

Comment number	Summary of submission	Department's response
80.	If leachate is used for dust suppression on internal roads as stated, then how is the migration of contaminants (PFAS) to groundwater being prevented? monitored? Stormwater runoff from internal roads will also mobilise contaminants (PFAS) to the stormwater ponds which are only clay lined. What additional mitigation is proposed to prevent contaminants in the stormwater ponds leaching to groundwater? are the monitoring bores appropriately located and at the correct depths? if contaminants were detected in groundwater, how would the contaminated groundwater be recovered?	The use of leachate for dust suppression on internal road surfaces is not approved under the premises licence.
81.	The area experiences very strong easterlies over the summer months. Whilst it is acknowledged that Cleanaway have a dust management plan and use leachate dust suppression on the working surfaces of the cells, there remains a risk of surface drying which would be readily mobilised in strong winds and deposited on agricultural and residential land west of the Banksia Road Landfill. There are multiple potential pathways that contaminants mobilised in dust, spray or mist and on the wind can be ingested by humans, two pathways are described below: Contaminated dust settles into soils and these contaminants are taken up by plants and ingested by animals such as cows. Contaminated dust also settles on the roofs of homes, many of which (especially on rural properties) collect rainwater for drinking. No dust monitoring is being undertaken at sensitive receptors down-wind of the Banksia Road Landfill facility.	Risk assessment outcomes relating to dust and spray drift form leachate recirculation are outlined in Section 3 of this Amendment Report.

Comment number	Summary of submission	Department's response
82.	PFAS can be present in the methane gas plume and is not necessarily destroyed by the burning	Refer to the Delegated Officer's response to comment Number 46.
83.	Groundwater down hydraulic gradient the Banksia Road facility flows towards the north-west, towards agricultural land with functioning pivot irrigation, towards Dardanup's drinking water supply. The irrigated land grazes cows which supply milk and meat to our supermarkets. PFAS bioaccumulates in animals and will end up in our food if animals are exposed to contaminated pastures (whether by contaminated groundwater or contaminated dust).	Refer to the Delegated Officer's response to comment Number 16.
84.	Crooked Brook, located approximately 1.1 km from landfill facility, is known to support aquatic life such as fish and ample birdlife. Locals are known to recreational fish in Crooked Brook. Jimmy Little Creek, drains into Crooked Brook and is located 0.84 km from the landfill leachate ponds.	Refer to the Delegated Officer's response to comment Number 50.
85.	The Banksia Road Landfill facility is potentially unsuitable to accept solid PFAS-contaminated material when giving regard to the landfill acceptance criteria outlined in the PFAS National Environmental Management Plan 3.0 (section 14.6).	Refer to the Delegated Officer's response to comment Number 28.
Lavan Legal on behalf of Grassy Gully Pty Ltd		
86.	DWER should have considerable pause in light of the conflicting conclusions on whether Cleanaway intends to use existing cells to accept PFAS-related materials, or whether it intends to construct entirely new cells.	The Delegated Officer does not consider that there is confusion around where the licence holder is intending to dispose of PFAS contaminated waste to. PFAS contaminated wastes are proposed to be disposed of to existing Class III landfill cells at the premises, and future cells 9 and 10 which are authorised to be constructed under works approval W6855/2023/1.

Comment number	Summary of submission	Department's response
87.	Further, the inconclusive nature of the results included with the Amendment Application should give rise for the need for DWER to proceed with caution, consistent with the precautionary principle (as codified in section 4A of the EP Act and discussed in Telstra Corp Ltd v Hornsby Shire Council [2006] NSWLEC 133 and adopted by the State Administrative Tribunal in Wattleup Road Development Co Pty Ltd v State Administrative Tribunal (No 2) [2016] WASC 279).	Section 4A of the EP Act states the following: 'In the application of the precautionary principle, decisions should be guided by — (a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and (b) an assessment of the risk-weighted consequences of various options.' DWER's risk assessment process has been developed with respected to – and is guided by – the precautionary principle. DWER's risk assessment and outcomes are outlined in Section 3 of this Amendment Report.
88.	In short, the approval of the Amendment Application gives rise to the risk of PFAS contamination to both surface and groundwater from the Subject Site. Further, due to the nature of the hydrology and the exclusive use of the groundwater by rural businesses in the locality, including the DBC Land, any PFAS contamination of the water resource will be catastrophic to their businesses (including my client's) and accordingly the requirements of the PFAS NEMP are imperative to the assessment of the Amendment Application.	The Delegated Officer considers that the risks to groundwater can be mitigated through conditions within the licence. The risk to groundwater, which may be hydraulically connected to surface water bodies has been considered by the Delegated Officer in DWER's risk assessment as outlined in Section 3 of this Amendment Report. Refer to the Delegated Officer's response to comment Number 16.
89.	My client submits that in light of the inconsistency in the information provided and the nature of PFAS, the precautionary principle should be exercised and the Amendment Application should be refused.	The Delegated Officer does not consider that there is inconsistency in the information provided in the application. Refer to the Delegated Officer's response to comment Number 87.

Comment number	Summary of submission	Department's response
90.	Finally, I would draw DWER's attention to the requirement within the PFAS NEMP to consider, in light of existing landfill facilities, the performance of landfill liner and leachate management system (giving consideration to historical groundwater and surface monitoring results for existing sites). The compliance history of Cleanaway is therefore relevant to your assessment, and I draw your attention to the following: • the significant number of existing environmental breaches at both the Subject Site and other Cleanaway facilities; and • the recent leaching of PFAS chemicals into nearby groundwater at Cleanaway's facility at 24 Stuart Drive, Henderson WA. In this instance, Cleanaway was issued an Environmental Protection Notice for the breach.24	Refer to the Delegated Officer's response to comment Number 3 and 26.
91.	On this basis, and in light of the potentially significant impacts on groundwater, surface water, and human health, and the substantial lack of clarity surrounding the implications of the Amendment Application, it is my submission that DWER cannot reasonably approve the Amendment Application.	The Delegated Officer considers that the risks to groundwater, surface water, and human health can be mitigated through conditions within the licence. The Delegated Officer does not consider that a substantial lack of clarity surrounding the implications of the Amendment Application exist within the application.