Government of Western Australia
Department of Water and Environmental Regulation

Decision Report

Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W6855/2023/1
Works Approval Holder	Cleanaway Solid Waste Pty Ltd
ACN	120 175 635
File Number	DER2018/001042-5
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 1 of the Works Approval
Date of Report	**23/02/2023**
Status of Report	**Final**

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1. Purpose and scope of assessment

On 7 April 2021, Cleanaway Solid Waste Pty Ltd (the applicant) submitted a works approval application for the Banksia Road Putrescible Landfill facility (the premises) for the construction of three additional Class III Landfill cells, being cells 12A, 9 and 10. The application was referred to the Environmental Protection Authority (EPA) under Part IV of the EP Act.

In accordance with section 54(4) of the EP Act, the CEO shall not make a determination on the works approval application where the application has been referred to the EPA. As such, the Delegated Officer was not able to determine the works approval application until the referral to the EPA had been determined, including any appeals that may result from the EPA referral. The works approval application was subsequently placed on hold.

The EPA published their report on the Part IV assessment on 5 October 2023, with the appeal date closing on 26 October. No appeals were received on the Part IV assessment and as a result, Ministerial Statement 1213 was published on 21 November 2023 and assessment of the works approval application could resume.

On 27 September 2023, the applicant submitted revised works approval application documents to align with the determinations outlined in the Part IV assessment. This works approval assessment will consider information submitted within the revised documents.

1.1 Application details

Revised documents submitted in 2023 to inform the works approval assessment supersede the previous documents submitted in 2021 and will be considered in assessing this works approval application. Table 2 lists these documents and other supporting information submitted during the assessment process. The Delegated Officer notes that where the outcome of the Part IV assessment did not alter information contained within a document originally submitted to support the works approval application in 2021, this document has been resubmitted in 2023 without edits to support the assessment of the works approval application.

Table 1: Documents and information submitted during the assessment process.

Document/information description	Date received
Banksia Road Landfill, Dardanup, Cell 12A, 9 & 10 Construction, Works approval application and supporting information (October 2022)	27 September 2023
Cell 12A, Cell 9 and Cell 10 Development Site Plan – Drawing BANK-421 (August 2023)	27 September 2023
Cell 12A Development Landfill Layout Plan – Drawing BANK-503 (August 2023	27 September 2023
Cell 9 Development Landfill Layout Plan – Drawing BANK-303 (August 2023)	27 September 2023
Cell 10 Development Landfill Layout Plan – Drawing BANK-403 (August 2023)	27 September 2023
Cell 12A Development Drawings – Drawing BANK-501 to 513 (August 2023)	27 September 2023
Cell 9 Development Drawings – Drawing BANK-301 to 312 (August 2023)	27 September 2023
Cell 10 Development Drawings – Drawing BANK-401 to 412 (August 2023)	27 September 2023
IW Projects Cell 12A Specifications (August 2023)	27 September 2023

Document/information description	Date received
IW Projects Cell 12A CQA Plan (August 2023)	27 September 2023
Environmental Management Plan (March 2021)	27 September 2023
Cell 12A Development Top of Waste Surface Profile – Drawing BANK-SK95 (September 2023)	27 September 2023
Cell 12A Development Top of Waste Sections – Drawing BANK-SK96 (September 2023)	27 September 2023
Cell 9 Development Top of Waste Surface Profile – Drawing BANK-SK91 (September 2023)	27 September 2023
Cell 9 Development Top of Waste Sections – Drawing BANK-SK92 (September 2023)	27 September 2023
Cell 10 Development Top of Waste Surface Profile – Drawing BANK-SK93 (September 2023)	27 September 2023
Cell 10 Development Top of Waste Sections – Drawing BANK-SK94 (September 2023)	27 September 2023
WML Cell 12A Stability Assessment (August 2023)	27 September 2023
WML Cell 9 & 10 Internal Waste Stability Assessment (September 2023)	27 September 2023
Tonkin Leachate Balance Assessment Report (April 2022)	27 September 2023
Landfill Gas Management Plan (September 2023)	27 September 2023
Banksia Road Landfill Rehabilitation and Closure Plan (September 2023)	27 September 2023
Strategen Dust Management Plan (March 2021)	27 September 2023
Herring Storer Acoustics Environmental Acoustic Assessment (December 2020)	27 September 2023
Fire Control Process (October 2020)	27 September 2023

2. Background

2.1 Operations under Licence

The premises operates under Licence L8904/2015/1 (the Licence) and is located at Lot 2 on Deposited Plan 65861, Crooked Brook within the Shire of Dardanup. The premises is located approximately 3.8 km south-east of the town of Dardanup as depicted in Figure 1. Table 3 lists the prescribed premises categories that are authorised on the Licence.

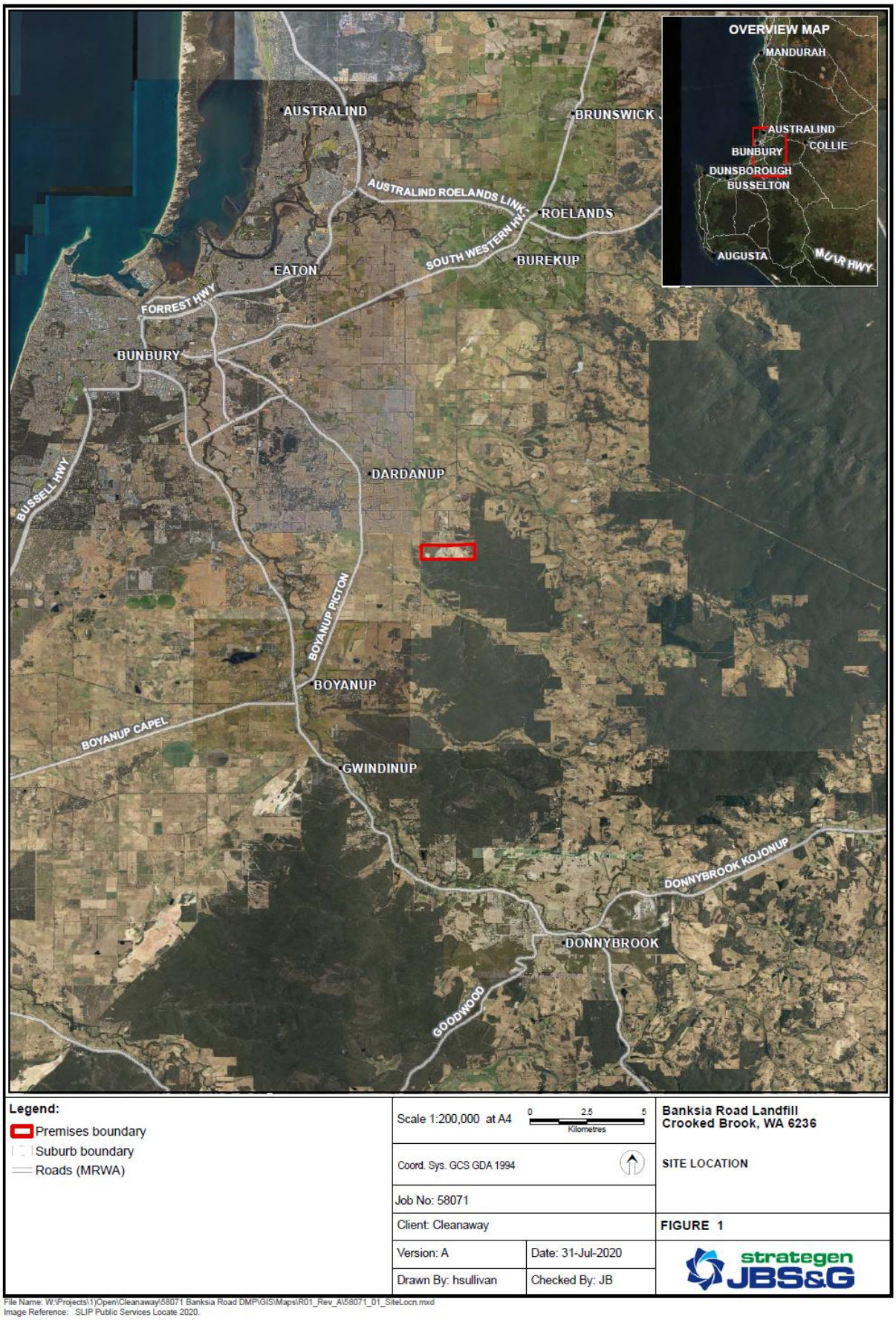

Figure 1: Premises siting.

Table 2: Prescribed Premises Categories authorised on the Licence.

Classification of Premises	Description	Approved Premises production or design capacity or throughput
Category 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; or (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
Category 61	Premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated, or irrigated.	350,000 tonnes per annual period
Category 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

The premises receives municipal, commercial, and industrial waste for disposal by landfilling under Category 64. The landfill operations encompass the closed and active solid waste cells, drainage infrastructure, stormwater collection dams and leachate collection ponds. Accepted wastes are weighed on arrival using the weighbridge then are delivered directly to the tipping face, where they are deposited and incorporated directly into the waste mass. Waste is progressively placed and compacted into thin layers of 500 mm thickness and covered regularly with inert material.

Landfilling operations were established at the Premises in June 2000. Prescribed activities under Category 64 have evolved as follows:

- The first two landfill cells were lined using the in-situ clays, incorporating a leachate collection system, and accepted waste until reaching capacity in 2006.
- The third cell was the first *Class III* cell to be constructed with a composite geosynthetic/ HDPE liner and included an independent leachate collection system. The design was revised following damage to the liner during construction and the cell was divided using an intermediate wall, forming Cell 3 and Cell 4.
- The fifth cell, a Class III composite geosynthetic/ HDPE lined cell with an independent leachate collection system, was constructed in May 2011 under Works Approval W4760/2010/1.
- An independent liquid waste 'MIC cell' (now referred to as TDS Cell 1) was constructed under Works Approval: W5096/2011/1 in 2012 for the discrete dewatering and disposal of Titanium Dioxide Slurry from Cristal Pigment (now Tronox).
- Leachate ponds 1 & 2 were constructed in 2012 under Works Approval W5124/2012/1.
- A landfill gas extraction system was installed in 2013 under Works Approval W5301/2012/1.

- Landfill Cell 4B was constructed in 2014 under Works Approval W5546/2013/1. The cell tied into the liners of Cell 3 and Cell 4 with leachate being managed through landfill Cell 4.
- Leachate evaporation pond 3 was constructed in 2015 under works approval W5748/2014/1.
- Cell 12, a Class III composite geosynthetic/ HDPE lined with an independent leachate collection system, was constructed, and commissioned in 2016 under Works Approval W5748/2014/1 and subsequently authorised for operation through an amendment to the Licence in 2016.
- The Licence was amended in 2017 to allow the construction of three composite HDPE liner Class III Landfill cells (Cells 6, 7 and 8).
- The Licence was amendment in 2018 to reflect the completion of the construction of Cell 6 and authorise it's use.
- A new Cristal Pigment (now Tronox) waste cell and pond was constructed and authorised for operation through Licence amendments in 2019.
- The Licence was amended in 2021 to allow for upgrades/improvements to the stormwater infrastructure along the southern boundary of the premises.
- The Licence was amended in 2021 to reflect the completion of the construction of Cell 7 and authorise it's use.
- The Licence was amended in 2021 as the result of a DWER initiated amendment for the addition of odour controls following an appeal determination on the Licence amendment for the authorisation of Cell 7.
- The Licence was amended in 2021 as the result of a DWER initiated amendment in 2021 to review premises operation and regulatory controls; and incorporate an amendment application to reflect the completion of construction of Cell 8 and authorise it's use.
- Works approval W6745/2022/1 was granted in 2023 to authorise the construction of additional stormwater management and storage infrastructure.
- The Licence was amended in 2023 to commence capping of stage 1, 2, and 5 and allow for the construction and operation of a leachate recirculation system.
- The Licence was amended in 2023 to facilitate the relocation of the landfill gas flare, as this was located within the future Cell 12A footprint.

2.2 Cell 12A pre-works

The applicant has identified that the following infrastructure is currently located within the proposed cell 12A footprint and will need to be relocated prior to commencing cell construction works:

- Workshop;
- Laydown area;
- Tailings Cell 1 discharge point;
- Landfill gas flare;
- Landfill gas infrastructure; and
- Water supply tanks.

The Tailings Cell 1 discharge point will be relocated immediately north of the cell 12A footprint

to permit access to delivery vehicles. The landfill gas flare will be relocated to the west of the cell 12A footprint, to the north of Tailings Cell 2, with the piped landfill gas extraction system being extended to facilitate the transfer of captured landfill gas to the new location. The workshop, laydown area, and water supply tanks can be located anywhere on site to suit operational needs.

For noting: Authorisation for the relocation of the landfill gas flare and associated infrastructure is being sought by Cleanaway Solid Waste Pty Ltd under a separate amendment application to Licence L8904/2015/1. As such, the relocation of the landfill gas flare falls outside the scope of this assessment.

3. Overview of proposed works

This works approval application seeks to authorise the following activities:

- Progressive construction of landfill Cells 12A, 9, and 10 over a six-to-seven-year period; and
- Construction of associated surface water control infrastructure within the excavated voids of Cells 9 and 10.

Figure 2 depicts the current premises layout as defined on the Licence. Figure 3 depicts the proposed footprint of Cells 12A, 9, and 10; and how these cells are located in relation to existing landfill cells at the premises.

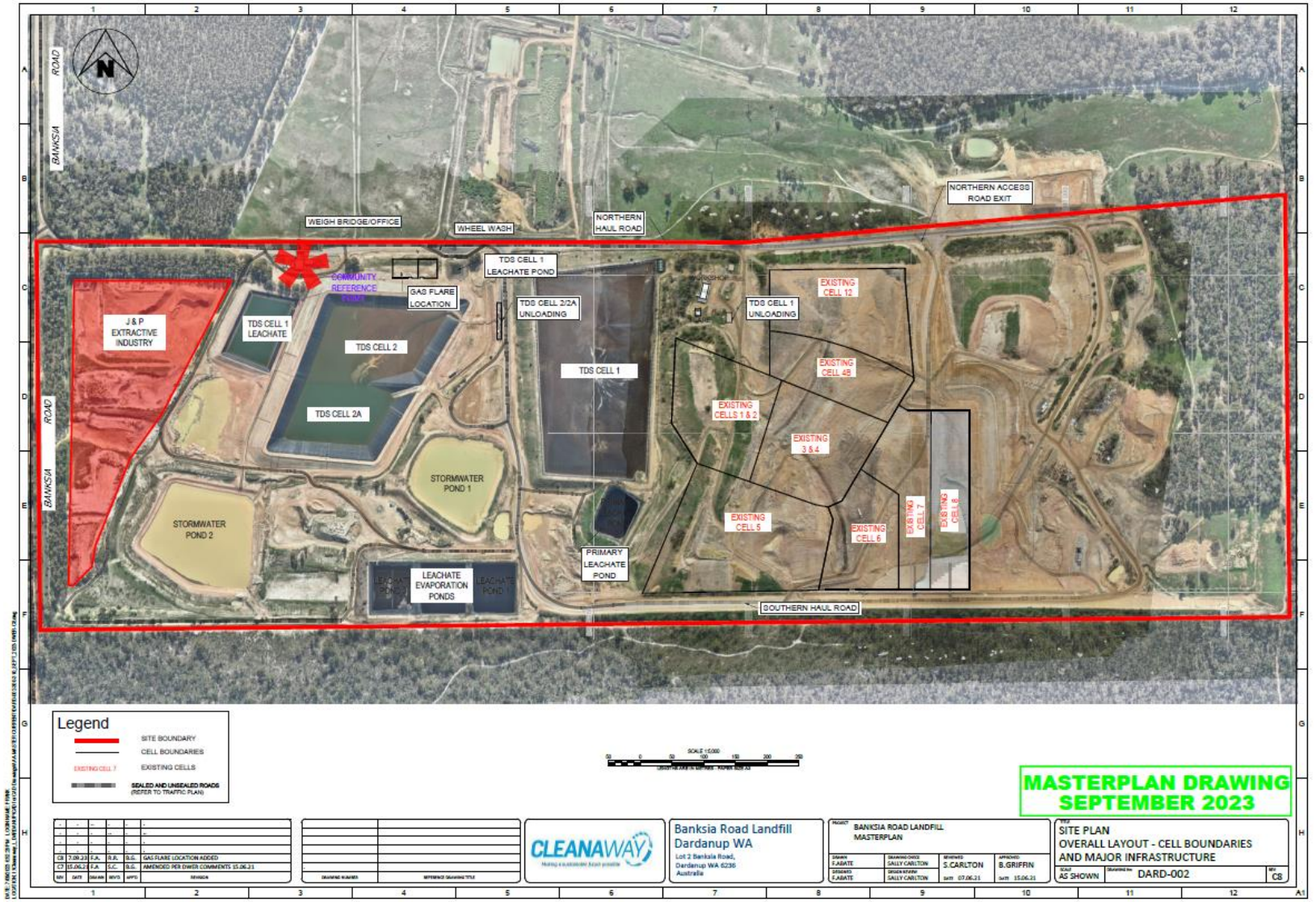

Figure 2: Current premises layout as depicted on Licence.

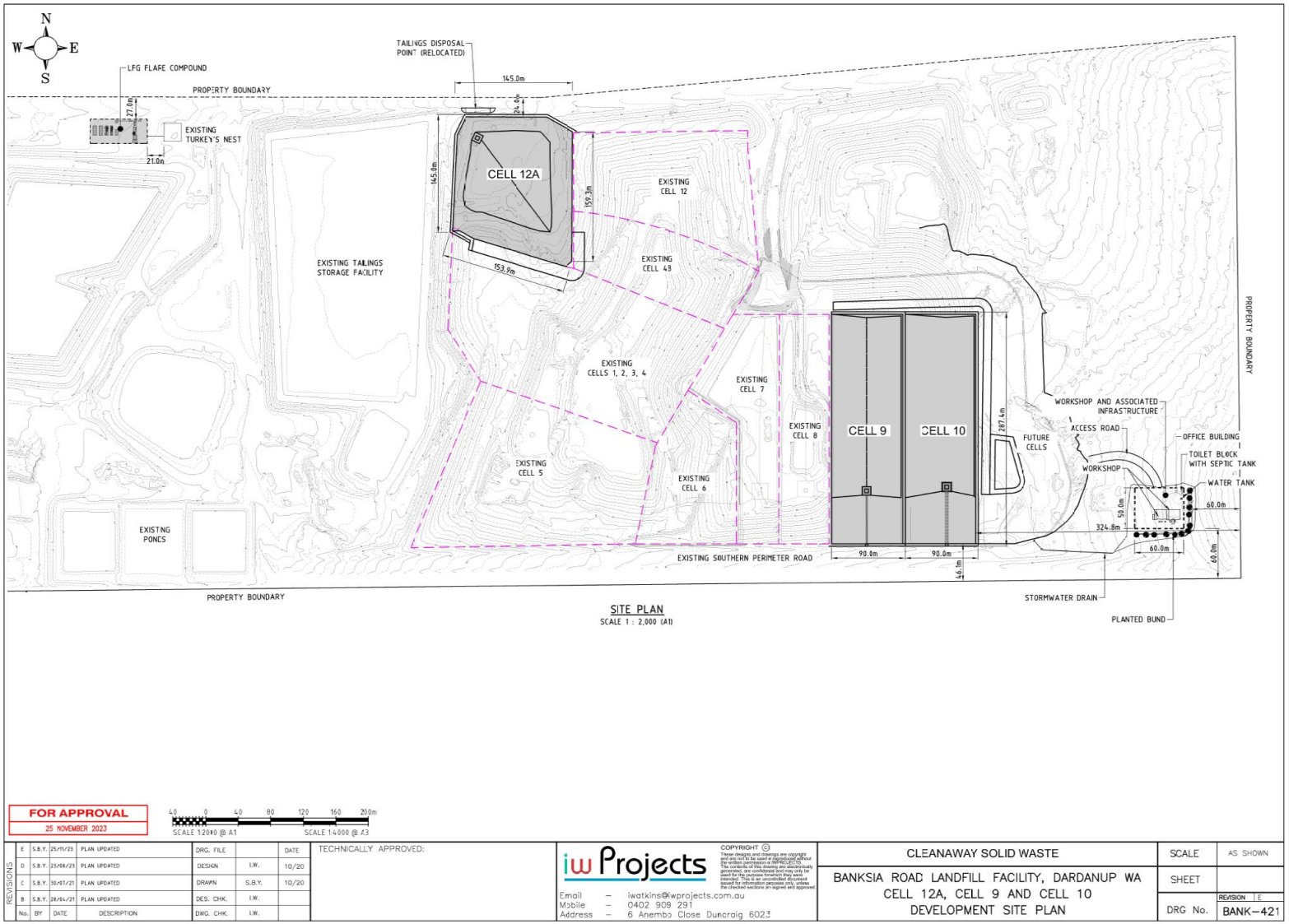

Figure 3: Proposed footprint of Cells 12A, 9, and 10.

3.1 Landfill cell construction

3.1.1 Construction specifications

Earthworks to facilitate landfill cell construction will involve the excavation of proposed cell footprint areas to reach the proposed landfill base design levels. The depth of excavation below natural ground level is variable between the proposed new cell footprints, from approximately 6 m for the Cell 12A area to 24 m in the Cell 10 area. The landfill cells and leachate containment infrastructure have been designed with a separation distance to groundwater of approximately 20 m. Cell perimeter bunds for the redirection of stormwater runoff will also be constructed.

The proposed new landfill cells will be built to the same design specifications as the existing Class III landfill cells (Cells 6, 7, and 8) at the premises and the liner systems will consist of the infrastructure and design components outlined in Table 3. An overview of the landfill liner design for the base and side slope of the new cells is provided in Figure 4 and Figure 5. The proposed lined cell design has been designed with consideration to the specifications of the *EPA Victoria BPEM: Siting, Design, Operation and Rehabilitation of Landfills* (Vic BEPM), noting that adherence to this guideline is not a requirement for landfill design in Western Australia. Each landfill cell has a projected design life of approximately two years.

Table 3: Cell 12A, 9, and 10 liner construction.

Liner layer	Design components
Layer 1	Subsoil beneath the cells consists of a minimum of 15 metres of clayey silt and sand that has an in-situ permeability of between 10^{-7} and 1×10^{-10} m/s. The subsoil will be reworked and compacted in layers not exceeding 150 mm in thickness to a minimum 95% of maximum dry density and -2% to + 2% of optimum moisture content as per AS1289.
Layer 2	Geosynthetic clay liner (GCL) - 300 mm GCL consisting of a layer of bentonite needle punched between two layers of geotextile and installed in direct contact with the engineered subsoil.
Layer 3	2 mm high-density polyethylene (HPDE) geomembrane overlying the lower GCL.
Layer 4	Protection / cushion geotextile - the composite lining system will be protected from the leachate collection system and overlying materials with a non-woven cushion/protection geotextile.
Layer 5	Leachate drainage collection pipework - network of perforated collection pipes. The collection pipes direct leachate to the leachate collection sump.
	Leachate aggregate drainage layer - a 300 mm thick layer of permeable gravel covered with a separation geotextile. Cell 12A only – 300 mm sand or recycled glass leachate drainage layer extending over large portions of Cells 1 and 2.
	Sand drainage layer – a 300 mm thick layer to extend the leachate drainage layer on the landfill cell side slopes, which will be installed by operations progressively as the cell is filled with waste.
Layer 6	Separation geotextile.

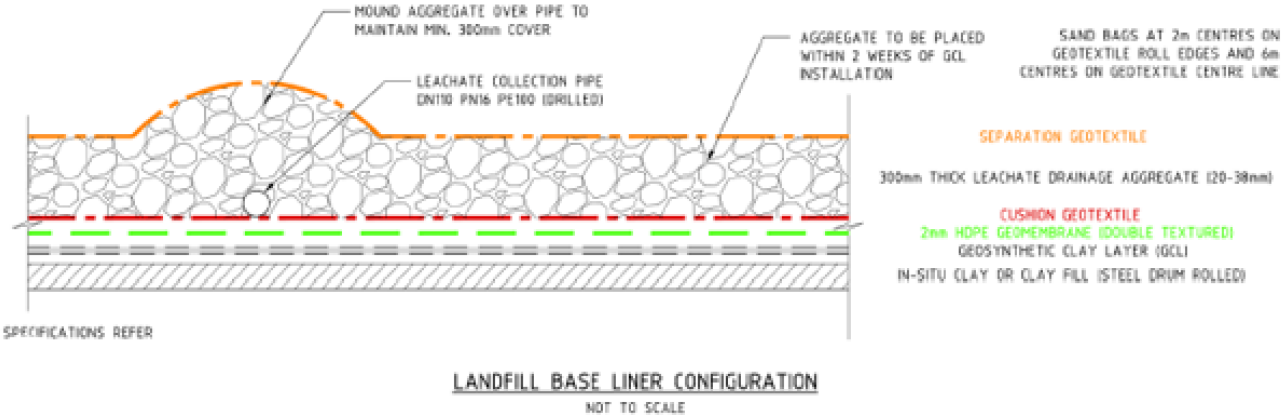

Figure 4: Landfill base liner configuration.

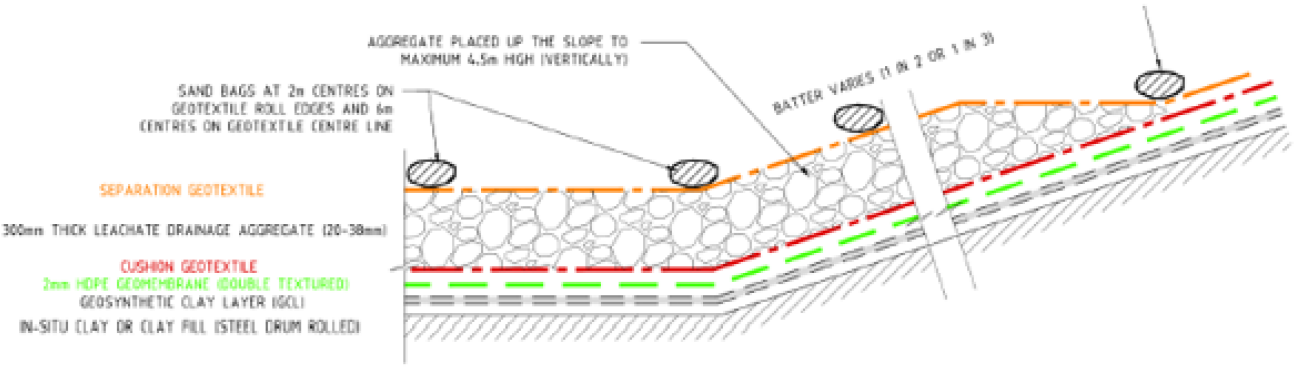

Figure 5: Landfill side slope liner configuration.

The applicant has previously commissioned an assessment of the liner design for landfill Cells 6, 7, and 8 to determine leakage rates and seepage performance. The results of this assessment confirmed that the liner design for these cells adequately conformed to the landfill development guideline specifications as outlined in the Vic BEPM, being a minimum liner leachate rate of 10 L/ha/day. The applicant has advised that the Cell 12A, 9, and 10 liner design is identical to the design for Cells 6, 7, and 8 and as such, considers the results from this assessment applicable to the liner design for the newly proposed cells.

The GCL, HDPE, and cushion geotextile are designed to extend up the side slopes of the landfill cells and extend onto the perimeter bunding. Due to stability issues within aggregate layers of landfills, the aggregate and cushion geotextile layers will initially stop at a maximum of 4.5 m vertically above the landfill floor prior to the acceptance of waste to the cell. As the waste height increases in the active, Cleanaway Solid Waste Pty Ltd will progressively increase the height of the aggregate layer on the cell side slopes. The top 5 m on the lined side batter for the external perimeter of the cells, measured on the slope, will be covered with a minimum of 300 mm of clay to seal the top perimeter of the liner to prevent fugitive landfill gas emissions from the leachate collection layer.

Key finding: The Delegated Officer notes that the liner design for Cells 12A, 9, and 10 is proposed to be identical to the liner design for Cells 6, 7, and 8. As such, The Delegated Officer agrees with the applicants reasoning that the results obtained for leakage rates and seepage performance on Cells 6, 7, and 8 are applicable to Cells 12A, 9, and 10, and will consider these results in undertaking the risk assessment for the construction and operation

of Cells 12A, 9, and 10.

The Delegated Officer considers that the landfill liner design conforms with the specifications outline in the Vic BEPM. In the absence of WA specific landfill construction guidance, the Delegated Officer considers the specifications in the Vic BEPM are representative of best practice.

3.1.2 Cell 12A design specifications

Cell 12A is proposed to be located within the overall landfilling area of the premises as depicted in Figure 3 and has been designed to partially transition over the top of the original Cell 1 and Cell 2 landfill areas. Cells 1 and 2 were the first two landfill cells developed on the premises prior to the applicant taking ownership. Cell 1 consists of a 300 mm compacted clay liner and Cell 2 consists of a compacted clay base and a GCL sidewall liner. The overall design of Cell 12A was based on the best available information on the surrounding landfill cells, being Cells 1, 2, 4B, and 12. The location of Cell 12A, and how the Cell 12A footprint will interact with the surrounding landfill cells is illustrated in Figure 6 below.

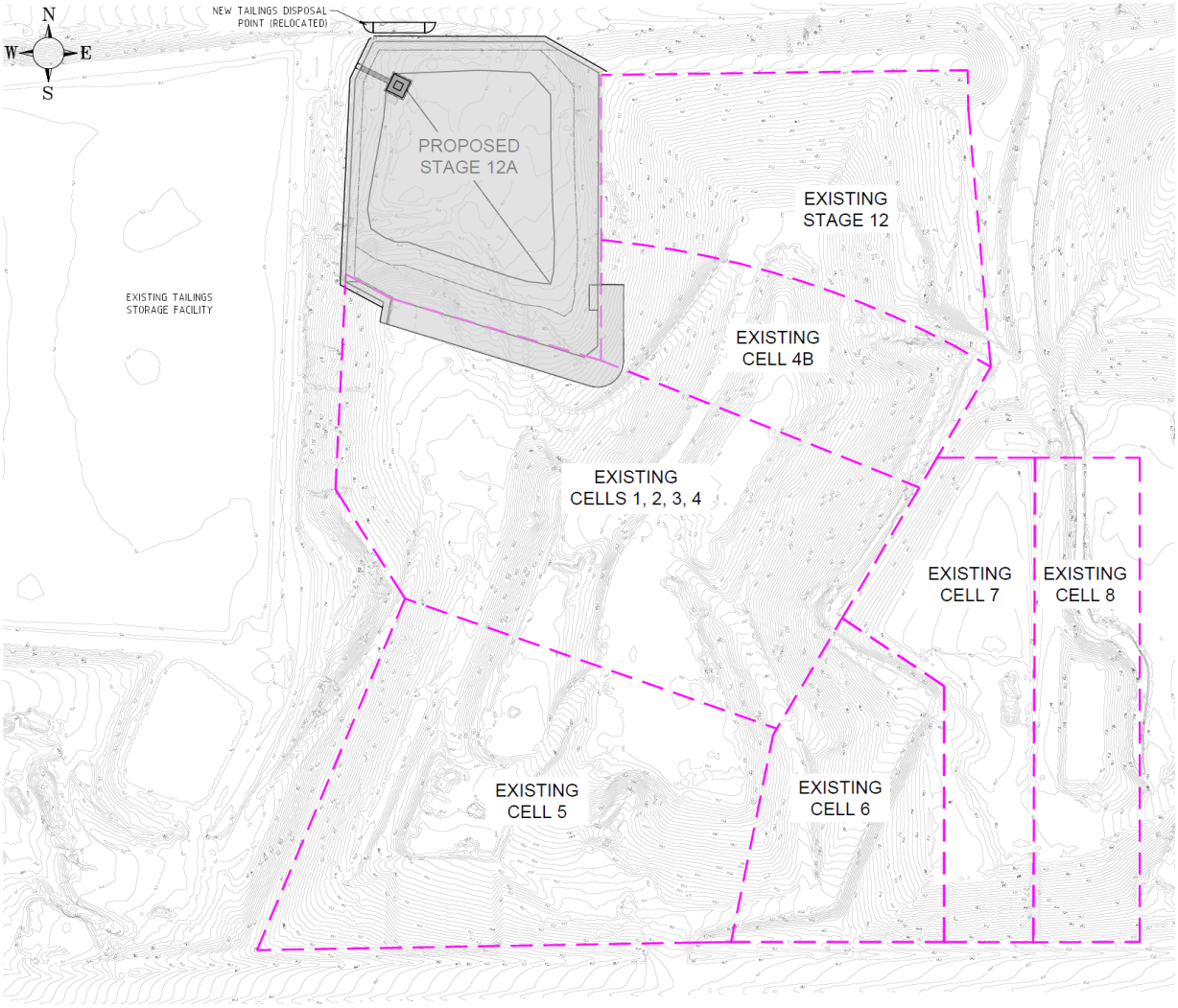

Figure 6: Cell 12A location and interaction with surrounding cells.

Noting uncertainty with the reliability of the Cell 1 and Cell 2 data given the age of the cells and the time that has elapsed since construction, the application details that the base of Cell 1 is a minimum of 6m below the level of the southern edge of the Cell 12A liner (although this varies between 6m and 10m), and the Cell 2 base is a minimum of 15 m below the southern edge of

the Cell 12A liner. As a result, the southern edge liner of Cell 12A, excluding the section that will transition over Cells 1 and 2, has been designed to align vertically with the northern edge of the base of Cells 1 and 2.

Cell 12A is proposed to transition over Cells 1 and 2 by 15 m horizontally due to significant level differences between the Cells 1 and 2 base liner levels and the proposed Cell 12A base liner levels, as it is not possible to connect all these liners together. The design of Cell 12A will include a 15 m wide 'piggyback' liner which will extend beyond the footprint of Cell 12A to the south and south-east, which will act as a barrier between the interface of Cells 12A, 1 and 2, and ensure that the Cell 12A environmental barrier extends beyond the perimeter of the adjoining landfill cells to account for any possible inaccuracies in as-built data. There is no as-built data on the landfill cell configuration, and as such, the applicant will ensure the piggyback liner is also installed a minimum of 5 m beyond the accessible liner of Cell 4B in this location. Anchor trenches will be installed within the overlap zones to secure the liner.

Additionally, the installation of this liner will aim to provide a preferred flow path for leachate generated from the deposition of fresh waste in Cell 12A so this leachate can drain to the north and enter the lined Cell 12A leachate collection system. This will also prevent leachate percolating through Cells 1 and 2, which are clay lined, as opposed to the other existing cells at the premises which have all been constructed using a composite liner system. As an extra precaution to ensure leachate generated from Class III waste does not enter the clay lined cells, the applicant has committed to only dispose of Class II waste to the Cell 1 and 2 areas, as this is the maximum class of waste that Cells 1 and 2 are permitted to accept.

The Licence was amended on 27 February 2023 to authorise the progressive capping of Cells 1 and 2 using a composite capping system comprising of a GCL, 1.5 mm double textured LLDPE liner and geocomposite drainage material. The capping of Cells 1 and 2 (Stage 2 capping) is planned to occur over the 2024/2025 summer periods, subject to the achievement of final waste profiles.

Cell 4B and Cell 12 are located to the east of Cell 12A and were constructed using a synthetic liner system, consisting of a GCL and 1.5 mm HDPE liner. These cells were constructed in 2014 and 2015 respectively, after the applicant took possession of the site. As these cells were constructed more recently, there is detailed as-built information on the location of the cell perimeter anchor trenches; hence, facilitating the accurate connection detail with the proposed Cell 12A.

The eastern edge of Cell 12A has been designed to tie into the western edge of the existing Cell 4B and Cell 12 synthetic liners. The Cell 12 liner is accessible along its full western edge, however the Cell 4B liner is only partially accessible as the liner tapers down to connect with the liner of Cell 3. The Cell 12A liner will be tied into the accessible portion of the Cell 4B liner and at the point where the Cell 4B liner becomes inaccessible, the Cell 12A liner edge will be laid back against the existing waste mass above Cell 1 and Cell 2, and the 'piggyback' liner will be utilised to ensure adequate liner coverage between the cells. The edge of the Cell 12A liner where the liner is directly tied into the Cell 12 and Cell 4B liners will be terminated in a new anchor trench immediately adjacent to the existing Cell 12 and Cell 4B anchor trenches. This approach will ensure a secure termination point for the Cell 12A liner, and that the liner will be able to withstand tension build-up due to waste settlement. A GCL strip will be placed in the gap between the existing and new anchor trenches with a minimum 500 mm overlap onto each of the adjoining cell liners, along with a 2 mm HDPE capping strip over the GCL strip, to ensure an environmental barrier is in place at this location.

The applicant has advised that they commenced excavation of a number of test pits in September 2023 to investigate the cover material over the waste in the southeastern corner of the Cell 12A footprint, and undertook minor investigation works to locate the Cell 4B and Cell 12 liner anchor trenches to ascertain how the transition between the Cell 4B synthetic liner, and the Cell 1 and Cell 2 waste levels were sitting. The results indicated that cell design is suited to

the on-site condition in this area. The cell design also ensures that a minimum 0.5 m soil layer will be in place between the waste mass and the new liner, to ensure that the liner is protected from possible damage, and to facilitate the construction of the new piggyback liner anchor trench within this soil layer.

3.1.3 Cell waste settlement

The applicant has advised that the impact of the settlement of the substrate below the proposed liner systems for the new cells has been considered by the engineering design team, as excess settlement has the potential to negatively impact the long-term integrity of the liner.

When considering Cells 9 and 10, the cell liner system will be installed directly onto the excavated earthworks ground surface. The applicant's design engineers have reviewed site geology in relation to the depth of excavation and determined that the soil cut surface and underlying substrate are firm and well compacted, thus concluding there is no requirement for any additional compaction to achieve a suitable surface for liner installation. If an uncompacted area is encountered during excavation, the area will be over excavated to remove any unsuitable material, and the void backfilled with suitable compacted engineered fill.

For Cell 12A, the majority of the cell liner is proposed to be installed on a cut in-situ soil surface as described for Cells 9 and 10. As such, there will be no settlement to negatively impact the cell liner when the liner is installed with this substrate.

In the areas of Cell 12A which are proposed for construction over Cells 1 and 2, and where the liner system is proposed to extend over Cell 4B, there is potential for minor settlement in the existing waste masses of these cells. The existing waste in Cells 1 and 2 is between 17 and 23 years old and, as such, it is assumed that the vast majority (estimated 95%) of waste settlement has already occurred. The future settlement within these cells below the Cell 12A liner is therefore anticipated to be extremely low, ranging from zero on the northern edge of Cell 1 and Cell 2 to between 100 mm and 200 mm on the southern edge of the Cell 12A liner, with this dependent on the depth of the existing waste mass. Differential settlement in this manner is likely to result in a slight southerly rotation of the cell liner. However, high shear forces within the liner resulting in strain are not expected as a result of this rotation.

Additionally, the Cell 12A liner system in the vicinity of the anticipated area which will undergo waste settlement has been designed with a minimum slope of 1V:5H, falling to the north to accommodate for the slight liner rotation whilst maintaining drainage into the Cell 12A sump.

Key Finding: The Delegated Officer considers that the applicant has adequately accounted for waste settlement within the existing cells to ensure that any residue settlement will have no detrimental effect on the construction and operation of the new landfill cells.

3.1.4 Stability assessment

The applicant has commissioned WML consulting engineers (WML) to undertake an additional assessment on Cells 12A, 9, and 10 to confirm the suitability of the landfill cell design. To inform the stability assessment WML adopted model parameters from previous design checks, laboratory testing and geotechnical investigations at the premises.

Project specific testing of the material parameters of underlying soils have not been undertaken for this stability assessment. However, WML have reviewed and assessed the material parameters provided in previous stability assessments for existing cells and have deemed them appropriate for this analysis. Nonetheless, WML also recommends that specific direct shear testing be undertaken on each of the founding soil materials prior to construction to validate the parameters assumed for this analysis.

WML were also provided with a previously obtained laboratory shear strength test results for each of the proposed liner interfaces of the lining system in place for Cells 6, 7 and 8. As the

lining system for Cells 12A, 9, and 10 will be identical to this, these results are also deemed appropriate for use in this analysis. However, it is recommended that the critical interface parameters of the lining system be confirmed once the materials have been procured. A composite shear box test should be undertaken with all the site-specific geomembranes and geocomposite materials, and each individual interface should also be sheer box tested. The assumptions and validity of the analysis made in this report should then be reassessed with these test result parameters as part of the construction and quality assurance (CQA) process.

The key consideration of the stability of the waste landform during Cell 9 and 10 operation is the deposition of waste into each cell. Three sections have been determined as being the critical phases where waste is placed with no support or buttressing at the base of the slope. Three scenarios for these sections were considered as part of the stability assessment, representing different conditions throughout the operational stages of the landform.

The key consideration of the stability of the waste landform during Cell 12A operation is the excavation of the cell to final design finish levels. Two sections of the ultimate top of waste profile, and two sections of the intermediate landfill profile (prior to waste placement) have been modelled. The intermediate profiles have been determined as the critical phase where the landfill shape of Cell 12A is excavated, leaving an unbuttressed waste slope over a soil bund. Three scenarios for these four sections were considered as part of the stability assessment, representing different conditions throughout the operational stages of the landform.

Each scenario across Cell 12A and Cells 9 and 10 has a recommended Factory of Safety (FoS) adopted from industry guidelines (ANCOLD 2019) for static, pseudo static and elevated phreatic surface conditions. The scenarios were modelled based on worst-case design groundwater levels. An elevated phreatic surface along the base of the waste cell was assumed to model leachate pump failure and an uncontrolled leachate head within the waste.

All stability analysis for each condition returned acceptable factors of safety for a waste slope of 1V:3.5H and internal slopes of 1V:3H, indicating that the proposed design for Cells 12A, 9, and 10 is suitable.

Assessment of the permanent landform for Cell 9 and Cell 10 was not undertaken as it was deemed unnecessary, as future landfill will progress to the east and north of the cells, and thus the only permanent slopes that will be present as Cells 9 and 10 are filled with waste will be the southern waste batter. The northern interim waste batter was analysed as one of the assessment scenarios for the stability analysis, and was found to meet the target FoS. It is therefore assumed that the southern batter will also meet the FoS given that the southern slope is only 17m high; compared to the northern slope which is 33 m high.

Key Finding: The Delegated Officer has reviewed the stability assessment conducted by WML and considers the following:

- Material parameter values derived from previous stability assessments appear to be acceptable for use in this analysis. However, the Delegated Officer agrees with WML's recommendation that these values be confirmed through direct sheer testing of underlying materials.
- Laboratory sheer strength test results for each of the proposed liner interfaces of the lining system in place for Cells 6, 7, and 8 appear to be acceptable for use in this analysis. However, the Delegated Officer agrees with WML's recommendation that these values be confirmed through specific testing on the materials to be used in liner construction, along with the testing of interfaces between these materials.
- FoS assigned to all scenarios are appropriate and consistent with industry guidelines. Additionally, all selected scenarios appear to provide a complete overview of conditions across the landfill cells.
- The assumption that the southern batter of Cells 9 and 10 will meet the relevant FoS

given that the northern slope has met the relevant FoS is valid.

The Delegated Officer considers that the WML stability assessment has generally demonstrated the design of the new cells will be suitable.

However, the outcomes of this report will be considered in conjunction to the outcomes of the peer review as detailed in Section 3.1.5 below.

3.1.5 Landfill construction and stability peer review

As an additional measure to confirm the suitability of landfill cell design, the applicant has commissioned WSP Australia Pty Ltd (WSP) to undertake a peer review of the Cells 12A, 9, and 10 stability assessment conducted by WML and the general construction specifications for the cells. The peer review also included an assessment of the tie-in between Cell 12A and the existing surrounding landfill cells (being Cells 1, 2, 3, 4, 4B, and 12) and the piggyback liner proposed to overlay Cells 1 and 2.

The findings of the peer review identified some uncertainties surrounding the proposed design of Cells 12A, 9, and 10 requiring further clarification from the applicant. The Delegated Officer sought this clarification as a part of the works approval assessment to ensure that the design of the new cells was suitable and to determine where recommendations of the peer review were to be implemented by the applicant. A summary of the peer review findings the applicant's response to these findings, and comments from the Delegated Officer is provided in Table 4 below.

Table 4: Peer review findings and applicant response.

Peer review finding	Applicant response	Delegated Officer comments
The temporary landform of Cells 9 and 10 has not been clearly outlined.	The temporary landform refers to the short-term waste slopes formed within a cell, as the cell is filled with waste. The waste slopes for the temporary landforms have been modelled at 1V:3.5H. Earthwork embankment slopes (cell sidewalls) have been modelled at 1V:3H. The Stability analysis shows that all the landforms meet the required factors of safety. Temporary landforms are not assessed for the raised phreatic or seismic cases, as these slopes are short-term slopes. The slope stability shows that for a temporary waste slope of 1V:3.5H, a FoS more than 1.7 is returned.	The use of temporary landforms within Cells 9 and 10 has been clarified. Stability analysis of the temporary landfills has demonstrated a suitable FoS.
The interface strength parameters used within analyses are generally appropriate for the geosynthetic materials proposed for within the cell liner system. However, the stability assessment be revalidated once the	Shear box testing of the actual materials intended to be used in Cell 12A construction is currently underway. Test results should be received in early January 2024. Upon review of the test results, the assumed interface strength parameters in the stability analyses will be reassessed. If the shear box test results indicate lower interface strength parameters than those assumed in the stability assessment, the Stability Consultant will re-examine the	Shear box testing results were received by DWER on 13 February 2024. The applicant referred the shear box testing results back to WSP for peer review on request of the Delegated Officer. Findings of this additional peer review by WSP were provided to DWER on 23 February 2024. The peer review concluded that

interface strength testing has been completed on the specific construction materials to be used in the works.	stability of the assessed slopes and, if required, the design will be amended to suit the actual interface strength properties of the materials intended for use in the cell construction. Given that interface test results for the intended material have been used for the design and stability analysis to-date, the requirement to amend the design is considered very unlikely. The results of the shear box testing, with changes (if any) to the stability assessment and the design will be appended to the final CQA report.	shear box test results confirmed interface strength parameters of the actual materials to be used in the Cell 12A construction are comparable to those used to conduct the stability assessment. As such, the Delegated Officer considers that the results of the stability assessment remain valid.
It is stated that '*groundwater has been modelled as show in the cross sections (RL 38 AHD)*', and that '*an elevated phreatic surface along the base of the cell was adopted in the modelling to reflect leachate pump failure and an uncontrolled leachate head within the waste'*. It appears that there are inconsistencies with how the piezometric surfaces have been presented / applied in the models.	To assess the static conditions, the sections have been modelled based on a worst-case design water level of approximately 2 m below the base of the cell. The phreatic surface was assessed by an experienced geotechnical engineer to consider the likely shape and contours considering the location of potential water sources, landform, and drainage points. This phreatic surface was assigned to represent an absolute worst-case design soil saturation condition, by locating a phreatic surface near the cell floor. This water level is not intended to represent the groundwater level, as the groundwater is located at R.L. 38 m AHD; however, raising the phreatic surface does model the foundation materials at full saturation, resulting in a conservative analysis.This could occur in the instance of localised flooding, pond failure, prolonged pipeline rupture etc. The phreatic surface is selected to represent a potential for a localised worst case water level (full saturation) rather than the groundwater. The ground water located at RL 38 m AHD is well below the cell floor, and thus it has no effect on the global stability of the embankment wall. In addition to the phreatic surface 2 m below the cell floor, an elevated phreatic surface above the base of the waste cell was assumed to model leachate pump failure and an uncontrolled leachate head within the waste (a worst possible case scenario).	Clarification on how piezometric surfaces have been applied to stability modelling for all new cells has been provided. The application of piezometric surfaces within stability modelling appears appropriate.
Surcharge loading has not been applied in the	It was considered that a surcharge loading scenario may be considered representing a compactor at the crest of a 1V:3.5H waste	Justification as to why surcharge loading has not been applied to stability analysis appears

stability modelling. Surcharge loading is an operational consideration.	batter. The Stability Consultant has undertaken the stability modelling for this scenario using a dry, static operational landform. The analysis indicated a FoS of 1.916. The same scenario assessed without the surcharge loading indicates a FoS of 1.988. It is evident that application of surcharge loading makes little to no difference to the returned FoS and makes no difference to the assessment outcomes and recommendations.	adequate – surcharge loading does not appear to be required.
A baseliner tie in between Cell 12A and Cells 1 and 2 is not proposed due to uncertainties in the extents of Cells 1 and 2, and the lining of these cells being a 300 mm clay liner. The proposed contours also do not tie in with existing surface levels.	The original design intended to excavate the vast majority of the existing interim cover material off of the waste and potentially would have included limited trimming of waste to achieve a more uniform surface for lining. Following the Peer Review comments, the design has been amended to avoid excavation into waste. The subgrade surface underlying the liner will be formed by minor trimming of the existing interim cover to form a smooth surface. The amended drawing set reflects these changes (mainly to the layout plans). Changes to the drawing set are immaterial with no increased risk to the environment. The amended drawings were provided to DWER. The specification and the CQA Plan have not changed.	Design changes as a result of the peer review recommendations have been noted. Final design specifications will be considered within this works approval application.
The piggyback liner configuration does not appear to include a separation geotextile layer over the proposed leachate drainage layer. It is recommended this be included.	The amended drawings include a separation geotextile layer over the piggyback liner leachate drainage layer, as recommended in the Peer Review. The leachate drainage layer and the separation geotextile will be installed progressively as the waste height increases during Landfill Operations.	The inclusion of a separation geotextile within the piggyback liner system as recommended by the peer review has been noted. Final design specifications will be considered within this works approval application.
There are uncertainties with how design components of the anchor trenches proposed for installation along the western external bund of cell 12A and along the western end of the southern bund of cell 12A are meant to	There are only two types of anchor trench around Cell 12A: 1. Where the anchor trench is constructed in a compacted soil perimeter bund (west, north, and most of the east), the anchor trench is 1 m deep. 2. Where the anchor trench is constructed over the existing waste surface, the depth of the anchor trench has been reduced to	The required additional clarification on anchor trench design specifications has been provided. This will act to further inform DWER's assessment on construction

transition to account for the change in liner grade between anchor trench types.	0.5 m, so as not to intercept any waste below the soil cover layer. The transition between the above two types of anchor trenches is that the anchor trench floor is simply raised up 0.5 m over a short transition zone of typically 1 m length of anchor trench. The top of the anchor trench is unchanged and simply follows the level of the perimeter bund or lined surface level.	specifications.
It is unclear how the anchor trench capping strip from the cell 4B tie into the piggyback liner will be terminated and what, if any, connection will occur between the Cell 12A anchor trench and the piggyback liner.	The welded join between the new and existing liner, including the capping strip, ends at the point where the Cell 4B liner dips down into the landfill and is no longer accessible. At this point, heading south, the design changes to include the piggyback that extends a minimum of 15 m beyond the end of Cell 12A to ensure that the new synthetic liner adequately covers the transition zone between the existing landfill cells and the new landfill cell. The join detail is that the 15 m piggyback starts immediately as the capping strip welded join ends. The transition between the above two details is presented in drawings supporting the application. To ensure that there is adequate protection of the join, the design includes an additional layer of liner extending both to the north (over Section E) and down slope (to the west) over the welded joint. This Liner Overlap is intended to prevent any leachate from the waste above percolating down to the transition join between the welded connection and the 15 m piggyback overlap.	The required additional clarification on anchor trench design specifications has been provided. This will act to further inform DWER's assessment on construction specifications.
There may be a risk of leachate or landfill gas migration from Cell 4B to below the Cell 12A liner.	Due to the Cell 4B liner dipping into the landfill and the Cell 1 and Cell 2 liners being 300 mm clay liner and in unknown location, it has not been possible to have a continuous liner tie-in to all existing cells. The piggyback liner design has been included to ensure that there is adequate environmental protection over this transition zone. Recently a vertical well was drilled in Cell 4B to ensure that the leachate in that cell is managed in accordance with the Leachate Plan for the site and to reduce the risk of leachate/LFG migration into Cell 12A. Based on the as-built information, the lowest level in Cell 4B baseliner is at RL 70.45 m, (which is over 3.5 m below the	The applicant has demonstrated that controls are in place within Cells 4B and 12A to mitigate the risk of leachate or landfill gas migration between the cells. These controls will be further considered in DWER's risk assessment relating to the construction of landfill cell 12A.

	Cell 12A leachate sump floor at RL 74m). The recent well in 4B has been drilled to RL 71.54 m (toe of the well). With the proposed pump, the leachate level can be drawn down to RL 72.4 m which meets the requirements of the Leachate Plan. The site has an existing extensive landfill gas extraction system within the waste mass, including in Cells 1, 2, 4, and 12 surrounding Cell 12A. Landfill gas is currently adequately being extracted from the landfill. This situation will continue as Cell 12A is filled with waste. With the active extraction of gas from around the liner tie-in area, there will be adequate control of landfill gas to prevent or significantly reduce any fugitive emissions from escaping below the new Cell 12A liner. In addition, the natural soil below the new liner consists of the typical in-situ silty clay that has a low permeability and hence, will resist the percolation/lateral movement of landfill gas out of the landfill.	
It is noted that waste was encountered above the Cell 12A design levels within cell 4B, and that the liner geometry must be adjusted to reflect this. It is recommended that any changes to liner geometry that could impact stability will need to be reassessed.	The drawings have been amended to account for: - The existing surface levels based on the most recent survey of the site dated 1 November 2023, - The extents and depth to waste based on the outcome of the recent trial excavation, and - The location of the as-built anchor trenches for Cell 12 and Cell 4B. The above changes to the drawings have not resulted in steeper batters than what was assessed in the stability assessment. Nonetheless, the revised slopes will be assessed in conjunction with the revised interface friction parameters once the results of the shear box testing are received.	Design changes based on the peer review recommendations have been noted. Final design specifications will be considered within this works approval application.

3.1.6 Leachate balance assessment

The premises currently consists of four leachate storage ponds, being the Primary leachate pond and leachate ponds 1 – 3. Leachate is managed at the premises by being removed from landfill cells either by gravity drainage (Cells 1, 2, and 5) or by being pumped to a main header along the southern boundary of the site (Cells 3, 4, 5, 6, 8, and 12). The gravity drained cells feed to leachate pond 1 and the pumped header cells drain to the primary leachate pond, from which leachate can be pumped to any of the other leachate ponds at the site.

Issues with ongoing leachate management at the premises were first examined by DWER during the assessment of a 2021 Licence review. The Delegated Officer noted at this time that there was no assessment or reporting requirements for operational leachate heads across the liner floor, and there was not enough information to adequately demonstrate compliance with

leachate management and disposal capacity.

The applicant commissioned Tonkin Engineering in April 2022 to undertake a leachate balance assessment to model the anticipated generation of leachate over the life of the landfill. Modelled leachate generation has then been compared with the site's current leachate disposal capacity to quantify any deficits in disposal capacity going forward. The leachate balance was undertaken for the solid waste disposal (landfilling) operations at the site only.

This model determined that leachate generation exceeded the disposal capacity of the existing infrastructure. In response, the applicant began undertaking measures to address the issues identified, including installing additional sprinklers to all leachate ponds to increase evaporation rates and carting leachate for use as dust suppression on the active tipping face as per licence conditions.

In response to these findings, the Delegated Officer determined that additional controls were required on the Licence to address data gaps relating to the risk of potential leachate emissions. These additional controls included:

- Undertaking investigations to determine the current levels of leachate within the landfill cells,
- Proposing leachate head management levels for each active and closed landfill and TDS cell, and
- Providing an action plan for achieving (if required) and maintaining leachate levels below leachate head management levels.

The applicant commissioned Golder Associates Pty Ltd to prepare and submit this information in a leachate management plan, as required under Condition 52 of the Licence, on 31 March 2022. The proposed leachate head management levels for each cell, including the justification used to assign the levels, are outlined in Table 5 below.

Table 5: Proposed leachate head management levels.

Cell	Allowable leachate head above cell base liner (at sump crest) (m)	Allowable leachate head relative level (RL) (mAHD)	Comment
8	0.9	83.4	Based on maintaining annual seepage below Vic BPEM seepage limit.
7	1.1	83.1	
6	1.1	82.1	
12	2.4	80.4	
4 & 4B	2.2	72.4	Based on maintaining leachate head below the overtopping limit for Cell 4 and 4B. Annual seepage based on overtopping limit is estimated to be approximately 0.5 x Vic BPEM seepage limit.

3	3.0	73.2	Based on maintaining leachate head at the practical limit from pumping and measuring leachate in the Cell 3 vertical riser. The leachate level will be limited by the overtopping limit (at 1.3 m above the cell liner, or RL 71.5. Annual seepage based on physical constraints of Cell 3 vertical riser is estimated to be approximately 2 x Vic BPEM seepage limit.

It should be noted that Cells 1, 2, and 5 are gravity fed and hence do not contain leachate heads, therefore assigning a management level is not appropriate. Leachate levels are therefore proposed to be monitored in these cells through the applicant undertaking visual inspections of leachate flow from cells into the leachate ponds as part of weekly checks, and recording these inspection results appropriately.

Should the leachate head management levels be exceeded for the pumped cells, the action plan submitted within the Leachate management plan outlines that the following measures should be taken:

- Review / troubleshoot pump performance and operating mode.
- Review / troubleshoot pump bubbler to confirm reading is accurate.
- Confirm interim capping integrity.
- Leachate recirculation from cells with exceedances to compliant cells using existing infrastructure.

Should the freeboard levels in the leachate ponds be exceeded, the leachate management plan outlines that the following measures should be taken:

- Leachate recirculation from cells with exceedances to compliant cells using existing infrastructure.
- Use of sprinklers in all four leachate ponds to increase the volume of evaporation of these ponds.
- Leachate trucking to tip face for dust suppression in active cells and distribute leachate to improve the opportunity for disposal via evaporation.
- Additional leachate volume control measures should be considered for implementation if the above measures be deemed insufficient.

In parallel with the above measures to address exceedances in both landfill cells and leachate ponds, the leachate management plan also outlines that the following actions are recommended to improve leachate level monitoring and collection measures at the premises:

- There is some uncertainty regarding the RL of the weekly leachate levels measured in the pumped landfill cells. It is recommended that the measured leachate levels are presented as an RL for future monitoring events.
- The viability of reinstating flow meters on Cells 1, 2, and 5 discharge pipes to the Primary leachate pond and leachate pond 1 should be considered. Flow meter data could be used to supplement the proposed visual inspections of leachate flow from these cells.

Key Finding: Regarding ongoing leachate management at the premises, the Delegated Officer considers the following:

- The effectiveness of management measures undertaken by the applicant to reduce leachate levels within the leachate ponds, such as sprinkler installation and carting leachate for use as dust suppression on the tipping face, is not understood as no additional information relating to leachate levels at the premises has been provided to DWER.
- The volume of leachate held within the landfill cells is uncertain and the setting of additional operational controls limiting leachate head levels may prove beneficial for ongoing leachate management at the premises.
- The reinstatement of flow meters on the Cell 1, 2, and 5 discharge pipes to the leachate ponds will provide much more certainty on the amount of leachate generated from these cells than visual inspection.
- The construction of additional landfill cells at the premises will result in more leachate generation from the landfill footprint once deposited putrescible waste starts to decompose.
- The progressive capping of landfill cells, as authorised under the February 2023 amendment to the Licence, will act to reduce leachate generation from these cells once the capping layer is completed.

Based on the above points, the Delegated Officer considers that several data gaps remain relating to ongoing leachate management and generation at the premises.

This will be taken into consideration through the works approval risk assessment relating to the risk of potential leachate emissions.

3.1.7 Landfill gas management

The applicant intents to progressively install landfill gas infrastructure as the waste mass develops across landfill cells at the premises. Landfill gas is collected by a combination of horizontal and vertical wells, where:

- The horizontal wells are typically 100 m long perforated pipes buried in an aggregate-filled trench and are typically installed at 6m vertical intervals and 30 m to 50 m horizontal intervals. The perforated pipes are then connected to the landfill gas extraction system, which transfers the collected landfill gas to the gas flare.
- The vertical wells are installed on top of the landfill surface once the landfill cell has reached maximum height and is being prepared for closure. Wells are typically drilled into the waste mass at grid spacings of between 30 m to 50 m apart and are typically between 20 m to 30 m deep. Wells are then connected to the gas flare via a network of lateral pipes and manifolds.

In 2021, the applicant engaged Resolve Environmental to undertake landfill gas generation rate modelling, with the intent that this modelling inform the creation of collection curves and estimates for extraction efficiency and gas capture. The results of this modelling are outlined in Figure 7 below. Typically, the flare capacity should match the expected or forecasted gas capture estimates and as such, the current capacity of the flare is 2,000 m^3/hr with a turndown ratio (the ratio between the minimum and maximum flow values) of 10:1.

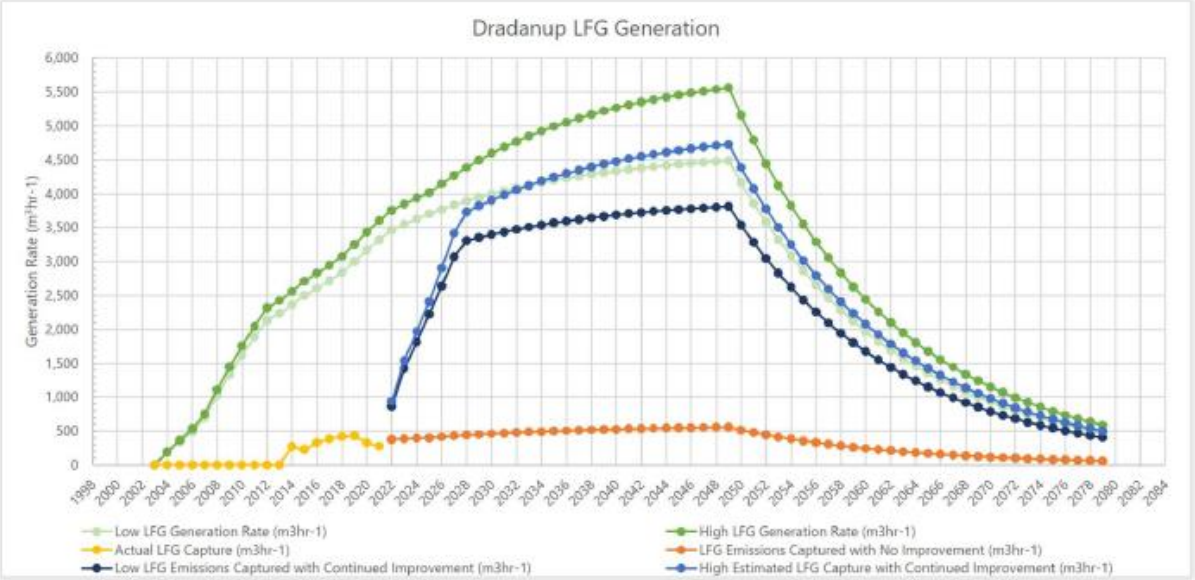

Figure 7: Modelling outcome - Landfill gas generation and capture curve.

Key Finding: The Delegated Officer considers that the outcomes of the landfill gas modelling demonstrates that the applicant's current landfill gas management procedures appear sufficient, and thus adequate for use in managing landfill gas emissions from future landfill cells at the premises.

3.2 Surface water management infrastructure

The applicant has previously commissioned Golder Associates Pty Ltd (Golder) to design and progressively install a surface water management system for the site. This system controls all surface water and directs it around the landfill areas, and down to the western portion of the site where it is stored in two stormwater dams for subsequent use in landfill operations. In mid-2022, the applicant wished to improve on the existing system and again engaged Golder to assess and update the current stormwater management plan in place for the existing premises. In developing a new stormwater management plan, the impact of a 1% AEP storm event on site stormwater infrastructure was considered and it was concluded that current site infrastructure is adequate to contain stormwater resulting from this storm event. The adequacy of existing site infrastructure is dependent on the maintenance of a 0.5 m freeboard in Stormwater Pond 2.

Due to site operational requirements, it was determined that Stormwater Pond 2 would be better used as a water storage dam so that the requirement to retain a freeboard could be removed. As a result, there became a need for alternative stormwater retention elsewhere on the premises to accommodate for a potential 1% AEP storm event. It was determined that a minimum stormwater storage area of 91,000 m^3 must be maintained on site to contain a 1% AEP storm event.

To accommodate this, the applicant submitted a works approval application to DWER to increase the dimensions of existing basins and construct one new basin, with these improvements providing a 95,650 m^3 storage area for stormwater retention, or approximately 5% more storage area than required as determined by Golder's modelling. The intent of these works was so the additional storage areas would cumulatively capture overflow from Stormwater Pond 2, as the ponds would rely on gravity to progressively fill basins down the flow path from Stormwater Pond 2.

On 21 April 2023 the applicant was granted works approval W6745/2022/1 for the construction of the new stormwater management infrastructure. Construction works are conditioned in the

works approval to occur over a three-year staged construction period. During this time, the applicant will ensure sufficient storage area and freeboard is retained within Stormwater Pond 2 to ensure that there is always adequate available storage to accommodate a 1% AEP storm event.

The excavation works proposed for Cells 9 and 10 are expected to generate a large surface water catchment within the cell void due to the base of the landfill cells being significantly below natural ground level. It has been identified that some of the surface water collected from these below ground excavation works is unable to be gravity fed into the surrounding stormwater management network. To manage this water, the applicant has ensured that Cells 9 and 10 incorporate a system of pipes, stormwater channels and control ponds adjacent to the active landfill cells which will collect surface water and stormwater from the excavated void. The ponds have been sized to contain a 1-in-100-year storm event of 24-hrs duration, which exceeds the sizing requirements for stormwater ponds outlined in the Vic BPEM, as the applicant has determined that stormwater will enter adjacent landfill cells if these ponds were to overtop. This additional infrastructure is temporary in nature and will be decommissioned on completion of Cell 9 and 10 construction works. The stormwater retention pond for Cell 9 will be constructed in the footprint of Cell 10 and decommissioned prior to the construction of Cell 10 commencing. The stormwater retention pond for Cell 10 will be constructed immediately east of the Cell 10 footprint.

Key Finding: DWER has reviewed the suitability of the stormwater management network both currently in place at the premises and approved for construction through the assessment of works approval W6745/2022/1 and has determined that the network is sufficient to contain stormwater generated across the premises.

The Delegated Officer considers that temporary surface water and stormwater management controls will be required to facilitate the construction of Cells 9 and 10. Controls proposed by the applicant appear suitable to meet this need without posing a risk to the environment or impacting existing premises operations.

3.3 Exclusions to the works approval

Prescribed premises categories that are authorised on the Licence are categories 5, 61 and 64. This works approval application seeks authorization to construct 3 new landfill cells, which will be constructed and operated under Category 64 within the works approval and subsequently the Licence. No changes to the operational aspects or throughputs to the Licence are being sought by the applicant in relation to categories 5 and 61 and hence will not be authorised under this works approval. As such, all licenced operations regulated under categories 5 and 61, and all associated premises infrastructure associated with these operations, will fall outside of the scope of this works approval.

Ongoing landfill operations

The facility is a Class III landfill that is permitted to accept the following materials:

- Clean fill
- Inert Waste Type 1
- Inert Waste Type 2 (asbestos)
- Putrescible Waste
- Contaminated solid waste (meeting up to and including Class III criteria)
- Special Waste Type 1 (asbestos)
- Special Waste Type 2 (biomedical/clinical waste)
- Green Waste

- Drilling mud following fixation.

The total operation has a nominated rate of throughput for the premises of 350,000 tonnes per annum. The applicant is not seeking an increase to this throughput as a part of this works approval. The new cells are proposed to be constructed to facilitate ongoing landfilling operations at the premises at the currently approved waste acceptance throughput, and as such the applicant is not seeking an increase to this throughput as a part of this works approval.

The acceptance and disposal of waste into landfill Cells 12A, 9, and 10 will conform with waste acceptance procedures currently in place at the premises. No proposed changes to waste processing specifications are anticipated when Cleanaway Solid Waste Pty Ltd applies to amend the premises Licence to facilitate waste acceptance to the new cells (upon confirmation that the cells have met construction and performance specifications outlined in the works approval). Alternatively, Cleanaway Solid Waste Pty Ltd may wish to apply for an amendment to this Works Approval to allow time-limited operations for a new cell once construction compliance has been demonstrated.

Cleanaway Solid Waste Pty Ltd has committed to only depositing Class II waste within Cell 12A vertically above Cells 1 and 2, since Cells 1 and 2 are clay-lined and hence not permitted to accept higher classes of waste. The piggyback liner extends over Cells 1 and 2 and as such, no Class III waste will be placed over this liner. Class III waste will be placed within Cell 12A vertically over the lined footprint within the cell.

Key Finding: The Delegated Officer considers that should any changes to waste processing specifications be required on completion of the works outlined in the works approval, then these proposed changes will be assessed through the subsequent licence amendment application assessment. This includes the commitment made by the applicant that only Class II waste be deposited within the cell 1 and cell 2 footprints of cell 12A.

4. Legislative context

4.1 Occupancy

Lot 2 on Deposited Plan 65861, Certificate of Title Volume 1670 Folio 568 is currently owned by J & P Corporation Pty Ltd. Cleanaway Solid Waste Pty Ltd holds the lease for the premises until 1 September 2026 with four extension options remaining (each of a ten-year period). DWER considers Cleanaway Solid Waste Pty Ltd to be the occupier of the premises for the purposes of Part V of the EP Act.

4.2 Part IV of the EP Act

4.2.1 Background

On 30 June 2011, Transpacific Waste Management Pty Ltd referred a proposal to EPA. The Proposal was for the development of a residue disposal cell. On 1 August 2011, the EPA made a determination to not assess the proposal, stating that the overall environmental impact of the proposal was not so significant as to require assessment by the EPA, and the subsequent setting of formal conditions by the Minister for Environment under Part IV of the EP Act.

On 16 March 2015, Cristal Pigment Australia (now Tronox) referred a proposal to EPA. The Proposal was for the development of a residue disposal facility and an upgrade of part of Panizza Road. One submission was received during the public consultation period and on 13 May 2015, the EPA made a determination to not assess the proposal, stating that the overall environmental impact of the proposal was not so significant as to require assessment by the EPA, and the subsequent setting of formal conditions by the Minister for Environment under Part IV of the EP Act. EPA noted that the potential environmental impacts on Flora and

Vegetation and Terrestrial Fauna could be adequately dealt with under Part V Division 2 (Clearing) of the EP Act and Inland Waters Environment Quality, Terrestrial Environmental Quality and Rehabilitation and Decommissioning can be adequately dealt with under Part V of the EP Act.

On 17 December 2018, DWER received a works approval application (W6212/2019/1) from the applicant for the construction of a Class III waste cell for the storage of tailings generated from the Albemarle lithium hydroxide refinery in Kemerton. On 1 May 2019, the Shire of Dardanup provided a third-party referral of the proposed lithium tailings storage cell to the EPA. The referral was released for public comment between 15 May 2019 to 21 May 2019 with public submissions received relating to potential health effects associated with dust emissions and groundwater contamination. In reviewing the application, DWER determined that the application met the description of a Category 5 Tailings Storage Facility under Schedule 1 of the Environmental Protection Regulations 1987 (EP Regs).

On 3 July 2019 the EPA made a determination to not assess the proposal, stating that the overall environmental impact of the proposal was not so significant as to require assessment by the EPA, and the subsequent setting of formal conditions due to the relatively small scale of the impacts, the small geographic footprint, and relatively short duration of planned activities. The EPA considered the mitigation strategies proposed by the proponent to avoid and minimise impacts, noting that no native vegetation and fauna habitat was to be cleared, and the presence of other statutory processes to regulate emissions and discharges, such as Part V of the EP Act and the Noise Regulations. 19 appeals were received against this decision.

On 7 November 2019, the applicant advised DWER that they wished to withdraw the works approval application for the lithium tailings storage cell. As a result, the application has been marked as withdrawn in DWER's records and no further assessment has taken place. Appellants were advised by the Office of Appeals Convenor that the appeal investigation had been placed on hold noting the withdrawal. Should a new application for the storage of lithium tailings at the premises be received, this may trigger a reactivation of the appeals.

4.2.2 Ministerial Statement 1213

On 1 April 2021, the applicant referred a proposal to the EPA under Part IV of the EP Act for consideration. The proposal was for the continuation of existing landfill activities and the establishment of additional landfill cells within the existing premises boundary, being cells 12A, 9 and 10. The Proposal was limited in extent to the existing Premises boundary with no proposed increase to the existing approved throughput or removal of any remnant native vegetation. A public consultation period was undertaken between 12 and 18 July 2021 with 17 submissions received. On 5 August 2021, EPA made a determination to assess the proposal stating that the proposal has the potential to impact on:

- Inland Waters (from stormwater runoff and leachate seepage into groundwater),
- Social Surroundings (from interference with amenity values),
- Generation of Greenhouse Gas emissions (from flaring), and
- Air Quality (from dust and odour emissions).

After assessment was undertaken, the EPA granted Ministerial Statement 1213 to the applicant on 21 November 2023. The Ministerial Statement (MS) provided conditions at the premises relating to the maximum extent or range for development envelope, development height, net greenhouse gas emissions, and project life for landfill Cells 12A, 9, and 10. No appeals were made against this decision.

Key Finding: The Delegated Officer is aware that, in exercising their duties, the Department must ensure that the decisions and conditions for a works approval are not contrary to, or otherwise than in accordance with, an implementation agreement or decision of the Minister

under sections 54(4)(b), 57(4)(b), and 59B(7)(b) of the EP Act. This means that works approvals must be consistent with Ministerial Statements and associated documents (such as approved management plans) for significant proposals that have been assessed under Part IV of the EP Act.

The Delegated Officer has therefore ensured that construction and / or operational management aspects outlined in the works approval application are aligned with those outlined through conditions in MS 1213.

Additionally, to avoid regulatory duplication, the Delegated Officer will exclude regulation of greenhouse gas emissions and projected landfill life for the new landfill cells from the works approval, as the regulation of these premises aspects is adequately covered by conditions within MS 1213.

4.3 Contaminated sites

The Premises was classified under Section 13 of the *Contaminated Sites Act 2003* (CS Act) as possibly contaminated - investigation required on 28 May 2014, and a memorial (M675551) was placed on the certificate of title. The classification was based on groundwater monitoring results submitted to the former Department of Environment and Conservation (DEC) up to May 2014. A summary of the contaminated sites within 2 km of the premises is shown in Table 6 below.

Table 6: Surrounding contaminated sites.

Lot No.	Classification	Summary
Lot 2 Banksia Road	Possibly contaminated - investigation required – Classified 28 May 2014	Current Cleanaway Banksia Road premises
Lots 81 & 800 (Formerly Lot 1 Banksia Road)	Possibly contaminated - investigation required – Classified 28 May 2014	Former Shire of Dardanup Class II putrescible landfill site
Lots 82 & 20	Possibly contaminated - investigation required – Classified 28 May 2014	Dardanup Wastewater Treatment Plant

4.4 Planning approvals

The applicant sought development approval for the construction of the new landfill cells through referral to a Joint Development Assessment Panel (JDAP) through the Department of Planning, Lands and Heritage (DPLH).

The JDAP granted the applicant development approval through a hearing outcome on 9 February 2024. The approval is subject to the following conditions:

- Internal circulation of all vehicles must not encroach on the 20 m landscaped boundary interface of the property,
- Prior to filling commencing, a ‘Noise Management Plan’ that has been prepared by a suitably qualified acoustic consultant must be submitted to and approved by the Shire of Dardanup that includes the following:
    - demonstrates that noise from the approved use will comply with the *Environmental Protection (Noise) Regulations 1997*, and
    - details the noise mitigation measures that will be implemented to make the noise comply with the *Environmental Protection (Noise) Regulations 1997*.

  Once approved the Noise Management Plan will form part of the development approval and must be complied with at all times for the life of this approval,

- An annual “Progress Report” must be submitted detailing progress of the landfill excavation pit over the previous 12-month period. The report should provide details of the following:
    - Extent of extraction undertaken (volume and area).
    - Extent of filling of the cells (volume and area),
    - Completion of stages,
    - Rehabilitation of completed stages,
    - Outcomes of monitoring of planted vegetation buffers, and
- Prior to works commencing an updated Bushfire Management Plan must be submitted and approved by the Shire of Dardanup.

4.5 Part V of the EP Act

4.5.1 Applicable regulations, standards, and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations.

The guidance documents which inform this assessment are:

- *Guidance Statement: Setting conditions (October 2015)*
- *Guidance Statement: Licence duration (August 2016)*
- *Guidance Statement: Publication of Annual Audit Compliance Reports (May 2016)*
- *Guideline: Decision making (December 2020)*
- *Guideline: Environmental siting (December 2020)*
- *Guideline: Regulatory principles (December 2020)*
- *Guideline: Risk assessments (December 2020)*

4.5.2 Works approval and licence history

Table 7 summarises the works approval and licence history for the premises for the last 10 years.

Table 7: Works approval and licence history.

Instrument	Issued	Nature and extent of works approval, licence, or amendment
W5301/2012/1	1/02/2013	Installation of landfill gas collection and flare.
L7439/1998/8	22/02/2013	Licence amendment to authorise use of TDS Cell 1 (formerly MIC cell).
W5546/2013/1	23/01/2014	Works approval for construction of Cell 4B.
L7439/1998/9	29/05/2014	Licence reissued for 5 years and converted to REFIRE format.
W5748/2014/1	29/01/2015	Works approval for construction of Cell 12 and leachate evaporation pond 3.
L8904/2015/1	3/08/2015	Licence issued due to L7439/1998/9 ceasing to have effect.

Instrument	Issued	Nature and extent of works approval, licence, or amendment
L8904/2015/1	22/10/2015	Licence amendment to authorise operation of leachate evaporation pond 3, constructed under W5748.
L8904/2015/1	5/05/2016	Licence amendment to change company name, authorise operation of Cell 12 constructed under W5748, and address stormwater upgrades.
L8904/2015/1	21/07/2016	Licence amendment to accept approximately 3,000 tonnes per annual period of drill muds for blending and disposal to landfill, and to increase allowable volumes of Processed Septage to 3,000 tonnes per annual period.
L8904/2015/1	13/04/2017	Licence amendment for construction and operation of three composite HDPE liner Class III landfill cells (Cells 6, 7, and 8), construction and operation of a phytocapping trial on Class III landfill Cell 5, and review of Premises operations and regulatory controls.
L8904/2015/1	2/02/2018	Amendment Notice 1 to reflect the completion of Cell 6 construction and authorise its use.
L8904/2015/1	18/02/2019	Amendment Notice 2 for a new Cristal pigment waste cell and Cristal Pond under Category 61.
L8904/2015/1	25/06/2019	Amendment Notice 3 to authorise the use of CC2 and Cristal pond constructed under Amendment Notice 2.
L8904/2015/1	17/12/2019	Licence amendment to increase in quantity limit for Category 64 waste acceptance to 350,000 tonnes per annual period, review of regulatory controls relating to dust and windblown waste, and consolidate Amendment Notices 1, 2, and 3 into the licence.
L8904/2015/1	12/05/2020	Licence amendment to reflect the completion of Cell 7 construction and authorise its use.
L8904/2015/1	28/05/2021	Licence amendment to reflect proposed changes to the emissions and discharges during construction and operation of the proposed southern boundary stormwater drain.
L8904/2015/1	5/10/2021	DWER initiated licence amendment to give effect to the Minister's decision for the Cell 7 appeal. to allow the appeal to the extent that additional conditions are imposed on the licence relating to odour. The Minister otherwise dismissed all other grounds of appeal (Appeal 30 of 2020).
L8904/2015/1	28/10/2021	DWER initiated licence review including the assessment and authorisation to use Cell 8.
L8904/2015/1	27/02/2023	Licence amendment to commence capping of stage 1,2 and 5 and to allow for the construction and operation of a leachate recirculation system.
W6745/2022/1	21/04/2023	Works approval for the construction of additional stormwater management and storage infrastructure.

Instrument	Issued	Nature and extent of works approval, licence, or amendment
L8904/2015/1	22/02/2024	Licence amendment for the relocation of the landfill gas flare station and extension of landfill gas conveyance infrastructure.
W6588/2023/1	TBC	Works approval for the construction of landfill Cells 12A, 9, and 10.

4.5.3 Key and recent approvals

On 16 June 2022, the applicant submitted an application to the department to amend their Licence L8904/2015/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act) to authorise the progressive capping of three portions of the landfilling area (Stage 1, 2 & 5), including installation of a leachate recirculation system. This licence amendment was granted to the applicant on 27 February 2023, and is currently subject to an Appeal. Once the appeal determination has been finalised, the Licence may be amended again to give effect to the Ministers decision. Landfill Cells 1 and 2 fall within the Stage 2 capping works, and the capping of these cells will need to complete before construction can commence on Cell 12A; as this cell is designed to partially transition over the top of the original Cell 1 and Cell 2 landfill areas.

On 18 July 2022 the applicant submitted a works approval application under Section 54 of the EP Act to authorise construction works relating to additional stormwater overflow basins at the premises. These works were sought to fulfil operational needs to improve the stormwater management system onsite and to maximise the storage of clean stormwater for onsite use in dryer seasons. This works approval application also sought to change the area within the premises currently excised from the premises boundary, which is held by the J & P Corporation Pty Ltd for extractive industry activities. The applicant intends to incorporate a portion of this area into the premises boundary to facilitate the development of an additional stormwater basin. Once all construction works are completed, the applicant will need to seek a Licence amendment to incorporate new infrastructure and the premises boundary change onto the Licence. Construction works are anticipated to be completed by summer 2025.

On 23 October 2023, Cleanaway Solid Waste Pty Ltd submitted an application to the department for a licence amendment which sought to relocate the landfill gas flare infrastructure from its previous location within the proposed landfill Cell 12A footprint to the west of the Titanium Dioxide Slurry (TDS) Cell 1 Leachate Pond. To facility the relocation of the flare, Cleanaway Solid Waste Pty Ltd also sought to construct additional pipework across the northern boundary of the premises to transfer landfill gas from the previous landfill gas collection infrastructure to the new flare location. The relocation of the landfill gas flare was directly related to this works approval application, as the relocation of the flare was required prior to construction works commencing on cell 12A. This Licence amendment was issued by DWER on 22 February 2024.

5. Suitability of current controls and monitoring

5.1 Noise

A number of noise assessments have been undertaken at the premises. In 2020 Herring Storer Acoustics (HSA) was commissioned by the applicant to undertake a noise assessment relating to noise emissions from the Banksia Road landfill. The purpose of the assessment was to assess noise emissions for the current and proposed operations at the facility for compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations). The applicant has submitted this report as supporting documentation to this works approval application.

HSA concluded that the results showed that compliance with the Noise Regulations was achieved at the residential location for all hours. The noise assessment was internally referred to DWER's Environmental Noise Branch (ENB) for technical advice, who were unable to confirm that the conclusions in the HSA report were reliable due to the following factors:

- Noise monitoring was conducted over 10 days. However, HSA only chose one day for analysis,
- The high noise levels were attributed to noise sources other than landfill operations. Audio recordings were not provided to backup this claim, and
- The report did not provide details of what equipment was in operation, in which areas of the landfill.

DWER sought additional information from HSA and although HSA provided some clarifications or statements to ENB's comments, no additional data or evidence was presented to support each of the statements.

DWER completed noise monitoring between 15 October and 11 November 2020 in response to noise complaints raised by two neighbours located near to the premises. DWER's investigation confirmed that the residents in these two premises could, on occasion hear the noise associated with the operation of the landfill, which appeared to be most noticeable on calm days. The monitored noise results indicated that noise emissions from the landfill site complied with the Noise Regulations at both noise sensitive premises during the investigation period.

Key Finding: The Delegated Officer notes that whilst noise monitoring undertaken by DWER indicates that premises operations comply with noise level requirements outlined in the Noise Regulations, the Department was unable to confirm all the HSA noise assessment conclusions. However, the acoustic analysis undertaken by the Department's Environmental Noise Branch confirmed that landfill operations were compliant with the assigned levels outlined in the Noise Regulations.

The Delegated officer also noted that the location of Cells 9 and 10 is further away from the closest sensitive receptors than current operations.

The Delegated Officer notes that the applicant is required to submit a Noise Management Plan to Shire of Dardanup as a condition of the JDAP outcome. The Noise Management Plan must demonstrate that noise generated from the premises complies with the Noise Regulations.

Should any further concerns be raised in relation to compliance with the Noise Regulations through the submission of the noise management plan to the Shire of Dardanup, the Delegated Officer can consider this through the assessment of the subsequent Licence amendment assessment to facilitate the operation of the new landfill cells.

5.2 Dust

Dust mitigation controls at the premises were reviewed as a part of the 2021 Licence review process. In response to this review, DWER incorporated conditions to the premises Licence requiring the applicant to design and implement a dust composition, sampling, and monitoring program, and provide a report on conclusion of the monitoring summarising the results.

The applicant commissioned Strategen JBS & G (Strategen) to prepare the program and report. The sampling and analysis program plan was required under Condition 55 of Licence L8904/2015/1 and was provided to DWER on 16 November 2021. The applicant received feedback from DWER on 4 March 2022 confirming that the plan was compliant with the requirements of Condition 55 and recommending an alternative location for one of the monitoring sites, and a 10 m high wind speed and direction sensor. The applicant responded to

the DWER feedback on 28 March 2022 and implemented the approved plan.

Dust and asbestos sampling using low volume sampling techniques was conducted for a 24-hour period every sixth day from 19 March 2022 until the monitors were decommissioned on 17 June 2022. Collected particulate samples were analysed for PM10 and the following metals: Silver, Aluminium, Arsenic, Boron, Barium, Beryllium, Cadmium, Cobalt, Chromium (III), Chromium (VI), Copper, Iron, Mercury, Manganese, Molybdenum, Nickel, Lead, Selenium, Vanadium, and Zinc. Asbestos samples collected were examined by microscope. Where fibres were detected, further examination was conducted to determine the type of fibres present. Two sampling locations were used, one on the northwest (NW) boundary and one on the premises west (W) boundary. The results from the sampling and monitoring program can be summarised as follows:

- Dust levels above the Ambient Air Quality NEPM criteria (50 µg/m^3) were determined for three samples collected within the first month of sampling. Two of these samples, collected at the NW site, may have been influenced by dust carried on winds coming from across the body of the landfill. The third sample exceeding the NEPM criteria was collected at the W site; prevailing winds during this collection period were from the south, which is not across the body of the landfill operations.
- Analysis of metals in the sampled particulate determined mainly non-detectable results. Concentrations at or above the ambient air quality average guideline values were determined for beryllium (two samples) and nickel (one sample).
- The count of asbestos fibres did not exceed the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres (NOHSC) defined geometric conditions for respirable fibres guidance value (0.01 fibres/mL) in any of the samples collected. However, samples with multiple fibres present were examined. The analysis determined asbestos was not present in any of the samples.

The Strategen report concludes that the results of the sampling and analysis indicate that the composition of dust generated at the site does not pose a significant risk with the potential to leave the site and reach nearby sensitive receptors. Further monitoring is not recommended based on the results of this monitoring program.

Key Finding: The Delegated Officer has examined the results of the Strategen report and considers that current controls in place at the premises, and conditioned within Licence L8904/2015/1, appear adequate to mitigate the risk of impacts from dust emissions generated from both current site operations and construction activities authorised under this works approval. Dust mitigation controls are also anticipated to be effective in preventing emissions resulting from the operation of the new landfill cells.

The adequacy of dust control conditions can be reviewed once the new landfill cells become operational.

5.3 Fire risk management

The applicant has submitted the current fire control procedure and emergency management plan in place at the premises (as prepared in October 2020) as supporting documentation to this assessment.

In response to the licence review undertaken in 2021, an appeal was submitted by five appellants to the Appeals Convenor on 14 November 2021. One of the grounds of this appeal was that the appellants considered that a fire management plan should be required by the Licence. The appeal was finalised on 26 October 2023.

In determining the appeal, the Minister for Environment; Climate Action (the Minister) accepted advice from the Appeals Convenor and determined that the applicant be required to have their

current fire management plan, being the plan submitted in support of this works approval application, reviewed by a suitably qualified fire safety engineer to ensure than plan is consistent with the Department of Fire and Emergency Services (DFES) guidance. This plan is also required to reflect the requirements of the Licence, including landfill gas monitoring, and address the risk of bush fires from the Dardanup Conservation Park. Following the review, the applicant will be required to action any review recommendations from DFES and then maintain and implement the plan. The plan is also required to be tested annually.

The appeal determinations will be given effect under section 110 of the EP Act through a DWER initiated amendment to Licence L8904/2015/1. DWER initiated the amendment process in January 2024.

Key Finding: The Delegated Officer notes that the operation of Cells 12A, 9, and 10 will be subject to the requirements of a fire management plan endorsed by DFES, which will be implemented through a DWER-initiated amendment to the sites operational licence.

5.4 Leachate

As discussed in Section 3.1.6 above, the Delegated Officer considers that several data gaps remain relating to ongoing leachate generation and management at the premises.

This will be taken into consideration through the works approval risk assessment relating to the risk of potential leachate emissions.

It is also noted that the Ministers appeal determination in response to the appeal against the 2021 Licence review, conditions within the Licence (condition 52) are to be amended to implement the Leachate management plan required to be submitted to DWER under current condition 52.

Please also refer to Section 5.4 below.

5.5 Groundwater

As a part of the licence review for the premises undertaken in 2021, the groundwater monitoring network in place at the premises was examined. The applicant commissioned 360 Environmental to prepare a Hydrogeological Risk Assessment and Groundwater Program Review report in March 2021 to inform DWER's review of the groundwater monitoring network. The outcome of this report recommended that although the monitoring network was generally suitable for a landfill facility of the type and size of the Banksia Road facility, additional monitoring bores were required to address data gaps in the spatial coverage of the monitoring network.

As a result of this recommendation, DWER imposed additional requirements within the revised Licence issued following the 2021 Licence review. This included a condition (condition 58 of the Licence) requesting the applicant provide a detailed quantitative hydrogeological risk assessment for the premises, which would incorporate the installation of additional groundwater monitoring bores where required. In response to this requirement, the applicant commissioned 360 Environmental to provide an updated Hydrogeological Risk Assessment and Groundwater Program Review Report, which was provided to DWER in September 2022. The objectives of this review report were to determine:

- Whether the existing groundwater monitoring network was sufficient to determine if there is impact to the underlying aquifers; considering the local geology and hydrogeology and proposed future site infrastructure/activities,
- Whether the analytical suite was adequate and complete given the activities undertaken at the site, and
- Whether the existing frequency of sampling and analysis was appropriate.

The outcomes obtained regarding the above objectives are outlined in Table 8 below. The locations of existing and future groundwater monitoring wells, as listed in Table 8 or as already existing at the premises, are outlined in Figure 8.

Table 8: Groundwater monitoring data gaps and corrective actions.

Aspect	Data gap evaluation	Priority / action	Status following 2021 / 2022 investigations
Monitoring Well Locations	The current groundwater monitoring network will not monitor potential future impacts from the future onsite landfill cells.	**HIGH:** Risks from future landfilling activities will not be identified with the current monitoring well network.	**IN PROGRESS:** GW13S/D and GW12D have been installed downgradient of the future cell areas. More wells are planned to progressively be installed.
	Upgradient wells GW5S/D are likely to be destroyed during cell expansions.	**HIGH:** Destruction of these wells will result in no upgradient monitoring and no monitoring locations for future cells.	**INCOMPLETE:** Replacement of upgradient wells is planned for 2023/4.

Monitoring Well Construction	Only nine monitoring wells (GW1S/D, SE4D, GW5S/D, GW7S/D and GW9S/D) are appropriately screened within the superficial or Leederville Aquifers.	**HIGH:** The limited spatial spread of these wells limit the ability to understand flow and contaminant migration in the Leederville Aquifer.	**IN PROGRESS:** GW3D, GW6D, GW8D, GW10D, GW11D, GW12D, GW13D, GW22D and GW23D were installed in 2021 / 2022. Additional Leederville wells are planned in the eastern portion of the site during future drilling.
	The wells screened across both aquifers may provide a direct migration pathway for impacts (not currently present) in the superficial aquifer into the Leederville Aquifer.	**MODERATE:** Migration of contaminants from the superficial aquifer to the Leederville aquifer may occur via the well screens in the future.	**COMPLETE:** Wells that were screened over both aquifers were decommissioned in 2021 and replacement wells installed.
	GW5D appears to have been installed too shallow as it is routinely dry.	**HIGH:** These dry wells result in no upgradient monitoring sites.	**INCOMPLETE:** Replacement of upgradient wells is planned for 2023/4.
	GW7D may have been damaged along the annulus as it is providing inexplicable water quality data.	**HIGH:** Migration of surface impacts along the well annulus may be occurring creating a pathway for contamination to the aquifer	**COMPLETE:** GW7D was decommissioned, and GW7D-R was installed (same location) in 2021.
Monitoring Analytical Suite	The analytical suite currently licenced for the site is appropriate to address potential impacts from the landfill based on the accepted waste classifications	**NO ACTION:** The current monitoring suite is appropriate.	**NO ACTION**
Monitoring Frequency	Vertical and lateral migration of contaminants from the landfill is anticipated to be slow, based on hydraulic testing and the presence of thick clays within the superficial aquifer. The six-monthly monitoring frequency for key landfill leachate indicator parameters and annual monitoring for potential landfill contaminants is considered appropriate for the site.	**NO ACTION:** The current monitoring frequency is acceptable given the slow migration rates associated with the aquifers.	**NO ACTION**

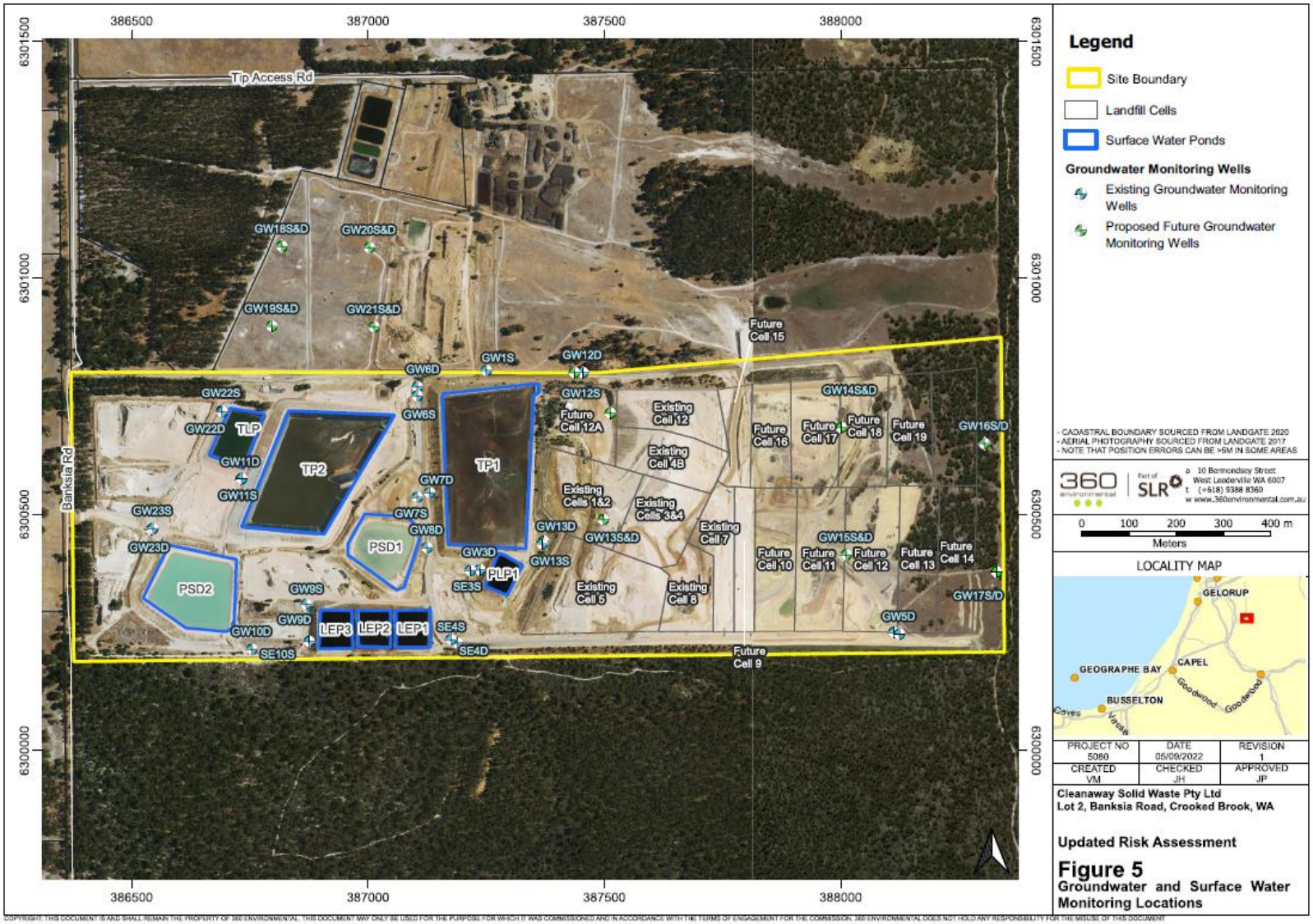

Figure 8: Existing and future groundwater monitoring locations.

The 2022 360 Environmental Hydrogeological Risk Assessment and Groundwater Program Review report concludes that the 2021 / 2022 drilling campaign detailed in Figure 8 significantly enhanced the integrity and spatial coverage of the monitoring network, particularity in the operational western and central portions of the premises. However, additional future monitoring wells were recommended to address data gaps in the spatial data coverage of the monitoring network associated with the future proposed landfill cells towards the eastern portion of the site (including Cells 12A, 9, and 10). The proposed wells were recommended to be installed approximately 12 months before waste is deposited into the new landfill cells to allow for an initial baseline groundwater monitoring event to be undertaken. These wells are outlined in Table 9 below and depicted in Figure 8 above.

Table 9: Proposed additional monitoring wells.

Proposed monitoring wells	Area and rationale	Approximate drilling time
Priority wells		
Redrill GW5S/D	Southeastern site boundary.	Completed.
GW12S	West of the existing landfill Cells 1 and 2 and Future Cell 12A to monitoring potential leachate impacts.	Early to mid-2024.
GW16S/D and GW17S/D	Upgradient site wells.	
Potential future wells		
GW14S/D and GW15S/D	Targeting future Cells 9, 10, 11, and 13 to 21.	Early to mid-2024.
GW16S/D and GW17S/D	Upgradient site wells.	

Key Finding: The Delegated Officer notes that the 2022 360 Environmental Hydrogeological Risk Assessment and Groundwater Program Review report also includes recommendations relating to the inclusion of additional monitoring wells to monitor potential impacts resulting from leachate from the Tronox tailings storage cells at the premises. As the Tronox tailings cells fall outside the scope of this assessment, these recommendations have not been considered as a part of this works approval application.

Based on the recommendations in the 2022 360 Environmental report, the Delegated Officer considers that the additional monitoring wells will ensure the monitoring network is adequate to account for spatial areas with potential to be impacted from the placement of waste into Cells 12A, 9, and 10.

The Delegated Officer will review monitoring bore installation requirements in the context of reviewing the risk of leachate to the surrounding environment, as an adequate groundwater monitoring network will be essential in monitoring the potential ongoing effects of leachate via seepage to groundwater from landfill cells or leachate ponds.

6. Consultation

The works approval application was advertised for public consultation on 24 November 2023 for a 21-day period. In addition, the application was referred to external stakeholders determined to have a direct interest in the works, being:

- The Shire of Dardanup,
- The Dardanup Environmental Action Group (DEAG, and
- Surrounding residents to the premises and community stakeholders.

Comments received during this consultation period, as well as the Delegated Officer's responses to these comments, are outlined in Appendix 1 to this Decision Report.

7. Location and siting

7.1 Siting context

The landfill is located at Lot 2 on Deposited Plan 65861, Crooked Brook within the Shire of Dardanup, approximately 3.8 kilometres south-east of the town of Dardanup.

7.2 Residential and sensitive receptors

The distances to residential and sensitive receptors are detailed in Table 10 and depicted in Figure 9.

Table 10: Receptors and distance from activity boundary.

Sensitive Land Uses	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.

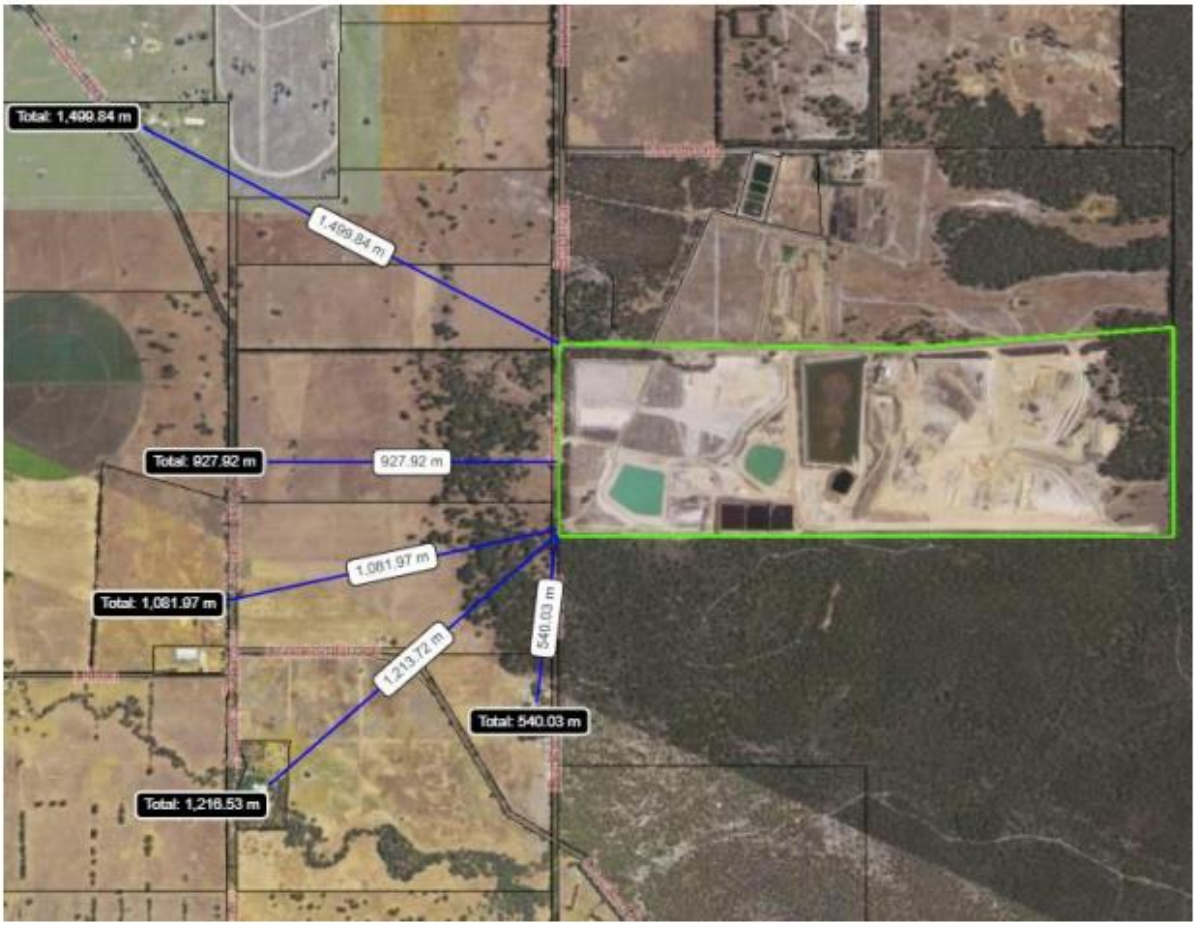

Figure 9: Distance to closest residential receptors.

7.3 Specified ecosystems

Specified ecosystems are areas of high conservation value and special significance which may be impacted as a result of activities at or emissions and discharges from the premises. The distances to specified ecosystems are shown in Table 11. Table 11 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

Table 11: Environmental values.

Specified ecosystems	Distance from the Premises
Dardanup Conservation Park	Adjacent to southern and eastern boundaries of the premises.
Boyanup State Forest	Approximately 0.7km south of the premises, and 1km east.
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 metres 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 site of Banksia Road.
Geomorphic wetland: Multiple use Palusplain and Dampland (flat, seasonally waterlogged)	Approximately 400 metres southwest through to the northwest of the premises boundary.
Biological component	**Distance from the Premises**
Priority Flora	• Priority 3 flora species – adjacent to the southeast corner of the premises and approximately 180m south of the premises. • Priority 4 flora species - approximately 160m 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.

7.4 Groundwater and water sources

The distances to groundwater and water sources are shown in Table 12.

Table 12: Groundwater and water sources.

Groundwater and water sources	Distance from Premises	Environmental value
Groundwater	It is understood that the superficial aquifer is present within the Yoganup geological formation between 20m to 30m below ground level. It is also possible that further isolated perched aquifers occur under the Premises 15 – 20m 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.	Groundwater
Beneficial users of groundwater	Approximately 41 bores are located within 3km of the Premises. Water abstracted from these bores are used for such purposes as: • Stock watering • Dairy purposes • Irrigation of pasture • Domestic use	Beneficial users of groundwater
Dardanup Water Reserve	The Priority 1 groundwater protection zone for Dardanup Water Reserve is located approximately 2.5 km northwest of the premises.	Dardanup Water Reserve

Crooked Brook (significant stream)	Located approximately 1100m south/ southwest of the Premises boundary flowing in a generally east/west direction. Flows into Preston River which is located approximately 5km downstream.	Crooked Brook (significant stream)
Preston River	Approx. 5km west of the Premises. Groundwater from the superficial aquifer discharges into the Preston River.	Preston River

7.5 Meteorology

The region is described as having a Mediterranean climate with warm to hot, dry summers and cool wet winters. The closest available meteorological data for the Premises can be sourced from the Bunbury Meteorology Site (Number 009965) which is located 10.8km from Dardanup.

7.5.1 Wind direction and strength

The 9 am and 3 pm wind speed and direction for the Bunbury Meteorology Site are shown in Figure 10. Several residential receptors are in line with the pathway of prevailing morning easterly winds. It is important to note that these wind roses show historical wind speed and wind direction data for the Bunbury weather station and should not be used to predict future data.

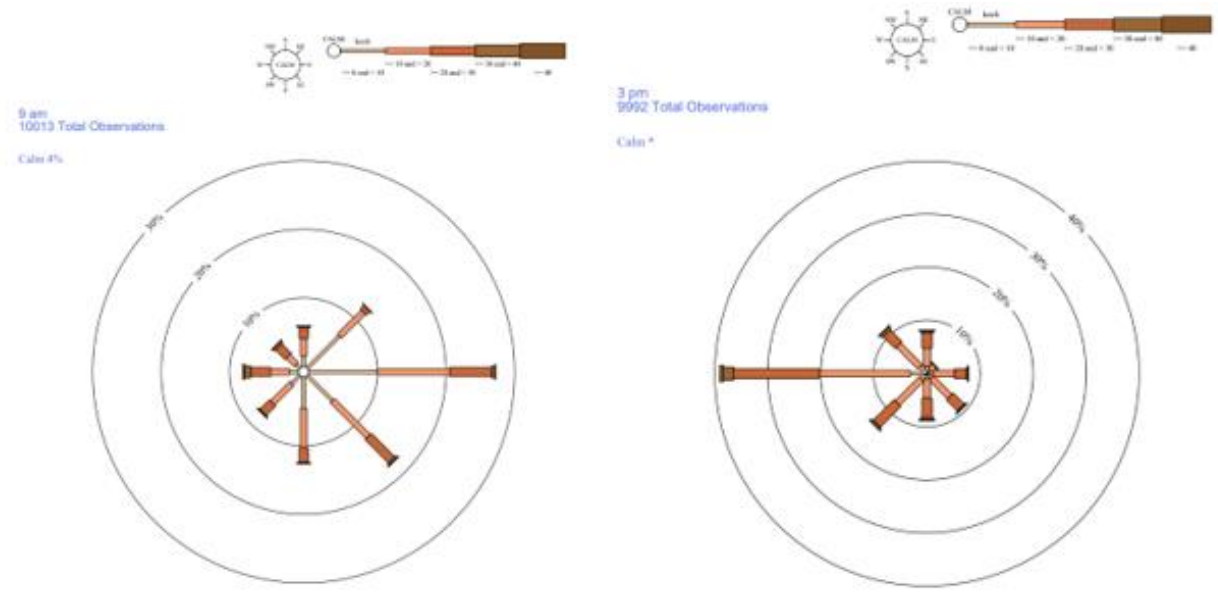

Figure 10: Bunbury 9am and 3pm wind roses (1995 - 2023).

7.5.2 Temperature

The mean maximum temperature during summer is 30 degrees Celsius with a mean maximum winter temperature of 17.3 degrees Celsius, based on statistical data obtained between 1995 and 2023.

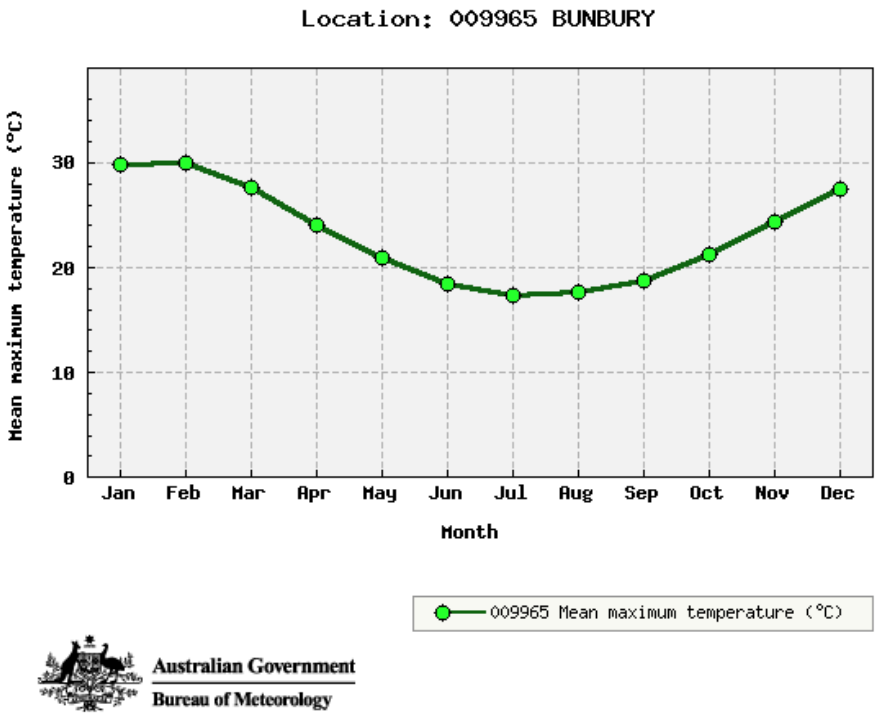

Figure 11: Bunbury mean maximum temperature.

7.5.3 Rainfall

Mean annual rainfall is 732.8 mm and has varied from 484.4 mm in 2010 to 995.6 mm in 1999. On a monthly basis, mean rainfall is < 20 mm per month from December to March, increasing to over 115 mm/month in winter. Pan evaporation is 1825 mm year and is also markedly seasonal. Evaporation exceeds rainfall from October to April, is approximately equivalent in May and September and less than rainfall from June to August. The average rainfall for Bunbury is shown in Figure 12.

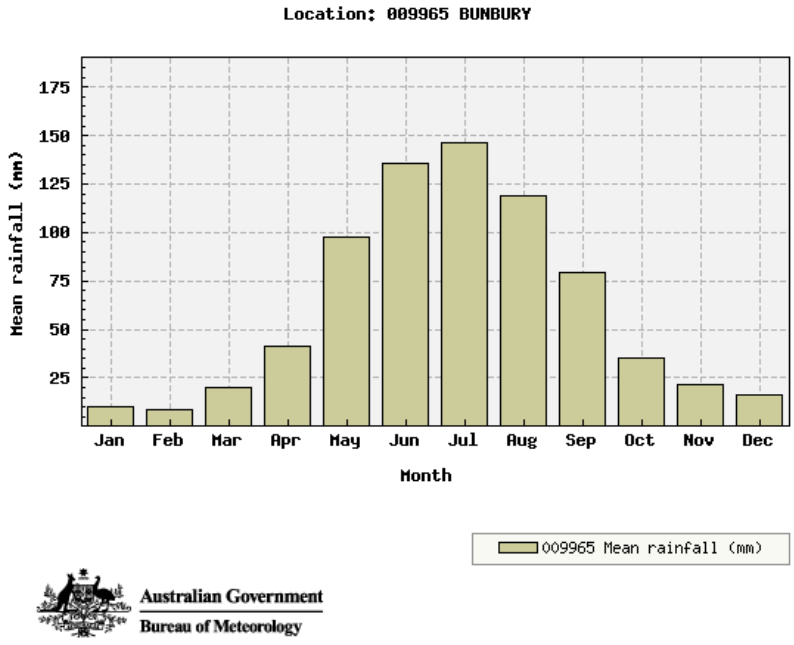

Figure 12: Bunbury mean rainfall (1995 – 2023).

8. Risk assessment

8.1 Determination of emission, pathway, and receptor

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

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through Table 13.

The identification of the sources, pathways, and receptors to determine Risk Events are set out in Table 13 below.

Table 13: Identification of emissions, pathway, and receptors during construction.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Construction of Cells 12A, 9, and 10	Vehicle movements	Noise	Closest residential receptors 500m south and 900m west Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary	Air / wind dispersion	Amenity impacts	No	The Delegated Officer considers that Noise emissions are adequately regulated under the *Environmental Protection (Noise) Regulations 1997.*
		Dust			Amenity impacts	No	The Delegated Officer considers that this emission is adequately managed under conditions of the existing licence. Dust emissions are also regulated through the general provisions of the EP Act.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
	Excavation and construction works	Noise	Closest residential receptors 500m south and 900m west Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary	Air / wind dispersion	Amenity impacts	No	The Delegated Officer considers that Noise emissions are adequately regulated under the *Environmental Protection (Noise) Regulations 1997.*
		Dust			Amenity impacts	No	The Delegated Officer considers that this emission is adequately managed under conditions of the existing licence. Dust emissions are also regulated through the general provisions of the EP Act.
Dewatering of Cells 9 and 10	Excavation below natural ground level	Potentially contaminated stormwater Surface water	Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary Geomorphic wetland approximately 400 metres southwest through to the northwest of the Premises boundary Groundwater and beneficial users of groundwater (including future users)	Overland flow due to overtopping of stormwater storage dams or the failure of stormwater conveyance infrastructure Stormwater overflow causing erosion and deposition of sediment Infiltration through soil profile to groundwater Movement through groundwater	Impacts to conservation values of the Conservation Park Contamination of waters or deterioration of local/regional surface water ecosystems Erosion	No	The Delegated Officer considers that the applicants proposed controls for the retention of stormwater and surface water are adequate to prevent emissions to the environmental. Conditions outlining these controls will be incorporated into the works approval.

Table 14: Identification of emissions, pathway, and receptors during operation.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
Waste acceptance to Cells 12A, 9, and 10	Acceptance and burial of all waste types	Noise	Closest residential receptors 500m south and 900m west Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary	Air / wind dispersion	Amenity impacts	No	Conditions within Licence L8904/2015/1, which the new landfill cells will ultimately operate under, are adequate to ensure the ongoing management of noise emissions. Noise emissions are also subject to the requirements outlined in the *Environmental Protection (Noise) Regulations 1997.*
		Dust		Air / wind dispersion	Amenity impacts	No	Conditions within Licence L8904/2015/1, which the new landfill cells will ultimately operate under, are adequate to ensure the ongoing management of dust emissions. Dust emissions are also regulated through the general provisions of the EP Act.
		Windblown waste / litter		Air / wind dispersion	Amenity impacts	No	Conditions within Licence L8904/2015/1, which the new landfill cells will ultimately operate under, are adequate to ensure the ongoing management of windblown waste and litter.
		Odour	Closest residential receptors 500m south and 900m west Users of the Dardanup Conservation Park adjacent to southern and eastern boundary Township of Dardanup located 3.8 kilometres northwest	Air / wind dispersion	Amenity impacts	No	Conditions within Licence L8904/2015/1, which the new landfill cells will ultimately operate under, are adequate to ensure the ongoing management of odour.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		Vermin, pests, and pathogens	Closest residential receptors 500m south and 900m west Dardanup Conservation Park adjacent to southern and eastern boundary	Air and land – insects, birds, and rodents	Amenity impacts and pest associated diseases Impacts to conservation values of the Conservation Park	No	Conditions within Licence L8904/2015/1, which the new landfill cells will ultimately operate under, are adequate to ensure the ongoing management of vermin and pests.
	Acceptance and burial of asbestos and ACM	Asbestos fibres	Closest residential receptors 500m south and 900m west Users of the Dardanup Conservation Park adjacent to southern and eastern boundary Township of Dardanup located 3.8 kilometres northwest	Air / wind dispersion	Human health and amenity impacts	No	Conditions within Licence L8904/2015/1, which the new landfill cells will ultimately operate under, are adequate to ensure the ongoing management of asbestos and ACM.
	Decomposition of putrescible wastes	Leachate	Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary Geomorphic wetland approximately 400 metres southwest through to the north west of the Premises boundary. Groundwater and beneficial users of groundwater (including future users)	Infiltration through soil profile to groundwater Movement through groundwater Abstraction of groundwater Direct exposure via irrigation and/or spraying	Degradation to the beneficial use of groundwater Health impacts to groundwater users	Yes	Refer to Section 5.4

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
		Landfill gas	Closest residential receptors 500m south and 900m west Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary	Air / wind dispersion Lateral migration of landfill gas through the soil profile Passive venting to air	Amenity impacts Adverse impacts to health including asphyxia. Explosion risk	No	The Delegated Officer considers that the landfill gas generation rate modelling submitted by the applicant demonstrates that current landfill gas management infrastructure is sufficient to process additional landfill gas generated from the operations of the new landfill cells. Additionally, conditions within Licence L8904/2015/1, which the new landfill cells will ultimately operate under, are adequate to ensure the ongoing management of landfill gas.
	Interaction between the waste mass and stormwater	Potentially contaminated stormwater	Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary Geomorphic wetland approximately 400 metres southwest through to the north west of the Premises boundary. Groundwater and beneficial users of groundwater (including future users)	Stormwater overflow causing erosion and deposition of sediment Infiltration through soil profile to groundwater Movement through groundwater	Impacts to conservation values of the Conservation Park Contamination of waters or deterioration of local/regional surface water ecosystems Erosion	No	The Delegated Officer considers that current stormwater management network, and the upgrades to current infrastructure authorised under works approval W6745/2022/1, have ensured adequate capacity is in place at the premises for the retention of stormwater to prevent emissions. Licence L8904/2015/1 will ultimately be amended by the applicant to authorise the use of the new stormwater management infrastructure. Until then existing stormwater management controls on the licence are adequate to prevent emission to the environment.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
	Failure in stability of cells	Decomposed wastes	Underlying soils Groundwater and beneficial users of groundwater (including future users)	Direct discharge of decomposing wastes to land due to failure in cell wall stability Infiltration through soil profile to groundwater Movement through groundwater	Degradation to the beneficial use of groundwater Health impacts to groundwater users	No	The Delegated Officer considers that the applicant's stability assessment has sufficiently demonstrated that the landfill cells design is stable, noting that the applicant has also incorporated design modifications as recommended in the WSP peer review on landfill construction specifications and stability.
		Leachate	Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary Geomorphic wetland approximately 400 metres southwest through to the northwest of the Premises boundary. Groundwater and beneficial users of groundwater (including future users)	Infiltration through soil profile to groundwater Movement through groundwater	Degradation to the beneficial use of groundwater Health impacts to groundwater users	Yes	Refer to Section 5.5

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
	Fire within the waste mass	Fire / smoke	Closest residential receptors 500m south and 900m west Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary	Air / wind dispersion	Human health and amenity impacts	No	Conditions within Licence L8904/2015/1, which the new landfill cells will ultimately operate under, are adequate to ensure that unauthorised fires at the premises are sufficiently mitigated.
		Fire wash waters	Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary Geomorphic wetland approximately 400 metres southwest through to the northwest of the Premises boundary. Groundwater and beneficial users of groundwater (including future users)	Infiltration through soil profile to groundwater Movement through groundwater Abstraction of groundwater	Degradation to the beneficial use of groundwater Health impacts to groundwater users	No	Conditions within Licence L8904/2015/1, which the new landfill cells will ultimately operate under, are adequate to ensure that unauthorised fires and wash waters arising from firefighting at the premises are sufficiently mitigated.

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts		
Operation of leachate collection infrastructure	Transmission of landfill leachate to leachate ponds	Leachate	Dardanup Conservation Park adjacent to southern and eastern boundary Priority Ecological Community within 15m Threatened Ecological Community adjacent to southern boundary Geomorphic wetland approximately 400 metres southwest through to the north west of the Premises boundary. Groundwater and beneficial users of groundwater (including future users)	Overland flow due to overtopping of leachate storage ponds or failure of leachate conveyance infrastructure Infiltration through soil profile to groundwater Movement through groundwater Abstraction of groundwater Direct exposure via irrigation and/or spraying	Degradation to the beneficial use of groundwater Health impacts to groundwater users	Yes	Refer to Section 5.4

8.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 15 below.

Table 15: 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 16 below.

Table 16: 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.

8.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment Table 17 below:

Table 17: 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.

8.4 Risk Assessment – Leachate

8.4.1 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 leachate is 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 as a result 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.

8.4.2 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 uses, and
- PFAS National Environmental Management Plan V 2.0 (January 2020). Applicable for the assessment of human health and ecological risks associated with PFAS compounds.

8.4.3 Applicant controls

This assessment has reviewed the controls set out in Table 18 below.

Table 18: Applicant's proposed controls for leachate emissions.

Site infrastructure	Description	Operation details
Leachate collection infrastructure	Extraction of leachate from landfill cells	Each cell constructed with a leachate aggregate drainage layer containing a network of perforated collection pipes. The collection pipes direct leachate to the leachate collection sump.
		Leachate is extracted from the collection sump and transported (pumped or gravity fed) to the leachate ponds for evaporation
		Stormwater diverted away from the tipping face
		Timely handling and covering of wastes
Primary Leachate Pond Leachate ponds 1 – 3	Forced evaporation	Spray irrigation over the surface of the leachate ponds
		Reticulation of leachate onto the lined side slopes of the landfill prior to waste placement
		Dust suppression onto the active tipping face

8.4.4 Groundwater monitoring

Licence L8904/2015/1 for the premises contains groundwater monitoring conditions with samples taken from existing monitoring bores. However, the 2022 360 Environmental

Hydrogeological Risk Assessment and Groundwater Program Review report, which was commissioned in 2022 in line with Licence conditions, outlined that additional groundwater monitoring wells had been installed to expand on the existing groundwater monitoring network; and identified that additional monitoring wells would need to be installed to address data gaps in the spatial data coverage of the monitoring network associated with future landfill Cells 12A, 9, and 10. The proposed wells were recommended to be installed approximately 12 months before waste is deposited into the new landfill cells to allow for an initial baseline groundwater monitoring event to be undertaken.

The Delegated Officer considers that there is a need to ensure that the groundwater monitoring network in place at the premises is comprehensive enough to provide a complete overview of the condition of groundwater and potential impacts to groundwater resulting from the operation of the new landfill cells. The monitoring of impacts to groundwater will assist the Delegated Officer in determining whether seepage of leachate from the landfill cells or leachate collection ponds is occurring, and whether any there is potential for negative impacts to receptors of groundwater to occur as a result of seepage.

8.4.5 Key findings

From a review of the supporting documentation provided by the applicant, the leachate management plan submitted to DWER as required by condition 52 of the premises Licence, and the 2022 360 Environmental Hydrogeological Risk Assessment and Groundwater Program Review report submitted to DWER as required by condition 58 of the premises Licence, the Delegated Officer considers that the following data gaps remain in relation to ongoing leachate management at the premises:

- The effectiveness of management measures undertaken by the applicant to reduce leachate levels within the leachate ponds, such as sprinkler installation and carting leachate for use as dust suppression on the tipping face, is not understood as no additional information relating to leachate levels at the premises has been provided to DWER.
- The leachate balance assessment undertaken in 2022 determined that leachate generation exceeded the disposal capacity of the existing infrastructure. However, this assessment does not consider changes to leachate management measures.
- The quantity of leachate produced and contained within the landfill cells directly impacts the risk associated with the overtopping of the leachate ponds. Based on the outcomes of the leachate balance assessment, the recirculation of leachate through the waste mass may not act as an adequate control to prevent the overtopping of the leachate ponds.
- Given the outcomes of leachate balance assessment, the risk of leachate emissions from overtopping leachate ponds will be much higher than the risk of leachate emissions resulting from seepage through the landfill liner system.
- There are currently no licence conditions requiring the applicant to routinely monitor leachate levels within the active or closed landfill cells. The volume of leachate held within the landfill cells and how the leachate head may be influencing the rate of leachate seepage through the liner is therefore uncertain.
- There is no additional infrastructure currently associated with leachate management infrastructure for Cells 1, 2, and 5 that provides an accurate overview of the leachate generation rates from these cells.
- There are currently gaps in the spatial data coverage of the current groundwater monitoring network at the premises associated with the operation of future landfill Cells 12A, 9, and 10.

8.4.6 Consequence

If impacts to groundwater from leachate emissions resulting from pond overtopping occur, then the Delegated Officer has determined that they will be mid-level on-site and low level off-site, in line with the relevant assessment criteria for this emission. Therefore, the Delegated Officer considers the consequence of to be **Moderate**.

8.4.7 Likelihood of Risk Event

When considering ongoing operations at the premises, including the ongoing acceptance of waste to landfill cells and hence the continuing generation of landfill leachate, the Delegated Officer has determined that the likelihood of impacts to groundwater from leachate emissions resulting from pond overtopping occurring will be possible in most circumstances. Therefore, the Delegated Officer considers the likelihood of the described impacts to groundwater from leachate emissions to land to be **Possible**.

8.4.8 Overall rating of Leachate emissions

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 **Medium**.

In line with the guidance outlined in Section 8.2, a medium risk event is subject to multiple regulatory controls.

8.5 Summary of acceptability and treatment of Risk Events

A summary of the risk assessment and the acceptability/unacceptability of the risk events set out above, along with the appropriate treatment and control, are set out in Table 19 below. Controls are described further in Section 9.

Table 19: Risk assessment summary

	Description of Risk Event			**Applicant controls**	**Risk rating**	**Acceptability with controls (conditions on instrument)**
	Emission	**Source**	**Pathway/ Receptor (Impact)**			
1.	Leachate	Decomposition of putrescible wastes within landfill cells 12A, 9 and 10 Overtopping of leachate ponds	Infiltration through soil profile to groundwater causing degradation of the beneficial use of groundwater	Cells constructed with leachate collection system Stormwater directed away from tipping face Timely handing and covering of wastes	Moderate consequence Possible likelihood **Medium Risk**	Acceptable subject to regulatory controls
		Overtopping of leachate ponds		Use of spray irrigations on leachate ponds Recirculation of leachate through landfill cells		

9. Regulatory controls

The Delegated Officer will incorporate the following controls into the works approval.

Time limited operations have not been sought for inclusion in this works approval. Operational controls for the acceptance of waste into the new landfill cells will therefore be incorporated into Licence L8904/2015/1 via an amendment application, or potentially by future amendment of this works approval to incorporate a time limited operations phase. The commencement of time limited operations or the amendment of the licence to facilitate waste acceptance will be contingent on the applicant demonstration compliance with the construction specifications sent out in the works approval.

9.1 Water balance assessment

The Delegated Officer has included the requirement for the applicant to provide a water balance for primary leachate pond and leachate ponds 1, 2, and 3 (leachate evaporation ponds) within the works approval conditions. The water balance must consider at a minimum the following parameters:

- Inputs
    - Rainfall directly into the ponds,
    - Run-off from operational areas of the premises to the ponds, and
    - Leachate generated from all landfill cells at the premises directed to the ponds.
- Outputs
    - Pan evaporation from the ponds,
    - Accelerated evaporation from the ponds through sprinkler use,
    - Leachate extraction form the ponds for use as dust suppression / for leachate circulation within operational landfill cells, and
    - Seepage of leachate through landfill liners.

The Delegated Officer considers that uncertainties surrounding available leachate capacity at the premises can be addressed through the provision of an updated water balance for the leachate ponds at the premises. An updated water balance will also act to provide evidence to substantiate the effectiveness of leachate management measures adopted by the applicant in response to the outcomes of previous leachate balance assessments and management plans.

DWER will review the water balance when submitted by the applicant. Upon review, the Delegated Officer will make further determinations based on:

- Whether or not it has been demonstrated that there is adequate capacity within current premises infrastructure to contain current and future volumes of leachate generated from the landfill cells at the premises,
- Whether leachate management measures currently being undertaken by the applicant are sufficient in reducing the volumes of leachate within the leachate ponds, and
- Whether leachate generation from Cells 1, 2, and 5 can be accurately determined without the use of flow meters in place at the discharge points from these cells, and how leachate generation rates calculated from these cells impact the outcome of the water balance.

If required, the Delegated Officer will review the suitability of conditions within the works approval and Licence L8904/2015/1. If current controls are deemed unsatisfactory to mitigate emissions and discharges, the Delegated Officer may then implement a higher degree of regulatory control within an instrument via a DWER initiated amendment.

9.2 Expansion of groundwater monitoring network

The Delegated Officer has included the requirement for the applicant to install the additional groundwater monitoring wells identified in the 2022 360 Environmental Hydrogeological Risk Assessment and Groundwater Program to enhance the integrity and spatial coverage of the monitoring network across the premises. The Delegated Officer considers that the installation of the additional bores, in the locations nominated by 360 Environmental, will address gaps in the spatial data coverage of the current groundwater monitoring network associated with the operation of future landfill Cells 12A, 9, and 10.

In addition, the Delegated Officer has included a requirement for the applicant to undertake one groundwater monitoring event to determine baseline ambient environmental conditions at the premises immediately following construction of the groundwater monitoring wells. The results of this monitoring event will assist in determining whether any impacts to groundwater are apparent as a result of the operation of Cells 12A, 9, and 10, as future monitoring results from the additional bores will be able to be compared to the results obtained from the baseline monitoring event.

Ongoing groundwater monitoring from the additional monitoring wells will be incorporated into operational monitoring conditions within Licence L8904/2015/1 through a subsequent licence amendment once the monitoring bores have been constructed and the baseline ambient monitoring event has been undertaken.

10. Applicant's comments

The applicant was provided with the draft Decision Report and draft works approval on 12 February 2024. The applicant provided comments which are summarised, along with DWER's response, in Appendix 2.

11. Conclusion

This assessment of the risks of activities on the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Decision Report as outlined in Section 4.5.1 .

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

Steve Checker

Digitally signed by Steve Checker
Date: 2024.02.23 15:44:01 +08'00'

Stephen Checker
MANAGER WASTE INDUSTRIES

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

Appendix 1: Summary of stakeholder comments on risk assessment and draft conditions

Summary of stakeholder comment	DWER response
DEAG submission	
A leachate plan should be implemented before this works approval is approved, and all documentation which refers to leachate management should be updated to reflect the true situation once the plan is implemented.	The implementation of a leachate plan for the premises is a requirement of the Ministers determination finalised on 26 October 2023. DWER has initiated an amendment to Licence L8904/2015/1 which will give effect to the Ministers determinations. DWER has reviewed the leachate plan prepared as required by condition 52 of the Licence under this works approval assessment. As outlined in Section 5.4 of this report, the Delegated Officer considers that uncertainties surrounding leachate management at the premises remain. As such, the Delegated Officer has incorporated the requirement for the applicant to undertake a leachate balance assessment as a part of this works approval application. The findings of this assessment, when considered with previous findings submitted to DWER, should provide a greater understanding as to how leachate is management at the premises and whether capacity issues are present. Should further uncertainties arise on completion of the leachate balance assessment, the Delegated Officer may impose a higher degree of regulatory control within the works approval and licence to ensure leachate is adequately managed. This may include executing changes to the leachate management plan implemented through the Ministers determinations.
The applicant should have their Fire Management Plan reviewed and the plan should include all requirements specified by the Appeals Convenor in their 2021 report before this works approval is granted.	The review of the applicants Fire Management Plan by a suitably qualified fire safety engineer is a requirement of the Ministers determination finalised on 26 October 2023. DWER has initiated an amendment to Licence L8904/2015/1 which will give effect to the Ministers determinations. This works approval authorises the construction of the new landfill cells only. It is considered that fire will only become a risk to the new cells once they become operational, i.e. once they begin accepting waste. As such, the Delegated Officer considers that it is suitable for the review of the Fire Management Plan to occur concurrently with the construction of the new cells.

Summary of stakeholder comment	DWER response
Complaints reporting and monitoring from the new cells should commence promptly.	Complaints reporting and monitoring for the new cells will commence once the cells become operational and when DWER has confirmed compliance with cell construction specifications. Complaints reporting and monitoring requirements for the new cells will be conditioned either through an amendment to the works approval authorising the operation of the cells under Time Limited Operations, or through an amendment to the Licence authorising the operation of the cells.
Supporting documentation to the applicant predates the issuing of MS 1213.	The applicant has submitted updated supporting documentation to align with the outcomes the EPA's assessment and the granting of MS 1213. These updated documents have been considered by DWER through the works approval assessment process.
Concerns with the construction of cell 12A on top of clay lined cells and the management of leachate within cell 12A, including where leachate will end up if not within cell 12A. Also concerns with adequacy of leachate management controls relevant to cell 12A.	DWER have considered construction specifications and the stability assessment prepared by the applicant, and the peer review of construction specifications and stability prepared by WSP in conducting the risk assessment for the construction of Cell 12A. Controls in place for the management of leachate have also been considered. The Delegated Officer considers the construction of Cell 12A to be suitable and controls in place to be adequate to manage leachate emissions from Cell 12A.
PFAS has been detected in a monitoring bore and it is much more likely that this has permeated through cells 1 and 2 to groundwater that come from the Conservation Park as suggested by the applicant.	This concern falls outside of the scope of this application, which relates to the construction of Cells 12A, 9 and 10 only.
Concerns with the validity of previous noise monitoring. Further noise assessments should be carried out prior to the works approval being issued.	As discussed in Section 5.1of this report, the acoustic analysis undertaken by ENB confirmed that landfill operations were compliant with the assigned levels outlined in the Noise Regulations. The applicant is required to submit a noise management plan to Shire of Dardanup as a condition of the JDAP outcome. The noise management plan must demonstrate that noise generated from the premises complies with the Noise Regulations. Should any further concerns be raised in relation to compliance with the Noise Regulations through the submission of the noise management plan to the Shire of Dardanup, the Delegated Officer can consider this through the assessment of the subsequent Licence amendment assessment to facilitate the operation of the new landfill cells.

Summary of stakeholder comment	DWER response
Concerns with the separation distance to groundwater not being sufficient when considering the excavation of cells 9 and 10.	Landfill cell construction and design specifications have been determined so as to generally align with the Vic BEPM, which is considered by DWER to be representative of a best practice guideline. The Vic BEPM suggests a minimum separation distance to groundwater of 2 metres when considering a landfill accepting putrescible wastes. The new cells have been designed so as to maintain an approximate distance to groundwater of 20 metres. Additionally, the liner system for the new cells, as well as their leachate collection systems, have been assessed by the Delegated Officer. The liner systems and leachate collection systems will also be constructed as per the guidance outlined in the Vic BEPM and both have been determined to be adequate to mitigate emissions to groundwater via seepage from the landfill cells.
How will leachate be drained from cells 9 and 10 and what infrastructure will be required, and will this infrastructure be below ground level and at risk of flooding.	Leachate collection infrastructure for Cells 9 and 10 is outlined in Section 4.1. The excavation works proposed for Cells 9 and 10 are expected to generate a large surface water catchment within the cell void due to the base of the landfill cells being significantly below natural ground level. To manage this water, the applicant has ensured that cells 9 and 10 incorporate a system of pipes, stormwater channels and control ponds adjacent to the active landfill cells which will collect surface water and stormwater from the excavated void. This additional infrastructure is temporary in nature and will be decommissioned on completion of Cell 9 and 10 construction works. No flooding is anticipated during the operation of the cells.
Has the existing monitoring bore network been reviewed to determine if it is adequate to detect seepage from cells 9 and 10.	The existing groundwater monitoring network has been considered in Section 5.5 of this report. The Delegated Officer considers that additional monitoring wells will be required to be installed at the premises to ensure the monitoring network is adequate to account of spatial areas with potential to be impacted from the operations of new Cells 12A, 9, and 10. The construction of these bores will be required under conditions in this works approval.
There is no evidence that the environmental management plan has been reviewed by an auditor as directed by the EPA environmental review associated with MS 1213.	The requirement for the environmental management plan to be reviewed by an auditor is conditioned within MS 1213 by the EPA under Part IV of the EP Act. This works approval is issued by the Delegated Officer under Part V of the EP Act. The Delegated Officer does not have authority to approve or enforce matters authorised under Part IV of the EP Act. As such, matters conditioned under MS 1213 will be enforced by the EPA.

Summary of stakeholder comment	DWER response
Concerns that the Community Reference Group is not being used as a communication tool and that many questions asked or issues raised with the applicant have not been adequately addressed or followed up.	This concern falls outside of DWER's regulatory scope.
Stakeholder 1	
Issues with the visual amenity of the landfill facility	DWER does not have regulatory remit over this concern. The impacts of a facility on visual amenity can be assessed by the local government authority (in this case the Shire of Dardanup).
Separation distance to groundwater has not been considered.	Landfill cell construction and design specifications have been determined so as to generally align with the guidelines of the Vic BEPM. The Vic BEPM suggests a minimum separation distance to groundwater of 2 metres when considering a landfill accepting putrescible wastes. The new cells have been designed so as to maintain an approximate distance to groundwater of 20 metres. Additionally, the liner system for the new cells, as well as their leachate collection systems, have been assessed by the Delegated Officer. The liner systems and leachate collection systems will also be constructed as per the guidance outlined in the Vic BEPM and both have been determined to be adequate to mitigate emissions to groundwater via seepage from the landfill cells.
The fault line beneath Dardanup has not been considered.	Seismic activity relative to the Dardanup area and surrounds has been considered within the stability assessment provided by the applicant and the peer review of stability undertaken by WSP. Both reports have determined that stability will be maintained under seismic conditions.
Issues with the land prices dropping in Dardanup due to the landfill facility	This concern falls outside of DWER's regulatory scope.
Concerns that trains will now service the landfill facility	This concern falls outside of DWER's regulatory scope.
Concerns with the use of plastic liners within the landfill cell design	The design of the new landfill cells conforms to the requirements outlined in the Vic BEPM, which supports the use of geotextiles in landfill liner systems.

Summary of stakeholder comment	DWER response
Health concerns resulting from landfill operations (i.e. acceptance of asbestos, pollution of groundwater)	The Delegated Officer has reviewed the controls in place at the premises for asbestos acceptance and seepage to groundwater and considers these to be adequate to supress emissions from the operation of the new landfill cells. However, since this application relates to the construction of the new cells only, the appropriateness of operational controls will be reviewed when the applicant seeks authorisation to operate (i.e. accept waste into) the new cells.
Stakeholder 2	
Concerns with leakage from the landfill facility into the ground contaminating the water table	Landfill cell construction and design specifications have been determined so as to generally align with the guidelines of the Vic BEPM. The Vic BEPM suggests a minimum separation distance to groundwater of 2 metres when considering a landfill accepting putrescible wastes. The new cells have been designed so as to maintain an approximate distance to groundwater of 20 metres. Additionally, the liner system for the new cells, as well as their leachate collection systems, have been assessed by the Delegated Officer. The liner systems and leachate collection systems will also be constructed as per the guidance outlined in the Vic BEPM and both have been determined to be adequate to mitigate emissions to groundwater via seepage from the landfill cells.
General concerns surrounding windblown waste, fire risk, dust, noise and odour emissions arising from landfill operations	These emissions have been considered in the risk assessment undertaken to inform decision making for this works approval application. The Delegated Officer considers that these emissions can be mitigated through the addition of standard conditions within the works approval. Additionally, conditions within Licence L8904/2015/1, which the new landfill cells will ultimately operate under, are currently adequate to ensure the ongoing management and mitigation of windblown waste and litter, dust, noise and odour. Licence conditions also adequately ensure the ongoing management of fire risk and emissions of smoke and wash waters that may occur in the event of a fire at the premises.

Summary of stakeholder comment	DWER response
Issues with the number of trucks arriving and departing the landfill, along with noise generated from trucks and dust lift off from loads	This concern falls outside of DWER's regulatory scope.
Issues with the location of the landfill facility within Dardanup	DWER does not have regulatory remit over this concern. The location of the landfill is a planning matter that should be taken up with the relevant governing bodies (i.e. Department of Planning, Lands and Heritage, Western Australian Planning Commission, Shire of Dardanup etc.).
Stakeholder 3	
Concern that the maximum landfill cell height will exceed the 128 mAHD proposed by the applicant	The Delegated Officer will incorporate conditions within the works approval and subsequently the licence limiting landfill cell height to 128 mAHD. This is consistent with the Ministers determination as outlined in the Environmental Protection Authorities MS 1213.
Dust, air and windblow debris pollution will intensify	The Delegated Officer has reviewed the controls in place at the premises for dust and windblown waste and considers these to be adequate to supress emissions from the operation of the new landfill cells. However, since this application relates to the construction of the new cells only, the appropriateness of operational controls will be reviewed when the applicant seeks authorisation to operate (i.e. accept waste into) the new cells.
Concerns as to whether current fire management practices are acceptable	This matter was raised in an appeal submitted to the Appeals Convenor on 11 November 2021 and finalised on 26 October 2023. The review of the applicants Fire Management Plan by a suitably qualified fire safety engineer is a requirement of the Ministers determination finalised on 26 October 2023. DWER has initiated an amendment to Licence L8904/2015/1 which will give effect to the Ministers determinations. This works approval authorises the construction of the new landfill cells only. It is considered that fire will only become a risk to the new cells once they become operational, i.e. once they begin accepting waste.

Summary of stakeholder comment	DWER response
Concerns relating to the construction of Cell 12A on top of existing cells 1 and 2, including the management of leachate	DWER have considered construction specifications and the stability assessment prepared by the applicant, and the peer review of construction specifications and stability prepared by WSP in conducting the risk assessment for the construction of Cell 12A. Controls in place for the management of leachate have also been considered. The Delegated Officer considers the construction of Cell 12A to be suitable and controls in place to be adequate to manage leachate emissions from Cell 12A.
Concerns with the contents of Cells 1 and 2, the cells being clay lined, and where waste from standalone events was disposed of within the Landfill facility	This concern falls outside of the scope of this application, which relates to the construction of cells 12A, 9 and 10 only.
Issues with the visual amenity of the landfill facility	DWER does not have regulatory remit over this concern. The impacts of a facility on visual amenity can be assessed by the local government authority (in this case the Shire of Dardanup).
Implementation of testing and monitoring requirements for the Tronox tailings cells	This works approval outlines the assessment for the construction of new landfill cells 12A, 9 and 10. The applicant is not seeking any works related to the Tronox tailing cells at the premises under this application. Therefore, this concern falls outside of the regulatory scope of this application and cannot be considered as a part of this application.
Concerns regarding the current testing regime for the leachate dams.	Leachate quality monitoring is conditioned within the current Licence for the premises and is currently considered to be sufficient to adequately characterise leachate contained within the leachate dams. Additionally, the implementation of weekly monitoring of leachate flows from cells 1, 2 and 5 is a requirement of the Ministers determination finalised on 26 October 2023. DWER has initiated an amendment to Licence L8904/2015/1 which will give effect to the Ministers determinations. The implementation of this monitoring will be through an amendment to current condition 51.

Summary of stakeholder comment	DWER response
The depth of excavation for landfill cells 9 and 10 is too close to groundwater levels.	Landfill cell construction and design specifications have been determined so as to generally align with the guidelines of the Vic BEPM. The Vic BEPM suggests a minimum separation distance to groundwater of 2 metres when considering a landfill accepting putrescible wastes. The new cells have been designed so as to maintain an approximate distance to groundwater of 20 metres. Additionally, the liner system for the new cells, as well as their leachate collection systems, have been assessed by the Delegated Officer. The liner systems and leachate collection systems will also be constructed as per the guidance outlined in the Vic BEPM and both have been determined to be adequate to mitigate emissions to groundwater via seepage from the landfill cells.
Stakeholder 4	
Supporting documents do not align with Ministerial determinations and an environmental management plan has not been reviewed by an auditor as directed by the EPA environmental review associated with MS 1213.	The applicant has submitted updated supporting documentation to align with the outcomes the EPA's assessment and the granting of MS 1213. These updated documents have been considered by DWER through the works approval assessment process.
There is a lack of litter collection undertaken along the verges of Banksia Road, Pannizza Road and the Dardanup Conservation Park.	This concern falls outside of DWER's regulatory scope.
Concerns with the validity of previous noise monitoring	As discussed in Section 5.1 of this report, the acoustic analysis undertaken by ENB confirmed that landfill operations were compliant with the assigned levels outlined in the Noise Regulations. The applicant is required to submit a noise management plan to Shire of Dardanup as a condition of the JDAP outcome. The noise management plan must demonstrate that noise generated from the premises complies with the Noise Regulations. Should any further concerns be raised in relation to compliance with the Noise Regulations through the submission of the noise management plan to the Shire of Dardanup, the Delegated Officer can consider this through the assessment of the subsequent Licence amendment assessment to facilitate the operation of the new landfill cells.

Summary of stakeholder comment	DWER response
The Community Reference Group is not meeting enough	This concern falls outside of DWER's regulatory scope.
The independent third party landfill construction quality assurance plant needs to be approved by the EPA before commencement.	MS 1213 issued by the EPA under Part IV of the EP Act does not contain a requirement for a landfill construction quality assurance plan to be approved by the EPA. This is because the construction of the landfill cells is regulated by this works approval under Part V of the EP Act. As such, this works approval contains conditions ensuring construction quality assurance is met for landfill cell construction (Conditions 4 – 6) and ensuring that reports are submitted to DWER demonstrating that landfill construction has been undertaken to appropriate specifications (Conditions 7 – 10). These reports will be reviewed by DWER prior to operation of the new landfill cells commencing.
Concerns with the landfilling of only Class II waste over the cell 1 and 2 areas within cell 12A.	DWER has considered construction specifications and the stability assessment prepared by the applicant, and the peer review of construction specifications and stability prepared by WSP in conducting the risk assessment for the construction of Cell 12A. This includes the consideration of the placement of Class II waste over the cell 1 and 2 areas within Cell 12A. The Delegated Officer considers the construction of Cell 12A to be suitable. Additionally, the placement of Class II waste over the cell 1 and 2 areas within Cell 12A is likely to become a condition within an amendment works approval (should Time Limited Operations be sought) or the licence for the premises once the cells become operational.

Summary of stakeholder comment	DWER response
Concerns with leachate containment capacity within premises infrastructure.	The implementation of a leachate plan for the premises is a requirement of the Ministers determination finalised on 26 October 2023. DWER has initiated an amendment to Licence L8904/2015/1 which will give effect to the Ministers determinations. DWER has reviewed the leachate plan prepared as required by condition 52 of the Licence under this works approval assessment. As outlined in Section 5.4 of this report, the Delegated Officer considers that uncertainties surrounding leachate management at the premises remain. As such, the Delegated Officer has incorporated the requirement for the applicant to undertake a leachate balance assessment as a part of this works approval application. The findings of this assessment, when considered with previous findings submitted to DWER, should provide a greater understanding as to how leachate is management at the premises and whether capacity issues are present. Should further uncertainties arise on completion of the leachate balance assessment, the Delegated Officer may impose a higher degree of regulatory control within the works approval and licence to ensure leachate is adequately managed. This may include executing changes to the leachate management plan implemented through the Ministers determinations.
Concerns with the adequacy of the Fire Management Plan, including that the risk from landfill gas flaring has not been considered.	This matter was raised in an appeal submitted to the Appeals Convenor on 11 November 2021 and finalised on 26 October 2023. The review of the applicants Fire Management Plan by a suitably qualified fire safety engineer is a requirement of the Ministers determination finalised on 26 October 2023. DWER has initiated an amendment to Licence L8904/2015/1 which will give effect to the Ministers determinations. The amendment will incorporate other determinations by the Minister in relation to landfill gas flaring. This works approval authorises the construction of the new landfill cells only. It is considered that fire will only become a risk to the new cells once they become operational, i.e. once they begin accepting waste.
Stakeholder 5	

Summary of stakeholder comment	DWER response
Concerns with the validity of previous noise monitoring and that noise monitoring has not considered all receptor locations.	As discussed in Section 5.1 of this report, the acoustic analysis undertaken by ENB confirmed that landfill operations were compliant with the assigned levels outlined in the Noise Regulations. The applicant is required to submit a noise management plan to Shire of Dardanup as a condition of the JDAP outcome. The noise management plan must demonstrate that noise generated from the premises complies with the Noise Regulations. Should any further concerns be raised in relation to compliance with the Noise Regulations through the submission of the noise management plan to the Shire of Dardanup, the Delegated Officer can consider this through the assessment of the subsequent Licence amendment assessment to facilitate the operation of the new landfill cells.
Concerns with height exceedances in the landfill design	Landfill cell height in relation to visual amenity is not a valid consideration under Part V of the EP Act. The Minister's determination under MS 1213 limits landfill cell height to 128 mAHD which reflect the design height approved in the Works Approval. DWER's decision making is required to be consistent with the Ministerial Statement.

Appendix 2: Summary of applicant's comments on risk assessment and draft conditions

Reference	Summary of Applicant's comment	DWER response
Licence		
Condition 1 Table 1, Item 1	The cell 9 stormwater retention pond 'must be sized to be able to contain water from a 1 in 100-year AEP stormwater event of 24 hrs duration without overtopping'. Operationally, this assumes pumping within 4 hours of the storm event commencing. Capacity of the pond is to the lowest level of Cell 9 eastern perimeter bund (i.e. including the road) minus 500 mm of freeboard.	Operational requirements around the management of pond capacity are noted, however this does not affect the sizing requirements of the pond. Condition will remain on the Licence.
Condition 1 Table 1, Item 2	The cell 10 stormwater retention pond 'must be sized to be able to contain water from a 1 in 100-year AEP stormwater event of 24 hrs duration without overtopping'. Operationally, this assumes pumping within 4 hours of the storm event commencing. Capacity of the pond is to the lowest level of Cell 10 eastern perimeter bund (i.e. including the road) minus 500 mm of freeboard.	Operational requirements around the management of pond capacity are noted, however this does not affect the sizing requirements of the pond. Condition will remain on the Licence.
Condition 2 Table 2, Cell 12A Infrastructure	The piggyback liner extends up to 20 m in the southeast corner to make sure it will span over all Cell 2 and Cell 4B liners in this corner. Condition should be amended to reflect that the 'piggyback liner must extend horizontally over Cells 1 and 2 by a minimum of 15 m'. It is also noted that compliance with this condition can only be assessed based on the current available information for Cells 1 and 2 (which is what the design is based on).	Condition amended as requested. It is the applicant's responsibility to ensure compliance with works approval conditions is demonstrated using appropriate data and resources.

Reference	Summary of Applicant's comment	DWER response
Condition 2 Table 2, Cell 9 and 10 Layer 6 – separation geotextile	The separation geotextile terminates on the slope, not at the top of thew slope, just above where the aggregate layer terminates. The geotextile is heat-bonded to the cushion geotextile beyond the aggregate layer (refer to LANDFILL SIDE LINER CONFIGURATION on BANK-308 and BANK-408). The separation geotextile cannot be terminated in an anchor trench. Condition should be amended to reflect that 'geotextiles installed on the landfill side slopes must be heat bonded to the cushion geotextile beyond the aggregate layer'.	Condition amended as requested.
Condition 2 Table 2, Cell 9 and 10 Layer 7 – drainage layer	This is not another layer on top of the leachate collection layer (Draft Decision Report, page 13, Table 3 refers to this as Layer 7). This is an extension of the leachate drainage layer on the side slopes which will be installed by operations progressively as the cells is filled with waste. Is there a need to submit a compliance document every time that operations extend the sand layer - if this is not the intent, can this condition be deleted. Layer also will consist of sand with a minimum thickness of 300 mm.	Based on receipt of this clarification that the drainage layer will be an extension to the leachate drainage layer and that it will be installed progressively during landfill operations, the Delegated Officer has removed construction requirements for the drainage layer from the works approval. Table 3 in the Decision Report will also be updated to reflect this. The installation of this layer during operations is likely to conditioned as an operational requirement through an amendment to this works approval (for time limited operations) or through a Licence amendment.
Condition 2 Table 2, Cell 12A Layer 6 – separation geotextile	The separation geotextile terminates on the slope, not at the top of thew slope, just above where the aggregate layer terminates. The geotextile is heat-bonded to the cushion geotextile beyond the aggregate layer (refer to LANDFILL SIDE LINER CONFIGURATION on BANK-308 and BANK-408). The separation geotextile cannot be terminated in an anchor trench. Condition should be amended to reflect that 'geotextiles installed on the landfill side slopes must be heat bonded to the cushion geotextile beyond the aggregate layer'.	Condition amended as requested.

Reference	Summary of Applicant's comment	DWER response
Condition 2 Table 2, 12A Layer 7 – drainage layer	This is not another layer on top of the leachate collection layer (Draft Decision Report, page 13, Table 3 refers to this as Layer 7). This is an extension of the leachate drainage layer on the side slopes which will be installed by operations progressively as the cells is filled with waste. Is there a need to submit a compliance document every time that operations extend the sand layer - if this is not the intent, can this condition be deleted. Layer also will consist of sand with a minimum thickness of 300 mm.	Based on receipt of this clarification that the drainage layer will be an extension to the leachate drainage layer and that it will be installed progressively during landfill operations, the Delegated Officer has removed construction requirements for the drainage layer from the works approval. Table 3 in the Decision Report will also be updated to reflect this. The installation of this layer during operations is likely to conditioned as an operational requirement through an amendment to this works approval (for time limited operations) or through a Licence amendment.
Condition 5 Table 4 Visual inspection of geomembrane	Typo with property requirements.	Typo amended.
Conditions 11 and 14 Tables 6 and 7	GW5S/D are already installed – please remove from tables.	Deleted as requested.
Decision Report		
Section 3.1.2 Cell 12A design specifications	The capping of cells 1 and 2 will only be able to be completed once cell 12A has been approved as the final waste height needs to be achieved and includes part of cell 12A.	Noted – previous text outing incorrect capping schedule for cells 1 and 2 has been removed from the Decision Report.

Reference	Summary of Applicant's comment	DWER response
Section 3.1.5 Landfill construction and stability peer review	Cleanaway has provided a technical response outlining the success of the shear testing, as well as findings of a peer review of the shear testing results undertaken by WSP. The peer review concluded that shear box test results confirmed interface strength parameters of the actual materials to be used in the Cell 12A construction are comparable to those used to conduct the stability assessment.	The Delegated Officer considers that the results of the stability assessment remain valid. Text outlining summary of results and Delegated Officer conclusions added to Decision Report.
Section 4.5.3 Key and recent approvals	The licence amendment application for the relocation of the landfill gas flare is about to be issued by DWER and is not still under assessment.	Text updated to reflect licence amendment issue date.
Section 5.5 Groundwater	Table 9 – Proposed additional monitoring wells Priority and future wells are to be installed early to mid-2024 subject to rig availability.	Timeline for well installation has been updated. Noting comments received on the Licence indicating that wells GW5S/D are already installed, the completion of this installation has also been reflected in Table 9.