



APPENDICES

Item 12.2.2 B

**UNDER SEPARATE
ELECTRONIC COVER**

ORDINARY COUNCIL MEETING

To Be Held

Wednesday, 28th June 2023

Commencing at 5.00pm

At

**Shire of Dardanup
ADMINISTRATION CENTRE EATON
1 Council Drive – EATON**

This document is available in alternative formats such as:
~ Large Print
~ Electronic Format [disk or emailed]

Attachment 1



Ferguson Road

Boyanup Picton Road

Banksia Road

LOT 2

Dardanup Conservation Park

05/08/2022

Attachment 2

DEVELOPMENT APPLICATION EXTRACTIVE INDUSTRY

Lot 2 Banksia Road,
CROOKED BROOK



Harley Dykstra[®]

PLANNING & SURVEY SOLUTIONS

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1. INTRODUCTION

1.1. Purpose

This Extractive Industry development application has been prepared by Harley Dykstra on behalf of Cleanaway Solid Waste Pty Ltd for the development of an extractive industry at the eastern side of Lot 2 Banksia Road, Crooked Brook as outlined on the attached site plan at **Appendix B**. Cleanaway Solid Waste Pty Ltd are intending to extract materials to be used internally on site to improve the operations of the existing landfill use.

The purpose of this report is to provide the planning justification for the proposal in order to assist decision-makers and service authorities to consider the proposed development.

This Development Application (DA) has been formulated by Harley Dykstra (lead consultant) in collaboration with the following sub-consultants for the preparation of each respective management report. A copy of each sub consultant report is attached to this report.

Stass Environmental	Materials Evaluation Report	Appendix C
WML Consulting Engineers	Materials Evaluation Technical Note	Appendix D
Herring Storer	Acoustic Assessment	Appendix E
Strategen JBSG	Dust Management Technical Note	Appendix F
Strategen JBSG	Approved Dust Management Plan	Appendix G

For context, the Material Evaluation Report at **Appendix C** was initially prepared in the context of being used for the development of additional landfill cells. This is not the intent of this application, however findings of this report are relevant to the proposed extractive industry in terms of the volume and nature of material for extraction, and soil details. Therefore, this report has been included with this application for this purpose.

The Dust Management Plan at **Appendix G** relates to the entirety of Lot 2, and includes provisions for all existing uses at the site. This DMP has been endorsed by Council. This existing DMP is complemented by the enclosed Dust Management Technical Note (**Appendix F**), which provides specific dust management provisions relevant to the proposed extractive industry.

This application seeks approval to withdraw around 31,000m³ of gravel and around 146,200m³ of sand over the period of 6.5 years.

1.2. Ownership & Site Location

The property details for Lot 2 Banksia Road, Crooked Brook are as follows:

LOT NUMBER:	DEPOSITED PLAN:	VOLUME/FOLIO:	LOT AREA:	REGISTERED PROPRIETOR:
2	65861	1670/568	121.6658 Ha	J&P Corporation Pty Ltd

A copy of the Certificate of Title and associated Memorial is attached at **Appendix A** of this report, together with landowner consent at the application forms which have been submitted with this document.

An indication of the location of the subject site is at **Figure 1**, below. The subject site is located approximately 3.8km south east of the Dardanup town-site, abutting the Dardanup Conservation Park along its eastern and southern boundaries. Waste disposal and processing occurs at the Depiazzi Depot, approximately 1.9km north of the subject site. Lot 81 Marginata Close, which directly abuts the northern boundary of Lot 2, hosts landfill use. Therefore, the proposed extractive industry is ancillary to the existing landfill use and its location complements the existing waste processing activities at the site.



Figure 1: Lot 2 Banksia Road context

2. EXISTING LAND USE

The subject site is approved to operate as a waste disposal facility, pursuant to licence L8904/2015/1 (with the most recent amendment approved 28th October 2021) issued under the Environmental Protection Act 1986 (WA) (EP Act) and pursuant to a number of development approvals, including the approval (PA 112/16) for the construction of landfill cells 6, 7 and 8.

Landfill cells are developed in stages as required; dependent on the remaining capacity of existing cells. The licence allows for the disposal of 353,000 tonnes of liquid waste per annum and 350,000 tonnes of Class 2 or 3 putrescible landfill waste per annum. This licence will expire 2 August 2035.

Lot 2 is also demonstrated in the Local Development Plan at Lot 2 Banksia Road, Crooked Brook, Dardanup, endorsed by the Shire of Dardanup on 26th May, 2021 and included with this application

at **Appendix L**. The proposed extractive industry will not impact upon the endorsed Local Development Plan.

On 18 March 2016, an Extractive Industry Licence was also granted to J&P Corporation for the extraction of mineral sands on the western portion of Lot 2 (PA 38/16). It is understood that this approval includes the extraction of up to 73,000m³ of material in the 5-10 years post-approval. It is understood that the existing EIL at Lot 2 has been granted development approval for renewal of the license, and conditions of consent are currently being fulfilled by the landowner to finalise the approval.

Lot 2 currently hosts a weigh bridge, office, nine waste cells, two stormwater ponds, four leachate ponds, two tailings storage facilities, a portion of extraction and internal sealed and unsealed access roads.

2.1. Hours of operation

Landfill operation at Lot 2 is currently carried out from 6:00am to 6:00pm weekdays, per previous consents. This Development Application does not propose any changes to the existing operating hours. The proposed extractive industry will operate within the existing opening hours.

2.2. Topography

The topography of the site is characterized by its location on the edge of the Darling Scarp, with the property gradually rising east towards the scape from a height of 52m AHD to 108m AHD as reflected by the 0.25m contours as shown on the Site Plan attached as **Appendix B**.

2.3. Landform and soils

The landform and soils experienced onsite are reflected within the Material Evaluation report attached at **Appendix C** of this report. In summary, the superficial formations at the site comprise Bassendean Sand and Yoganup Formation. The formations at the eastern side of the site predominantly comprise variably lateritised sandy clay or clayey sand over highly plastic sandy or silty clay which are either colluvium or residual soils derived of the outcropping Leederville formation.

3. PROPOSED DEVELOPMENT

The proposed Extractive Industry will improve the overall management of the existing approved Category 61 liquid waste facility and Category 64 Class II or III putrescible landfill site. Currently, the landfill use at Lot 2 requires materials of gravel, sand and clay for maintaining internal trafficable areas, daily capping of compacted waste, as well as the capping of batters of the landfill cells. Capping relates to covering all waste with 150mm of material at least once per day, to minimise odour and prevent flyaway waste.

The proposed extractive industry is to be to a maximum depth of 6m below ground level over the footprint of 5.95ha, with key extracted materials being gravel (at a depth of 0.3m-2m below ground level) and sand (at a depth of 2m-6m below ground level). Evidence of these materials are in the Materials Evaluation Report prepared by Stass Environmental at **Appendix C** (bore logs GW5 & SE5).

The top 0.3m of topsoil will be stockpiled on site to be used in the remediation process. The technical note provided by WML Consulting Engineers at **Appendix D** demonstrates the relevance of these materials to be used for their proposed purposes on site.

Annually, 4,800m³ of gravel is used to maintain the surface of internal haul roads and minimise erosion in stormwater management, which are integral to the efficient day-to-day operations at the site. Currently gravel is bought from another provider for around \$16/m³, totalling expenses in excess of \$76,000 per annum. The gravel seam at a depth of 0.3m-2m below ground level at the proposed extraction site comprises around 31,000m³ of material. Further, larger rocks are required at the site to slow the velocity of runoff water and minimise the instance of erosion as a result of rainfall events. Currently, some rocks have been sourced from the excavation work required to prepare Cell 8 for use. These rocks have been located in the stormwater drains on the southern side of the site and have been integral in guaranteeing the functionality and longevity of swales onsite through the most recent winter. Considering the ongoing expected changes to climate, and likely increased prevalence of significant weather events, access to large rocks through extraction at the eastern side of Lot 2 would improve the resilience of the landfill use against significant weather events. The technical note provided by WML Consulting Engineers at **Appendix D** demonstrates the relevance of gravel to be used for the proposed purposes.

Sand withdrawn at a depth of 2m-6m below ground level, totalling around 146,200m³ of material, will be used to provide a trafficable surface on the operating face of the landfill cell. Particularly, the permeability of sand ensures areas of the landfill cell are trafficable during all seasons, which allows for waste to be trucked directly onto the landfill site.

Daily, a minimum of 150mm of cover material (sand and/or clay, dependent on whether the surface is to be trafficable) is required to seal waste which is received and compacted throughout the day. This cover controls odour and prevents vermin at the site. The cover material is currently being purchased from the extractive industries on the western side of Lot 2 which is being managed by the landowner, however this is becoming less financially viable for the applicant. Therefore, the tenants of Lot 2, Cleanaway, intend on withdrawing their own stock of material for this purpose. Considering around 25,728m³ of sand is bought per annum for \$5.00/t totalling \$128,640 per year, the proposed extractive industry on-site for Cleanaway Solid Waste Pty Ltd will improve the economic viability of the landfill facility. Further, the volume of material extracted represents around 5.5 years' worth of sand supply at the current rate of use. The technical note provided by WML Consulting Engineers at **Appendix D** demonstrates the relevance of sand to be used for the proposed purposes, being a trafficable surface on the face of the landfill cells.

This application proposes to exhaust the store of gravel and sand material over the period of 5 years, and stockpiling the excess to benefit the landfill use in following 18 months. Temporary excess material stockpiles are to be exhausted before extraction activities are completed. Temporary excess material stockpiles will enable materials to be stockpiled near the excavation site while the pit face is being excavated. Once the north eastern corner of the pit face has been excavated, the excess material stockpiles will be sited in this location, as is demonstrated in the Excavation Site Plan at **Appendix I**. All stockpiled material will be exhausted within 18 months of the completion of the extraction process.

3.1. Works and Excavation Program

3.1.1. NATURE OF OPERATION AND DURATION

The proposed operations onsite are outlined on the attached Excavation Works Plan attached at **Appendix I** and include the following:

- A loader for the purpose of loading each truck
- A bulldozer for gravel extraction and rehabilitation of each stage;
- An excavator for the stockpiling of vegetation, topsoil, sand, rock, and arising clay and gravel onsite; and
- A 15kl watercart for dust suppression. Water to be carted from onsite, as is detailed in the Dust management technical note.

No crushing or screening is proposed as part of this application.

The duration of extraction works onsite are anticipated to occur over a five-year period. Excess material is to be stockpiled at the site for a duration of 18 months after extraction has finished. All operations associated with the proposed extractive industry are to be completed within 6.5 years of commencing. Rehabilitation will then be implemented in accordance with the attached Rehabilitation Plan at **Appendix H**, with rehabilitation being complete within 12 months of commencing. Therefore, works associated with the proposed extractive industry will be complete and the site rehabilitated over the period of 7.5 years.

3.1.2. EXTRACTION PROCESS

Survey and Set-out

- Obtain Clearing Permit area digital files.
- Surveyor to set out Clearing Permit area perimeter prior to clearing be undertaken.
- Post clearing, perimeter drain, road and crest of void perimeter to be set out and batter boards established around the void perimeter to assist in cutting the batters at the design 1 in 4 slope.

Topsoil Removal and Management: 0 m to - 0.3 m

- Once vegetation has been removed the topsoil is to be carefully removed and stockpile.
- There is anticipated to be approximately 300 mm of topsoil over the surface.
- Topsoil is to be carefully removed to ensure that minimal gravel and larger rocks are removed, but all/most useful topsoil is removed.
- Topsoil is to be stockpiled in the low mounds/piles no higher than 4 m above natural ground level to ensure ongoing biological activity within the soil (oxygen availability).
- When stockpiling is complete, the topsoil stockpile is to be hydroseeded with grass seeds to encourage vegetation growth and prevent dust generation and erosion.
- Due to the dusty nature of the topsoil material, this activity is ideal to occur when the soil is moist, and the wind is coming from the westerly or south-westerly direction. In the event that the topsoil is removed when dry and dusty conditions persist, a water cart is to be used to wet down the topsoil and the topsoil stockpiles to manage dusty missions. Compliance with the site Dust Management Plan is to be maintained.

Excavation Development

- Trial excavations will determine where the various materials are located. Precise staging and timing of extraction is dependent upon these preliminary excavations in order to be completely responsive to the materials found at the site. In any case, extraction will begin at the northern end of the pit and work south. This process of extraction is to be gradual, with the footprint of extraction being exhausted after five years from beginning. The process of excavation will not follow a specific staging plan.

Gravel and Rock Excavation: -0.3 m to -2.0 m

- Gravel and rock, is anticipated to be present in the top 2 m of lateritic material.
- An excavator is to be used to excavate a number of trial pits to assess the type and extent of available resource.
- Based on the outcome of the trial pits:
 - Thin resource layer or rocky material - A dozer is to be used to push up the material into small stockpiles for subsequent removal to the main stockpile area.
 - Deep resource layer - An excavator is to be used to excavate the resource layer and direct loading dump trucks for haulage of the material to stockpile.
- Materials to be stockpiled in accordance with material type:
 - Gravel-good-quality
 - Gravel – bush gravel
 - Rocks – less than 500 mm
 - Rocks-greater than 500 mm
 - Clean sand
 - Residual material.

Sand and Clay Excavation -2.0 m to -6.0 m:

- Sand and clay, is anticipated to be present below the lateritic material layer and continue at depth.
- Based on the outcome of the trial pits:
 - Thin resource layer - A dozer is to be used to push up the material into small stockpiles for subsequent removal to the main stockpile area.
 - Deep resource layer - An excavator is to be used to excavate the resource layer and directory loading dump trucks for haulage of the material to stockpile.

*Stockpile management***General:**

- Materials to be stockpiled separately in accordance with material type and usability.
- Stockpile locations and size to be controlled by the Local Development Plan. Selection to be based on space availability subject to future site development, site lines and offsite visual impact, material type, accessibility and when the material will be used.
- Maximum level of any stockpile is to be RL114m AHD, consistent with the requirements of the Local Development Plan (maximum approved stockpile level).
- Maximum stockpile side batters to be 1 in 2.
- Care is to be taken to ensure stockpiles do not cover/block site stormwater drainage system.
- Stockpile areas to incorporate silt traps to minimise silt in downstream stormwater drains.
- HydroMulching of sandy stockpiles.

Topsoil:

- Maximum height to be 4 m above natural ground level up to 114m AHD, to ensure ongoing biological activity within the topsoil.

3.2. Proposed depth of extraction

Extraction is proposed to be to a maximum of 6m below current ground level, as is demonstrated on the Excavation Site Plan at **Appendix I**. The depth shown on the post extraction plan is calculated based on the average depth set out within the material evaluation report prepared by Stass Environmental, and the technical note provided by WML. Extraction is to terminate once the material extracted meets the depth of 6m below ground level.

3.3. Rehabilitation and decommissioning program

The proposed Extractive Industry is to be rehabilitated in a manner consistent with the Rehabilitation Plan at **Appendix H**, whereby the land will be graded to have 1:6 slope, and vegetated with the pasture species described at **Appendix H**. Rehabilitation of the land to the final contours is to occur within 6 months of the final material stockpile being exhausted, while all seeding required in the landscaping plan is to be finalised within 6 months of the final material stockpile being exhausted (weather permitting).

	Months post-completion		
	6	12	18
Final contours established			
Areas seeded to become pasture			
Maintenance of seeded areas			

Areas between the extraction footprint and the lot boundary, identified as being buffer zones in the Local Development Plan, are to be completely vegetated with species endemic to the area.

4. ENVIRONMENTAL MANAGEMENT STRATEGIES

4.1. General Management

4.1.1. DUST

Dust is to be managed in accordance with the Dust Management Technical Note prepared by Strategen/JBS&G and attached to this report as **Appendix F**. In summary, the following measures are to be applied:

- General management;
- Management of trafficable areas;

- Operation of vehicles;
- Administrative controls; and
- Incident and complaints management.

In addition to the general control measures specified in the DMP, the following specific measures will apply to the proposed EIL activity:

- Topsoil mounds will be restricted to a height no greater than 4 m;
- Stockpiles, where possible, will be limited to the anticipated cubic volume/vehicle movement for cartage on the following operating day;
- Stockpiles will be configured to accommodate easy access for watering/dust minimisation if required;
- Stockpiles of topsoil will be subject to suitable stabilisation techniques based on environmental conditions, e.g., watering or seeded mulching;
- Operations will take place when wind conditions determine it to be suitable as far as reasonably practicable;
- Visual monitoring of dust will be undertaken daily by all personnel, if dust emissions are observed, dust suppression techniques will be implemented immediately, and all operations will cease until the situation is under control; and
- As sections of the staged extraction progress, the area will be rehabilitated as soon as practical to minimise areas that are high risk for dust dispersal.

Existing dust measures required at the subject site include extensive dust control measures and dust monitoring. Dust control measures prescribed by the Department of Water and Environmental Regulation are included in the existing Dust Management Plan V5 which has been endorsed by Council for the site, which are regularly reported on as part of the relevant licenses and permits between the proponent and DWER.

Therefore, all proposed operations at Lot 2 are to appropriately manage dust onsite.

4.1.2. ODOUR

Generation of odour is not an outcome of gravel and sand extractive industry operations. Therefore, the proposed extractive industry will not have an adverse impact on odour being emitted from the site.

4.1.3. NOISE

Noise generation is not proposed to increase as a result of this proposal. The Environmental Acoustic Assessment finds that acoustic outputs occurring as a result of the proposed extractive industry are projected to be up to 12 dB below the assigned noise level, prescribed by the *Environmental Protection (Noise) Regulations 1997* (EPA Noise Regulations 1997), and therefore noise emissions from the facility will comply with the requirements of the EPA Noise Regulations 1997 at all times.

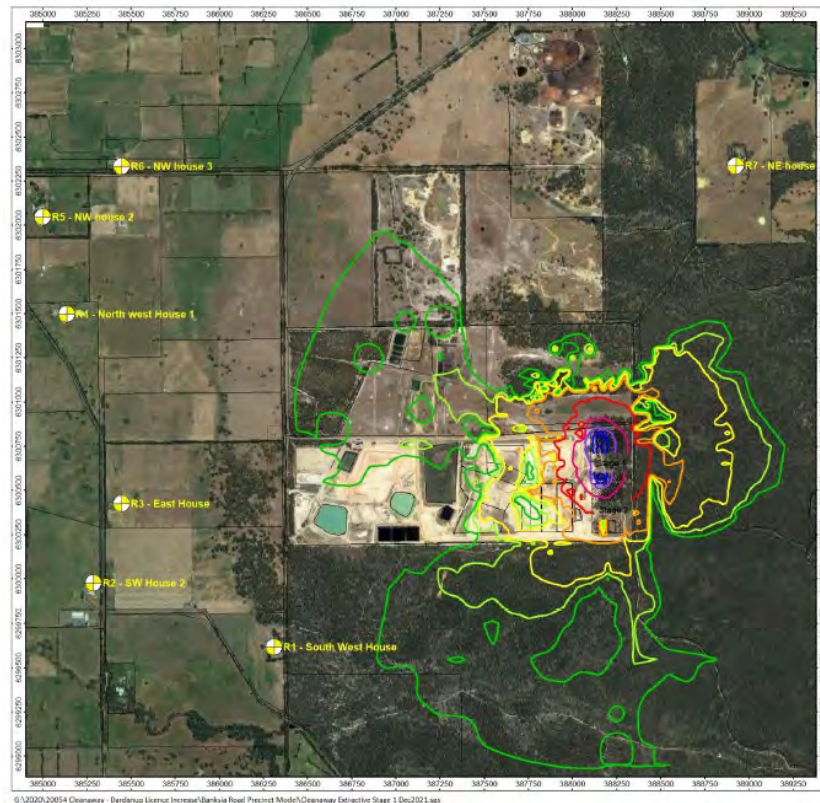


Figure 2 – Herring Storer Noise Modelling of future extractive operations.

Noise modelling undertaken by Herring Storer is demonstrated at **Figure 2** above, and shows that no neighbouring sensitive land uses will be adversely impacted by the proposed extractive industry.

4.1.4. VISUAL IMPACTS

Management of visual impact onsite is minimally required, as the existing landfill cells located between Lot 2 proposed Extraction Site and Banksia Road provide a visual screen, and appropriately manages any future visual impact from extraction operations. The Visual Impact Plan at **Appendix K** demonstrates the expected visual impacts from the proposed extractive industry.

The proposed rehabilitated height of up to 114m AHD will be shielded from public view by the landfill face, and will not cause significant visual impact.

4.1.5. TRAFFIC

The extractive industry will not have any material impact to the traffic generation onsite or offsite (i.e. no increase), since the extractive industry proposed is to service the existing use at Lot 2. Any minor changes to traffic patterns resulting from this Development Application will be contained within Lot 2.

The construction equipment fleet will include 1 excavator, 4 dump trucks, 1 bulldozer, 1 loader, 1 grader and 1 skid steer. These construction vehicles will remain on site.

4.1.6. ACID SULPHATE SOILS

Acid Sulphate Soils (ASS) are naturally occurring soils and sediment that contain the mineral iron sulphide. The subject site contains some ASS risk within the western portion of the lot, which is generally a height of around 60m AHD. According to the ASS Risk Map of the Swan Coastal Plain, it has a potential a moderate - low risk of ASS occurring within 3m of the natural soil surface.

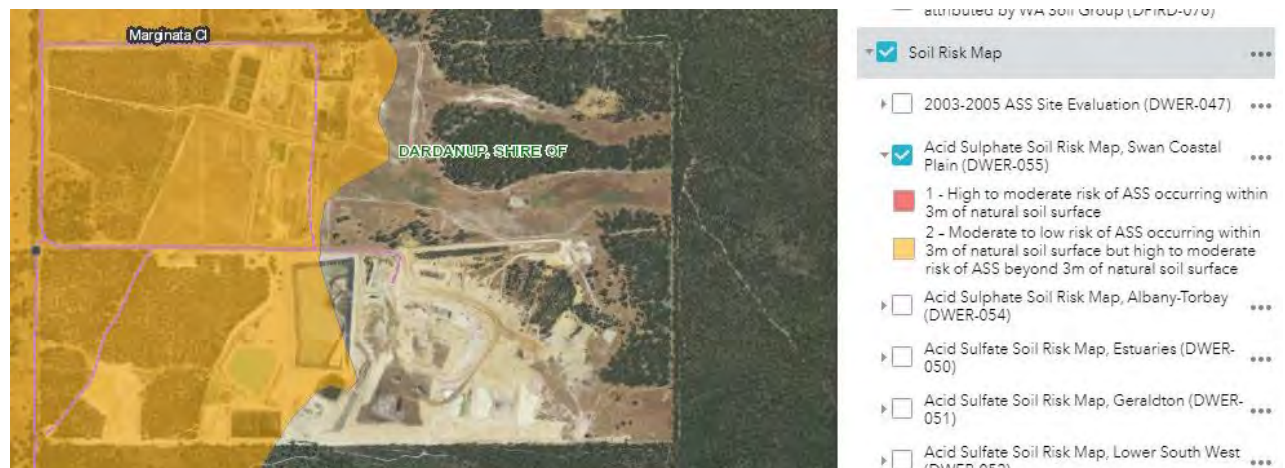


Figure 3 - ASS Mapping of Lot 81

The proposed extractive industries are to occur at the eastern side of the site, where the general height of the ground level is around 105m AHD, significantly higher than the areas identified to be at risk of ASS occurring, and therefore the likelihood of exposure to ASS is considered negligible. No further reporting has been conducted to this end.

4.1.7. CONTAMINATION

A memorial on the Certificate of Title indicates that the site is 'potentially contaminated, further investigation required'. A copy of both the Certificate of Title and Memorial are at **Appendix A** of this report. Studies were conducted at the site in 2021 in relation to material located on the northern side of the site in stockpiles. These stockpiles comprised sandy clay and clay material as part of amendment DWER licence for L8904/2015/01 issued on 13/04/2017 for the construction and operation of three composite HDPE liner Class III landfill cells (cells 6, 7 and 8).

This material was collected from an area to the west of the proposed extraction footprint, which is downhill from the extraction site. Tests conducted by Tonkin on the stockpiled material found that the material qualified for 'Uncontaminated fill' status under Section 5 DWER Landfill Waste Classifications and Waste Definitions 1996 (as amended in 2019). Test results can be found at **Appendix M** of this report.

Tonkin (March 2022) provided the technical summary at **Appendix M**. Their research found that *'the sampling and analysis undertaken for the 'clay' and 'sandy clay' stockpiled material...was all not contaminated...'* (Tonkin, March 2022; 1). Further, *'...lot 2, where the material originated from, is also therefore, not contaminated based on the analysis of the material.'*

Therefore, despite the memorial on the title indicating the site may be 'potentially contaminated, further investigation required', studies conducted at the site have found no signs of contamination at the eastern side of the site, and therefore material extracted as a result of the proposed works will not be contaminated.

4.2. Water

4.2.1. STORMWATER

Stormwater will continue to be managed as per the Stormwater Management Plan prepared by Cleanaway at **Appendix O**. This Stormwater Management Plan is compliant with the 2019 Australian Rainfall & Runoff Guidelines, with modelling conducted which proves the site has capacity to cope with a 1 in 500 year rainfall event. Rainfall estimates and peak flow discharges in the Stormwater Management Plan have been updated to comply with the Australian Rainfall & Runoff 2019 Guidelines. A copy of the current Stormwater Management Plan is attached at **Appendix O** of this report. All surface water onsite flows towards the western boundary of the site. All surface water will continue to be managed internally on site.

It is to be noted that the proposed extractive industry will not impact on the stormwater upgrade work along the southern boundary of Lot 2 approved by the Shire in March 2021 (DAP-Fo174854).

The base of the extraction footprint has been designed with input from IW Projects to ensure water can flow out of the basin and into the existing stormwater drains which run parallel to the lot boundaries. Stormwater diversion bunds along the outside northern, southern and eastern interfaces of the extraction site will utilise the existing contours of the land to guide stormwater runoff into the existing stormwater networks which follow the northern and southern boundaries of the site.

Meanwhile, the pit floor has been designed to ensure any water falling within the pit is channelled out via the internal roads, and into the stormwater infrastructure along the northern boundary of the site.

Stormwater Management within Excavation Void

- There is to be a perimeter access road constructed around the pit. This is to be progressively constructed as the pit develops, using suitable construction material excavated from the void. The road is to be raised approximately 500 mm above the surrounding natural ground level to prevent external stormwater from flooding into the pit. A V-drain of approximately 1 m deep is to be constructed on the outside of the perimeter road (opposite side to the void) to direct any surface water run-off to the surrounding stormwater management system.
- The void floor is to be developed with a slight slope falling to the northwest where the stormwater will exit the void. The floor of the void is to incorporate a number of silt traps through which the stormwater is to flow to reduce the silt loading of the stormwater before it enters the surrounding stormwater drainage system.

4.2.2. SEPARATION TO GROUNDWATER

For more than a decade, numerous specialist consultants have been engaged to monitor and model the groundwater below the subject site. This ongoing monitoring has determined the highest seasonal level of the groundwater. Based on this information, in the vicinity of the proposed

extractive industry site, groundwater is between 40.5m (per bore log SE5 of **Appendix C**) and 58m (per bore log GW5 of **Appendix C**) below ground level, meaning there is a minimum separation distance of 34.5m between the underside of the extractive industry and the highest groundwater level.

Discussion with DWER determined that groundwater separation distance is dependent upon site specific constraints, and generally around 2m separation distance between extractive industries and groundwater is required. Verbal confirmation from DWER staff has confirmed that the proposed separation distance of at least 34.5m is consistent with the requirements of DWER. Evidence of the groundwater levels can be found in appendices of the Material Evaluation Report at **Appendix C** of this document (particularly bore logs GW5 and SE5, which are in the vicinity of the proposed extractive industry).

4.3. Flora and Fauna

4.3.1. EXISTING ENVIRONMENTAL VALUES

Accendo Australia has prepared and lodged with DWER a comprehensive clearing application over Lot 2 and 81 Banksia Road. To date, substantial environmental works have been undertaken onsite to the satisfaction of DWER to underpin the clearing application. Progression of this clearing permit has been delayed until a development application has been approved for both of the lots subject to the clearing permit.

The Offset report, prepared by Accendo to accompany the clearing permit application, has been included with this application as it details the environmental values of the site. In terms of environmental values, the Offset report details:

- Black cockatoo assessment by Harewood (2021a) identified two habitat trees with hollows potentially suitable for nesting within Lot 2 clearing footprint. Within Lot 2, no actual evidence of any hollow was found to be present (Accendo Offset Proposal, page 2).

In order to offset these values, the report finds that, in exchange for the proposed 5.95ha of clearing at Lot 2 Banksia Road, and proposed 10.75ha of clearing at Lot 81 Maginata Close:

- Direct Offset 1: Conservation in perpetuity of 5.22 ha of non-secure remnant native vegetation within Lot 10 Temple Road, East Picton,
- Direct Offset 2: Conservation in perpetuity of 38ha of non-secure remnant native vegetation in Lot 2148 Ferguson Road, Ferguson, and,
- Direct Offset 3: Retention and improvement of 7.86 ha of black cockatoo foraging and breeding habitat within the vegetation buffer.

These offsets total 51.08ha of secured native vegetation.

Therefore, the existing environmental values at the proposed extraction site have been justified to DWER. Copy of the Environmental Offset report, prepared by Accendo and distributed to DWER for assessment, can be found at **Appendix N** of this report. It is expected that determination from DWER will be issued once the proposed use has been approved by a determining body.

4.3.2. CLEARING

It is intended that the whole development footprint is to be cleared in one stage. Impacts resulting from this, specifically dust generation, will be managed by the Dust Mitigation Measures included

in the approved Dust Management Plan Version 5, and the additional dust control measures detailed by Strategen JBSG at **Appendix F**.

Where possible, smaller trees will be transplanted within the subject site in the buffer area between the development footprint and the lot boundary. This buffer area is demonstrated at the approved Local Development Plan for the site, at **Appendix L** of this document.

Cleared vegetation is to be sorted according to its suitability, with usable timber logs being sent to a sawmill supplier, wood unsuitable for timber will be sent to be used as firewood and residual wood will be mulched, stockpiled and eventually used to provide protection of the exposed surface when rehabilitation is undertaken.

The method of clearing is detailed below:

- Following the set-out of the Clearing Permit perimeter, clearing can commence in accordance with the requirements of the Clearing Permit, including the management and care of native fauna.
- Clearing is to be undertaken using a dozer and/or excavator as appropriate.
- Cleared vegetation to be managed in accordance with the approved methodology, options include:
 - Removal from site with larger trees used for timber, suitable smaller trees used for firewood and remaining vegetation mulched and used in landscaping industry or composting; or,
 - Mulched as it is being cleared, with mulch stockpiled for subsequent useful on-site for rehabilitation purposes and erosion control.

Therefore, matters relating to flora and fauna at the site have been addressed, and the proposed offset compensates for environmental impacts resulting from the proposed extraction.

5. PLANNING FRAMEWORK

5.1. State Planning Instruments

5.1.1. GREATER BUNBURY REGION SCHEME

The subject site is zoned 'Rural' under the Greater Bunbury Region Scheme (GBRS) with the proposed extractive industry considered to meet the objectives of the Rural zone per the GBRS. As the proposed extractive industry is considered consistent with the Rural zone, no adverse impacts are expected for neighbouring properties.

5.1.2. GBRS STRATEGIC MINERALS AND BASIC RAW MATERIALS

This policy identifies strategic mineral resources and basic raw materials Significant Geological Supplies (SGS) in the Greater Bunbury Region Scheme (GBRS) area and responds to calls from the community, industry and government to:

- facilitate the timely extraction of resources;
- ensure present and future extraction of basic raw materials and mineral resources are not prejudiced; and
- minimise the impact of extraction on surrounding land uses.

The principal purpose of this policy is to ensure long-term security of access for minerals and basic raw materials through appropriate land use planning and control of development.

Lot 2 is demonstrated at Figure 2: Strategic Minerals and Basic Raw Materials Resource Policy Map (see extract at **Figure 4**, below). The objectives of the GBRS Strategic Minerals and Basic Raw Materials Policy (GBRS P) is to identify regionally significant pockets of resources and to ensure the resources are not sterilised, while encouraging the mining of resources in accordance with acceptable environmental stands.

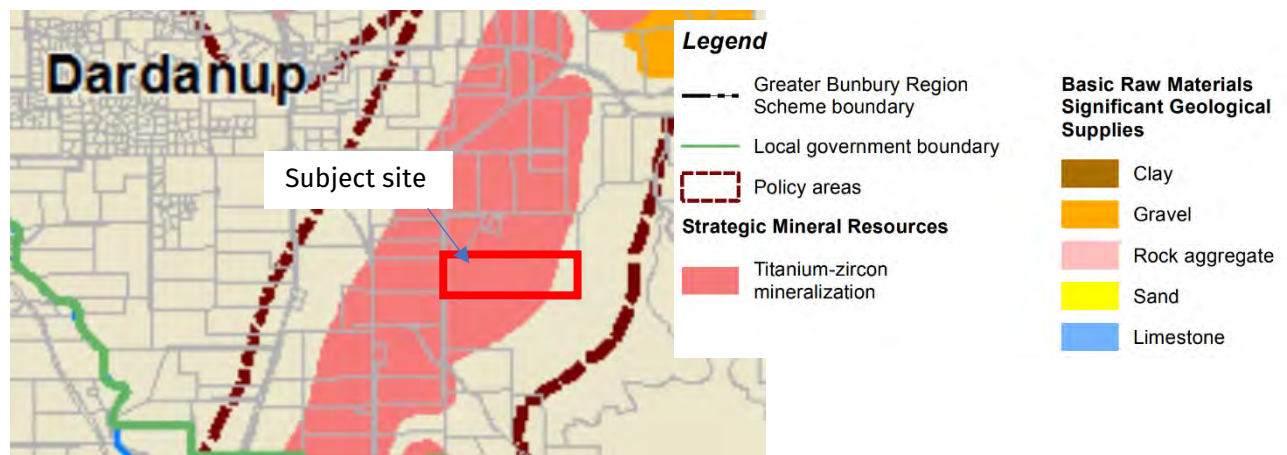


Figure 4 – Extract from GBRS Strategic Minerals and Basic Raw Materials Policy Map

The proposed extractive industry seeks to achieve the objectives of GBRS P through ensuring the mineral resource at Lot 2 is not sterilised.

The table overleaf demonstrates consistency between GBRS P Part 5 Policy Statement and the proposed extractive industry.

GBRS P Part 5 Policy Statement	Applicant response
<p>5.1 Strategic resources and their buffers are not to be developed for other purposes until the resource is extracted, or unless development incompatible with the future extraction of the resource.</p>	<p>The proposed extractive industry represents the actualisation of the GBRS P.</p>
<p>5.2 The WAPC will give due regard to this policy when considering amendments to the GBRS and local planning schemes and amendments, and in determining subdivision and development applications.</p>	<p>It is understood that the decision making agency will consider this application against the GBRS P. Consistency with GBRS P is provided in this section of the application report.</p>
<p>5.3 Local governments should give due regard to this policy when preparing local planning schemes and amendments, and in making decisions about the use or development of land within the policy areas.</p>	<p>It is understood that the Shire of Dardanup, being the local government agency, will give due regard to this policy when making decisions about the proposed development within the policy area.</p>
<p>5.4 Strategic resources, and an indicative separation distance or buffer should be identified in the sub-regional and/or local planning strategies</p>	<p>This resource is identified under the GBRS Strategic Minerals and Basic Raw Minerals Resource Policy 2018, as well as the Shire of Dardanup's Local Planning Strategy. Therefore, the strategic resource is identified in the sub-regional and local planning strategies.</p>
<p>5.5 Region and local planning schemes should identify strategic resources, and include provisions for their protection, access and use.</p>	<p>Extractive Industry is an A use at Appendix 1 – zoning table of the Shire of Dardanup's Local Planning Scheme No. 3.</p>
<p>5.6 Region and local planning schemes should not generally prohibit the extraction of strategic resources.</p>	<p>The region and local planning schemes identify the proposed extractive use, and do not prohibit the extraction of resources in this area.</p>
<p>5.7 Sequential land use planning is encouraged whereby extraction and appropriate rehabilitation can take place on a programmed basis in advance of longer-term use and development.</p>	<p>The proposed extractive industry will benefit the existing land use, and will be rehabilitated to an appropriate level to enable future use of the land.</p>
<p>5.8 Sensitive zones and/or land uses may be approved where it can be demonstrated they will not limit the existing or potential extraction of strategic resources.</p>	<p>The proposed use is not considered sensitive, and will not impact upon the existing or potential extraction of strategic resources.</p>
<p>5.9 Consideration may be given to approving rezoning, subdivision or development within the policy areas where, following detailed investigations and consultations with the Department of Mines, Industry Regulation and</p>	<p>The proposed extractive industry is consistent with the objectives of GBRS P, and therefore approval within the policy area is sought as the application is for development which will</p>

GBRS P Part 5 Policy Statement	Applicant response
<p>Safety, the Department of Water and Environment Regulation and the Department of Planning, Lands and Heritage, it can be demonstrated that the proposed rezoning, subdivision or development would not prejudice current or future mining of strategic resources within the areas. The acceptability of any proposed rezoning, subdivision or development within the policy areas will be determined with due regard to:</p> <ul style="list-style-type: none"> • Advice from the Department of Mines, Industry Regulation and Safety on matters referred to in this policy • Any other planning or environmental considerations, including WAPC policies and local government policies adopted under their local planning scheme. 	<p>contribute toward the objectives of GBRS P coming to fruition.</p>
<p>5.10 Where a strategic resource is located with native vegetation or significant biodiversity values, extraction of the resource may require referral under Part IV or Part V of the Environmental Protection Act 1986. Environmental regulation of the proposal may require vegetation retention and/or protection of other environmental assets.</p>	<p>It is understood that the proposed extractive industry may require referral under Part IV or Part V of the <i>Environmental Protection Act 1986</i>.</p>
<p>5.11 Planning decision-makers are to give due regard to advice from environmental agencies and consider potential impacts on fragmentation and connectivity of remnant vegetation.</p>	<p>It is understood that this application will be referred to relevant environmental agencies. A clearing permit and subsequent offset proposal has already been lodged to DWER in relation to this application.</p>
<p>5.12 For basic raw materials, the horizontal separation distances from water supply infrastructure, and other management measures to protect water quality, should be applied in planning decision-making.</p>	<p>No water supply infrastructure is located in close proximity to the proposed extractive industry. The bottom of the proposed pit will be separated from groundwater by at least 34.5m.</p>
<p>5.13 Extraction of basic raw materials will normally be subject to achieving vertical separation distances to the groundwater table to protect water quality. The separation distance will vary based on the value of the groundwater resource (for example, public drinking water source areas).</p>	<p>The subject site is not impacted by a groundwater resource of high value. There will be a minimum separation distance of 27m between the base of the proposed pit, and the groundwater. This is evidenced in the appendices of the Material Evaluation Report.</p>
<p>5.14 Rehabilitation and restoration of basic raw material extraction sites will normally ensure that an appropriate vertical separation distance to groundwater is achieved. The distance needs</p>	<p>Rehabilitation of the site will ensure appropriate vertical separation distance to the groundwater is achieved. Rehabilitated areas</p>

GBRS P Part 5 Policy Statement	Applicant response
<i>to be consistent with the long-term use of the land and protection of the groundwater quality.</i>	will be vertically separated from groundwater by at least 34.5m.

5.1.3. STATE PLANNING POLICY 2.5 RURAL PLANNING

State Planning Policy 2.5 Rural Planning (SPP 2.5) part 5.9 identifies planning provisions for Basic raw materials outside the Perth and Peel planning regions. The proposed extractive industry is within the Shire of Dardanup, and is therefore outside the Perth and Peel regions. Demonstration of consistency between the proposed extractive industry and SPP 2.5 is provided below.

- The proposed extractive industry is considered consistent with SPP 2.5 part 5.9(a) as the proposed extractive industry represents utilisation of the regionally identified significant geological supply. This geological supply is considered regionally significant as it is identified within GBRS P.
- Lot 2 is identified in region (GBRS P) and local (Shire of Dardanup Local Planning Strategy) planning strategies as a basic raw materials site.
- Sequential land use planning is proposed whereby the proposed extractive industry site will be rehabilitated in accordance with the enclosed Rehabilitation Plan to ensure the proposed extractive industry does not impact upon future uses at Lot 2.

Therefore, the proposed extractive industry is consistent with SPP 2.5.

5.1.4. STATE PLANNING POLICY 2.4 BASIC RAW MATERIALS

State Planning Policy 2.4 (July 2021) seeks to enable the responsible extraction of Basic Raw Materials (BRM) while ensuring the protection of people and the environment. The application of this policy provides the foundation for land use planning to address the sustainable management of BRM in Western Australia. Applicable to this proposal, the following objectives of the policy are as follows:

- ensure BRM and its regional importance is considered at the earliest stages of the planning process,*
- ensure BRM resources are used efficiently in land use planning and development,*
- identify BRM extraction opportunities through sequential land use without compromising the final intended land use, and,*
- ensure the extraction of BRM avoids, minimises or mitigates any adverse impacts on the community, water resources and biodiversity values.*

In light of the above policy objectives, the proposed Extractive Industry seeks to meet the objectives of the policy as outlined as follows:

- The proposed extractive industry is of regional significance, proposed to supply sand & gravel to future infrastructure projects within the southwest. This resource has been identified early in the planning process via the GBRS Strategic Minerals and Basic Raw Materials Policy and the Shire of Dardanup's Local Planning Strategy;
- The proposed extraction and remediation onsite allows for the efficient use of the land, while allowing for sequential land use planning which will allow for the final intended use, being agriculture, to be implemented at the site;

- Due to the property's location, it appropriately avoids, minimises and mitigates potential adverse impacts to the community, water resources and biodiversity values. This has been demonstrated in detail at Part 4 of this report.

Demonstration of consistency with the assessment criteria detailed within can be found in the table below.

SPP 2.4 Guidelines Part 4	Analysis of this Extractive Industry Application
<i>(a) the avoidance or mitigation of conflicts and detrimental effects on existing and future sensitive land uses and agricultural land in the surrounding areas (that is, noise, dust, vibration, blasting and vehicular traffic);</i>	The proposed extractive industry is not in proximity to sensitive land uses or agricultural land. The proposed extractive industry achieves legislated noise and dust outputs, as is demonstrated at part 4 of this report.
<i>(b) having an effective consultation process with appropriate stakeholder engagement, including advertising as required;</i>	The development application is to be made available for public comment as part of the development assessment process.
<i>(c) prioritisation of proposals within SGS areas aligned with DMIRS geoVIEW.WA mapping in Perth and Peel;</i>	Not applicable to this application, as the subject site is located outside of the Perth and Peel region.
<i>(d) if the resources is identified as a SGS area and/or local basic raw material demand;</i>	The site is identified as a significant geological supply (SGS) as referenced at Part 5.1.2.
<i>(e) the quantity and quality of resource and scale and duration of extraction;</i>	The proposed extractive industry is proposed to extract an estimated 146,200m ³ of sand within a 5 year period.
<i>(f) management of finished ground levels for BRM extraction and site rehabilitation to:</i> i) <i>Maintain appropriate horizontal separation between extraction, water supply infrastructure and any other engineering requirements;</i> ii) <i>Avoid the exposure of groundwater and maintain the required vertical separation distances to groundwater for sequential land use;</i> iii) <i>Protect ground water and surface water quality.</i>	The proposed extractive industry will be consistent with SPP 2.4 Guidelines Part 4(f). The proposed extractive industry is adequately separated from groundwater, water supply and engineering infrastructure. Further commentary regarding surface water and ground water is provided within this report. A separation to groundwater of at least 34.5m is proposed.
<i>(g) the site's potential for sequential land use and the ability to rehabilitate the land in a manner compatible with its long-term use identified by the Local Planning Scheme;</i>	Following extraction, the site is to be rehabilitated to pasture, which is consistent with the General Agriculture zoning of the site under the Local Planning Scheme.
<i>(h) the ability to stage the extraction operations to avoid conflicts with any adjacent land uses;</i>	Works on the proposed extraction will occur sequentially to avoid adverse impacts on adjacent land uses.

<i>(i) the effect of the proposed extractive industry on any adjacent agricultural land;</i>	The proposed extractive industry is not considered to negatively impact any adjacent agricultural land uses.
<i>(j) the availability and suitability of road access;</i>	The proposed extractive industry will provide materials to be used internally on site. Therefore, suitability of road access for haulage vehicles related to the proposed extractive industry is not relevant.
<i>(k) the effect of the proposed extractive industry on any native flora and fauna and general landscape values;</i>	Impacts on native flora and fauna, including landscape values are appropriately addressed within this report. The proposed extraction area represents clearing of only 5.95 Ha of vegetation. Landscape values are maintained through appropriate buffer vegetation and clearing is compensated through the vegetated areas protected via the offset proposal.
<i>(l) how all water resources will be protected during BRM extraction including a separation distance to the defined groundwater level plus other management measures to protect water resources during BRM extraction;</i>	Water will be appropriately managed on site in accordance with part 4.2 of this report.
<i>m) potential impacts on fragmentation and connectivity of remnant vegetation;</i>	No fragmentation of vegetation is proposed as part of this application.
<i>n) any requirements for an environmental offset;</i>	An offset proposal has been submitted for consideration by DWER as part of the clearing permit application. The offset proposal proposes 51.08ha of vegetation is protected and rehabilitated for this application.
<i>o) sites of cultural and historic significance on and near the land, having regard to how they are likely to be integrated with subsequent land uses; and</i>	Not applicable to this application.
<i>p) location and stability of excavations, stockpiles and overburden dumps.</i>	Location of proposed stockpiles is demonstrated in the attached Excavation Plan at Appendix I .

Therefore, in light of the above, the proposed extractive industry is considered to be in accordance with SPP 2.4 and SPP 2.4 Guidelines, and provides the opportunity to supply BRM to the south west region.

5.1.5. STATE PLANNING POLICY 3.7 PLANNING IN BUSHFIRE PRONE AREAS

Lot 2 is partially designated to be bushfire prone by the Department of Fire and Emergency Services commissioner. A copy of the bushfire mapping applicable to the subject site is included within **Figure 5** below.

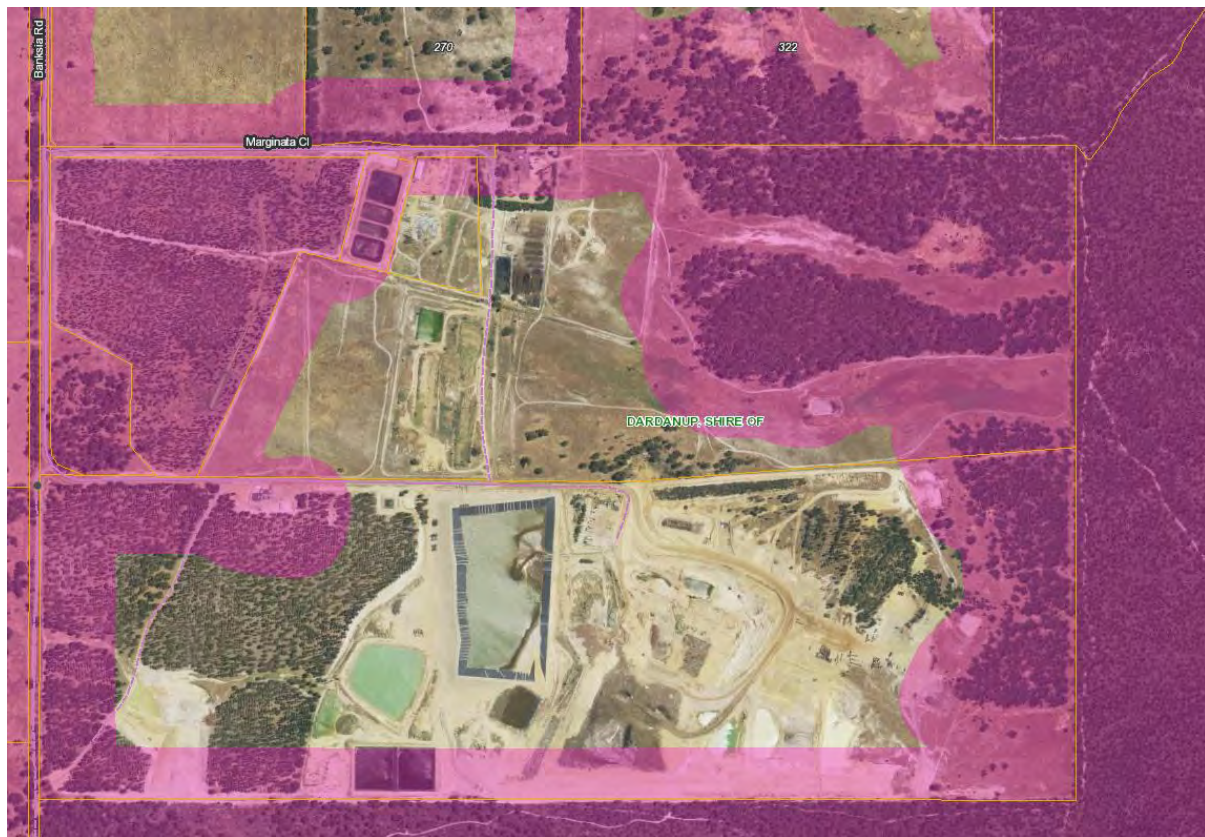


Figure 5 Bushfire Prone Mapping

As the proposed Extractive Industry will not result in intensification of the existing land use, no further bushfire reporting has been prepared for this application.

Part 2.6 of the Guidelines for Planning in Bushfire Prone Areas determines that decision makers can exercise discretion in relation to the requirements of further bushfire reporting when there is no intensification of the land use. Intensification of land use is defined in the Guidelines for planning in bushfire prone areas to include planning proposals that:

- a) Result in an increase of visitors, residents or employees, or
- b) Involve occupation of employees on site for more than three hours at a time for multiple periods during a week.

The proposed extractive industry will not result in a change from the existing number of employees or length of time employees will spend on site. As the proposed land use will not result in intensification of the existing use of the site, it is respectfully requested that the decision maker exercise its discretion to not require further reporting in relation to the bushfire

5.2. LOCAL PLANNING INSTRUMENTS

5.2.1. SHIRE OF DARDANUP LOCAL PLANNING STRATEGY

The Shire of Dardanup's Local Planning Strategy designates the subject site to be within the Waste Disposal/processing land use designation at Map 2. An excerpt from the Shire of Dardanup's Local Planning Strategy is included within **Figure 6** below.

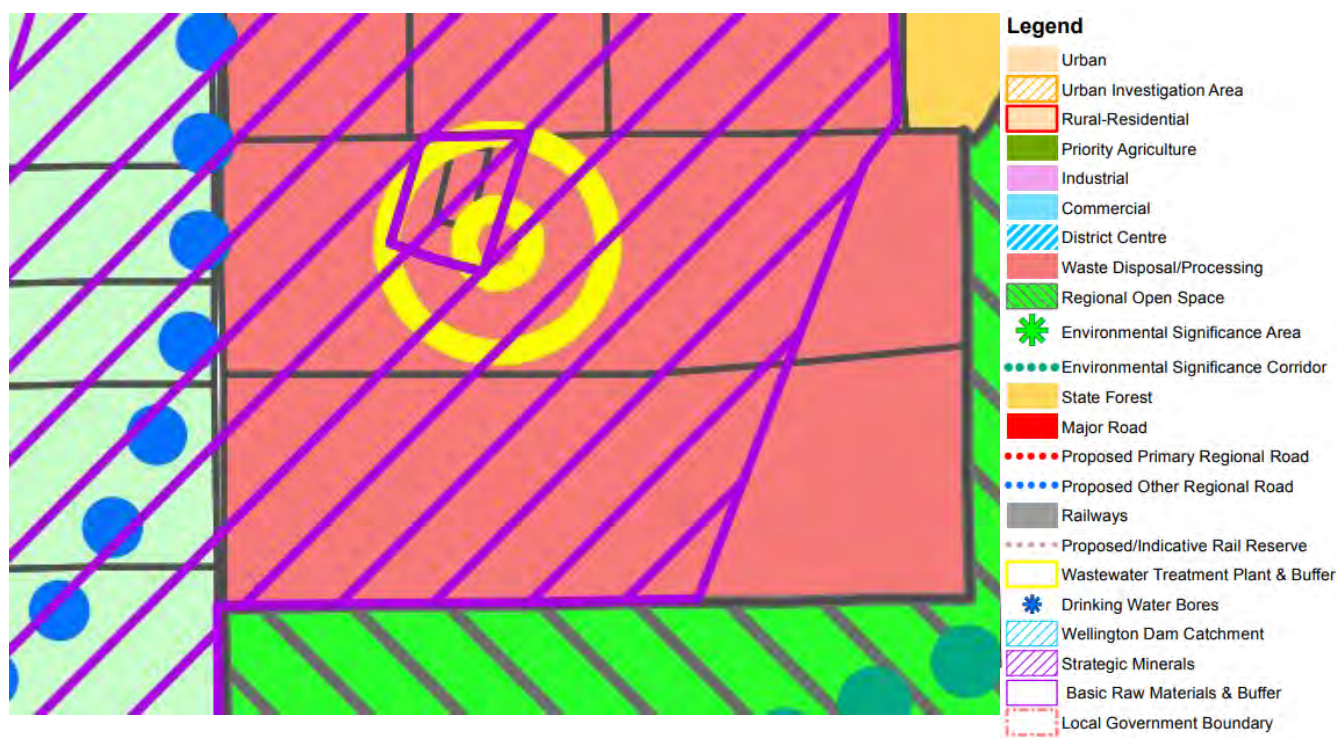


Figure 6 – Shire of Dardanup Local Planning Strategy

The proposed development application seeks to reflect the Shire's Local Planning Strategy by proposing an extractive industry use within the waste precinct to enable continued and improved operation of the existing landfill site. Further, the proposed extractive industry represents utilisation of the mineral resource identified at the eastern side of the site, which was determined after detailed scoping over the site. This detailed scoping provides evidence of the strategic mineral resource which is not identified within the Local Planning Strategy.

5.2.2. SHIRE OF DARDANUP LOCAL PLANNING SCHEME NO. 3

The Shire of Dardanup's Local Planning Scheme No. 3 (LPS 3) zones the subject site as 'General Farming' at Map 1 as outlined within **Figure 7** below.

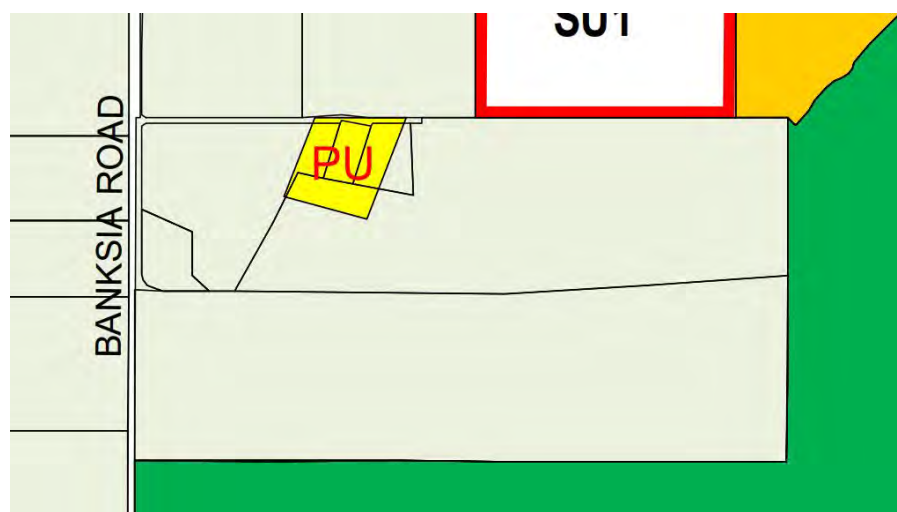


Figure 7 – LPS 3 General Farming Zoning

An extractive industry is considered an “A” use within the General Farming zone, and therefore approval for the use can only be granted after special notice has been given in accordance with clause 7.2 of LPS 3. An Extractive Industry is defined at part 1.8.2 of LPS 3 as follows:

Industry- Extractive: means an industry which involves the extraction, quarrying or removal of sand, gravel, clay, hard rock, stone or similar materials from the land and includes the treatment and storage of those materials, or the manufacture of products from those materials on, or adjacent to, the land from which the materials are extracted, but does not include industry – mining;

Therefore, the Development Assessment Panel can approve an extractive industry within the General Farming zone, as proposed.

5.2.3. LOT 2 BANKSIA ROAD LOCAL DEVELOPMENT PLAN

The Lot 2 Banksia Road Local Development Plan (LDP) was approved by Council resolution on 26th May 2021. The LDP details development requirements at Lot 2. The proposed extractive industry has been designed to specifically respond to the requirements of the LDP. Detail of this consistency is demonstrated in the table below.

Local Development Plan Requirement	Applicant response
<i>Development applications are to clearly detail all development, including any temporary, staged and/or incidental works, with all development to occur within the boundary of the subject site.</i>	This development application clearly details all required works associated with the proposed extraction, and all works are to be undertaken within the boundary of Lot 2.
<i>Any variations to the provisions below will need to be fully justified and should be accompanied by relevant technical reports as necessary, which may include the revision/update of any existing management plans, or other technical reports previously approved by the Shire.</i>	
<i>Development is to be setback from site boundaries a minimum of 30m to the Primary Street (Banksia Road) and a minimum of 20m to all other boundaries.</i>	The proposed extraction site is setback 30m from the northern boundary, 50m from the eastern boundary, approximately 172m from the southern boundary and more than one kilometre to the western boundary.
<i>Development is not to exceed a maximum height of 114m AHD, as outlined in the Cross Section. This height limitation will apply to any structure on site, inclusive of buildings, plant or equipment, and any temporary or permanent bulk earthworks, stockpiles occurring on site. As evident from the ‘Example view locations’, the current facility has begun to protrude above the skyline and any proposed variation to this height limitation will require consideration of</i>	All aspects of the proposed extractive industry are consistent with the height requirements of the LDP, with a maximum height of 114m AHD prescribed for all components associated with the proposed extractive industry.

the visual impact to surrounding landowners and the ability to minimise this impact.

The primary site access is to occur via Banksia Road at the location shown on the Site Plan, with internal circulation of all vehicles not to encroach on the 20m landscaped boundary interface. No heavy vehicles associated with the landfill facility are permitted on Panizza Road and the unsealed portion of Banksia Road. Any development application which will result in additional traffic generation to the subject site is to be accompanied by:

- a) Traffic Impact Assessment or Traffic Impact Statement consistent with the Department of Transport Guidelines to outline the relevant transport considerations and demonstrate the suitability of the proposed site access and vehicle circulation;*
- b) Where additional heavy vehicles are proposed to access and egress the site, an assessment of the standard and suitability of the public road network to accommodate these vehicles, and an overview of the necessary upgrades and/or potential additional maintenance costs to accommodate these vehicle movements in perpetuity.*

Development is to be appropriately screened from key viewpoints via the installation of a minimum 20m landscaping strip adjacent to the subject site boundary which includes:

- Native tree plantings at a minimum size of 30 litres with a minimum mature height of 10m.*
- A variety of smaller shrubs and plantings to provide greater density of foliage to the understory of any trees.*

Development applications are to be supported by a landscaping plan outlining the proposed landscape design and its effectiveness to screen the development proposed.

All boundaries of the site are to be fenced with chain mesh fencing to a minimum of 2m in height and to include wildlife egress points.

Development applications are to demonstrate consistency with any environmental approvals for the subject site, and where relevant should

No additional traffic movements will occur on Banksia Road as a result of the proposed extractive industry. All materials withdrawn are to be used onsite.

The Rehabilitation Plan at **Appendix H** described the landscaping to be installed. No encroaching of development into the landscaping buffer zone will occur as a result of this development. As is demonstrated in the visual impact plan at **Appendix K**, the site of the proposed extraction will be screened from public view by the existing operations at the site.

The required fencing has been constructed at the site.

This application is complemented by:

- Stormwater measures at Part 4.2 of this report,

be supported by technical assessment and management plans including but not limited to:

- *A Stormwater Management Plan where the development will impact upon the management of stormwater on site and should address the mitigation of the off-site impacts of stormwater, including water erosions risk on neighbouring properties;*
- *An environmental management plan that addresses vegetation clearing, hydrogeological impacts on surrounding land uses and the investigation and management of contamination or acid sulphate soils;*
- *A Bushfire management plan prepared in accordance with the guidance provided by State Planning Policy 3.7 where the development proposed is considered to pose a risk to human life or property;*
- *A Dust Management Plan where the development is considered likely to generate dust which will impact on surrounding landholdings;*
- *A Visual Impact Assessment where the development is considered likely to impact views from key locations within the surrounding locality;*
- *An Acoustic Report and Noise Management Plan where the development is considered likely to result in noise which impacts the amenity and operations of surrounding landowners.*

- Bushfire statement at Part 5.1.5 of this report,
- Dust management technical note at **Appendix F** of this report,
- Visual Impact Assessment at **Appendix K** of this report, and,
- An Acoustic Report at **Appendix E** of this report.

Additional technical reports include:

- Material evaluation plan at **Appendix C** of this report,
- Material evaluation technical note at **Appendix D** of this report, and,
- Surveyors certificate at **Appendix J** of this report.

A note on the LDP at **Appendix L** details that 'Any future development may require a clearing permit'. This is understood, and the landowner has submitted application for clearing permit to DWER to achieve this requirement.

Considering this justification, the proposed extractive industry is consistent with the requirements of the LDP.

6. CONCLUSION

Development approval by the Joint Development Assessment Panel is respectfully sought on behalf of Cleanaway Solid Waste Pty Ltd for Lot 2 Banksia Road, Crooked Brook.

The proposed Extractive Industry development application is justified as follows:

- This proposal seeks to extract basic raw materials, critical for onsite operations; and
- Extractive works onsite are to be appropriately conducted and implemented to minimise any offsite impacts, and,
- Extractive works onsite are consistent with relevant planning instruments.

On the basis of the description and rationale provided within this report, it is therefore respectfully requested that the Joint Development Assessment Panel review this application and approve the proposed extractive industry at Lot 2 Banksia Road, Crooked Brook.

APPENDIX A | Certificate of Title and Memorial

05/08/2022

Attachment 2

WESTERN



AUSTRALIA

REGISTER NUMBER 2/D65861	
DUPLICATE EDITION 4	DATE DUPLICATE ISSUED 21/6/2016

RECORD OF CERTIFICATE OF TITLE
UNDER THE TRANSFER OF LAND ACT 1893

VOLUME
1670

FOLIO
568

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 2 ON DIAGRAM 65861

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

J & P CORPORATION PTY LTD OF 10 SHORT STREET, PICTON

(AN L999766) REGISTERED 23/7/2012

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. *K878714 CAVEAT BY TRANSPACIFIC WASTE MANAGEMENT PTY LTD LODGED 13/3/2009.
2. *M675551 MEMORIAL. CONTAMINATED SITES ACT 2003 REGISTERED 19/6/2014.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: 1670-568 (2/D65861)
PREVIOUS TITLE: 1245-703
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY: SHIRE OF DARDANUP

NOTE 1: G682312 SECTION 138D TLA APPLIES TO CAVEAT G649330.

05/08/2022

Attachment 2

INSTRUCTIONS

1. If insufficient space in any section, Additional Sheet Form B1, should be used with appropriate headings. The boxed sections should only contain the words "see page....."
2. Additional Sheets shall be numbered consecutively and bound to this document by staples along the left margin prior to execution by the parties.
3. No alteration should be made by erasure. The words rejected should be scored through and those substituted typed or written above them, the alteration being initialled by the persons signing this document and their witnesses.

NOTES

1. **DESCRIPTION OF LAND**
Lot and Diagram/Plan/Strata/Survey-Strata Plan number or Location name and number to be stated.
Extent - Whole, part or balance of the land comprised in the Certificate of Title to be stated. If this document relates to only part of the land comprised in the Certificate of Title further narrative or graphic description may be necessary. The volume and folio number to be stated.
2. **REGISTERED PROPRIETOR**
State full name and address of the Registered Proprietors as shown on the Certificate of Title and the address / addresses to which future notices can be sent.
3. **INFORMATION CONCERNING SITE CLASSIFICATION**
Include information concerning site classification as either: contaminated - restricted use, contamination - remediation required, remediated for restricted use or possibly contaminated - investigation required.
4. **CHIEF EXECUTIVE OFFICER'S ATTESTATION**
This document must be signed by or on behalf of the Chief Executive Officer, Department of Environment Regulation under Section 91 of Contaminated Sites Act 2003. An Adult Person should witness this signature. The address and occupation of the witness must be stated.

EXAMINED

M675551 ML

19 Jun 2014 11:44:42 Perth



REG \$ 160.00

MEMORIAL CONTAMINATED SITES ACT 2003

LODGED BY
Department of Environment Regulation

ADDRESS
Level 4, 168 St Georges Terrace
Perth, WA 6000

PHONE No. 1300 762 982

FAX No. (08) 9333 7575

REFERENCE No. 17268

ISSUING BOX No. 888V

PREPARED BY
Contaminated Sites
Department of Environment Regulation

ADDRESS
Level 4, 168 St Georges Terrace
Perth, WA 6000


PHONE No. 1300 762 982 FAX No. (08) 9333 7575

INSTRUCT IF ANY DOCUMENTS ARE TO ISSUE TO OTHER
THAN LODGING PARTY

1/6

TITLES, LEASES, DECLARATIONS ETC LODGED HERewith

1. _____	Received Items Nos. 9
2. _____	
3. _____	
4. _____	
5. _____	
6. _____	

Receiving Clerk 

Lodged pursuant to the provisions of the TRANSFER OF LAND ACT 1893 as amended on the day and time shown above and particulars entered in the Register.



05/08/2022

Attachment 2

APPROVAL NUMBER

DEPARTMENT OF ENVIRONMENT
REGULATION

Client ID 1534

WESTERN AUSTRALIA
TRANSFER OF LAND ACT 1893 AS AMENDED

MEMORIAL

CONTAMINATED SITES ACT 2003

SECTION 58(1) (a) (i) (II) (III) (IV)

DESCRIPTION OF LAND (Note 1)

LOT 2 ON DIAGRAM 65861

EXTENT

Whole

VOLUME

1670

FOLIO

568

REGISTERED PROPRIETOR (Note 2)

J & P CORPORATION PTY LTD OF 10 SHORT STREET, PICTON

INFORMATION CONCERNING SITE CLASSIFICATION (Note 3)

Under the Contaminated Sites Act 2003, this site has been classified as "possibly contaminated - investigation required". For further information on the contamination status of this site, please contact the Contaminated Sites at the Department of Environment Regulation.

Dated this

Fifth


day of June

Year 2014

CHIEF EXECUTIVE OFFICER'S ATTESTATION (Note 4)



Paul Newell, A/MANAGER

DELEGATE OF THE CHIEF EXECUTIVE OFFICER
DEPARTMENT OF ENVIRONMENT REGULATION
UNDER SECTION 91 OF THE
CONTAMINATED SITES ACT 2003

SIGNATURE OF WITNESS

FULL NAME:

Trini-Liis Harna

ADDRESS:

168 St Georges Tce, PERTH WA 6000

OCCUPATION:

Business Systems Admin Officer

APPENDIX B | Site Plan

7/08/2022 LOCATION MAP

81

81

BANKSIA	ROAD
---------	------

2

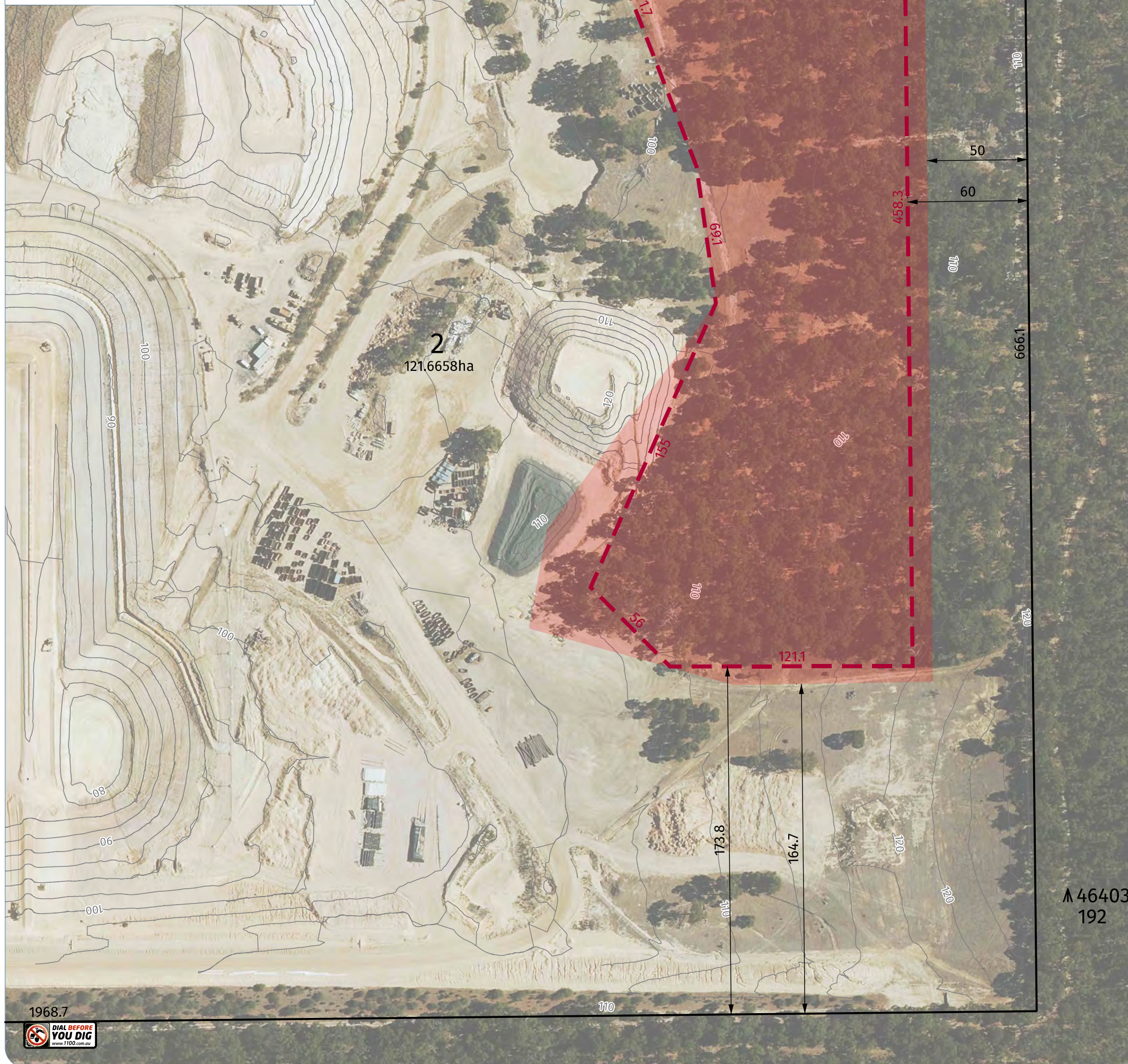
Λ 46403
192

LEGEND



Extractive Industry Footprint
(5.95ha)

Vegetation to be Cleared (7.1ha)



SITE PLAN

Lot 2 on Diagram 65891 Banksia Road, CROOKED BROOK

Plan No.	22910-01
Date	13/05/22
Drawn	NP
Checked	MK
Revision	C

BUNBURY OFFICE:
21 Spencer Street,
BUNBURY WA 6230
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Scale | 1:2000@A3



NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey



Harley Dykstra

PLANNING & SURVEY SOLUTIONS

APPENDIX C | Material Evaluation Report



**Cleanaway Banksia Rd Landfill,
Mineralisation Report for Sand and Gravel Extraction
from Proposed Cells 13, 14, 19 and 20
Banksia Road, Dardanup, WA**

Report written for:

Cleanaway Waste Management Pty Ltd

October 2021



REPORT TITLE: **Cleanaway Banksia Rd Landfill, Mineralisation Report for Sand and Gravel Extraction from Proposed Cells 13, 14, 19 and 20 Banksia Road, Dardanup, WA**

DATE: October 2021

REPORT VERSION: Version 1.0

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October 2021

**Cleanaway Banksia Rd Landfill,
Mineralisation Report for Sand and Gravel Extraction from Proposed
Cells 13, 14, 19 and 20, Banksia Road, Dardanup, WA.**

1 INTRODUCTION

Stass Environmental was commissioned by Cleanaway Solid Waste Management Pty Ltd (Cleanaway) to undertake an assessment of the resources within a proposed extraction area for proposed future landfill cells 13, 14, 19 and 20. The assessment of the resources is based on the information derived from previous investigations at the site, from 1995 to 2021. Information within the site is taken from literature review from the bore logs and from desk based studies undertaken by Stass Environmental. This assessment is not a JORC compliant report as it only serves to produce an evaluation of in-situ resource.

This Mineralisation Resource Report details the key characteristics of the proposed mining lease and presents the following sections:

- a) Location – provides a general location of the proposed extraction area, gives details of the site area and coordinates, and covers access details.
- b) Applicant – provides details of the applicant.
- c) Description – provides a general description in terms of the strategic importance, topography, flora, general features and setting.
- d) Detailed Geology – provides a commentary of the geology of the proposed mining lease based on exploration drilling and field observations, measurements and photographs etc.
- e) Previous Investigations – provides details of any previous investigations undertaken on the proposed lease to ascertain details of the resource in terms of extent or quality.
- f) Resource Quality – provides details of any analyses undertaken, considers suitability for certain uses, looks at weathering and any other structural considerations etc.
- g) Resource Estimate -provides an estimate of the potential resource available based on provided surface area and workable depth estimates.

2 OBJECTIVES

The following objectives have been established for the investigation:

- To provide information on geology of the potential extraction area..
- To determine the characteristics and volumes of geological materials
- To generate a document for submission to DWER in support of a Clearing Permit application.

3 TERMS OF REFERENCE

Following a meeting at the offices of Harley Dykstra in Bunbury, Stass Environmental was asked to undertake the work related to generation of the Mineralisation Report for the future cell extraction in the indicated areas.

4 SITE LOCATION

The site is 175 km south of Perth and 6 km southwest of the Dardanup townsite and services the surrounding Greater Bunbury Region (see Figure 1), including industries throughout the wider South West. The site is located in a rural setting comprising a combination of forest and agricultural land. The nearest residential area is Dardanup, located approximately 3.5 km to the northwest.

The site is bounded to the east, south, and west by forested land. To the north of the site is a quarry and associated infrastructure including a closed council landfill. The infrastructure on this closed landfill and quarry site includes five non-natural ponds assumed to be utilised for activities relating to the landfill or quarrying activities.

4.1 Site Operations

Cleanaway has operated the Class III (mid-level) landfill site at the Banksia Road site in Dardanup since approval was granted in 2006. The Site is operational as an active Class II and III landfill (DWER Category 64) and a liquid waste facility (DWER Category 61) and contains liquid waste cells, solid waste cells, stormwater collection dams and leachate collection ponds.

The eastern portion of the site has been operated as a landfill since approximately 2000 and received only Class II waste until approximately 2006. Since then, the landfill has been receiving both Class II and Class III waste comprising a mixture of municipal, commercial, and industrial waste, as well as residue from Water Corporation wastewater treatment plants. There are currently nine landfill Waste Disposal Cells of which seven are being actively filled, in addition to two liquid and tailings Waste Disposal Cells. The final project plan would see up to

22 Cells and two liquid and tailings Waste Disposal Cells on the site constructed and rehabilitated in sequence across the life of the project.

The western portion of the site has been used both as a blue gum plantation and for gravel extraction since approximately 2011, and more recently to also accommodate the second storm water pond.

The proposed extraction of sand and gravels is considered important to the future management of the landfill in terms of providing materials for road improvements (gravel) and cover materials (sand and clay) that will meet the regulatory requirements for the management of the waste fill.

4.2 Site Environmental Setting

The region experiences a Mediterranean climate, characterised by warm dry summers and cool wet winters. During summer (September to March) a belt of anticyclones lies over the region producing dry easterly winds and high temperatures. During winter this belt moves north and the predominant winds blow onshore from the south-west bringing cool temperatures and cold fronts that produce 90% of the region's total annual rainfall.

The nearest rainfall weather station to the site is the Dardanup East Station (Bureau of Meteorology BOM ID 9527, Latitude: 33.40° Longitude: 115.78°) while the nearest temperature data station is located at Donnybrook (BOM ID 9534, Latitude 33.57° Longitude 115.82°).

4.3 Topography

The site slopes from east to west from an elevation of 110 mAHD in the east to 40 mAHD in the west. The western portion of the property is flatter than the eastern portion which forms a part of the north/south trending Whicher Escarpment. The natural topographic relief of the central portion of the site is broken by the presence of several landfill cells, a mineral sands processing tailing cell, leachate ponds and surface water dams.

4.4 Geomorphology and Drainage

The site straddles the Swan Coastal Plain and the western facing slope of the Whicher Scarp. The Darling Fault is approximately 1.2 km to the east of the site with the Darling Scarp in the eastern side of the fault. A north-west trending spur of the Whicher Scarp is present at the eastern portion of the site and comprises lateritic soils. The scarp is bisected by drainage gullies infilled with colluvial and alluvial soils which also spill out along the fringe of the scarp and partially overlap the Yoganup Formation. A natural drainage channel runs almost along and parallel to the southern boundary which has been slightly modified by the excavation operations.

An ephemeral watercourse, Crooked Brook, is located approximately 1 km south and southwest of the site (**Figure 1**). The brook flows in a north-westerly direction into the Preston River approximately 5.5 km to the west of the Site.

5 GEOLOGY

5.1 Regional Geology

The regional surface geology at and surrounding the site is shown in Figure 3. The western portion (approximately half) of the site is shown to be characterised by the clayey sands of the Yoganup Formation which has been deposited against the Whicher Scarp during a period of higher sea level (shoreline marine deposit) (Golder 2015). The site approximately straddles the boundary between the outcropping Leederville Formation (east) and the Yoganup Formation (west) which abuts the Whicher Scarp. The Leederville Formation outcrops along the Whicher Scarp and on the Blackwood Plateau and the shallow weathered profile has been laterised into a massive laterite and pisolitic gravel that is observable at surface in the eastern portion of the site (Baddock 2005).

Published geological maps and surveys of the general site area indicate that both the Quaternary age superficial deposits and the Cretaceous Leederville Formation are present in the upper 100 m beneath the Site (Geological Survey of Western Australia, 1981). The surface of the Leederville Formation slopes downward towards the western site boundary from both the east and the west, due to the Dardanup Syncline which passes within or near the western boundary of the site (Baddock 2005).

5.2 Local Geology

The Superficial formations, in the general vicinity of the Site comprise (see Figure 3):

- Bassendean Sand – consisting of white quartz, with mineral sand deposits at its base. Depths vary from 1.9 metres below ground level (mbgl) to 4 mbgl.
- Yoganup Formation – a sequence of shore-line deposits consisting of leached and ferruginised beach sand.

Previous reports (Stass Environmental, 2016 and Golder, 2015) have confirmed the shallow geology as being mainly sandy clays and clayey sands overlain by a sandy topsoil and laterite (1 mbgl to 2 mbgl). The variably iron cemented sands of the Yoganup Formation comprise predominantly dense to very dense sand with hard, red-brown and pink laterised zones. Iron cementing/staining of the Yoganup sands tends to decrease with depth where it is characterised as dense, pale grey to cream, clayey to silty, fine to medium grained sand. Lenses of coarse sands and tin inter-beds of orange, brown and light grey silt and clay are common throughout the Yoganup Formation (Golder 2015).

In the eastern portion of the site (above 80 mAHD), surface and shallow subsurface materials comprise variably lateritised sandy clay or clayey sand over highly plastic sandy or silty clay which are either colluvium or residual soils derived from the weathering of the outcropping Leederville Formation (WML 2014).

The Leederville Formation encountered by Stass was described as bands of charcoal grey clay with some fine, medium, and coarse, white and beige sand lenses. These materials are consistent with the description of the Quindalup Member of the Leederville Formation (Baddock 2005) which suggests these materials are proximal to shallow marine origin, dominated by clay in the upper horizons, however also contain thin beds of coal (lignite) (Golder 2015).

Stass (2016) details that the clay content in the site soil profiles increases with depth to approximately 9 mbgl when the geology becomes generally sandier, however it is noted that clay and sandier layers interfinger at this depth providing complex geology and flow patterns. Permeability tests undertaken at approximately 9 mbgl depth reported permeabilities of 2.1×10^{-10} m/s and 5.9×10^{-10} m/s within the standard range of clays which suggests low permeability clays are present between 9 mbgl depth and approximately 19 mbgl to 29 mbgl.

Additionally, drilling and installation of groundwater monitoring wells has confirmed the presence of the Leederville Formation at levels, which vary between 35 mbgl and 40 mbgl (19 mAHD to 31 mAHD) at the site. Bore logs are provided in **Appendix B**.

6 PROPOSED MINING

6.1 Location

The proposed mining sits is located due east of the active landfill, as shown in Figure 2.

The proposed sand and gravel mining area has an average length of 580 m in an approximate north-south orientation, an average width of 250 m with an east west orientation and a proposed workable depth in the region of 25 to 30 m from the natural surface. The total proposed extraction area for all the cells is approximately 10 ha.

Access is achieved via a sealed road immediately to the north-west of the proposed extraction cells, which connects with far eastern portion of the lease area.

Table 1 Coordinates of Proposed Mining Area (anti-clockwise from NW corner)

Geographic Co-ordinates (UTM m) of proposed extraction area	
Easting	Northing
388090	6300838
388110	6300229
388319	6300248
388324	6300862

The site boundary and extraction area is shown on Figure 2.

The regional geology in relation to the extraction area is indicated in Figure 3.

6.2 Previous Investigations

From MJ Lundstrom and Associates (1996), the following description was provided:

Approximately 50% of the site has been used as a sand and gravel pit for the past five years and an extractive industries licence is still valid. The majority of the area worked as a quarry has recently been partially rehabilitated, but some gravel quarrying is still in progress. Approximately 35 hectares of the western portion of the site is planted to blue gum trees which are approximately three years old.

A wealth of shallow geological information is available for the property as a result of Westralian Sands making results of their intensive prospecting on the site available as well as investigations done on the adjoining Lot 1 where drilling was used to prove the existence of low permeability clays for the establishment of a solid waste disposal site.

In addition, 11 bore holes were drilled for the purpose of this report and a 6 X 4 X 1 metre trench excavated to extend and confirm the available data. Since confidentiality constraints preclude the publishing of results derived from Westralian Sands Ltd, information provided by them is referred to in general terms only.

Since exploration undertaken by Westralian Sands indicated the possibility of a viable ore body for future mining, the area investigated (Site A) is slightly to the north east of the ore body. A small overlap in drilling on Site A and Westralian Sands drilling was erected in order to verify and test results obtained in the two separate surveys.

The drilling on the site confirms the shallow geology as being mainly sandy clays and clayey sands of ancient marine origin formed during a period of higher sea level than at present. Some debate exists as to whether these sediments form horizons of the Yoganup or Guildford Formations, but of greater significance than nomenclature in this case is the properties of these materials.

Analyses undertaken from the extensive drilling on the site show the materials as being mainly clayey sands and sandy clays overlain by a sandy topsoil and laterite (1-2 metres). Clay content increases with depth until approximately 9 metres when materials become sandier. The lithological pattern is complex at this level of detail with lensing in and out of sandier and clayier layers.

6.3 Resource Quality

The drill cuttings from groundwater monitor bore drilling indicated that the sand resource will provide a good quality fine to medium grained sand. The sand is of quality required by the landfill operator for daily waste cover and eventual capping of the landfill.

Likewise, the gravel resource is ideal for both, the building trade and road fill (aggregate) as that used for road maintenance.

6.4 Resource Estimate

Stass Environmental has estimated the non-JORC compliant volume of the deposits based upon the following methodology:

- a) Data from exploration drilling was used to extrapolate proportions of sand to clay and laterite/lateritic gravel within the extracted volume of the cell pits.
The average depth of laterite and lateritic soils from the surface was estimated from previous drilling at 2 m from the surface, which approximates to 10% of total extracted volume (given pit trapezoidal shape). Sand at 60% and the remainder as clay to clayey sand at 30% by proportional volume.
- b) The approximate resource surface area of 49,860m² (5 ha) has been obtained from computer modelling for proposed extraction pits for Cells 13 and 14 and a resource surface area of 49,717 m² for proposed extraction pits for Cells 19 and 20 (Master Plan, Cleanaway, 2020).
- c) The resource volume allows for approximately 25 grading to 30 m depth below natural surface of extraction within the pit areas.
- d) In order to calculate the tonnage estimates, a sand density of 1.64 t/m³, sandy clay at 2.35 and gravel of 2.7 t/m³ was used.

Based on the historical assessment results, the following resource quantities were calculated:

Table 2 – Resource Estimates Cells 13 and 14

Resource	BCM	LCM	Conversion Factor	Tonnes
Sand 60%	667,318	934,424	1.64	1,532,162
Laterite/Gravel 10%	111,217	155,707	2.7	420,410
Clay/clayey sand 30%	333,659	467,122	2.35	1,097,738
Total (100%)	1,112,197	1,557,253	*	3,057,031

BCM (Bank cubic metre - in situ volume)

LCM (Loose cubic metre - extracted volume)

Assumed voids for LCM is 40%

From this it is reasonable to estimate that approximately 1,500,000 tonnes of sand and 420,000 t of gravel are available within the extraction pits for Cells 13 and 14.

Table 3 – Resource Estimates Cells 19 and 20

Resource	BCM	LCM	Conversion Factor	Tonnes
Sand 60%	470,793	659,111	1.64	1,080,942
Gravel 10%	78,465	109,851	2.7	296,597
Clay/clayey sand 30%	235,396	329,555	2.35	774,455
Total (100%)	784,656	313,862	*	2,151,994

BCM (Bank cubic metre - in situ volume)

LCM (Loose cubic metre - extracted volume)

Assumed voids for LCM is 40%

From this it is reasonable to estimate that approximately 1,100,000 tonnes of sand and 300,000 t of gravel are available within the extraction pits for Cells 19 and 20.

It should be noted that the Stass Environmental resource estimate reflects the resource within the boundary of the proposed landfill cells shown in Figure 2. No adjustment has been made for battered side slopes to the excavation, void loss due to haul road access ramps etc.

As per DMP Mining Approval Guidelines (DMP 2006), a JORC estimation of resource is not applicable for small extractive industry sites and hence has not been provided. Using a resource length and width and an assumed depth of 25m above the base of the pit, simplistic resource estimation has been undertaken.

7 STATEMENT OF COMPLIANCE

The information in this report that relates to Mineral Resources is based upon information compiled by Stass Environmental. Andre Stass as a Principal of Stass Environmental is a Member of the Australasian Institute of Geosciences. Andre Stass has an Honours Degree in Geology, a Masters Degree in Mining Engineering and has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration to qualify as a Competent Person as defined by JORC 2004.

This report has been prepared by Stass Environmental with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid. This is not a JORC compliant resource assessment.

This report is for the exclusive use of Cleanaway Solid Waste Management Pty Ltd. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Stass Environmental.



Andre Stass BSc (Hons), MSc(Eng)
Principal Consultant
Stass Environmental

Member: Australian Institute for Geoscientists

LIMITATIONS

1. The conclusions presented in this report are relevant to the condition of the site and the state of legislation currently enacted as at the date of this report. We do not make any representation or warranty that the conclusions in this report will be applicable in the future as there may be changes in the condition of the site, applicable legislation or other factors that would affect the conclusions contained in this report.
2. Stass Environmental has used a degree of skill and care ordinarily exercised by reputable members of our profession practicing in the same or similar locality. Conclusions are based on representative samples or locations at the site, the intensity of those samples being in accordance with the usual levels of testing carried out for this type of investigation. Due to the inherent variability in natural soils we cannot warrant that the whole overall condition of the site is identical or substantially similar to the representative samples.
3. This report has been prepared for Cleanaway and for the specific purpose to which it refers. No responsibility is accepted to any third party and neither the whole of the report or any part or reference thereto may be published in any document, statement or circular nor in any communication with third parties without our prior written approval of the form and context in which it will appear.
4. This report and the information contained in it is the intellectual property of Stass Environmental. The Cleanaway is granted an exclusive licence for the use of the report for the purpose described in the report.

APPENDIX 1

Figures

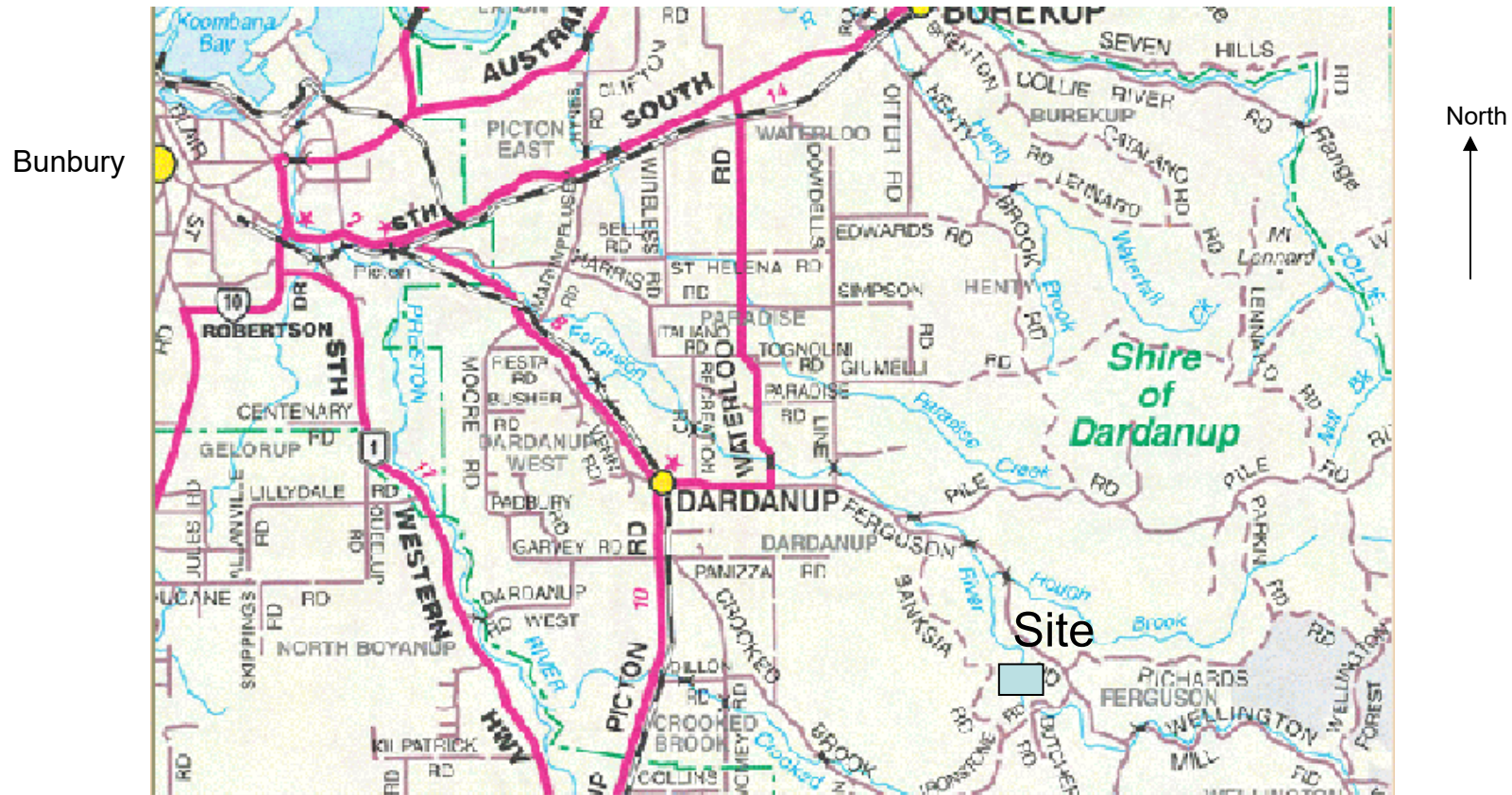


Figure 1 : Site location

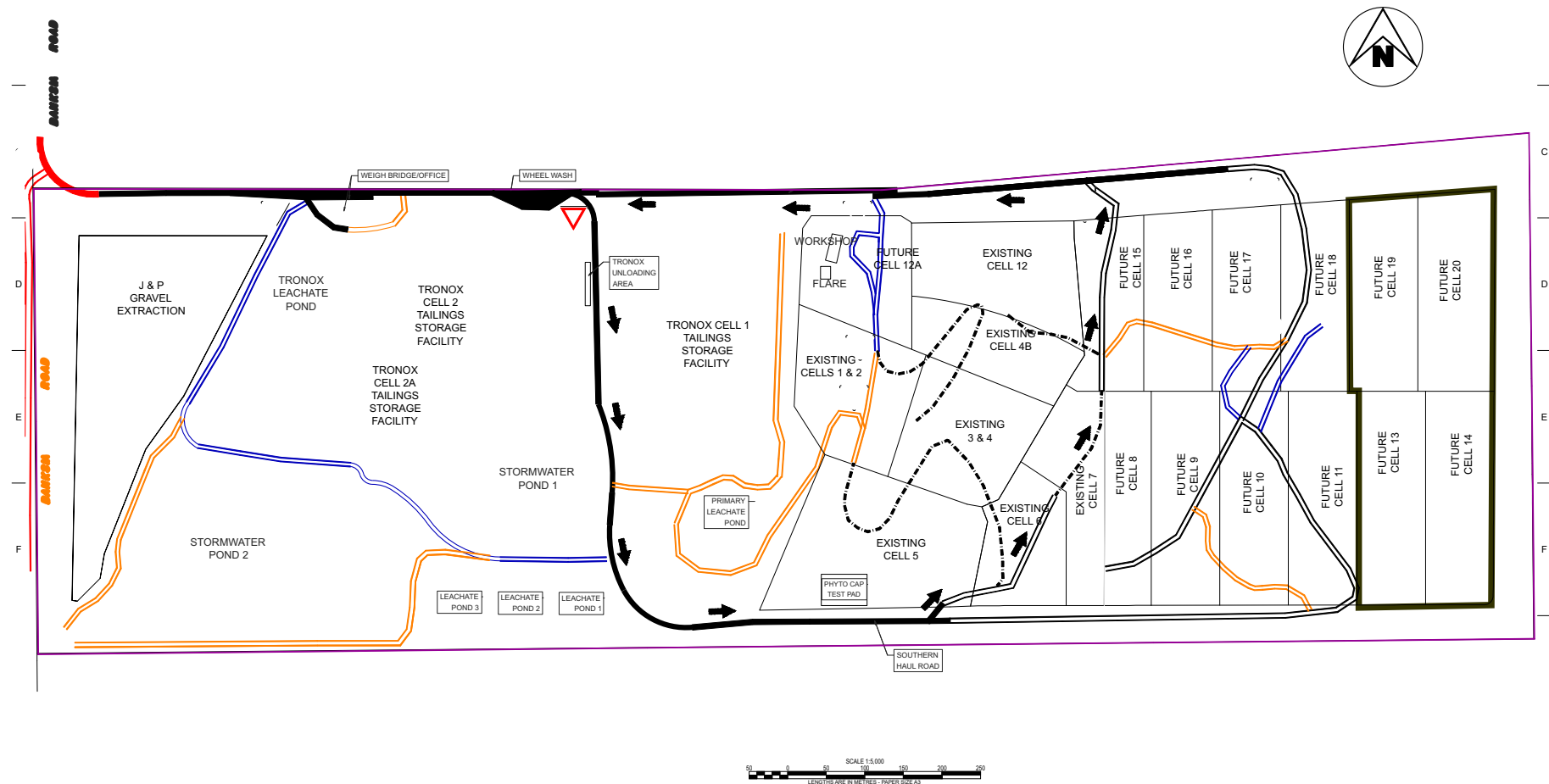


Figure 2 :Location of Cells 13, 14, 19 and 20

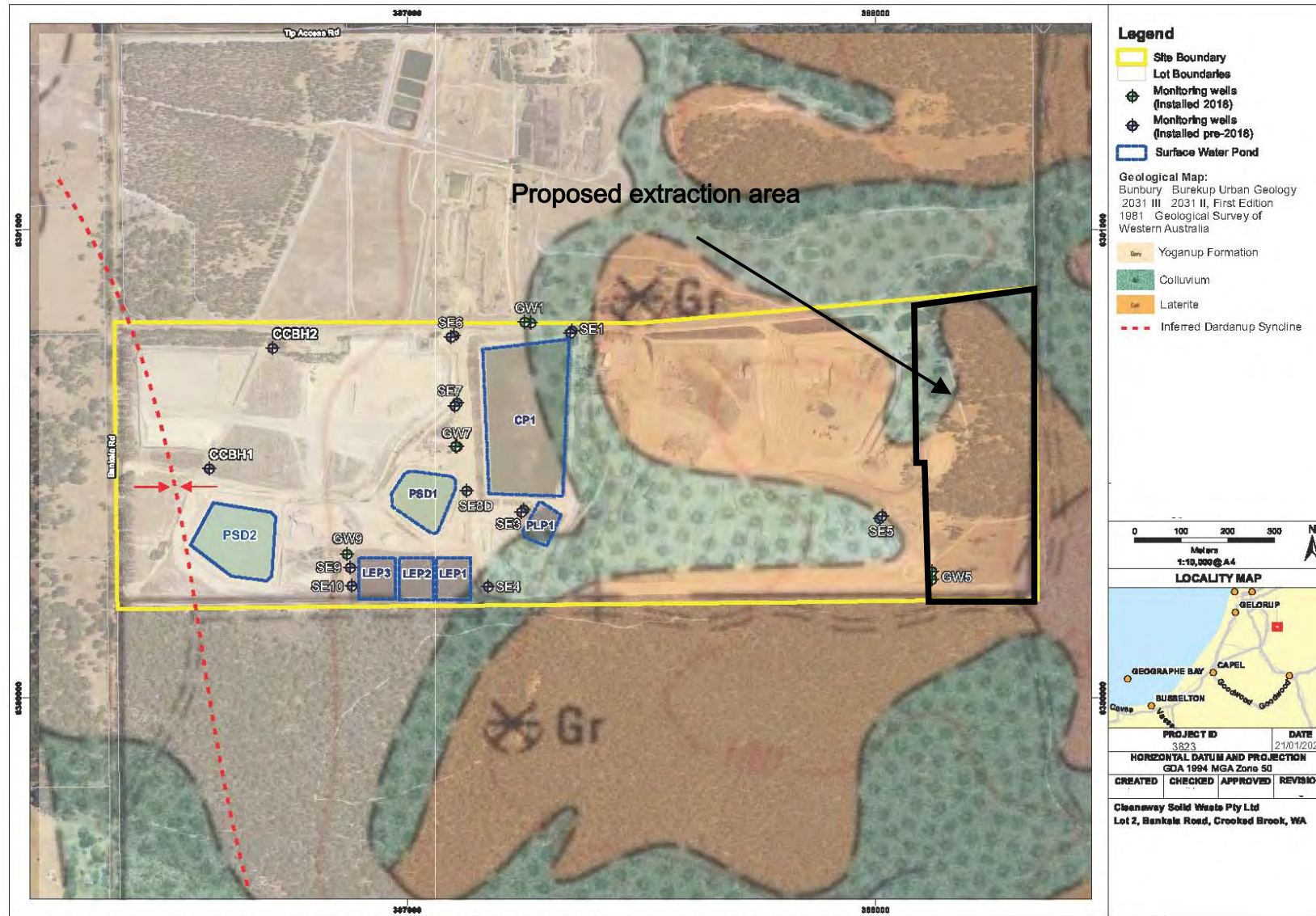


Figure 3 :Geology


APPENDIX 2






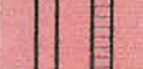






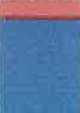


Historical Bore Logs

05/08/2022

Attachment 2

BORE CONSTRUCTION

			Coords: 387243East by 6300801 North, RL 69.668 mAHd			
			Drill Rig: Australind Water		Date Drilled: 19 March 2015	Logged By: A Stass
			Boring Dia: DHH 200 mm		Boring Number: Bore SE 1 New	
Sample	Casing Type	Completion	SWL Metres	Depth Meters	Lithology	Description
	Surface					Coffee rock, brown changing to red laterite gravels and clayey sand.
	Blank Casing			6		Fine creamy coloured sand and silt/clay in equal proportions.
				12		Fine sand and creamy to red coloured clay
				18		Fine white sand and clayey matrix (50/50)
						White clay beds
						Fine sand layers with little to no clayey matrix.
	Bentonite clay seal - 2 m			24		White sand and white clay, possibly kaolin Clay becoming more grey in colour with clay proportion increasing up to 90% of total
	Slotted Casing	Gravel packed		30		Medium grained sand increasing in proportion with some cream coloured clay
	Cap at base			36		Course grained red and brown sands
						Static water level at 34.448 below the surface (measured 2 days after drilling)
				42		coarse grained sand layers
	Bentonite clay seal - 2 m					Charcoal grey clay bands, cold water strike
	Slotted Casing	Gravel packed		48		Thick dark grey clay bands
	Cap at base					Medium grained white sand layer
				54		fine white sand layer some white clay
				58		
Completion Notes: Piezometer SE 1DD (New) Class 12, 55 mm blank PVC casing from 0 to 42 mbgs; Class 12, 55 mm, slotted, PVC casing from 42 to 48 mbgs; Colar is set at 0.55 m above g.s. Water field quality: pH = 6.3, EC = 483 uS/cm, TDS 280 mg/l REDOX = 203 mV Piezometer was capped at base.					Site: South West Waste Landfill Banksia Road Dardanup	
					Project No.: TPI March 2015	Page 1

			GEOLOGICAL LOG				
Drill Rig:		Rotary Mud		Date Drilled: 13-09-2005		Logged By:	
Boring Dia:		200 mm		Boring Number: SE- 2		Andre Stasikowski	
Sample	Casing Type	Completion	SWL Metres	Depth Meters	Lithology	Description	
	Solid casing			3		Coarse dirty beige sand of medium to coarse grain.	
			6	Fine grained chunks of coffee rock - dark rusty reddish to black			
			9	40% as fine white clayey sand with the remainder being 60% white clay			
	Backfill			12		Fine white clayey sand 80% with beds of coarse oaka (yellow) coloured sand	
			15	Medium grained oaka sand - 80% by composition - with 20% white clay			
	Bentonite Seal			18		Medium grained oaka sand - 80% by composition - with 20% white clay	
			21				
			24	50/50 coarse yellow sand with fine white clayey sand			
	Bentonite Seal			27		dark grey bands of fine clay at about 25 m depth	
			30	50/50 coarse yellow sand with fine white clayey sand			
			33	thick dark grey bands of fine clay			
	Bentonite Seal			36		Beige to yellow medium grained sands at 50% by composition and 50% coarse white sand in a matrix of white clay	
			39				
			42				
	Backfill			45		Thick bands of Charcoal grey fine clay - 80% by composition	
			48	Some light coloured sand and medium to coarse beige sand with white clay matrix			
	Slotted			51			
			54				

Completion Notes:

Class 12, 55 mm solid PVC casing from 0 to 18 m bgs; Class 12, slotted, PVC casing from 18 to 30 m bgs; Deep plezo as shown.

Water strike at 26 m below ground surface;

GPS bore location: South 33° 25.65' East 116° 47.25'

Site:

Groundwater Monitoring Bore Installation
J&P Regional Landfill
Dardanup, WA


Project No.: J&P 009

Page 1

05/08/2022

Attachment 2


BORE CONSTRUCTION

			Coords: 387248 East by 6300402North, RL 73.097 mAHD			
			Drill Rig: Australind Water		Date Drilled: 25 June 2014	Logged By: A Stasikowski
			Boring Dia: DHH 200 mm		Boring Number: Bore SE 3 New	
Sample	Casing Type	Completion	SWL Metres	Depth Meters	Lithology	Description
	Surface					Coarse grained sand with creamy clay.
	Blank Casing			6		Fine creamy coloured sand and red clay in equal proportions Coarse creamy coloured sand and yellow silt/clay
				12		Medium to fine grained white to pink sand, with some whitish clay as above
				18		white sand layers with some cream clayey matrix.
	Bentonite clay seal - 2 m					White fine sand
	Slotted Casing			24		White medium grained to creamy coarse sand with some quartz pebbles white clay content increasing
	Cap at base			30		Thick bands of dark grey clay with some coarse sands between.
				36		Light coloured beige to creamy clay.
						Static water level at 37.16 m below the surface (measured 2 days after drilling)
				42		Grey massive clay band Some larger quartz fragments in white sand and clay matrix Massive grey clay band
	Bentonite clay seal - 2 m			48		Medium grained sand white in colour with white clay
	Slotted Casing			54		Coarse grained sand with white lumpy clay.
	Cap at base			58		Coarse grained grey sand, some creamy clay
Completion Notes: Piezometer SE 3 (New) Class 12, 55 mm blank PVC casing from 0 to 48 mbgs; Class 12, 55 mm, slotted, PVC casing from 48 to 54 mbgs; Colar is set at 0.5 m above g.s. Water field quality: pH = 4.51 , EC = 481 uS/cm, TDS 210 mg/l REDOX = Piezometer was capped at base. Backfilled with cement grout					Site: South West Waste Landfill Banksia Road Dardanup	
					Project No.: TPI June 2014	Page 1

05/08/2022

Attachment 2

BORE CONSTRUCTION

			Coords: 387148 East by 6300223North, RL 71.683 mAHD			
			Drill Rig: Australind Water		Date Drilled: 26 June 2014	Logged By: A Stasikowski
			Boring Dia: DHH 200 mm		Boring Number: Bore SE 4 New	
Sample	Casing Type	Completion	SWL Metres	Depth Meters	Lithology	Description
	Surface					Coarse grained sand with lateritic gravels.
	Blank Casing			6		Fine creamy coloured sand and pink clay in equal proportions Coarse creamy coloured sand and yellow silt/clay
				12		Sandy clay Majority clay with a small portion (around 20%) fine sand
				18		as above
	Bentonite clay seal - 2 m					white sand layers with some cream clayey matrix.
	Slotted Casing			24		White fine sand. White medium grained to creamy coarse sand with some quartz pebbles white clay content increasing
	Cap at base			30		Thick bands of dark grey clay with some coarse sands between. Medium grained white sand with beige to creamy clay.
				36		Static water level at 35.78 m below the surface (measured 2 days after drilling) Some larger quartz fragments in white sand and clay matrix
				42		Large band of cream coloured clay
				48		Medium grained sand white in colour with white clay
	Bentonite clay seal - 2 m					Coarse grained white sand with white lumpy clay.
	Slotted Casing			54		Brown medium grained sand
	Cap at base			58		Medium grained white sand, some white clay
Completion Notes: Piezometer SE 4 (New) Class 12, 55 mm blank PVC casing from 0 to 48 mbgs; Class 12, 55 mm, slotted, PVC casing from 48 to 54 mbgs; Colar is set at 0.5 m above g.s. Water field quality: pH = 4.05 , EC = 193 uS/cm, TDS = 90 mg/l REDOX = Piezometer was capped at base. Backfilled with cement grout					Site: South West Waste Landfill Banksia Road Dardanup	
					Project No.: TPI June 2014	Page 2

05/08/2022

Attachment 2



GEOLOGICAL LOG

Drill Rig: Rotary Mud

Date Drilled: 14-09-2005

Logged By:

Boring Dia: 200 mm

Boring Number: SE-5

Andre Stasikowski

Sample	Casing Type	Completion	SWL Metres	Depth Meters	Lithology	Description
	Solid casing			3		Medium beige sand with 50% coffee rock gravel 5 mm diameter to 25 mm diameter
				6		White pinkish clay 30%, to medium yellow sand to dark beige fine sand
				9		Thin banding of fine white to pink sandy clay .
	Backfill			12		White clay and light yellow fine sand with a clay matrix and loose quartz fragments
				15		
				18		
	Bentonite Seal			21		Coarse to medium grained yellow and thin bands of white fine sands in white clay matrix
				24		
				27		
				30		Fine to medium coarse sand, beige, with white/pink c;lay matrix.
				33		20% quartz fragments 2mm to 10 mm in size.
	Bentonite Seal			36		Some thin bands of medium grained yellow sand at 35 m depth
				39		
	Backfill			42		Coarse yellow sand with some pink clay bandingh 30% quartz fragments @ 2mm diameter
				45		
	Slotted			48		Massive charcoal grey clay layers
				51		at up to 90 % by composition over entire depth segment
				54		

Completion Notes:

Class 12, 55 mm solid PVC casing from surface to 36m bgs and slotted to 54 depth

Water strike at 40.5 m below ground surface;

GPS bore location: South 33° 25.81" East 115°47.73"


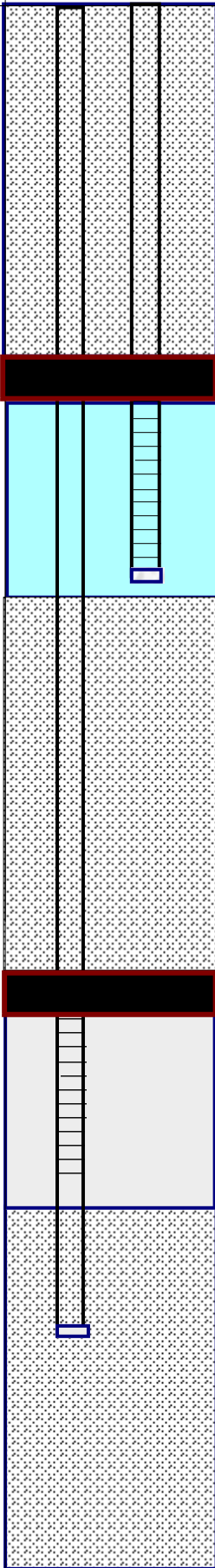
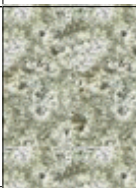
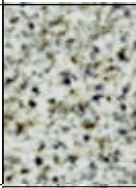



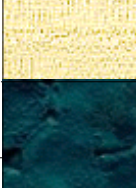
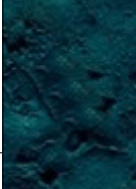
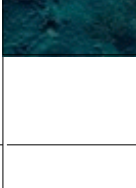
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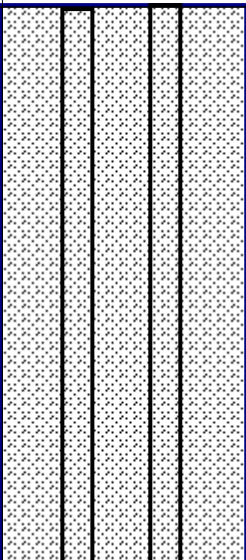


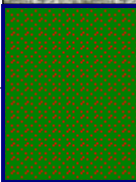

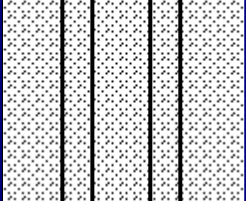
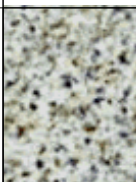


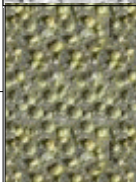
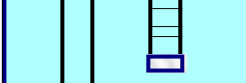



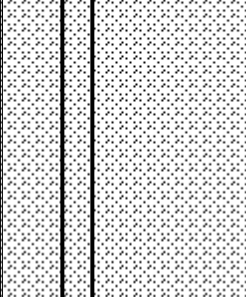

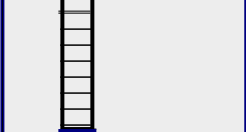

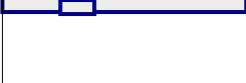
Groundwater Monitoring Bore Installation
J&P Regional Landfill
Dardanup, WA


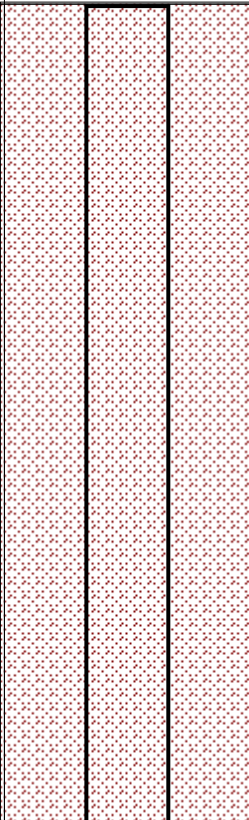

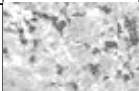

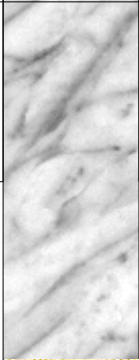


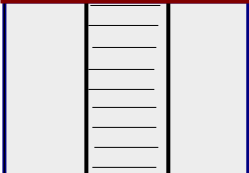
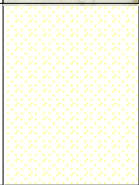
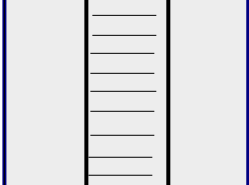

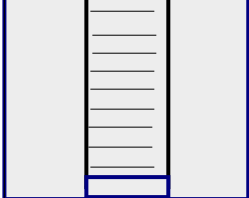
Project No.: J&P 009

Page

1

<div></div>			GEOLOGICAL LOG				
			Drill Rig: Rotary Mud		Date Drilled: 28-03-2012	Logged By:	
			Boring Dia: 200 mm		Boring Number: SE-6	Nolan Grobler	
Sample	Casing Type	Well Completion	SWL Metres	Depth Meters	Lithology	Description	
	Backfill (Enviroplug/cement grout)			3		Lateritic gravels, grading to coarse brown sand	
				6			
	Solid casing			9		Transition to grey clayey sand (fine grained) 50% clay by composition	
				12			
	2 m thick Bentonite Seal			15		White to grey fine clayey sand (with a white clay matrix.	
	Slotted			18		Clay content at approximately 50% to 90% of total mass.	
	Gravel Pack			21		White to grey medium clayey sand	
	End cap			24		Clay content at approximately 20% to 40% of total mass.	
				27		Coarse white to grey sand	
				30		White clay content at approximately 10% to 40% of total mass. Large white clay lumps mixed in with the sand.	
	Backfill (Enviroplug/cement grout)			33		Coarse sand with sandstone (white in colour), medium grained hard chunks 5 mm Ø, white clay present at 10 % by composition	
				36		Coarse cream to beige sand at 90% of the composition, fine white sand and clay present at 10 % by composition	
	2 m thick Bentonite Seal			39			
	Slotted Casing			42		Bands of Charcoal grey fine clay - 30% by composition	
	Gravel Pack			45		Some white clay approximately 5% and medium to coarse beige sand	
	Solid casing			48			
	End cap			51			
				54			
<div>Completion Notes:</div> <div><i>Deep Piezometer:</i></div> <div>Class 12, 55 mm solid PVC casing from 0 to 39m bgs;Class 12, slotted, PVC casing from 39 to 51m bgs, slotted section gravel packed and sealed from upper aquifer with 2 m of bentonite (Enviroplug No 8) ;</div> <div>Water strike at 19 m below ground surface;</div> <div>GPS bore location: 6300771 N by 387100 E - hand held Magellan GPS</div>						<div>Site:</div> <div>Groundwater Monitoring Bore Installation</div> <div>SWW Regional Landfill</div> <div>Dardenup, WA</div>	
Project No.: TPI Millenium Bores						Page 1	

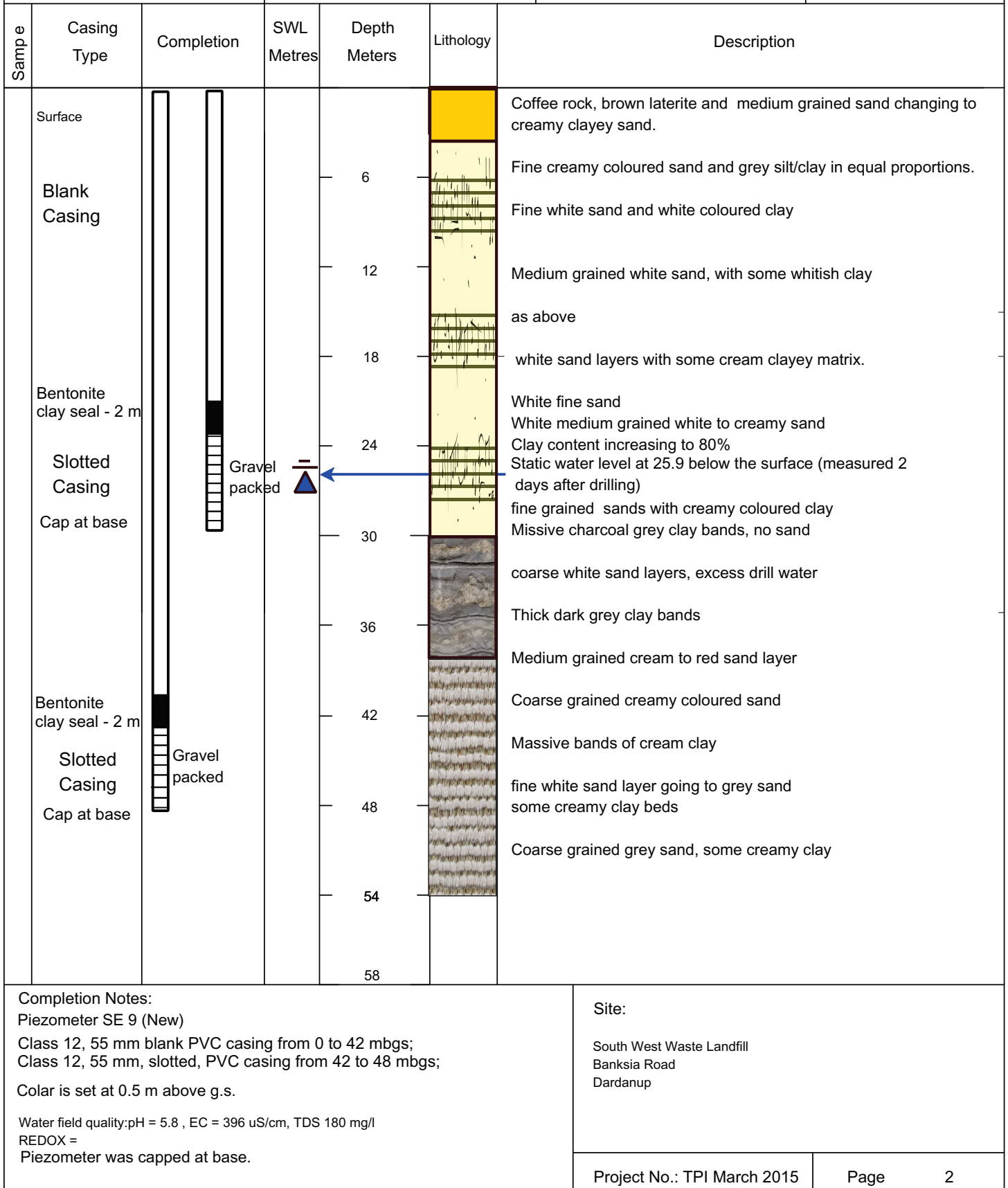
			GEOLOGICAL LOG					
			Drill Rig: Rotary Mud		Date Drilled: 28-03-2012		Logged By:	
			Boring Dia: 200 mm		Boring Number: SE-7		Nolan Grobler	
Sample	Casing Type	Well Completion Details	SWL Metres	Depth Meters	Lithology	Description		
	Backfill (enviroplug/cement grout)			3		Lateritic gravels, grading to coarse brown sand		
				6		Red clay, grading to coarse brown sand, 30% by composition		
				9		Transition to grey clayey sand (fine grained) 50% clay by composition		
	Solid casing			12		White to grey fine clayey sand (with a white clay matrix. Clay content at approximately 50% to 90% of total mass.		
				15				
				18		White to grey medium clayey sand Clay content at approximately 20% to 40% of total mass.		
	3 m thick Bentonite Seal			21		Brown medium grained sand White clay content at approximately 60% of total mass.		
	Slotted Gravel Pack			24				
				27				
	End cap			30		Coarse brown sand with sandstone, white clay present at 80 % by composition		
				33		Coarse cream to beige sand at 90% of the composition, fine white sand and clay present at 10 % by composition		
	Solid casing			36				
				39				
				42				
	3 m thick Bentonite Seal			45				
	Slotted Gravel Pack			48		Bands of Charcoal grey fine clay - 30% by composition		
				51		Some white clay approximately 5% and medium to coarse beige sand		
End cap		54						
Completion Notes: Deep Piezometer: Class 12, 55 mm solid PVC casing from 0 to 45m bgs;Class 12, slotted, PVC casing from 45 to 51m bgs; Bentonite seals between 2.5 and 3 Grouted above seals with a clay/cement composite; SWL at 24.38 m below ground surface; GPS bore location: 6300771 N by 387100 E - hand held Magellan GPS					Site: Groundwater Monitoring Bore Installation SWW Regional Landfill Dardenup, WA			
					Project No.: TPI Millenium Bores		Page 2	

<div></div>			GEOLOGICAL LOG					
			Drill Rig: Rotary Mud		Date Drilled: 02-04-2012		Logged By:	
			Boring Dia: 200 mm		Boring Number: SE-8		Nolan Grobler	
Sample	Casing Type	Well Completion	SWL Metres	Depth Meters	Lithology	Description		
	Backfill (clay/cement grout)			3		Coarse brown to purple sand, with a creamy to grey clay, 40% by content		
				6		Red coarse sand with grey clay at 50 % by content		
				9		Transition to creamy clayey sand (medium grained) 50% clay by composition		
				12		Creamy clay with light red coarse sand grading to medium to fine sand. Clay at 40 to 80 % content		
				15				
				18				
				21				
				24		Creamy to carmel coloured medium grained sand with white clay content at approximately 30% of total mass.		
				27				
	3 m thick Bentonite Seal			30		Creamy medium grained sand with creamy coloured silt and clay		
				33				
				36				
	Gravel Pack			39		Mainly clay, with some fine white silt. Clay present at up to 90 % by composition		
				42				
	Slotted Casing			45		Coarse sand. Grading to medium grained sand - creamy to white in colour		
				48				
	End cap			51		Mainly clay, up to 90 % by composition		
				54				

Completion Notes: Class 12, 110 mm solid PVC casing from 0 to 33m bgs;Class 12, slotted, PVC casing from 33 to 48m bgs; SWL at 31.08 m below ground surface; GPS bore location: 6300440 N by 387128 E - hand held Magellan GPS				Site: Groundwater Monitoring Bore Installation SWW Regional Landfill Dardenup, WA			
				Project No.: TPI Millenium Bores		Page 3	


Attachment 2

BORE CONSTRUCTION



Attachment 2

BORE CONSTRUCTION

			Coords: 386850 East by 6300222 North, RL 60.036 mAHD			
			Drill Rig: Australind Water		Date Drilled: 23 March 2015	Logged By: A Stass
			Boring Dia: DHH 200 mm		Boring Number: Bore SE 10 New	
Sample	Casing Type	Completion	SWL Metres	Depth Meters	Lithology	Description
	Surface					
	Blank Casing			6		Brown medium grained sand changing to brown clayey sand.
						Fine creamy coloured sand and grey silt/clay in equal proportions.
				12		Fine pink sand and white coloured clay
						Medium grained white sand, with some whitish clay
				18		as above
	Bentonite clay seal - 2 m					Coarse white sand layers with some cream clayey matrix.
	Slotted Casing			24		White sand and cream slimy clay, possibly kaolin
	Cap at base					White coarse grained white sand
						Static water level at 26.6 m below the surface
				30		medium grained pink sands with pink coloured clay
				36		coarse grained light brown sand layers
				42		Charcoal grey clay bands
						coarse white sand layers, excess drill water
						Thick dark grey clay bands
	Bentonite clay seal - 2 m			48		Medium grained brown sand layer
	Slotted Casing					fine white sand layer going to grey sand
	Cap at base			54		some creamy clay
				58		
Completion Notes: Piezometer SE 10 (New) Class 12, 55 mm blank PVC casing from 0 to 48 mbgs; Class 12, 55 mm, slotted, PVC casing from 48 to 54 mbgs; Colar is set at 0.55 m above g.s. Water field quality: pH = 5.1 , EC = 380 uS/cm, TDS 170 mg/l REDOX = Piezometer was capped at base.					Site: South West Waste Landfill Banksia Road Dardanup	
					Project No.: TPI March 2015	Page 2



05/08/2022

BOREHOLE LOG
Attachment 2

MONITORING WELL GW1_D

ENVIRONMENTAL-GROUNDWATER

Page 1 of 2

Client Cleanaway Solid Waste Pty Ltd; Cleanaway			Drill Co. Groundwave			Easting, Northing 387249.888, 6300801.697		
Project Banksia Rd Waste Disposal Site GW Monitoring; Cleanaway			Driller Chris Johnson			Grid Ref GDA94_MGA_zone_50		
Project No. 6134872; 6136462; 6136867			Rig Type Sonic Rig 6			Elevation 69.376		
Site Cleanaway - Banksia Rd, Dardanup			Drill Method Sonic 150mm			Collar RL 70.058		
Location Banksia Rd, Dardanup WA 6236			Total Depth (m) 50.00			Logged By AS		
Date Drilled 22/06/2018 - 25/06/2018			Diameter (mm) 150			Checked By AO		
Casing 50 mm Class 18 PVC			Screen 0.4mm slots (46 to 49m)			Surface Completion Monument cover		
Depth (m)	Drilling Method	Water	Well Details		Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.		Elevation (m)
2	Sonic 150m			Concrete for cover Depth: 0.0 - 1.0		SILTY SAND; Sand, light grey/brown, fine to medium grained, sub angular, poorly sorted, loose. Compacted. Dry. [Yoganup Formation - superficial]		68
4						GRAVELLY CLAY; Clay, red/brown, low to moderate plasticity, soft. Gravel is lateritic, up to 3cm diameter. Compacted. Dry. [Yoganup Formation - superficial]		66
6						SANDY CLAY; Clay, light grey and light red, moderate to high plasticity, stiff. Sand is fine to medium grained, sub angular, poorly sorted. Compacted. Dry. [Yoganup Formation - superficial]		64
8						SANDY CLAY; Clay, light grey and light red mottled light orange, moderate to high plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]		62
10						SILTY CLAY; Silty clay, light grey mottled light red/orange, low to moderate plasticity, stiff. Minor sand (10-20%). Dry. [Yoganup Formation - superficial]		60
12				~800L (750L water, 2 x 22.6 kg bentonite gel, 21 x 20 kg cement) Depth: 0.5 - 43.		SANDY CLAY; Clay, light grey mottled light red/orange, moderate plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted (20-40%). Dry. [Yoganup Formation - superficial]		58
14						SILTY CLAY; Silty clay, light grey mottled light red/orange, moderate to high plasticity, stiff. Minor sand (10-20%). Dry. [Yoganup Formation - superficial]		56
16						SANDY CLAY; Clay, light grey mottled light red/orange, low to moderate plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted (20-40%). Dry. [Yoganup Formation - superficial]		54
18						SANDY SILT; Silt, light grey with bands of orange, low plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]		52
20								50
22						SILTY CLAY; Silty clay, light grey mottled light red/orange, moderate to high plasticity, stiff. Trace sand (<5%). Dry. [Yoganup Formation - superficial]		48
24						SANDY CLAY; Clay, light grey/light red, low to moderate plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted (20-40%). Dry. [Yoganup Formation - superficial]		46
						SILTY CLAY; Silty clay, light grey/light red, moderate to high plasticity, stiff. Trace sand (<5%). Dry. [Yoganup Formation - superficial]		
						SANDY CLAY; Clay, light grey mottled yellow, moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted (20-40%). Dry. [Yoganup Formation - superficial]		
Notes								
This log is not intended for geotechnical purposes.								
Drilling Abbreviations					Moisture Abbreviations		Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler					D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated		Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	
							Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard	



05/08/2022

BOREHOLE LOG
Attachment 2

MONITORING WELL GW1_D

ENVIRONMENTAL-GROUNDWATER

Page 2 of 2

Depth (m)	Drilling Method	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Elevation (m)
26					- superficial]	44
28					SILTY CLAY; Silty clay, light grey and brown with orange band from 25.1m to 25.4m, moderate to high plasticity, stiff. Minor sand (10-30%). Dry. [Yoganup Formation - superficial]	42
30					SANDY SILT; Silt, light grey mottled light orange, low plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted (30-50%). Dry. [Yoganup Formation - superficial]	40
32					SILTY CLAY; Silty clay, light grey mottled light red, moderate to high plasticity, stiff. Trace sand (<5%). Dry. [Yoganup Formation - superficial]	38
34			~800L (750L water, 2 x 22.6 kg bentonite gel, 21 x 20 kg cement) Depth: 0.5 - 43.		SANDY CLAY; Clay, light grey mottled light orange, low to moderate plasticity, soft. Sand is fine to coarse grained, sub angular, poorly sorted (20-40%). Moist. [Yoganup Formation - superficial]	36
36					SANDY CLAY; Clay, light grey with bands of light red, low to moderate plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted (30-50%). Moist. [Yoganup Formation - superficial]	34
38					SANDY CLAY; Clay, light grey mottled orange, low to moderate plasticity, soft. Sand is fine to coarse grained, sub angular, poorly sorted (40-60%). Wet. [Yoganup Formation - superficial]	32
40					SANDY CLAY; Clay, orange with bands of light grey, low to moderate plasticity, firm. Sand is fine to coarse grained, sub angular, poorly sorted, contains shell fragments (30-50%). Wet. [Leederville Formation]	30
42					SANDY CLAY; Clay, light grey with bands of orange, low plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted (20-40%). Wet. [Leederville Formation]	28
44			Slow release pellets Depth: 43. - 44.		SILTY CLAY; Silty clay, dark grey/red/brown, moderate to high plasticity, very stiff. Trace sand (<5%). Slightly moist. [Leederville Formation]	26
46			Including backfill for base of hole Depth: 44. - 49.		SANDY CLAY; Clay, white/light grey with minor orange mottling, moderate plasticity, soft. Sand is fine to coarse grained, sub angular, poorly sorted (40-60%). Wet. [Leederville Formation]	24
48					SANDY CLAY; Clay, light grey with orange mottling, low to moderate plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted (20-30%). Wet. [Leederville Formation]	22
50			Slow release pellets Depth: 49. - 50.		Termination Depth at: 50.00 m. Target depth.	20
52						18
54						16

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations

AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler

Moisture Abbreviations

D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated

Consistency Abbreviations

Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense
Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



05/08/2022

BOREHOLE LOG
Attachment 2

MONITORING WELL GW1_S

ENVIRONMENTAL-GROUNDWATER

Page 1 of 2

Client Cleanaway Solid Waste Pty Ltd; Cleanaway				Drill Co. Groundwave		Easting, Northing 387262.903, 6300800.607	
Project Banksia Rd Waste Disposal Site GW Monitoring; Cleanaway				Driller Chris Johnson		Grid Ref GDA94_MGA_zone_50	
Project No. 6134872; 6136462; 6136867				Rig Type Sonic Rig 6		Elevation 70.292	
Site Cleanaway - Banksia Rd, Dardanup				Drill Method Sonic 150mm		Collar RL 71.173	
Location Banksia Rd, Dardanup WA 6236				Total Depth (m) 38.00		Logged By AS	
Date Drilled 30/08/2018 - 30/08/2018				Diameter (mm) 150		Checked By AO	

Casing 50 mm Class 18 PVC			Screen 0.4mm slots (35 to 38m)			Surface Completion Monument cover		
<div>Depth (m)</div>	<div>Drilling Method</div>	<div>Water</div>	<div>Well Details</div>		<div>Graphic Log</div>	<div>LITHOLOGICAL DESCRIPTION</div> <div>Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.</div>		<div>Elevation (m)</div>
	Sonic 150m			Concrete for cover Depth: 0.0 - 1.0		SILTY SAND; Sand, light grey/brown, fine to medium grained, sub angular, poorly sorted, loose. Compacted. Dry. [Yoganup Formation - superficial]	70	
2						GRAVELLY CLAY; Clay, red/brown, low to moderate plasticity, soft. Gravel is lateritic, up to 3cm diameter. Compacted. Dry. [Yoganup Formation - superficial]	68	
4						SANDY CLAY; Clay, light grey and light red, moderate to high plasticity, stiff. Sand is fine to medium grained, sub angular, poorly sorted. Compacted. Dry. [Yoganup Formation - superficial]	66	
6							64	
8						SANDY CLAY; Clay, light grey and light red mottled light orange, moderate to high plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]	62	
10						SILTY CLAY; Silty clay, light grey mottled light red/orange, low to moderate plasticity, stiff. Minor sand (10-20%). Dry. [Yoganup Formation - superficial]	60	
12				~800L (750L water, 2 x 22.6 kg bentonite gel, 21 x 20 kg cement) Depth: 0.5 - 32.		SANDY CLAY; Clay, light grey mottled light red/orange, moderate plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted (20-40%). Dry. [Yoganup Formation - superficial]	58	
14						SILTY CLAY; Silty clay, light grey mottled light red/orange, moderate to high plasticity, stiff. Minor sand (10-20%). Dry. [Yoganup Formation - superficial]	56	
16						SANDY CLAY; Clay, light grey mottled light red/orange, low to moderate plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted (20-40%). Dry. [Yoganup Formation - superficial]	54	
18						SANDY SILT; Silt, light grey with bands of orange, low plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]	52	
20							50	
22						SILTY CLAY; Silty clay, light grey mottled light red/orange, moderate to high plasticity, stiff. Trace sand (<5%). Dry. [Yoganup Formation - superficial]	48	
24						SANDY CLAY; Clay, light grey/light red, low to moderate plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted (20-40%). Dry. [Yoganup Formation - superficial]	46	
						SILTY CLAY; Silty clay, light grey/light red, moderate to high plasticity, stiff. Trace sand (<5%). Dry. [Yoganup Formation - superficial]		
						SANDY CLAY; Clay, light grey mottled yellow, moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted (20-40%). Dry. [Yoganup Formation - superficial]		

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



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BOREHOLE LOG
Attachment 2

MONITORING WELL GW1_S

ENVIRONMENTAL-GROUNDWATER

Page 2 of 2

Depth (m)	Drilling Method	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Elevation (m)
26					- superficial]	44
28			~800L (750L water, 2 x 22.6 kg bentonite gel, 21 x 20 kg cement) Depth: 0.5 - 32.		SILTY CLAY; Silty clay, light grey and brown with orange band from 25.1m to 25.4m, moderate to high plasticity, stiff. Minor sand (10-30%). Dry. [Yoganup Formation - superficial]	42
30					SANDY SILT; Silt, light grey mottled light orange, low plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted (30-50%). Dry. [Yoganup Formation - superficial]	40
32			Slow release pellets Depth: 32. - 34.		SILTY CLAY; Silty clay, light grey mottled light red, moderate to high plasticity, stiff. Trace sand (<5%). Dry. [Yoganup Formation - superficial]	38
34					SANDY CLAY; Clay, light grey mottled light orange, low to moderate plasticity, soft. Sand is fine to coarse grained, sub angular, poorly sorted (20-40%). Moist. [Yoganup Formation - superficial]	36
36			Including backfill for base of hole Depth: 34. - 38.		SANDY CLAY; Clay, light grey with bands of light red, low to moderate plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted (30-50%). Moist. [Yoganup Formation - superficial]	34
38					SANDY CLAY; Clay, light grey mottled orange, low to moderate plasticity, soft. Sand is fine to coarse grained, sub angular, poorly sorted (40-60%). Wet. [Yoganup Formation - superficial]	32
40					Termination Depth at: 38.00 m. Target depth.	30
42						28
44						26
46						24
48						22
50						20
52						18
54						16
Notes						
This log is not intended for geotechnical purposes.						
Drilling Abbreviations				Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler				D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard









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BOREHOLE LOG
Attachment 2

MONITORING WELL GW5_D

ENVIRONMENTAL-GROUNDWATER

Page 1 of 2

Client Cleanaway Solid Waste Pty Ltd; Cleanaway			Drill Co. Groundwave			Easting, Northing 388119.74, 6300262.571		
Project Banksia Rd Waste Disposal Site GW Monitoring; Cleanaway			Driller Chris Johnson			Grid Ref GDA94_MGA_zone_50		
Project No. 6134872; 6136462; 6136867			Rig Type Sonic Rig 6			Elevation 105.297		
Site Cleanaway - Banksia Rd, Dardanup			Drill Method Sonic 150mm			Collar RL 105.998		
Location Banksia Rd, Dardanup WA 6236			Total Depth (m) 62.00			Logged By AO		
Date Drilled 12/06/2018 - 19/06/2018			Diameter (mm) 150			Checked By AO		
Casing 50 mm Class 18 PVC			Screen 0.4mm slots (55.5 to 58.5m)			Surface Completion Monument cover		
Depth (m)	Drilling Method	Water	Well Details		Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.		Elevation (m)
2	Sonic 150m					Concrete for cover Depth: 0.0 - 1.0		104
4						Concrete for cover Depth: 0.0 - 1.0		102
6						Concrete for cover Depth: 0.0 - 1.0		100
8						Concrete for cover Depth: 0.0 - 1.0		98
10						Concrete for cover Depth: 0.0 - 1.0		96
12						Concrete for cover Depth: 0.0 - 1.0		94
14						Concrete for cover Depth: 0.0 - 1.0		92
16						Concrete for cover Depth: 0.0 - 1.0		90
18						Concrete for cover Depth: 0.0 - 1.0		88
20						Concrete for cover Depth: 0.0 - 1.0		86
22						Concrete for cover Depth: 0.0 - 1.0		84
24						Concrete for cover Depth: 0.0 - 1.0		82
26	900L (800L water, 2 x 22.6 kg bentonite, 24 x 20 kg cement) Depth: 0.5 - 52.				Silty sand, fine grained. Light brown. With increasing clay. Clay becomes firm and darker with depth. Dry. Grading into... [Yoganup Formation - superficial]		104	
28					Silty clay, light brown to beige/off white. With 20-40% gravel, angular laterite clasts / ferricrete. Clay becoming stiff with depth. Dry. [Yoganup Formation - superficial]		102	
30					Mottled clay, firm to stiff, grey to brown. Mottled iron staining and ferricrete nodules. Minor organic matter. Dry [Yoganup Formation - superficial]		100	



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BOREHOLE LOG
Attachment 2

MONITORING WELL GW5_D

ENVIRONMENTAL-GROUNDWATER

Page 2 of 2

Depth (m)	Drilling Method	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Elevation (m)
32						74
34					CLAY; Clay, stiff to very firm, grey. Minor white inclusions, iron brown/orange bands. Dry. [Yoganup Formation - superficial]	72
36					SANDY CLAY; Clay and sand, light brown. 60% silt in clay matrix. Sand is fine to coarse, quartz rich, sub angular (approx. 20% of sample). Occasional iron stained bands. Moist. [Yoganup Formation - superficial]	70
38						68
40						66
42			900L (800L water, 2 x 22.6 kg bentonite, 24 x 20 kg cement) Depth: 0.5 - 52.			64
44					SILTY CLAY; Grading from above, reduction in sands. Increasing clay and silt and stiff to firm. [Yoganup Formation - superficial]	62
46					SANDY CLAY; Clay with 50% sands, light brown to white, with minor iron banding. Clay is soft to firm. Moist. [Yoganup Formation - superficial]	60
48						58
50					CLAY; Clay, stiff to very stiff, grey to dark grey. Plastic when wetted. Minor silty bands at 50.0m. Minor iron bands/staining. Darker with depth. Coal / lignite band at 52.5-52.7m. [Leederville Formation]	56
52						54
54			Slow release pellets Depth: 52. - 55.		SILTY SAND; Fine grained sand with silt, cream to white, significant silt and clay. Sands are fine grained to minor medium grained, quartz rich, sub rounded. Trace of shells, dark minerals. Minor brown silt bands Clays are white. Moist/saturated. [Leederville Formation]	52
56						50
58						48
60			Including backfill for base of hole Depth: 55. - 62.		SILTY CLAY / CLAY ; Silty clays to clays, firm to stiff, dark brown to grey. Trace sand, white. Bands of silty clay/sands, brown soil like. Moist. [Leederville Formation]	46
62					SILTY/SANDY CLAY/SILT; Silt with significant sand and clay, white to slight brown, firm. Clay to 30%. sand to 30% of fine to coarse quartz rich sand up to 2-3 mm, sub angular. Dry to slightly moist. [Leederville Formation]	44
64					Termination Depth at: 62.00 m. Target depth.	42
						40
Notes						
This log is not intended for geotechnical purposes.						
Drilling Abbreviations				Moisture Abbreviations		Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler				D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated		Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense
						Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



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BOREHOLE LOG
Attachment 2

MONITORING WELL GW5_S

ENVIRONMENTAL-GROUNDWATER

Page 1 of 2

Client Cleanaway Solid Waste Pty Ltd; Cleanaway	Drill Co. Groundwave	Easting, Northing 388119.851, 6300252.465
Project Banksia Rd Waste Disposal Site GW Monitoring; Cleanaway	Driller Chris Johnson	Grid Ref GDA94_MGA_zone_50
Project No. 6134872; 6136462; 6136867	Rig Type Sonic Rig 6	Elevation 105.162
Site Cleanaway - Banksia Rd, Dardanup	Drill Method Sonic 150mm	Collar RL 105.967
Location Banksia Rd, Dardanup WA 6236	Total Depth (m) 48.80	Logged By AO
Date Drilled 28/08/2018 - 29/08/2018	Diameter (mm) 150	Checked By AO

Casing 50 mm Class 18 PVC**Screen** 0.4mm slots (45.8 to 48.8m)**Surface Completion** Monument cover

Depth (m)	Drilling Method	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Elevation (m)
2	Sonic 150m		Concrete for cover Depth: 0.0 - 1.0		SILTY SAND; Silty sand, fine grained. Light brown. With increasing clay. Clay becomes firm and darker with depth. Dry. Grading into... [Yoganup Formation - superficial]	104
4					SILTY CLAY / GRAVELLY CLAY; Silty clay, light brown to beige/off white. With 20-40% gravel, angular laterite clasts / ferricrete. Clay becoming stiff with depth. Dry. [Yoganup Formation - superficial]	102
6					GRAVELLY CLAY; Mottled clay, firm to stiff, grey to brown. Mottled iron staining and ferricrete nodules. Minor organic matter. Dry [Yoganup Formation - superficial]	100
8					FERRICRETE; Cemented iron sands, red to brown. Very firm to friable. Clay increasing with depth and becoming light brown. Dry. [Yoganup Formation - superficial]	98
10					CLAY; Clay, very stiff, pink to grey. Minor iron mottle, increasing with depth. Dry. [Yoganup Formation - superficial]	96
12					CLAY; Clay, firm to very stiff, grey to brown. With iron staining and minor weak cementing. Dry [Yoganup Formation - superficial]	94
14			900L (800L water, 2 x 22.6 kg bentonite, 24 x 20 kg cement) Depth: 0.5 - 42.		SILTY CLAY; Silty clay to clay, light brown. Minor white mottle, minor laminar texture. Dry. [Yoganup Formation - superficial]	92
16					CLAY; Stiff to firm clay, light brown and mottled. Bands of iron/red cementing. Very stiff/hard at 16-17m. Dry. [Yoganup Formation - superficial]	90
18					SANDY CLAY/SILT; Clay with silts, soft, cream to white. Up to 50% silt, 20% sand medium to coarse grained quartz, sub rounded. Moist. [Yoganup Formation - superficial]	88
20						86
22					SILTY SAND; Sand, fine to coarse grained, poorly sorted, red to brown. Quartz sand is medium to coarse, sub angular to sub rounded. With significant silty and clay increasing with depth 23-25m. Moist. [Yoganup Formation - superficial]	84
24						82

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



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BOREHOLE LOG
Attachment 2

MONITORING WELL GW5_S

ENVIRONMENTAL-GROUNDWATER

Page 2 of 2

Depth (m)	Drilling Method	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Elevation (m)
26					SILTY CLAY; Clay, plastic, light brown. With silty clay increasing with depth. Moist. [Yoganup Formation - superficial]	80
28					SANDY CLAY; Clay and sandy clay, grey to light brown. Bands of iron stained sands/silty sands. Minor blueish clay. Sand bands, medium to coarse grained, sub rounded, quartz rich. Silt matrix to 50%. Moist. [Yoganup Formation - superficial]	78
30						76
32						74
34			900L (800L water, 2 x 22.6 kg bentonite, 24 x 20 kg cement) Depth: 0.5 - 42.		CLAY; Clay, stiff to very firm, grey. Minor white inclusions, iron brown/orange bands. Dry. [Yoganup Formation - superficial]	72
36					SANDY CLAY; Clay and sand, light brown. 60% silt in clay matrix. Sand is fine to coarse, quartz rich, sub angular (approx. 20% of sample). Occasional iron stained bands. Moist. [Yoganup Formation - superficial]	70
38						68
40						66
42					SILTY CLAY; Grading from above, reduction in sands. Increasing clay and silt and stiff to firm. [Yoganup Formation - superficial]	64
44			Slow release pellets Depth: 42. - 44.			62
46			Including backfill for base of hole Depth: 44. - 48.		SANDY CLAY; Clay with 50% sands, light brown to white, with minor iron banding. Clay is soft to firm. Moist. [Yoganup Formation - superficial]	60
48						58
50					Termination Depth at: 48.80 m. Target depth.	56
52						54
54						52
Notes						
This log is not intended for geotechnical purposes.						
Drilling Abbreviations				Moisture Abbreviations		Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler				D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated		Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



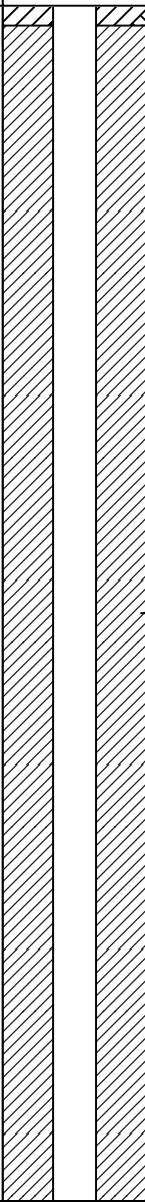
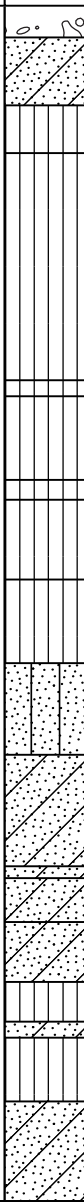
05/08/2022

BOREHOLE LOG
Attachment 2

MONITORING WELL GW7_D

ENVIRONMENTAL-GROUNDWATER

Page 1 of 2

Client Cleanaway Solid Waste Pty Ltd; Cleanaway Project Banksia Rd Waste Disposal Site GW Monitoring; Cleanaway Project No. 6134872; 6136462; 6136867 Site Cleanaway - Banksia Rd, Dardanup Location Banksia Rd, Dardanup WA 6236 Date Drilled 21/06/2018 - 22/06/2018			Drill Co. Groundwave Driller Chris Johnson Rig Type Sonic Rig 6 Drill Method Sonic 150mm Total Depth (m) 59.00 Diameter (mm) 150			Easting, Northing 387102.262, 6300536.059 Grid Ref GDA94_MGA_zone_50 Elevation 66.819 Collar RL 67.637 Logged By AS Checked By AO		
Casing 50 mm Class 18 PVC			Screen 0.4mm slots (52 to 55m)			Surface Completion Monument cover		
Depth (m)	Drilling Method	Water	Well Details		Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.		Elevation (m)
2	Sonic 150m			Concrete for cover Depth: 0.0 - 1.0		GRAVELLY SAND; Sand, light grey, fine to medium grained, sub angular, poorly sorted. Gravel is lateritic up to 2cm. Dry. [Yoganup Formation - superficial]		66
4						SANDY CLAY; Clay, light grey mottled orange/brown, moderate to high plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted with lateritic gravel. Dry. [Yoganup Formation - superficial]		64
6						SILTY CLAY; Clay, light red mottled cream, low to moderate plasticity, stiff. Minor laterite gravel (10-20%). Dry. [Yoganup Formation - superficial]		62
8						SILTY CLAY; Clay, dark red mottled light grey and yellow, stiff. Minor light grey sand (<5%). Likely the above unit fresh/non-weathered. Dry. [Yoganup Formation - superficial]		60
10						SILTY CLAY; Clay, light grey, low to no plasticity, stiff. Minor (<5%) sand. Dry. [Yoganup Formation - superficial]		58
12						SILTY CLAY; Clay, dark red mottled light grey and yellow, stiff. Minor light grey sand (<5%). Dry. [Yoganup Formation - superficial]		56
14						SILTY CLAY; Clay, light grey, low to no plasticity, stiff. Minor (<5%) sand. Dry. [Yoganup Formation - superficial]		54
16						SILTY CLAY; Clay, dark red mottled light grey, stiff. Minor light grey sand (<10-15%). Dry. [Yoganup Formation - superficial]		52
18						SILTY CLAY; Clay, light grey, low to no plasticity, stiff. Light grey sand (~20-40%). Becoming mottled with light orange in last 0.5m. Dry. [Yoganup Formation - superficial]		50
20						SANDY SILT; Silt, light grey with bands of light red, low plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]		48
22						SANDY CLAY; Clay, light grey with bands of orange/brown, low to moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]		46
24						CLAYEY SAND; Sand, light grey, sub angular, medium dense. Clay is orange/brown, moderate plasticity, soft. Dry. [Yoganup Formation - superficial]		44
26						SANDY CLAY; Clay, light grey with bands of orange/brown, low to moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]		42
28						CLAYEY SAND; Sand, light grey, fine to medium grained, sub angular, poorly sorted, medium dense. Clay is brown/orange, moderate plasticity, soft. Dry. [Yoganup Formation - superficial]		40
30						SILTY CLAY; Clay, light grey/light red, moderate to high plasticity, very stiff. Trace sand (<5%). Dry. [Yoganup Formation - superficial]		38
			800L (700L water, 2 x 22.6 kg bentonite gel, 15 x 20 kg cement) Depth: 0.5 - 50.		SANDY CLAY; Clay, orange/brown, low to moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]			
					SILTY CLAY; Clay, light grey with light red bands, low to moderate plasticity, firm. Trace sand (<5%). Dry. [Yoganup Formation - superficial]			
					SANDY CLAY; Clay, orange/brown with light grey and light red banding through unit, moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]			
Notes This log is not intended for geotechnical purposes.								
Drilling Abbreviations AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler					Moisture Abbreviations D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated		Consistency Abbreviations Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard	



05/08/2022

BOREHOLE LOG
Attachment 2

MONITORING WELL GW7_D

ENVIRONMENTAL-GROUNDWATER

Page 2 of 2

Depth (m)	Drilling Method	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Elevation (m)
36					sorted. Moist. [Yoganup Formation - superficial]	36
34						34
32					SILTY CLAY; Clay, light grey with light orange and light red mottling, moderate to high plasticity, stiff. Trace sand (<5%). Slightly moist. [Yoganup Formation - superficial]	32
30					SANDY CLAY; Clay, light grey/white with light orange mottling, moderate plasticity, soft. Sand is fine to coarse grained, sub angular, poorly sorted. Wet. [Yoganup Formation - superficial]	30
28					SILTY CLAY; Clay, dark grey with orange mottling, moderate to high plasticity, stiff. Trace sand (<5%). Slightly moist. [Yoganup Formation - superficial]	28
26					SANDY CLAY; Clay, light grey/white with light orange mottling, moderate to high plasticity, soft. Sand is fine to coarse grained, sub angular, poorly sorted. Wet. [Yoganup Formation - superficial]	26
24					SILTY CLAY; Clay, light grey with light orange mottling, moderate to high plasticity, stiff. Trace sand (<5%). Slightly moist. [Leederville Formation]	24
22					SANDY CLAY; Clay, light grey/white, low to moderate plasticity, soft. Sand is fine to coarse grained, sub angular, poorly sorted. Wet. [Leederville Formation]	22
20					SILTY CLAY; Clay, dark grey /red becoming lighter in colour with depth, moderate to high plasticity, stiff. Trace sand (<5%). Slightly moist. [Leederville Formation]	20
18					SANDY SILT; Silt, light grey/white with orange mottling, moderate plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted. Wet. [Leederville Formation]	18
16						16
14					CLAYEY SAND; Sand, light grey/white with orange mottling, fine to coarse grained, sub angular, poorly sorted, medium dense. Clay is moderate to high plasticity, soft. Wet. [Leederville Formation]	14
12					SILTY CLAY; Clay, light grey with orange mottling, moderate to high plasticity, firm to stiff. Minor sand (10-20%). Slightly moist. [Leederville Formation]	12
10					SANDY CLAY; Clay, light grey with orange mottling, moderate plasticity, soft. Sand is fine to coarse grained, sub angular, poorly sorted (20-40%). Wet. [Leederville Formation]	10
8						8
60					Termination Depth at: 59.00 m. Target depth.	6
62						4
64						2

Notes			
This log is not intended for geotechnical purposes.			
Drilling Abbreviations		Moisture Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler		D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	
		Consistency Abbreviations	
		Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense	Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



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BOREHOLE LOG
Attachment 2

MONITORING WELL GW7_S

ENVIRONMENTAL-GROUNDWATER

Page 1 of 2

Client Cleanaway Solid Waste Pty Ltd; Cleanaway			Drill Co. Groundwave			Easting, Northing 387104.944, 6300536.342							
Project Banksia Rd Waste Disposal Site GW Monitoring; Cleanaway			Driller Chris Johnson			Grid Ref GDA94_MGA_zone_50							
Project No. 6134872; 6136462; 6136867			Rig Type Sonic Rig 6			Elevation 66.836							
Site Cleanaway - Banksia Rd, Dardanup			Drill Method Sonic 150mm			Collar RL 67.446							
Location Banksia Rd, Dardanup WA 6236			Total Depth (m) 38.00			Logged By AS							
Date Drilled 26/06/2018 - 26/06/2018			Diameter (mm) 150			Checked By AO							
Casing 50 mm Class 18 PVC			Screen 0.4mm slots (35 to 38m)			Surface Completion Monument cover							
Depth (m)	Drilling Method	Water	Well Details		Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.		Elevation (m)					
2	Sonic 150m					GRAVELLY SAND; Sand, light grey, fine to medium grained, sub angular, poorly sorted. Gravel is lateritic up to 2cm. Dry. [Yoganup Formation - superficial]		66					
SANDY CLAY; Clay, light grey mottled orange/brown, moderate to high plasticity, firm. Sand is fine to medium grained, sub angular, poorly sorted with lateritic gravel. Dry. [Yoganup Formation - superficial]						64							
SILTY CLAY; Clay, light red mottled cream, low to moderate plasticity, stiff. Minor laterite gravel (10-20%). Dry. [Yoganup Formation - superficial]						62							
SILTY CLAY; Clay, dark red mottled light grey and yellow, stiff. Minor light grey sand (<5%). Likely the above unit fresh/non-weathered. Dry. [Yoganup Formation - superficial]						60							
SILTY CLAY; Clay, light grey, low to no plasticity, stiff. Minor (<5%) sand. Dry. [Yoganup Formation - superficial]						58							
SILTY CLAY; Clay, dark red mottled light grey and yellow, stiff. Minor light grey sand (<5%). Dry. [Yoganup Formation - superficial]						56							
SILTY CLAY; Clay, light grey, low to no plasticity, stiff. Minor (<5%) sand. Dry. [Yoganup Formation - superficial]						54							
SILTY CLAY; Clay, dark red mottled light grey, stiff. Minor light grey sand (<10-15%). Dry. [Yoganup Formation - superficial]						52							
SILTY CLAY; Clay, light grey, low to no plasticity, stiff. Light grey sand (~20-40%). Becoming mottled with light orange in last 0.5m. Dry. [Yoganup Formation - superficial]						50							
SANDY SILT; Silt, light grey with bands of light red, low plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]						48							
SANDY CLAY; Clay, light grey with bands of orange/brown, low to moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]						46							
CLAYEY SAND; Sand, light grey, sub angular, medium dense. Clay is orange/brown, moderate plasticity, soft. Dry. [Yoganup Formation - superficial]						44							
SANDY CLAY; Clay, light grey with bands of orange/brown, low to moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]						42							
CLAYEY SAND; Sand, light grey, fine to medium grained, sub angular, poorly sorted, medium dense. Clay is brown/orange, moderate plasticity, soft. Dry. [Yoganup Formation - superficial]													
SILTY CLAY; Clay, light grey/light red, moderate to high plasticity, very stiff. Trace													
Notes													
This log is not intended for geotechnical purposes.													
Drilling Abbreviations						Moisture Abbreviations		Consistency Abbreviations					
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler					D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated		Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense						
							Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard						



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BOREHOLE LOG
Attachment 2

MONITORING WELL GW7_S

ENVIRONMENTAL-GROUNDWATER

Page 2 of 2

Depth (m)	Drilling Method	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Elevation (m)
26					CLAY, light grey/white, moderate to high plasticity, very stiff. Trace sand (<5%). Dry. [Yoganup Formation - superficial]	40
28			800L (700L water, 2 x 22.6 kg bentonite gel, 15 x 20 kg cement) Depth: 0.5 - 32.		SANDY CLAY; Clay, orange/brown, low to moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Dry. [Yoganup Formation - superficial]	38
30					SANDY CLAY; Clay, orange/brown with light grey and light red banding through unit, moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Moist. [Yoganup Formation - superficial]	36
32			Slow release pellets Depth: 32. - 34.		SANDY CLAY; Clay, orange/brown with light grey and light red banding through unit, moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Moist. [Yoganup Formation - superficial]	34
34					SANDY CLAY; Clay, orange/brown with light grey and light red banding through unit, moderate plasticity, soft. Sand is fine to medium grained, sub angular, poorly sorted. Moist. [Yoganup Formation - superficial]	32
36			Including backfill for base of hole Depth: 34. - 38.		SANDY CLAY; Clay, light grey/white with light orange mottling, moderate plasticity, soft. Sand is fine to coarse grained, sub angular, poorly sorted. Wet. [Yoganup Formation - superficial]	30
38					Termination Depth at: 38.00 m. Target depth.	28
40						26
42						24
44						22
46						20
48						18
50						16
52						14
54						12

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard



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BOREHOLE LOG
Attachment 2

MONITORING WELL GW9_D

ENVIRONMENTAL-GROUNDWATER

Page 1 of 2

Client Cleanaway Solid Waste Pty Ltd; Cleanaway			Drill Co. Groundwave			Easting, Northing 386870.902, 6300309.531		
Project Banksia Rd Waste Disposal Site GW Monitoring; Cleanaway			Driller Chris Johnson			Grid Ref GDA94_MGA_zone_50		
Project No. 6134872; 6136462; 6136867			Rig Type Sonic Rig 6			Elevation 60.044		
Site Cleanaway - Banksia Rd, Dardanup			Drill Method Sonic 150mm			Collar RL 60.546		
Location Banksia Rd, Dardanup WA 6236			Total Depth (m) 50.00			Logged By AS		
Date Drilled 19/06/2018 - 20/06/2018			Diameter (mm) 150			Checked By AO		
Casing 50 mm Class 18 PVC			Screen 0.4mm slots (43 to 46m)			Surface Completion Monument cover		
Depth (m)	Drilling Method	Water	Well Details		Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.		Elevation (m)
2	Sonic 150m					Concrete for cover Depth: 0.0 - 1.0		60
4						SILTY SAND; Sand, fine to medium grained, poorly sorted, sub angular, grey to dark grey. With minor silt increasing with depth. Dry. [Yoganup Formation - superficial]		58
6						GRAVELLY CLAY; Silty clay, light grey with moderate plasticity. With 20-40% gravel, angular laterite clasts / ferricrete up to 3cm. Dry. [Yoganup Formation - superficial]		56
8						SANDY SILT; Silt with significant sand, dark grey, soft, low to no plasticity. Sand is fine to medium grained and quartz rich with minor (<20%) laterite gravel, sub angular. Dry. [Yoganup Formation - superficial]		54
10						GRAVELLY CLAY; Silty clay, light grey with moderate to high plasticity, firm. With 20-40% gravel, angular laterite clasts / ferricrete up to 3cm. Dry. [Yoganup Formation - superficial]		52
12						SILTY CLAY; Silty clay, light grey with low to moderate plasticity, hard. With 10-20% sand, fine to medium grained, sub angular, yellow. Dry. [Yoganup Formation - superficial]		50
14						CLAYEY SILT; Clayey silt, light grey with banding of red/brown laterite staining, low plasticity, firm. Dry. [Yoganup Formation - superficial]		48
16						SANDY CLAY; Clay, light grey to white with low plasticity, firm. Sand is fine to medium grained, sub angular, grey. Minor bands of light red staining throughout. Dry. [Yoganup Formation - superficial]		46
18						SANDY SILT; Silt, light grey with banding of light red staining, low plasticity, firm. Sand is fine to medium grained, sub angular, light grey. Light red bands are more frequent with depth. Dry. [Yoganup Formation - superficial]		44
20						SILTY SAND; Sand, light grey, fine to coarse grained, poorly sorted, angular, loose. With ~20% fines. Moist. [Yoganup Formation - superficial]		42
22					SANDY SILT; Silt, light grey with occasional banding of red/brown laterite staining, low plasticity, firm. Sand is fine to medium grained, sub angular. Moist. [Yoganup Formation - superficial]		40	
24							38	
Notes This log is not intended for geotechnical purposes.								
Drilling Abbreviations AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler					Moisture Abbreviations D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated		Consistency Abbreviations Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard	



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BOREHOLE LOG
Attachment 2

MONITORING WELL GW9_D

ENVIRONMENTAL-GROUNDWATER

Page 2 of 2

Depth (m)	Drilling Method	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Elevation (m)
26						34
28					SANDY CLAY; Silty clay, light grey with orange/brown laterite staining, low plasticity, firm. Sand is fine to coarse grained, sub angular, grey with thin bands of orange. Last 0.5m is orange/brown. Moist. [Leederville Formation]	32
30					SILTY CLAY; Silty clay, light grey with bands of light red, moderate plasticity, stiff. Less than 10% sand. Dry. [Yoganup Formation - superficial]	30
32			700L (600L water, 1.5 x 22.6 kg bentonite gel, 12 x 20 kg cement) Depth: 0.5 - 41.		SANDY CLAY; Clay, grey with occasional bands of orange/brown laterite staining, low to moderate plasticity, firm. Sand is fine to medium grained, sub angular. Moist. [Yoganup Formation - superficial]	28
34						26
36					SILTY CLAY; Silty clay, light grey with bands of light red, moderate plasticity, very stiff. Less than 10% sand. Dry. [Yoganup Formation - superficial]	24
38					SANDY CLAY; Clay, light grey and orange/brown, moderate to high plasticity, soft. Sand is fine to coarse grained, sub angular. Moist. [Yoganup Formation - superficial]	22
40						20
42			Slow release pellets Depth: 41. - 42.		SANDY SILT; Silt, light grey with bands of light red, moderate plasticity, soft to firm. Sand is fine to medium grained, sub angular, contains shell fragments and feldspar. 41.9 to 42.0m band of orange/brown sandy silt. Moist. [Yoganup Formation - superficial]	18
44			Including backfill for base of hole Depth: 42. - 46.		SILTY CLAY; Silty clay, light grey, moderate plasticity, very stiff. Less than 10% sand. Slightly moist. [Yoganup Formation - superficial]	16
46					SANDY SILT; Clay, light grey and orange/brown, moderate plasticity, soft. Sand is fine to coarse grained, sub angular, contains shell fragments and feldspar. Moist. [Leederville Formation]	14
48			Slow release pellets Depth: 46. - 50.		SILTY CLAY; Silty clay, light grey with light red bands, moderate plasticity, very stiff. Less than 10% sand. Slightly moist. [Leederville Formation]	12
50					SANDY CLAY; Clay, dark grey, moderate plasticity, soft. Sand is fine to coarse grained, sub angular. Moist. [Leederville Formation]	10
52					Termination Depth at: 50.00 m. Target depth.	8
54						6
Notes						
This log is not intended for geotechnical purposes.						
Drilling Abbreviations				Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler				D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard	



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BOREHOLE LOG
Attachment 2

MONITORING WELL GW9_S

ENVIRONMENTAL-GROUNDWATER

Page 1 of 2

Client Cleanaway Solid Waste Pty Ltd; Cleanaway			Drill Co. Groundwave			Easting, Northing 386870.32, 6300306.036		
Project Banksia Rd Waste Disposal Site GW Monitoring; Cleanaway			Driller Chris Johnson			Grid Ref GDA94_MGA_zone_50		
Project No. 6134872; 6136462; 6136867			Rig Type Sonic Rig 6			Elevation 59.962		
Site Cleanaway - Banksia Rd, Dardanup			Drill Method Sonic 150mm			Collar RL 60.563		
Location Banksia Rd, Dardanup WA 6236			Total Depth (m) 36.00			Logged By AS		
Date Drilled 20/06/2018 - 21/06/2018			Diameter (mm) 150			Checked By AO		

Casing 50 mm Class 18 PVC			Screen 0.4mm slots (33 to 36m)			Surface Completion Monument cover		
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Depth (m)	Drilling Method	Water	Well Details		Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Elevation (m)
2	Sonic 150m			Concrete for cover Depth: 0.0 - 1.0		SILTY SAND; Sand, fine to medium grained, poorly sorted, sub angular, grey to dark grey. With minor silt increasing with depth. Dry. [Yoganup Formation - superficial]	
4						GRAVELLY CLAY; Silty clay, light grey with moderate plasticity. With 20-40% gravel, angular laterite clasts / ferricrete up to 3cm. Dry. [Yoganup Formation - superficial]	
6						SANDY SILT; Silt with significant sand, dark grey, soft, low to no plasticity. Sand is fine to medium grained and quartz rich with minor (<20%) laterite gravel, sub angular. Dry. [Yoganup Formation - superficial]	
8						GRAVELLY CLAY; Silty clay, light grey with moderate to high plasticity, firm. With 20-40% gravel, angular laterite clasts / ferricrete up to 3cm. Dry. [Yoganup Formation - superficial]	
10						SILTY CLAY; Silty clay, light grey with low to moderate plasticity, hard. With 10-20% sand, fine to medium grained, sub angular, yellow. Dry. [Yoganup Formation - superficial]	
12						CLAYEY SILT; Clayey silt, light grey with banding of red/brown laterite staining, low plasticity, firm. Dry. [Yoganup Formation - superficial]	
14						SANDY CLAY; Clay, light grey to white with low plasticity, firm. Sand is fine to medium grained, sub angular, grey. Minor bands of light red staining throughout. Dry. [Yoganup Formation - superficial]	
16						SANDY SILT; Silt, light grey with banding of light red staining, low plasticity, firm. Sand is fine to medium grained, sub angular, light grey. Light red bands are more frequent with depth. Dry. [Yoganup Formation - superficial]	
18						SILTY SAND; Sand, light grey, fine to coarse grained, poorly sorted, angular, loose. With ~20% fines. Moist. [Yoganup Formation - superficial]	
20						SANDY SILT; Silt, light grey with occasional banding of red/brown laterite staining, low plasticity, firm. Sand is fine to medium grained, sub angular. Moist. [Yoganup Formation - superficial]	
22				700L (600L water, 1.5 x 22.6 kg bentonite gel, 12 x 20 kg cement) Depth: 0.5 - 30.			38
24							36

Notes			
This log is not intended for geotechnical purposes.			

Drilling Abbreviations		Moisture Abbreviations		Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler		D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated		Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	
				Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard	



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BOREHOLE LOG
Attachment 2

MONITORING WELL GW9_S

ENVIRONMENTAL-GROUNDWATER

Page 2 of 2

Depth (m)	Drilling Method	Water	Well Details	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Elevation (m)
26			700L (600L water, 1.5 x 22.6 kg bentonite gel, 12 x 20 kg cement) Depth: 0.5 - 30. Slow release pellets Depth: 30. - 32. Including backfill for base of hole Depth: 32. - 36.		SANDY CLAY; Silty clay, light grey with orange/brown laterite staining, low plasticity, firm. Sand is fine to coarse grained, sub angular, grey with thin bands of orange. Last 0.5m is orange/brown. Moist. [Leederville Formation]	34
28						32
30					SILTY CLAY; Silty clay, light grey with bands of light red, moderate plasticity, stiff. Less than 10% sand. Dry. [Yoganup Formation - superficial]	30
32					SANDY CLAY; Clay, grey with occasional bands of orange/brown laterite staining, low to moderate plasticity, firm. Sand is fine to medium grained, sub angular. Moist. [Yoganup Formation - superficial]	28
34						26
36					Termination Depth at: 36.00 m. Target depth.	24
38						22
40						20
42						18
44						16
46						14
48						12
50						10
52						8
54						6
Notes						
This log is not intended for geotechnical purposes.						
Drilling Abbreviations				Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, NDD-Non Destructive Drilling, PT-Push tube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler				D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	Granular Soils VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense, VD - Very Dense Cohesive Soils VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard	

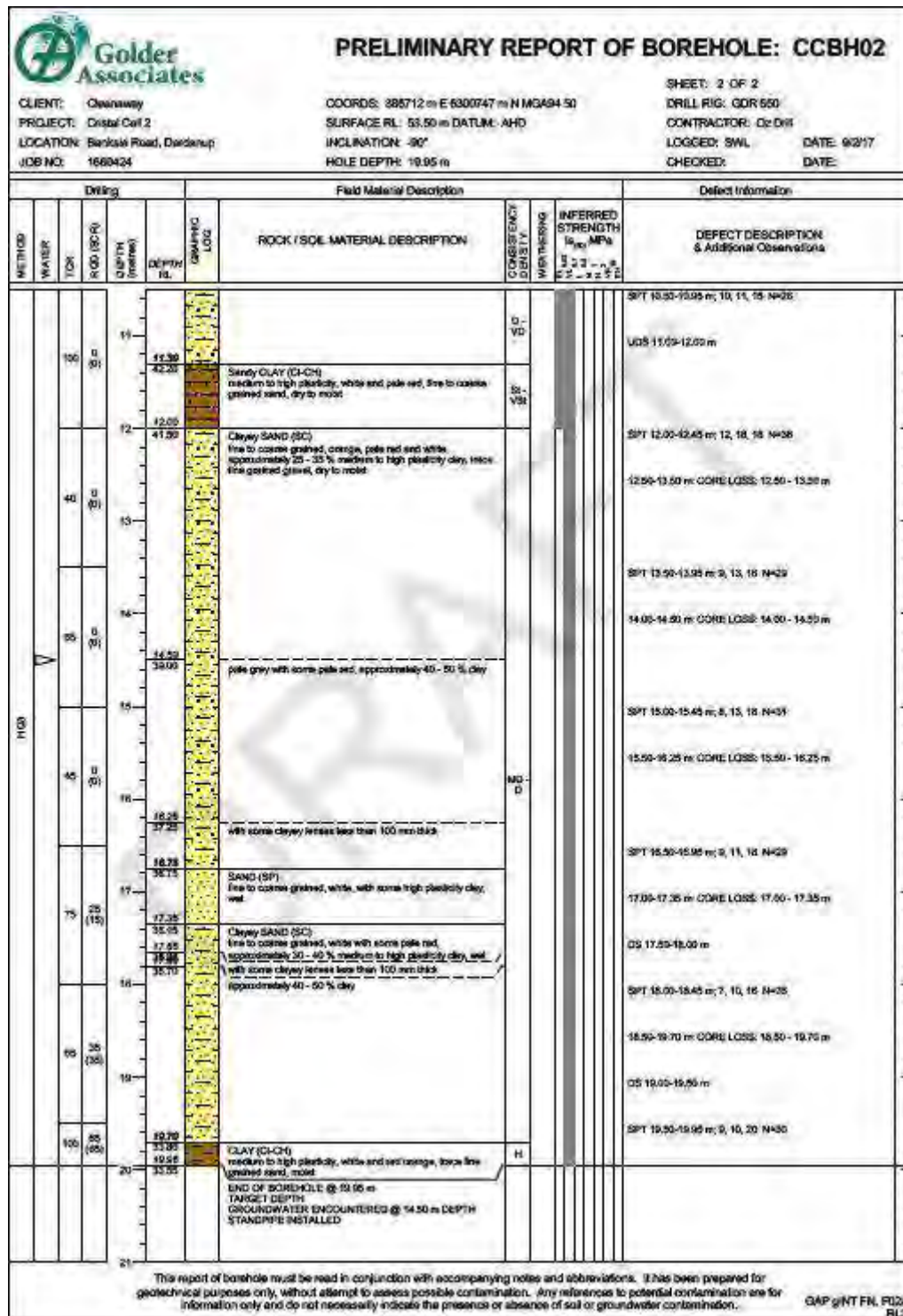
Golder Associates		PRELIMINARY REPORT OF BOREHOLE: CCBH01				SHEET: 1 OF 2	
CLIENT: Cleanway		COORDS: 282586 m E 6300487 m N MGA84 50		DRILL RIG: GDR 650		CONTRACTOR: Qz Div	
PROJECT: Crystal Cof 2		SURFACE RL: 52.05 m DATUM: AHD		LOGGED: SWL		DATE: 15/2/17	
LOCATION: Bankale Road, Dandenup		INCLINATION: -90°		CHECKED:		DATE:	
JOB NO: 1660424		HOLE DEPTH: 10.95 m					
Drilling			Field Material Description			Defect Information	
METHOD	WATER	LOG (RCP)	LOG (TH)	LOG (TH)	LOG (TH)	LOG (TH)	LOG (TH)
AS	NO3	LOG (RCP)	LOG (TH)	LOG (TH)	LOG (TH)	LOG (TH)	LOG (TH)
0		52.05					
0.30		51.75					
1		51.75					
1.10		51.65					
1.30		51.55					
2		51.55					
2.30		51.35					
2.50		51.25					
3		51.25					
3.30		51.05					
3.50		50.95					
4		50.95					
4.30		50.75					
4.50		50.65					
5		50.65					
5.30		50.45					
5.50		50.35					
6		50.35					
6.30		50.15					
6.50		50.05					
7		50.05					
7.30		49.85					
7.50		49.75					
8		49.75					
8.30		49.55					
8.50		49.45					
9		49.45					
9.30		49.25					
9.50		49.15					
10		49.15					
10.95		48.95					
TOPSOIL: SAND (SP)			fine to coarse grained, grey and dark grey, with some sand, trace organic (rootlets), dry			0.00-0.30 m CORE LOSS: 0.0 - 0.30 m	
SAND (SP)			fine to coarse grained, pale grey, dry			0.30-0.90 m CORE LOSS: 0.30 - 0.90 m	
dark brown, with some very weakly cemented, fine to medium gravel-sized nodules							
GRAVEL (GP)			fine to coarse grained, sub-rounded to sub-angular, brown, orange-brown and red, with some cobbles, dry			1.50-2.10 m CORE LOSS: 1.50 - 2.10 m	
higher percentage of coarse grained gravel							
fine to medium grained, with some grey sand, weakly cemented in a sandy matrix							
Sandy GRAVEL (GP)			fine to coarse grained, orange brown and red, fine to medium grained, grey sand, dry			3.45-4.10 m CORE LOSS: 3.45 - 4.10 m	
Gravelly CLAY (CI-CH)			medium to high plasticity, pale grey, dark red, pale red and orange brown, fine to coarse grained, sub-rounded to sub-angular gravel, gravel in a weakly cemented clay matrix, dry to moist				
Gravelly Sandy CLAY (CI-CH)			medium to high plasticity, dark red, pale grey and orange, fine to medium grained sand, fine to coarse grained gravel, dry to moist				
Sandy CLAY (CI-CH)			medium to high plasticity, pale red, orange brown and red, fine to medium grained sand, very weakly cemented, dry to moist				
pale red, pale grey, orange, slightly to moderately weathered, weakly to moderately well cemented							
very weakly to weakly cemented							
weakly to moderately well cemented							

This report of borehole must be read in conjunction with accompanying notes and observations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

GAP gINT FN, R02a
RL3

GAP gINT FN, F02a
B12

Golder Associates		PRELIMINARY REPORT OF BOREHOLE: CCBH02				SHEET: 1 OF 2	
CLIENT: Deservely		COORDS: 385712 m E 8300747 m N MAG34.50		DRILL RIG: GOR 650		CONTRACTOR: Oz Drill	
PROJECT: Crystal Cui 2		SURFACE RL: 53.99 m DATUM: AHD		LOGGED: SWL		DATE: 9/2/17	
LOCATION: Bankia Road, Dandahup		INCLINATION: -80°		CHECKED:		DATE:	
JOB NO: 1660434		HOLE DEPTH: 29.95 m					
Drilling		Field Material Description				Defect Information	
METHOD	WATER	LOG	ROD (GPR)	DEPTH (m)	DEPTH (m)	ROCK / SOIL MATERIAL DESCRIPTION	DEFECT DESCRIPTION & Additional Observations
AS				0	0.00	TOPSOIL: SAND (SP)	0.00-1.00 m CORE LOSS: 0.0 - 1.0 m
				1.30	33.30	fine to coarse grained, pale grey and dark grey, with some silt, trace organics, dry	0.10 m: Located at retained ground level
				2	32.20	SAND (SP)	
				3	31.30	fine to coarse grained, pale grey, dry	
				4	30.20	GRAVEL with cobbles (SP)	1.50-2.00 m CORE LOSS: 1.5 - 2.0 m
				5	29.30	fine to coarse grained, sub-rounded, brown and red, up to 100 mm diameter cobbles, with some fine to coarse grained sand, very weakly cemented, dry	
				6	28.30	Clayey GRAVEL (SC)	SPT 3.00-3.32 m, 3, 30, 100mm M-45 hammer sounding
				7	27.30	fine to medium grained, grey, orange-brown and dark red, medium to high plasticity clay, weakly to moderately well cemented gravel in a clayey matrix with some fine to coarse sand throughout, with some very weakly cemented clayey SAND lenses, dry	3.75-7.25 m CORE LOSS: 3.75 - 3.88 m
				8	26.30	Clayey SAND (SC)	
				9	25.30	fine to coarse grained, dark red, grey and orange, medium to high plasticity clay, weakly to moderately well cemented, dry to moist	
				10	24.30	orange-brown, red and grey, very weakly to weakly cemented	
				11	23.30	moderately well to well cemented	
				12	22.30	approximately 25 - 35 % medium to high plasticity clay, with some fine to coarse grained gravel, weakly cemented	8.08 m: S, PL, Rn, clayey SAND
				13	21.30		8.36 m: S, PL, Rn, clayey SAND
				14	20.30		9.00-9.75 m CORE LOSS: 9.0 - 9.75 m
				15	19.30		
				16	18.30		
				17	17.30		
				18	16.30		
				19	15.30		
				20	14.30		
				21	13.30		
				22	12.30		
				23	11.30		
				24	10.30		
				25	9.30		
				26	8.30		
				27	7.30		
				28	6.30		
				29	5.30		
				30	4.30		
				31	3.30		
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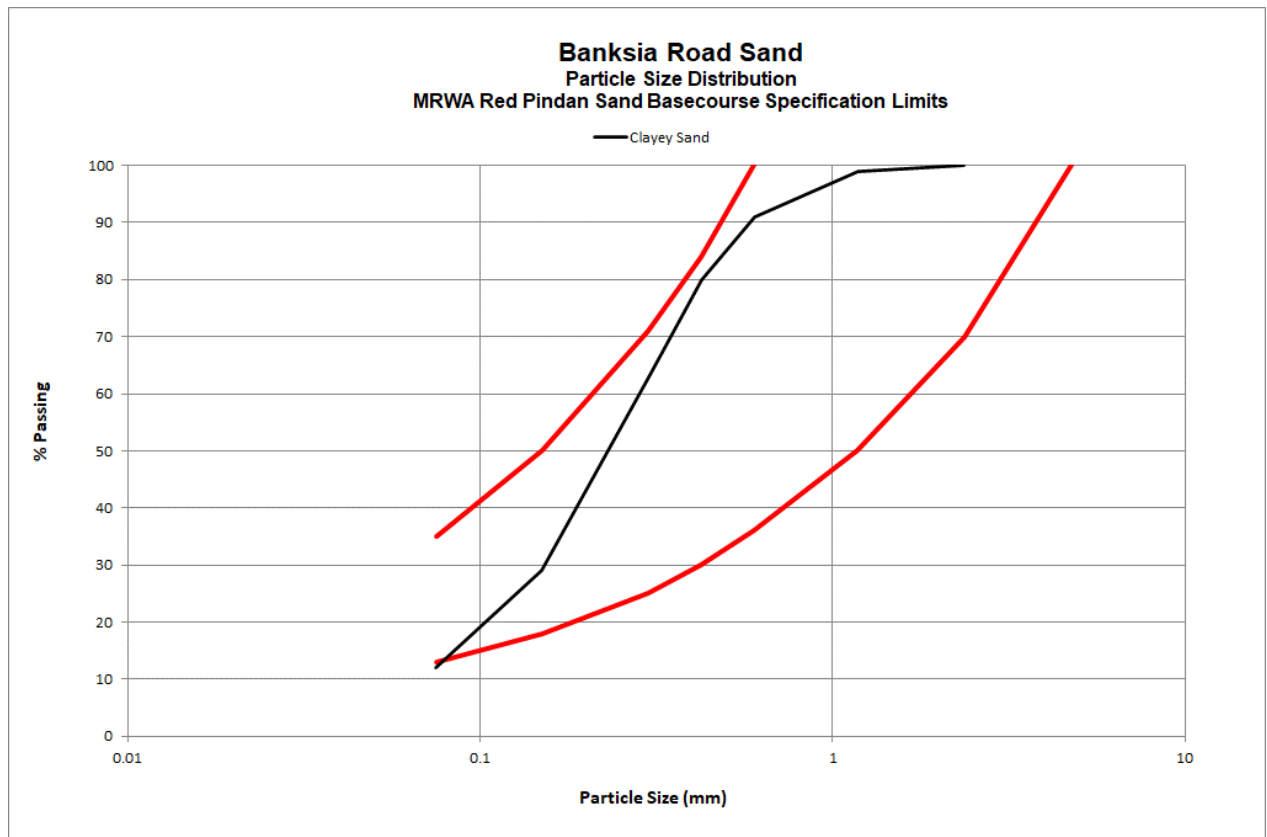
APPENDIX D | Materials Evaluation Technical Note

Material	Intended Use	Suitability (technical comment from Geotechnical Engineers at WML)
Gravel spalls	On landfill face as an all-weather trafficable surface	Gravel spalls 50mm to 100mm in diameter may be used as sheeting material over sand, that once compacted and crushed will provide an all-weather trafficable surface.
	Off landfill face as an all-weather trafficable surface	
	Larger rocks to be used in stormwater drains for erosion control and mitigation	These gravel spalls, particularly larger rocks are suitable to mitigate water flow, providing erosion control in stormwater drains.
Sand	On landfill face as an all-weather trafficable surface (ideal for trafficable capping as a result of its permeability)	<p>The sand is classified as a poorly graded sand that falls mainly within the grading envelope of MRWA Specification for the Pindan Sand used as pavement material in the Gascoyne and Pilbara Regions. The material was found to be non-plastic.</p> <p>The calculated permeability of the sand based on soil grading is approximately 3.4m/day indicated a permeable free draining material. Typically, sands are classified as free draining when the permeability falls in the range of 3-5m/day.</p> <p>Overall, the results indicate that the sand is suitable for use as a temporary permeable capping layer that can be trafficked.</p>

During the 1960s and 1970s MRWA constructed hundred of kilometres of low cost rural highways in the Gascoyne and Pilbara Regions using locally occurring road building materials such as Pindan Sand, a fine well graded sand with just sufficient binder to provide a compacted surface suitable for the application of bituminous surfacing.

The performance of these roads exceeded all expectations and are still in use today despite carrying volumes of heavy vehicles greater than the design traffic estimated at construction.

The sand from the landfill site has similar properties to the Pindan sand except it lacks fine particles less than 0.15mm sieve, see graph below, However once compacted it will still provide a suitable trafficable surface for light vehicles and the truck traffic using the landfill site.



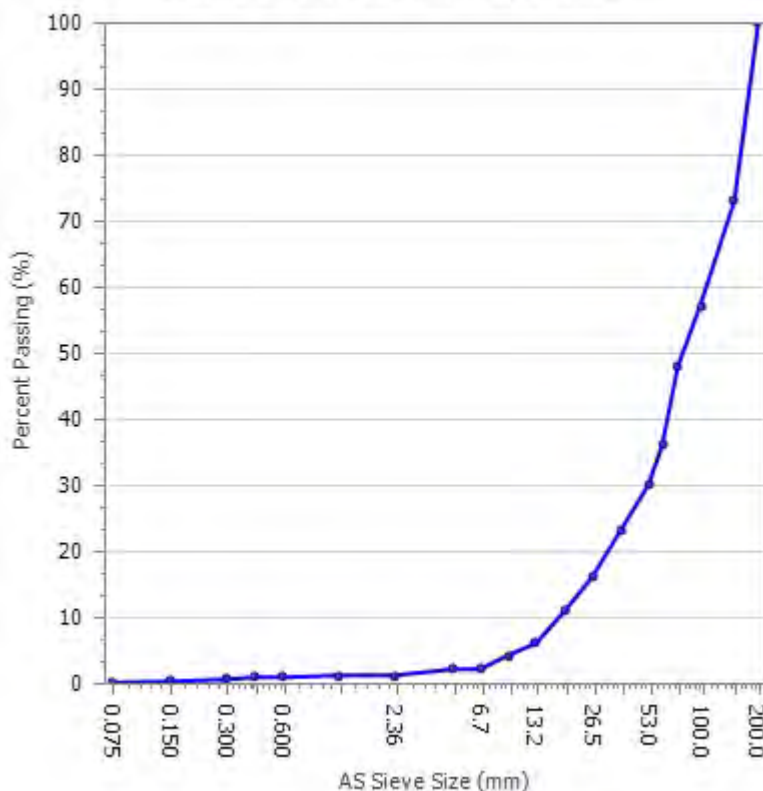
PARTICLE SIZE DISTRIBUTION REPORT

Client:	WML Consultants	Report Number:	5022/R/54176-1
Client Address:	1st Floor 62 Wittenoom Street, Bunbury	Project Number:	5022/P/1661
Project:	Harley Dykstra	Lot Number:	Bag 1 - cobble sample
Location:	South West WA	Internal Test Request:	5022/T/16096
Supplied To:	n/a	Client Reference/s:	Job No.10142
Area Description:		Report Date / Page:	14/04/2022 Page 1 of 1

Test Procedures:	WA210.1, WA105.1	Sample Location	
Sample Number	5022/S/87341	Test Request	
Sampling Method	Tested As Received	Area	
Date Sampled	15/03/2022	Location	
Sampled By	Client	Sample No.	
Date Tested	13/04/2022	Material Type	Rock
Material Source	Client		

AS Sieve (mm)	Specification Minimum (%)	Percent Passing (%)	Specification Maximum (%)
200.0		100	
150.0		73	
100.0		57	
75.0		48	
63.0		36	
53.0		30	
37.5		23	
26.5		16	
19.0		11	
13.2		6	
9.5		4	
6.7		2	
4.75		2	
2.36		1	
1.18		1.0	
0.600		0.9	
0.425		0.8	
0.300		0.6	
0.150		0.3	
0.075		0.1	
Percent Retained 37.5mm		77	

PARTICLE SIZE DISTRIBUTION GRAPH



Remarks	Results apply to the sample/s as received.,
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g zsh

Verified By: Janine Fischer

Form ID: W9Rep Rev 2

APPENDIX E | Acoustic Assessment

05/08/2022

Attachment 2



CLEANAWAY

DARDANUP WASTE FACILITY
LOT 2 BANKSIA ROAD, CROOKED BROOK
EXTRACTIVE INDUSTRY

ENVIRONMENTAL ACOUSTIC ASSESSMENT

MARCH 2022

OUR REFERENCE: 29293-2-20054-04



DOCUMENT CONTROL PAGE

**ENVIRONMENTAL ACOUSTIC ASSESSMENT
CLEANAWAY FACILITY; DARDANUP**

Job No: 20054-04

Document Reference: 29293-2-20054-04

FOR

CLEANAWAY

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Date of Issue:	29 March 2022			
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6.	RESULTS	7
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8.	CONCLUSION	8

APPENDICIES

A	Site Layout/ Reference Locations
C	Noise Contours – Proposed

1. INTRODUCTION

Herring Storer Acoustics was commissioned by Cleanaway to undertake a noise assessment relating to noise emissions from extractive industry at the Dardanup Waste Disposal Facility, located at Lot 2 Banksia Road, Crooked Brook.

The purpose of this assessment was to assess noise emissions for the extractive industry current for compliance with requirements of the *Environmental Protection (Noise) Regulations 1997*. Therefore, this assessment concentrates on compliance with the requirements of the Regulations at noise sensitive premises (residences) in the vicinity of the Facility.

The proposed daily operations onsite are outlined on in Figure 1.1, Excavation Works Plan and include the following:

- A loader for the purpose of loading each trailer truck.
- A bulldozer for gravel extraction and rehabilitation of each stage.
- An excavator for the stockpiling of vegetation, top soil, sand, rock, and arising clay and gravel onsite; and
- A 15kl watercart for dust suppression.

The duration of works onsite are anticipated to occur over a five year period in accordance with the time limited approval provided by the Shire of Dardanup for an Extractive Industry as per the Shire's Extractive Industry Local Law (1999). If further extraction of material is required, an extractive industry approval granted will be appropriately renewed in accordance with Part 12 of the Shire of Dardanup's Extractive Industry Local Law (1999).

For information, a locality plan is shown in Appendix A, with Figure 1.1 detailing the location of the site.

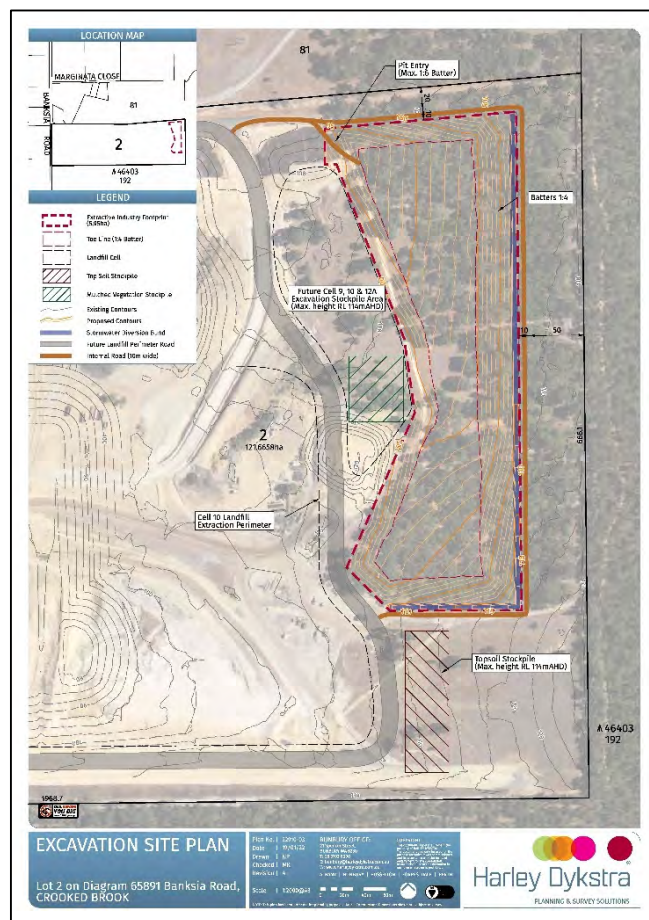


FIGURE 1.1 – SITE LOCATION

2. SUMMARY

Assessment has been conducted on the noise emissions from the Cleanaway proposed extraction industry, located on the eastern boundary of the facility.

The extraction operations are between 06:00 and 18:00 weekdays.

Noise modelling and assessment of the noise emissions from the various operating conditions has been undertaken. The result of the assessment shows that noise emissions from the facility will comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times.

Additionally, as the noise emissions of the extractive industry are up to 12 dB below the assigned noise level, noise would be considered as not significantly contributing to any other noise from the waste facility operations.

3. CRITERIA

The allowable noise level for noise sensitive premises in the vicinity of the proposed Facility site is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 and 8 stipulate maximum allowable external noise levels or assigned noise levels that can be received at a premise from another premises. For “highly sensitive area” of a residential premises, this noise level is determined by the calculation of an influencing factor, which is then added to the base levels shown below. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern. For noise received at noise sensitive premises, “other than highly sensitive area” the assigned noise levels are fixed at all times. The base noise levels for residential premises are listed in Table 3.1.

TABLE 3.1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35 + IF	45 + IF	55 + IF
Noise sensitive premises: other than highly sensitive area	At all times	60	75	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

The “Highly sensitive area” of a noise sensitive premises means:

that area (if any) of noise sensitive premises comprising —

- a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
- any other part of the premises within 15m of that building or that part of the building.

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

“impulsiveness” means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax\ Slow}$ is more than 15 dB when determined for a single representative event;

“modulation” means a variation in the emission of noise that –

- (a) is more than 3dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;
- (b) is present for more at least 10% of the representative assessment period; and
- (c) is regular, cyclic and audible;

“tonality” means the presence in the noise emission of tonal characteristics where the difference between –

- (a) the A-weighted sound pressure level in any one-third octave band; and
- (b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 3.2 below.

TABLE 3.2 - ADJUSTMENTS TO MEASURED LEVELS

Where tonality is present	Where modulation is present	Where impulsiveness is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

The closest neighboring noise sensitive premises are located at more than 450 metres from any commercial or industrial premises. Thus, the Influencing Factor at these residences would be 0 dB. The assigned noise levels would be as for the base assigned noise levels listed in Table 3.1. For clarity, these are shown on Table 3.3, with Figure 3.1 showing the receiver location plan.

TABLE 3.3 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises	0700 - 1900 hours Monday to Saturday (Day)	45	55	65
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day Period)	40	50	65
	1900 - 2200 hours all days (Evening)	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35	45	55
Noise sensitive premises: other than highly sensitive area	At all times	60	75	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
 L_{A1} is the noise level exceeded for 1% of the time.
 L_{Amax} is the maximum noise level.

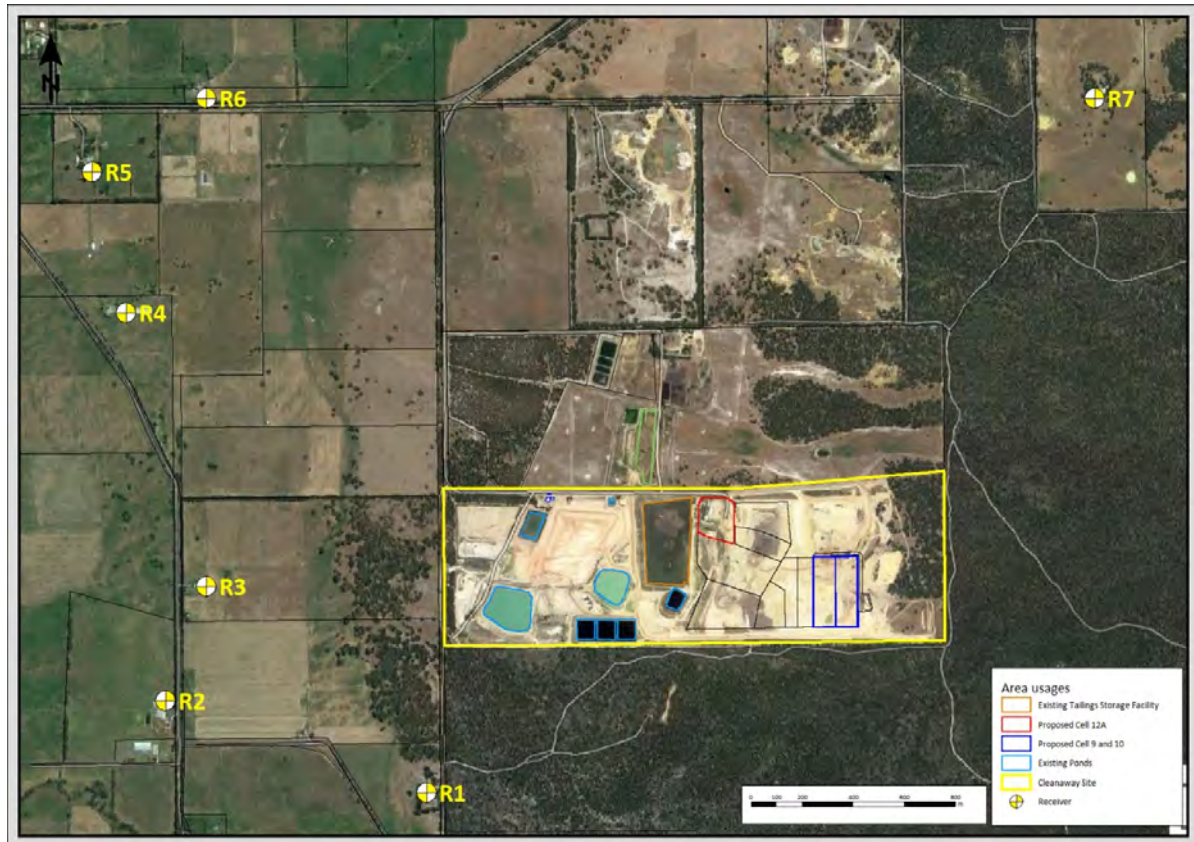


FIGURE 3.1 – RECEIVER LOCATIONS

Additional to the above, it is noted that under the Regulations, where noise received at a premises from a number of different industries, then either the combined noise from all industry needs to comply with the assigned noise levels; or where the combined noise level would lead to an exceedance, then to be deemed compliant with the Regulations, the noise received from those industries contributing to the exceedance need to be considered as NOT “Significantly Contributing” to the noise received at a premises. Under the regulation, to be NOT “Significantly Contributing”, the noise received at a premises from that industry needs to be at least 5 dB(A) below the assigned noise.

For information, under the Regulations, “Significantly Contributing” means:

For the purposes of sub-regulation (1)(a), a noise emission is taken to **significantly contribute** to a level of noise if the noise emission as determined under sub-regulation (3) exceeds a value which is 5 dB below the assigned level at the point of reception.

For this development to be considered NOT “Significantly Contributing” to the noise received at the closest neighbouring noise sensitive premises, need to comply with an L_{A10} noise level of 30 dB(A).

Having stated the above, it is noted that at the closest neighbouring premises is located to the south west. At this premises, given the layout of the Industrial Area, the Cleanaway site is the southern most site and given the distances to other potential operations, noise received at this residence would be such that they would not contribute to the noise received. Hence, the “significantly contributing” provisions of the Regulations would not apply at this residence to the south west and the assigned noise levels as stated in Table 3.3 would be the appropriate criteria for compliance.

4. FACILITY

Extractive working hours are limited to 6.00 to 18.00 on Monday to Friday. There is no extraction on Sunday or Public holidays.

Noise monitoring of the current facility (March 2020) resulted in compliance with the regulatory criteria at all neighbouring residential premises, including the most critical at 268 Banksia Road.

5. MODELLING

5.1 MODELLING SCENARIO

The anticipated stages of extraction for materials are to occur in the following manner:

Preparatory Site Works:

Prior to the development of the site for the extraction of materials, preparatory works onsite are to include the following:

- Construction of an appropriate haul road and to the extraction site; and,
- The marking of the extraction footprint by a licensed surveyor including the location of all stockpiles and vegetation retention buffers.

Extraction Stage 1: Clearing Vegetation

Clearing of vegetation is to occur using the Bulldozer and Excavator as required to remove vegetation contained within the extraction footprint. This process is subject to obtaining a clearing permit from DWER.

Extraction Stage 2: Remove and Stockpiling of Topsoil

Following clearing, the top 300mm of topsoil from the extraction footprint is to be removed and stockpiled in the location shown on the Excavation Works Plan. Stockpiles are to be constructed with a batter of 1:6 to ensure minimal erosion of the stockpile during winter periods. Stockpiles materials are to complement the landfill operations at Lot 2.

Materials Extraction Stage 3: Extraction of Materials

Following the removal of topsoil, materials extraction is to begin via a front end loader and stockpiled in the corresponding stockpile location indicated on the Excavation Plan for ease of loading trucks by the loader. As required, the bulldozer onsite will move extracted materials from the edge of the extraction boundary to the centre of the stage, maintaining a 1:6 batter along the extractive licence boundary extent. Materials are to either be stockpiled onsite as indicated on the Extraction Footprint Plan, or immediately used to improve the surfaces of roads and landfill cells within the site.

Based on the above, an operating scenario has been developed where a loader, dozer, excavator and water cart are located in each stage (1-4) at natural ground level. Whilst early stages of the development would likely be considered construction, this operating condition noise level of all equipment at the same time allows for the worst case noise levels at the commencement of each stage of the extraction process.

5.2 MODELLING INPUTS

To determine the noise that would be received at the surrounding premises from the facility, modelling of noise emission propagation was carried out using “SoundPlan”.

From information received from Cleanaway, the items of plant and mobile equipment used at the extraction site are listed in Table 5.1. These items form the basis on noise sources within the predictive modelling scenario for the proposed operations.

The calculations used the following input data:

- a) Ground contours (current site topography).
- b) Sound power levels used in the model were based on either data measured on site, or file data from measurement of the same model of equipment being used. The sound power data is summarised in Table 6.3.
- c) DWER worst case day weather conditions, as shown in Table 6.5.
- d) Source locations as per Figure 5.1.

TABLE 5.1 – SOUND POWER LEVELS

Item of Plant / Equipment	Sound Power Level (dB(A))
Water Cart	97
Excavators 30t (PC300 or equivalent)	97
Dozer (CAT D8 or equivalent)	105
Loader (CAT 962 or equivalent)	105

Weather conditions for the modelling were undertaken using the “Default Conditions for Noise Modelling” as stipulated within the Environmental Protection Authority’s “*Draft Guidance for Environmental Noise for Prescribed Premises*” as listed in Table 6.5.

TABLE 6.5 – WEATHER CONDITIONS

Condition	Day
Temperature	20°C
Relative humidity	50%
Pasquil Stability Class	E
Wind speed	4 m/s*

* From sources, towards receivers.

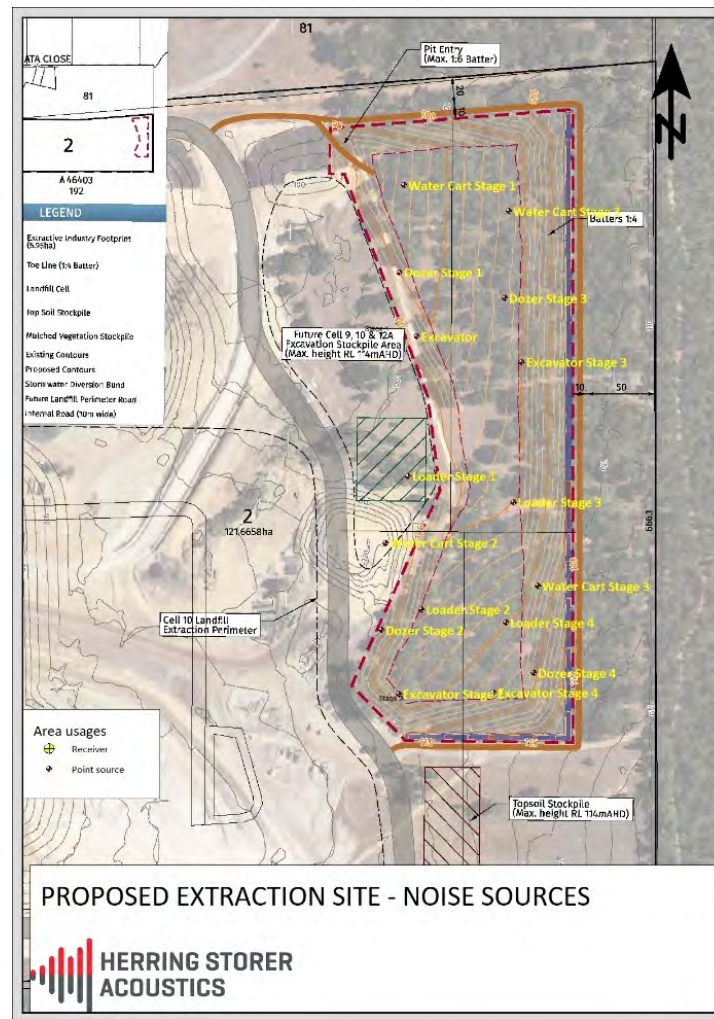


FIGURE 5.1 – NOISE SOURCE LOCATION

6. RESULTS

The results of the noise modelling are attached in Appendix C.

Additionally, for information, the resultant noise level at the worst case receiver for the above scenario is listed in Table 6.1.

TABLE 6.1 – SUMMARY OF RESULTS WORST CASE RECIEVERS

Extraction Operations	R1	R2	R3	R4	R5	R6
Stage 1	26	21	23	22	20	22
Stage 2	28	23	24	21	19	21
Stage 3	27	22	24	21	20	21
Stage 4	28	22	24	21	19	21

7. ANALYSIS / ASSESSMENT

Based on calculated noise levels at the nearest premises, noise levels could be considered as being tonal in characteristics. Therefore, a +5 dB(A) penalty has been included to allow for a tonal component.

Hence, Table 7.1 summarises the applicable Assigned Noise Levels, and assessable noise level emissions, for the scenario considered.

TABLE 7.1 – ASSESSABLE NOISE LEVEL WITH TONAL PENALTY APPLIED

Scenario	R1	R2	R3	R4	R5	R6
Stage 1	31	26	28	27	25	27
Stage 2	33	28	29	26	24	26
Stage 3	32	27	29	26	25	26
Stage 4	33	27	29	26	24	26

Based on the assessable noise level above, comparison against the relevant assigned noise level is contained in Table 7.2.

TABLE 7.2 – ASSESSMENT OF NOISE LEVELS

Scenario	R1	R2	R3	R4	R5	R6	Assigned L _{A10} Level (dB)	Compliance
Stage 1	31	26	28	27	25	27	35	Complies
Stage 2	33	28	29	26	24	26	35	Complies
Stage 3	32	27	29	26	25	26	35	Complies
Stage 4	33	27	29	26	24	26	35	Complies

8. CONCLUSION

Assessment has been conducted on the noise emissions from the Cleanaway proposed extraction industry, located on the eastern boundary of the facility.

The extraction operations are between 06:00 and 18:00 weekdays.

Noise modelling and assessment of the noise emissions from the various operating conditions has been undertaken. The result of the assessment shows that noise emissions from the facility will comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times.

Additionally, as the noise emissions of the extractive industry are up to 12 dB below the assigned noise level, noise would be considered as not significantly contributing to any other noise from the waste facility operations.

APPENDIX A

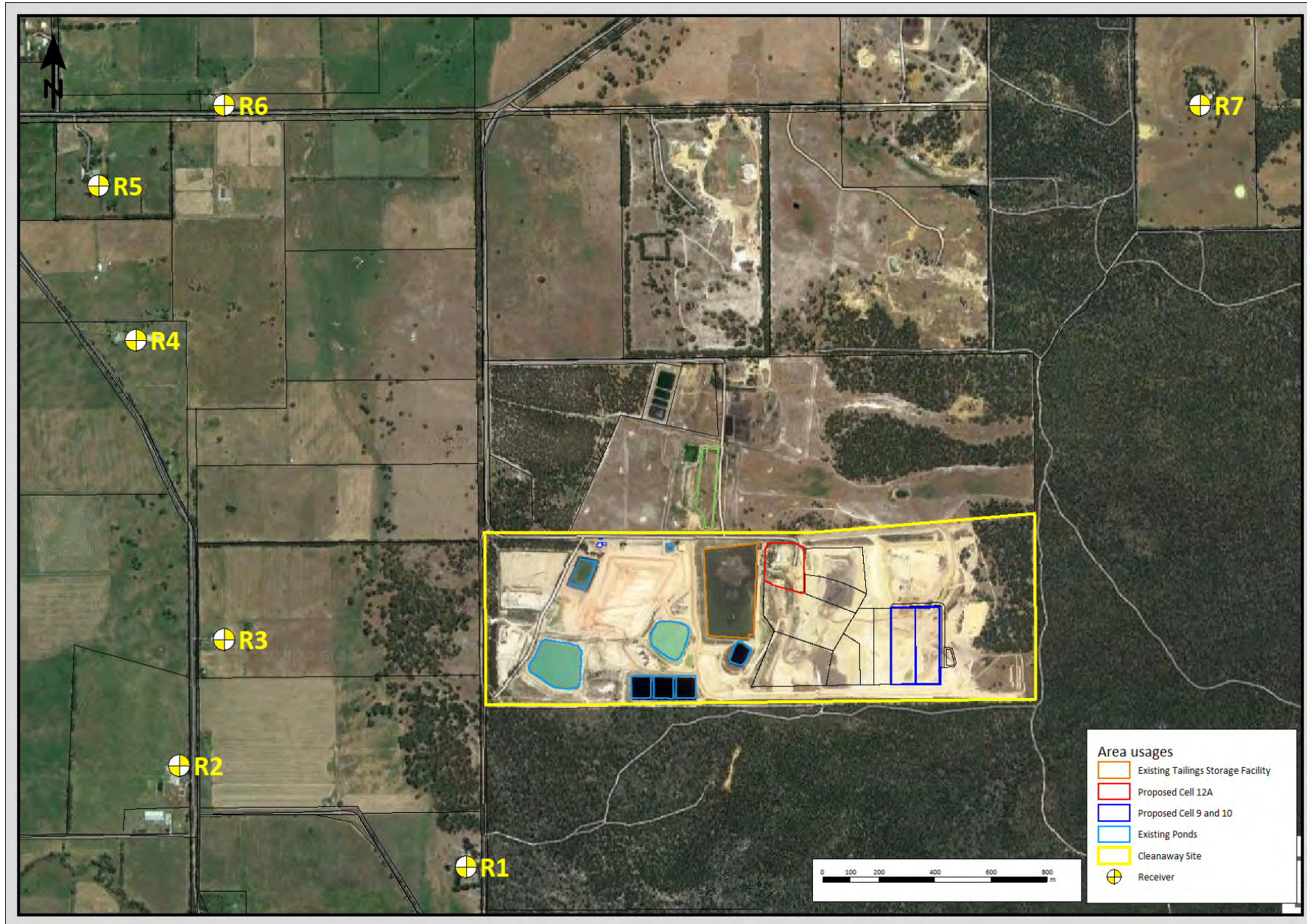
LOCATION MAPS / REFERENCE LOCATIONS

05/08/2022

Attachment 2

Herring Storer Acoustics
Our Ref: 29293-2-20054-04

Appendix A



05/08/2022

Heffing Storer Acoustics

Our Ref: 29293-2-20054-04

Attachment 2

Appendix B

APPENDIX B

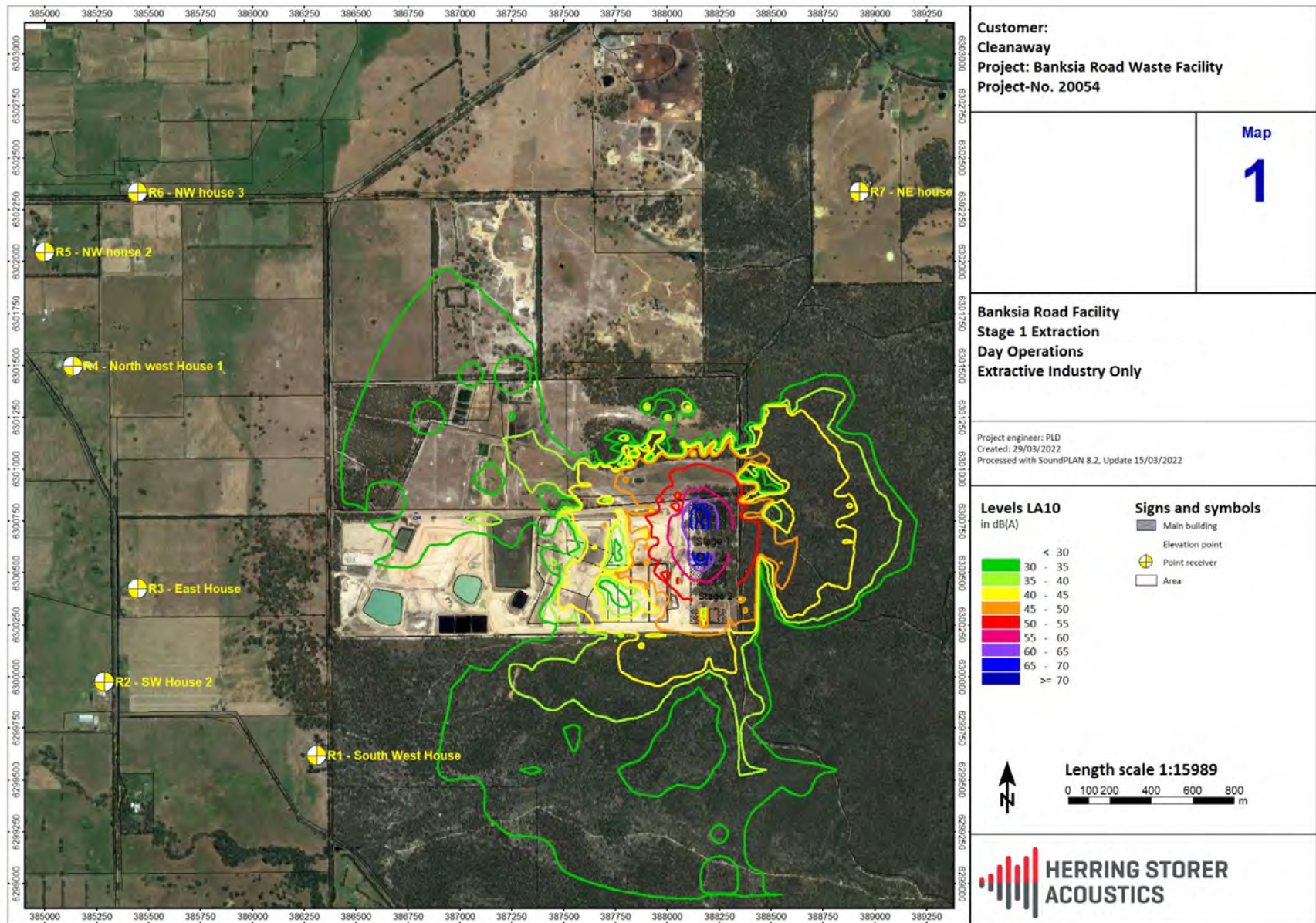
NOISE CONTOUR PLOT

05/08/2022

Attachment 2

Herring Storer Acoustics
Our Ref: 29293-2-20054-04

Appendix B

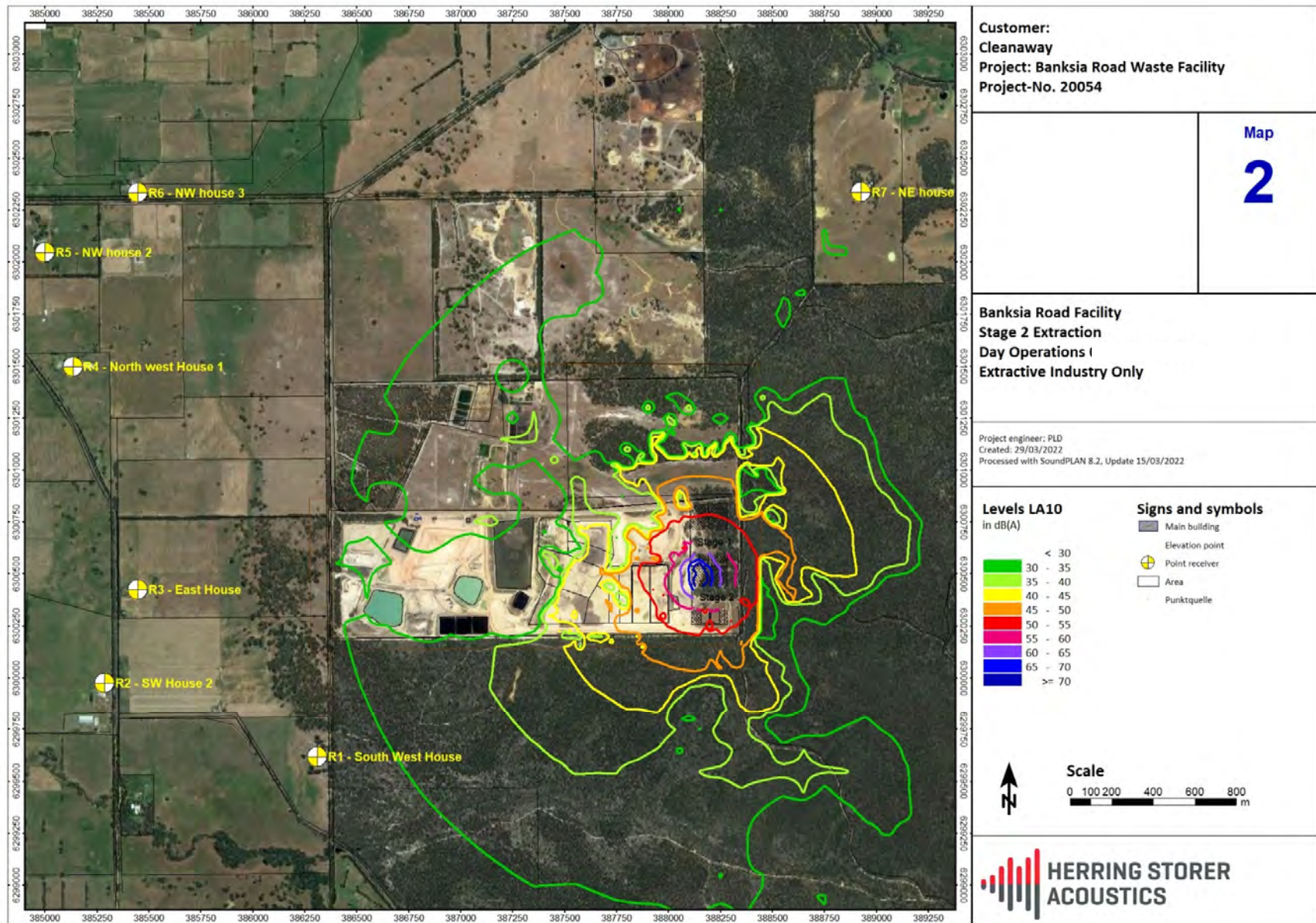


05/08/2022

Attachment 2

Herring Storer Acoustics
Our Ref: 29293-2-20054-04

Appendix B

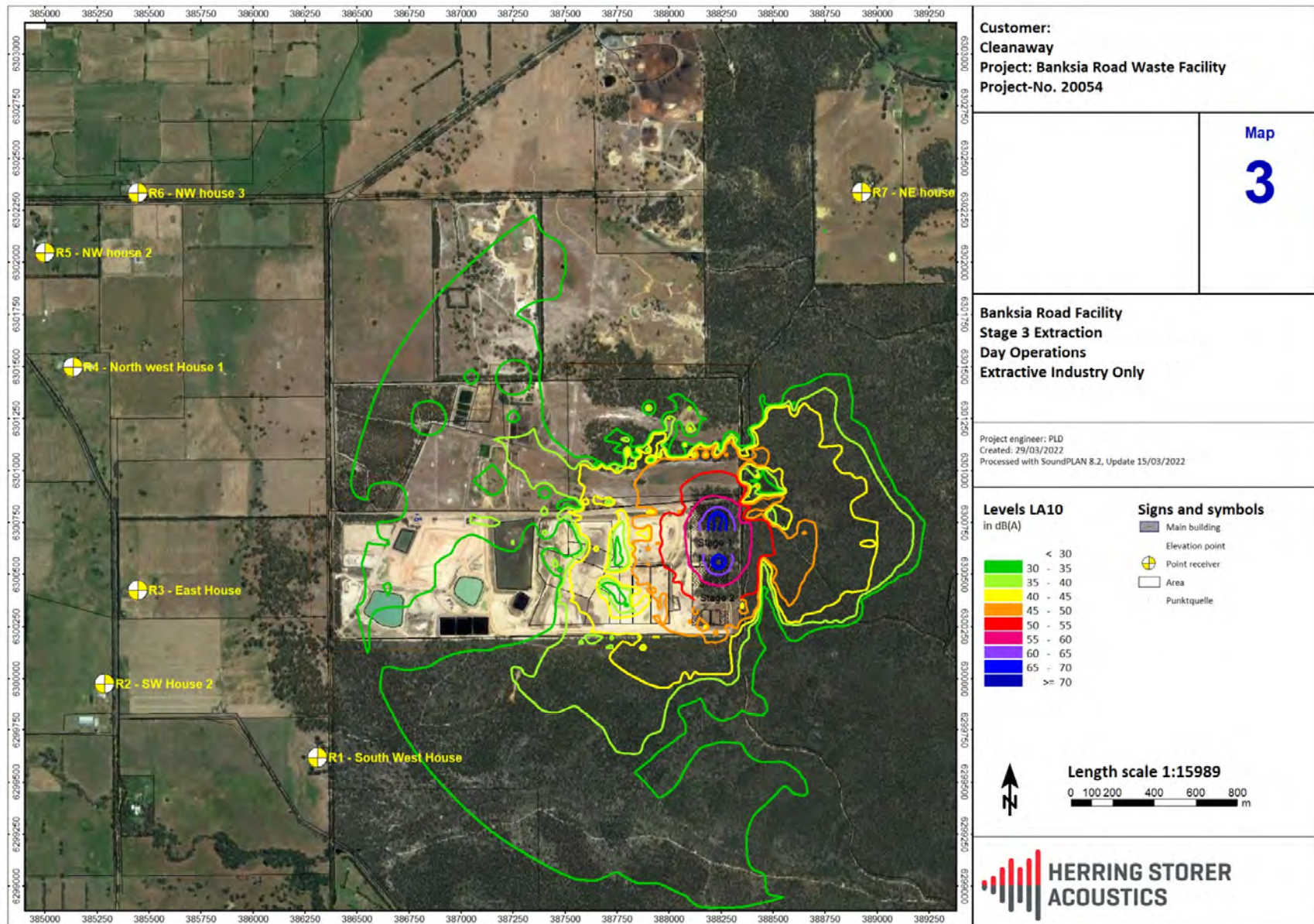


05/08/2022

Attachment 2

Herring Storer Acoustics
Our Ref: 29293-2-20054-04

Appendix B



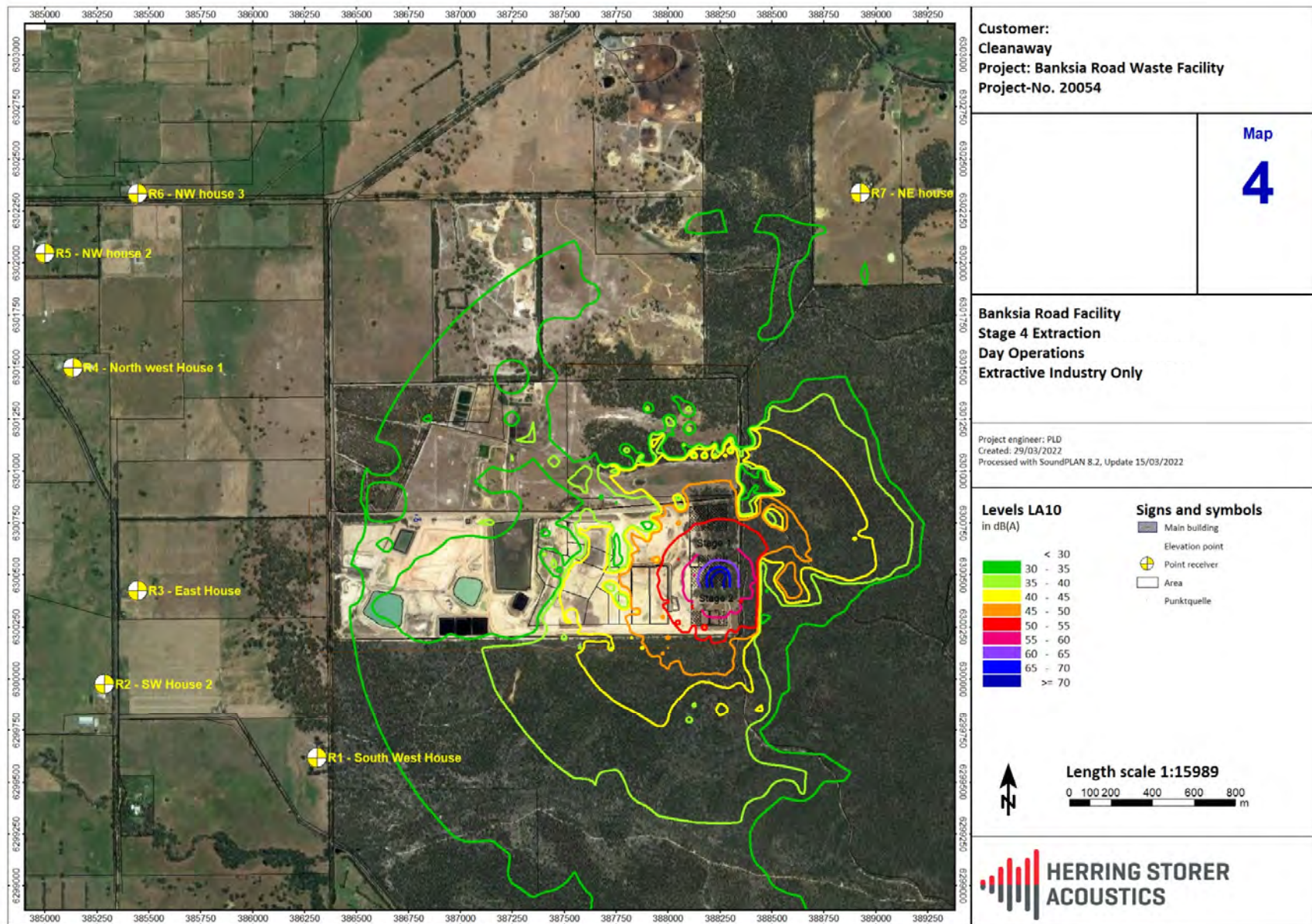
G:\2020\20054 Cleanaway - Dardanup Licence Increase\Banksia Road Precinct Model\Cleanaway Extractive Stage 3 Dec2021.sgs

05/08/2022

Attachment 2

Herring Storer Acoustics
Our Ref: 29293-2-20054-04

Appendix B



APPENDIX F | Dust Management Technical Note

61783 Banksia Road DMP tech note EIL Rev0

Company: Harley Dykstra

Date: 30 May 2022

Job/Doc. No.: 61783/145,599

Enquiries: Jonathan Bailes

Extractive Industry Licence – Lot 2 Banksia Road, Crooked Brook – Dust Management Information and Measures Technical Note

1. Background

Cleanaway Solid Waste Pty Ltd (Cleanaway) operates the Banksia Road Waste Landfill (the site) located at Lot 2 on Plan 65861, Banksia Road, Crooked Brook in the Shire of Dardanup, approximately 10 km southeast of the City of Bunbury and 3.8 km southeast of the town of Dardanup.

The use of the site as a waste disposal facility has been determined by the Shire of Dardanup (the Shire) to constitute 'dust-generating development'. Therefore, a dust management plan (DMP) has been prepared to meet obligations under the Shire's Dust Control Local Law 2011 (the Local Law). The current DMP (version 5) was approved at the Shire Council meeting on 23 March 2022.

Cleanaway intends to undertake sand and gravel extraction over the eastern footprint of the site, pending the approval of an Extractive Industry Licence application by the Shire. The activity involves clearing vegetation and excavating material for reuse in advance of the construction of new landfill cells.

This *Dust Management Information and Measures Technical Note* has been prepared to support the EIL application and demonstrate that the existing DMP and any additional necessary controls are sufficient to ensure that the proposed activity will not result in non-compliant dust emissions.

2. Dust Management Plan

The objective of the DMP is to provide a framework for the management and mitigation of dust from the activities and operations conducted at the site to minimise the risk of dust emissions crossing the site boundary. The DMP consists of the following:

- Introduction outlining site background, context, and purpose of the DMP;
- A description of the existing environmental setting, regulatory obligations, site characteristics, and significant environmental aspects to be managed; and
- Details of the proposed dust management measures.

The purpose of the plan is to prevent dust-related impacts, including amenity impacts, on workers, surrounding residences and the environment from activities associated with the site's operation.

The DMP was prepared following the Department of Environment and Conservation (DEC) document, *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*, which applies to the proposed EIL and current dust management, bulk handling, stockpiling, and waste disposal activities conducted at the site.

As part of the DMP, a dust risk assessment/classification was conducted by Strategen-JBS&G using the framework provided in the DEC guideline to determine the level of dust management and monitoring required for the site.

Based on the assessed site classification score, the site is considered Classification 3 (medium risk) for potential dust impacts. The dust management and monitoring requirements in the DMP are consistent with those recommended for Classification 3 sites in the DEC guideline.

The dust risk assessment was reviewed to include the proposed EIL activities, and the site classification score did not change. Therefore, the controls in the current DMP are considered appropriate.

3. Dust Control Measures

The DMP contains general dust control measures for the following aspects, which are considered relevant to the proposed EIL activity:

- General management;
- Management of trafficable areas;
- Operation of vehicles;
- Administrative controls; and
- Incident and complaints management.

In addition to the general control measures specified in the DMP, the following specific measures will apply to the proposed EIL activity:

- Topsoil mounds will be restricted to a height no greater than 4 m;
- Stockpiles, where possible, will be limited to the anticipated cubic volume/vehicle movement for cartage on the following operating day;
- Stockpiles will be configured to accommodate easy access for watering/dust minimisation if required;
- Stockpiles of topsoil will be subject to suitable stabilisation techniques based on environmental conditions, e.g., watering or seeded mulching;
- Operations will take place when wind conditions determine it to be suitable as far as reasonably practicable;
- Visual monitoring of dust will be undertaken daily by all personnel, if dust emissions are observed, dust suppression techniques will be implemented immediately, and all operations will cease until the situation is under control; and
- As sections of the staged extraction progress, the area will be rehabilitated as soon as practical to minimise areas that are high risk for dust dispersal.

4. Summary

Assuming that the requirements and controls specified in the DMP and this technical note are applied, the risk of fugitive dust from the proposed EIL activity impacting off-site receptors is expected to be low.

APPENDIX G | Approved Dust Management Plan

05/08/2022

Attachment 2

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Document control

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Document Status

Rev No.	Author	Reviewer	Approved for Issue			Version
		Name	Name	Signature	Date	
A	C.Ingram	J.Bailes	J.Bailes	JMB	14/01/2020	Draft document issued for Cleanaway review.
0	C.Ingram	J.Bailes	J.Bailes	JMB	16/01/2020	Final draft document issued for Cleanaway and Shire of Dardanup review.
1	C.Ingram	J.Bailes	J.Bailes	JMB	21/02/2020	Document updated to consider Shire of Dardanup comments; final version issued for public advertisement, external peer review and Department of Water and Environmental Regulation (DWER) review.
2	C.Ingram	J.Bailes	J.Bailes	JMB	07/08/2020	Document updated to consider peer review and DWER review comments; revised version issued for Shire of Dardanup review.
3	J.Bailes	C.Ingram / P.Forster	J.Bailes	JMB	11/09/2020	Document updated to consider Shire of Dardanup review comments; revised version issued for public advertisement and Shire of Dardanup Council review.
4	C.Ingram	J.Bailes	J.Bailes	JMB	10/03/2021	Document updated to include construction activities and revised monitoring parameter and trigger levels.
5	J.Bailes	J.Bailes	J.Bailes		10/03/2021	Document updated to include Shire of Dardanup CEO comments.

Definitions and abbreviations

Term	Definition
Ambient air	The external air environment, it does not include the air environment inside buildings or structures.
DMP	Dust management plan.
Dust	The generic term used to describe solid airborne particles generated and dispersed into the air by processes such as handling, crushing and grinding of organic or inorganic materials such as rock, ore, metal, coal, wood or grain and stockpiling of materials and windblown dust.
Dust event	The occurrence of visible fugitive dust from a source or activity at the site that exits a boundary of the site for a duration of greater than one (1) minute.
Dust generating development	Means development referred to in clause 3.1 of the Shire of Dardanup's 2011 Dust Control Local Law.
Dust Risk Areas	The areas highlighted as having moderate to high risk of dust generating potential as shown on Figure 4
DWER	Department of Water and Environmental Regulation.
EPA	Environmental Protection Authority.
EP Act	<i>Environmental Protection Act 1986</i> .
Fugitive dust	Dust which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent openings.
NEPM	National Environmental Protection (Ambient Air Quality) Measure 2015.
PM ₁₀	Dust particles/particulate matter with an equivalent aerodynamic diameter of up to 10 micrometres.
PM _{2.5}	Dust particles/particulate matter with an equivalent aerodynamic diameter of up to 2.5 micrometres.
QA/QC	Quality assurance/quality control
Sensitive receptor	Individuals/communities/components of the environment which could be adversely affected by dust emissions, such as people in dwellings, schools, hospitals, nursing homes, childcare facilities, offices, public recreation areas that exist now and in the future and protected wetlands. Some individuals may be more susceptible to adverse air quality, such as, children, the elderly and people with pre-existing medical conditions such as asthma or heart disease.
Total suspended particles (TSP)	All particles entrained/suspended in the atmosphere and includes the fine, respirable particles (PM ₁₀ and PM _{2.5}) and larger size particles that may settle out of the air causing nuisance impacts, usually measured as those particles having an equivalent aerodynamic diameter of 50 micrometres or less.
Trigger level	The 'corrective action' trigger level is the ambient boundary air dust level which if exceeded will result in corrective action being taken to reduce dust emissions until the dust levels fall below the trigger level. The 'stop work' trigger level is the ambient boundary dust level which will result in site activities ceasing until the dust levels fall below the trigger level.

1. Introduction

Cleanaway Solid Waste Pty Ltd (Cleanaway) operates the Banksia Road Waste Landfill (the site) located at Lot 2 on Plan 65861, Banksia Road, Crooked Brook in the Shire of Dardanup approximately 10 km southeast of the City of Bunbury and 3.8 km southeast of the town of Dardanup (Figure 1).

The use of the land as a waste disposal facility has been determined by the Shire of Dardanup (the Shire) to constitute 'dust generating development'. Therefore, this dust management plan (DMP) has been prepared to meet obligations under the Shire's Dust Control Local Law 2011.

1.1 Objective

The objective of this DMP is to provide a framework for the management and mitigation of dust from the activities and operations conducted at the site to minimise the risk of dust emissions crossing the site boundary.

The DMP consists of the following:

- introduction outlining site background, context and purpose of the DMP
- a description of the existing environmental setting, regulatory obligations, site characteristics and significant environmental aspects to be managed
- details of the proposed dust management measures.

The purpose of this plan is to prevent dust-related impacts, including amenity impacts, on workers, surrounding residences and the environment from activities associated with the operation of the site.

1.2 Site background

The site is a putrescible landfill and liquid waste facility operated under *Environmental Protection Act 1986* (EP Act) Licence L8904/2015/1 (the licence) granted by the Department of Water and Environmental Regulation (DWER). The site accepts general (household and commercial) waste and tailings¹.

1.3 Stakeholder consultation

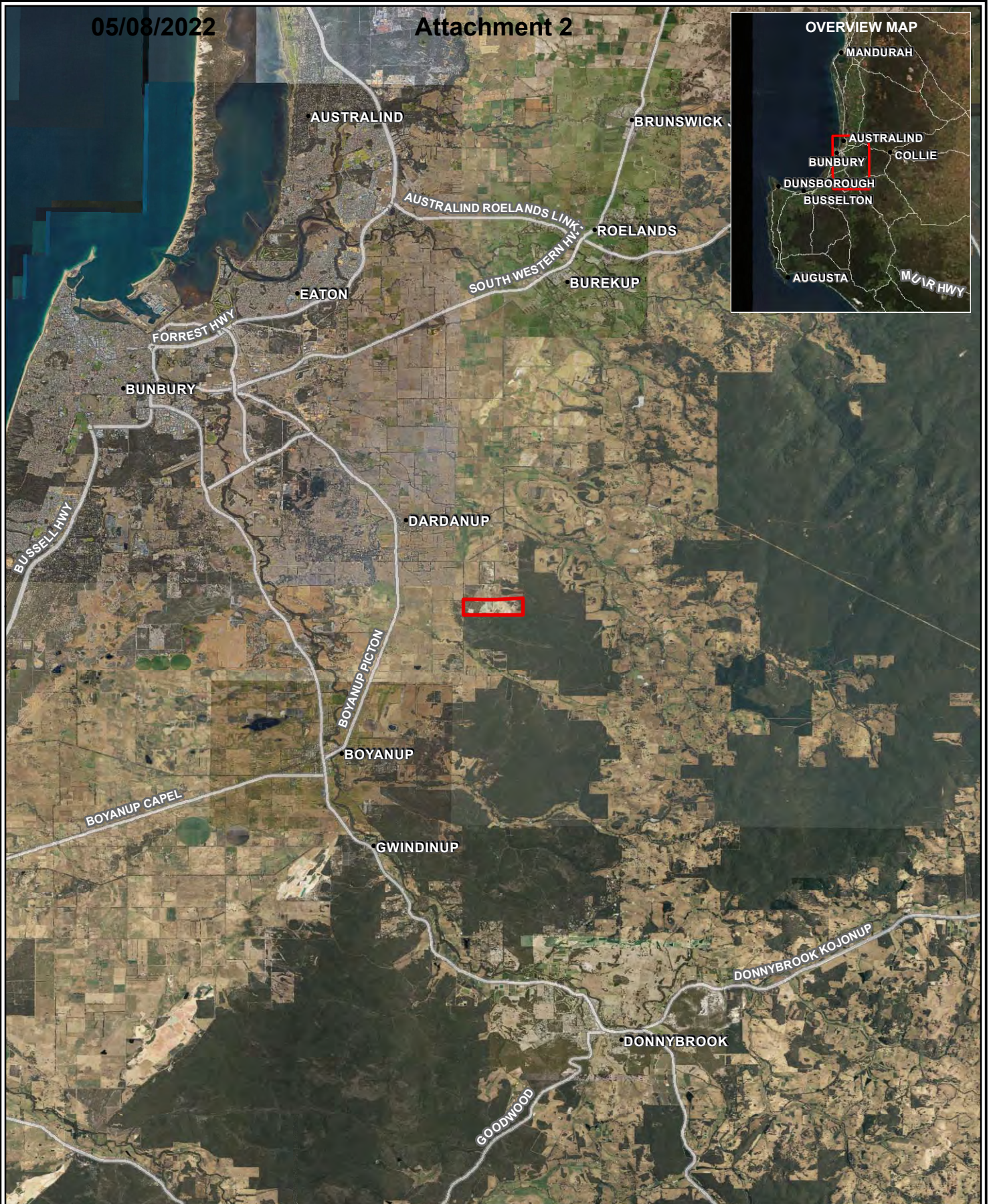
This DMP has been developed in consultation with relevant stakeholders, including the Shire of Dardanup and DWER; and has also been advertised to the public and subject to third-party peer review (refer to Document Control page).

The DMP will continue to be updated in consultation with relevant stakeholders where appropriate in accordance with the document review schedule described in Section 10.

¹ Cleanaway is currently authorised to accept and store tailings from mineral sands processing within defined cells at the site.

05/08/2022

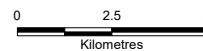
Attachment 2



Legend:

- Premises boundary
- Suburb boundary
- Roads (MRWA)

Scale 1:200,000 at A4



Coord. Sys. GCS GDA 1994



Job No: 58071

Client: Cleanaway

Version: A

Drawn By: hsullivan

Date: 31-Jul-2020

Checked By: JB

**Banksia Road Landfill
Crooked Brook, WA 6236**

SITE LOCATION

FIGURE 1



2. Environmental setting

The environmental setting and proximity of surrounding environmental features and nearby sensitive receptors to the site are shown in Figure 2.

2.1 Existing land use

The 121 ha site is zoned 'General Farming' under Shire of Dardanup Town Planning Scheme No. 3. The site is privately owned and leased by Cleanaway. The site has been operated by Cleanaway since the landfill was first granted approval in 1999.

A portion of the western part of the site not under the control of Cleanaway is currently used by a third-party for sand extraction (see Figure 3). DWER has confirmed that this activity is not a prescribed premises category specified in Schedule 1 of the *Environmental Protection Regulations 1987* and is not regulated by the department under the works approvals and licensing provisions of the *Environmental Protection Act 1986* (EP Act).

2.2 Surrounding land use

Land uses surrounding the site include rural properties, other waste management facilities and conservation areas. Surrounding land uses include:

- North: Dardanup Landfill Site (closed)
- East: State Forest (Regional Open Space)
- South: State Forest (Regional Open Space)
- West: Banksia Road and rural properties.

Other waste management facilities are located approximately 400 m north of the site and include the Bunbury Harvey Regional Council Banksia Road Organics Processing Facility, the Shire of Dardanup Waste Transfer Station and a Water Corporation wastewater treatment plant.

Table 2.1 below provides a summary of the potential human and environmental receptors that may be impacted as a result of dust-generating activities at the site.

Table 2.1: Sensitive human and environmental receptors

Human receptors	Distance from site
Closest residential receptors	<ul style="list-style-type: none"> • 0.5 km south of the southwest corner of the site boundary, separated by the Dardanup Conservation Park and Boyanup State Forest • 0.9 km due west of the site boundary • 1 km west southwest of the southwest corner of the site boundary • 1.5 km due south of the site boundary, separated by the Dardanup Conservation Park and Boyanup State Forest • 1.5 km northwest of the northwest corner of the site boundary • 1.5 km northeast of the northeast corner of the site boundary separated by the Dardanup Conservation Park and Boyanup State Forest • 1.75 km east northeast from the eastern boundary of the site boundary separated by the Dardanup Conservation Park and Boyanup State Forest.
Environmental receptors	Distance from site
Dardanup Conservation Park and Boyanup State Forest	Immediately adjacent south and east of the site boundary.
Threatened Ecological Communities	Four priority Threatened Ecological Communities are present within the adjacent Dardanup Conservation Park.
Geomorphic wetland: Multiple use Palusplain and Dampland (flat, seasonally waterlogged)	Approximately 400 m southwest through northwest of the site boundary.
Crooked Brook (including Registered Aboriginal Heritage Places)	Approximately 1,100 m south/southwest of the site boundary flowing in a generally east to west direction. A minor watercourse located approximately 750 m south of the site boundary flows into Crooked Brook.

2.3 Physical environment

2.3.1 Climate and meteorology

The Southwest of WA experiences a Mediterranean type climate with cool, wet winters and hot, dry summers, with the majority of the rain falling in the winter. The nearest Bureau of Meteorology (BoM) climate station, which records wind speed and direction is Bunbury (Site number:9965), located approximately 14 km to the northwest of the site.

The average maximum temperatures (1995-2018) for Bunbury range from 17.3°C in July to 30.0°C in February. The average minimum temperatures range from 7.1°C in July to 15.9°C in February.

The majority of rainfall is received between April and October. Rainfall averages 726.1 mm/year and mean monthly rainfall varies from 7.2 mm in February to 142.5 mm in July.

At the Bunbury BOM station, the average morning (9 am) wind speed reported during summer is 4.3 m/s, prevailing predominately from the east and southeast. Wind speed typically increases in the afternoon (3 pm) with an average wind speed 5.6 m/s reported, which prevails from a westerly direction. During winter, winds abate to an average of 3.5 m/s during the morning prevailing from the east and northeast. Afternoon winds increase to an average of 5.1 m/s during winter and range in direction from the west, northwest and north.

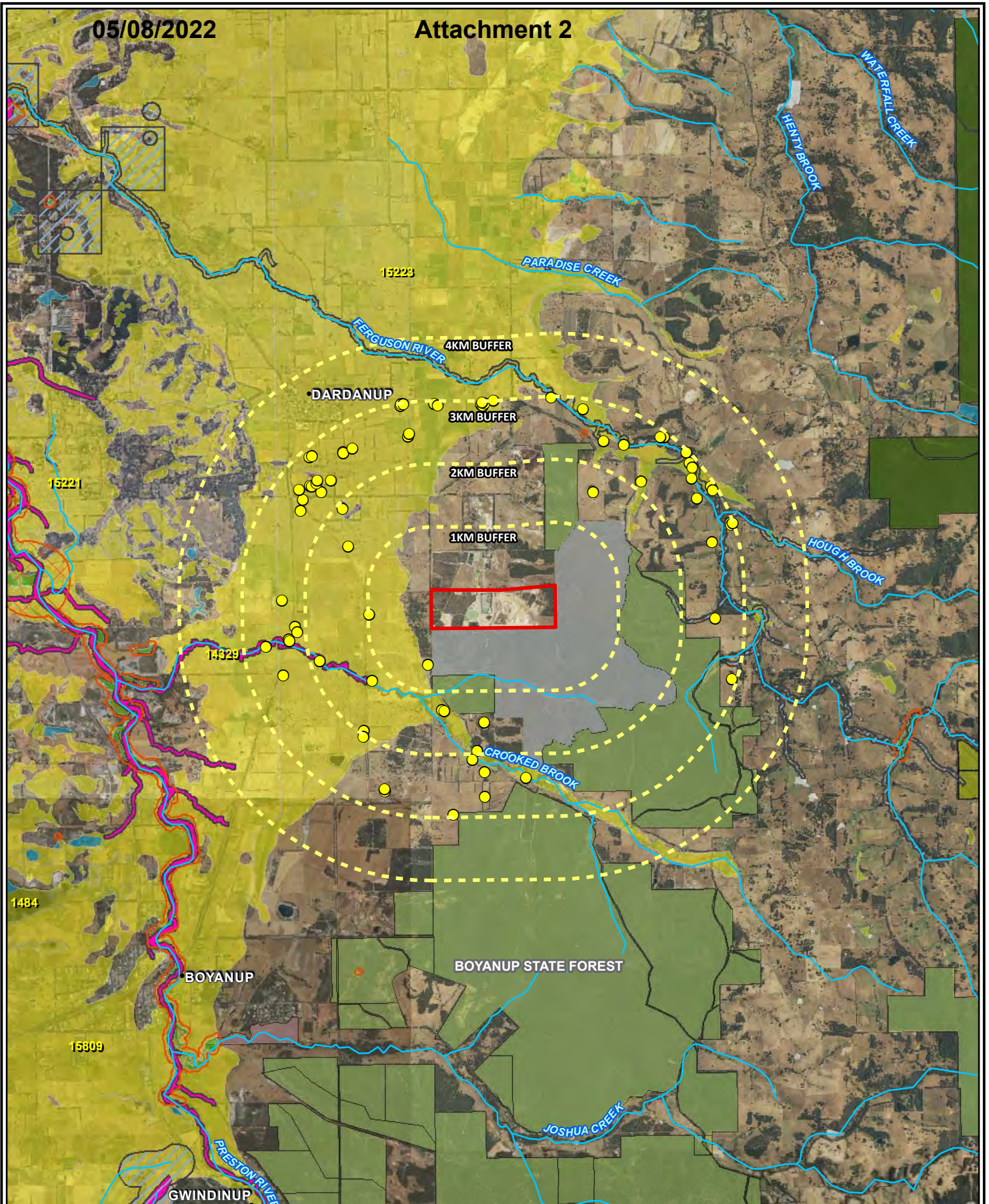
In order to characterise the local wind influences at the site, monitoring of the meteorology on-site commenced at the end of June 2019. Monthly wind roses to date are contained in Appendix A.

2.3.2 Topography

The site is situated along the boundary between the Swan Coastal Plain and the western facing slope of the Whicher Scarp. Due to its location on the scarp, the ground surface falls from approximately 125 mAHD in the southeast of the site to 45 mAHD at the western boundary. The natural ground surface has been modified due to landfilling activities.

05/08/2022

Attachment 2



- | | |
|---|--|
| Premises boundary | Environmentally sensitive areas (DWER) |
| 1km interval buffers | Legislated Lands and Waters (DBCA) |
| Aboriginal Heritage Places (DAA-001) | National Park |
| Registered Site | Section 34A Freehold |
| Other Heritage Place | Section 5(1)(h) Reserve |
| Geomorphic Wetlands (DBCA) | Nature Reserve |
| Conservation | State Forest |
| Resource Enhancement | Other Reserves |
| Multiple Use | ● Sensitive receptor - residence |
| — Watercourses | |

Scale 1:80,000 at A4		0 1 2 Kilometres
Coord. Sys. GDA 1994 MGA Zone 50		
Job No: 58071		
Client: Cleanaway		
Version: A	Date: 23-Jul-2020	
Drawn By: cthatcher	Checked By: JB	

Banksia Road Landfill
Crooked Brook, WA 6236

ENVIRONMENTAL SETTING AND SENSITIVE RECEPTORS

FIGURE 2



3. Regulatory Framework

3.1 Environmental Protection Act 1986

The site is regulated by DWER under Part V of the EP Act. Cleanaway holds Licence L8904/2015/1 for prescribed premises categories 61 and 64, as shown in Table 3.1.

Table 3.1: Current prescribed premises categories

Category	Description	Category production or design capacity	Premises production or design capacity
<i>Existing categories</i>			
61	Liquid waste facility: premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	100 tonnes or more per year	353,000 tonnes per year
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" is accepted for burial.	20 tonnes or more per year	350,000 tonnes per year

The licence is prescriptive of the control of fugitive dust emissions (conditions 1.4.15 to 1.4.22) and includes a dust risk area map reproduced in Figure 4.

The Dust Risk Areas were identified by their potential for fugitive dust generation, considering orientation, exposed surfaces, topography and vehicle movements as detailed in the figure notes. The DMP includes management actions consistent with the licence conditions related to dust, as indicated in Section 7.

3.2 National Environmental Protection (Ambient Air Quality) Measure

The *National Environment Protection Council (NEPC) (Commonwealth) Act 1994* established the National Environmental Protection Council (NEPC) which determines and evaluates National Environment Protection Measures (NEPMs) for the nation. The *National Environment Protection Council (Western Australia) Act 1996* is mirror legislation of the commonwealth act and implements the NEPMs in Western Australia.

The National Environmental Protection (Ambient Air Quality) Measure 2015 (the ambient air quality NEPM; NEPC 2015) provides air quality standards applicable to urban airsheds. In the absence of guidance specifically for rural settings, the ambient air quality NEPM is adopted.

3.3 Shire Local Laws

The site is required to comply with the Shire of Dardanup Dust Control Local Law 2011 (the Local Law). The Local Law requires a dust management plan to be accepted by the local government and operations to be conducted within any terms and conditions to which the accepted dust management plan is subject.

3.4 Separation guidance

Environmental Protection Authority (EPA) Guidance Statement No. 3 (GS3) (EPA 2005) provides advice on the use of generic separation distances for a range of industrial land uses. In determining the separation distances emissions – including gaseous and particulate emissions, noise, dust and odour – that may affect the amenity of nearby sensitive land uses were considered. Separation distances are not intended to replace actions to mitigate emissions and offsite impacts.

Recommended separation distances for category 64 putrescible landfill sites (Class II & III) is 500 m for sensitive uses (subdivisions), 150 m for single residences with an internal buffer of 35 m from the site boundary. There are no single residences within 150 m of the site boundary (see Table 2.1).

3.5 Dust management guidelines

The Department of Environment and Conservation (DEC 2011) document, *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*, is applicable to the dust management bulk handling, stockpiling and disposal of materials activities conducted at the site.

It is understood that DWER is preparing a new guideline on dust emissions. This DMP will be reviewed when the new guideline is published to ensure it meets the relevant requirements (see Section 10).

4. Site activities

4.1 Normal operations

Activities conducted at the site associated with the operation of the landfill include vehicle movements on sealed and unsealed surfaces and transport, bulk handling, stockpiling and burial of waste. The layout of the site is shown in Figure 3.

4.1.1 Hours of operation

The hours of operation for the disposal of solid waste at the site, as agreed with Council currently, are:

- weekdays and weekends: 6.00 am to 6.00 pm
- Public Holidays: open, unless otherwise posted.

4.1.2 Equipment

Equipment used on-site may include, but is not limited to:

- two landfill compactors (greater than 50 tonnes) to compact the waste
- bulldozer to spread and cover the waste and for general earthmoving activities
- two track loaders for cleaning the landfill floor, spreading, processing and covering waste
- front end loader and articulated dump truck for moving cover soils from stockpiles, supplying materials for access roadways and other earthmoving activities
- two excavators to assist in excavating landfill areas and to load aggregate materials and cover soils from stockpiles
- water truck and water cart for dust mitigation and for emergency fire response
- diesel generators for power supply and water pumps for managing stormwater
- street sweeper for use on bitumised haul roads for managing fugitive dust.

4.1.3 Solid waste handling procedures

The working face is the area where solid waste is unloaded from the incoming vehicles, levelled, compacted, and cover material is applied. The site limits the number of working faces in use at any one time – generally, there will only be one active disposal area in operation. However, some circumstances require additional disposal areas to be open-ended (e.g. in response to adverse weather conditions and for receipt of special waste materials).

The size of the working face depends on the number of vehicles that need to be managed and the landfill equipment that is available to place and cover the waste. The area of the working face is kept as small as practical, minimising potential environmental impacts and requirement for cover material.

Trucks can be unloaded from either the top or bottom of the working face. Where possible, trucks are unloaded at the bottom of the working face, which is shielded from wind, unless surface water and muddy conditions during wet weather hinder truck movement and cause mud-tracking issues. Drop/tip heights are also minimised as far as practicable.

The deposited waste is spread in layers no greater than 500 mm thick using a bulldozer, track loader or compactor and then compacted by a compactor, which makes several passes over each layer. The waste is compacted and covered with inert material or approved alternate materials at the end of each working day. The cover material is also placed in a progressive manner through the day on the side slopes and top deck areas, and an amount is retained for fire control.

4.2 Construction activities

Construction activities associated with extending the landfill capacity (following grant of the appropriate works approval) involves the establishment of new cells to accommodate waste and rehabilitation of completed cells (refer to Figure 3 for cell layout). Current construction and rehabilitation areas are shown on the dust risk area map (Figure 4).

4.2.1 Hours of operation

Construction activities generally occur on:

- weekdays: 7.00 am and 5.00 pm
- Saturday: occasionally as needed, typically 7.00 am to 3.00 pm.

No construction work is carried out on Sundays or Public Holidays.

4.2.2 Equipment

Equipment employed for the earth works required for the construction of new landfill cells includes the following:

- two excavators (45 t and 30 t)
- four dump trucks (40 t)
- one bulldozer
- one front-end loader
- one grader
- one compact track loader.

Typically, up to seven pieces (occasionally eight) of plant are operated for construction activities at one time.

4.2.3 Cell construction

The construction of a new landfill cell entails the excavation of a void and subsequent installation of a plastic liner. Excavation starts at the natural/existing ground surface, progressing down to approximately 18 m to 20 m depth.

Excavated soil is stockpiled as close to the site of excavation as practicable to minimise the impacts of haulage. Historic construction of cells required up to 300,00 m³ of soil to be excavated taking up to six months to complete. Future cells are planned to be wider requiring more volume to be removed, likely pushing construction time out to up to nine months.

05/08/2022

Attachment 2

SITE ENTRANCE/EXIT

OFFICE, WEIGH BRIDGE AND CARPARK

WHEEL WASH

MIC CELL LEACHATE POND

ACCESS ROAD

CRISTAL POND

CRISTAL CELL 2

MIC CELL

12A

12

15

16

17

18

19

20

1 & 2

3 & 4

4B

5

6

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14

PRIMARY STORMWATER DAM

SECONDARY STORMWATER DAM

LEACHATE EVAPORATION PONDS

PRIMARY LEACHATE POND

LANDFILL

Legend:

- Premises boundary
- Landfill cells - future
- Landfill cells - existing
- Cadastral boundary
- Sand extraction area (excluded from DMP)
- Cristal - sealed road
- Waste - sealed road
- Waste alt - unsealed



Job No: 58071

Client: Cleanaway

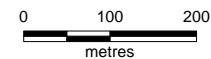
Version: A

Date 11/03/2021

Drawn By: cthatcher

Checked By: JB

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Banksia Road Landfill
Crooked Brook, WA 6236







SITE LAYOUT

FIGURE 3

05/08/2022

Attachment 2

Legend:

-  Premises boundary
-  Grid
-  Dust risk - high
-  Dust risk - moderate
-  Minor road
-  Track



Job No: 58071

Client: Cleanaway

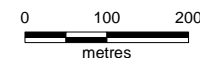
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Date 12/03/2021

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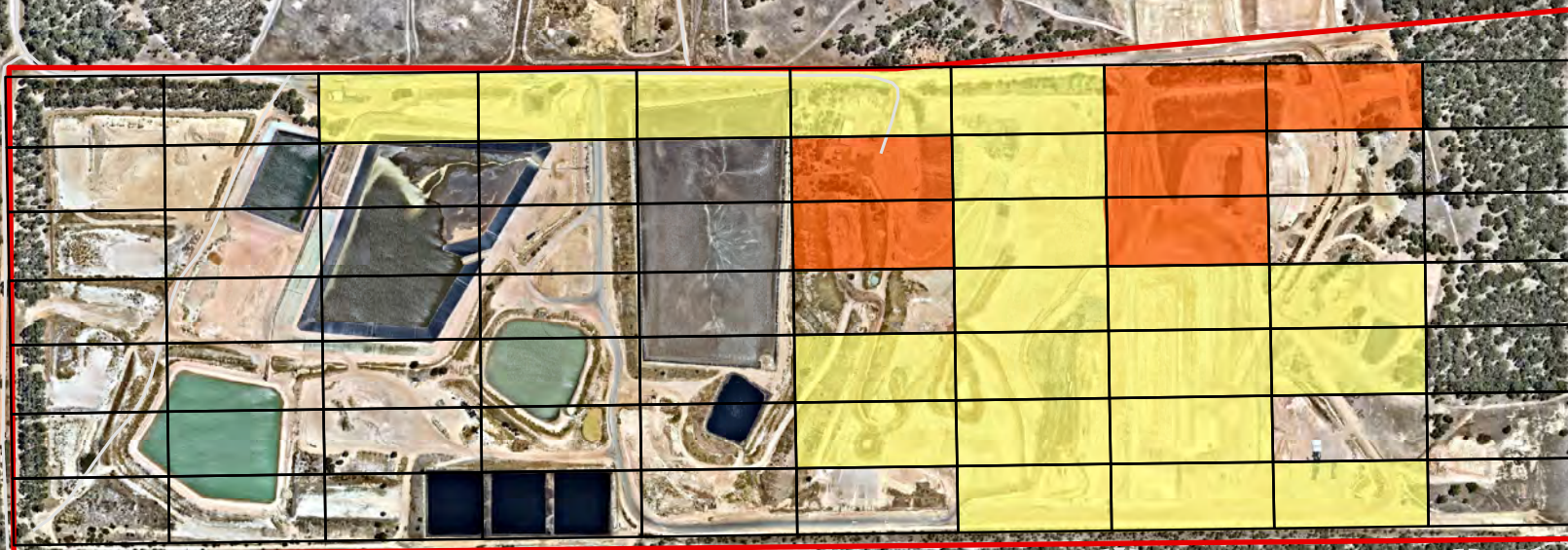
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Banksia Road Landfill
Crooked Brook, WA 6236

DUST RISK AREA MAP

FIGURE 4



Dust risk area map notes:

1. Northern haul route C1-I1:

The main haul route carries traffic to and from the active face and, whilst being sealed, is within a designated waste precinct, at a low elevation, and carries significant traffic on the site boundary.

2. Laydown H1, I1 and I4-I5:

Large area of unsealed road and flat spaces at elevation, presenting increased opportunity for fugitive dust.

3. Southern haul route G7-I7:

The unsealed road carries only minor operational traffic, not waste vehicles. As future landfill cells are developed, the waste vehicles will progressively travel east along this road. The road will progressively be sealed as required to accommodate waste vehicles.

4. Active cells G2-G6:

At elevation and the site of tipping loads until mid-2021.

5. Future active cells H3-H6:

Active use of Cell 8 to commence in mid-2021.

6. Construction site F2-F3:

Cell 12A construction estimated to October 2021.

7. Active works F5-F6:

Cell 5 capping and rehabilitation.

5. Potential impacts

5.1 Parameters of interest

The operational activities conducted at the site have the potential to result in airborne dust (fugitive dust), including the Total Suspended Particulates (TSP) and PM₁₀ fractions, which could impact upon human health and amenity. Impacts to amenity from dust include:

- regular dust events over several weeks leading to a gradual build-up of dust on surfaces
- short period dust events of very high concentrations which cause a rapid build-up of dust on surfaces, or soiling, if dust deposition rates are high.

Dust may impact upon the environment where surface deposition affects vegetation growth.

5.1.1 Particles

PM₁₀ is particulate matter of 10 micrometres or less in diameter, which is the fine particle fraction of TSP. PM₁₀ includes inhalable particles that are small enough to penetrate the thoracic region of the lungs, where they can have a direct physical (inflammatory) effect and/or be absorbed into the bloodstream. All people are continuously exposed to PM₁₀ from naturally occurring and anthropogenic dust emissions in urban and industrial areas.

The TSP fraction comprises particles each having an equivalent aerodynamic diameter of up to nominal 50 micrometres. Upper respiratory tract health effects from TSP inhalation can arise in sensitive individuals; however, the primary issue with TSP emissions relates to impacts on amenity from a visible dust perspective and deposition onto surfaces.

PM_{2.5} is particulate matter of 2.5 micrometres or less in diameter. PM_{2.5} is not considered in this DMP as it is typically associated with combustion emissions. This particle size is expected to form a small fraction of the particulate matter emitted from the site and will be managed in accordance with the management actions defined for the control of PM₁₀ emissions.

5.1.2 Contaminated waste

The site is a Class III landfill and is licensed to accept contaminated materials (solids) in accordance with the acceptance criteria for Class III landfills (DWER 2019).

Contaminated wastes are subject to specific management in accordance with conditions of the licence including contaminated waste must be accompanied by documentation (thus identifying hazard to operators) and must only be disposed of by burial to the active landfill area. Following the application of controls, it is expected that species arising from contaminated wastes are not expected to occur in fugitive dust in concentrations that will pose a human health risk.

5.1.3 Radiation

The tailings accepted at the site contain technically enhanced trace levels of naturally occurring radioactive materials thorium and uranium. Radiation risks at the facility are managed under a Radiation Management Plan. The plan was approved in November 2018 by the Radiological Council under Permit number RS77/2018.

Radiation management is governed by the Environmental Health Directorate of the Department of Health, in accordance with the *Radiation Safety Act 1975*. Radiation is therefore not considered further in this DMP.

5.1.4 Asbestos

The DWER licence for the site (L8904/2015/1) prescribes the requirements for handling of asbestos containing waste. Under the licence, asbestos containing waste is handled as Special Waste Type 1 in order to mitigate the potential discharge of asbestos containing material or asbestos fibres.

Asbestos containing materials are managed under the site Asbestos Management Plan and, therefore, are not considered further in this DMP.

5.2 Emissions sources

The dust-generating sources and activities identified the site are described in Table 5.1.

Table 5.1: Potential dust sources and dust-generating activities

Activity	Description	Dust generation and exposure potential
Wind erosion and dust lift-off from dry waste material, soil stockpiles or unsealed surfaces	As the active landfill cell is filled there may be areas of fine material on the surface. Natural residual soils are stockpiled on-site, and there are large areas of unsealed exposed surfaces.	Airborne dust generated by action of wind on exposed ground, stockpile surfaces, or dry waste material surfaces.
Vehicles movements	Heavy plant/earthwork vehicles, trucks and light vehicles will be traversing the site.	Vehicle movements on paved and unpaved roads could suspend fine particles in air. Vehicles exiting site can track material out onto the public road which could become airborne once dried out.
Vehicle unloading	Emptying of waste trucks at active landfill working face by tipping.	Dust generation during tipping of waste from trucks either from fine waste material from within truck or fine material disturbed from receiving surface.
Heavy plant activity spreading and compacting waste in the active landfill area	In the process of spreading, combining and compacting waste materials, heavy plant may traverse over dry soil or dry waste material.	Dust generated by soil or dry fine waste material disturbance during dozer movement. Dust generated by action of wind over exposed dry ground or dry fine waste material.
Construction activities	Landfill cell construction requiring excavation, haulage and stockpiling of soil.	Dust generation during excavation and soil handling is limited due to moisture content. Vehicle movements associated with construction.

5.3 Relevant air quality criteria

5.3.1 TSP

As discussed previously, health effects associated with TSP mainly arise from the PM₁₀ fraction. Given this, any particulate monitoring results would be compared to air quality standards for PM₁₀ (see Section 5.3.2).

5.3.2 PM₁₀

The standards in the ambient air quality NEPM will be adopted as a basis against which to compare monitoring results for particulates. The air quality standards are applicable to urban airsheds, and include criteria for particles as PM₁₀ at 50 µg/m³ on a 24-hr averaging period, and an annual limit of 25 µg/m³ derived from 24-hr measurements across a year.

6. Dust risk assessment

A site risk assessment/classification was conducted by Strategen-JBS&G in accordance with the framework provided in the DEC (2011) guideline (Appendix B) to determine the level of dust management and monitoring required for the site as follows.

Part A Nature of site

Item	Comment	Score
Nuisance potential of soil/waste when disturbed	Dust is largely expected to be windblown uncontaminated crustal particles; therefore, the nuisance potential is considered primarily to amenity. Potential for contaminated dust is low due to specific procedures in place to manage hazardous substances, i.e., asbestos and radiation.	2
Topography and protection provided by undisturbed vegetation	Some parts of the site are less exposed (lower down or within pits); however, the elevated topography of the eastern end of the site means little protection is afforded to exposed surfaces and ground level.	18
Area of site disturbed by the works	More than 10 ha.	9
Type of work being done	Bulk earthworks – this is conservative as handling of waste is largely below the level of the surface and construction activities are a minor aspect in comparison to operational waste handling aspects. The waste material being handled generally has lower dust-generating potential than soils.	9
Total part A score		38

Part B Proximity of site to other land uses

Item	Commentary	Score
Distance of other land uses from site	The nearest residence is approximately 500 m from the site boundary.	12
Effects of prevailing wind direction (at time of construction) on other land uses	The residential properties are isolated land uses affected by one wind direction.	6
Total Part B score		18

Site classification score

The site classification score is the product of the Part A and Part B scores. The total score is used to determine the site classification score as follows:

- Site classification 1 — under 199
- Site classification 2 — 200 to 399
- Site classification 3 — 400 to 799
- Site classification 4 — over 800.

Based on a site classification score of $38 \times 18 = 684$, the site is considered Classification 3 and medium risk for potential dust impacts. The dust management and monitoring requirements in this DMP have been determined in accordance with those recommended for Classification 3 sites in the DEC (2011) guideline.

7. Dust control measures

The following dust control measures (referenced to the relevant licence conditions where applicable) are implemented at the site as part of normal operations to mitigate dust generation. The control measures aim to achieve a residual level of risk of fugitive dust emission that is as low as reasonably practicable.

7.1 General management

General management measures pertaining to fugitive dust mitigation are:

- weather forecasts will be used to minimise dust generating activities during adverse meteorological conditions
- wind speed and direction will be checked throughout the day and used to plan and modulate active landfill operations. The outcome of the air monitoring campaign will inform specific controls measures for implementation on-site (see Section 8.2)
- where wind speed and direction indicate a likelihood of fugitive dust emission, site speed limits will be reduced for Dust Risk Areas (Figure 4)
- stormwater dams have capacity and are maintained in order to provide sufficient water for dust suppression
- leachate, where available, will be used for dust suppression in the wetting down of the active landfill areas only (as authorised by licence condition 1.4.17 (b))
- a 15 kL water cart will be available for application of water for dust suppression and priority will be given to high-risk Dust Risk Areas (Figure 4); the use and frequency of the water cart will be determined using wind speed and direction observations, use of trafficable areas and active tipping areas, observations of visible dust and effectiveness of water application
- dust suppressant will be applied to the Dust Risk Areas identified to have potential for fugitive dust-generating including non-vegetated areas, landfill batters and within the laydown area as identified in the dust risk area map (Figure 4), when such areas have the potential to generate fugitive dust (licence condition 1.4.19); the frequency of dust suppressant application will be set based on the effectiveness of the applied suppressant and the current risk associated the relevant Dust Risk Area.

7.2 Management of trafficable areas

In accordance with licence conditions:

- the Main Haul Road and Southern Haul Road were bitumised before 31 July 2020 (licence condition 1.4.15)
- prior to commencement of and during work activities:
 - a water cart will be used to apply water from primary and secondary stormwater dams to trafficable areas (licence condition 1.4.16 (a)); and
 - a street sweeper will be used on the bitumised Main Haul Road and Southern Haul Road (licence condition 1.4.16 (b))
- a wheel wash operates in the northwest of the site and will be used by all operational vehicles exiting the site (licence condition 1.4.22); the area between the wheel wash and the public road is sealed

- the area between the wheel wash and the public road will be inspected daily to ensure that the wheel wash is operating effectively, and that mud is not being tracked on to the public roads
- The daily inspection of the wheel wash and the public road will be recorded.

7.3 Operation of vehicles

Vehicle movements across the site may disturb soils and generate dust. The following measures are adopted during all operational activities to prevent excessive dust generation:

- all loads will be contained in sealed or covered vessels prior to acceptance - uncovered vehicles or vessels for which cover is not effective must not proceed beyond the weighbridge; where effective cover cannot be achieved, loads will be rejected in accordance with the site rejected waste procedure
- records will be kept of vehicles that are rejected because effective cover cannot be achieved; and the vehicle owner will be contacted to ensure future loads are adequately covered
- speed restrictions exist within the site – the appropriate speed limit, up to a maximum of 25 km/h, will be determined by weighbridge staff and will be based on the activities being undertaken, location and site conditions at the time
- vehicles will keep to designated access roads as far as reasonably practicable; vehicles deviating from designated access routes will do so only as required for specific work activities and under appropriate permissions.

7.4 Landfill areas

- dust emissions from the active tipping area are managed by applying water using the water cart during working hours (licence condition 1.4.17(a))
- material with potential to generate fugitive dust will be wet down during disposal and burial at the active tipping area (licence condition 1.4.18)
- waste will be covered with a minimum of 150 mm of Type 1 inert waste or clean fill as soon as practicable after tipping and no later than the end of the working day
- as far as practicable, the active landfill area will be positioned away from the edge of the active cell
- as far as practicable, loads will not be tipped oblique to the wind, with dust being more likely to travel further where this is case
- material drop/tip heights will be minimised where possible
- where waste processing is approved, wastes processed by crushing, shredding or screening will be wet down during processing
- Exposed soil surfaces and stockpiles in non-active area will be stabilised (e.g. with chemical surfactants) or temporarily covered (e.g. with mulch) prior to permanent re-vegetation or restoration.

7.5 Construction activities

- during construction activities, the contractor will provide an additional water cart, which waters down construction haulage roads and any areas associated with construction as required
- dust generation will be monitored by construction personnel and water cart utilised in the construction area as required.

7.6 Administrative controls

- operational personnel will be trained with respect to dust mitigation; training will include mechanisms of the generation of dust emissions, the importance of and responsibility of individuals to implement mitigation measures and reporting of visible dust emissions
- personnel and contractors will be required to report observations of visible dust emissions that appear to cross the boundary of the site, including date, time, location and extent of the visible plume
- fugitive dust emission inspections will be conducted monthly in accordance with a documented site operational procedure; the results of all inspections will be documented and recorded
- an annual assessment of the potential for dust emissions from within the site will be carried out, and proposed controls for high-risk Dust Risk Areas will be detailed (Condition 1.4.20); the annual review will be submitted to DWER (licence condition 1.4.21)
- adjoining landowners and the Shire will be notified in writing at least 48 hours in advance of any activities outside of normal or regular site operations that have the potential to generate dust; records of such notifications will be maintained.

7.7 Incident and complaints management

- fugitive dust events will be raised as an Environmental Incident and an event report entered into the site incident management system with corrective actions identified and allocated
- the following information will be recorded in the site incident management system in relation to complaints received by the site (whether received directly from a complainant or forwarded by the Shire or DWER) about any alleged emissions from the premises:
 - the name and contact details of the complainant (if provided)
 - the time and date of the complaint
 - the complete details of the complaint and any other concerns or other issues raised
 - the complete details and dates of any action taken to investigate or respond to any complaint
 - the effectiveness of any action taken in response to the complaint to reduce or eliminate the risk of future events.

8. Dust monitoring

8.1 Visual monitoring

Visual assessments of fugitive dust emissions will be conducted by operational personnel during working hours. A 'dust event' is defined as the occurrence of visible fugitive dust from a source or activity at the site that exits a boundary of the site for a duration of greater than one (1) minute. A windsock will be installed at the site to indicate wind direction and approximate wind strength to aid visual monitoring.

When a 'dust event' is observed and reported on-site, the following corrective actions will be implemented:

- the site operational personnel will review the working methodology of the dust-generating activity and ensure that the appropriate measures listed in the DMP have been implemented
- if the dust event continues following implementation of the above measures, the activity will be controlled, and water will be applied at the source of the dust generation to damp down soils; work will not recommence until the dust event is under control
- spraying of water will be carried out at a frequency sufficient to keep surface soils damp throughout the dust-generating activity without resulting in run-off.

8.2 Dust monitoring

In addition to existing management already in place, the implementation of the added measures in this DMP will result in a further reduction in the likelihood of any airborne dust exiting the site.

Air quality monitoring will be conducted to assist in further understanding of the effectiveness of the control of dust emissions from the site operations. The monitoring will be initially carried out for six months between November 2020 and April 2021 to encompass the dryer months of the year.

The PM₁₀ fraction was initially selected for the monitoring program as this is relevant to human health and has criteria to assess against (NEPM). If required, the sampled particle fraction can be changed to TSP during the sampling campaign by changing the sampling head. The current parameter being measured is recorded in Appendix D, which allows for it to be easily updated outside of formal review of the DMP (refer to Section 10).

The purpose of the monitoring program is to establish data regarding existing ambient air quality surrounding the site. This will allow an assessment of the effectiveness of the management of emissions during site operation activities and confirm that off-site impacts are being minimised.

8.2.1 Monitoring equipment

The air quality monitoring program utilises three real-time nephelometer dust monitoring instruments, each equipped with sensors to monitor wind speed and direction at the sampling location. Each monitoring location is fitted with telemetry to enable remote interrogation of the monitoring data and to allow alarms when trigger levels (See Section 8.2.3) are exceeded to be set with SMS text notification to a nominated phone number. The instruments are powered by solar panels with battery storage.

8.2.2 Monitoring locations

The monitoring instruments are located according to an analysis of the prevailing winds expected for the time of year the monitoring program is being conducted. This analysis includes current data from the on-site meteorology monitoring station and data from the BOM station in Bunbury.

The monitors are located on boundary locations most likely to be impacted by dust, which is informed by analysis of wind direction and available information on visual observation of dust emissions. If appropriate to the prevailing wind directions, one monitor will be set upwind and two downwind to allow comparison of dust concentrations between the three sites.

Siting of monitoring instruments is subject to a site inspection and assessment of feasible locations. The stations are sited, to the extent possible, in accordance with AS/NZS 3580.1.1:2007 *Methods for sampling and analysis of ambient air, Part 1.1: Guide to siting air monitoring equipment*.

The locations of the monitoring instruments are shown on Figure 5 in Appendix C, which will be updated if and when monitors are relocated in response to changing site operations or prevailing weather conditions.

8.2.3 Performance criteria (trigger levels)

Trigger levels have been set at the monitoring locations for the duration of the monitoring program as follows.

Corrective action trigger

The corrective action trigger level is used to set alarm notifications that will be received by the responsible site employee (refer to Section 9). If the corrective action trigger level is exceeded, corrective actions will be implemented as required, including, but not limited to:

- the site operational personnel will review the working methodology of any dust-generating activities and ensure that the appropriate measures have been implemented
- if the dust event continues following implementation of the above measures, the activity will be controlled, and water will be applied at the source of the dust generation to damp down soils; work will not recommence until the dust event is under control and dust levels have reduced below the corrective action trigger level
- spraying of water will be carried out at a frequency sufficient to keep surface soils damp throughout the dust-generating activity without resulting in run-off.

The corrective action trigger level was established after the first month of monitoring, considering measured concentrations of dust and is designed to protect the air quality criteria at the site boundary. Prior to this during the first month of monitoring, an initial trigger level was set. The level set is below the threshold of a visible dust event and provide an early warning.

Stop work trigger level

The stop work trigger level is the ambient dust level which will result in a stop work alarm being dispatched. Actions in response to stop work alarms include:

- all site activities generating visible dust will cease
- the site operational personnel will review the working methodology of any dust-generating activities and ensure that the appropriate measures can be implemented
- water will be applied at the source of the dust generation to damp down soils; work will not recommence until the dust event is under control and dust levels have reduced below the corrective action trigger level
- spraying of water will be carried out at a frequency sufficient to keep surface soils damp throughout the dust-generating activity without resulting in run-off.

The stop work trigger level was established after the first month of monitoring informed by the measured data. Prior to this, an initial trigger level was set.

The current corrective action and stop work trigger levels are contained in Appendix D, which allows for the value to be easily updated outside of formal review of the DMP (refer to Section 10).

The trigger levels will be periodically reviewed as required to determine their adequacy in protecting sensitive receptors from dust and to ensure they are relevant to actual dust events and do not result in multiple false-alarms that can distract from and disturb site operations.

8.2.4 Data analysis, QA/QC and reporting

During the monitoring period, continuous data will be routinely downloaded weekly from each station, recorded and securely archived. The data will be used for assessment and comparison to the adopted trigger criteria and to confirm satisfactory implementation of dust management practices at the site.

Validated data, which has been subject to QA/QC checks, will be delivered to the Shire on a monthly basis (or as required/requested if a dust event requires investigation). A valid data capture rate of greater than 90% is expected. Instruments will be subject to maintenance in accordance with Australian Standards and manufacturers' guidelines.

Should a dust event be recorded by on-site monitoring; or community complaints are received; or exceedances of the NEPM recorded at the monitoring locations, the source of the dust will be investigated via analysis of the wind direction data. The data will be utilised to inform and improve the implementation of this plan.

Upon on completion of the six month monitoring program, a summary report will be provided to the Shire within 30 calendar days that will include, but not be limited to:

- the locations of the monitoring instruments
- the specifications of the monitoring equipment
- tabular and graphical representation of the monitoring data
- summary of any exceedances of and performance against the trigger levels (including number of SMS text alarms) and any corrective action taken
- summary of any exceedances of the NEPM criteria and identification of dust source(s)
- evaluation of the effectiveness of the applied dust controls and recommendations for any amended or additional controls as informed by the monitoring and assessment of dust emissions generated
- recommendation on the need for, or specification of, ongoing dust monitoring
- summary of complaints received
- summary of any notifications provided to adjacent landowners and the Shire regarding activities outside of normal or regular site operations that have the potential to generate dust.

The need for or specification of any ongoing instrumental monitoring of dust will be reviewed after the first six month monitoring program and will be informed by:

- monitoring data and trends
- performance against trigger levels
- verified complaints
- review of the site classification score and associated management and monitoring requirements (see dust risk assessment in Section 6)

- risk-based assessment carried out in accordance with DWER guidelines (DER 2017) to assess the consequence of emissions at the levels measured impacting sensitive receptors and the likelihood of those impacts occurring.

The outcomes of the above review and the use of ongoing instrumental monitoring will be determined in consultation with relevant stakeholders, including the Shire (see Section 1.3). Visual monitoring of dust-generating site activities will continue as a primary mechanism for ongoing dust monitoring (refer to Section 8.1).

9. Roles and responsibilities

Roles and responsibilities with respect to management of fugitive dust emissions are outlined in Table 9.1 below:

Table 9.1: Site roles and responsibilities

Role	Responsibilities
All personnel	Monitor and report instances of fugitive dust by raising an incident report as required.
Operations Manager	Develop and allocate resources to provide for a level of risk of fugitive dust that is as low as reasonably practicable and conduct and review fugitive dust inspections. Ensure compliance obligations are met, including annual reporting on the assessment of the potential for dust emissions and proposed controls within the required timeframe. Investigate and document complaints as required.
Leading Hand	Monitor wind speed, direction and incoming and nature of incoming loads throughout the day. Incorporate appropriate controls into planning and modulation of active landfill operations, including guidance and coaching of personnel and allocation of water cart routes and waste processing activities. Intervene in and modify/stop active landfill operations in response to notification of exceedances of trigger levels in order to prevent triggering and stop any dust event. Investigate complaints as required.
Customer Service Officer	Maintain site complaints register.
Weighbridge Operator	Monitor and control incoming loads and advise Leading Hand of any oncoming loads consisting of soil or fine particulate. Monitor dust concentrations at the monitoring locations throughout the day and respond to any alarms notifying an exceedance of trigger levels by advising UHF channel 31 and Leading Hand. Advise incoming drivers of any reduction in speed limits.
Landfill Operator	Monitor wind speed, direction and contents of tipped loads throughout the day and modulate active landfill operations accordingly. This is to include communication with tippers to ensure appropriate tipping direction. Modify/stop own machine operation and influence carrier activities in response to notification of exceedances of trigger levels in order to prevent triggering and stop any dust event.
Construction contractor	Comply with all onsite dust management requirements as set out in the DMP. Provide a water cart to adequately manage all dust generating activities associated with construction. Monitor dust generation within the construction areas and prevailing and forecast weather conditions in order to adapt construction activities to minimise the generation of dust. Modify or cease construction activities in order to prevent exceedances of trigger levels and stop any dust event. Work closely with operational site staff to ensure comprehensive dust management across the whole site.

10. Review

This DMP will be subject to, at a minimum, twelve-monthly review to ascertain its relevancy for ongoing site management and allow for continual improvement. Reviews may also be implemented:

- at the direction of the Shire of Dardanup
- after completion of the initial six month monitoring campaign
- as a corrective action resulting from an investigation into a dust impacts
- after completion of the annual review required by Condition 1.4.20 of the licence
- prior to any significant change to site activities and operations
- on publication of a new dust emission guideline by DWER.

11. Limitations

Scope of services

This report ("the report") has been prepared by Strategen-JBS&G in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen-JBS&G. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen-JBS&G has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen-JBS&G has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen-JBS&G has also not attempted to determine whether any material matter has been omitted from the data. Strategen-JBS&G will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen-JBS&G. The making of any assumption does not imply that Strategen-JBS&G has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen-JBS&G disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

Strategen-JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by Strategen-JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

12. References

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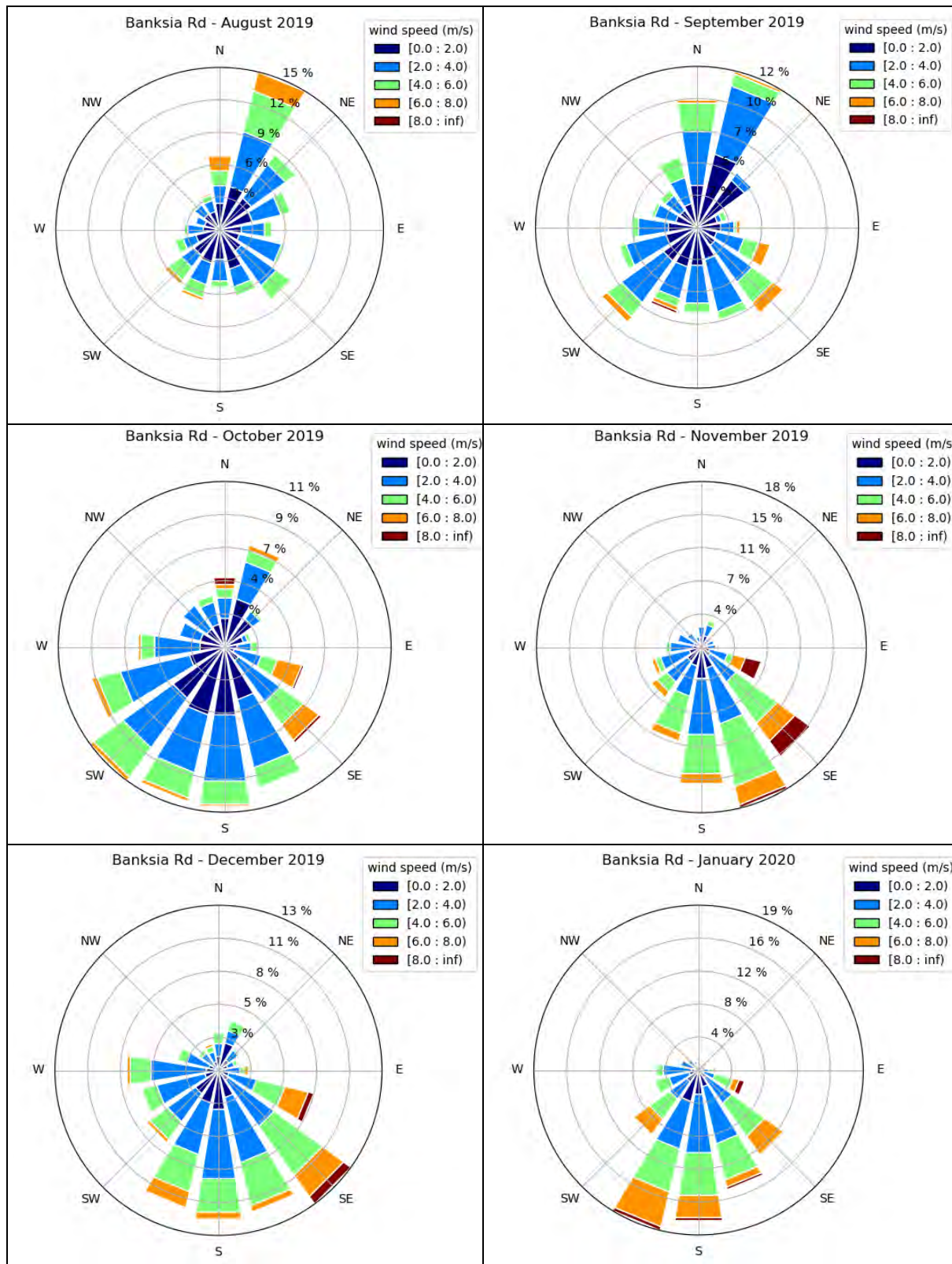
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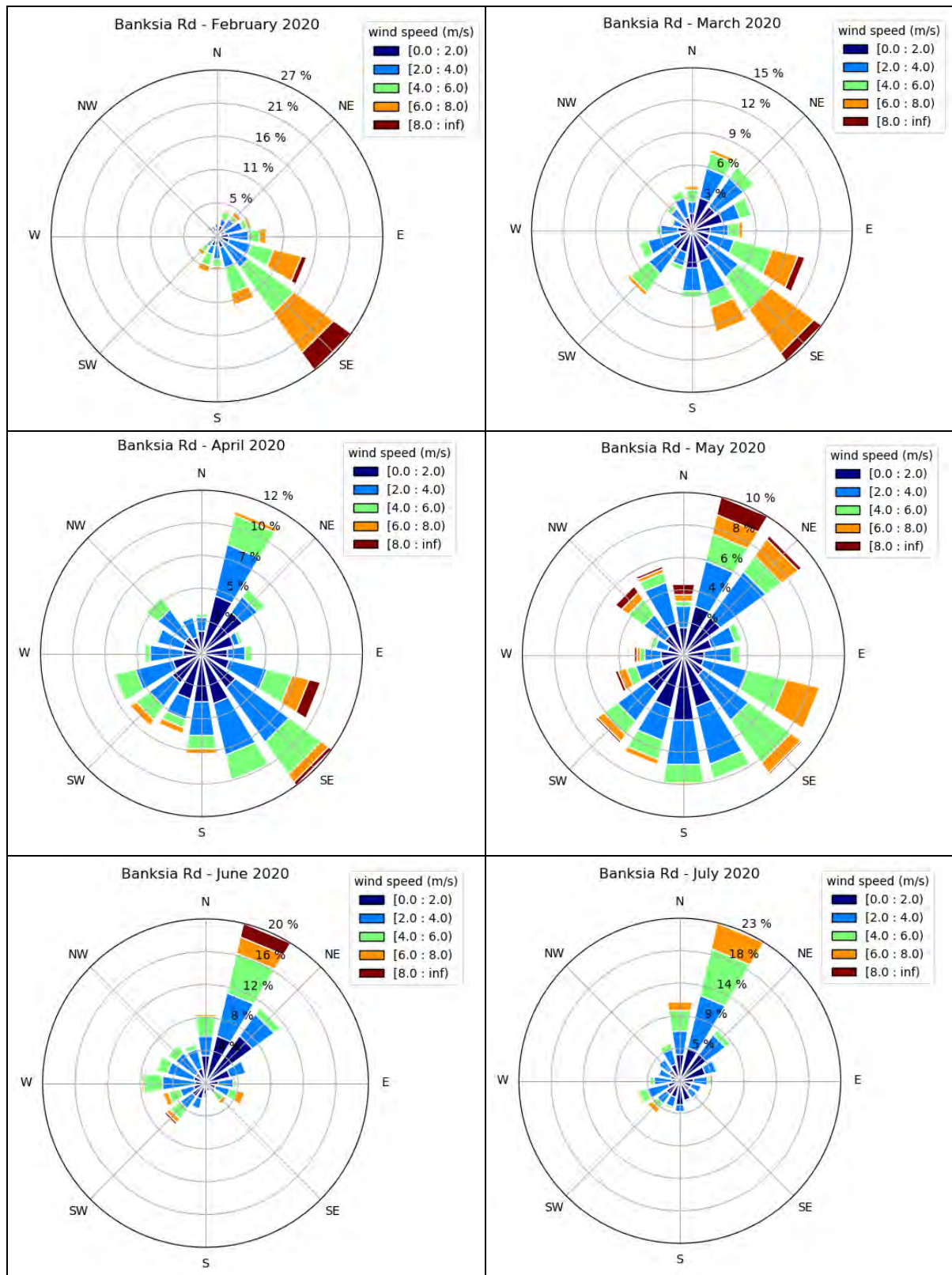
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Appendix A Wind roses (on-site station)





05/08/2022

Attachment 2

Appendix B Site risk assessment/classification (DEC 2011)

05/08/2022

Attachment 2 ADDENDUM

The Department of Environment and Conservation (DEC) released an updated dust guideline in January 2011, “A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities, January 2011”. An error was identified in Appendix 1 on page 35. This error has since been corrected (See below). This document is the corrected version published in March 2011.

Appendix 1: Site risk assessment/classification for activities generating uncontaminated dust

Sheet 1: Site classification assessment chart

Part A. Nature of site

Item	Score options				Allocated score
1. Nuisance potential of soil, when disturbed	Very low.....1	Low.....2	Medium.....4	High.....6	
2. Topography and protection provided by undisturbed vegetation	Sheltered and screened.....1	Medium screening....6	Little screening.....12	Exposed and wind prone.....18	
3. Area of site disturbed by the works	Less than 1ha.....1	Between 1 and 5ha..3	Between 5 and 10ha.....6	More than 10ha.....9	
4. Type of work being done	roads or shallow trenches.....1	roads, drains and medium depth sewers.....3	Roads, drains, sewers and partial earthworks.....6	Bulk earthworks and deep trenches.....9	
TOTAL score for Part A					

Part B. Proximity of site to other land uses

Item	Score options				Allocated score
1. Distance of other land uses from site	More than 1km.....1	Between 1km and 500m.....6	Between 100m and 500m.....12	Less than 100m.....18	
2. Effect of prevailing wind direction (at time of construction) on other land uses	Not affected.....1	Isolated land uses affected by one wind direction.....6	Dense land uses affected by one wind direction.....9	Dense/sensitive land uses highly affected by prevailing winds.....12	
TOTAL score for Part B					

SITE CLASSIFICATION SCORE (A X B) =

05/08/2022





Attachment 2

Appendix C Monitoring locations

05/08/2022

Attachment 2

Legend:

-  Premises boundary
-  Cadastral boundary
-  Sand extraction area (excluded from DMP)
-  Dust monitoring location



Job No: 58071

Client: Cleanaway

Version: A

Date 10/12/2020

Drawn By: cthatcher

Checked By: JB

Scale 1:8,750



0 100 200
metres

**Banksia Road Landfill
Crooked Brook, WA 6236**

DUST MONITORING LOCATIONS

FIGURE 5

Appendix D Trigger levels

The current trigger levels described in Section 8.2.3 are shown in Table D.1 and Table D.2.

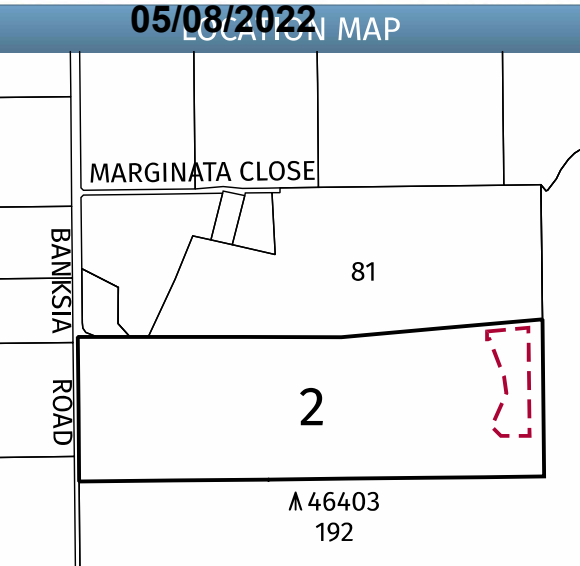
Table D.1: Trigger level

Date	Parameter	Corrective action trigger level	Units	Averaging period	Comment
11/09/2020	PM ₁₀	600	µg/m ³	10-minute	Initial trigger level set prior to completion and review of one month of monitoring data
08/02/2021	PM ₁₀	150	µg/m ³	10-minute	Revised trigger level established after first month of monitoring
17/02/2021	TSP	150	µg/m ³	10-minute	All monitor sampling heads changed to TSP

Table D.2: Stop work trigger level

Date	Parameter	Stop work trigger level	Units	Averaging period	Comment
11/09/2020	PM ₁₀	1,200	µg/m ³	10-minute	Initial trigger level set prior to completion and review of one month of monitoring data
08/02/2021	PM ₁₀	300	µg/m ³	10-minute	Revised trigger level established after first month of monitoring
17/02/2021	TSP	300	µg/m ³	10-minute	All monitor sampling heads changed to TSP

APPENDIX H | Rehabilitation Plan



- NOTES
- PERSONS RESPONSIBLE

Sally Carlton
Engineering Manager
Cleanaway Pty Ltd
0401 222 508
sally.carlton@cleanaway.com.au
- REHABILITATION

a) All batters no greater than 1 in 6.

b) Final contours as per this plan.

c) Finished extraction to have 100mm soil and hydroseeded with perennial rye grass.

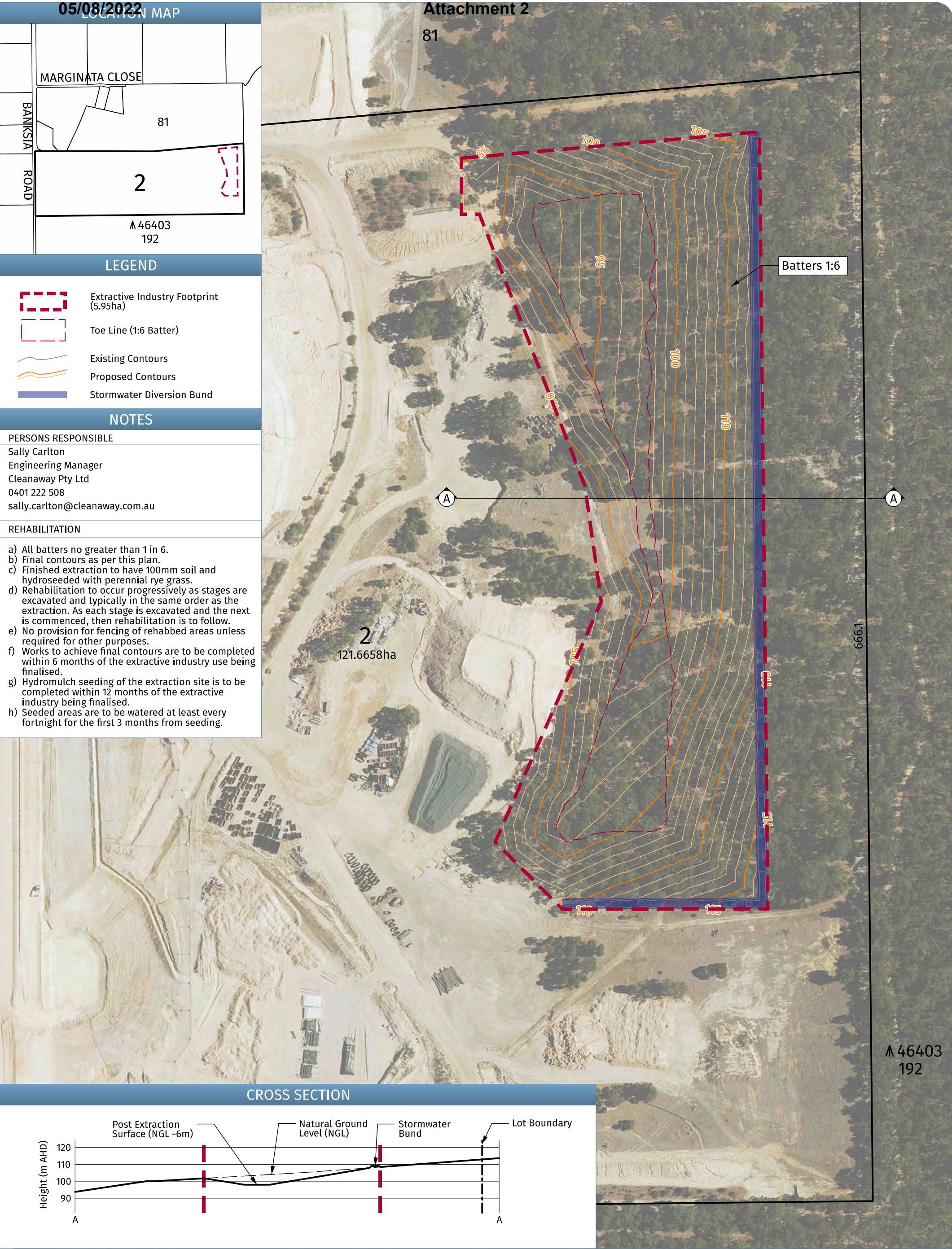
d) Rehabilitation to occur progressively as stages are excavated and typically in the same order as the extraction. As each stage is excavated and the next is commenced, then rehabilitation is to follow.

e) No provision for fencing of rehabbed areas unless required for other purposes.

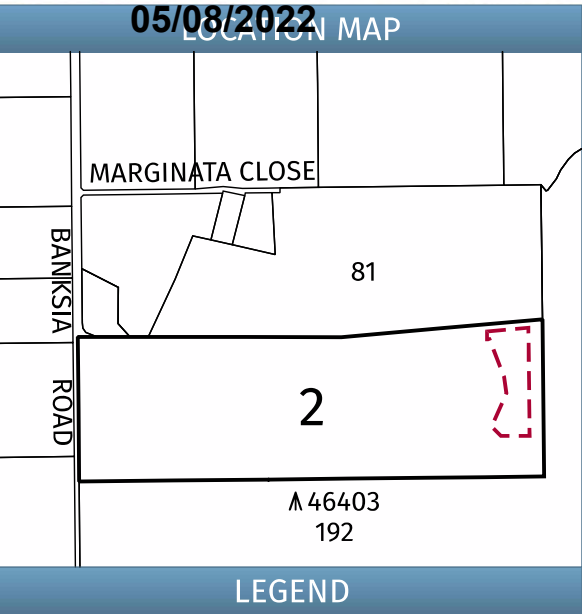
f) Works to achieve final contours are to be completed within 6 months of the extractive industry use being finalised.

g) Hydromulch seeding of the extraction site is to be completed within 12 months of the extractive industry being finalised.

h) Seeded areas are to be watered at least every fortnight for the first 3 months from seeding.



APPENDIX I | Site Excavation Plan

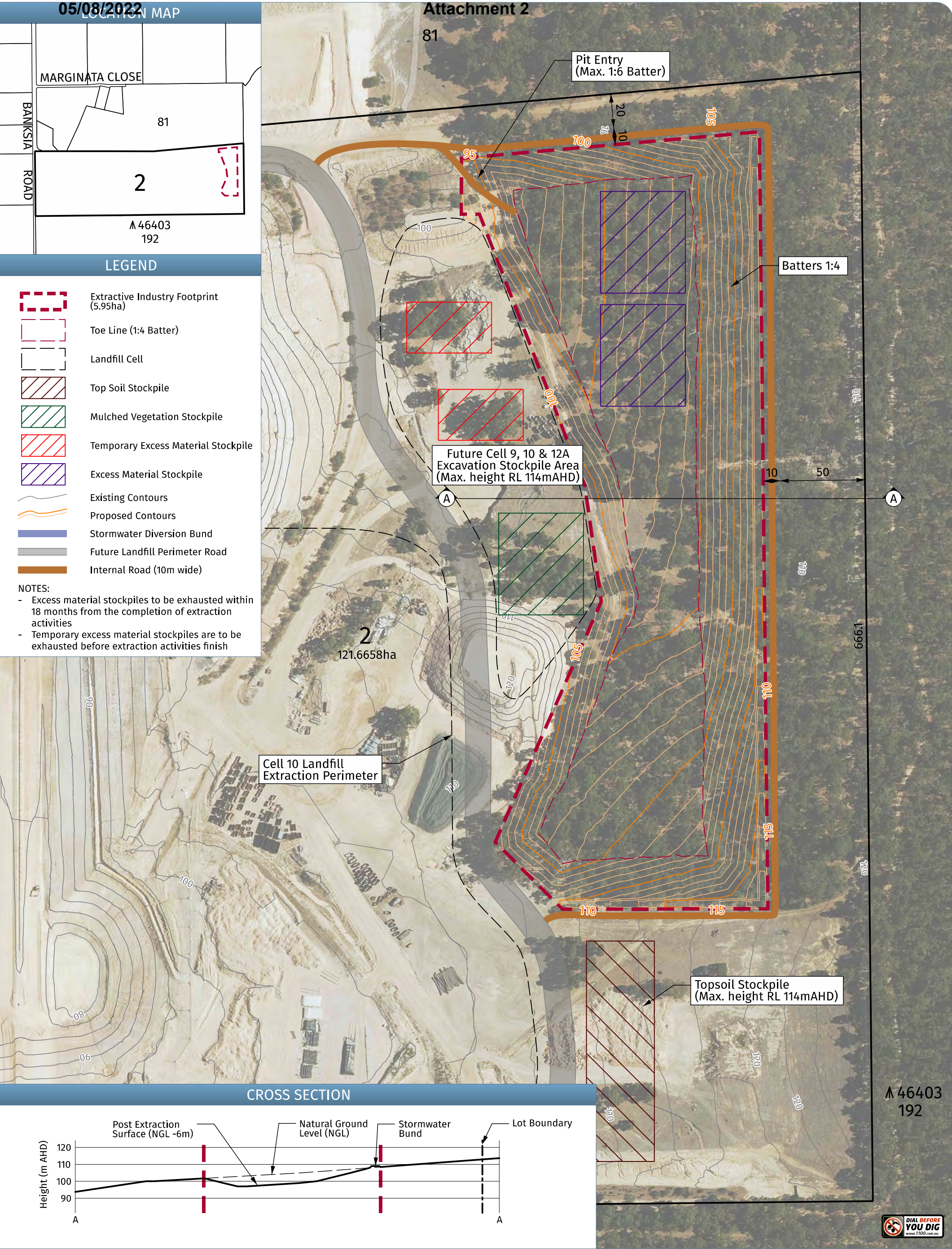


NOTES:

-

Excess material stockpiles to be exhausted within 18 months from the completion of extraction activities

-

Temporary excess material stockpiles are to be exhausted before extraction activities finish

EXCAVATION SITE PLAN

Lot 2 on Diagram 65891 Banksia Road, CROOKED BROOK

Plan No. | 22910-03

Date | 04/07/22

Drawn | NP

Checked | MK

Revision | B

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Scale | 1:2000@A3

0 20m 40m 60m

NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey

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APPENDIX J | Surveyors Certificate

Our Ref: 22910

25 February 2022

Shire of Dardanup
1 Council Drive
EATON WA 6232

To Whom It May Concern,

RE: Extractive Industry License – Lot 2 Banksia Road, Crooked Brook

With reference to the Extractive Industry operations proposed for the Eastern portion of Lot 2 and as required at item 7(e) of the Shire of Dardanup's Extractive Industries Local Law 1999, this Surveyors Certificate stands to certify that the Site Excavation Plan (Reference 22910-03A dated 19/01/2022) is relative to the datum control:

20210908-82	46723.82	99912.98	56.298AHD	Star Iron Picket
HD100	46648.76	99781.26	53.093AHD	Buried Spike

Yours sincerely

Mitchell Woods,

Licensed Surveyor
Harley Dykstra Pty Ltd

BUNBURY

21 Spencer Street, Bunbury WA 6230
PO Box 778, Bunbury WA 6231

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Albany Bunbury Busselton Kelmscott Perth

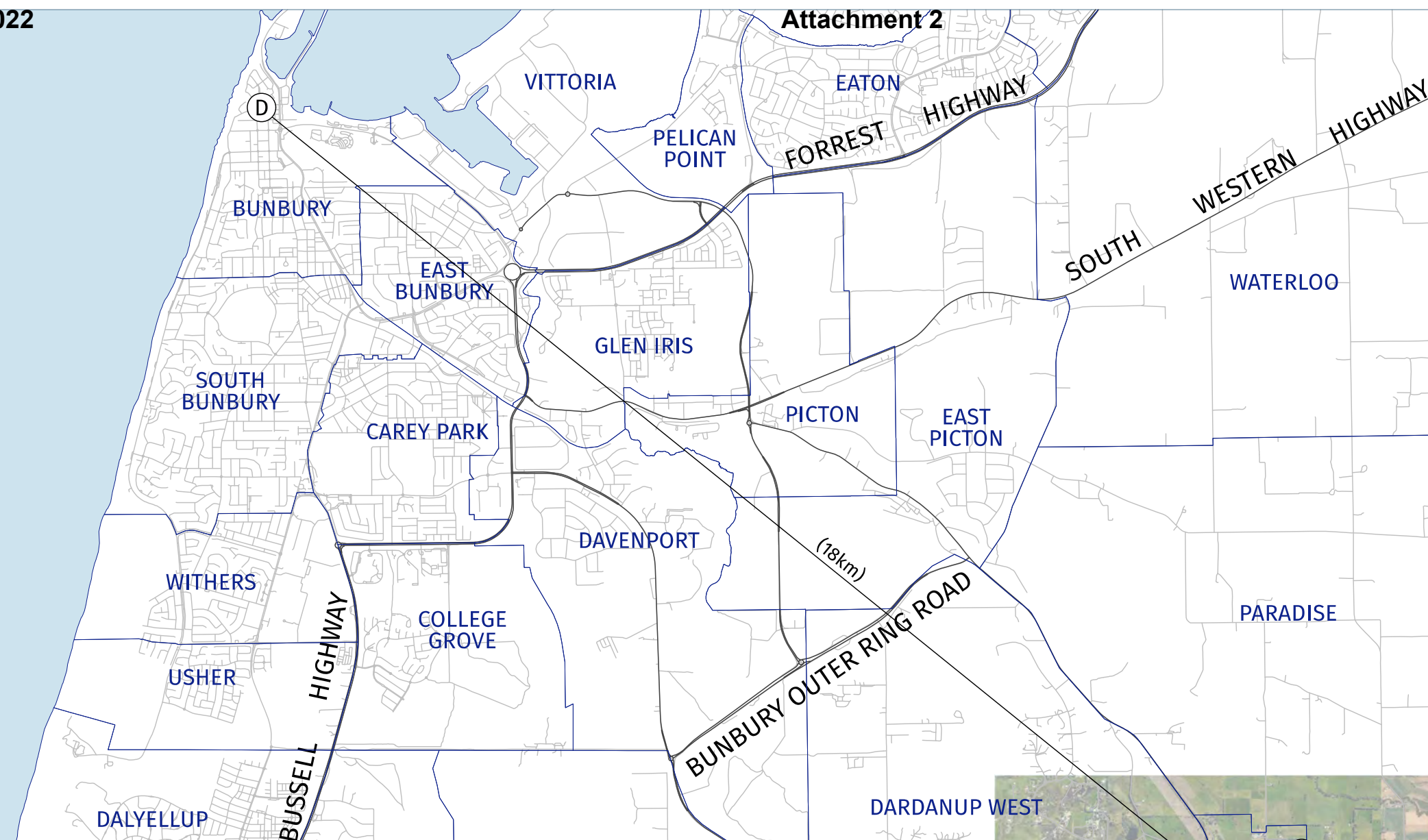
ACN 009 101 786 ABN 77 503 764 248



APPENDIX K | Visual Impact Plan

05/08/2022

Attachment 2



LOCATION A



Ferguson Road (Eastern edge of Dardanup Townsite)

LOCATION B



Crooked Brook Road (South of Intersection with Panizza Road)

LOCATION C

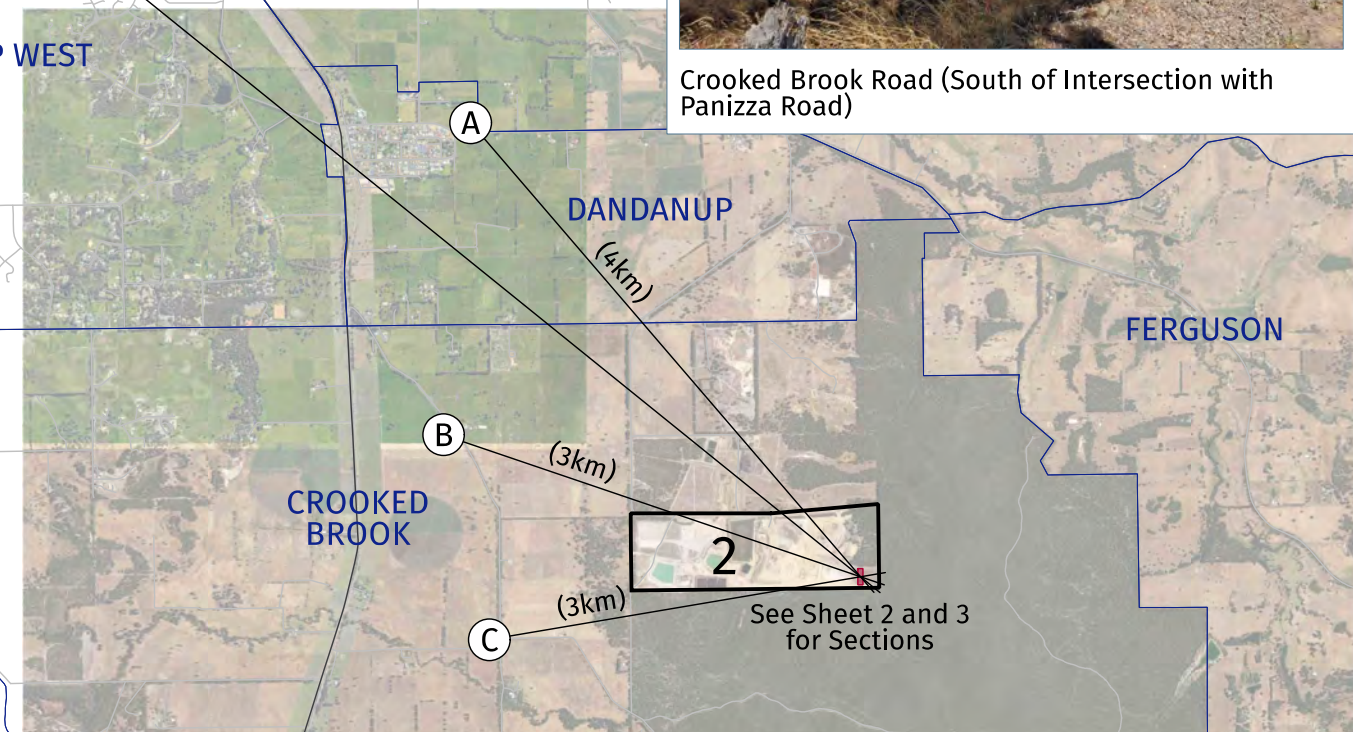


Crooked Brook Road (Near Intersection with Twomey Road)

LOCATION D



Bunbury CBS lookout (Marlton Hill Apex Drive)



VISUAL IMPACT PLAN

Lot 2 on Diagram 65891 Banksia Road,
CROOKED BROOK

SHEET 1 OF 3

Plan No. | 22910-05
Date | 25/02/22
Drawn | NP
Checked | MK
Revision | A

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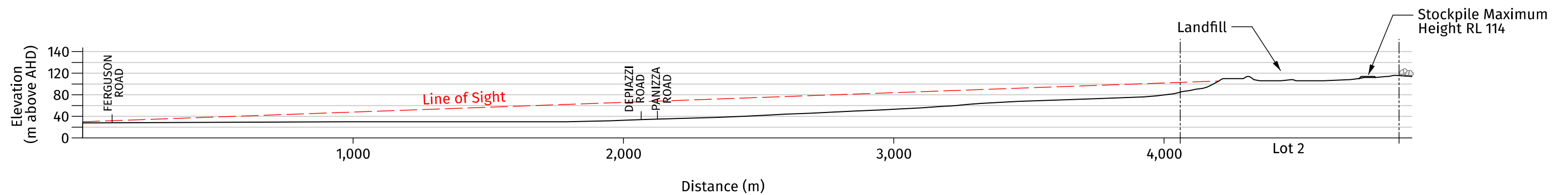


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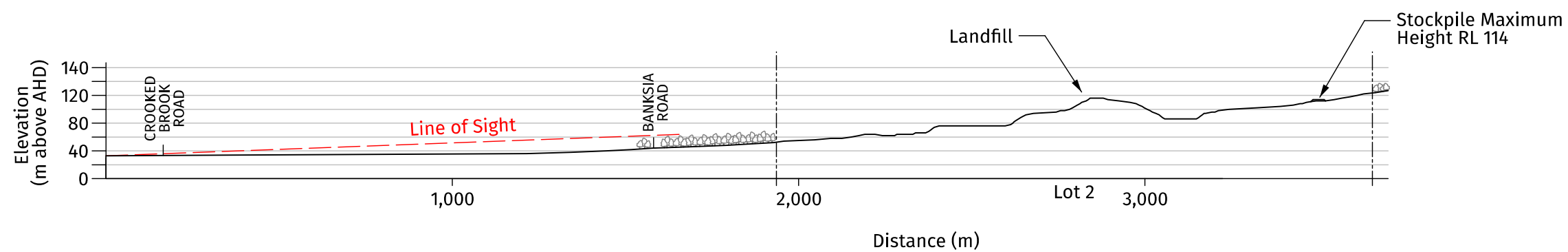
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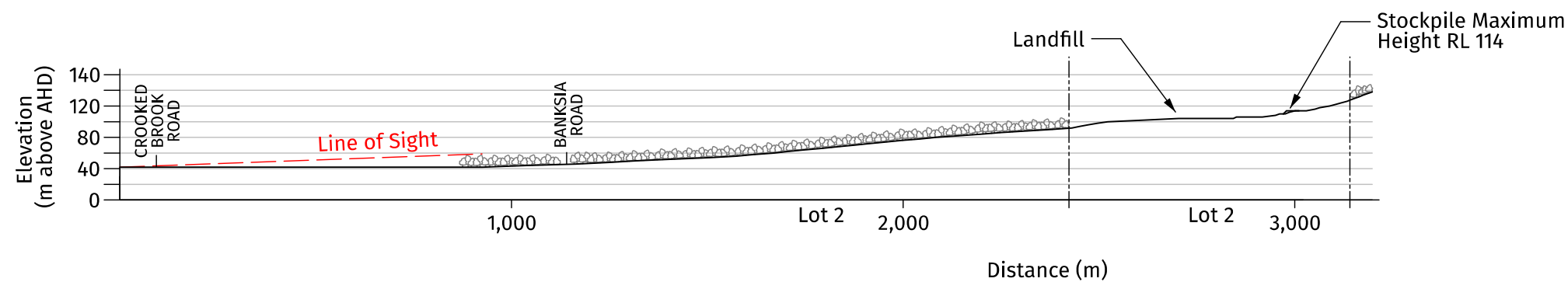
Cross Section A

Vertical Exaggerated 1:5



Cross Section B

Vertical Exaggerated 1:5



Cross Section C

Vertical Exaggerated 1:5

NOTE:

1. Cross sections are exaggerated by a factor of 5. At a scale of 1:1 (as seen naturally) the height shown is reduced to 20% of that currently indicated on the plans and therefore the stockpiles are not visible.
2. The photos indicate a lighter colour which consists of the Cleanaway facility on lot 2 Banksia Road
3. All ground contours derived from the latest topographical data and trees shown indicatively with screening applicable by the vegetation for all sections.

VISUAL IMPACT SECTIONS

Lot 2 on Diagram 65891 Banksia Road,
CROOKED BROOK

SHEET 2 OF 3

Plan No. | 22910-05
Date | 25/02/22
Drawn | NP
Checked | MK
Revision | A

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Scale | 1:15,000@A3

0 200m 400m

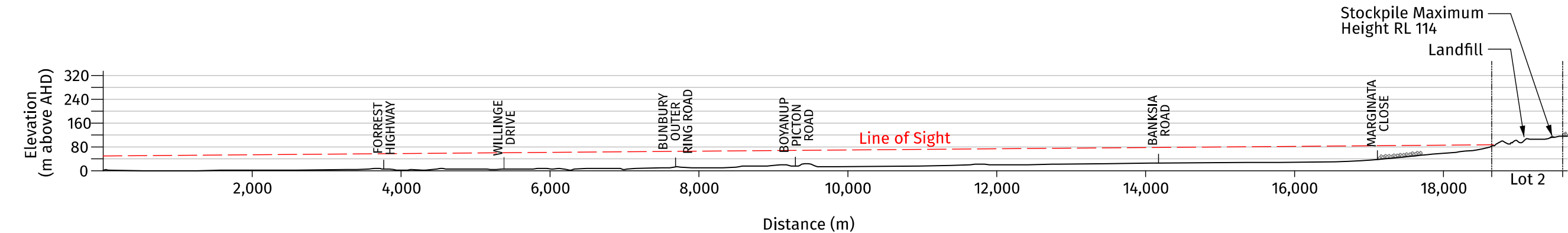


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Cross Section D
Vertical Exaggerated 1:5

- NOTE:
- 1. Cross sections are exaggerated by a factor of 5. At a scale of 1:1 (as seen naturally) the height shown is reduced to 20% of that currently indicated on the plans and therefore the stockpiles are not visible.
 - 2. The photos indicate a lighter colour which consists of the Cleanaway facility on lot 2 Banksia Road
 - 3. All ground contours derived from the latest topographical data and trees shown indicatively with screening applicable by the vegetation for all sections.

VISUAL IMPACT SECTIONS

Lot 2 on Diagram 65891 Banksia Road,
CROOKED BROOK

SHEET 3 OF 3

Plan No. | 22910-05

Date | 25/02/22

Drawn | NP

Checked | MK

Revision | A

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Scale | 1:60,000@A3

0

500m

1000m

1500m

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NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey

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PLANNING & SURVEY SOLUTIONS

APPENDIX L | Local Development Plan

This Local Development Plan (LDP) has been prepared in accordance with clause 47d) of the Deemed Provisions (Schedule 2) of the *Planning and Development (Local Planning Schemes) Regulations 2015*, as the Commission and the Shire of Dardanup has identified an LDP is required for the purposes of orderly and proper planning.

The objectives of this LDP are to:

- Ensure onsite development and associated operations are undertaken in an orderly manner;
- Ensure that any impacts from development on surrounding sensitive land uses are minimised; and
- Provide guidance and a general understanding of current and future development(s), and the key considerations applicable to any future development applications.

Background

The subject site has been operated as a resource extraction area and landfill facility since the 1990's, and via a series of development and environmental approvals the site accommodates gravel and sand extraction, landfill disposal, liquid and tailings waste disposal and associated site infrastructure.

The facility operator prepared a draft Masterplan in December 2020 for consideration of the Shire outlining their current and future proposed development.

The Masterplan includes a series of Management Plans which provides overarching information on matters including dust, fire control, landscaping and rehabilitation.

The Masterplan has not been formally endorsed by the Shire however this LDP has been prepared in consideration of the Masterplan.

Subject Site Context

The subject site is identified on the LDP and is described as Lot 2 Banksia Road, Crooked Brook. The site is located:

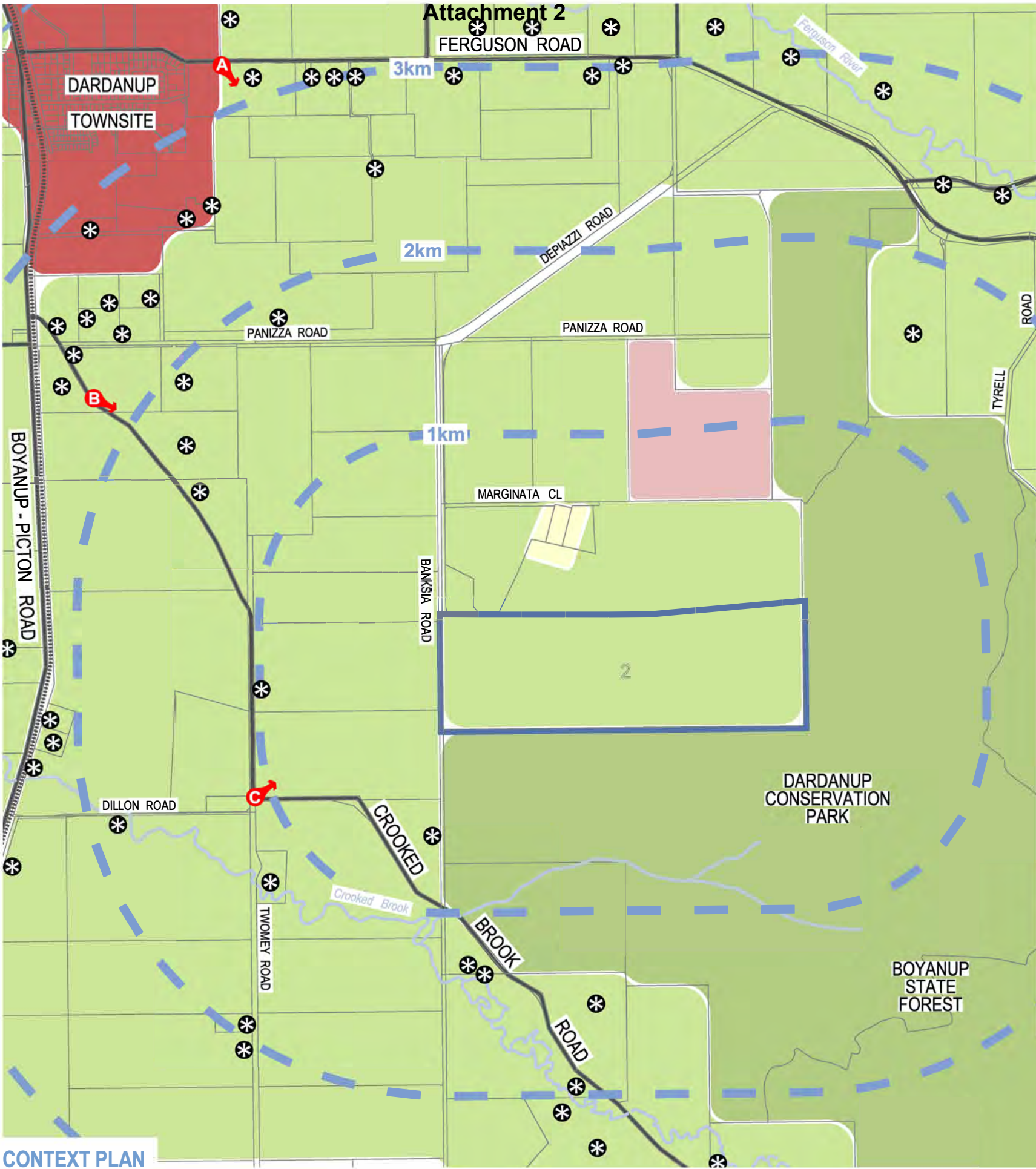
- To the immediate north and west of the Dardanup Conservation Park;
- Approximately 3.5km to the south-east of the Dardanup Townsite; and
- Approximately 1.5km to the north and north-east of the Crooked Brook creek.

Statutory Framework

All applications which are submitted to the Shire of Dardanup are to be guided by, and assessed against, the provisions of this LDP. Sufficient information should be provided with all development applications so that the local government can assess the cumulative impacts of previous/existing development

Endorsement Table

This Local Development Plan was approved by resolution of the Council of the Shire of Dardanup at the Ordinary Meeting of the Council held on the 26th day of May 2021.



Legend

- Extent of Local Development Plan
- Dardanup Townsite
- Rural/Rural Residential
- Conservation/State Forest/Open Space
- Public Purpose
- Special Use
- Sensitive Receptor - Residence
- Example View Locations

Example View Location 'A'



Example View Location 'B'



Example View Location 'C'



Development Applications

Development Applications are to clearly detail all development, including any temporary, staged and/or incidental works, with all development to occur within the boundary of the subject site.

Any variations to the provisions below will need to be fully justified and should be accompanied by relevant technical reports as necessary, which may include the revision/update of any existing management plans, or other technical reports previously approved by the Shire.

Boundary Setbacks

Development is to be setback from site boundaries a minimum of 30m to the Primary Street (Banksia Road) and a minimum of 20m to all other boundaries.

Height

Development is not to exceed a maximum height of 114m AHD, as outlined in the **Cross Section**.

This height limitation will apply to any structure on site, inclusive of buildings, plant or equipment, and any temporary or permanent bulk earthworks, stockpiles occurring on site.

As evident from the 'Example View Locations', the current facility has begun to protrude above the skyline and any proposed variation to this height limitation will require consideration of the visual impact to surrounding landowners and the ability minimize this impact.

Site Access and Circulation

The primary site access is to occur via Banksia Road at the location shown on the **Site Plan**, with internal circulation of all vehicles not to encroach on the 20m landscaped boundary interface. No heavy vehicles associated with the landfill facility are permitted on Panizza Road and the unsealed portion of Banksia Road.

Any development application which will result in additional traffic generation to the subject site is to be accompanied by:

- A Traffic Impact Assessment or Traffic Impact Statement consistent with the Department of Transport Guidelines to outline the relevant transport considerations and demonstrate the suitability of the proposed site access and vehicle circulation;
- Where additional Heavy Vehicles are proposed to access and egress the site, an assessment of the standard and suitability of the public road network to accommodate these vehicles, and an overview of the necessary upgrades and/or potential additional maintenance costs to accommodate these vehicle movements in perpetuity.

Landscaping Requirements

Development is to be appropriately screened from key viewpoints via the installation of a minimum 20m landscaping strip adjacent the subject site boundary which includes:

- Native tree plantings at a minimum size of 30 litres with a minimum mature height of 10m.
- A variety of smaller shrubs and plantings to provide greater density of foliage to the understorey of any trees.

Development applications are to be supported by a landscaping plan outlining the proposed landscape design and its effectiveness to screen the development proposed.

Fencing

All boundaries of the site are to be fenced with chain mesh fencing to a minimum of 2m in height and to include wildlife egress points.

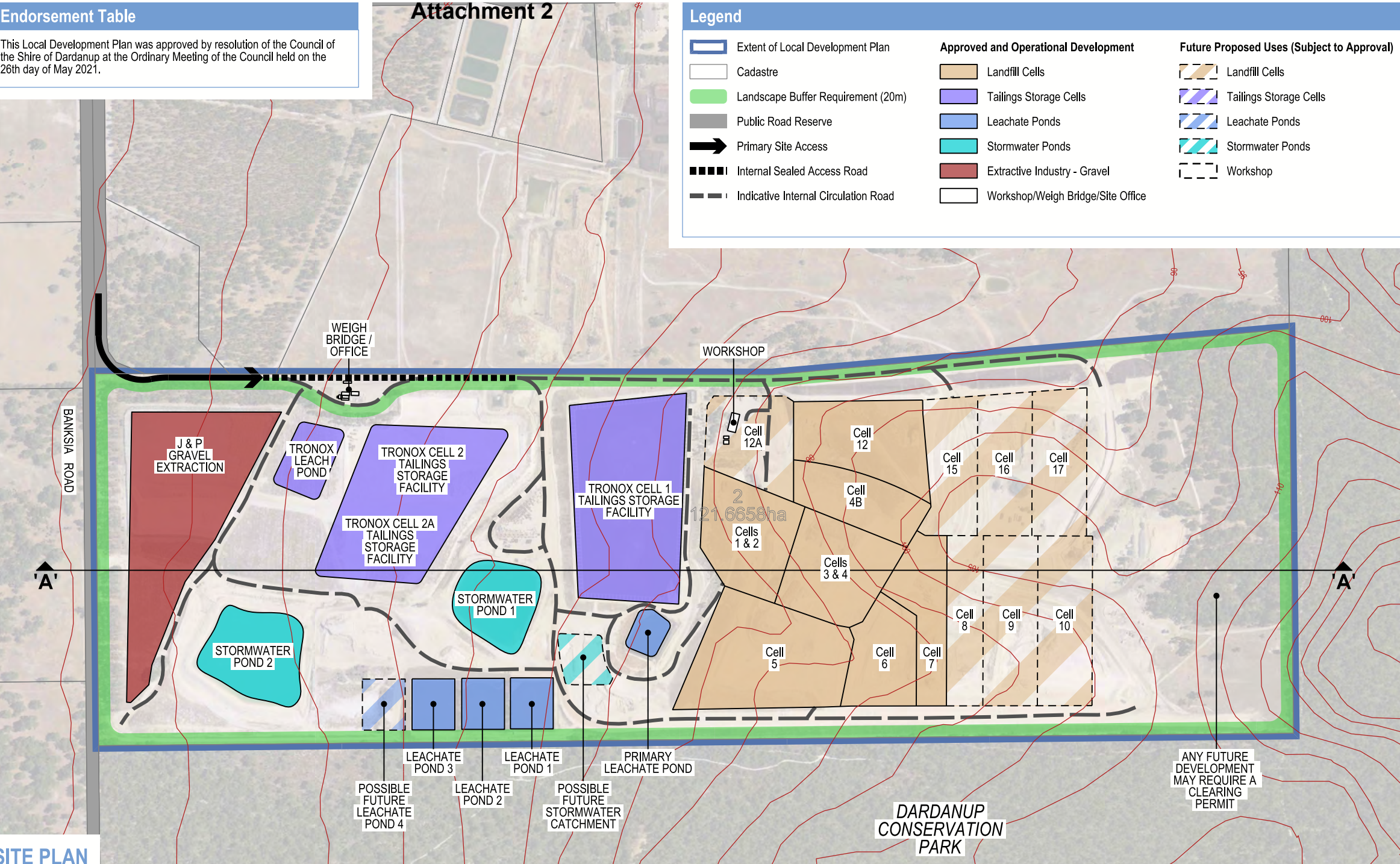
Environmental Management

Development applications are to demonstrate consistency with any environmental approvals for the subject site, and where relevant should be supported by technical assessment and management plans including but not limited to:

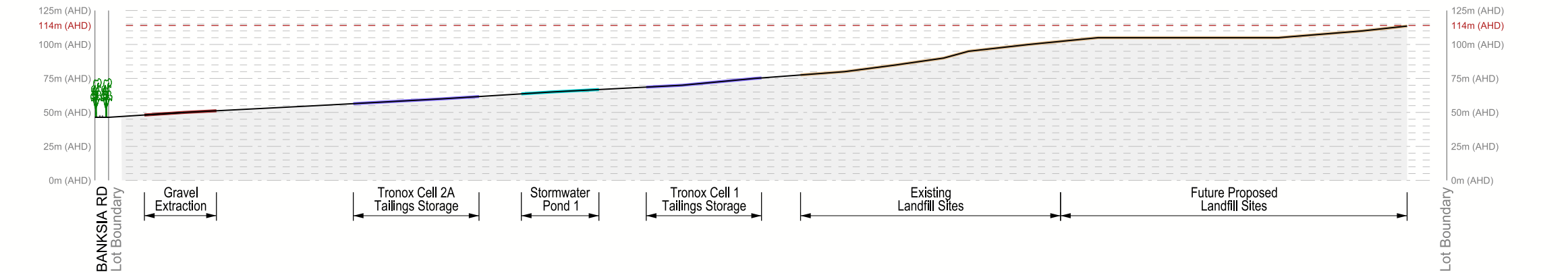
- A **Stormwater Management Plan** where the development will impact upon the management of stormwater on site and should address the mitigation of the off-site impacts of stormwater, including water erosions risk on neighbouring properties;
- An **Environmental Management Plan** that addresses vegetation clearing; hydrogeological impacts on surrounding land uses and the investigation and management of contamination or acid sulfate soils
- A **Bushfire Management Plan** prepared in accordance with the guidance provided by *State Planning Policy 3.7* where the development proposed is considered to pose a risk to human life or property
- A **Dust Management Plan** where the development is considered likely to generate dust which will impact on surrounding landholdings;
- A **Visual Impact Assessment** where the development is considered likely to impact views from key locations within the surrounding locality.
- An **Acoustic Report and Noise Management Plan** where the development is considered likely to result in noise which impacts the amenity and operations of surrounding landowners.

Endorsement Table

This Local Development Plan was approved by resolution of the Council of the Shire of Dardanup at the Ordinary Meeting of the Council held on the 26th day of May 2021.



Cross Section 'A-A'



APPENDIX M | Northern Stockpiles Contamination Technical Summary & Assessment



201515L01B

17 March 2022

Sally Carlton
Engineering Manager – WA
Cleanaway Waste Management
Lot 2 Banksia Road
Dardanup WA 6236

Attention: Sally Carlton

Dear Sally

DARDANUP LANDFILL SOIL STOCKPILE CLASSIFICATION WORKS**Executive Summary**

During the construction of Cell 8 on Lot 2, Cleanaway extracted clay and sandy clay material from Lot 2 and temporarily stored this material on the adjacent Lot 81 in two stockpiles. Following a Retrospective Development Application for the two stockpiles on Lot 81 not being approved by the Shire of Dardanup (Shire), Cleanaway was instructed to remove the stockpiles. Associated with the Stockpile Removal and Management Plan¹ (SRMP) agreed with the Shire as guidance for how the stockpiles are to be removed, there is a requirement to investigate the stockpiles to confirm their status with respect to contamination and the potential contamination risk for Lot 81. As part of the removal of this material from Lot 81 and transferring back to lot 2 for use in the landfill operations, Cleanaway commissioned the sampling and analysis to confirm the classification of the stockpiled material in accordance with relevant Western Australian site contamination guidelines.

The sampling and analysis undertaken for the "clay" and "sandy clay" stockpiled material provided a classification of the material and concluded that it was all not contaminated, and therefore, the stockpiled material would not have contaminated Lot 81 and does not preclude the use of Lot 81 for uses consistent with its rural zoning, i.e. agriculture. Additionally, Lot 2, where the material originated from, is also therefore, not contaminated based on the analysis of the material.

Introduction

Tonkin were commissioned by Cleanaway for environmental consultancy services to assist Cleanaway in the assessment of stockpiled soils. Cleanaway operates the Dardanup Landfill on Lot 2 Banksia Road, Dardanup WA as a putrescible (Class III) Landfill under Department of Water and Environmental Regulation (DWER) Licence L8904/2015/1. During the construction of Cell 8 at the Dardanup Landfill in 2020, soil material was stockpiled on the adjacent Lot 81 Marginata Close Crooked Brook (Lot 81) in two stockpiles: a "sandy clay" stockpile containing 37,222 m³ and a "clay" stockpile containing 139,129 m³.

The Shire of Dardanup (Shire) has given Cleanaway a written direction, under the *Planning and Development Act 2005*, requiring the removal of the stockpiles and restoration of the relevant area of Lot 81 by September 2022 but this is the subject of review proceedings and an order staying the

¹ Tonkin. 2021. *Stockpile Removal and Management Plan. Lot 81 Marginata Close*. Ref 201515R008 Revision 2 Dated 21/12/2021



effect of the direction. Notwithstanding the ongoing proceedings, Cleanaway has commissioned sampling and analysis of the stockpiled material to confirm it is uncontaminated, as part of the removal of the material and restoration of Lot 81.

Four samples have been recovered from the stockpiles with two samples from the “clay” stockpile and two samples from the “sandy clay” stockpile. These samples were used to inform the development of the sampling program detailed in the Stockpile Removal and Management Plan¹ (SRMP) that Cleanaway has had prepared and is provided as an attachment to this letter. The environmental consultancy services consisted of professional advice and instruction to Cleanaway’s nominated sampling team (WML Engineering, Bunbury) regarding the collection of soil samples.

Objectives

The objective of these works was to classify the stockpiled material in accordance with relevant Western Australian site contamination guidelines to ensure it is not contaminated and would not preclude the use of Lot 81 for uses consistent with its rural zoning, i.e. agriculture.

Investigation Methodology

The investigation methodology described herein, was completed in accordance with the ‘Sampling of Soil Stockpiles’ Memorandum² completed by Tonkin. All soil investigation, data interpretation and reporting works undertaken as a part of this assessment has been completed in accordance with the requirements of the *National Environmental Protection (Assessment of Site Contamination) Measure 1999* (ASC NEPM), as amended in 2013, as required by the *Assessment of Contaminated Sites. Contaminated Sites Guidelines*” (DER, 2014).

Soil investigation works were completed on 14 and 15 February 2022 by experienced personnel from WML Engineering. A total of 85 samples plus ten duplicate samples were collected from both stockpiles. The sampling numbers and collection methodology were based on the ASC NEPM as detailed in the SRMP. It should be noted that the volume of both stockpiles has decreased since the SRMP was completed and at the time of sampling, the “clay” stockpile was approximately 72,582 m³ and the “sandy clay” stockpile was approximately 36,254 m³, reducing the total number of samples required to be collected.

The works undertaken as part of the soil investigation included:

- Provision of detailed sampling instructions to Cleanaway’s nominated field sampling team, WML Engineering. Instructions included written information completed by Tonkin regarding sampling procedure, paperwork requirements and instruction for packing and sending samples.
- Coordination of the delivery of soil sample jars, eskies and ice bricks from Perth to the WML office in Bunbury.
- Collection of soil samples from both stockpiles using a small excavator. Samples were collected at various depths ranging from 0.3 m to 5 m from the surface within the stockpiles. The collection of samples from the exterior 300 mm was avoided.
- The sampling program undertaken was grid-based sampling consisted with the approach detailed in Section 7.5, Schedule B2 ASC NEPM.
- Recording of observations of the encountered soil material and logging of the identified stratigraphy in general accordance with the Unified Soil Classification System (USCS).

² Tonkin. 2021. *Sampling of Soil Stockpiles*. Ref 201515C02Rev0, dated 29/11/2021



- Collection of a total of 50 samples and six duplicates from the “clay” stockpile and collection of 35 samples and four duplicates from the “sandy clay” stockpile.
- Soil samples were placed in pre-labelled laboratory supplied glass soil jars and stored on ice inside a cooler while onsite and in transit to the NATA accredited analytical laboratories under standard chain of custody procedures.
- Review of test pit logs and soil descriptions provided by WML and the ordering of testing of the soil samples which were couriered by WML directly to ALS Environmental (ALS) Perth.
- All soil samples were submitted to ALS for a range of analysis including pH, heavy metals, polycyclic aromatic hydrocarbons (PAH), total recoverable hydrocarbons (TRH) and analytes contained within a complete suite of contaminants:
 - pH (1:5), EC (1:5), Fe, CEC, TOC, Clay content
 - Metals and metalloids: As, B, Ba, Be, Cd, Cr, Cr (VI), Co, Cu, Mn, Ni, Pb, Se, V, Zn, Hg
 - Inorganics: cyanide (amenable), cyanide (total)
 - Organics: BTEX, petroleum hydrocarbons, PAHs (16), cresols (total), phenols, OCPs, PCBs
- Five intra-laboratory duplicate samples were submitted to ALS and analysed for heavy metals.
- Five inter-laboratory duplicate samples were forwarded to Eurofins MGT (MGT) and analysed for heavy metals.

Summary of Findings

The “clay” stockpile consisted predominantly of pale coloured sands with trace clay as well as cream brown clayey sands with low plasticity. The “sandy clay” stockpile consisted of predominantly pale grey sands and clayey sand with low plasticity. Descriptions of individual samples are provided in the field notes (Attachment 1) as well as the sampling location plan.

Assessment Criteria

“Assessment and Management of Contaminated Sites. Contaminated Sites Guidelines” (DER, 2014), referred to hereafter as the CS Guideline, has been developed under the *Contaminated Sites Act 2003* for the assessment and management of contaminated sites in Western Australia. It has been developed using the framework provided by the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (ASC NEPM) and is therefore the relevant guideline for assessing potential contamination of Lot 81. The Landfill Waste Classification and Waste Definitions 1996 (as amended December 2019), referred to hereafter as Waste Guideline, is for classification of wastes for acceptance to landfills.

For Lot 81, a Tier 1 screening risk assessment had been undertaken which compares the site collected data with generic assessment levels. The relevant assessment levels nominated for soil in the CS Guideline are contained within the NEPM. The NEPM provides guidance on Ecological Investigation Levels (EILs) and Health Investigation Levels (HILs) for a range of land use settings. Lot 81 is rural zoned and hence the relevant investigation levels are:

- EIL for Urban Residential and Public Open Space, which is in line with the requirement for agricultural land (Section 2.2.1.4 Schedule B5b); and
- HIL D – Commercial Industrial.

Analytical Results

Laboratory reports and a complete table of analytical results compared against relevant criteria are provided as attachments to this letter and summarised below.



Quality Assurance and Quality Control

Quality assurance and quality control procedures were undertaken in accordance with the requirements of the ASC NEPM and Australian Standard AS4482.1 2005 *'Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile compounds'*, which includes:

- Quality assurance: decontaminating field sampling equipment; wearing clean nitrile gloves for each sample collected; using laboratory provided sampling jars; placing samples in a chilled ice box upon collection; couriering samples to the laboratory as soon as possible and delivering of samples to the laboratory under standard Chain of Custody procedures.
- Quality control: for every 20 samples, or part thereof, collected, collect one intra-laboratory duplicate and one intra-laboratory duplicate.

The sampling instructions which were sent to the field sampling team (WML Engineering) prior to the field works, detailed the necessary quality assurance protocols which should be followed during the sampling program. This included using clean nitrile gloves for each sample, cleaning the small hand trowel or shovel in between samples using a dry brush and distilled water and utilising the glass sample jars provided by the laboratory. The samples were also sent in accordance with the laboratories standard Chain of Custody Procedures and the laboratory received the samples the day after sampling was completed.

The number of duplicate samples collected were in accordance with the ASC NEPM as a total of 10 duplicate samples were collected from the 85 primary samples. The Relative Percentile Differences (RPDs) were also calculated between the primary and duplicate sample pairs. Precision of analytical results is measured by the RPDs between duplicate results. RPDs are generally considered acceptable if they are less than 30% (ASC NEPM). When both results are less than 10 times the laboratory limit of reporting (LOR), where actual differences are minor, higher RPDs are not considered to affect the interpretation of results.

Five intra-laboratory duplicates and five inter-laboratory duplicates were collected and submitted for laboratory analysis. There were no RPD's observed to be elevated above the acceptable range between the following primary and duplicate samples:

- Primary sample SP2-11 and intra-laboratory duplicate DUP01.
- Primary sample SP2-19 and inter-laboratory duplicate DUP02.
- Primary sample SP2-17 and intra-laboratory duplicate DUP03.
- Primary sample SP2-35 and inter-laboratory duplicate DUP04.
- Primary sample SP1-12 and intra-laboratory duplicate DUP05.
- Primary sample SP1-22 and intra-laboratory duplicate DUP07.
- Primary sample SP1-36 and inter-laboratory duplicate DUP08.

RPDs were elevated above the acceptable range between the following primary and duplicate samples:

- Primary sample SP1-19 and inter-laboratory duplicate DUP06 for arsenic.
- Primary sample SP1-46 and intra-laboratory duplicate DUP09 for chromium.
- Primary sample SP1-50 and inter-laboratory duplicate DUP10 for moisture content.



The elevated RPDs for arsenic and chromium are considered acceptable as the results are less than 10 times the LOR. The elevated RPD for moisture is not considered to affect the interpretation of the results due to soil heterogeneity.

It should be noted that however, most of the results in both the primary samples and the duplicates were below the LOR, therefore, RPDs were unable to be calculated for the majority of analytes.

The laboratory quality control reports (Attachment 3) were reviewed and were found to contain three matrix spike outliers in the ALS report EP2201806. The matrix spike outliers occurred for arsenic and two for hexavalent chromium. For all three matrix spikes, the recovery was less than the lower data quality objective. No method blank, duplicate, laboratory control, holding time or surrogate outliers were recorded. No outliers occurred for the Eurofins report 866929. The laboratory reports are considered acceptable for the purposes of this investigation.

Results

On receipt of the analytical data, a qualitative review was undertaken against the relevant NEPM criteria as specified above. The results with comparison to the afore mentioned criteria are provided as an attachment to this letter. Of the 85 samples submitted for analysis, the exceedances of the assessment criteria are summarised following:

- There were no exceedances of the HIL-D commercial/industrial or the EILs for urban residential and public open space criteria.

Conclusions/ Recommendations

The sampling and analysis undertaken for the "clay" and "sandy clay" stockpiles have concluded that the material within both stockpiles is uncontaminated and therefore, would not have contaminated Lot 81 and does not preclude the use of Lot 81 for uses consistent with its rural zoning, i.e. agriculture. Additionally, Lot 2, where the material originated from, is also therefore not contaminated based on the analysis of the material.

Yours sincerely,

Ellen Tansell

Environmental Scientist

Tonkin

Enc Attachment 1 – Field Notes
 Attachment 2 – Table 1: Stockpile 1 Results
 – Table 2: Stockpile 2 Results
 Attachment 3 – Laboratory Reports
 Attachment 4 – Stockpile Removal and Management Plan

05/08/2022

Attachment 2

Northern Stockpiles Assessment as DWER Waste Classifications -Uncontaminated Fill

Clean fill : The definition of clean fill is contained in section 2 of the Waste Definitions and essentially means raw, excavated, natural material such as clay, gravel, sand, soil or rock fines sourced from land that has not been used for any of the potentially contaminating land uses listed in Appendix B of the Assessment and management of contaminated sites – (DWER Website)

Section 5-of DWER -Landfill Waste Classifications and Waste definitions 1996 as amended 2019) has how to confirm ‘uncontaminated fill’ status.

Table 6 contains the ‘Maximum concentration thresholds of relevant chemical substances and limits of relevant physical attributes for uncontaminated fill’

Table 6 Maximum concentration thresholds of relevant chemical substances and limits of relevant physical attributes for uncontaminated fill			Northern Stockpile Sample Results – Eurofins-ARL Laboratory							
Parameter	Maximum Concentration mg/kg , dry weight	Leaching test ASLP ug/L	Clay Stockpile Sample 1		Clay Stockpile Sample 2		Sandy Clay Stockpile Sample 3		Clay Stockpile Sample 4	
Metals & Metalloids			Max. Conc. mg/kg	ASLP ug/L	Max. Conc. mg/kg	ASLP ug/L	Max. Conc. mg/kg	ASLP ug/L	Max. Conc. mg/kg	ASLP ug/L
Antimony	20	3	<2	<0.001	<2	<0.001	<2	<0.001	<2	<0.001
Arsenic	100	10	<5	<0.001	<5	<0.001	<5	<0.001	<5	<0.001
Barium	500	-	21	0.54	10	0.35	14	0.41	25	0.48
Beryllium	4	-	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01
Cadmium	1	0.2	<0.1	<0.02	<0.1	<0.02	<0.1	<0.02	<0.1	<0.02
Chromium (III)	160	3	<1	<0.001	3	<0.001	14	<0.001	3	<0.001
Chromium (VI)	1	1	<1	<0.002	<1	<0.002	<1	<0.002	<1	<0.002
Cobalt	50	1	<1	<0.01	3	<0.01	14	<0.01	3	<0.01
Copper	50	2	2	<0.01	12	<0.01	15	<0.01	9	<0.01
Lead	300	3	5	<0.01	11	<0.01	13	<0.01	4	<0.01
Manganese	500	500	8	<0.01	17	<0.01	22	<0.01	7	<0.01
Mercury	0.5	0.05	<0.02	<0.0002	<0.02	<0.0002	<0.02	<0.0002	<0.02	<0.0002
Molybdenum	10	50	<2	<0.01	<2	<0.01	<2	<0.01	<2	<0.01
Nickel	10	10	<1	<0.01	<1	<0.01	<1	<0.01	<1	<0.01
Selenium	1	5	<2	<0.001	13	<0.001	14	<0.001	5	<0.001
Silver	20	0.05	<1	<0.01	<1	<0.01	<1	<0.01	<1	<0.01
Thallium	1	0.03	<0.5	<0.01	<0.5	<0.01	<0.5	<0.01	<0.5	<0.01
Tin	50	-	<1	<0.01	<1	<0.01	<1	<0.01	<1	<0.01
Uranium	25	0.5	<0.5	<0.001	0.6	<0.001	0.7	<0.001	<0.5	<0.001
Vanadium	130	-	18	<0.01	67	<0.01	52	<0.01	13	<0.01
Zinc	120	10	2	0.01	2	0.04	2	0.04	2	0.03

05/08/2022

Attachment 2

[illegible]

05/08/2022

Attachment 2

Parameter	Maximum Concentration mg/kg , dry weight	Leaching test ASLP ug/L	Clay Stockpile Sample 1		Clay Stockpile Sample 2		Sandy Clay Stockpile Sample 3		Clay Stockpile Sample 4	
Pesticides			Max. Conc. mg/kg	ASLP ug/L	Max. Conc. mg/kg	ASLP ug/L	Max. Conc. mg/kg	ASLP ug/L	Max. Conc. mg/kg	ASLP ug/L
Aldrin	-	0.001	<0.01	Lab Results not yet available	<0.01	Lab Results not yet available	<0.01	Lab Results not yet available	<0.01	Lab Results not yet available
Dieldrin	-	0.01	<0.01		<0.01		<0.01		<0.01	
DDT+DDD+DDE	3	0.006 DDT 0.0005 DDE	Sum <0.04		Sum <0.04		Sum <0.04		Sum <0.04	
Physical Attributes	pH Units		pH Units		pH Units		pH Units		pH Units	
pH (pH units)	5.5-8.5		6.4		5.8		5.4		5.3	

Note:

A '-' indicated in Table 6 means no laboratory testing required for that individual analyte.

Laboratory Evaluation not completed for:

- i) Asbestos
- ii) Laboratory has yet to complete the leaching test results (ASLP) for organic compounds – results to follow in the near future.
- iii) Review of Other Pesticides as less <Australian Drinking Water Guidelines (<ADWG) & <Australian & NZ Fresh & Marine Water Quality (<WQG) – with any additional compounds selected for analysis of based on site history – Nil additional pesticides applicable based on site history.

Attached is the Eurofins Laboratory Report- Job Number 21-12849 Rev 00 -4th August 2021

25/08/2021

S Carlton

APPENDIX N | Environmental Offset Report



ENVIRONMENTAL OFFSET PROPOSAL

LOT 81 AND LOT 2 BANKSIA ROAD, CROOKED
BROOK

JUNE 2022



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1 INTRODUCTION

1.1 Background

J and P Corporation (the proponent) are proposing to clear 10.75 hectares (ha) on Lot 81 on Plan 403943 Banksia Road, Crooked Brook (herein referred to as Lot 81) and 6.06 ha on Lot 2 on Diagram 65861 Banksia Road, Crooked Brook (herein referred to as Lot 2). The total clearing footprint equates to 16.81 ha.

Within Lot 81, the proposed clearing is required to enable development for a sand and gravel extraction operation.

Within Lot 2, the clearing is required to:

- Utilise in-situ sand for daily cover and internal roads during the winter months, and gravel material for the construction of internal drains and stormwater infrastructure.

A Development Approval application for the abovementioned works within Lot 2 has been submitted to the Shire of Dardanup and approval is pending.

Lot 81 and Lot 2 are zoned “Rural” under the Greater Bunbury Region Scheme and “General Farming” pursuant to the Town Planning Scheme (TPS) No. 3. In accordance with the Shire of Dardanup’s Local Planning Strategy, Lot 81 and Lot 2 are zoned ‘Waste Disposal/Processing’. Currently, Lot 2 is operated as a waste facility to meet the waste needs of the southwest region. A report commissioned by the Shire of Dardanup which involved community and government agency engagement determined that suitable land uses for Lot 81 and Lot 2 included waste storage facility, waste disposal facility and Industry – Extractive (Urbaqua 2020). This determination was made in consideration of environmental, planning and social impacts with consultation undertaken between the Department of Planning, Land and Heritage (DPLH), Department of Water and Environmental Regulation (DWER) and Department of Biodiversity, Conservation and Attractions (DBCA).

A black cockatoo (Baudin’s black-cockatoo (*Calyptorhynchus baudinii*), Carnaby’s black cockatoo (*Calyptorhynchus latirostris*) and the forest red-tailed black-cockatoo (*Calyptorhynchus banksii naso*)) assessment (Harewood 2015 and Harewood 2021a) was undertaken whereby it was identified that the vegetation present within Lot 81 and Lot 2 contains potential black cockatoo breeding habitat in addition to identified foraging and roosting habitat. Accordingly, environmental offsets are required to compensate for the residual adverse impacts of the proposed action on black cockatoo habitat.

1.2 Document Purpose

This Offset Proposal applies only to the proposed clearing at Lot 81 and Lot 2 Banksia Road, Crooked Brook. It addresses the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* and the *Environmental Offsets Policy* (October 2012). This Proposal applies the offset requirements of the Department of Agriculture, Water and the Environment (DAWE) EPBC Act offsets policy and calculator.

The environmental offset is directed at the residual impacts on the three threatened species of black cockatoo from the proposed action.

The objectives of this Plan are to:

- Mitigate significant and unavoidable adverse environmental impacts by a positive environmental gain, with an aspirational goal of achieving a ‘net environmental benefit’;

- Apply actions for implementation as other options to avoid and mitigate environmental impacts have been considered and exhausted;
- Target the stated matters with significant residual impacts resulting from the implementation of the proposed action;
- Deliver the offset in a timely manner and be long lasting; and
- Monitor and audit the implementation of the proposed offsets.

1.3 Black Cockatoo Habitat Assessment

1.3.1 Lot 81 Banksia Road

The black cockatoo assessment (Harewood 2015) identified 24 habitat trees (DBH of >50cm) with hollows potentially suitable for nesting within the Lot 81 clearing footprint (refer to **Figure 1**). No actual evidence of any hollows being used by black cockatoos for nesting (currently or previously) was recorded (Harewood 2015).

The following represents a list of the observed plant species present within Lot 81 known to be used by one or more of the black cockatoo species as a food source (i.e. foraging habitat):

- Marri – *C. calophylla*/Mountain Marri *C. haematoxylon* - flowers, seeds, nectar, grubs.
- Jarrah – *E. marginata* – seeds.
- Bull banksia – *B. grandis* - flowers, seeds, grubs.
- Snottygobble - *P. longifolia* – seeds.

Evidence of two species of black cockatoos foraging onsite was observed during the field survey in the form of numerous examples of chewed jarrah fruits and to a lesser extent chewed marri/mountain marri fruits and banksia cones. This majority of this evidence (jarrah and marri/mountain marri fruits) was attributed to the forest red-tailed black cockatoo, a species which appears to be relatively common in the area. Foraging evidence attributed to Baudin's black cockatoo (marri and banksia cones) was less commonly recorded. With the dominance of jarrah and marri/mountain marri, the vegetation present within Lot 81 can be regarded as quality foraging habitat for black cockatoos (Harewood 2015).

1.3.2 Lot 2 Banksia Road

A black cockatoo habitat assessment (Harewood 2021a, refer to **Appendix A**) identified two habitat trees (DBH of >50cm) with hollows potentially suitable for nesting within the Lot 2 clearing footprint. Hollows in other trees were assessed as being unsuitable (i.e. too small or with an unfavourable orientation) or in some cases no hollow was found to be present. Within the clearing footprint, no actual evidence of any hollows being used by black cockatoos for nesting (currently or previously) was recorded (Harewood 2021a). Within the vegetation retention buffer, one tree assessed as having hollows possibly suitable for black cockatoos to use for nesting purposes showed evidence of past use. This evidence was in the form of significant chewing around the hollows entrance. This tree will be retained within the vegetation buffer denoting that only two habitat trees with hollows potentially suitable for nesting will be impacted within Lot 2 (Harewood 2021a).

The following flora species are known to be or are potentially used as a direct food source (e.g. seeds, flowers, nectar, bark or grubs) by one or more species of black cockatoo and have been recorded within Lot 2:

- Marri – *Corymbia calophylla*;
- Jarrah – *Eucalyptus marginata*;

- Couch Honey-pot Dryandra - *Banksia dallanneyi*;
- Honeybush - *Hakea lissocarpa*;
- Kingia - *Kingia australis*;
- Snottygoble - *Persoonia longifolia*; and
- Peppermint – *Agonis flexuosa*.

During the assessment, evidence of black cockatoos foraging was observed at a few locations (Harewood 2021a). This evidence was mainly in the form of chewed fruits from marri. This foraging activity was attributed to the forest red-tailed black cockatoo. Given the dominance of jarrah and marri across the site, the vegetation can be regarded as representing quality foraging habitat (Harewood 2021a).

No evidence of black cockatoos roosting within trees located within the survey area was observed during the survey period (Harewood 2021a).

2 AVOIDANCE AND MITIGATION MEASURES

2.1 Avoidance Measures

The proponent has considered alternative locations for the proposed action within Lot 81 and Lot 2. However, regarding Lot 81, the gravel resource is restricted to the nominated clearing footprint. Previously cleared areas within Lot 81 either do not contain sufficient resource to warrant the proposed extractive industry or are considered unfeasible due to depth to groundwater.

In relation to Lot 2, the topographic relief in certain areas, and proximity to groundwater in the western portions of the Lot render the proposed clearing footprint as the only feasible location for obtaining the required materials.

To avoid any potential impacts to the adjacent Dardanup Conservation Park from the proposed action, a 50 m and 100 m buffer of vegetation will be established from the internal firebreak within Lot 2 and Lot 81, respectively. This will involve the application of a conservation covenant over the vegetation to enable protection in perpetuity. This will also ensure that the identified black cockatoo roosting tree (Harewood 2015) on the northern boundary of Lot 81 will be retained, in addition to the tree containing a hollow with evidence of historical use within Lot 2 (Harewood 2021a).

Given that the clearing area has historically been subject to livestock grazing (resulting in a reduced mid and understorey), the key environmental attributes are the mature habitat trees. These are interspersed throughout the clearing footprint and therefore areas of increased environmental value could not be reasonably isolated.

It is considered that no other feasible avoidance measures can be implemented within the clearing footprint.

2.2 Mitigation Measures

Historically, there have been some impacts to the Dardanup Conservation Park associated with the existing land use within Lot 2 (landfill). This has included wind-blown litter and inadequate stormwater management. Over the last two years, these two issues have been targeted resulting in the following:

- The installation of 3 m high cyclone fencing around the periphery of waste cells and 2 m high fencing around the property boundary to prevent wind-blown litter (refer to **Plates 1 and 2**);
- A full time litter picker has been employed to collect litter throughout the site for five days a week; and
- Significant upgrades to stormwater infrastructure have been implemented to ensure that there is no direct discharge of stormwater into the Dardanup Conservation Park.



Plate 1. Cyclone fencing on southern property boundary and upgraded stormwater infrastructure.



Plate 2. Cyclone fencing on the periphery of a waste cell.

In order to further reduce the impacts from the proposed action, a series of management plans will be implemented as described below.

Flora and Vegetation Management

The management objectives for vegetation and flora are:

- Restrict vegetation clearing to a practical minimum;
- Prevent unauthorised clearing of native vegetation outside of the clearing footprint; and
- Minimise disturbance to remaining vegetation to retain health and integrity.

Management actions to minimise disturbance to vegetation include:

- Peg/flag areas to be cleared to avoid any unnecessary disturbance to adjacent vegetation;
- Create strategic firebreaks where necessary; and
- Restrict vehicle movement to designated access tracks, to prevent vegetation damage and erosion.

Fauna Management

The proposed management actions to mitigate potential impacts to fauna include:

- Plan clearing such that it does not result in the creation of isolated remnants of native vegetation that have no ecological corridors to allow fauna movement to adjacent areas;
- Restrict all vehicle use to designated roads and access tracks;
- Enforce compliance with onsite speed limits at all times;
- General housekeeping procedures such as litter removal at the perimeter of the Lots will be maintained to discourage fauna from entering the site from the adjacent Dardanup Conservation Park;
- Investigate methods for removing European honey bee hives from the clearing footprint;
- During clearing, a qualified fauna expert will be present to direct clearing operators, particularly when clearing trees that are occupied by fauna, to ensure that these are cleared in a way that allows the animals to safely mobilise to adjacent areas. In addition, they will supervise any animal handling and the rescue of injured animals should this be required;
- No stockpiling of topsoil or other material is to occur outside of the clearing boundary;
- If clearing during black cockatoo breeding season (i.e. August to May), check potential habitat trees (i.e. DBH in excess of 50 cm) for nesting hollows; and
- If active black cockatoo nests are located in the clearing footprint, do not clear until fledglings have left the nest.

Weed and Pathogen Management

The proposed management actions to mitigate potential impacts associated with weeds and pathogens include:

- All earthmoving and ground engaging equipment will be inspected and cleaned of vegetation, mud and soil prior to entry and exit of the impact area.

In addition to the proposed management measures, within Lot 81 the 10.76 ha will be cleared progressively over approximately five years. Subsequently, it is not proposed that the entire 10.76 ha will be cleared as a single exercise but rather at an approximate rate of four hectares per annum. For both Lots, clearing will commence in a west to east direction, which will enable fauna to naturally disperse into the adjoining Dardanup Conservation Park.

Based on the above, the proposed clearing is unlikely to impact on the persistence of the species', however the action will result in a residual impact of clearing 16.81 ha of black cockatoo habitat.

3 OFFSET PROPOSAL

3.1 Offset Proposal

This Offset Proposal addresses the significant residual impacts to black cockatoos from the impact of clearing 16.81 ha of known foraging habitat and potential breeding habitat.

The proponent proposes the following offsets to counterbalance the residual environmental impacts associated with the proposed clearing:

- Direct Offset 1: Conservation in perpetuity of 5.22 ha of non-secure remnant native vegetation within Lot 10 Temple Road, East Picton (Lot on Survey P070159 10) (refer to **Figure 2**);
- Direct Offset 2: Conservation in perpetuity of 38 ha of non-secure remnant native vegetation in Lot 2148 Ferguson Road, Ferguson (refer to **Figure 3**); and
- Direct Offset 3: Retention and improvement of 7.86 ha of black cockatoo foraging and breeding habitat within the vegetation buffer (refer to **Figure 1**).

3.1.1 Direct Offset 1

Lot 10 is located approximately 12 km north-west of the clearing footprint. The vegetation has been mapped as Beard Vegetation Association 1000. This vegetation is described as medium forest consisting of jarrah and marri low woodland and banksia low forest with teatree (*Melaleuca* spp.) (Shepherd *et al.*, 2001). It is also mapped as Southern River complex which is described as predominately open woodland of marri, jarrah and banksia sp., with fringing woodland of *Eucalyptus rudis* and *Melaleuca raphiophylla* (swamp paperbark) along creek beds (Hedde *et al.*, 1980).

A flora vegetation and fauna survey was undertaken within Lot 10 to determine the quality and extent of black cockatoo habitat (GHD 2021) (refer to **Appendix B**). The proposed offset area (5.22 ha) was identified to contain four fauna habitat types, namely Marri-Banksia woodland (Habitat 1), Banksia Nuytsia woodland (Habitat 2), Marri Peppermint woodland (Habitat 4) and *Melaleuca raphiophylla* wetland (Habitat 7) (refer to **Plates 3** and **4**). A detailed foraging habitat assessment using the foraging habitat scoring tool (DotEE 2017) was undertaken to determine the value of the vegetation within the offset area for black cockatoos. This resulted in a classification of 'Very High' quality foraging habitat for Habitats 1, 2 and 4. In addition, along surveyed transects (not within the entire area), 18 potential black cockatoo habitat trees were identified within the proposed offset area (GHD 2021).

The survey also identified the presence of one Western Ringtail Possum (*Pseudocheirus occidentalis*), listed as Critically Endangered under the EPBC Act and BC Act, within adjoining vegetation (GHD 2021).

Based on the results of the desktop searches, dominant species, landform features and field observations three conservation significant ecological community were identified within the proposed offset area. These communities cover the same extent and are associated with Marri, Jarrah, Banksia woodlands. The communities are:

- EPBC Act Threatened Ecological Community (TEC) Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered);
- BC Act Priority Ecological Community (PEC) Southern *Banksia attenuata* woodlands FCT 21b (Priority 3);
- BC Act PEC Banksia dominated woodlands of the Swan Coastal Plain IBRA region Priority 3 Priority Ecological Community (PEC) listed by DBCA).

Lot 10 is currently owned by the proponent. It is zoned “Rural” under the Greater Bunbury Region Scheme and “General Farming” pursuant to the Town Planning Scheme (TPS) No. 3.

To protect the 5.22 ha of vegetation, the proponent will enter into a conservation covenant (voluntary written agreement) with the Commissioner of Soil and Land Conservation under section 3 of the *Soil and Land Conservation Act 1945*. The purpose of the conservation covenant is to protect and manage the native vegetation in such a way as to retain and promote its growth. The term of the conservation covenant will be in perpetuity and will bind the landowner and all successive landowners through registration as a memorial on the property’s certificate of title.



Plate 3. Remnant vegetation within Lot 10, Direct Offset 1.



Plate 4. Remnant vegetation within Lot 10, Direct Offset 1.

3.1.2 Direct Offset 2

For Direct Offset 2 it is proposed to conserve in perpetuity 38 ha of remnant vegetation within Lot 2148 Ferguson Road, Ferguson. Lot 2148 is located approximately 14 km east of the clearing footprint and is

situated on private property that is surrounded by 28,000 ha of State Forest, forest conservation zones, conservation parks, proposed conservation parks, and Crown reserves.

Within Lot 2148, the vegetation has been mapped as Beard Vegetation Association 3. This vegetation is described as medium forest consisting of jarrah and marri (Shepherd *et al.*, 2001) (refer to **Plates 5 and 6**). It is also mapped as Yarragil complex which is described as open forest of *Eucalyptus marginata subsp. Marginata-Corymbia calophylla* on slopes with mixtures of *Eucalyptus patens* and *Eucalyptus megacarpa* (Hedde *et al.*, 1980).

A black cockatoo habitat survey (Harewood 2021b) was undertaken within the proposed offset area to provide an estimate of the number of black cockatoo breeding habitat trees present. To estimate the number of trees with a DBH of >50cm present, six 100 metre by 100 metre quadrats (1 ha each) were established and the number of trees with a DBH >50cm present counted. These figures were then used to estimate the total number of trees with a DBH >50cm present in the total survey area. Based on the habitat tree survey, it was estimated that the offset area contains approximately 1,286 habitat trees (refer to **Appendix C**).

Vegetation across the entire Lot can be considered as representing black cockatoo foraging habitat given the dominance of marri and jarrah. Foraging evidence was observed at several location. This evidence was attributed to either the forest redtailed black cockatoo (marri, jarrah and blackbutt debris) and Baudin's black cockatoo (marri debris) depending on the nature of the evidence observed (Harewood 2021b).

No evidence of black cockatoos roosting with the offset area was observed however it may be used for this purpose at times (Harewood 2021b).

Lot 2148 is zoned "Rural" under the Greater Bunbury Region Scheme and "General Farming" pursuant to the Town Planning Scheme (TPS) No. 3.

To protect the 38 ha of vegetation, the proponent has purchased the property and will enter into a conservation covenant (voluntary written agreement) with the Commissioner of Soil and Land Conservation under section 3 of the *Soil and Land Conservation Act 1945*. The purpose of the conservation covenant is to protect and manage the native vegetation within the offset in such a way as to retain and promote its growth. The term of the conservation covenant will be in perpetuity and will bind the landowner and all successive landowners through registration as a memorial on the property's certificate of title.



Plate 5. Remnant vegetation within Lot 2148, Direct Offset 2.



Plate 6. Remnant vegetation within Lot 2148, Direct Offset 2.

3.1.3 Direct Offset 3

Direct Offset 3 involves the conservation in perpetuity of 7.86 ha of remnant vegetation within Lot 81 and Lot 2 Banksia Road, Crooked Brook. This vegetation will provide a 50 m and 100 m buffer of vegetation from the internal firebreak to the Dardanup Conservation Park within Lot 2 and Lot 81, respectively. This will involve the application of a conservation covenant over the vegetation to enable protection in perpetuity. This will also ensure that the identified black cockatoo roosting tree (Harewood 2015) on the

northern boundary of Lot 81 will be retained, in addition to the tree containing a hollow with evidence of historical use within Lot 2 (Harewood 2021).

The vegetation buffer is zoned “Rural” under the Greater Bunbury Region Scheme and “General Farming” pursuant to the Town Planning Scheme (TPS) No. 3. In accordance with the Shire of Dardanup’s Local Planning Strategy, it is zoned ‘Waste Disposal/Processing’. Accordingly, without protection this vegetation would likely be subject to clearing to accommodate the expansion of the current waste facility.

To protect the vegetation buffer, the proponent will enter into a conservation covenant (voluntary written agreement) with the Commissioner of Soil and Land Conservation under section 3 of the *Soil and Land Conservation Act 1945*. The purpose of the conservation covenant is to protect and manage the native vegetation within the offset in such a way as to retain and promote its growth. The term of the conservation covenant will be in perpetuity and will bind the landowner and all successive landowners through registration as a memorial on the property’s certificate of title.

The vegetation within the proposed buffer does contain areas of significant weed infestation and vegetation that has been structurally degraded as result of historical and recent anthropogenic impacts. It is therefore proposed to implement a rehabilitation program which will involve intensive weed control and infill planting with suitable native species. Furthermore, to prevent access to the proposed buffer from unauthorised vehicles and foxes, ring-lock fencing will be installed along its boundary. These management measures will be documented in a Buffer Management Plan (discussed further below).

Buffer Management Plan

A key design objective for the *Concept Plan* was the protection of the subject site’s existing biodiversity values. This has been achieved through the retention of 7.87 ha of strategically selected remnant vegetation within a vegetation buffer. Areas of vegetation retention have been intentionally located to retain quality habitat for black cockatoos while also providing ecological linkages throughout the subject site and to adjoining areas.

In addition, within the buffer, it is proposed to conduct infill planting in degraded areas, weed control and access control. Species associated with black cockatoo habitat will be utilised for revegetation. This will significantly enhance the value of this remnant vegetation.

The proponent will implement a Buffer Management Plan which will include weed management, revegetation, access control and general maintenance. The objective of the Buffer Management Plan is to enhance the existing habitat for black cockatoos by minimising the current indirect impacts which include:

- Uncontrolled access – currently vehicles, motorbikes and pedestrians have unfettered access to the buffer. This is resulting in vegetation destruction (through the creation of new tracks, paths etc.), rubbish dumping, fire risks and the spread/introduction of weeds and dieback.
- Weed and disease spread/introduction – weeds are prolific throughout some areas as a result of previous and ongoing anthropogenic impacts. There are currently no mechanisms for the control of weeds and disease within this area.
- Feral and domestic animal management – the buffer areas are completely unmanaged and therefore in consideration of the surrounding rural environment, provide a sanctuary for feral and animals.

The Buffer Management Plan will be prepared in consultation with the DBCA. It will provide the following:

- Location of key natural area and its environmental attributes;
- Identification of areas to be rehabilitated;
 - The objectives of the revegetation and completion criteria;

- Supplementary planting program;
- Weed control;
- Implementation of management program including controlling public access, rubbish collection, weeds, pests and fire management; and
- Monitoring program and contingency actions.

3.2 EPBC Act Offset Policy

3.2.1 Background

The *EPBC Act Environmental Offsets Policy* (October 2012) (referred to as the EPBC Act Offset Policy) requires the delivery of an “overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environmental law and affected by the proposed action”. The Commonwealth environmental offset is a measure that compensates for the residual adverse impacts of an impact on the environment, whereby offsets are only necessary where the residual impacts are significant. The *EPBC Act Offsets Policy* provides for the application of direct offsets and other compensatory measures as follows:

- Direct offsets are defined as those actions that provide a measurable conservation gain for an impacted protected matter. A minimum of 90% of an offset must be a direct offset; and
- Other compensatory measures are defined as those actions that do not directly offset impacts but are anticipated to lead to benefits for the impacted protected matter.

3.2.2 Calculations

In order to determine the acceptability of the proposed offsets in regard to the *EPBC Act Offsets Policy*, the associated calculator has been used for the Carnaby’s Black Cockatoo (given that it has the highest conservation rating of the three species of black cockatoo (i.e. Endangered)). This appraisal is based on habitat using the average for each rating of impact, habitat quality, offset start quality and future quality, to ascertain an initial comparison. A summary of the results is provided within **Table 1** which demonstrates that the proposed offsets are adequate to meet the minimum direct offset requirements (refer to **Appendix D** for specific calculations).

Table 1. Summary of offset calculations.

Species	Protected Matter Attribute	Quantum of Impact	% of Impact Offset	Direct Offset Adequate
Carnaby’s Black Cockatoo	Area of habitat	11.76 ha	100.69%	Yes

3.2.3 Policy Compliance

In order to determine the consistency of the proposed offset approach with the eight principles of the *EPBC Act Offsets Policy*, an assessment has been conducted as provided within **Table 2**.

Table 1. Comparison of the proposed offsets with the EPBC Act Offsets Policy.

No.	EPBC Offset Principle	Current Project
1	Must deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by	The offset proposed will increase the representation of foraging and potential breeding habitat for black cockatoos within conservation. This protection will,

	national environment law and affected by the proposed action	at a minimum, assist in maintaining the viability of the protected matter.
2	Must be built around direct offsets but may include other compensatory measures	The proposal achieves the 100% direct offset target.
3	Must be in proportion to the level of statutory protection that applies to the protected matter	The offsets proposed are considered appropriate and consistent with the DAWE policy given that they adequately offset the impact as identified through the offset calculator.
4	Must be of a size and scale proportionate to the residual impacts on the protected matter	The proposed offsets will be proportionate to the residual impacts on habitat within the application area as reflected through the offset calculator.
5	Must effectively account for and manage the risks of the offset not succeeding	Given the land is vegetated and will be protected by a legal mechanism there is a very low risk of the offset not succeeding. This has been reflected in the inputs used in the EPBC Offset Guide to calculate the offset required.
6	Must be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action, see section 7.6)	The proposed offsets package for the 'Matters of National Environmental Significance' have been developed to satisfy the requirements of the Commonwealth EPBC Act only.
7	Must be efficient, effective, timely, transparent, scientifically robust and reasonable	The proposed offset is considered to be effective and efficient as the offset sites will be legally protected. The offset is considered to meet the timeliness requirement as the covenants will be implemented prior to the commencement of clearing, and the offset sites are already vegetated and provide foraging and potential breeding habitat for black cockatoos. Habitat for the species has been thoroughly defined by a number of studies and reports. The offset has been calculated using the EPBC Offset Guide and is therefore considered reasonable.
8	Must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	Offsets will be monitored and reported annually through the Annual Environmental Report (AER).

REFERENCES

GHD (2021). *Part Lot 2 and 10, Temple Rd Picton Biological Survey Report. Report prepared for J and P Group.*

Harewood (2015). *Fauna Assessment. Lot 81 Banksia Road, Dardanup.*

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Urbaqua (2020). *Community Engagement and Advice on Shire of Dardanup Waste Precinct – Local Planning Scheme No. 9 Report.*

FIGURES

05/08/2022

Attachment 2



PROJECT Lot 1 Banksia Road, Crooked Brook

DRAWING TITLE Figure 1 - Habitat trees with one or more hollows possibly suitable for black cockatoos

CLIENT J + P Group



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West Busselton
Western Australia 6280
Mobile 0418 950 852

Project Number 1901
Drawing Number Figure 1
Revision C
Date 28/7/2021
Sheet 1 of 1

Designed PN
Drawn PN
Checked
Approved
Local Authority Shire of Dardanup

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Vegetation to be Retained (5.2254ha)

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D	Updated Vegetation Area	21/07/21
C	Updated Vegetation Area	18/05/21
B	Updated Vegetation Area	22/04/21
A	Original drawing	SB 02/12/20
rev	details	approved date
survey	N/A	22869-01C.dgn
drawn	NP 02/12/20	checked SB 02/12/20
horiz datum	MGA 94	level datum N/A
scale at A3	all distances are in metres	
1 : 2500		

plan type	figure 2. Direct offset 1	
description		
Lot 10 on D 70159 Temple Road PICTON EAST		
client	J & P Corporation	drawing no 22869-01C

Harley Dykstra

PLANNING & SURVEY SOLUTIONS



PROJECT Lot **2148 Ferguson Road**

DRAWING TITLE **FIGURE 3 -Direct Offset 2**

CLIENT **J & P Group**

Legend

Direct Offset 2

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1516

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Local Authority

Drawing Number
FIG 2

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Approved KMT

Shire of Dardanup

Revision
A
Date 28.03.2018
Sheet 1 of 1

APPENDIX A – Lot 2 Fauna Assessment

Fauna Assessment



Lot 2 Banksia Road

Dardanup

April 2021

V1

On behalf of:

Cleanaway Solid Waste Pty Ltd
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APPENDIX A: Conservation Categories

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SUMMARY

This report details the results of a fauna assessment over an area of land within the Banksia Road Waste Disposal Facility operated by Cleanaway Waste Management Pty Ltd (Cleanaway) (Figure 1).

Cleanaway are proposing to clear about 7.4 hectares of remnant native vegetation at the eastern end of the property (Lot 2 Banksia Road) to enable the expansion of the current Class III putrescible landfill operation. Cleanaway have requested that a previous fauna assessment (Astron 2014) be reviewed and updated using current data. This report details the results of this review.

The defined survey area is comprised of the proposed clearing area in addition to a 50 metre buffer (to be retained) along the eastern boundary of Lot 2 and the Dardanup Conservation Park (Figure 2). The survey area has a total extent of about 8.7 ha.

The assessment has included a literature review, a daytime reconnaissance survey (including the use of camera traps and a bat detector), and a nocturnal spotlighting survey carried out in March 2021.

Key Findings

Astron identified one broad fauna habitat type within the survey area which is described as a “jarrah-marri woodland on the mid to upper slopes” (Astron 2014). More specifically the vegetation consists of a woodland/low woodland of jarrah and marri over an open/tall open shrubland over an open/low open shrubland over grassland/open sedgeland on a dark brown to lateritic loam. The vegetation present is similar in composition and are contiguous with the adjacent Dardanup Conservation Park, though in a more degraded condition (Astron 2014).

Overall, the single broadly defined fauna habitat present appears to be degraded from its original natural state, a consequence of historical livestock grazing, logging activities and frequent fires with much of the vegetation being regrowth, with many relatively small trees/saplings being present. The total fauna assemblage within the survey area itself is therefore likely to be depauperate as a consequence. As this relatively small parcel of vegetation directly adjoins the Dardanup Conservation Park/State Forest it may nonetheless be utilised (if only infrequently) by a range of fauna species that would otherwise not persist in such a small, degraded remnant.

Foraging debris attributed to the forest red-tailed black cockatoo (vulnerable) and Carnaby’s black cockatoo (endangered) have been observed at several locations with the survey area during the various assessments (2014 and/or 2021) and both species have been heard/and or seen within or nearby the survey area also.

Calls of the western false pipistrelle (DBCA Priority 4 species) were recorded during the bat survey carried out in March 2021 (along with five other bat species).

The south-western brush-tailed phascogale (Schedule 6 – BC Act) was recorded at several locations during the camera trap survey carried out in March 2021 (along with five other fauna species).

No evidence of any other fauna species of conservation significance was observed. However, this does not eliminate the potential for some species to still occur, if only infrequently.

A total of 81 potential black cockatoo breeding “habitat trees” (i.e. those with a DBH >50cm) have been identified within the survey area. Three of these trees were found to contain hollows possibly suitable for black cockatoos to use for nesting purposes. Hollows in other trees were assessed as being unsuitable (i.e. too small or with an unfavourable orientation) or in some cases no hollow was found to be present.

Of the three trees assessed as having hollows possibly suitable for black cockatoos to use for nesting purposes only one showed any evidence of past use (Tree 29). This evidence was in the form of significant chewing around the hollows entrance. This particular tree is situated outside of the currently proposed clearing footprint and therefore will not be directly impacted on.

Given the dominance of jarrah and marri across almost the entire survey area all of the site can be regarded as representing quality foraging habitat (~8.7 ha in total, ~7.4 ha within the proposed clearing area). No black cockatoo roost sites were identified within the survey area with the closest a documented roost site being located about 2.1 km east of the survey area.

No evidence of the western ringtail possum was found despite targeted day and night surveys. Habitat for the species within the survey area appears marginal in quality given the absence of a coherent midstory element.

In summary four vertebrate fauna species of conservation significance were positively identified as utilising the survey area:

- Forest Red-tailed Black Cockatoo – Vulnerable (WA/Federal);
- Carnaby’s Black Cockatoo – Endangered (WA/Federal);
- South-western Brush-tailed Phascogale - Schedule 6 (WA);
- Western False Pipistrelle – Priority 4 (DBCA Priority Species).

Several additional species of conservation significance may also utilise the survey area, though, as no evidence of their presence was identified during the field survey, their status in the area remains uncertain. In most cases the species in question probably only occurs occasionally and/or for brief periods:

- Peregrine Falcon – Schedule 7 (WA);
- Masked Owl – Priority 3 (DBCA Priority Species);
- Baudin’s Black Cockatoo – Endangered (WA/Federal);

- Chuditch - Vulnerable (WA/Federal);
- Western Brush Wallaby – Priority 4 (DBCA Priority Species)

Potential impacts on these fauna species and fauna in general are anticipated to be low primarily due to the degraded nature of the remnant vegetation present (and anticipated low fauna population densities), and the relatively small area of clearing required. Nonetheless ongoing planning should consider the potential presence of fauna so that any impacts can be further minimised where considered reasonable and practicable.

Given the confirmed presence of several fauna species of conservation significance (and other fauna in general) residing within the of proposed clearing footprint (e.g. south-western brush-tailed phascogale and common brushtail possum) it is recommended that appropriate management measures (e.g. trapping) be employed prior to and during clearing operations.

1. INTRODUCTION

This report details the results of a fauna assessment over an area of land within the Banksia Road Waste Disposal Facility operated by Cleanaway Waste Management Pty Ltd (Cleanaway) (Figure 1).

Cleanaway are proposing to clear about 7.4 hectares (ha) of remnant native vegetation at the eastern end of the property (Lot 2 Banksia Road) to enable the expansion of the current Class III putrescible landfill operation. In 2014 Astron Environmental Services undertook a Level 1 fauna assessment (and a Level 2 flora and vegetation survey) of the proposed clearing area. At the time, approval to clear the vegetation was not finalised and so, given the time lapse since the previous survey work, Cleanaway have requested that the previous fauna assessment be reviewed and updated using current data. This report details the results of this review.

The defined survey area is comprised of the proposed clearing area in addition to a 50 metre buffer (to be retained) along the eastern boundary of Lot 2 and the Dardanup Conservation Park (Figure 2). The survey area has a total extent of about 8.7 ha.

Information obtained as part of this fauna assessment report will be used in conjunction with other environmental investigations to guide project planning and will also be used in the formulation of management plans, both of which will aim to minimise potential environmental impacts. The information presented may also be used by regulatory authorities to assess the potential impact of the proposal on fauna and fauna habitats at the site during the project evaluation and approval process as required.

2. SCOPE OF WORKS

The scope of works was defined as:

- A general assessment of the presence/potential occurrence of specially protected fauna species;
- Black Cockatoo Habitat Assessment
 - Black Cockatoo Breeding Habitat – confirm the number of previously identified potential habitat trees with hollows (based on findings of the 2014 Astron report). Within trees identified as containing hollows, confirm if there is any actual evidence of use by black cockatoos.
 - Black Cockatoo Foraging habitat – discuss quality of foraging habitat and evidence of use by black cockatoos.
 - Black Cockatoo Roosting – confirm if there is any evidence of black cockatoos roosting within trees on site.

- Western Ringtail Possum Assessment
 - Carry out a targeted day and night survey for evidence of western ringtail possum (dreys, scats and individuals);
- Compile a report detailing methods and results.

Note: For the purposes of this proposal the term black cockatoo is in reference to Baudin's black cockatoo *Calyptorhynchus baudinii*, Carnaby's black cockatoo *Calyptorhynchus latirostris* and the forest red-tailed black cockatoo *Calyptorhynchus banksii naso*.

3. METHODS

3.1 LITERATURE REVIEW – FAUNA SPECIES OF CONSERVATION SIGNIFICANCE

A list of conservation significant fauna recorded or likely to occur within the survey area has been compiled by a review of available databases and literature including, but not limited to the following data sources:

- Department of Biodiversity, Conservation and Attractions (DBCA) Threatened Fauna Database (NatureMap) (DBCA 2021). A 15 km buffer around the survey area was applied to capture previous fauna records within the immediate vicinity;
- *EPBC Act* Protected Matters database for fauna of national environmental significance (DAWE 2021). The minimum buffer (1 km) was applied to this search as the databases contains distribution data (areas) and not actual fauna records; and
- Literature search and review of other fauna surveys in the vicinity.

The conservation status of each species has been based on current lists produced under Federal and State Acts (EPBC Act and the *Biodiversity Conservation Act 2016 (BC Act)*), those species recognised under international treaties (CAMBA, JAMBA and the Bonn Convention) and Priority Fauna (as listed by the DBCA).

3.2 FIELD SURVEYS

The field component of the fauna assessment was carried out by Greg Harewood (Zoologist) and consisted of a daytime reconnaissance survey (24 March 2021) and nocturnal spotlighting (31 March 2021) as described in the sections below.

3.2.1 FAUNA HABITAT ASSESSMENT

The objective of the habitat assessment was to assess if it were likely that species of conservation significance would utilise the habitats identified within the survey area.

During the field survey, fauna habitats within the survey area were assessed, and specific elements identified, which informed the likelihood of listed conservation significant species utilising the area and fauna habitat significance.

Vegetation units, landforms and soils observed during the site reconnaissance survey were used to define broad fauna habitat types across the survey area.

3.2.2 FAUNA OBSERVATIONS

The aim of this part of the assessment was to obtain enough information to assess the likely significance of the survey area to fauna species of conservation significance.

Based on the results of the literature review, evidence of the presence or likely presence of fauna species of conservation significance known to or likely to frequent the general area was searched for and recorded during the field survey.

This included but was not limited to:

- Undertaking a series of transects across the survey area.
- Searching for evidence (i.e. individuals, tracks, scats, calls) of potential conservation significant species under logs, rocks and leaf litter.
- Observing bird species with binoculars.

These observations were supplemented with the use of motion sensing, infrared “camera traps” and a “bat detector” as described below.

Ten motion sensing, infrared “camera traps” (Acorn model LTI 5210A) were placed within the survey area on the 24 March 2021. These were retrieved on the 31 March 2021 (eight days of deployment). The camera traps were set to take three consecutive pictures when triggered, with a five second time lapse before any subsequent trigger event. The location of each camera trap is shown in Figure 3.

All pictures were examined and fauna species, where possible, identified. Only one image of each species taken on any one day was documented as a record.

Two nights (23 and 24 March 2021) of acoustic bat call recordings were undertaken using a Wildlife Acoustics SM2+ Bat Detector. The recordings were commenced at sunset and continued until sunrise the following day. The recording locations are shown in Figure 3.

The bat detector converts ultrasonic echolocation signals produced by bats into audible electronic signals that are then recorded. The recordings were later processed by Bob Bullen (Bat Call WA Pty Ltd) to determine the presence of species-specific calls.

Fauna observations made by Astron during their field survey work in November 2014 (Astron 2014) have also been incorporated into the data set.

3.2.3 BLACK COCKATOO HABITAT ASSESSMENT

The following methods were employed to comply with the defined scope of works and are based on Commonwealth of Australia (2012) guidelines which state that surveys for Carnaby's, Baudin's and forest red-tailed black cockatoo habitat should:

- be done by a suitably qualified person with experience in vegetation or cockatoo surveys, depending on the type of survey being undertaken;
- maximise the chance of detecting the species' habitat and/or signs of use;
- determine the context of the site within the broader landscape—for example, the amount and quality of habitat nearby and in the local region (for example, within 12 km);
- account for uncertainty and error (false presence and absences); and
- include collation of existing data on known locations of breeding and feeding birds and night roost locations.

The Commonwealth of Australia (2012) places habitats used by Black Cockatoos into the following three categories:

- Breeding Habitat;
- Foraging Habitat; and
- Night Roosting Habitat.

3.2.3.1 Breeding Habitat Assessment

As part of this assessment all previously identified habitat trees containing possible large hollows (17 in total) deemed “potentially suitable for breeding purposes” (Astron 2014) were re-inspected and specific details on any hollows present recorded. Some additional trees that appeared to contain possible large hollows were also reviewed (three in total). The assessment included but was not limited to recording specific details on any evidence of actual use (e.g. significant chew marks around hollow entrances).

Where practical to do so a drone (DJI Mavic Air) was used to examine and photograph each potential hollow at close range to assist in determining suitability and to aid in identifying any signs of current or previous use by black cockatoos.

Identified hollows have initially been placed into one of three categories based on the type of hollow entry (Birdlife Australia 2018):

- Chimney: the hollow entry faces directly upwards in the end of the trunk;
- Spout: hollow entry which is at the end of a broken branch; or
- Side: the entry is directly into the side of the trunk or a branch with no protrusions.

For the purpose of this review, hollows have then been placed into one of seven categories based on the observable characteristics of each hollow. The categories used were:

- **Confirmed Hollow:** Black cockatoos observed utilising the hollow for breeding purposes;
- **Chewed Hollow:** The hollow shows signs of chewing (“chipping” around or near entrance and/or internally) attributed to black cockatoo activity (in most cases indicating nesting activity, but in some cases possibly marks left by black cockatoos investigating (“prospecting”) hollows);
- **Unused Hollow:** The hollow appears to be of a suitable size for black cockatoos to use for nesting, but no conclusive evidence of this activity seen. It should be noted that chew marks/chipping are not always evident or present on some hollows that have been used for nesting. Hollows classified as “unused” may therefore have been used for nesting but cannot be specifically classified as such. Alternatively, some “unused” hollows may not be suitable for black cockatoos as a range of characteristics, not all of which can be seen or measured, ultimately determined if a hollow will ever actually be used;
- **Unsuitable Hollow:** The hollow has been assessed, based on information obtained, as being unlikely to be suitable for black cockatoos (generally because of the entrance appearing to be too small or because the actual hollow or accommodating branch/tree trunk appears to be too small or as having an unfavourable orientation);
- **No Hollow:** The tree was not observed to contain any hollows. Generally, this would be due to mis-identification from ground level during the initial assessment where a feature of the tree appeared to possibly represent a hollow but upon closer inspection was found not to qualify as such;
- **No Tree Present:** A standing tree is no longer present i.e. the original tree has fallen over, been burnt or has been removed/felled.
- **Status Unknown:** The tree could not be found or was not revisited.

A review of available literature was carried out to determine the location/extent of any known/likely black cockatoo breeding habitat areas in the vicinity of the survey area.

3.2.3.2 Foraging Habitat Assessment

The location and nature of black cockatoo foraging evidence (e.g. chewed fruits around base of trees) observed during the field survey was recorded. The nature and extent of potential foraging habitat present was also documented irrespective of the presence of any actual foraging evidence. Foraging habitat is represented by plant species that are known to provide a food source for black cockatoos. This can be in the form of seeds, flowers and also boring grubs that are extracted from some plant species.

A review of available literature was carried out to determine the location/extent of any known/likely Black Cockatoo foraging habitat areas in the vicinity.

3.2.3.3 Night Roosting Habitat Assessment

Direct and indirect evidence of black cockatoos roosting within trees on site was noted where observed (e.g. branch clippings, droppings or moulted feathers).

A review of available literature was carried out to determine the location/extent of any known/likely black cockatoo roosting habitat areas in the vicinity.

3.2.4 WESTERN RINGTAIL POSSUM ASSESSMENT

3.2.4.1 Daytime Survey

A day time survey to locate and record dreys, obvious tree hollows, scats and individual WRPs was carried out concurrent with the site reconnaissance survey/black cockatoo habitat assessment and involved a series of close spaced traverses on foot across the survey area.

3.2.4.2 Night Time Survey

A single night time survey to locate and record individual WRPs was carried out. This involved a series of transect across the survey area, on foot using a LED head torch.

3.2.4.3 Habitat Assessment

Description and comments on the amount and quality of WRP habitat within the survey area are provided based on observations made during the site surveys.

4. SURVEY LIMITATIONS

No seasonal sampling was carried out as part of this fauna assessment. The conclusions presented are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. It should be recognised that site conditions can change with time.

Lack of observational data on some species should also not necessarily be taken as an indication that a species is absent from the site or does not utilise it for some purpose at times.

During the survey, habitat trees with hollows were searched for. It should be noted that identifying hollows suitable for fauna species from ground level has limitations. Generally, the full characteristics of any hollow seen are not fully evident (e.g. internal dimensions). It is also difficult to locate all hollows within all trees as some are not observable from ground level.

The location of observations was recorded using a handheld GPS. The accuracy of the GPS cannot be guaranteed above a level of about 5 to 10 metres, though it should be noted that in some circumstance the accuracy can increase or decrease beyond this range.

5. RESULTS

5.1 LITERATURE REVIEW – FAUNA SPECIES OF CONSERVATION SIGNIFICANCE

The literature review identified multiple fauna species of conservation significance as potentially occurring in the general area as listed in Table 1. The NatureMap (DBCA 2021) and Protected Matter Search Tool (DAWE 2021) results, used as a primary source for compiling this listing, are held within Appendix B.

Table 1: Conservation significant fauna previously recorded or potentially occurring within the general vicinity of survey area.

Species	Conservation Status ¹	
	BC Act/ DBCA Priori	EPBC Act
Pouched Lamprey <i>Geotria australis</i>	P3	-
Carter's Freshwater Mussel <i>Westralunio carteri</i>	S3	VU
Swan Coastal Plain Shield-backed Trapdoor Spider <i>Idiosoma sigillatum</i>	P3	-
Western Pygmy Trapdoor Spider <i>Bertmainius opimus</i>	P3	-
Coastal Plains Skink <i>Ctenotus ora</i>	P3	-
Australasian Bittern <i>Botaurus poiciloptilus</i>	S2	EN
Migratory Shorebirds/Marine Species/Wetland Species	Various	Various
Eastern Osprey <i>Pandion cristatus</i>	S5	Mig, Ma
Peregrine Falcon <i>Falco peregrinus</i>	S7	-
Grey Falcon <i>Falco hypoleucos</i>	S3	VU
Masked Owl <i>Tyto novaehollandiae novaehollandiae</i>	P3	-
Barking Owl <i>Ninox connivens connivens</i>	P3	-

¹ See Appendix A for conservation status codes

Species	Conservation Status ¹	
	BC Act/ DBCA Priori	EPBC Act
Blue-billed Duck <i>Oxyura australis</i>	P4	-
Carnaby's Black Cockatoo <i>Calyptorhynchus latirostris</i>	S2	EN
Baudin's Black Cockatoo <i>Calyptorhynchus baudinii</i>	S2	EN
Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i>	S3	VU
Fork-tailed Swift <i>Apus pacificus</i>	S5	Mig
Grey Wagtail <i>Motacilla cinerea</i>	S5	Mig
Chuditch <i>Dasyurus geoffroii</i>	S3	VU
Quenda <i>Isodon fusciventer</i>	P4	-
South-western Brush-tailed Phascogale <i>Phascogale tapoatafa wambenger</i>	S6	-
Western Ringtail Possum <i>Pseudocheirus occidentalis</i>	S1	CR
Quokka <i>Setonix brachyurus</i>	S3	VU
Woylie <i>Bettongia penicillata ogilbyi</i>	S1	EN
Western Brush Wallaby <i>Notamacropus irma</i>	P4	-
Water Rat <i>Hydromys chrysogaster</i>	P4	-
Western False Pipistrelle <i>Falsistrellus mackenziei</i>	P4	-


5.2 FIELD SURVEYS

5.2.1 FAUNA HABITAT ASSESSMENT

The survey area has a total extent of about 8.7 ha most of which contains vegetation of some type (Figure 2). Astron identified one broad fauna habitat type within the survey area which is described as a "jarrah-marri woodland on the mid to upper slopes" (Astron 2014). More specifically the vegetation consists of a woodland/low woodland of jarrah and marri over an open/tall open shrubland over an open/low open shrubland over grassland/open sedgeland on a dark brown to lateritic loam. The vegetation present is similar in composition and are contiguous with the adjacent Dardanup Conservation Park, though in a more degraded in condition (Astron 2014).

Example images of the fauna habitat present are provided in Table 2.

Table 2: Example Images of the Fauna Habitat within the Survey Area

Fauna Habitat Description	Example Images
<p>Woodland/low woodland of Jarrah and Marri over an open to tall open shrubland over an open to low open shrubland over grassland/open sedgeland on dark brown to lateritic loam</p>	

Overall, the single broadly defined fauna habitat present appears to be degraded from its original natural state, a consequence of historical livestock grazing, logging activities and frequent fires with much of the vegetation being regrowth, with many relatively small trees/saplings being present. There is also a distinct lack of midstorey vegetation such as banksia, peppermint and other low woodland species generally found in similar vegetation types which lower the sites habitat value to some species.

The total fauna assemblage within the survey area itself is therefore likely to be depauperate as a consequence. As this relatively small parcel of vegetation directly adjoins the Dardanup Conservation Park/State Forest it may nonetheless be utilised (if only infrequently) by a range of fauna species that would otherwise not persist in such a small, degraded remnant.

5.2.2 FAUNA OBSERVATIONS

To date 38 fauna species have been recorded within the survey area during the various assessments carried out (i.e. Astron in November 2014 and this assessment - March 2021) either by direct observation during day and night surveys, secondary signs (e.g. tracks/scats) camera trap records or from bat call recordings.

A full listing of the species observed is held on Appendix C. The majority of fauna recorded are common bird species.

Foraging debris attributed to the forest red-tailed black cockatoo (vulnerable) and Carnaby's black cockatoo (endangered) have been observed at several locations with the survey area during the various assessments and both species have been heard/and or seen. (Note: Astron (2014) report finding foraging debris (chewed marri fruits) which they erroneously attributed to Baudin's black cockatoo, when in fact it is typical of Carnaby's black cockatoo).

Calls of the western false pipistrelle (DBCA Priority 4 species) were recorded during the bat survey carried out in March 2021 (along with five other bat species).

The south-western brush-tailed phascogale (Schedule 6 – BC Act) was recorded at several locations during the camera trap survey carried out in March 2021 (along with five other fauna species).

No evidence of any other fauna species of conservation significance was observed. However, this does not eliminate the potential for some species to still occur, if only infrequently (see Table 5 for an assessment of likelihood of occurrence).

5.2.3 BLACK COCKATOO HABITAT ASSESSMENT

5.2.3.1 Breeding Habitat Assessment

Trees considered potentially suitable for black cockatoos to use as nesting habitat (subject to a suitable hollow being present and other factors) found within the survey area comprised the following species:

- Marri – *Corymbia calophylla*;
- Jarrah – *Eucalyptus marginata*; and
- Dead Unidentified - *Eucalyptus* spp.

Astron (2014) identified 80 habitat trees within the survey area (i.e. trees with a DBH >50cm). Of the 80 trees recorded, Astron assessed 17 as possibly containing hollows potentially suitable for black cockatoos. (Note One additional habitat tree, not previously recorded has been added to the data set – making 81 habitat trees in total).

These 17 trees and three additional trees were examined in detail with a drone (where possible). The results of this review are summarised in the table below. Additional details

and photographs are contained in appendix D. The locations of habitat trees are shown in Figure 4.

Table 3: Summary – Habitat Tree Review

Tree ID	Review Status (BC Hollow)	Justification
5	Unsuitable Hollows.	Dead marri with a side entry hollow. The hollow has a relatively large entrance but appears to be too small internally for a black cockatoo to use for nesting purposes. No evidence of use by fauna of any type.
13	Unsuitable Hollows.	Marri with a possible side entry/spout type hollow and a possible large side entry hollow. Neither hollow appeared suitable with one appearing to be too small and the other having no depth. No evidence of use by fauna of any type.
18	Unsuitable Hollow.	Marri with a possible upward facing spout type hollow. The hollow was found to have two entrances, both of which are too small for black cockatoos. No evidence of use by fauna of any type.
24	Unsuitable Hollow.	Marri with several possible side entry hollows. All but one hollow was found to be non-existent. The single side entry hollow's entrance appears to be too small for black cockatoos. Some chew marks suggest possible galah activity though not conclusive.
29	Chewed Hollow.	Marri with possible side entry/spout type hollow. The hollow was found to have depth and also appeared to have chew marks near the entrance suggesting black cockatoo activity.
37	Unsuitable Hollow/No Hollow.	Large near dead jarrah with possible large chimney/spout type hollow. The hollow was however found to have no depth when examined with a drone. Several much smaller possible spout type hollows in dead branches. No evidence of use by fauna of any type.
40	Unsuitable Hollow.	Marri with near horizontal spout type hollows. The hollow appears to have some depth but the fact that it is horizontal makes it unfavourable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
41	Unsuitable Hollow.	Jarrah with a side entry/spout type hollow. The hollow appears to have some depth but only provides entry into a relatively small branch/trunk of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
42	Unsuitable Hollow.	Marri with a side entry/spout type hollow. The hollow appears to have some depth but only provides entry into a relatively small trunk of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
43	Unsuitable Hollow.	Marri with a side entry type hollow. The hollow only provides entry into a relatively small branch of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
45	Unsuitable Hollows.	Jarrah with two side entry type hollows. Both hollows only provide entry into a relatively small branch of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
46	Unsuitable Hollow.	Marri with a spout type hollow created recently when a branch of the tree broke off. The hollow appears to have a large entrance and some depth but appears too small internally to be considered suitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
47	No Hollow.	Marri with a possible side entry hollow. The hollow was found to be non-existent when examined with a drone.
59	No Hollow.	Jarrah with possible chimney type hollow. The hollow was found to be non-existent when examined with the drone.
62	Unsuitable Hollow.	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.

Tree ID	Review Status (BC Hollow)	Justification
69	Unsuitable Hollow.	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
74	Unused Hollow	Marri with a chimney type hollow. The hollow has a large entrance and appears to be quite deep and therefore it must be considered potentially suitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
77	Unsuitable Hollow	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.
78	Unused Hollows	Marri with a two possible side entry type hollows possibly joined. Both hollows appear to be suitable (size and orientation) to be classified as potentially suitable for black cockatoos to use for nesting purposes. No evidence of use.
81	Unsuitable Hollows	Near dead jarrah with a possible chimney type hollow. This hollow was found to be non-existent when examined with a drone. Several much smaller possible spout type hollows in dead branches.

Of the 20 trees examined only three appeared to contain hollows possibly suitable for black cockatoos to use for nesting purposes. Hollows in other trees were assessed as being unsuitable (i.e. too small or with an unfavourable orientation) or in some cases no hollow was found to be present.

Of the three trees assessed as having hollows possibly suitable for black cockatoos to use for nesting purposes only one showed any evidence of past use (Tree 29). This evidence was in the form of significant chewing around the hollows entrance.

It should be noted that not all the identified habitat trees will necessarily require clearing as the survey area is larger than the currently proposed clearing footprint. For example, Tree 29, which shows evidence of use by black cockatoos is outside the proposed clearing footprint and therefore will not be directly impacted on.

Based on available mapping, there is approximately 18,800 ha of remnant native vegetation within 12 km of the survey area (DPIRD 2020). Much of this is likely to contain “potential” breeding habitat as defined by DAWE (i.e. suitable tree species with a DBH ≥ 50 cm).

5.2.3.2 Foraging Habitat Assessment

The following flora species are known to be or are potentially used as a direct food source (e.g. seeds, flowers, nectar, bark or grubs) by one or more species of black cockatoo and have been recorded within the survey area:

- Marri – *Corymbia calophylla*;
- Jarrah – *Eucalyptus marginata*;
- Couch Honeypot Dryandra - *Banksia dallanneyi*;

- Honeybush - *Hakea lissocarpa*;
- Kingia - *Kingia australis*;
- Snottygoble - *Persoonia longifolia*
- Peppermint – *Agonis flexuosa*; and



It should be noted that some of the above-mentioned species (e.g. Kingia and peppermint) while foraged upon on occasions would make up only a small proportion of any one bird's diet relative to more favoured plant species such as marri. Some plant species are also only represented by a small number of specimens and therefore do not contribute to the overall foraging resource to a significant degree.

During the March 2021 assessment evidence of black cockatoos foraging was observed at a small number of locations. This evidence was mainly in the form of chewed fruits from marri. This foraging activity was attributed to the forest red-tailed black cockatoo.

During their assessment in the spring of 2014 Astron also recorded foraging evidence which was attributed to the forest red-tailed black cockatoo and Carnaby's black cockatoo.

Examples of the foraging debris observed are provided in Table 4.

Table 4: Foraging Evidence Examples

Foraging Evidence Description	Example Image
Marri fruits – foraging activity attributed to the Forest Red-tailed Black Cockatoo (recorded March 2021).	
Marri fruits – foraging activity attributed to Carnaby's Black Cockatoo (recorded Nov 2014 – Astron).	

Given the dominance of jarrah and marri across almost the entire survey area all of the site can be regarded as representing quality foraging habitat (~8.7 ha in total, ~7.4 ha within the proposed clearing area).

Based on available mapping there is about 18,800 ha of remnant native vegetation within 12 km of the survey area (DPIRD 2020). Much of this is likely to represent black cockatoo foraging habitat of some type.

5.2.3.3 Night Roosting Habitat Assessment

No evidence of black cockatoos roosting within trees located within the survey area was observed during the survey period. It is difficult to determine if trees or groves of trees within the survey area represent potential roosting habitat as a range of factors, not all of which can be observed, determine suitability. Some of the larger trees may be suitable for roosting but as indicated no actual evidence of use was seen.

A review of the 2019 Great Cocky Count database shows no documented roost sites within the survey area. The 2019 Great Cocky Count recorded the closest active roost, approximately 2.1 kilometres east of the survey area (Site ID: CAPFERR001). This roost was being used by 34 forest red-tailed black cockatoos during the April 2019 survey (Peck *et al.* 2019). Another six documented roost sites (but not necessarily in current use) occur within 12 km of the survey area.

5.2.4 WESTERN RINGTAIL POSSUM ASSESSMENT

5.2.4.1 Daytime Survey

No evidence of western ringtail possums (scats, dreys or individuals) was observed during the day survey within the survey area.

5.2.4.2 Night Time Survey

No western ringtail possums were detected during the nocturnal survey. Two common brush-tailed possums were observed.

5.2.4.3 Habitat Assessment

The survey area is comprised of a jarrah marri woodland which shows a distinct lack of associated midstory vegetation such as peppermint, banksia, and sheoak. Western ringtail possums show a preference for relatively dense midstory vegetation and as such the survey area appears to represent marginal habitat for the species which in part explains their apparent absence from the survey area. Western ringtail possums are known from nearby surrounding areas (Greg Harewood pers. obs.) and therefore it is possible that individuals of the species may occur on occasions despite the apparent poor quality of the habitat present.

6. CONSERVATION SIGNIFICANT FAUNA SPECIES

Based on the information gathered during the site reconnaissance survey and the documented distribution and habitat preferences of the species of conservation significance identified as potentially being present in the general area, their likelihood of occurrence has been assessed. A summary of this assessment is presented in Table 5.

Table 5: Likelihood of Occurrence – Fauna Species of Conservation Significance

Species	Conservation Status		Habitat Preferences	Habitat Present	Likelihood of Occurrence	Comments/Possible Impacts
	BC Act/ DBCA Priority	EPBC Act				
Pouched Lamprey <i>Geotria australis</i>	P3	-	This species lives in mud burrows in the upper reaches of coastal streams for the first 4 years of life until migrating to the sea. Adults migrate up to 60km upstream during spawning.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Carter's Freshwater Mussel <i>Westralunio carteri</i>	S3	VU	Occurs in greatest abundance in slower flowing streams with stable sediments that are soft enough for burrowing amongst woody debris and exposed tree roots.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Swan Coastal Plain Shield-backed Trapdoor Spider <i>Idiosoma sigillatum</i>	P3	-	Burrows of this species usually found in <i>Banksia</i> woodland and heathland on sandy soils.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Western Pygmy Trapdoor Spider <i>Bertmainius opimus</i>	P3	-	Poorly documented - Found in mesic habitats. The species makes shallow burrows in the bark of trees and in the mossy banks of creeks.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Coastal Plains Skink <i>Ctenotus ora</i>	P3	-	Sandy substrates with low vegetation (including heath) in open <i>Eucalyptus/Corymbia</i> woodland over <i>Banksia</i> .	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Australasian Bittern <i>Botaurus poiciloptilus</i>	S1	EN	Freshwater wetlands, occasionally estuarine; prefers heavy vegetation such as beds of tall dense <i>Typha</i> , <i>Baumea</i> and sedges in freshwater swamps.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Migratory Shorebirds/Wetland Species/Marine Species (various reptiles, birds and mammals)	S5, Various	Ma, Mig, Various	Varies between species but includes open ocean, and permanent/temporary wetlands varying from billabongs, swamps, lakes, floodplains, sewerage farms, saltwork ponds, estuaries, lagoons, mudflats sandbars, pastures, airfields, sports fields and lawns.	No	Would Not Occur.	No suitable habitat. No impact on these species will occur.
Blue-billed Duck <i>Oxyura australis</i>	P4	-	Well vegetated freshwater swamps, large dams and lakes, winters on more open water. Occasionally salt lakes and estuaries freshened by floodwaters.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Eastern Osprey <i>Pandion haliaetus</i>	S5	Ma, Mig	Coasts, estuaries, bays, inlets, islands, and surrounding waters, coral atolls, reefs, lagoons, rock cliffs and stacks. Ascends larger rivers.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Peregrine Falcon <i>Falco peregrinus</i>	S7	-	Diverse from rainforest to arid shrublands, from coastal heath to alpine. Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes.	Yes	Possibly Occurs.	This species is uncommon but the survey area may represent part of a larger home range used by individuals of this species. No significant impact on this species anticipated.

Grey Falcon <i>Falco hypoleucos</i>	S3	VU	Frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses mainly where annual rainfall is less than 500 mm	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Masked Owl (SW population) <i>Tyto n. novaehollandiae</i>	P3	-	Roosts and nests in heavy forest, hunts over open woodlands and farmlands.	Yes	Possibly Occurs.	This species is uncommon but may occur, if only occasionally. No significant impact on this species anticipated.
Barking Owl <i>Ninox connivens connivens</i>	P3	-	Dense vegetation, especially forest and thickets of waterside vegetation such as melaleucas. Roosts in tree hollows.	No/Marginal	Unlikely to Occur,	No suitable/very marginal habitat. No impact on this species will occur.
Carnaby's Black Cockatoo <i>Calyptorhynchus latirostris</i>	S2	EN	Forests, woodlands, heathlands, farms; feeds on <i>Banksia</i> , <i>Hakea</i> and Marri.	Yes	Known to Occur.	Loss/modification of very small areas of habitat. Negligible impact.
Baudin's Black Cockatoo <i>Calyptorhynchus baudinii</i>	S2	EN	Mainly eucalypt forests where it feeds primarily on the Marri seeds.	Yes	Possibly Occurs.	Loss/modification of very small areas of habitat. Negligible impact.
Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i>	S3	VU	Eucalypt forests, feeds on Marri, Jarrah, Blackbutt, Karri, Sheoak and Snottygobble.	Yes	Known to Occur.	Loss/modification of very small areas of habitat. Negligible impact.
Fork-tailed Swift <i>Apus pacificus</i>	S5	Mig, Ma	Low to very high airspace over varied habitat from rainforest to semi desert.	Yes	Unlikely to Occur, Flyover only on very rare occasions.	May occur very occasionally for brief periods. Entirely aerial. No impact on this species will occur.
Grey Wagtail <i>Motacilla cinerea</i>	S5	Mig, Ma	In Australia, near running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields.	No	Would Not Occur.	No suitable habitat. No impact on this species will occur.
Chuditch <i>Dasyurus geoffroii</i>	S3	VU	Forest, mallee shrublands, woodland and desert. The densest populations have been found in riparian jarrah forest.	Yes/Marginal	Possibly Occurs.	May occur very occasionally for brief periods. Habitat marginal in quality. Negligible impact on species status anticipated.
Quenda <i>Isodon fusciventer</i>	P4	-	Dense scrubby, often swampy, vegetation with dense cover.	No/Marginal	Unlikely to Occur.	The generally sparse groundcover across the survey area suggests this species is unlikely to persist. No impact on this species anticipated.
South-western Brush-tailed <i>Phascogale Phascogale tapoatafa wambenger</i>	S6	-	Dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover.	Yes	Known to Occur.	Loss/modification of small areas of habitat. Negligible impact on species status anticipated.
Western Ringtail Possum <i>Pseudocheirus occidentalis</i>	S1	CR	Coastal peppermint, Tuart, Jarrah-Marri associations, Sheoak woodland, Eucalypt woodland and Mallee.	No/Marginal	Unlikely to Occur.	Habitat for this species is marginal. Occasional transient individuals only. Negligible impact on species status anticipated.
Quokka <i>Setonix brachyurus</i>	S3	VU	Currently restricted to densely vegetated coastal heaths, swamps, riverine habitats including tea-tree thickets on sandy soils along creek systems.	No	Would Not Occur.	This species is locally extinct. No impact on this species will occur.

Woylie <i>Bettongia penicillata ogilbyi</i>	S1	EN	Open sclerophyll forest and woodland with a low, dense, understorey of tussock grasses or woody scrub.	No	Would Not Occur.	This species is locally extinct. No impact on this species will occur.
Western Brush Wallaby <i>Notamacropus irma</i>	P4	-	Open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets.	Yes/Marginal	Possibly Occurs.	May occur very occasionally for brief periods. Habitat marginal in quality. Negligible impact on species status anticipated.
Water Rat <i>Hydromys chrysogaster</i>	P4	-	Permanent water, fresh, brackish or marine.	No	Would Not Occur.	There is no suitable habitat for this species in the survey area. No impact on this species will occur.
Western False Pipistrelle <i>Falsistrellus mackenziei</i>	P4	-	Wet sclerophyll forest dominated by karri and in high rainfall zones of the jarrah and marri forest.	Yes	Know to Occur.	Loss/modification of small areas of habitat. Negligible impact on species status.

See Appendix A for conservation status codes

Four vertebrate fauna species of conservation significance (listed as State or Federal threatened/migratory species or as DBCA priority species) were positively identified as utilising the survey area for some purpose during the survey period (or during Astron's Survey – 2014):

- Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* – S3 (BC Act), Vulnerable (EPBC Act). Several individuals and some foraging evidence attributed to this species was found during the surveys (chewed marri fruits). The survey area contains potential black cockatoo breeding habitat (trees with a DBH >50cm) and the majority of the native vegetation within the survey area represents potential foraging habitat for this species. No evidence of roosting observed.
- Carnaby's Black-Cockatoo *Calyptorhynchus latirostris* – S2 (BC Act), Endangered (EPBC Act). Several individuals and some foraging evidence attributed to this species was found during the 2014 survey (chewed marri fruits). The survey area contains potential black cockatoo breeding habitat (trees with a DBH >50cm) and the majority of the native vegetation within the survey area represents potential foraging habitat for this species. No evidence of roosting observed.
- South-western Brush-tailed Phascogale *Phascogale tapoatafa wambenger* – S6 (BC Act). This species was recorded at several locations during the camera trap survey undertaken in March 2021. Utilises hollow bearing trees for daytime refuge.
- Western False Pipistrelle *Falsistrellus mackenziei* – P4 (DBCA Priority Species) Recorded during the bat call survey. All sections of the survey area represent potential foraging habitat for this species and any hollow bearing trees represent possible day time roost sites.

Several additional species of conservation significance may utilise the survey area for some purpose at times, but their status on-site and/or in the general area is difficult to determine because they were not sighted during the field survey, or evidence of use was not observed. In most cases the species in question probably only occurs occasionally and/or for brief periods:

- Peregrine Falcon *Falco peregrinus* – S7 (BC Act)
This species potentially utilises some sections of the survey area as part of a much larger home range though only likely to occur infrequently. All areas represent potential foraging habitat for this species. Listed as a potential species based on available information.
- Masked Owl *Tyto novaehollandiae* – P3 (DBCA Priority Species)
Status in the general area is difficult to determine. May utilise woodland areas within and near the survey area for roosting and may forage in more open areas. Probably only present occasionally and for short periods. Listed as a potential species based on available information.

- Baudin's Black-Cockatoo *Calyptrorhynchus baudinii* – S2 (BC Act), Endangered (EPBC Act).
Possibly occurs. The survey area contains potential black cockatoo breeding habitat (trees with a DBH >50cm) and the majority of the native vegetation within the survey area represents potential foraging habitat for this species. No evidence of roosting observed. No evidence of roosting observed. Listed as a potential species based on available information.
- Chuditch *Dasyurus geoffroii* - S3 (BC Act), Vulnerable (EPBC Act)
Habitat with the survey area itself appears marginal for this species however given the proximity of the Dardanup Conservation Park it may occur occasionally but is unlikely to be specifically attracted to the site.
- Western Brush Wallaby *Notamacropus irma* – P4 (DBCA Priority Species)
Habitat with the survey area itself appears marginal for this species however given the proximity of the Dardanup Conservation Park it may occur occasionally but is unlikely to be specifically attracted to the site.

A number of other species of conservation significance (as listed in Table 5), while possibly present in the larger bush remnants in the wider area (e.g. Dardanup Conservation park) are not listed as potentially occurring within the survey area primarily due to a complete lack of suitable habitat (quality and extent) and/or known local/regional extinction.

In cases where some habitat is present and available information indicates at least some probability of the species occurrence, likely impacts are anticipated to be low primarily due to likely low population densities and the relatively small area of clearing required. No overall change in the conservation status of any fauna species currently utilising the survey area is therefore anticipated. While some small, localised residual loss of fauna habitat may occur for some species, regional impacts on the status of any one species are anticipated to be negligible/non-existent.

In this instance impacts are most likely to be related to the loss of a relatively small area habitat (which is relatively common in the wider area) and the potential for some species to be killed or injured during clearing.

7. CONCLUSION

The fauna assessment within the survey area was primarily undertaken to document black cockatoo habitat and to determine the possible presence of western ringtail possums and other conservation significant fauna species and/or their habitat.

Overall, the single broadly defined fauna habitat present appears to be degraded from its original natural state, a consequence of historical livestock grazing, logging activities and frequent fires with much of the vegetation being regrowth, with many relatively small trees/saplings being present. The total fauna assemblage within the survey area itself is therefore likely to be depauperate as a consequence. As this relatively small parcel of vegetation directly adjoins the Dardanup Conservation Park/State Forest it may

nonetheless be utilised (if only infrequently) by a range of fauna species that would otherwise not persist in such a small, degraded remnant.

Foraging debris attributed to the forest red-tailed black cockatoo (vulnerable) and Carnaby's black cockatoo (endangered) have been observed at several locations with the survey area during the various assessments (2014 and/or 2021) and both species have been heard/and or seen within or nearby the survey area also.

Calls of the western false pipistrelle (DBCA Priority 4 species) were recorded during the bat survey carried out in March 2021 (along with five other bat species).

The south-western brush-tailed phascogale (Schedule 6 – BC Act) was recorded at several locations during the camera trap survey carried out in March 2021 (along with five other fauna species).

No evidence of any other fauna species of conservation significance was observed. However, this does not eliminate the potential for some species to still occur, if only infrequently.

A total of 81 potential black cockatoo breeding "habitat trees" (i.e. those with a DBH >50cm) have been identified within the survey area. Three of these trees were found to contain hollows possibly suitable for black cockatoos to use for nesting purposes. Hollows in other trees were assessed as being unsuitable (i.e. too small or with an unfavourable orientation) or in some cases no hollow was found to be present.

Of the three trees assessed as having hollows possibly suitable for black cockatoos to use for nesting purposes only one showed any evidence of past use (Tree 29). This evidence was in the form of significant chewing around the hollows entrance. This particular tree is situated outside of the currently proposed clearing footprint and therefore will not be directly impacted on.

Given the dominance of jarrah and marri across almost the entire survey area all of the site can be regarded as representing quality foraging habitat (~8.7 ha in total, ~7.4 ha within the proposed clearing area). No black cockatoo roost sites were identified within the survey area with the closest a documented roost site being located about 2.1 km east of the survey area.

No evidence of the western ringtail possum was found despite targeted day and night surveys. Habitat for the species within the survey area appears marginal in quality given the absence of a coherent midstory element.

In summary four vertebrate fauna species of conservation significance were positively identified as utilising the survey area:

- Forest Red-tailed Black Cockatoo – Vulnerable (WA/Federal);
- Carnaby's Black Cockatoo – Endangered (WA/Federal);
- South-western Brush-tailed Phascogale - Schedule 6 (WA);

- Western False Pipistrelle – Priority 4 (DBCA Priority Species).

Several additional species of conservation significance may also utilise the survey area, though, as no evidence of their presence was identified during the field survey, their status in the area remains uncertain. In most cases the species in question probably only occurs occasionally and/or for brief periods:

- Peregrine Falcon – Schedule 7 (WA);
- Masked Owl – Priority 3 (DBCA Priority Species);
- Baudin's Black Cockatoo – Endangered (WA/Federal);
- Chuditch - Vulnerable (WA/Federal);
- Western Brush Wallaby – Priority 4 (DBCA Priority Species)

Potential impacts on these fauna species and fauna in general are anticipated to be low primarily due to the degraded nature of the remnant vegetation present (and anticipated low fauna population densities), and the relatively small area of clearing required. Nonetheless ongoing planning should consider the potential presence of fauna so that any impacts can be further minimised where considered reasonable and practicable.

Given the confirmed presence of several fauna species of conservation significance (and other fauna in general) residing within the of proposed clearing footprint (e.g. south-western brush-tailed phascogale and common brushtail possum) it is recommended that appropriate management measures (e.g. trapping) be employed prior to and during clearing operations.

8. REFERENCES

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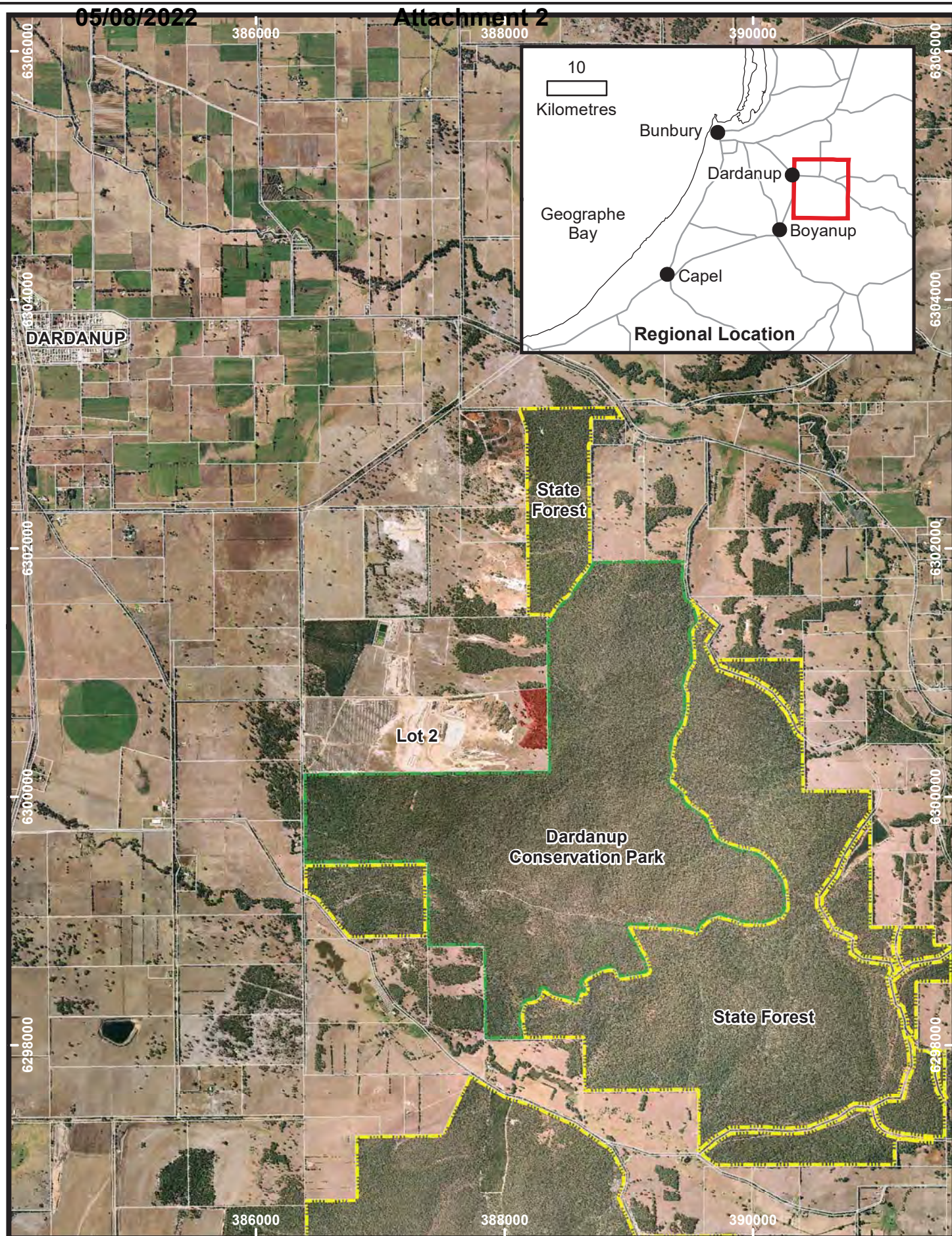
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FIGURES

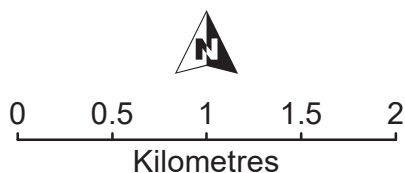
05/08/2022

Attachment 2



Legend

-  Lot 2 Survey Area
-  Conservation Park
-  State Forest



Drawn: G. Harewood
Date: March 2021
Scale: 1:40,000

Cleanaway Solid Waste Pty Ltd
Lot 2 Banksia Road Dardanup

Subject Site and Surrounds


Projection/Coordinate System: UTM/MGA Zone 50 Figure: 1

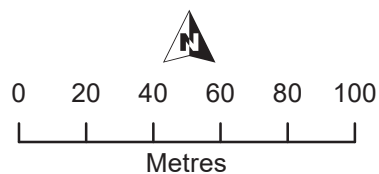
05/08/2022

Attachment 2



Legend

 Survey Area



Drawn: G. Harewood

Date: March 2021

Scale: 1:2,250

Projection/Coordinate System: UTM/MGA Zone 50

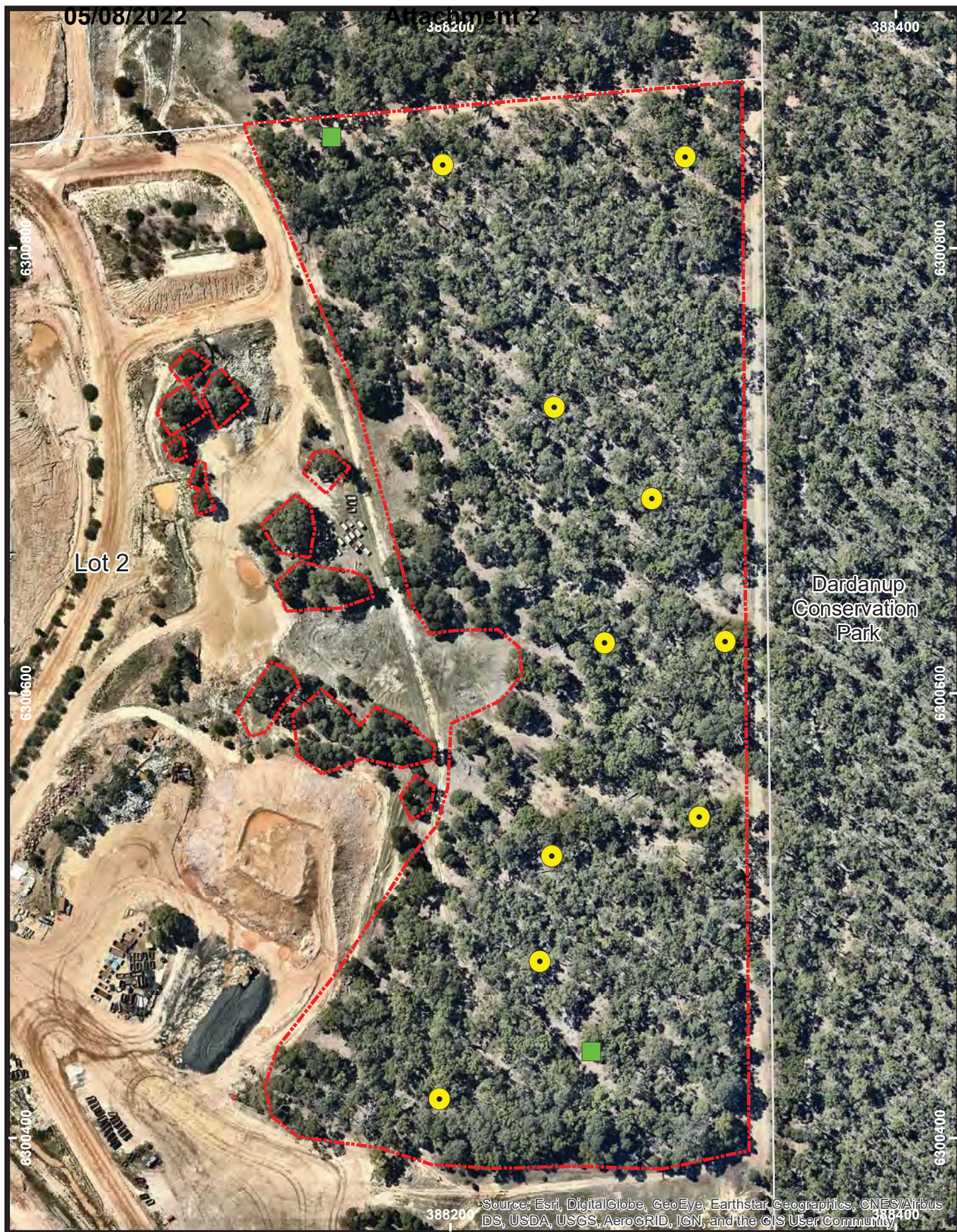
Cleanaway Solid Waste Pty Ltd
Lot 2 Banksia Road Dardanup

**Survey Area
Aerial Photograph**

Figure: 2

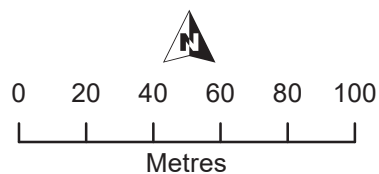
05/08/2022

Attachment 2



Legend

- Survey Area
- Bat Detector
- Camera Trap



Drawn: G. Harewood

Date: March 2021

Scale: 1:2,250

Projection/Coordinate System: UTM/MGA Zone 50

Cleanaway Solid Waste Pty Ltd
Lot 2 Banksia Road Dardanup

Recording Locations

Figure: 3

05/08/2022

Attachment 2

388400

388200

6300800

6300800

6300600

6300600



6300400

6300400

Lot 2

Dardanup Conservation Park



Habitat Trees (DBH>50cm)

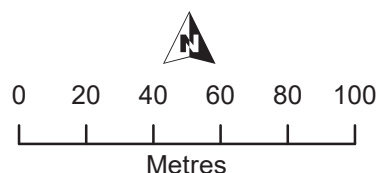
-  Habitat Tree - No Hollows or one or more possible/actual hollows assessed as unsuitable for black cockatoos
-  Habitat Tree - One or more actual hollows assessed as possibly suitable for black cockatoos

Hollow with chew marks

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

-  Survey Area
-  Jarrah/Marri Woodland



Drawn: G. Harewood

Date: March 2021

Scale: 1:2,250

Projection/Coordinate System: UTM/MGA Zone 50

Cleanaway Solid Waste Pty Ltd
Lot 2 Banksia Road Dardanup

Fauna Habitats & Habitat Trees (DBH >50cm)

Figure: 4

APPENDIX A

CONSERVATION CATEGORIES

EPBC Act (1999) Threatened Fauna Categories

Threatened fauna may be listed under Section 178 of the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* in any one of the following categories:

Category	Code	Description
Extinct	E	There is no reasonable doubt that the last member of the species has died.
*Extinct in the wild	EW	A species (a) is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or (b) has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
*Critically Endangered	CE	A species is facing an extremely high risk of extinction in the wild in the immediate future.
*Endangered	EN	A species: (a) is not critically endangered; and (b) is facing a very high risk of extinction in the wild in the near future.
*Vulnerable	VU	A species (a) is not critically endangered or endangered; and (b) is facing a high risk of extinction in the wild in the medium-term future.
Conservation Dependent	CD	A species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered
*Migratory	Migratory	(a) all migratory species that are: (i) native species; and (ii) from time to time included in the appendices to the Bonn Convention; and (b) all migratory species from time to time included in annexes established under JAMBA, CAMBA and ROKAMBA; and (c) all native species from time to time identified in a list established under, or an instrument made under, an international agreement approved by the Minister.
Marine	Ma	Species in the list established under s248 of the <i>EPBC Act</i>

Note: Only species in those categories marked with an asterisk are matters of national environmental significance (NES) under the *EPBC Act*.

Wildlife Conservation (Specially Protected Fauna) Notice 2018 Categories

Published as Specially Protected under the *Wildlife Conservation Act 1950*, and listed under Schedules 1 to 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Category	Code	Description
Schedule 1 (S1) Critically Endangered species	CR	Threatened species considered to be facing an extremely high risk of extinction in the wild in the immediate future.
Schedule 2 (S2) Endangered species	EN	Threatened species considered to be facing a very high risk of extinction in the wild in the near future.
Schedule 3 (S3) Vulnerable species	VU	Threatened species considered to be facing a high risk of extinction in the wild in the medium-term future.
Schedule 4 (S4) Presumed extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last member of the species has died.
Schedule 5 (S5) Migratory birds protected under an international agreement	MI	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds.
Schedule 6 (S6) Fauna that is of special conservation need as conservation dependent fauna	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Schedule 7 (S7) Other specially protected fauna.	OS	Fauna otherwise in need of special protection to ensure their conservation.

Western Australian DBCA Priority Fauna Categories

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Category	Code	Description
Priority 1 (P1) Poorly Known Species.	P1	Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2 (P2) Poorly Known Species.	P2	Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3 (P3) Poorly Known Species.	P3	Species that are known from several locations and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4 (P4) Rare, Near Threatened and other species in need of monitoring.	P4	<p>(a) Rare: Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.</p> <p>(b) Near Threatened: Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>

*Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

IUCN Red List Threatened Species Categories

The *IUCN Red List of Threatened Species™* is a checklist of taxa that have undergone an extinction risk assessment using the *IUCN Red List Categories and Criteria*.

Categories are summarized below.

Category	Code	Description
Extinct	EX	Taxa for which there is no reasonable doubt that the last individual has died.
Extinct in the Wild	EW	Taxa which is known only to survive in cultivation, in captivity or and as a naturalised population well outside its past range and it has not been recorded in known or expected habitat despite exhaustive survey over a time frame appropriate to its life cycle and form.
Critically Endangered	CR	Taxa facing an extremely high risk of extinction in the wild.
Endangered	EN	Taxa facing a very high risk of extinction in the wild.
Vulnerable	VU	Taxa facing a high risk of extinction in the wild.
Near Threatened	NT	Taxa which has been evaluated but does not qualify for CR, EN or VU now but is close to qualifying or likely to qualify in the near future.
Least Concern	LC	Taxa which has been evaluated but does not qualify for CR, EN, VU, or NT but is likely to qualify for NT in the near future.
Data Deficient	DD	Taxa for which there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status.
Not Evaluated	NE	Taxa which has not been evaluated.

A full list of categories and their meanings are available at:

<http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria>

APPENDIX B
NATUREMAP DATABASE SEARCH
AND
PROTECTED MATTERS SEARCH TOOL RESULTS

NatureMap Species Report

Created By Greg Harewood on 29/03/2021

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 115° 47' 53" E, 33° 25' 39" S
Buffer 15km
Group By Species Group

Species Group	Species	Records
Amphibian	10	84
Bird	153	5605
Fish	3	19
Invertebrate	87	305
Mammal	32	2615
Reptile	33	172
TOTAL	318	8800

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Amphibian				
1.	25398 <i>Crinia georgiana</i> (Quacking Frog)			
2.	25399 <i>Crinia glauerti</i> (Clicking Frog)			
3.	25400 <i>Crinia insignifera</i> (Squelching Froglet)			
4.	25401 <i>Crinia pseudinsignifera</i> (Bleating Froglet)			
5.	25404 <i>Geocrinia leai</i> (Ticking Frog)			
6.	25410 <i>Heleioporus eyrei</i> (Moaning Frog)			
7.	25411 <i>Heleioporus inornatus</i> (Whooping Frog)			
8.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
9.	25378 <i>Litoria adelaidensis</i> (Slender Tree Frog)			
10.	25388 <i>Litoria moorei</i> (Motorbike Frog)			
Bird				
11.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
12.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
13.	24262 <i>Acanthiza inornata</i> (Western Thornbill)			
14.	24560 <i>Acanthorhynchus superciliosus</i> (Western Spinebill)			
15.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
16.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
17.	25537 <i>Accipiter novaehollandiae</i> (Grey Goshawk)			
18.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
19.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
20.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
21.	24301 <i>Aegotheles cristatus</i> subsp. <i>cristatus</i> (Australian Owlet-nightjar)			
22.	24310 <i>Anas castanea</i> (Chestnut Teal)			
23.	24312 <i>Anas gracilis</i> (Grey Teal)			
24.	24313 <i>Anas platyrhynchos</i> (Mallard)			
25.	<i>Anas platyrhynchos</i> subsp. <i>domesticus</i>			
26.	24315 <i>Anas rhynchotis</i> (Australasian Shoveler)			
27.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
28.	47414 <i>Anhinga novaehollandiae</i> (Australasian Darter)			
29.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
30.	24562 <i>Anthochaera lunulata</i> (Western Little Wattlebird)			
31.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
32.	41324 <i>Ardea modesta</i> (great egret, white egret)			
33.	24340 <i>Ardea novaehollandiae</i> (White-faced Heron)			
34.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
35.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
36.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
37.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
38.	24318 <i>Aythya australis</i> (Hardhead)			
39.	<i>Barnardius zonarius</i>			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
40.	24319	<i>Biziura lobata</i> (Musk Duck)			
41.	25714	<i>Cacatua pastinator</i> (Western Long-billed Corella)			
42.	25716	<i>Cacatua sanguinea</i> (Little Corella)			
43.	25598	<i>Cacomantis flabelliformis</i> (Fan-tailed Cuckoo)			
44.	24784	<i>Calidris ferruginea</i> (Curlew Sandpiper)		T	
45.	25717	<i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
46.	24731	<i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black Cockatoo)		T	
47.	24733	<i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)		T	
48.	24734	<i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)		T	
49.	48400	<i>Calyptorhynchus</i> sp. (white-tailed black cockatoo)		T	
50.	24377	<i>Charadrius ruficapillus</i> (Red-capped Plover)			
51.	24321	<i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
52.		<i>Chroicocephalus novaehollandiae</i>			
53.	24432	<i>Chrysococcyx lucidus</i> subsp. <i>plagosus</i> (Shining Bronze Cuckoo)			
54.	24288	<i>Circus approximans</i> (Swamp Harrier)			
55.	24774	<i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
56.	47915	<i>Climacteris rufus</i> (Black-tailed Treecreeper)			
57.	25675	<i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
58.	24399	<i>Columba livia</i> (Domestic Pigeon)	Y		
59.	25568	<i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
60.	25592	<i>Corvus coronoides</i> (Australian Raven)			
61.		<i>Corvus splendens</i> subsp. <i>protegatus</i>			
62.	24671	<i>Coturnix pectoralis</i> (Stubble Quail)			
63.	24420	<i>Cracticus nigrogularis</i> (Pied Butcherbird)			
64.	25595	<i>Cracticus tibicen</i> (Australian Magpie)			
65.		<i>Cracticus torquatus</i>			
66.	25596	<i>Cracticus torquatus</i> (Grey Butcherbird)			
67.	24322	<i>Cygnus atratus</i> (Black Swan)			
68.	30901	<i>Dacelo novaeguineae</i> (Laughing Kookaburra)	Y		
69.	25673	<i>Daphoenositta chrysoptera</i> (Varied Sittella)			
70.	25607	<i>Dicaeum hirundinaceum</i> (Mistletoebird)			
71.	24470	<i>Dromaius novaehollandiae</i> (Emu)			
72.		<i>Egretta garzetta</i>			
73.		<i>Egretta novaehollandiae</i>			
74.		<i>Elanus axillaris</i>			
75.	47937	<i>Elseiornis melanops</i> (Black-fronted Dotterel)			
76.		<i>Eolophus roseicapillus</i>			
77.	24652	<i>Eopsaltria georgiana</i> (White-breasted Robin)			
78.	24567	<i>Epthianura albifrons</i> (White-fronted Chat)			
79.	25621	<i>Falco berigora</i> (Brown Falcon)			
80.	25622	<i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
81.	24472	<i>Falco cenchroides</i> subsp. <i>cenchrus</i> (Australian Kestrel, Nankeen Kestrel)			
82.	25623	<i>Falco longipennis</i> (Australian Hobby)			
83.	25624	<i>Falco peregrinus</i> (Peregrine Falcon)		S	
84.	24616	<i>Falcunculus frontatus</i> subsp. <i>leucogaster</i> (Western Shrike-tit, Crested Shrike-tit)			
85.	25727	<i>Fulica atra</i> (Eurasian Coot)			
86.	24761	<i>Fulica atra</i> subsp. <i>australis</i> (Eurasian Coot)			
87.	25729	<i>Gallinula tenebrosa</i> (Dusky Moorhen)			
88.	24763	<i>Gallinula tenebrosa</i> subsp. <i>tenebrosa</i> (Dusky Moorhen)			
89.	24765	<i>Gallirallus philippensis</i> subsp. <i>mellori</i> (Buff-banded Rail)			
90.	25530	<i>Gerygone fusca</i> (Western Gerygone)			
91.	24443	<i>Grallina cyanoleuca</i> (Magpie-lark)			
92.	24487	<i>Haematopus longirostris</i> (Pied Oystercatcher)			
93.	24293	<i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)			
94.	24295	<i>Haliastur sphenurus</i> (Whistling Kite)			
95.	47965	<i>Hieraaetus morphnoides</i> (Little Eagle)			
96.	25734	<i>Himantopus himantopus</i> (Black-winged Stilt)			
97.	24491	<i>Hirundo neoxena</i> (Welcome Swallow)			
98.	48587	<i>Hydroprogne caspia</i> (Caspian Tern)		IA	
99.	24511	<i>Larus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Silver Gull)			
100.	25661	<i>Lichmera indistincta</i> (Brown Honeyeater)			
101.	24326	<i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
102.	25650	<i>Malurus elegans</i> (Red-winged Fairy-wren)			
103.	25654	<i>Malurus splendens</i> (Splendid Fairy-wren)			
104.	25758	<i>Megalurus gramineus</i> (Little Grassbird)			
105.	47997	<i>Melanodryas cucullata</i> (Hooded Robin)			
106.	24598	<i>Merops ornatus</i> (Rainbow Bee-eater)			
107.		<i>Microcarbo melanoleucos</i>			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
108.	25610	<i>Myiagra inquieta</i> (Restless Flycatcher)			
109.	24738	<i>Neophema elegans</i> (Elegant Parrot)			
110.	25564	<i>Nycticorax caledonicus</i> (Rufous Night Heron)			
111.	24407	<i>Ocyphaps lophotes</i> (Crested Pigeon)			
112.	24328	<i>Oxyura australis</i> (Blue-billed Duck)		P4	
113.	25680	<i>Pachycephala rufiventris</i> (Rufous Whistler)			
114.	48591	<i>Pandion cristatus</i> (Osprey, Eastern Osprey)		IA	
115.	25681	<i>Pardalotus punctatus</i> (Spotted Pardalote)			
116.	24626	<i>Pardalotus punctatus</i> subsp. <i>xanthopyge</i> (Yellow-rumped Pardalote)			
117.	25682	<i>Pardalotus striatus</i> (Striated Pardalote)			
118.	24648	<i>Pelecanus conspicillatus</i> (Australian Pelican)			
119.	48061	<i>Petrochelidon nigricans</i> (Tree Martin)			
120.	48066	<i>Petroica boodang</i> (Scarlet Robin)			
121.	24659	<i>Petroica goodenovii</i> (Red-capped Robin)			
122.	25697	<i>Phalacrocorax carbo</i> (Great Cormorant)			
123.	25698	<i>Phalacrocorax melanoleucos</i> (Little Pied Cormorant)			
124.	24667	<i>Phalacrocorax sulcirostris</i> (Little Black Cormorant)			
125.	25699	<i>Phalacrocorax varius</i> (Pied Cormorant)			
126.	24409	<i>Phaps chalcoptera</i> (Common Bronzewing)			
127.	25587	<i>Phaps elegans</i> (Brush Bronzewing)			
128.	48071	<i>Phylidonyris niger</i> (White-cheeked Honeyeater)			
129.	24596	<i>Phylidonyris novaehollandiae</i> (New Holland Honeyeater)			
130.	24841	<i>Platalea flavipes</i> (Yellow-billed Spoonbill)			
131.	25720	<i>Platycercus icterotis</i> (Western Rosella)			
132.	24745	<i>Platycercus icterotis</i> subsp. <i>icterotis</i> (Western Rosella)			
133.	24843	<i>Plegadis falcinellus</i> (Glossy Ibis)		IA	
134.	24383	<i>Pluvialis squatarola</i> (Grey Plover)		IA	
135.	25703	<i>Podargus strigoides</i> (Tawny Frogmouth)			
136.	25704	<i>Podiceps cristatus</i> (Great Crested Grebe)			
137.	24681	<i>Poliiocephalus poliocephalus</i> (Hoary-headed Grebe)			
138.	25722	<i>Polytelis anthopeplus</i> (Regent Parrot)			
139.	25731	<i>Porphyrio porphyrio</i> (Purple Swamphen)			
140.	24767	<i>Porphyrio porphyrio</i> subsp. <i>bellus</i> (Purple Swamphen)			
141.	24771	<i>Porzana tabuensis</i> (Spotless Crane)			
142.		<i>Purpureicephalus spurius</i>			
143.	24776	<i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
144.	48096	<i>Rhipidura albiscapa</i> (Grey Fantail)			
145.	25614	<i>Rhipidura leucophrys</i> (Willie Wagtail)			
146.	25534	<i>Sericornis frontalis</i> (White-browed Scrubwren)			
147.	30948	<i>Smicornis brevirostris</i> (Weebill)			
148.	24645	<i>Stagonopleura oculata</i> (Red-eared Firetail)			
149.	48594	<i>Sternula nereis</i> (Fairy Tern)			
150.	24329	<i>Stictonetta naevosa</i> (Freckled Duck)			
151.	25597	<i>Strepera versicolor</i> (Grey Currawong)			
152.	25590	<i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
153.	25705	<i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
154.	24682	<i>Tachybaptus novaehollandiae</i> subsp. <i>novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
155.	24331	<i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
156.	48597	<i>Thalasseus bergii</i> (Crested Tern)		IA	
157.	24845	<i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
158.	25549	<i>Todiramphus sanctus</i> (Sacred Kingfisher)			
159.	24309	<i>Todiramphus sanctus</i> subsp. <i>sanctus</i> (Sacred Kingfisher)			
160.	24808	<i>Tringa nebularia</i> (Common Greenshank, greenshank)		IA	
161.	48147	<i>Turnix varius</i> (Painted Button-quail)			
162.	24386	<i>Vanellus tricolor</i> (Banded Lapwing)			
163.	25765	<i>Zosterops lateralis</i> (Grey-breasted White-eye, Silveryeye)			

Fish

164.	34028	<i>Galaxias occidentalis</i> (Western Minnow)			
165.	34030	<i>Geotria australis</i> (Pouched Lamprey)		P3	
166.		<i>Nannoperca vittata</i>			

Invertebrate

167.		<i>Acariformes</i> sp.			
168.		<i>Aeshnidae</i> sp.			
169.		<i>Akamptogonus novarae</i>			
170.		<i>Allothreua maculata</i>			
171.		<i>Aname mainae</i>			
172.		<i>Aname tepperi</i>			
173.		<i>Ancylidae</i> sp.			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
174.	<i>Antichiropus nanus</i>			
175.	<i>Arachnura higginsii</i>			
176.	<i>Araneus senicaudatus</i>			
177.	<i>Argiope protensa</i>			
178.	<i>Arkys walckenaeri</i>			
179.	<i>Artoriopsis expolita</i>			
180.	<i>Athericidae sp.</i>			
181.	<i>Austracantha minax</i>			
182.	<i>Backobourkia brounii</i>			
183.	<i>Badumna insignis</i>			
184.	<i>Baetidae sp.</i>			
185.	<i>Baiami teganarioides</i>			
186.	<i>Baiami volucripes</i>			
187.	47873 <i>Bertmainius opimus</i> (western pygmy trapdoor spider)		P3	
188.	<i>Brentidae sp.</i>			
189.	<i>Caenidae sp.</i>			
190.	<i>Carabidae sp.</i>			
191.	<i>Ceratopogonidae sp.</i>			
192.	<i>Cercophonius sulcatus</i>			
193.	33939 <i>Cherax cainii</i> (Marron)			
194.	<i>Cherax quinquecarinatus</i>			
195.	<i>Chironominae sp.</i>			
196.	<i>Corduliidae sp.</i>			
197.	<i>Corixidae sp.</i>			
198.	<i>Cormocephalus aurantiipes</i>			
199.	<i>Cormocephalus hartmeyerii</i>			
200.	<i>Cryptoerithus quobba</i>			
201.	<i>Culicidae sp.</i>			
202.	<i>Cyclosa trilobata</i>			
203.	<i>Dytiscidae sp.</i>			
204.	<i>Ecnomidae sp.</i>			
205.	<i>Empididae sp.</i>			
206.	<i>Erigone prominens</i>			
207.	<i>Eriophora biapicata</i>			
208.	<i>Gripopterygidae sp.</i>			
209.	<i>Gyrinidae sp.</i>			
210.	<i>Hydrobiosidae sp.</i>			
211.	<i>Hydrophilidae sp.</i>			
212.	<i>Hydropsychidae sp.</i>			
213.	48935 <i>Idiosoma sigillatum</i> (Swan Coastal Plain shield-backed trapdoor spider)		P3	
214.	<i>Isopeda leishmanni</i>			
215.	<i>Isopedella castanea</i>			
216.	<i>Lagynochthonius australicus</i>			
217.	<i>Lampona brevipes</i>			
218.	<i>Lampona cylindrata</i>			
219.	<i>Lampona punctigera</i>			
220.	<i>Latrodectus hasseltii</i>			
221.	<i>Leptoceridae sp.</i>			
222.	<i>Leptophlebiidae sp.</i>			
223.	<i>Missulena granulosa</i>			
224.	<i>Missulena occatoria</i>			
225.	<i>Mitullodon tarantulinus</i>			
226.	<i>Mitzoruga insularis</i>			
227.	<i>Neoniphargidae sp.</i>			
228.	<i>Nephila edulis</i>			
229.	<i>Nicodamus mainae</i>			
230.	<i>Nunciella aspera</i>			
231.	<i>Oligochaeta sp.</i>			
232.	<i>Ommatoiulus moreletii</i>			
233.	<i>Oniscidae sp.</i>			
234.	<i>Orthocladinae sp.</i>			
235.	<i>Palaemonidae sp.</i>			
236.	<i>Paramelitidae sp.</i>			
237.	<i>Parastacidae sp.</i>			
238.	<i>Perthidae sp.</i>			
239.	<i>Philopotamidae sp.</i>			
240.	<i>Pholcus phalangoides</i>			
241.	<i>Platorish gelorup</i>			
242.	<i>Scirtidae sp.</i>			
243.	<i>Scutigera indecisa</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
244.	<i>Simuliidae</i> sp.			
245.	<i>Staphylinidae</i> sp.			
246.	<i>Tanypodinae</i> sp.			
247.	<i>Tasmanicosa leuckartii</i>			
248.	<i>Telephlebiidae</i> sp.			
249.	<i>Tipulidae</i> sp.			
250.	<i>Urodacus novaehollandiae</i>			
251.	<i>Velliidae</i> sp.			
252.	<i>Venatrix pullastra</i>			
253.	34113 <i>Westralunio carteri</i> (Carter's Freshwater Mussel)		T	
Mammal				
254.	25449 <i>Antechinus flavipes</i> (Yellow-footed Antechinus)			
255.	24088 <i>Antechinus flavipes</i> subsp. <i>leucogaster</i> (Yellow-footed Antechinus, Mardo)			
256.	24162 <i>Bettongia penicillata</i> subsp. <i>ogilbyi</i> (Woylie, Brush-tailed Bettong)		T	
257.	24251 <i>Bos taurus</i> (European Cattle)	Y		
258.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
259.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattled Bat)			
260.	24187 <i>Chalinolobus morio</i> (Chocolate Wattled Bat)			
261.	24092 <i>Dasyurus geoffroii</i> (Chuditch, Western Quoll)		T	
262.	24189 <i>Falsistrellus mackenziei</i> (Western False Pipistrelle, Western Falsistrelle)		P4	
263.	24041 <i>Felis catus</i> (Cat)	Y		
264.	24215 <i>Hydromys chrysogaster</i> (Water-rat, Rakali)		P4	
265.	48588 <i>Isoodon fusciventer</i> (Quenda, southwestern brown bandicoot)		P4	
266.	24132 <i>Macropus fuliginosus</i> (Western Grey Kangaroo)			
267.	48005 <i>Mormopterus kitcheneri</i> (South-western Free-tailed Bat)			
268.	24223 <i>Mus musculus</i> (House Mouse)	Y		
269.	48022 <i>Notamacropus irma</i> (Western Brush Wallaby)		P4	
270.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
271.	25508 <i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)		S	
272.	48070 <i>Phascogale tapoatafa</i> subsp. <i>wambenger</i> (South-western Brush-tailed Phascogale, Wambenger)		S	
273.	24166 <i>Pseudocheirus occidentalis</i> (Western Ringtail Possum, ngwayir)		T	
274.	24243 <i>Rattus fuscipes</i> (Western Bush Rat)			
275.	24244 <i>Rattus norvegicus</i> (Brown Rat)	Y		
276.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
277.	24145 <i>Setonix brachyurus</i> (Quokka)		T	
278.	24259 <i>Sus scrofa</i> (Pig)	Y		
279.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
280.	24167 <i>Tarsipes rostratus</i> (Honey Possum, Noolbenger)			
281.	25521 <i>Trichosurus vulpecula</i> (Common Brushtail Possum)			
282.	24158 <i>Trichosurus vulpecula</i> subsp. <i>vulpecula</i> (Common Brushtail Possum)			
283.	30954 <i>Tursiops aduncus</i> (Indo-Pacific Bottlenose Dolphin)			
284.	24206 <i>Vespadelus regulus</i> (Southern Forest Bat)			
285.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		
Reptile				
286.	42368 <i>Acritoscincus trilineatus</i> (Western Three-lined Skink)			
287.	24990 <i>Aprasia pulchella</i> (Granite Worm-lizard)			
288.	43380 <i>Chelodina colleei</i> (South-western Snake-necked Turtle)			
289.	24980 <i>Christinus marmoratus</i> (Marbled Gecko)			
290.	30893 <i>Cryptoblepharus buechananii</i>			
291.	25047 <i>Ctenotus impar</i>			
292.	25049 <i>Ctenotus labillardieri</i>			
293.	41641 <i>Ctenotus ora</i> (Coastal Plains Skink)		P3	
294.	24939 <i>Diplodactylus polyophthalmus</i>			
295.	25096 <i>Egernia kingii</i> (King's Skink)			
296.	25100 <i>Egernia napoleonis</i>			
297.	25250 <i>Elapognathus coronatus</i> (Crowned Snake)			
298.	25115 <i>Hemiergis initialis</i> subsp. <i>initialis</i>			
299.	25118 <i>Hemiergis peronii</i> subsp. <i>tridactyla</i>			
300.	25119 <i>Hemiergis quadrilineata</i>			
301.	25131 <i>Lerista distinguenda</i>			
302.	25133 <i>Lerista elegans</i>			
303.	25005 <i>Lialis burtonis</i>			
304.	25184 <i>Menetia greyii</i>			
305.	25191 <i>Morethia lineocellata</i>			
306.	25192 <i>Morethia obscura</i>			
307.	25252 <i>Notechis scutatus</i> (Tiger Snake)			
308.	25253 <i>Parasuta gouldii</i>			
309.	25255 <i>Parasuta nigriceps</i>			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
310.	25510	<i>Pogona minor</i> (Dwarf Bearded Dragon)			
311.	24907	<i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
312.	25511	<i>Pseudonaja affinis</i> (Dugite)			
313.	25259	<i>Pseudonaja affinis</i> subsp. <i>affinis</i> (Dugite)			
314.	25266	<i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
315.	25519	<i>Tiliqua rugosa</i>			
316.	24983	<i>Underwoodisaurus milii</i> (Barking Gecko)			
317.	25218	<i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
318.	25225	<i>Varanus rosenbergi</i> (Heath Monitor)			

Conservation Codes

T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 29/03/21 17:41:49

[Summary](#)

[Details](#)

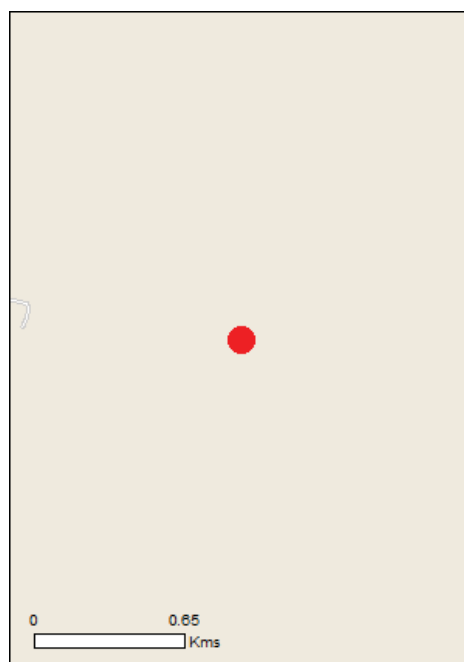
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

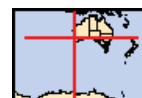
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 0.0Km



Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	15
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	1
Invasive Species:	20
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
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Birds

[Botaurus poiciloptilus](#)

Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
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[Calidris ferruginea](#)

Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
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[Calyptorhynchus banksii naso](#)

Forest Red-tailed Black-Cockatoo, Karak [67034]	Vulnerable	Species or species habitat likely to occur within area
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[Calyptorhynchus baudinii](#)

Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding likely to occur within area
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[Calyptorhynchus latirostris](#)

Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
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[Falco hypoleucos](#)

Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
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[Numenius madagascariensis](#)

Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
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Mammals

[Dasyurus geoffroii](#)

Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
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[Pseudocheirus occidentalis](#)

Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat may occur within area
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Plants

[Diuris drummondii](#)

Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat may occur within area
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[Diuris micrantha](#)

Dwarf Bee-orchid [55082]	Vulnerable	Species or species
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Name	Status	Type of Presence
05/08/2022	Attachment 2	habitat likely to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Synaphea sp. Pinjarra Plain (A.S. George 17182) [86878]	Endangered	Species or species habitat may occur within area
Synaphea stenoloba Dwellingup Synaphea [66311]	Endangered	Species or species habitat likely to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species [\[Resource Information \]](#)

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species

Name	Status	Type of Presence
05/08/2022	Attachment 2	habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.42761 115.79802

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Acknowledgements

Attachment 2

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

APPENDIX C

OBSERVED FAUNA LISTING

Fauna Observed

Lot 2 Banksia Road, Dardanup

Compiled from data collected by Astron (Nov 2014) and Greg Harewood (March 2021)

Class Family Species	Common Name	Conservation Status
Amphibia		
Myobatrachidae Ground or Burrowing Frogs		
<i>Heleioporus eyrei</i>	Moaning Frog	LC
Reptilia		
Pygopodidae Legless Lizards		
<i>Lialis burtonis</i>	Burton's Legless Lizard	LC
Scincidae Skinks		
<i>Cryptoblepharus buchanani</i>	Fence Skink	LC
<i>Morethia lineocellata</i>	West Coast Pale-flecked Morethia	LC
Aves		
Threskiornithidae Ibises, Spoonbills		
<i>Threskiornis molucca</i>	Australian White Ibis	LC
Accipitridae Kites, Goshawks, Eagles, Harriers		
<i>Elanus caeruleus</i>	Black-shouldered Kite	LC
Columbidae Pigeons, Doves		
<i>Phaps chalcoptera</i>	Common Bronzewing	Bh LC

BC Act Status - S1 to S7, EPBC Act Status - CR = Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions LC = Least Concern - see <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status
Psittacidae Parrots		
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	S3 VU Bp LC
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	S2 EN Bp EN
<i>Platycercus spurius</i>	Red-capped Parrot	LC
<i>Platycercus zonarius</i>	Australian Ringneck	LC
Halcyonidae Tree Kingfishers		
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	Introduced
<i>Todiramphus sanctus</i>	Sacred Kingfisher	LC
Meropidae Bee-eaters		
<i>Merops ornatus</i>	Rainbow Bee-eater	LC
Maluridae Fairy Wrens, GrassWrens		
<i>Malurus splendens</i>	Splendid Fairy-wren	Bh LC
Acanthizidae Thornbills, Geryones, Fieldwrens & Whitefaces		
<i>Acanthiza apicalis</i>	Broad-tailed Thornbill	Bh LC
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	LC
<i>Gerygone fusca</i>	Western Gerygone	LC
<i>Sericornis maculatis</i>	Spotted Scrubwren	Bh LC
<i>Smicrornis brevirostris</i>	Weebill	LC
Meliphagidae Honeyeaters, Chats		
<i>Lichenostomus virescens</i>	Singing Honeyeater	LC
<i>Lichmera indistincta</i>	Brown Honeyeater	LC

BC Act Status - S1 to S7, EPBC Act Status - CR = Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions LC = Least Concern - see <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo		
<i>Rhipidura fuliginosa</i>	Grey Fantail	LC
Cracticidae Currawongs, Magpies & Butcherbirds		
<i>Cracticus tibicen</i>	Australian Magpie	LC
Corvidae Ravens, Crows		
<i>Corvus coronoides</i>	Australian Raven	LC
Hirundinidae Swallows, Martins		
<i>Hirundo neoxena</i>	Welcome Swallow	LC
Zosteropidae White-eyes		
<i>Zosterops lateralis</i>	Silvereye	LC
Mammalia		
Dasyuridae Carnivorous Marsupials		
<i>Antechinus flavipes</i>	Yellow-footed Antechinus, Mardo	LC
<i>Phascogale tapoatafa wambenger</i>	South-western Brush-tailed Phascogal	S6 NT
Phalangeridae Brush-tail Possums, Cuscuses		
<i>Trichosurus vulpecula vulpecula</i>	Common Brushtail Possum	LC
Macropodidae Kangaroos, Wallabies		
<i>Macropus fuliginosus</i>	Western Grey Kangaroo	LC
Molossidae Freetail Bats		
<i>Ozimops kitcheneri</i>	Southern Freetail-bat	LC

BC Act Status - S1 to S7, EPBC Act Status - CR = Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, DBCA Priority Status - P1 to P4, Bush Forever Decreaser Species - Bh = habitat specialists, Bp = wide ranging species, Be = extinct in Perth Coastal Plain Region, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions LC = Least Concern - see <http://www.iucnredlist.org/technical-documents/categories-and-criteria/2001-categories-criteria> for others.

Class Family Species	Common Name	Conservation Status
Vespertilionidae Ordinary Bats		
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	LC
<i>Chalinolobus morio</i>	Chocolate Wattled Bat	LC
<i>Falsistrellus mackenziei</i>	Western False Pipistrelle	P4 VU
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat	LC
<i>Vespadelus regulus</i>	Southern Forest Bat	LC
Canidae Dogs, Foxes		
<i>Vulpes vulpes</i>	Red Fox	Introduced

APPENDIX D

HABITAT TREE DETAILS/HOLLOW PHOTOGRAPHS

05/08/2022

Attachment 2

Habitat Trees (DBH >50cm)

Modified from Astron (2014)

Datum - GDA94

Tree No.	mE	mN	Tree species	Tree height (m)	No. of possible large hollows visible	Hollow height (m)	Diameter of branch (cm)	Status of branch (living/dead)	Hollow entrance diameter	Possibly Suitable For Cockatoos	Evidence of past or current breeding (Yes/No)
1	388208	6300213	Eucalyptus marginata	20	-	-	-	-	-	No	No
2	388192	6300268	Eucalyptus marginata	20	-	-	-	-	-	No	No
3	388229	6300333	Eucalyptus marginata	22	-	-	-	-	-	No	No
4	388292	6300426	Corymbia calophylla	30	-	-	-	-	-	No	No
5	388290	6300383	Corymbia calophylla	25	1	15	30	Dead	?	No	No
6	388286	6300391	Corymbia calophylla	15	-	-	-	-	-	No	No
7	388251	6300412	Corymbia calophylla	30	-	-	-	-	-	No	No
8	388209	6300394	Eucalyptus marginata	25	-	-	-	-	-	No	No
9	388204	6300401	Eucalyptus marginata	25	-	-	-	-	-	No	No
10	388219	6300394	Eucalyptus marginata	25	-	-	-	-	-	No	No
11	388206	6300389	Eucalyptus marginata	30	-	-	-	-	-	No	No
12	388177	6300411	Corymbia calophylla	30	-	-	-	-	-	No	No
13	388165	6300402	Corymbia calophylla	30	2	15; 30	25; 40	Living	20; ?	No	No
14	388164	6300415	Corymbia calophylla	20	-	-	-	-	-	No	No
15	388124	6300411	Eucalyptus marginata	30	-	-	-	-	-	No	No
16	388160	6300434	Corymbia calophylla	25	-	-	-	-	-	No	No
17	388191	6300429	Corymbia calophylla	15	-	-	-	-	-	No	No
18	388214	6300430	Corymbia calophylla	20	1	15	-	Living	35	No	No
19	388237	6300434	Corymbia calophylla	25	-	-	-	-	-	No	No
20	388248	6300430	Eucalyptus marginata	25	-	-	-	-	-	No	No
21	388289	6300422	Corymbia calophylla	27	-	-	-	-	-	No	No
22	388253	6300431	Eucalyptus marginata	25	-	-	-	-	-	No	No
23	388347	6300418	Corymbia calophylla	30	-	-	-	-	-	No	No
24	388326	6300436	Corymbia calophylla	35	3	10; 20; 20	35; 35; 40	Living	20; ?; ?	No	No
25	388293	6300439	Corymbia calophylla	25	-	-	-	-	-	No	No
26	388188	6300487	Eucalyptus marginata	18	-	-	-	-	-	No	No
27	388196	6300491	Eucalyptus marginata	18	-	-	-	-	-	No	No
28	388347	6300458	Eucalyptus marginata	25	-	-	-	-	-	No	No
29	388318	6300485	Corymbia calophylla	25	1	25	35	Living	30	Yes	Yes; potential
30	388304	6300491	Eucalyptus marginata	20	-	-	-	-	-	No	No

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Tree No.	mE	mN	Tree species	Tree height (m)	No. of possible large hollows visible	Hollow height (m)	Diameter of branch (cm)	Status of branch (living/dead)	Hollow entrance diameter	Possibly Suitable For Cockatoos	Evidence of past or current breeding (Yes/No)
31	388250	6300534	Corymbia calophylla	25	-	-	-	-	-	No	No
32	388253	6300532	Eucalyptus marginata	25	-	-	-	-	-	No	No
33	388301	6300535	Eucalyptus marginata	27	-	-	-	-	-	No	No
34	388316	6300534	Corymbia calophylla	25	-	-	-	-	-	No	No
35	388337	6300564	Corymbia calophylla	30	-	-	-	-	-	No	No
36	388329	6300572	Eucalyptus marginata	20	-	-	-	-	-	No	No
37	388332	6300577	Eucalyptus marginata	30	1	20	40	Dead	~35?	No	No
38	388316	6300582	Corymbia calophylla	25	-	-	-	-	-	No	No
39	388285	6300586	Corymbia calophylla	25	-	-	-	-	-	No	No
40	388283	6300614	Corymbia calophylla	20	1	10	30	Dead	~30?	No	No
41	388313	6300612	Eucalyptus marginata	25	1	11	31	Living	~25?	No	No
42	388308	6300650	Corymbia calophylla	24	1	14	20	Dead	~15?	No	No
43	388249	6300651	Corymbia calophylla	20	1	18	35	Dead	?	No	No
44	388257	6300649	Eucalyptus marginata	15	-	-	-	-	-	No	No
45	388250	6300653	Eucalyptus marginata	20	2	17; 17	~30; 35	Dead	~20??	No	No
46	388231	6300639	Corymbia calophylla	25	1	19	40	Dead	20	No	No
47	388197	6300658	Corymbia calophylla	26	-	-	-	-	-	No	No
48	388184	6300688	Eucalyptus marginata	30	-	-	-	-	-	No	No
49	388142	6300652	Corymbia calophylla	30	-	-	-	-	-	No	No
50	388133	6300673	Corymbia calophylla	28	-	-	-	-	-	No	No
51	388150	6300701	Corymbia calophylla	28	-	-	-	-	-	No	No
52	388242	6300690	Corymbia calophylla	20	-	-	-	-	-	No	No
53	388247	6300694	Corymbia calophylla	20	-	-	-	-	-	No	No
54	388265	6300708	Corymbia calophylla	25	-	-	-	-	-	No	No
55	388322	6300735	Eucalyptus marginata	20	-	-	-	-	-	No	No
56	388304	6300754	Corymbia calophylla	20	-	-	-	-	-	No	No
57	388294	6300736	Corymbia calophylla	25	-	-	-	-	-	No	No
58	388252	6300722	Eucalyptus marginata	25	-	-	-	-	-	No	No
59	388275	6300759	Eucalyptus marginata	20	-	-	-	-	-	No	No
60	388271	6300767	Corymbia calophylla	25	-	-	-	-	-	No	No
61	388276	6300767	Corymbia calophylla	25	-	-	-	-	-	No	No
62	388241	6300783	Eucalyptus marginata	25	1	17	-	Living	~30??	No	No
63	388232	6300788	Eucalyptus marginata	25	-	-	-	-	-	No	No

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Attachment 2

Tree No.	mE	mN	Tree species	Tree height (m)	No. of possible large hollows visible	Hollow height (m)	Diameter of branch (cm)	Status of branch (living/dead)	Hollow entrance diameter	Possibly Suitable For Cockatoos	Evidence of past or current breeding (Yes/No)
64	388204	6300790	Eucalyptus marginata	18	-	-	-	-	-	No	No
65	388149	6300760	Eucalyptus marginata	30	-	-	-	-	-	No	No
66	388169	6300748	Corymbia calophylla	30	-	-	-	-	-	No	No
67	388169	6300782	Corymbia calophylla	30	-	-	-	-	-	No	No
68	388194	6300812	Corymbia calophylla	25	-	-	-	-	-	No	No
69	388288	6300827	Eucalyptus marginata	20	1	18	40	Dead	??	No	No
70	388312	6300831	Corymbia calophylla	28	-	-	-	-	-	No	No
71	388305	6300824	Corymbia calophylla	20	-	-	-	-	-	No	No
72	388317	6300865	Corymbia calophylla	26	-	-	-	-	-	No	No
73	388245	6300837	Eucalyptus marginata	20	-	-	-	-	-	No	No
74	388190	6300831	Corymbia calophylla	30	1	20	35	Dead	??	Yes	No
75	388198	6300846	Corymbia calophylla	25	-	-	-	-	-	No	No
76	388198	6300815	Corymbia calophylla	25	-	-	-	-	-	No	No
77	388187	6300795	Corymbia calophylla	15	-	-	-	-	-	No	No
78	388171	6300784	Corymbia calophylla	30	1	20	45	Dead	40	Yes	No
79	388139	6300823	Corymbia calophylla	20	-	-	-	-	-	No	No
80	388079	6300732	Corymbia calophylla	30	-	-	-	-	-	No	No
81	388087	6300759	Eucalyptus marginata	25	-	-	-	-	-	No	No

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Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388289 mE	6300382 mN	Tree Species	Dead (Marri)	Survey Date	24/03/2021
5	Comments	Dead marri with a side entry hollow. The hollow has a relatively large entrance but appears to be too small internally for a black cockatoo to use for nesting purposes. No evidence of use by fauna of any type. Several smaller possible spout type hollows.				Classification	Unsuitable Hollows.



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Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388164 mE	6300402 mN	Tree Species	Marri	Survey Date	24/03/2021
13	Comments	Marri with a possible side entry/spout type hollow and a possible large side entry hollow. Neither hollow appeared suitable with one appearing to be too small and the other having no depth. No evidence of use by fauna of any type.				Classification	Unsuitable Hollows.



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Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388213 mE	6300429 mN	Tree Species	Marri	Survey Date	24/03/2021
18	Comments	Marri with a possible upward facing spout type hollow. The hollow was found to have two entrances, both of which are too small for black cockatoos. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.



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Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388326 mE	6300436 mN	Tree Species	Marri	Survey Date	24/03/2021
24	Comments	Marri with sever possible side entry hollows. All but one hollow was found to be non-existent. The single side entry hollow's entrance (pictured below) appears to be too small for black cockatoos. Some chew marks suggest possible galah activity though not conclusive.				Classification	Unsuitable Hollow.



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Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388318 mE	6300485 mN	Tree Species	Marri	Survey Date	24/03/2021
29	Comments	Marri with possible side entry/spout type hollow. The hollow was found to have depth and also appeared to have chew marks near the entrance (see picture below) suggesting black cockatoo activity.				Classification	Chewed Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388332 mE	6300577 mN	Tree Species	Jarrah	Survey Date	24/03/2021
37	Comments	Large near dead jarrah with possible large chimney/spout type hollow. The hollow was however found to have no depth when examined with a drone. Several much smaller possible spout type hollows in dead branches. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow/No Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388283 mE	6300614 mN	Tree Species	Marri	Survey Date	24/03/2021
40	Comments	Marri with near horizontal spout type hollows. The hollow appears to have some depth but the fact that it is horizontal makes it unfavourable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.



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Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388313 mE	6300611 mN	Tree Species	Jarrah	Survey Date	24/03/2021
41	Comments	Jarrah with a side entry/spout type hollow. The hollow appears to have some depth but only provides entry into a relatively small branch/trunk of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388307 mE	6300650 mN	Tree Species	Marri	Survey Date	24/03/2021
42	Comments	Marri with a side entry/spout type hollow. The hollow appears to have some depth but only provides entry into a relatively small trunk of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388249 mE	6300650 mN	Tree Species	Marri	Survey Date	24/03/2021
43	Comments	Marri with a side entry type hollow. The hollow only provides entry into a relatively small branch of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388250 mE	6300652 mN	Tree Species	Jarrah	Survey Date	24/03/2021
45	Comments	Jarrah with two side entry type hollows. Both hollows only provide entry into a relatively small branch of a size unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollows.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388230 mE	6300639 mN	Tree Species	Marri	Survey Date	24/03/2021
46	Comments	Marri with a spout type hollow created recently when a branch of the tree broke off. The hollow appears to have a large entrance and some depth but appears too small internally to be considered suitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388197 mE	6300657 mN	Tree Species	Marri	Survey Date	24/03/2021
47	Comments	Marri with a possible side entry hollow. The hollow was found to be non-existent when examined with a drone.				Classification	No Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388275 mE	6300758 mN	Tree Species	Jarrah	Survey Date	24/03/2021
59	Comments	Jarrah with possible chimney type hollow. The hollow was found to be non-existent when examined with the drone.				Classification	No Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388241 mE	6300782 mN	Tree Species	Marri	Survey Date	24/03/2021
62	Comments	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388288 mE	6300827 mN	Tree Species	Jarrah	Survey Date	24/03/2021
69	Comments	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388189 mE	6300830 mN	Tree Species	Marri	Survey Date	24/03/2021
74	Comments	Marri with a chimney type hollow. The hollow has a large entrance and appears to be quite deep and therefore it must be considered potentially suitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unused Hollow.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388187 mE	6300795 mN	Tree Species	Marri	Survey Date	24/03/2021
77	Comments	Marri with a chimney type hollow. The hollow appears to be very shallow/open and is therefore considered unsuitable for black cockatoos to use for nesting purposes. No evidence of use by fauna of any type.				Classification	Unsuitable Hollow.

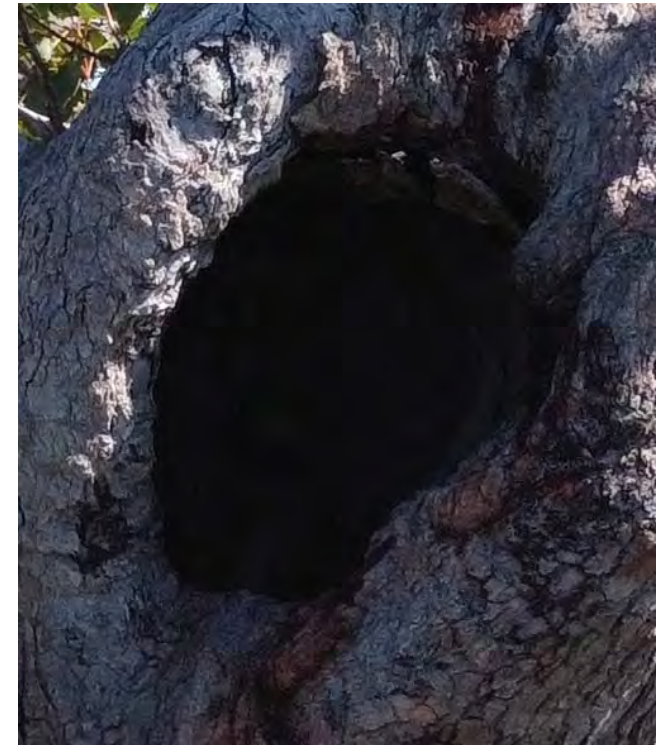


05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388170 mE	6300784 mN	Tree Species	Marri	Survey Date	24/03/2021
78	Comments	Marri with a two possible side entry type hollows possibly joined. Both hollows appear to be suitable (size and orientation) to be classified as potentially suitable for black cockatoos to use for nesting purposes. No evidence of use.				Classification	Unused Hollows.



05/08/2022

Attachment 2

FAUNA ASSESSMENT - LOT 2 BANKSIA ROAD – DARDANUP - MARCH 2021 – V1

WPT	Coordinates (MGA 94/Z50)	388087 mE	6300759 mN	Tree Species	Jarrah	Survey Date	24/03/2021
81	Comments	Near dead jarrah with a possible chimney type hollow. This hollow was found to be non-existent when examined with a drone. Several much smaller possible spout type hollows in dead branches.				Classification	Unsuitable Hollows.



DISCLAIMER

This fauna assessment report (“the report”) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Greg Harewood (“the Author”). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints. In accordance with the scope of services, the Author has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

The conclusions are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of preparing the report. Also it should be recognised that site conditions, can change with time.

Within the limitations imposed by the scope of services, the field assessment and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

In preparing the report, the Author has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report (“the data”). Except as otherwise stated in the report, the Author has not verified the accuracy of completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (“conclusions”) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. The Author will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to the Author.

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The Author will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

APPENDIX B – Flora, Vegetation and Fauna Assessment for Lot 10



J&P Metals Group
Part Lot 2 and 10, Temple Rd Picton
Biological Survey Report

February 2021

Executive summary

J&P Group commissioned terrestrial ecology surveys to investigate the potential environmental values of Lot 2 and 10 Temple Rd, Picton. The survey area was 37.52 ha covering portions of both Lot 2 and Lot 10.

The ecology surveys were,

- Detailed flora and vegetation survey
- Basic fauna survey and
- Black Cockatoo and Western Ringtail Possum assessment was completed over several days between 1 October to 14 January 2021.

The purpose of the studies was to identify and map key flora and fauna values as they occur in the survey area.

Key findings (Flora)

- Two main vegetation types were described and mapped within the survey area with seven sub-units identified. The main vegetation types are broadly described as *Melaleuca preissiana* and *Melaleuca raphiophylla* dominated wetlands on Bassendean Soils and Marri, Jarrah, Banksia Woodlands on Bassendean Sand.
- One Threatened Ecological Community - Banksia Woodlands of the Swan Coastal Plain ecological community was identified and two Priority three communities, Southern *Banksia attenuata* woodlands FCT 21b and *Banksia* dominated woodlands of the Swan Coastal Plain IBRA region. These communities have overlapping extent within the survey area and covered 19.96 ha.
- The vegetation condition of the survey area ranged from Excellent to Completely Degraded.
- One hundred and forty-six flora taxa (including subspecies and varieties) representing 42 families were recorded from the survey area during the field survey. This total comprised 101 native taxa and 45 naturalised flora taxa.
- No EPBC/BC Act or DBCA listed flora were recorded from the survey area.
- Forty five naturalised flora species were recorded in the survey area. None of these were reported as Declared Pests or Weeds of National Significance.

Key findings (Fauna)

- One conservation significant fauna species was recorded in the field, this was the Western Ringtail Possum (Critically Endangered). Two species were recorded from feeding evidence, these being Forest Red-tailed black Cockatoo (Vulnerable) and Rakali (Priority 4). Eleven other species were considered likely to occur including Carnaby's Cockatoo and Baudin's Cockatoo (Endangered).
- For the Western Ringtail Possum, 14.62 ha of high value habitat and 9.07 ha of moderate value habitat was identified.
- A total of 190 potential Black Cockatoo breeding habitat trees with a diameter at breast height greater than 500 mm were recorded in the survey area. Twenty-two trees were further inspected by pole camera due to having hollows that were identified as being potentially suitable for Black Cockatoo breeding. One single tree had a hollow that satisfied the criteria of a suitable Black Cockatoo breeding hollow. No breeding activity was observed.

- High value foraging habitat for Black Cockatoo species totalling 23.7 ha was identified in the survey area. This habitat is also considered potential breeding habitat and potential roosting habitat. Foraging evidence of Black Cockatoo species was observed within the survey area at several locations.

An assessment against the Environmental Protection Authority (EPA) Ten Clearing Principles was undertaken to identify which principles clearing of the survey area may be at variance to.

The following principles were identified:

- (b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.
- (d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.
- (f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

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Appendix B – Relevant legislation, background information and conservation codes

Appendix C – Desktop searches

Appendix D – Flora survey results

Appendix E - Fauna survey results

Appendix F – Black Cockatoo breeding tree assessment

Appendix G – Black Cockatoo Foraging Habitat Assessment

1. Introduction

1.1 Project background

J&P Group commissioned to GHD to investigate potential environmental values on Lot 2 and 10 Temple Rd, Picton. The surveys were designed quantify the extent of environmental values to determine potential opportunities or constraints for future uses of the area. This report presents the results of the survey for Lot 2 and Lot 10 separately as well as for the combined survey area.

1.2 Purpose of this report

The purpose of this study is to identify the flora and fauna within the survey area in order to inform and provide technical support.

The aim of the study was to:

- Identify, map and describe vegetation types.
- Assess and map the condition of vegetation.
- Identify and map the location of Threatened and Priority Ecological Communities.
- Identify areas of high floristic value including those that provide habitat for conservation significant flora, wetland / riparian vegetation, vegetation types that are poorly represented and those with high diversity.
- Map the location of conservation significant species.
- Assess and map fauna habitats.
- Undertake a targeted Western Ringtail Possum assessment.
- Undertake a Black Cockatoo assessment.
- Undertaken an assessment against the Ten Clearing Principles.

1.3 Project location

1.3.1 Survey area

The survey area runs north from Temple Road/South Western Highway to the Australind Bypass, across Lots 2 and 10 of Temple Rd. The survey area is 37.5 ha in size, with 20.16 ha occurring on Lot 2 and 17.36 ha on Lot 10. The survey area is zoned as Rural (DPLH 2020). The Lot immediately to the south of the survey area is zoned as Industrial. The survey area mapped is Figure 1 (Appendix A).

1.3.2 Study Area

A study area was defined for the desktop-based searches for the assessment and includes a 10 km buffer of the survey area.

1.4 Scope of works

The scope of works was to undertake an assessment of the flora and fauna values of the survey area. The following actions were completed to fulfil the scope:

A desktop review of publicly available information and relevant reports to determine the environmental values of the survey area.

A single season detailed and targeted flora and vegetation to identify:

- Vegetation community types present, including presence of any Threatened or Priority Ecological Communities (TECs or PECs) or other significant vegetation.
- Vegetation condition, including the location of any Weeds of National Significance (WONS) or Declared Weeds.
- Flora species present including introduced species.
- The presence or potential presence of any Threatened or Priority Flora.
- A basic terrestrial fauna survey including a Black Cockatoo and Western Ringtail Possum assessment to identify:
 - Dominant fauna habitat types.
 - Fauna species present at the time of survey, including opportunistic searches for conservation listed fauna species.
 - Black Cockatoo assessment.
 - Western Ringtail Possum assessment.

Preparation of a report (this document) that:

- Documents the results of the desktop assessment and field survey, including mapping.
- Identifies and discusses potentially occurring significant flora and vegetation communities.
- Identifies and discusses potentially occurring significant fauna and fauna habitat.
- Provision of spatial files in GIS format.

In WA, some ecological communities, flora and fauna are protected under both Federal and State Government legislation. In addition, regulatory authorities also provide a range of guidance and information on expected standards and protocols for environmental surveys.

An overview of key legislation and guidelines, conservation codes and background information relevant to this biological survey is provided in Appendix B.

1.5 Limitations and assumptions

This report has been prepared by GHD for J&P Group and may only be used and relied on by J&P Group for the purpose agreed between GHD and J&P Group as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than J&P Group arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by J&P Group and others who provided information to GHD (including Government authorities), which GHD has not

independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of infrastructure, services and vegetation, and access. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

This report has assessed the flora and fauna values within the survey area, as shown in Figure 1, Appendix A. Should the survey area change or be refined, further assessment may be required.

2. Methodology

2.1 Desktop assessment

Prior to the field survey, a desktop assessment was undertaken to identify relevant environmental information pertaining to both the survey area and study area and assist in survey design. The desktop assessment involved a review of:

- Department of Agriculture, Water and the Environment (DAWE) (previously the Department of the Environment and Energy (DoEE)) Protected Matters Search Tool (PMST) to identify communities and species listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) potentially occurring within the study area (DAWE 2020a) (Appendix C).
- The Department of Biodiversity, Conservation and Attractions (DBCA) TEC and PEC database (DBCA 2020a) to determine the potential for significant ecological communities to be present within the study area.
- The DBCA NatureMap database for flora species previously recorded within the study area (DBCA 2007-2020).
- The DBCA Threatened (Declared Rare) and Priority Flora database (TPFL) and the WA Herbarium database (WAHERB) for Threatened flora species listed under the Biodiversity Conservation Act 2016 (BC Act) (which replaced the Wildlife Conservation Act 1950) or listed as priority by DBCA, previously recorded within the study area (DBCA 2020b).
- Existing datasets including previous vegetation mapping of the survey area, aerial photography, geology/soils and hydrology information to provide background information on the variability of the environment, likely vegetation units and to identify areas with potential to contain TECs, PECs, and Threatened and Priority listed flora species.
- Previous studies undertaken within or in close proximity to the survey area.

2.2 Field survey

2.2.1 Flora and vegetation

The field survey was undertaken by Russel Smith (SL flora permit FT61000473) and Colin Spencer (SL flora permit FB62000169) on 6, 14 and 16 November 2020 and 14 January 2021. The field survey was undertaken to identify and describe the dominant vegetation types, assess vegetation condition, and identify and record vascular flora taxa present at the time of survey. Searches for conservation significant or other significant ecological communities and flora taxa were also undertaken during the field survey. Information on species present, vegetation structure and condition were collected at 83 recording sites, or relevés, and nine 10 m x 10 m floristic quadrats.

The survey methodology was undertaken with reference to the Environmental Protection Authority (EPA) *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a).

A targeted survey for *Diuris drummondii* was conducted on 14 January 2021 within vegetation unit A1 and A2, which was considered good potential habitat for the orchid, based on observations of known populations within Bunbury and Stratham. The population in Bunbury was inspected prior to survey to ascertain the flowering status. This population was in fruit, but easy to see, so if the plants were present in the survey, they would have been readily observable.

Data collection

Information on species present, vegetation structure and condition were collected at 83 recording sites, or relevés, and nine 10 m x 10 m floristic quadrats (Figure 8, Appendix A). Flora data are provided in Appendix D.

Quadrats (measuring 10 m x 10 m – area of 100 m²) were located within each identified vegetation type. A minimum of three quadrats were established within each main identified vegetation unit, where possible, with relevés used to collect additional information.

Flora species not identified in the field were collected or photographed for later identification. Taxonomy and conservation status of flora species was checked against Parks and Wildlife Service databases.

Field data at each quadrat were recorded on a pro-forma data sheet and included the parameters detailed in Table 2-1.

Table 2-1 Data collected during the field survey

Aspect	Measurement
Collection attributes	Site code, personnel/recorder; date, quadrat dimensions, photograph of the quadrat.
Physical features	Aspect, slope, landform, soil attributes, ground surface cover, leaf and wood litter.
Location	Coordinates recorded in GDA94 datum using a hand-held GPS tool to accuracy approximately ± 5 m.
Vegetation condition	Vegetation condition was assessed using the condition rating scale adapted by EPA (2016a) for the South West Botanical Province.
Disturbance	Level and nature of disturbances (e.g. weed presence, fire and time since last fire, impacts from grazing, exploration activities).
Flora	List of dominant flora from each structural layer. List of all species within the quadrat including average height and cover (using NVIS)

A flora inventory was compiled from taxa listed in described relevés and from opportunistic floristic records throughout the survey area.

Vegetation types

Vegetation types were identified and boundaries delineated using a combination of aerial photography, topographical features and field data/observations. Vegetation types were described based on structure, dominant taxa and cover characteristics as defined by quadrat data and field observations. Vegetation type descriptions follow NVIS and are consistent with NVIS Level V (Association) (NVIS Technical Working Group 2017).

Statistical analysis

The floristic quadrat data from the survey area were subject to MVA (multivariate analysis) using the software PATN (Belbin 2003) to determine the relationship of the vegetation units described and mapped within the survey area to the floristic community types derived for the Swan Coastal Plain by Gibson *et al.* (1994) and DEP (1996).

The MVA used two-way classification (Agglomerative Hierarchical Fusion) of the presence/absence data for each quadrat. The flexible UPGMA classification strategy was used ($\beta = -0.1$), together with the Bray-Curtis site similarity measure. The default settings for number of groups to be produced by the classification (i.e. the “cut-off level”) was accepted in each case. The primary output of the classification were dendrograms and a two-way table of taxa and quadrats. The analysis consisted of a total of 1,107 quadrats and 1,736 taxa.

Data from all quadrats from the Southern Swan Coastal Plain (SCP) survey dataset (Gibson et al., 1994) and supplementary surveys (DEP 1996) were used in the MVA after taxonomic updating was carried out. Taxonomic updating of the 25-year-old SCP data was required because many taxonomic changes have taken place since the original survey was carried out (e.g., *Dryandra* to *Banksia*, *Eucalyptus calophylla* to *Corymbia calophylla*, etc.). In addition, there is some uncertainty about the identification of such species as *Thysanotus manglesianus* and *T. patersonii*, where many Swan Coastal Plain specimens have intermediate characteristics between the two. In such cases terms such as '*Thysanotus manglesianus/patersonii* complex' were used.

For the quadrats from the Gibson et al. (1994) report, the assigned FCT code was affixed to the quadrat name to facilitate understanding the MVA outputs in Appendix D.

Mapping

Derivation and mapping of vegetation units was primarily based on the results of quadrats and relevés supported by results of the MVA of quadrats. Two primary vegetation units were recognised units A and B. These were divided into subunits (A1, A2, A3, B1, B2, B3 and B4 based primarily on structural differences). Dendrograms showing the clustering of these vegetation units are shown in Appendix D. A further mapping unit "cleared" was used for areas for the most part lacking vegetation. These include roads, cleared verges and in this survey area instance areas cleared as part of the sand quarry.

Vegetation condition

The vegetation condition was assessed and mapped in accordance with the vegetation condition rating scale for the South West and Interzone Botanical Provinces of Western Australia (IBRA) (devised by Keighery (1994) and adapted by EPA (2016a)). The scale recognises the intactness of vegetation and consists of six rating levels. The vegetation condition rating scale is located in Appendix B.

Conservation significant flora

Prior to the field survey, information obtained from the desktop assessments (e.g. EPBC Act PMST, *NatureMap* and DBCA database search results) was reviewed to determine conservation significant flora taxa potentially present within the survey area. Targeted searches for conservation significant flora based on desktop assessments and habitat availability was undertaken throughout the survey area.

Flora identification and nomenclature

Species well known to the survey botanist were identified in the field. All other species were collected and assigned a unique collection number to facilitate tracking. Specimens collected during the field assessment were dried and processed in accordance with the requirements of the WA Herbarium. Species were identified by the use of taxonomic literature, electronic keys and online electronic databases.

The conservation status of all recorded flora was compared against the current lists available on *FloraBase* (WA Herbarium 1998–2020) and the EPBC Act Threatened species database provided by DAWE (2020a). Nomenclature used in this report follows that used by the WA Herbarium as reported on *FloraBase* (WA Herbarium 1998–2020).

Targeted surveys for Threatened and Priority Ecological Communities (TEC/PEC)

Targeted surveys for the presence of TECs and PECs were undertaken by identifying vegetation types and delineating boundaries using a combination of aerial photography, topographical features, field data/observations and statistical analyses (multivariate analyses).

Vegetation units were described based on structure, dominant species and cover characteristics as defined by quadrat data and field observations.

2.2.2 Fauna

Field Survey

The survey methodology was undertaken in accordance with the EPA Technical Guidance – Sampling methods for terrestrial vertebrate fauna (EPA 2016b) and Technical Guidance – Terrestrial Fauna Surveys (EPA 2020).

Study Team and Survey Timing

GHD Senior ecologist, Andrew Fry, undertook the basic fauna survey and targeted significant species assessment on 16-18th December 2020 with supplementary nocturnal surveys using a team of two ecologists on 4 November 2020 and 18 January 2021.

On the Swan Coastal Plain, Baudin's Black-Cockatoo and Carnaby's Black-Cockatoo are most commonly present from February through to September, with Forest Red-tailed Black-Cockatoo presence being flexible across the year. The timing of the survey in December provided less opportunity to record foraging individuals, particularly with regard to White-Tailed Black-Cockatoos. This was compensated by searching for foraging evidence, which will generally persist in the landscape (particularly Marri nut chews).

Black-Cockatoo Habitat Assessment

The field survey methodology was designed in accordance with draft Commonwealth referral guidelines for threatened Black Cockatoos (DotEE 2017;DSEWPaC 2012,).

Breeding Habitat Assessment

The survey assessed whether suitable breeding habitat for Black-Cockatoos was present within the survey area. The Commonwealth *Referral guideline for three black cockatoo species* (DSEWPaC 2012) defines breeding habitat as species of trees known to support breeding within the range of the black-cockatoo species, which either have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow (being greater than 50 cm diameter at breast height)

All individual trees of species with the potential to form hollows (primarily Jarrah, Marri, Flooded Gum and Tuart) and with sufficient diameter to be considered breeding habitat trees (i.e. DBH >50 cm) were recorded using a GPS and scored by the survey team

The following parameters were scored:

- DBH in centimetres.
- tree species.
- the number any observed hollows.
- the entrance diameter of the hollow/s.
- suitability of entry/egress angle of the hollow/s.
- signs of cockatoo use (including chewing, shell fragments, feathers etc)
- the presence of beehives.
- photographs were taken to aid future identification.

Any trees identified as containing potentially suitable hollows were assessed where possible utilising an eight metre long pole camera. The pole camera allowed access to the majority of potentially suitable hollows.

Foraging Habitat Assessment

Foraging habitat is defined as areas including plants of species known to support foraging within the range of each cockatoo species. Marri and Jarrah woodlands are particularly important to Baudin's Black-Cockatoo and the Forest Red-tailed Black-Cockatoo, while proteaceous heaths (i.e. shrublands dominated by *Banksia*, *Hakea* and *Grevillea* species) are also important to Carnaby's Black-Cockatoo (DSEWPac 2012).

In assessing the quality of Black-Cockatoo foraging habitat, the criteria detailed in both the current referral guideline (DSEWPac 2012) and the draft revised referral guideline (DotEE 2017) were considered. These include foraging plant composition and density, foraging evidence such as chewed Marri nuts, proximity to known roosting areas and breeding areas and proximity to water sources.

Roosting Habitat Assessment

During the field survey, searches were conducted for evidence of roosting (e.g. piles of scats, feeding debris chewed trees). Two sunset observations were undertaken on site to observe potential roosting behaviour.

Western Ringtail Possum

Searching was carried out for presence or signs of occurrence of Western Ringtail Possum and for suitable habitat. This involved searching potentially suitable habitat, specifically *Agonis* (Peppermint tree) woodland for scats and dreys (possum nests). A nocturnal survey of identified habitat was also undertaken on two separate night through spotlighting traverses following habitat mapping.

The following information was recorded with every Western Ringtail Possum, scat or drey observation:

- observer
- animal/ evidence location using a GPS
- time
- number of individuals if possible

Fauna Habitat Type Description and Opportunistic Searching

As the site was traversed, general fauna habitat descriptions were made wherever a distinct junction in habitat types was noted. Habitat elements recorded included landscape type, any notable microhabitats present, any disturbance (e.g. fire, weeds, grazing, evidence of introduced fauna), broad vegetation characteristics and representative photographs. Site descriptions were then considered in the context of the detailed vegetation mapping descriptions as provided by Ecoedge botanical consultants.

Habitat suitability and likelihood of occurrence of other locally relevant conservation significant fauna species was assessed based on the fauna habitat characteristics and the results of the database searches. All conservation significant fauna species recorded or likely to occur are presented in Appendix C.

Opportunistic observations were made of any other vertebrates (or signs of their presence). Fauna taxa observed or heard were noted, and indirect evidence (such as scats, tracks, diggings, nests, feathers, bones, pellets) indicating the current or recent presence of a species

also noted. Non-destructive Searching was undertaken through microhabitats including turning over leaf litter and examining tree hollows and hollow logs.

2.3 Limitations

2.3.1 Desktop limitations

Desktop investigations use a variety of online resources such as the WA Museum and DBCA NatureMap database (DBCA 2007-2020), and the EPBC Act PMST (DAWE 2020a). The EPBC Act PMST is based on bioclimatic modelling for the potential presence of species. As such, this does not represent actual records of the species within the area. The records from the DBCA searches of threatened flora provide more accurate information for the general area. However, some records of collections cannot be dated and often misrepresent the current range of threatened species, therefore when undertaking desktop assessment flora database records need to be interrogated.

2.3.2 Field survey limitations

The EPA (2016a and 2020) Technical Guide states flora survey reports for environmental impact assessment in WA should contain a section describing the limitations of the survey methods used. The limitations and constraints associated with this field survey are discussed in Table 2-2.

Table 2-2 Field survey limitations

Aspect	Constraint	Comment
Sources of information and availability of contextual information	Nil	Adequate information is available for the survey area. This information includes: Broad scale (1:250,000) mapping by Beard (1979) and digitised by Shepherd et al. (2002) Vegetation mapping by Heddle et al. 1980 and Webb (DBCA) (2016) Regional biogeography (Mitchell et al. 2002).
Scope (what life forms were sampled etc.)	Nil	Vascular flora and terrestrial fauna were sampled during the survey.
Proportion of flora and fauna collected and identified (based on sampling, timing and intensity)	Minor	The detailed vegetation and flora survey was undertaken on 6, 14 and 16 November 2020 and 14 January 2021. The flora recorded from the field survey is detailed in Section 4.1 and a full flora species list is provided in Appendix D. The portion of flora collected and identified was considered moderate, based on largely degraded survey area, survey effort and timing. Fauna surveys were undertaken 16-18th December 2020 with supplementary nocturnal surveys using a team of two ecologists on 4 November 2020 and 18 January 2021. Fauna recorded from the field survey is provided in Appendix E.. The portion of fauna identified was considered moderate in line with the required intensity of Basic fauna survey. Considering the survey methodology and sampling intensity applied the proportion of flora and fauna recorded is not considered a major constraint.
Flora determination	Nil	Flora determination was undertaken by Ecoedge botanists/ecologists in the field and at the WA

Aspect	Constraint	Comment
		<p>Herbarium. Flora species were generally identifiable, with the exception one species which was identified to a genus level only. This taxa is not representative of significant flora likely to occur in the survey area and does not adversely impact the survey results.</p> <p>The taxonomy and conservation status of the WA flora is dynamic. This report was prepared with reliance on taxonomy and conservation status current at the time report development, but it should be noted this may change in response to ongoing research and review of International Union for Conservation Nature criteria.</p>
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Minor	<p>The survey area was entirely accessible and was accessed by foot. The entire survey area was adequately surveyed.</p> <p>Nocturnal surveys for Western Ringtail Possum were sufficient to identify presence or absence of the species, however to form an estimate of population for the survey area additional transect based surveys will be required.</p>
Mapping reliability	Nil	<p>The vegetation types were mapped using high-resolution ESRI aerial imagery obtained from Landgate, topographical features, previous broad scale mapping (Beard 1979) and field data.</p> <p>Data were recorded in the field using hand-held GPS tools (e.g. Samsung tablet and Garmin GPS).</p>
Timing/weather/season/cycle	Nil	<p>The field survey was undertaken in spring 2020 and Summer 2021. This timing of the flora and vegetation survey is considered the optimal season complete flora and vegetation surveys on the Swan Coastal Plain (optimal time is during spring).</p> <p>Conditions during the fauna survey were warm and sunny with warm still to breezy nights nights.</p>
Disturbances (e.g. fire, flood, accidental human intervention)	Nil	<p>Parts of the survey area have been subject to historical disturbances such as clearing and weeds. These disturbances did not impact the survey.</p>
Resources	Nil	<p>Adequate resources were employed during the field surveys. Eight person days were applied to the flora survey and seven days to the fauna survey.</p>
Access restrictions	Nil	<p>There were no access problems along the alignment.</p>
Experience levels	Nil	<p>The ecologist and botanists who executed the survey are suitably qualified and experienced in the field with eight to 20 years experience undertaking flora and fauna surveys in the bioregion.</p>

3. Desktop Assessment

3.1 Climate

The Bunbury area experiences a Mediterranean climate and is characterised by warm, dry summers and cool, wet winters. Rainfall is largely received during the winter months as a result of cold fronts that regularly cross the South West coast. The closest BoM weather station is Bunbury (site number 009965) (BoM 2020). Climate statistics for the Bunbury weather station have been presented in Plate 1.

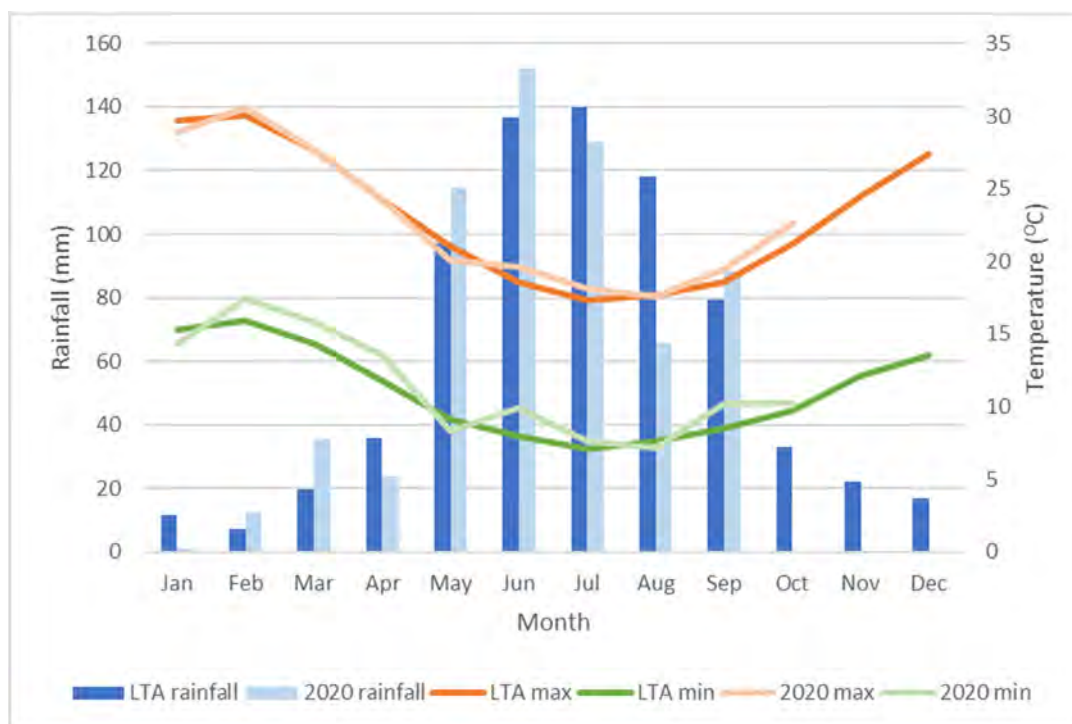


Plate 1 Climate statistics for Bunbury Weather Station (No. 9965) Annual and 2020

Note: Annual climate statistics are from November 1995 to current.

3.2 Province

The study area is located in the South West Botanical Province of WA (Beard 1990). The study area is located in the Swan Coastal Plain Bioregion and Perth (SWA2) subregion as described by the Interim Biogeographic Region of Australia (IBRA) (Department of the Environment 2012).

The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats and coastal limestone. Heath and/or Tuart woodlands occur on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages and Marri on colluvial and alluvial soils. The subregion also includes a complex series of seasonal wetlands (Mitchell *et al.* 2002).

3.3 Landforms and soils

The Swan Coastal Plain is comprised of five major geomorphological units, which lie more or less parallel to the coast, being the Quindalup, Spearwood and Bassendean Dunes, the Pinjarra Plain and the Ridge Hill Shelf (McArthur and Bettenay 1960, Churchwood and McArthur 1980). The survey area lies within the Bassendean Dune and Pinjarra Plain systems which are broadly described as:

- Bassendean dune and sandplain system: Pleistocene sand dunes with very low relief, leached grey siliceous sand intervening sandy and clayey swamps and gently undulating plains. These occur immediately west of, and partly overlie, the Pinjarra Plain. Topography becomes more subdued from west to east.
- Pinjarra Plain: Broad low relief plain west of the foothills, comprising predominantly Pleistocene fluvial sediments and some Holocene alluvium associated with major current drainage systems. Major soils are naturally poorly drained with many swamps.

The Department of Primary Industries and Regional Development (DPIRD) soil-landscape mapping of the South West of WA (Government of Western Australia (GoWA) 2018a) provides soil and landform data compiled from various sources. This mapping identifies two different soil zones within the survey area (Figure 5, Appendix A).

Pinjarra Zone: Alluvial deposits (early Pleistocene to Recent) between the Bassendean Dunes Zone and the Darling Scarp, colluvial and shelf deposits adjacent to the Darling Scarp. Clayey to sandy alluvial soils with wet areas.

Bassendean Zone: Mid Pleistocene Bassendean sand. Fixed dunes inland from coastal dune zone. Non-calcareous sands, podsolised soils with low-lying wet areas.

3.4 Hydrology

3.4.1 Watercourses

There are no drainage lines intersecting the survey area. Large parts of the survey area have been extensively modified for agricultural drainage, sand extraction, fill for industrial sites and for construction of surrounding roads. Survey area occurs 2.5 km north of the Ferguson River and 1.8 km south of the Collie River.

3.4.2 Wetlands

Sections of the survey area occur within a low-lying palusplain, which is seasonally inundated or has a high-water table during winter. The EPBC Act PMST did not identify any wetlands of international importance (Ramsar wetland) or Nationally Important Wetlands within a 5 km buffer of the survey area.

The Geomorphic Wetlands Swan Coastal Plain dataset (Hill et al. 1996) identifies three wetlands occurring within the survey area as shown in Table 3-1 below and Figure 3, Appendix A.

Table 3-1 Geomorphic Wetlands

Geomorphic Wetland ID	Management Category	Wetland Type
ID 14352	Conservation	Not assessed
ID 1551	Multiple Use	Dampland
ID 1631	Multiple Use	Dampland

3.5 Land Use

3.5.1 Conservation reserves and estates

The survey area does not intersect with any DBCA legislated lands.

3.5.2 Environmentally Sensitive Areas

The central section of the survey area intersects with an Environmentally Sensitive Area (ESAs) which appears to be associated with the conservation class wetland (ID 14352) (Figure 2, Appendix A).

3.6 Flora and Vegetation

3.6.1 Broad vegetation mapping and extents

Broad scale (1:250,000) pre-European vegetation mapping of the area has been completed by Beard (1979) at an association level. The survey area intersects the -

- Bassendean (association 1000) - Medium forest; Jarrah-Marri/Low woodland; Banksia/Low forest; Teatree (*Melaleuca* spp.) vegetation association.

The pre-European mapping has been adapted and digitised by Shepherd *et al.* (2002). The extent of the vegetation associations has been determined by the state-wide vegetation remaining extent calculations maintained by the DBCA (latest update May 2020 – GoWA 2017). As shown in Table 3-2, the current extents of vegetation association 1000 are less than 30 % of their pre-European extent at the IBRA Bioregion, IBRA subregion and within the Local Government Authority (LGA) levels.

Regional vegetation for the Swan Coastal Plain (at vegetation complex level) was mapped by Heddle *et al.* (1980) and updated and extended by Webb *et al.* (2016). The mapping indicates that one vegetation complex is present within the survey area:

- Southern River Complex – Open woodland of *Corymbia calophylla* (Marri) – *Eucalyptus marginata* (Jarrah) – *Banksia* species on elevated areas and a fringing woodland of *Eucalyptus rudis* (Flooded Gum) – *Melaleuca raphiophylla* (Swamp Paperbark) along streams. South of the Murray River *Agonis flexuosa* (Peppermint) occurs in association with the Flooded Gum and Swamp Paperbark.

GoWA (2018c) has assessed the vegetation complexes against presumed pre-European extents within the SWA IBRA Bioregion (Table 3-3) and LGA levels (Table 3-4). The current extents of the Southern River Complex vegetation occurring within the survey area are less than 30% of the pre-European distribution within the SWA IBRA Bioregion and LGAs.

Table 3-2 Extents of vegetation associations mapped within the survey area (GoWA 2019b)

Vegetation Association	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining extent (%)	Current extent remaining within all DBCA managed land (%)
Swan Coastal Plain IBRA Bioregion		1,501,221.93	579,813.47	38.62	38.45

Vegetation Association	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining extent (%)	Current extent remaining within all DBCA managed land (%)
1000	State: WA	99,835.86	27,768.84	27.81	18.64
	IBRA Bioregion: Swan Coastal Plain	94,175.31	24,869.20	26.41	19.18
	Sub-region: Perth	94,175.31	24,869.20	26.41	19.18
	LGA: City of Bunbury	2,171.67	621.00	28.60	2.12

Table 3-3 Extent of vegetation complexes on the Swan Coastal Plain mapped within the survey area (GoWA 2019c)

Vegetation complex	Pre-European extent (ha)	Current extent (ha)	Remaining extent (%)	Current extent remaining within all DBCA managed land (%)
Southern River Complex	58,781.48	10,828.04	18.42	1.59

Table 3-4 Extent of vegetation complexes within Local Government Areas mapped within the survey area (GoWA 2019c)

Vegetation complex	LGA	Pre-European extent (ha)	Current extent (ha)	Remaining extent (%)	Proportion of the vegetation complex within the LGA (%)
Southern River Complex	City Bunbury	2,205.16	635.67	28.83	3.75

Note: red and orange indicate that less than 10 % and 30 %, respectively, of the pre-European extent is remains.

3.6.2 Conservation significant ecological communities

A search of the EPBC Act PMST identified four EPBC Act-listed TECs potentially occurring within the 10 km desktop study area (Table 3-5) and (Figure 4, Appendix A). Sixteen TECs and PECs were identified in a search of the DBCA TEC/PEC database (DBCA 2020).

Table 3-5 Threatened and Priority Ecological Communities

Community type	EPBC Act	BC Act/ DBCA	Description
Banksia woodlands of the Swan Coastal Plain (TEC)	Endangered	Priority 3	The ecological community is a woodland associated with the Swan Coastal Plain. A key diagnostic feature is a prominent tree layer of Banksia, with scattered eucalypts and other tree species often present among or emerging above the Banksia canopy. The understorey is a species

Community type	EPBC Act	BC Act/ DBCA	Description
Banksia dominated woodlands of the Swan Coastal Plain IBRA region (PEC)			rich mix of sclerophyllous shrubs, graminoids and forbs. The ecological community is characterised by a high endemism and considerable localised variation in species composition across its range (TSSC 2016).
Coastal shrublands on shallow sands (SCP29a)		Priority 3	Mostly heaths on shallow sands over limestone close to the coast. No single dominant but important species include <i>Spyridium globulosum</i> , <i>Rhagodia baccata</i> , and <i>Olearia axillaris</i> .
<i>Corymbia calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands, Swan Coastal Plain (floristic community type 3c as originally described in in Gibson et al. (1994))	Endangered	Critically Endangered	Plant community located on heavy soils of the eastern side of the Swan Coastal Plain between Bullsbrook, and Waterloo near Bunbury. Dominant species in the community are the trees <i>Corymbia calophylla</i> and occasionally <i>Eucalyptus wandoo</i> ; the shrubs <i>Xanthorrhoea preissii</i> , <i>Acacia pulchella</i> , <i>Dryandra nivea</i> , <i>Gompholobium marginatum</i> , and <i>Hypocalymma angustifolia</i> and the herbs <i>Burchardia umbellata</i> , <i>Cyathochaeta avenacea</i> and <i>Neurachne allopecuroidea</i> (Gibson et al. 1994). The introduced species <i>Briza maxima</i> and <i>Romulea rosea</i> are also common.
<i>Corymbia calophylla</i> woodlands on heavy soils of the southern Swan Coastal Plain (floristic community type 1b as originally described in Gibson et al. (1994))		Vulnerable	Plant community located on heavy soils of the eastern side of the Swan Coastal Plain between Waroona and Forrestfield. Typical and common native taxa in the community are: <i>Corymbia calophylla</i> ; the shrubs <i>Dryandra nivea</i> , <i>Eriostemon spicatus</i> , <i>Kingia australis</i> and <i>Xanthorrhoea preissii</i> ; and the herbs, <i>Cyathochaeta avenacea</i> , <i>Dampiera linearis</i> , <i>Haemodorum laxum</i> , <i>Loxocarya fasciculata</i> , <i>Mesomelaena tetragona</i> and <i>Tetraria octandra</i> . The introduced grass <i>Briza maxima</i> is also common in the community.
Dense shrublands on clay flats (floristic community type 9 as originally described in Gibson et al. (1994))	Critically Endangered	Vulnerable	The shrublands or open woodlands of this community are inundated for longer periods and have lower species richness and numbers of weed taxa than the other clay pan types. Sedges including <i>Chorizandra enodis</i> , <i>Cyathochaeta avenacea</i> , <i>Lepidosperma longitudinale</i> and <i>Meeboldina coangustata</i> are more common in this community. Shrubs including <i>Hakea varia</i> , <i>Melaleuca viminea</i> and <i>Eutaxia virgata</i> are common.
Herb rich saline shrublands in clay pans (floristic community type 7 as originally described in Gibson et al. (1994))	Critically Endangered	Vulnerable	The community can occur under a shrub layer comprising <i>Melaleuca viminea</i> , <i>M. osullivanii</i> , <i>M. cuticularis</i> or <i>Casuarina obesa</i> or other shrubs but can also occur as woodlands or herblands. Some areas such as where <i>Melaleuca cuticularis</i> or <i>Casuarina obesa</i> occur as an overstorey may be saline for part of the year due to evaporation resulting in increased salinity. A suite of herbs such as <i>Philydrella pygmaea</i> , <i>Brachyscome bellidioides</i> , <i>Centrolepis aristata</i> , <i>Centrolepis polygyna</i> , <i>Pogonolepis stricta</i> and <i>Cotula coronopifolia</i> ; frequently occur in the community.

Community type	EPBC Act	BC Act/ DBCA	Description
			Species such as <i>Angianthus drummondii</i> , <i>Eryngium pinnatifidum</i> subsp. <i>palustre</i> and <i>Blennospora drummondii</i> occur in low frequency
Herb Rich Shrublands in Clay Pans (SCP08)	Critically Endangered	Vulnerable	This vegetation community type occurs in low lying flats with a clay impeding layer allowing seasonal inundation. While aquatic annuals are common. This vegetation community type is dominated by one or more of the shrubs: <i>Viminaria juncea</i> , <i>Melaleuca viminea</i> , <i>M. lateritia</i> , broom bush, <i>Kunzea micrantha</i> or <i>K. recurva</i> with occasional emergents of <i>Eucalyptus wandoo</i> . Species such as <i>Hypocalymma angustifolium</i> (white myrtle), <i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant (G. J. Keighery 5026) and <i>Verticordia huegelii</i> (variegated featherflower) occur at moderate frequencies. This vegetation community type has a high percentage of weeds and appears to be the clay pan vegetation community type that has the greatest disturbance.
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Priority 3	Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (south of 23oS latitude).
Tuart (Eucalyptus gomphocephala) woodlands and Forests of the Swan Coastal Plain (TEC) Tuart (Eucalyptus gomphocephala) woodlands of the Swan Coastal Plain (PEC)	Critically Endangered	Priority 3	Mostly confined to Quindalup Dunes and Spearwood Dunes from Jurien Bay to the Sabina River, with outliers along some rivers. Tuart is the key dominant canopy species however Tuart communities comprise a variety of flora assemblages. Flora commonly occurring with Tuart include <i>Agonis flexuosa</i> , <i>Banksia attenuata</i> , <i>B. grandis</i> , <i>Allocasuarina fraseriana</i> , <i>Xylomelum occidentale</i> , <i>Macrozamia riedlei</i> , <i>Xanthorrhoea preissii</i> , <i>Spyridium globulosum</i> , <i>Templetonia retusa</i> and <i>Diplolaena dampieri</i>
Southern Eucalyptus gomphocephala – Agonis flexuosa woodlands (SCP25) (Can form a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC or the Tuart Woodlands of the Swan		Priority 3	Woodlands of <i>Eucalyptus gomphocephala</i> - <i>Agonis flexuosa</i> south of Woodman Point. Recorded from the Karrakatta, Cottesloe and Vasse units. Dominants other than tuart were occasionally recorded, including <i>Corymbia calophylla</i> at Paganoni block and <i>Eucalyptus decipiens</i> at Kemerton. Occasionally dominants other than tuarts were recorded (<i>Corymbia calophylla</i> and <i>Eucalyptus decipiens</i>) however tuarts are emergent nearby. Banksias found in this community include <i>Banksia attenuata</i> , <i>B. grandis</i> and <i>B. littoralis</i> . Tuart formed the overstorey nearby however.

Community type	EPBC Act	BC Act/ DBCA	Description
Coastal Plain PEC)			
Quindalup Eucalyptus gomphocephala and / or Agonis flexuosa woodlands (SCP30b) (Can form a component of the Tuart Woodlands of the Swan Coastal Plain PEC)		Priority 3	This community is dominated by either Tuart or <i>Agonis flexuosa</i> . The presence of <i>Hibbertia cuneiformis</i> , <i>Geranium retrorsum</i> and <i>Dichondra repens</i> differentiate this group from other Quindalup community types. The type is found from the Leschenault Peninsular south to Busselton
Low lying Banksia <i>attenuata</i> woodlands or shrublands	Endangered	Priority 3	This type occurs sporadically between Gingin and Bunbury, and is largely restricted to the Bassendean system. The type tends to occupy lower lying wetter sites and is variously dominated by <i>Melaleuca preissiana</i> , <i>Banksia attenuata</i> , <i>B. menziesii</i> , <i>Regelia ciliata</i> , <i>Eucalyptus marginata</i> or <i>Corymbia calophylla</i> . Structurally, this community type may be either a woodland or occasionally shrubland.
Shrublands on dry clay flats (floristic community type 10a as originally described in Gibson et al. (1994))	Critically Endangered	Endangered	The community occurs on skeletal soils that have shallow microtopography and the habitat is the most rapidly drying of the four clay pans identified in Gibson et al. (1994). Shrubs in the community include <i>Hakea sulcata</i> , <i>Hakea varia</i> , <i>Pericalymma ellipticum</i> and <i>Verticordia densiflora</i> . Herbs and sedges that are also common include <i>Schoenus rigens</i> , <i>Aphelia cyperoides</i> , <i>Centrolepis aristata</i> , <i>Schoenolaena juncea</i> , <i>Drosera gigantea</i> subsp. <i>gigantea</i> , 11 and <i>Drosera menziesii</i> subsp. <i>menziesii</i>
Southern Banksia <i>attenuata</i> woodlands	Endangered	Priority 3	Southern Banksia attenuata woodlands ('community type 21b') (a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC) Priority 3(i) Endangered TEC (part) This community is restricted to sand sheets at the base of the Whicher Scarp, the sand sheets on elevated ridges or the sand plain south of Bunbury. Structurally, this community type is normally <i>Banksia attenuata</i> or <i>Eucalyptus marginata</i> – <i>B. attenuata</i> woodlands. Common taxa include <i>Acacia extensa</i> , <i>Jacksonia</i> sp. Busselton, <i>Laxmannia sessiliflora</i> , <i>Lysinema ciliatum</i> and <i>Johnsonia acaulis</i> .
Sedgeland in Holocene dune swales of the southern Swan Coastal Plain	Endangered	Critically Endangered	The community occurs in linear damplands and occasionally sumplands, between Holocene dunes. Typical and common native species are the shrubs <i>Acacia rostellifera</i> , <i>Acacia saligna</i> , <i>Xanthorrhoea preissii</i> , the sedges <i>Baumea juncea</i> ,

Community type	EPBC Act	BC Act/ DBCA	Description
(floristic community type 19 as originally described in in Gibson et al. (1994))			<i>Ficinia nodosa</i> , <i>Lepidosperma gladiatum</i> , and the grass <i>Poa porphyroclados</i> . Several exotic weeds are found in this community but generally at low cover values.
Shrublands on calcareous silts of the Swan Coastal Plain (floristic community type 18 as originally described in in Gibson et al. (1994))		Vulnerable	A suckering form of <i>Acacia saligna</i> (orange wattle), <i>Melaleuca viminea</i> (mohan), <i>Melaleuca teretifolia</i> (banbar), <i>Hakea varia</i> (variable-leaved hakea), <i>Xanthorrhoea preissii</i> (balga) and <i>Leptomeria ellytes</i> are common in the shrub layer, with sedges including <i>Lepidosperma longitudinale</i> (pithy sword-sedge) and <i>Gahnia trifida</i> (coast sawsedge), and a suite of herbs including <i>Meionectes tenuifolia</i> a priority 3 flora taxon also common

3.6.3 Conservation significant flora

Desktop searches of the EPBC Act PMST (DAWE 2020a), NatureMap (DBCA 2007-2020), DBCA TPFL, WAHERB databases (DBCA 2020b) identified the presence/potential presence of 55 conservation significant flora species within the study area. The desktop searches recorded:

- 19 taxa under the EPBC Act and/or Threatened under the BC Act
- Three Priority 1
- Three Priority 2
- Eight Priority 3
- Nine Priority 4

The locations of conservation significant flora registered on the DBCA databases are mapped in Figure 4, Appendix A and listed with likelihood of occurrence in Appendix C. There are no previous records of conservation listed flora species mapped within the survey area (DBCA 2020b).

3.7 Fauna

3.7.1 Conservation significant fauna

Searches of the EPBC Act PMST (DAWE 2020a), NatureMap (DBCA 2007-2020) and DBCA database (DBCA 2020c) identified the presence/potential presence of 26 conservation significance fauna within the study area. This total does not include those species that are exclusively marine as no marine habitat is present within the study area or indirectly impacted by the project. A likelihood of occurrence assessment for conservation significant fauna identified by the desktop is provided in Appendix C.

A search of the habitat suitability of the survey area was completed using the GIS data associated with the 2014 assessment of habitat for Western Ringtail Possum (*Pseudocheirus occidentalis*) on the southern Swan Coastal Plain (Binningup to Dunsborough) (Shedley E and Williams K 2014). The survey area was classified as “C – medium”. This classification is categorized as having the following:

- Expected WRP density (No./ha) of 2-5
- Habitat Quality score of 3
- Observed mean density (No./ha) of 1.31
- Observed density range of 0.1–4.3
- Predicted mean density (No./ha) of 0.11.

4. Field Survey Results


4.1 Flora and vegetation


4.1.1 Vegetation types


Two main vegetation types (A and B) with three and four sub-units respectively were identified intersecting with the survey area, not including cleared areas. The vegetation types are described in detail in Table 4-1 and mapped in Figure 7, Appendix A.


Table 4-1 Vegetation types recorded in the survey area


VEGETATION TYPE DESCRIPTION and SAMPLING SITES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA LOT 2 (HA)	EXTENT WITHIN SURVEY AREA LOT 10 (HA)	EXTENT WITHIN SURVEY AREA TOTAL (HA)
<p>Vegetation Unit A: <i>Melaleuca preissiana</i> and <i>Melaleuca raphiophylla</i> dominated wetlands on the Bassendean Soils</p> <p>Vegetation Sub-unit A1:</p> <p>Mostly inundated 'deep' wetland community</p> <p><i>Melaleuca preissiana</i> and <i>Melaleuca raphiophylla</i> low woodland to low closed forest over a tall open shrubland of <i>Melaleuca osullivanii</i> over an open to closed low sedgeland of <i>Lepidosperma longitudinale</i>, <i>Juncus pallidus</i>, <i>Eleocharis acuta</i> and <i>Baumea juncea</i> over a sparse forbland of <i>Triglochin lineare</i> over water of varying depths over grey -brown peaty sand (Good to Excellent).</p> <p>Sample Sites:</p> <p>REL-939, REL-940, REL-943, REL-575, REL-576, REL-581, REL-582, REL-596</p>		0	2.49	2.49


VEGETATION TYPE DESCRIPTION and SAMPLING SITES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA LOT 2 (HA)	EXTENT WITHIN SURVEY AREA LOT 10 (HA)	EXTENT WITHIN SURVEY AREA TOTAL (HA)
<p>Vegetation Unit A: <i>Melaleuca preissiana</i> and <i>Melaleuca raphiophylla</i> dominated wetlands on the Bassendean Soils</p> <p>Vegetation Sub-unit A2:</p> <p>Transition 'shallow' wetland community</p> <p><i>Melaleuca preissiana</i>, <i>Melaleuca raphiophylla</i> and <i>Agonis flexuosa</i> low open forest over <i>Melaleuca osullivanii</i>, <i>Kunzea glabrescens</i> tall open shrubland over a sparse to open shrubland of <i>Astartea scoparia</i> and <i>Pericalymma ellipticum</i> over sparse low sedgeland to closed low sedgeland of <i>Lepidosperma longitudinale</i> and <i>Juncus pallidus</i> and over an open forbland of <i>*Rumex acetosella</i>, <i>Cotula coronopifolia</i>, <i>*Lotus subbiflorus</i> and <i>*Rumex crispus</i> and a sparse to open low grassland of <i>*Polypogon monspeliensis</i> and <i>Lachnagrostis filiformis</i> over grey-brown peaty sand .</p> <p>The native forbs <i>Microtis media</i> subsp. <i>media</i> and <i>Lobelia anceps</i> are scattered on the edge of this community with isolated clumps of <i>Hypocalymma angustifolium</i> and <i>Platytheca galioides</i></p> <p>This community occurs at the northern fringe of Unit A and is characterised by the presence of transition community shrubs, herbs and grasses absent in the deeper wetland (Good).</p> <p>Sample sites: Quadrat JPG03.</p> <p>REL-597, REL-686, REL-690, REL-693</p>		0	0.36	0.36

VEGETATION TYPE DESCRIPTION and SAMPLING SITES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA LOT 2 (HA)	EXTENT WITHIN SURVEY AREA LOT 10 (HA)	EXTENT WITHIN SURVEY AREA TOTAL (HA)
<p>Vegetation Unit A: <i>Melaleuca preissiana</i> and <i>Melaleuca raphiophylla</i> dominated wetlands on the Bassendean Soils</p> <p>Vegetation Sub-unit A3:</p> <p>Dampland wetland communities</p> <p><i>Melaleuca preissiana</i>, <i>M. raphiophylla</i>, <i>Agonis flexuosa</i> and <i>Banksia littoralis</i> – mid height open woodland to closed mid-height forest over a sparse to open tall shrubland of <i>Kunzea glabrescens</i> and <i>Acacia longifolia</i> over a sparse to closed mid-height shrubland of <i>Astartea scoparia</i> over a sparse low shrubland of <i>Hypocalymma angustifolia</i> over a sparse to closed low sedgeland of <i>Lepidosperma longitudinale</i>, <i>Juncus pallidus</i> and <i>Baumea juncea</i> and a low open grassland to low grassland of <i>Briza maxima</i>, <i>Ehrharta calycina</i>, <i>Lolium multiflorum</i> and <i>Vulpia bromoides</i> and sparse forbland of <i>Ursinia anthemoides</i>, <i>Hypochaeris glabra</i> and <i>Microtis media</i> subsp. <i>media</i> over grey-brown peaty sand.</p> <p>These are dampland wetlands. The density of canopy and understorey sedges varies across the survey area, mostly according to condition. <i>Banksia littoralis</i> was noticeable in the better condition parts (Degraded to Very Good).</p> <p>Sample sites: Quadrats JPG04 and JPG05.</p> <p>REL-697, REL-699, REL-708, REL-578, REL-600, REL-603, REL-691, REL-909, REL-942, REL-565, REL-562, REL-589, REL-840, REL-845, REL-856, REL-858, REL-864, REL-865</p>		6.52	0.08	6.60

VEGETATION TYPE DESCRIPTION and SAMPLING SITES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA LOT 2 (HA)	EXTENT WITHIN SURVEY AREA LOT 10 (HA)	EXTENT WITHIN SURVEY AREA TOTAL (HA)
<p>Vegetation Unit B: Marri, Jarrah, Banksia Woodlands on Bassendean Sand</p> <p>Sub-unit B1:</p> <p>This was one of the dominant communities across the survey area.</p> <p><i>Corymbia calophylla</i>, <i>Eucalyptus marginata</i> mid-height open woodland over <i>Banksia attenuata</i>, <i>B. ilicifolia</i>, <i>Agonis flexuosa</i> and <i>Xylomelum occidentale</i> low open woodland to Low open Forest over a sparse tall shrubland to tall shrubland of <i>Kunzea glabrescens</i> over a sparse low shrubland to open low shrubland of <i>Xanthorrhoea brunonis</i>, <i>Macrozamia riedlei</i>, <i>Dasypogon bromeliifolius</i> and <i>Adenanthos meisneri</i> over a sparse low grassland to grassland of <i>*Briza maxima</i>, <i>*Ehrharta calycina</i> and <i>*Bromus diandrus</i> and low sparse to low open forbland of <i>*Ursinia anthemoides</i>, <i>*Hypochaeris glabra</i> and <i>*Romulea rosea</i> and a sparse low sedgeland of <i>Hypolaena exsulca</i> over grey-brown to yellow-brown sand (Degraded to Very Good).</p> <p>This vegetation unit is consistent with the WA PEC Southern <i>Banksia attenuata</i> woodlands FCT 21b, <i>Banksia</i> dominated woodlands of the Swan Coastal Plain IBRA region and EPBC TEC Banksia Woodlands of the Swan Coastal Plain ecological community</p> <p>Sample sites: Quadrats JPG01, JPG02 and JPG07.</p> <p>REL-571, REL-587, REL-592, REL-607, REL-610, REL-612, REL-614, REL-627, REL-685, REL-700, REL-905, REL-806</p>		2.19	10.86	13.05

VEGETATION TYPE DESCRIPTION and SAMPLING SITES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA LOT 2 (HA)	EXTENT WITHIN SURVEY AREA LOT 10 (HA)	EXTENT WITHIN SURVEY AREA TOTAL (HA)
<p>Vegetation Unit B: Marri, Jarrah, Banksia Woodlands on Bassendean Sand</p> <p>Vegetation Sub-unit B2</p> <p><i>Corymbia calophylla</i>, <i>Eucalyptus marginata</i> mid-height woodland over an open low woodland to low woodland of <i>Agonis flexuosa</i> and <i>Banksia attenuata</i> over a sparse to open low shrubland of <i>Xanthorrhoea brunonis</i> and <i>Dasypogon bromeliifolius</i> over a low grassland of <i>*Briza maxima</i>, <i>*Ehrharta calycina</i> and <i>*Bromus diandrus</i> and a low open forbland of <i>*Ursinia anthemoides</i> and <i>*Hypochaeris glabra</i> over grey, grey-brown to yellow-brown sand.</p> <p>This variation of Unit B comprised mostly of denser and visibly taller canopy of <i>C. calophylla</i> and <i>E. marginata</i> than B1. <i>Kunzea glabrescens</i> tall shrubland is absent and the low shrub layer has a simpler composition – possibly due to historical grazing (Degraded to Very Good).</p> <p>This vegetation unit is consistent with the WA PEC Southern <i>Banksia attenuata</i> woodlands FCT 21b, <i>Banksia</i> dominated woodlands of the Swan Coastal Plain IBRA region and EPBC TEC Banksia Woodlands of the Swan Coastal Plain ecological community</p> <p>Sample sites: Quadrats JPG09 and JPG06.</p> <p>REL-837, REL-847, REL-855, REL-862, REL-863, REL-594, REL-703, REL-704, REL-881, REL-882, REL-883, REL-886, REL-889, REL-890, REL-902</p>		8.66	0	8.66

VEGETATION TYPE DESCRIPTION and SAMPLING SITES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA LOT 2 (HA)	EXTENT WITHIN SURVEY AREA LOT 10 (HA)	EXTENT WITHIN SURVEY AREA TOTAL (HA)
<p>Vegetation Unit B: Marri, Jarrah, Banksia Woodlands on Bassendean Sand</p> <p>Vegetation Sub-unit B3</p> <p><i>Corymbia calophylla</i>, <i>Eucalyptus marginata</i> mid-height woodland over <i>Agonis flexuosa</i>, <i>Melaleuca preissiana</i>, <i>Xylomelum occidentale</i> low open woodland to low woodland over a sparse mid-height <i>Astartea scoparia</i> shrubland over a sparse low shrubland to low open shrubland of <i>Xanthorrhoea brunonis</i>, <i>Dasypogon bromeliifolius</i> over a sparse low grassland to low grassland of <i>*Briza maxima</i>, <i>*Ehrharta calycina</i> and <i>*Bromus diandrus</i> and low sparse to low open forbland of <i>*Hypochaeris glabra</i> and <i>*Romulea rosea</i> over grey, grey-brown to yellow-brown sand .</p> <p>This community has a limited distribution and is a transition community between the dampland wetland community Sub-unit A3 and the Jarrah, Marri, Banksia woodland community Sub-unit B1. Its canopy was dominated by <i>C. calophylla</i> and has species representative of both communities. It is noticeably lacking in <i>Banksia attenuata</i>, <i>B. ilicifolia</i> and <i>B. grandis</i> which occur in Sub-units B1 and B2 (Degraded to Very Good).</p> <p>Sample sites: Quadrat JPG08.</p> <p>REL-893</p> <p>REL-895</p>		0.59	0	0.59

VEGETATION TYPE DESCRIPTION and SAMPLING SITES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA LOT 2 (HA)	EXTENT WITHIN SURVEY AREA LOT 10 (HA)	EXTENT WITHIN SURVEY AREA TOTAL (HA)
<p>Vegetation Unit B: Marri, Jarrah, Banksia Woodlands on Bassendean Sand</p> <p>Vegetation Sub-unit B4 Marri, Peppermint, Bracken fern community</p> <p><i>Corymbia calophylla</i>, <i>Eucalyptus marginata</i> mid-height open woodland over a low woodland of <i>Agonis flexuosa</i> over a low closed shrubland of <i>Pteridium esculentum</i> and <i>Xanthorrhoea brunonis</i> over grey-brown sand.</p> <p>This unit occurs appears to be the product of disturbance. It is located on the southwestern boundary of the survey area within proximity to the deeper wetland sub-unit A1 and adjacent to a cleared storage yard (Good).</p> <p>This vegetation unit is represented by quadrat JPG08.</p>		-	0.23	0.23
Cleared		2.20	3.34	5.54
Total		20.16	17.36	37.53

4.1.2 Vegetation condition

The vegetation condition of the survey area ranged from Excellent to Completely Degraded. The majority of the survey areas was in good condition (25.85 ha or 68.89 %). Disturbances to the survey area were widespread and included clearing, sand extraction, vehicle tracks, selective firewood harvesting, weeds and rubbish dumping.

A summary of the vegetation condition is provided in Table 4-2 and vegetation condition mapping is shown in Figure 8, Appendix A.

Table 4-2 Extent of vegetation condition ratings mapped within the survey area

VEGETATION CONDITION	EXTENT IN SURVEY AREA LOT 2 (HA)	EXTENT IN SURVEY AREA LOT 2 (%)	EXTENT IN SURVEY AREA LOT 10 (HA)	EXTENT IN SURVEY AREA LOT 10 (%)	EXTENT IN SURVEY AREA TOTAL (HA)	EXTENT IN SURVEY AREA TOTAL (%)
Excellent	0	0	0.28	1.61	0.28	0.74
Very Good	0.47	2.31	2.39	13.79	2.86	7.62
Good	14.74	73.07	11.11	64.02	25.85	68.89
Degraded	1.75	8.68	0.02	0.12	1.77	4.72
Completely Degraded	1.02	5.04	0.21	1.22	1.23	3.27
Cleared	2.20	10.89	3.34	19.24	5.54	14.75
Total	20.16	100	17.36	100	37.53	100

4.1.3 Conservation significant ecological communities

Based on the results of the desktop searches, dominant species, landform features and field observations three conservation significant ecological community were identified within the survey area. These communities cover the same extent and are associated with Marri, Jarrah, Banksia Woodlands. The communities are:

- EPBC Act TEC Banksia Woodlands of the Swan Coastal Plain ecological community (Endangered)
- WA BC Act PEC Southern *Banksia attenuata* woodlands FCT 21b (Priority 3)
- WA BC Act PEC *Banksia* dominated woodlands of the Swan Coastal Plain IBRA region Priority 3 Priority Ecological Community (PEC) listed by Department of Biodiversity, Conservation and Attractions (DBCA).

Lot 2 contains 9.33 ha of these communities and Lot 10 contains 10.63 ha.

4.1.4 Flora diversity

One hundred and forty-six flora taxa (including subspecies and varieties) representing 42 families were recorded from the survey area during the field survey. This total comprised 101 native taxa and 45 naturalised flora taxa

Dominant families recorded from the survey area included:

- Fabaceae (19 taxa)
- Poaceae (14 taxa)
- Myrtaceae (13 taxa).

The combined species list is provided in Appendix D.

4.1.5 Conservation significant flora

No EPBC Act or BC Act listed flora or DBCA Priority listed flora taxa were recorded from the survey area. A rating of likelihood of occurrence of conservation significant flora known from the surrounding area is provided in Appendix C.

4.2 Fauna

4.2.1 Fauna habitat types


Seven broad habitat types were identified in the survey area based on the predominant landforms, soil and vegetation structure in the area, shown in Figure 9, Appendix A. These habitat types generally correspond to the vegetation types outlined in Section 4.1 and include:

- Marri-Banksia Woodland – Habitat 1
- Banksia Nuytsia woodland - Habitat 2
- Marri Nuytsia Woodland - Habitat 3
- Marri Peppermint Woodland - Habitat 4
- Melaleuca dampland - Habitat 5
- Dense Melaleuca-Kunzea dampland - Habitat 6
- *Melaleuca raphiophylla* wetland - Habitat 7

These fauna habitat types are outlined in Table 4-3, including their suitability as habitat for conservation significant fauna.


All habitat types within the survey area provide some habitat value for a range of common birds, lizards, snakes, frogs, macropods, possums, and small ground dwelling mammals. Habitat values for specifically assessed for Western Ringtail Possum and Black Cockatoo species are outlined in Table 4-4 and Table 4-5.

Table 4-3 Habitat types present within the survey area

BROAD FAUNA HABITAT TYPES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA (ha)		
		Lot 10	Lot 2	Total
<p>Habitat type: 1</p> <p>Marri and Banksia Woodland: <i>Corymbia calophylla</i> and <i>Banksia attenuata</i> open woodland to woodland over <i>Kunzea glabrescens</i> and <i>Xylomelum occidentale</i> shrubland over native sedges and weed grass species. Scattered presence of <i>Eucalyptus marginata</i>.</p> <p>This habitat has been selectively logged historically, resulting in reduced presence of larger <i>Corymbia calophylla</i> and <i>Eucalyptus marginata</i> individuals. Micro-habitat types present included patches of thick leaf litter, fallen logs and branches. Disturbances included previous clearing and weeds.</p> <p>Corresponds with vegetation types: VT-B.</p> <p>Habitat Significance:</p> <p>High value foraging, suitable roosting and potential breeding for Forest Red-tailed, Carnaby's and Baudin's Cockatoo, South-western Brush-tailed phascogale, Coastal Plains Skink, Perth Slider Lined Skink, Swan Coastal Plain shield-backed trapdoor spider.</p> <p>Moderate value for Peregrine Falcon, Western False Pipistrelle, Western Brush Wallaby, Western Ringtail Possum.</p>		6.61	0.94	7.54


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Attachment 2

BROAD FAUNA HABITAT TYPES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA (ha)		
		Lot 10	Lot 2	Total
<p>Habitat type: 2</p> <p>Banksia Nuytsia woodland:</p> <p>Dense <i>Banksia attenuata</i> and <i>Nuytsia floribunda</i> woodland, with scattered <i>Corymbia calophylla</i> over <i>Kunzea glabrescens</i> and <i>Agonis flexuosa</i> midstory. Open understory.</p> <p>Correspond vegetation type: VT-B.</p> <p>Habitat Significance:</p> <p>High value foraging, suitable roosting and potential breeding for Forest Red-tailed, Carnaby's and Baudin's Cockatoo, South-western Brush-tailed phascogale, Coastal Plains Skink, Perth Slider Lined Skink, Swan Coastal Plain shield-backed trapdoor spider Western Ringtail Possum.</p> <p>Moderate value for Peregrine Falcon, Western False Pipistrelle, Western Brush Wallaby.</p>	<p>West Elevation</p> 	2.14	0.34	1.52

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Attachment 2

BROAD FAUNA HABITAT TYPES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA (ha)		
		Lot 10	Lot 2	Total
<p>Habitat type: 3</p> <p>Marri Nuytsia Woodland:</p> <p><i>Corymbia calophylla</i>, <i>Banksia attenuata</i> and <i>Nuytsia floribunda</i> woodland over dense <i>Kunzea glabrescens</i> midstory. Open understory.</p> <p>Micro-habitat types present included patches of thick leaf litter, fallen logs and branches.</p> <p>Corresponds with vegetation type: VT-B</p> <p>Habitat Significance:</p> <p>High value foraging, suitable roosting and potential breeding for Forest Red-tailed, Carnaby's and Baudin's Cockatoo, South-western Brush-tailed phascogale, Coastal Plains Skink, Perth Slider Lined Skink, Swan Coastal Plain shield-backed trapdoor spider.</p> <p>Moderate value for Peregrine Falcon, Western False Pipistrelle, Western Brush Wallaby, Western Ringtail Possum.</p>		1.53	0.00	1.53

BROAD FAUNA HABITAT TYPES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA (ha)		
		Lot 10	Lot 2	Total
<p>Habitat type: 4</p> <p>Marri Peppermint Woodland:</p> <p><i>Corymbia calophylla</i> and <i>Agonis flexuosa</i> woodland with scattered <i>Eucalyptus marginata</i>, over <i>Kunzea glabrescens</i> with open understory of weed grass species with occasional native sedges and grass trees.</p> <p>Ranges from closed to open, with majority showing canopy cover. Micro-habitat types present included patches of thick leaf litter, fallen logs and branches.</p> <p>Close to cleared sand pit/laydown yard.</p> <p>Corresponds with sections of vegetation types: VT-B.</p> <p>Habitat Significance:</p> <p>High value foraging, suitable roosting and potential breeding for Forest Red-tailed, Carnaby's and Baudin's Cockatoo, Western Ringtail Possum, South-western Brush-tailed phascogale, Coastal Plains Skink, Perth Slider Lined Skink, Swan Coastal Plain shield-backed trapdoor spider.</p> <p>Moderate value for Peregrine Falcon, Western False Pipistrelle, Western Brush Wallaby.</p>		0.72	11.42	12.13


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Attachment 2

BROAD FAUNA HABITAT TYPES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA (ha)		
		Lot 10	Lot 2	Total
<p>Habitat type: 5</p> <p>Melaleuca dampland: <i>Melaleuca preissiana</i> and <i>Melaleuca raphiophylla</i> dampland over midstory of <i>Astartea scoparia</i> shrubs.</p> <p>Very open understory, with scattered weed grass species. Heavily disturbed by vehicle movements.</p> <p>Sandy base dampland, with no water presence observed in December.</p> <p>Habitat Significance: Moderate for Coastal Plains Skink, Perth Slider Lined Skink. Low for all conservation significant species</p>	<p>South East Elevation</p> <p>317°NW (T) -33.325417, 115.725008 ±4 m ▲ -30 m</p>  <p>17 Dec 2020, 09:59:49</p>	0.00	4.48	4.48


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Attachment 2

BROAD FAUNA HABITAT TYPES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA (ha)		
		Lot 10	Lot 2	Total
<p>Habitat type: 6</p> <p>Dense <i>Melaleuca</i> and <i>Kunzea</i> dampland:</p> <p>Dense <i>Melaleuca preissiana</i> and <i>Kunzea glabrescens</i> dampland. Very open understory, with presence of weedy herbaceous and grass species. High leaf litter content.</p> <p>Correspond vegetation type: VT-A.</p> <p>Habitat Significance:</p> <p>Moderate for Coastal Plains Skink, Perth Slider Lined Skink.</p> <p>Low for all conservation significant species</p>		0	0.74	0.74

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Attachment 2

BROAD FAUNA HABITAT TYPES	PHOTOGRAPH	EXTENT WITHIN SURVEY AREA (ha)		
		Lot 10	Lot 2	Total
Habitat type: 7 <i>Melaleuca raphiophylla</i> wetland: <i>Melaleuca raphiophylla</i> over native sedges, with water present in lower areas of the understory. More open areas of <i>Typha orientalis</i> . Suitable habitat for a range of terrestrial vertebrates associated with seasonal dampland areas. Habitat Significance: High for Rakali (Water-rat), Quenda Moderate for Western Brush Wallaby, Low for Peregrine Falcon, Western Ringtail Possum, Black Cockatoo species		3.33	0.00	3.33
Cleared		3.03	2.25	5.29
Total		20.16	17.36	37.53

4.2.2 Fauna diversity

The field survey recorded a total of 31 fauna species, consisting of 18 bird, seven mammal, and four reptile and two amphibian species within the survey area. Of these, 27 are native and four are introduced.

A list of the fauna species recorded during the survey is provided in Appendix E.

4.2.3 Conservation significant fauna

Conservation significant species recorded from the survey area from observation, scats and feeding evidence were:

- Western Ringtail Possum (*Pseudocheirus occidentalis*)- EPCB listed Critically Endangered
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*)- EPBC listed Vulnerable
- Rakali (*Hydromys chrysogaster*)- BC Act listed Priority Four

A likelihood of occurrence assessment was conducted for all conservation significant fauna species identified in the desktop assessment. This assessment was based on species biology, habitat requirements, the presence of suitable habitat and records of the species in the vicinity of the survey area. No assumptions were made on the transient potential of these species. The detailed likelihood assessment is provided in Appendix C.

Of the 26 conservation significant fauna (threatened and priority listed species) identified in the desktop searches three were present and nine are considered likely to occur, including:

- Baudin's Cockatoo (*Calyptorhynchus baudinii*) - EN
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) - EN
- Coastal Plains Skink (*Ctenotus ora*)
- Peregrine Falcon (*Falco peregrinus*) - OS
- Perth Slider Lined Skink (*Lerista lineata*) – P3
- Quenda (*Isodon fusciventer*) – P4
- Western Brush Wallaby (*Macropus irma*)
- South-western Brush-tailed Phascogale (*Phascogale tapoatafa* subsp. *wambenger*) - CD
- Swan Coastal Plain shield-backed trapdoor spider (*Idiosoma sigillatum*) – P3

Table 4-6 provides the conservation listed species present and considered likely for each of the fauna habitats within the survey area.

Western Ringtail Possum

The Western Ringtail Possum (*Pseudocheirus occidentalis*) is listed as Critically Endangered under the EPBC Act and BC Act. One Western Ringtail Possum was recorded during the field survey. Scats of the species were recorded at several locations. No dreys were observed during the survey. The survey area is classed as category C in the mapping undertaken by Shedley and Williams (2014), with an expected density of 2-5 animals per ha. The two nocturnal survey events along with searches for secondary evidence was sufficient to identify presence or absence of the species, however additional survey work following a line intersect or grid-based methodology is recommended if population estimates are required.

The possum observation location and suitable habitat for Western Ringtail Possum, where Peppermint was recorded, is presented in Figure 9, Appendix A. The fauna habitat Peppermint woodland is considered to be the preferred habitat for the Western Ringtail Possum. The extent of habitat for Western Ringtail Possum in each lot is presented in Table 4-4.

Table 4-4 - Western Ringtail Possum habitat quality and extents

Habitat Type	Score	Extent (ha)		
		Lot 10	Lot 2	Total
1	Moderate	6.61	0.94	7.55
2	High	2.14	0.34	2.48
3	Moderate	1.53	0	1.53
4	High	0.72	11.42	12.13
5	Low	0	4.48	4.47
6	Low	0	0.74	0.74
7	Low	3.33	0	3.33
Total	Low	3.33	5.21	8.53
	Moderate	8.14	0.94	9.07
	High	2.86	11.76	14.62

Black Cockatoos

A total of 190 potential Black Cockatoo breeding habitat trees with a diameter at breast height greater than 500 mm were recorded from the survey area. Of these, 22 were identified as having hollows that were considered potentially suitable for Black Cockatoo breeding. A detailed inspection of the hollows using a pole mounted camera was undertaken to investigate the suitability of these hollows. This inspection identified a single tree that contained a hollow that satisfied the criteria of a suitable Black Cockatoo breeding hollow. No signs of nesting such as chew marks were observed (DSEWPaC 2012). Not all hollows were able to be assessed using the pole camera due to the height of the trees or the presence of beehives in the hollows. No evidence of breeding or roosting activity was observed but foraging evidence of Black Cockatoo species (Forest Red-tailed Black-Cockatoo) was observed within the survey area at several locations, see Figure 9 in Appendix A.

The foraging habitat scoring tool (DotEE 2017) was used to score each fauna habitat for foraging quality with results summarised in Table 4-5. The detailed foraging habitat assessment table is provided in Appendix G. Fauna habitats one to four were all defined as 'Very High' quality foraging habitat, with habitats five to seven defined as 'Low' quality foraging habitat. The associated extents in hectares are shown in Table 4-5. All habitat types scored as very high foraging habitat are also considered to represent potential breeding habitat and potential roosting habitat.

Table 4-5 - Black Cockatoo foraging habitat quality and extent

Habitat Type	Score	Extent (ha)		Total extent (ha)
		Lot 10	Lot 2	
1	Very High	6.607	0.944	23.704
2	Very High	2.143	0.339	
3	Very High	1.53	0	
4	Very High	0.719	11.422	
Total	Very High	10.99	12.71	
5	Low	0	4.476	8.543
6	Low	0	0.737	
7	Low	3.33	0	
Total	Low	3.33	5.21	

Table 4-6 Conservation significant fauna recorded and likely to occur within each fauna habitat

TAXON	COMMON NAME	STATUS		1	2	3	4	5	6	7	LIKELIHOOD OF OCCURRENCE
		BC Act	EPBC Act								
BIRDS											
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	VU	VU	F,B	F,B	F,B	F,B				Present
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo,	EN	EN	F,B	F,B	F,B	F,B				Likely
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo,	EN	EN	F,B	F,B	F,B	F,B				Likely
<i>Falco peregrinus</i>	Peregrine Falcon	OS		F	F	F	F				Likely
MAMMALS											
<i>Hydromys chrysogaster</i>	Water-rat	P4								F,B	Present
<i>Isodon fusciventer</i>	Quenda	P4		F,B	F,B	F,B	F,B	F	F	F,B	Likely
<i>Macropus irma</i>	Western Brush Wallaby	P4		F	F	F	F			F	Likely

TAXON	COMMON NAME	STATUS		1	2	3	4	5	6	7	LIKELIHOOD OF OCCURRENCE
		BC Act	EPBC Act								
<i>Phascogale tapoatafa wambenger</i>	South-western Brush-tailed phascogale	CD		F,B	F,B	F,B	F,B				Likely
<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum	CR	VU	F	F,B	F	F,B				Present
REPTILES											
<i>Ctenotus ora</i>	Coastal Plains Skink	P3		F,B	F,B	F,B	F,B				Likely
<i>Lerista lineata</i>	Perth Slider Lined Skink	P3		F,B	F,B	F,B	F,B				
OTHER											
<i>Idiosoma sigillatum</i>	Swan Coastal Plain shield-backed trapdoor spider	P3		F,B	F,B	F,B	F,B				Likely

F - Foraging, B - Breeding

5. Conclusion and Recommendations

J&P Group commissioned to GHD to investigate potential environmental values on Lot 2 and 10 Temple Rd, Picton. The surveys were designed quantify the extent of environmental values to determine potential opportunities or constraints for future uses of the area.

Key environmental values identified included:

- The survey area contains habitat with significant value to EPBC Act listed Black Cockatoo species. High value foraging habitat totalling 23.7 ha was identified. This habitat is also suitable roosting habitat and potential breeding habitat. Foraging evidence of Black Cockatoo species was observed within the survey area at several locations. It is considered highly likely that other species including Baudin's Cockatoo and Carnaby's Cockatoo would utilise the survey area at varying times of the year
- A total of 190 potential Black Cockatoo breeding habitat trees with a diameter at breast height greater than 500 mm were recorded in the survey area. No evidence of breeding was recorded during the surveys.
- The EPBC Act listed Western Ringtail possum was identified as being present through nocturnal surveys and scat searches. For the Western Ringtail Possum, 14.62 ha of high value habitat and 9.07 ha of moderate value habitat was identified.
- One Threatened Ecological Community - Banksia Woodlands of the Swan Coastal Plain ecological community was identified and two Priority three communities, Southern *Banksia attenuata* woodlands FCT 21b and *Banksia* dominated woodlands of the Swan Coastal Plain IBRA region. These communities have overlapping extent within the survey area and covered 19.96 ha.
- The central section of the survey area intersects with an Environmentally Sensitive Area (ESAs) which appears to be associated with a mapped Conservation Class Wetland (ID 14352)

Recommendations for further surveys are provided below:

- Due to the presence of significant values for EPBC Act listed species and communities it is likely that it would be appropriate to refer large scale plans for development and clearing of the survey area to the Commonwealth Department of Agriculture, Water and the Environment for formal assessment.
- To better quantify Black Cockatoo species usage of the survey area additional studies undertaking observations and foraging evidence search may be undertaken
- To quantify or provide a population estimate for Western Ringtail Possum additional surveys utilising a transect or grid-based survey method is recommended.

6. Assessment against the 10 clearing principles

An assessment of potential clearing of native vegetation within the survey area was undertaken against the Environmental Protection Authority Ten Clearing Principles. See Table 6-1. This assessment concluded that clearing of significant portions of the survey area is likely to be at variance to principles B, D and F. Potential clearing of the survey area is considered unlikely to be at variance to the remaining principles.

Table 6-1 Assessment against the ten clearing principles

Principle	Assessment	Outcome
(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.	<p>The survey area is located in the South West Botanical Province of WA (Beard 1990) and the Swan Coastal Plain Bioregion and Perth (SWA2) subregion as described by the Interim Biogeographic Region of Australia (IBRA) (Department of the Environment 2012).</p> <p>Two main vegetation type were identified intersecting with the survey area, not including cleared areas. The majority of the vegetation is in Good or worse condition where clearing, grazing, changes in fire regime and selective logging or other activities have fundamentally altered the natural composition of native vegetation.</p> <p>No conservation significant flora species were identified in the survey area and the survey area does not contain areas of native vegetation that are in better condition, or of a higher floristic value, than that represented in surrounding vegetation.</p> <p>A total of 101 native flora taxa and 45 naturalised flora taxa were recorded from the survey area. A total of 31 fauna species, consisting of 18 bird, seven mammal, and four reptile and two amphibian species within the survey area. Of these, 27 are native and four are introduced.</p> <p>Given the history of disturbances within the survey area due to clearing, grazing, altered fire regimes and edge effects (both within and adjacent to the survey area), the survey area is not considered to comprise a greater diversity than similar areas either locally or at a bioregional scale. Clearing in the survey area would not likely to be at variance to this Principle.</p>	Clearing is unlikely to be at variance to this principle.
(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	The survey contains significant habitat for Black Cockatoo species and Western Ringtail Possums.	Clearing would be at variance to this principle.
(c) Native vegetation should not be cleared if it includes, or is necessary for the	Desktop searches of the EPBC Act PMST, NatureMap (DBCA 2007-2020), DBCA TPFL, WAHERB databases identified no rare flora as being recorded in the survey area. The field survey also did not record any priority or threatened flora species.	Clearing is unlikely to be at variance to this principle.

Principle	Assessment	Outcome
continued existence of, rare flora.	Given the survey effort and season coverage (spring and summer survey), if populations of Threatened flora taxa were present it is considered likely that they would have been identified in the field. Potential clearing is not likely to be at variance to this Principle.	
(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	One Threatened Ecological Community - Banksia Woodlands of the Swan Coastal Plain ecological community was identified. This community covered 19.96 ha of the survey area and is in Good or better condition.	Clearing would be at variance to this principle.
(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	<p>The study area is located in the South West Botanical Province of WA (Beard 1990). The study area is located in the City of Bunbury Local Government Authority area, which falls within the Swan Coastal Plain Bioregion and Perth (SWA2) subregion as described by the Interim Biogeographic Region of Australia (IBRA)(Department of the Environment 2012).</p> <p>Broad scale (1:250,000) pre-European vegetation mapping of the area has been completed by Beard (1979) at an association level. The survey area intersects the —Mosaic: Medium forest; Jarrah-Marri/Low woodland; Banksia/Low forest; Teatree (Melaleuca spp.) (association 1000) vegetation association.</p> <p>The extent of the vegetation associations has been determined by the state-wide vegetation remaining extent calculations maintained by the DBCA (latest update March 2019 – GoWA 2019b). The current extents of vegetation association 1000 are less than 30 % of their pre-European extent at the State (27.75%), IBRA Bioregion (26.34%), IBRA subregion (26.34%) and within the Local Government Authority (LGA) (28.60%) levels.</p> <p>In the immediate vicinity of the survey area there exists significant areas of remnant vegetation associated with the Preston River and Ferguson River corridors and adjacent vegetation. Although the broad scale vegetation associated with the survey area is remaining at less than 30% of the pre-European extent, at a local scale the survey area is not considered to represent a significant remnant of native vegetation. Significant areas of similar vegetation are present in close proximity to the survey area</p>	Clearing is unlikely to be at variance to this principle.

Principle	Assessment	Outcome
(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	<p>The survey area occurs within a low-lying palusplain, which sections of are seasonally inundated or has a high water table during winter. The EPBC Act PMST did not identify any wetlands of international importance (Ramsar wetland) or Nationally Important Wetlands within a 5 km buffer of the survey area.</p> <p>The Geomorphic Wetlands Swan Coastal Plain dataset identified the survey area intersects with a multiple use wetland and conservation class wetlands</p> <p>There are no drainage lines intersecting the survey area.</p>	Clearing of wetland areas would be at variance to this principle.
(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Given the lack of drainage lines, sandy soil material and flat topography of the site, potential clearing is not likely to cause appreciable land degradation either from wind erosion, changes to soil properties, or likely to have an impact on adjacent vegetation.	Clearing is unlikely to be at variance to this principle.
(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The survey area does not intersect with or occur adjacent to any DBCA legislated lands	Clearing is unlikely to be at variance to this principle.
(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	<p>There are no regionally significant wetlands or watercourses with permanent water within the survey area.</p> <p>The survey area does not intersect any major watercourses or drainage lines.</p> <p>Clearing in the survey area is unlikely to change the hydrology of the area.</p>	Clearing is unlikely to be at variance to this principle.

Principle	Assessment	Outcome
(j) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	There are some low-lying areas present within the survey area but due to the sandy soils and flat topography of the survey area it is not expected that clearing works would have a significant impact on the natural surface and groundwater processes. The survey area also does not intersect any major watercourses or drainage lines. Potential clearing is not likely to cause, or exacerbate, the incidence or intensity of flooding.	Clearing is unlikely to be at variance to this principle.

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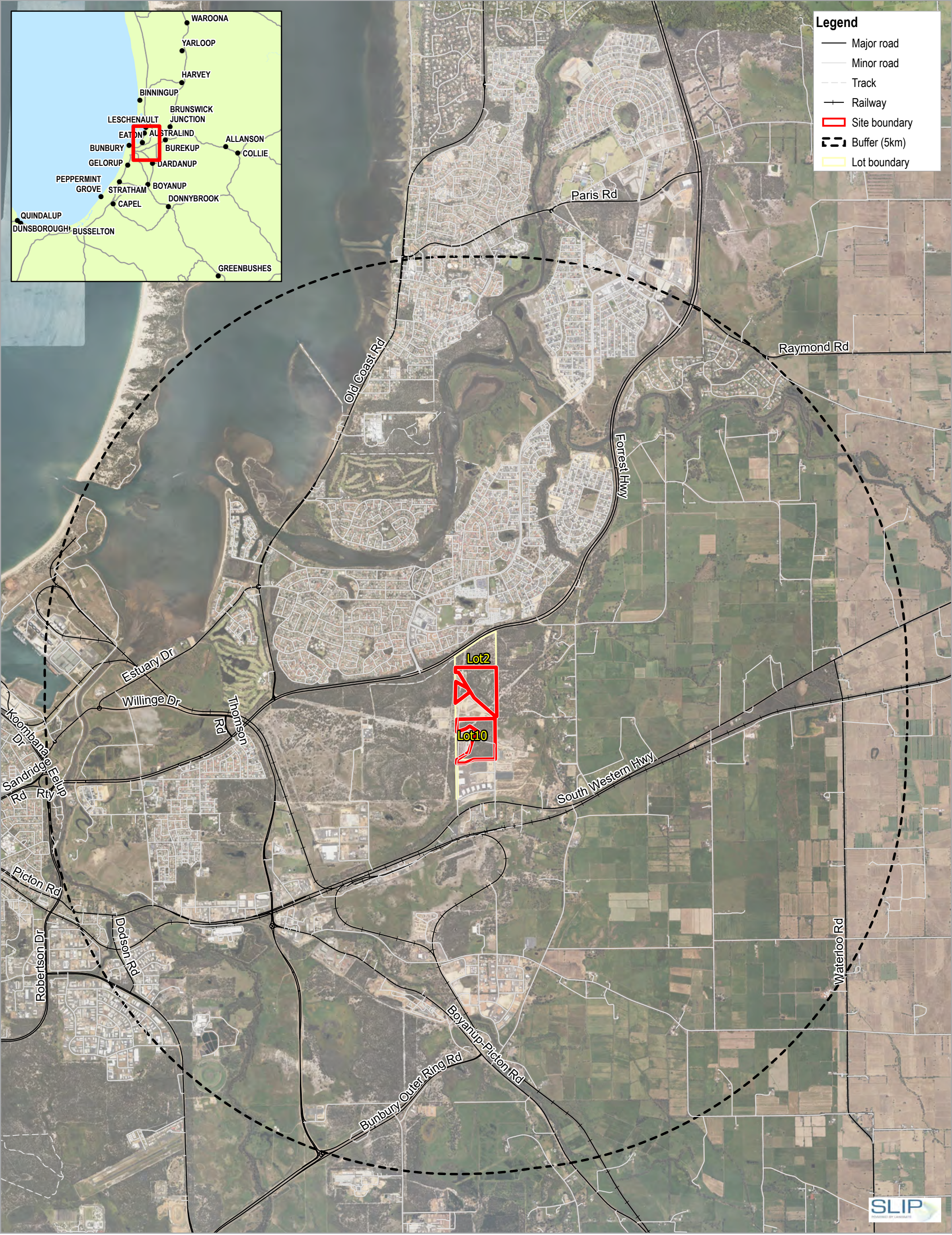
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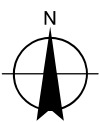
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Appendices

Appendix A – Figures



Paper Size ISO A3
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Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



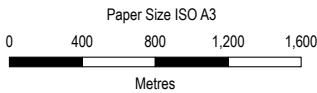
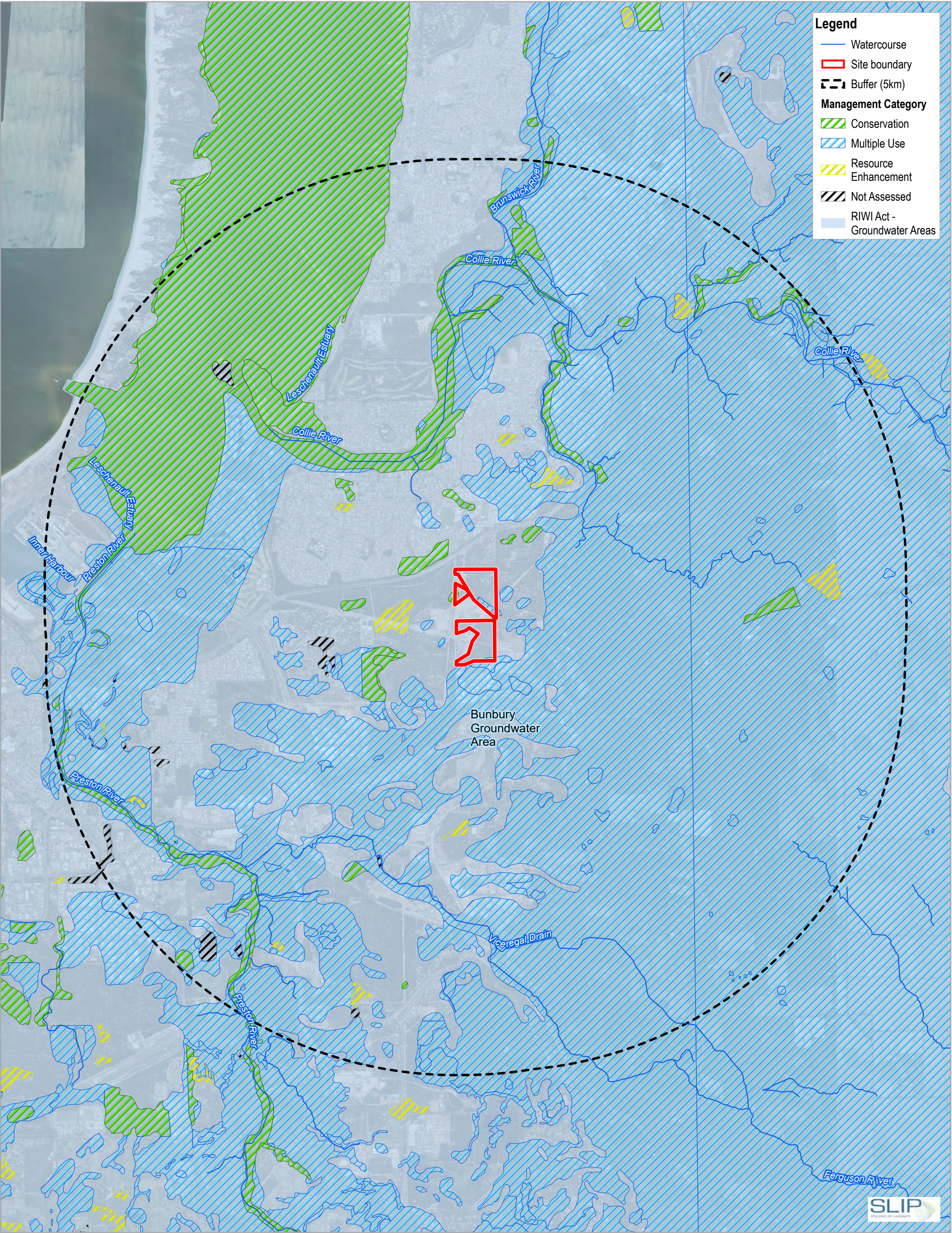
J and P metals Group
Flora, Vegetation, and Black Cockatoo Survey -
Temple Rd, Picton East.

Project locality

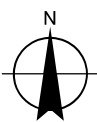
Project No. 12541162
Revision No. 0
Date 19 Feb 2021

FIGURE 1





Map Projection: Transverse Mercator
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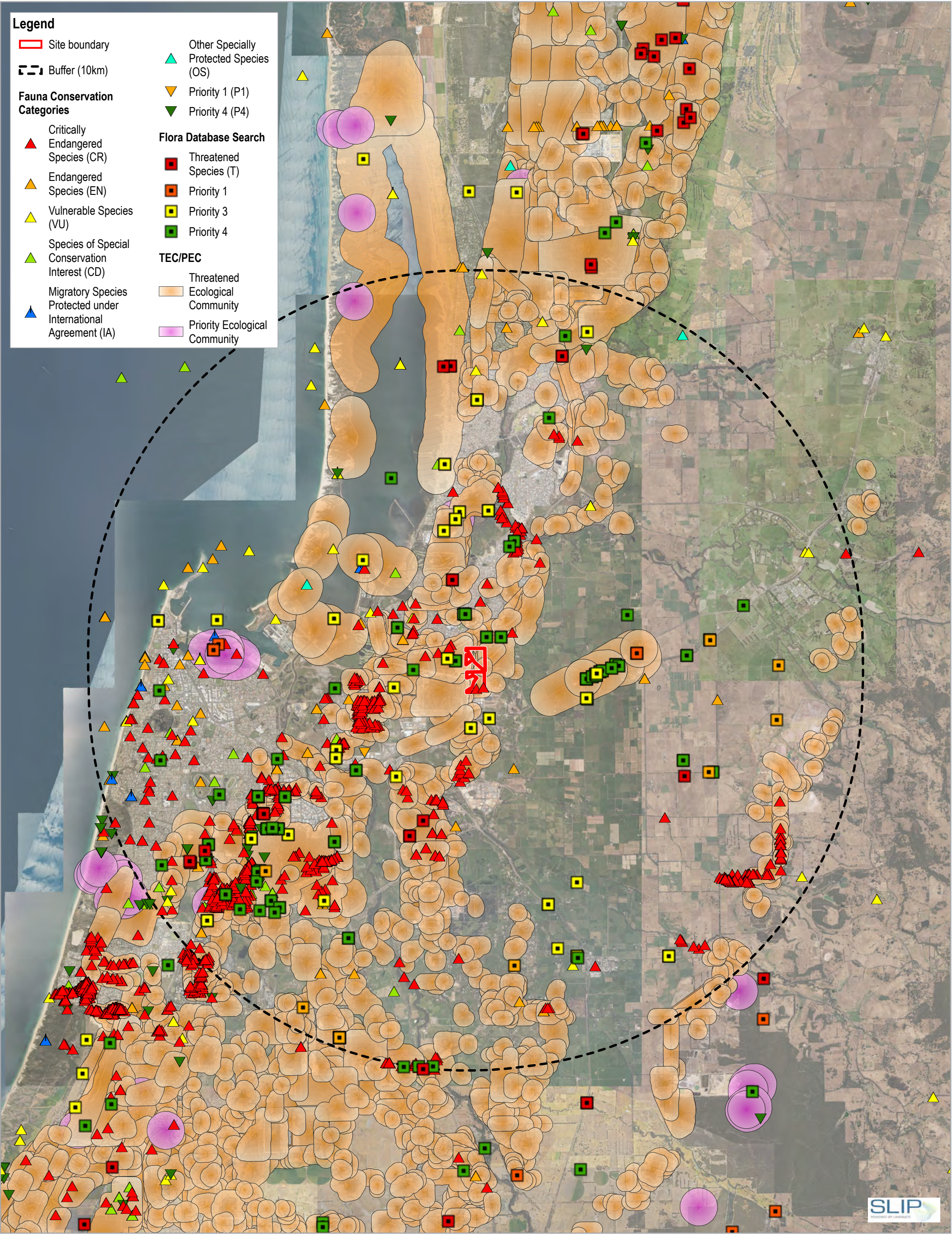


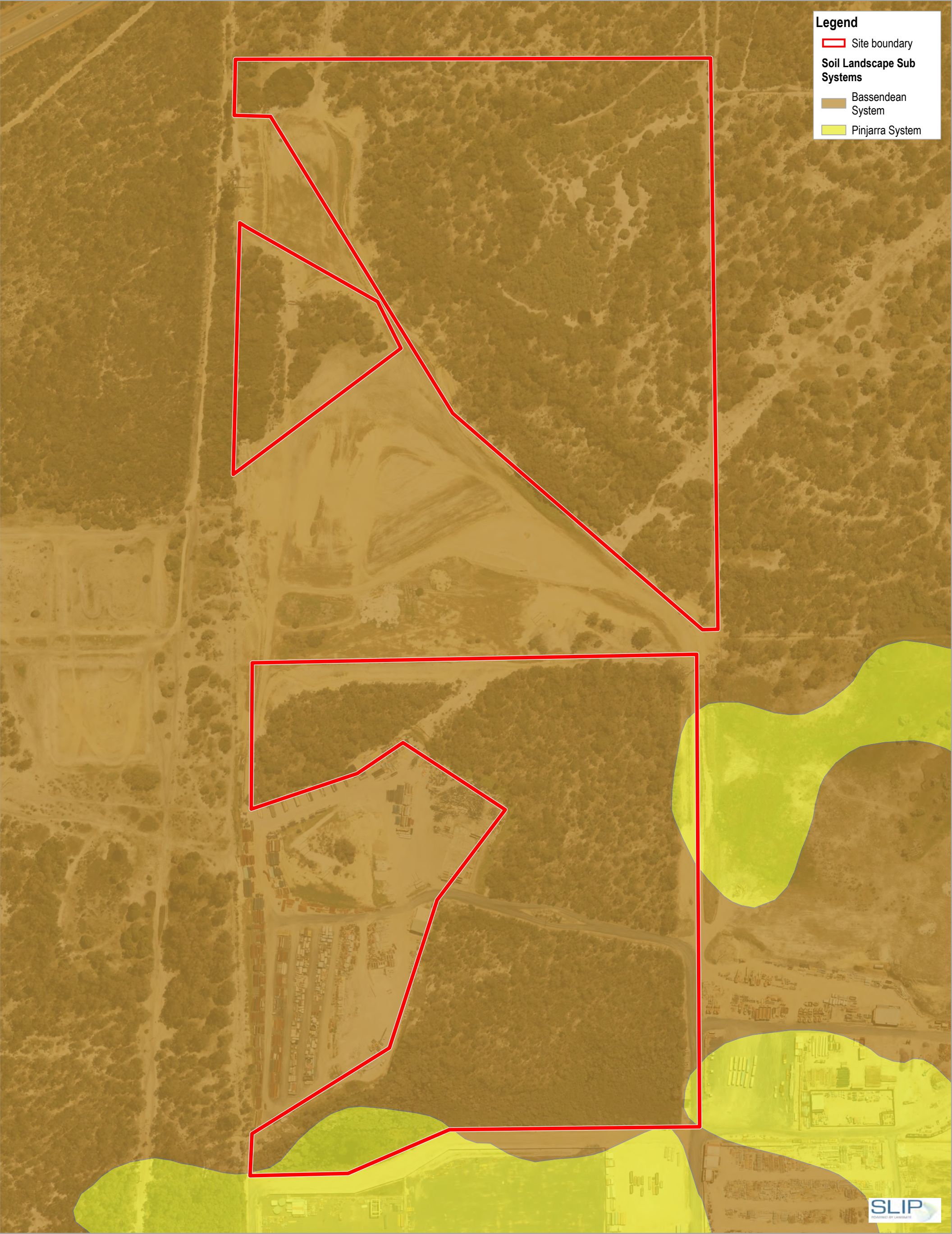
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Flora, Vegetation, and Black Cockatoo Survey -
Temple Rd, Picton East.

Hydrology constraints

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FIGURE 3





Legend

Site boundary

Soil Landscape Sub Systems

Bassendean System

Pinjarra System

Paper Size ISO A3

0 40 80 120 160

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

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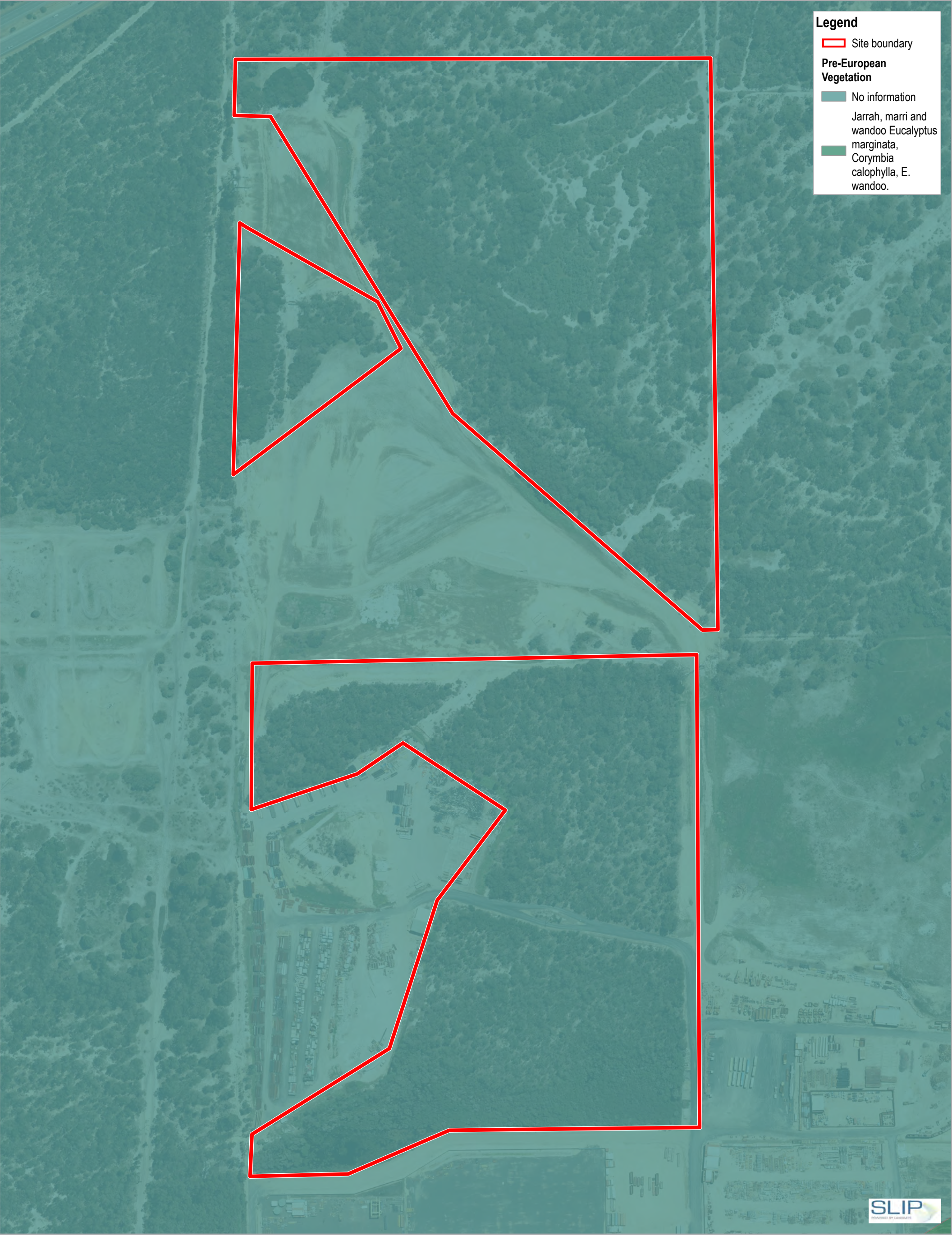


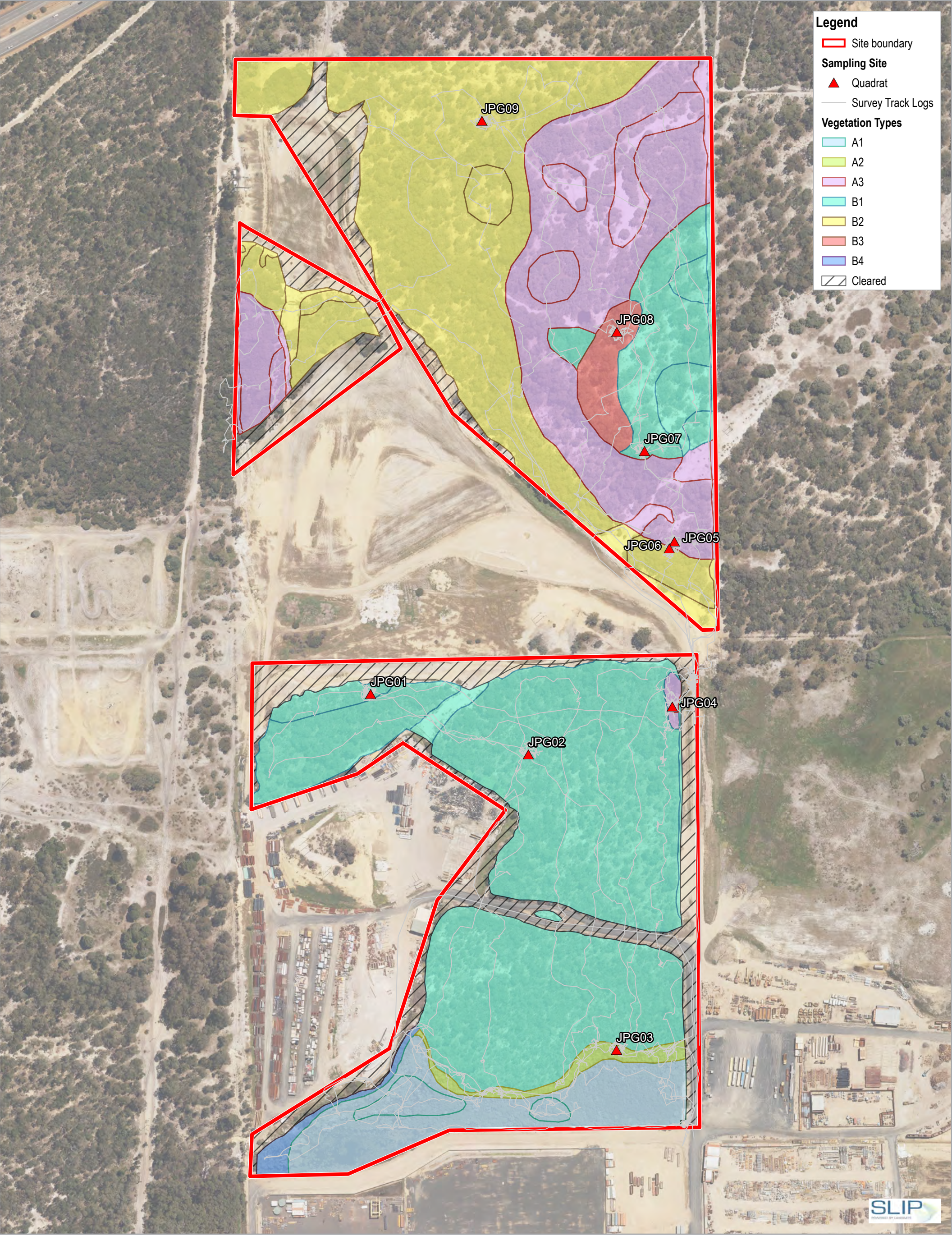
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Temple Rd, Picton East.

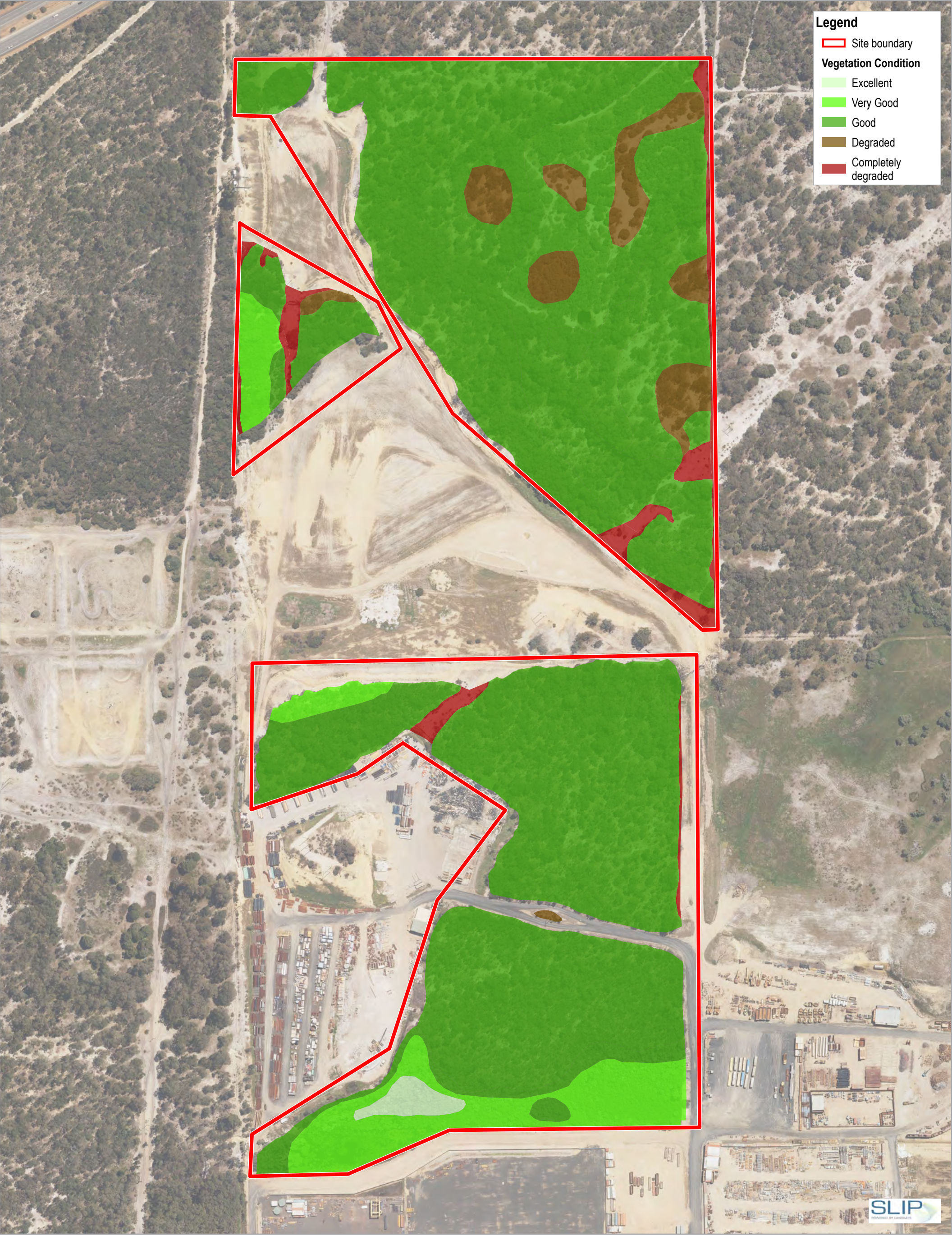
Soil Landscape Systems

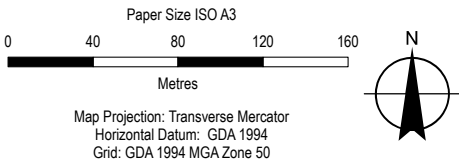
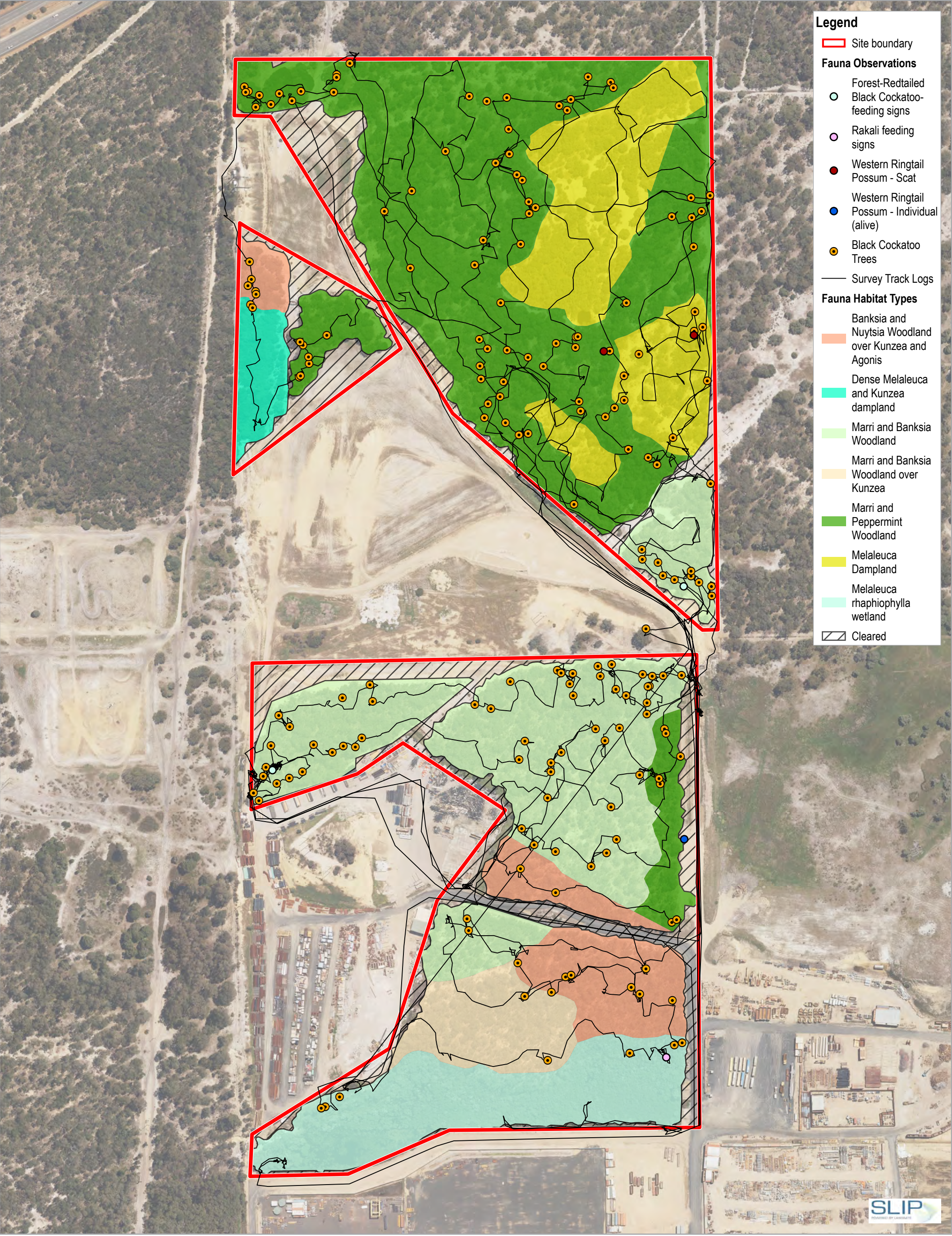
Project No. 12541162
Revision No. 0
Date 19 Feb 2021

FIGURE 5









J and P metals Group
Flora, Vegetation, and Black Cockatoo Survey -
Temple Rd, Picton East.

Fauna Survey Results

Project No. 12541162
Revision No. 0
Date 19 Feb 2021

FIGURE 9

Appendix B – Relevant legislation, background information and conservation codes

Relevant legislation

Federal Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Federal Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as Matters of National Environmental Significance (MNES).

The biological aspects listed as MNES include:

- Nationally threatened flora and fauna species and ecological communities
- Migratory species

A person must not undertake an action that has, will have, or is likely to have a significant impact (direct or indirect) on MNES, without approval from the Federal Minister for the Environment.

The EPBC Act is administered by the Department of Agriculture, Water and the Environment (DAWE).

State Environmental Protection Act 1986

The *Environmental Protection Act 1986* (EP Act) is the primary legislative Act dealing with the protection of the environment in Western Australia. The Act allows the Environmental Protection Authority (EPA), to prevent, control and abate pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing. Part IV of the EP Act is administered by the EPA and makes provisions for the EPA to undertake environmental impact assessment of significant proposals, strategic proposals and land use planning schemes.

The Department of Water and Environment Regulation (DWER) is responsible for administering the clearing provisions of the EP Act (Part V). Clearing of native vegetation in Western Australia requires a permit from the DWER, unless exemptions apply. Applications for clearing permits are assessed by the Department and decisions are made to grant or refuse the application in accordance with the Act. When making a decision the assessment considers clearing against the ten clearing principles as specified in Schedule 5 of the EP Act:

- a) Native vegetation should not be cleared if it comprises a high level of biodiversity.
- b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significance habitat for fauna indigenous to Western Australia.
- c) Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.
- d) Native vegetation should not be cleared if it comprises the whole or part of native vegetation in an area that has been extensively cleared.
- e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.
- f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
- g) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.
- h) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

- i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.
- j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

Exemptions for clearing include clearing that is a requirement of a written law or authorised under certain statutory processes (listed in Schedule 6 of the EP Act) and exemptions for prescribed low impact day-to-day activities (prescribed in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004); these exemptions do not apply in environmentally sensitive areas (ESAs).

State Biodiversity and Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) provides for the conservation and protection of biodiversity and biodiversity components, as well as the promotion of the ecologically sustainable use of biodiversity components in Western Australia. The BC Act replaces both the repealed *Wildlife Conservation Act 1950* (WC Act) and the *Sandalwood Act 1929* (Sandalwood Act), as well as their associated regulations. To attain the objectives of the BC Act, principles of ecological sustainable development have been established:

- Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- The conservation of biodiversity and ecological integrity should be a fundamental consideration in decision-making
- Improved valuation, pricing and incentive mechanisms should be promoted.

The BC Act is administered by the Department of Biodiversity Conservation and Attractions (DBCA).

State Biosecurity and Agriculture Management Act 2007

The *Biosecurity and Agriculture Management Act 2007* (BAM Act) and associated regulations are administered by the Department of Primary Industries and Regional Development (DPIRD) and replace the repealed *Agriculture and Related Resources Protection Act 1976*. The main purposes of the BAM Act and its regulations are to:

- Prevent new animal and plant pests (vermin and weeds) and diseases from entering WA
- Manage the impact and spread of those pests already present in the state
- Safely manage the use of agricultural and veterinary chemicals
- Increased control over the sale of agricultural products that contain violative chemical residues.

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act. A Declared Pest is a prohibited organism or an organism for which a declaration under Section 22(2) of the Act is in force. Declared Pests may be assigned a control category including: C1 (exclusion), C2 (eradication) and C3 (management). The category may apply to the whole of the State, LGAs, districts, individual properties or even paddocks, and all landholders are obliged to comply with the specific category of control. Categories of control are defined below.

DPIRD Categories for Declared Pests under the BAM Act

Control class code	Description
C1 (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 (Management)	Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Background information

Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared by the Minister for Environment under Section 51B of the EP Act. The Table below outlines the aspects of areas declared as ESA in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005.

Aspects of ESAs

Aspects of Environmentally Sensitive Areas
A declared World Heritage property as defined in Section 13 of the EPBC Act.
An area that is included on the Register of the National Estate (RNE), because of its natural values, under the <i>Australian Heritage Commission Act 1975</i> of the Commonwealth (the RNE was closed in 2007 and is no longer a statutory list – all references to the RNE were removed from the EPBC Act on 19 February 2012).
A defined wetland and the area within 50 m of the wetland. Defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands.
The area covered by vegetation within 50 m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located.
The area covered by a Threatened Ecological Community.
A Bush Forever Site listed in “Bush Forever” Volumes 1 and 2 (2000), published by the Western Australia Planning Commission, except to the extent to which the site is approved to be developed by the Western Australia Planning Commission.
The areas covered by the <i>Environmental Protection (Gnangara Mound Crown Land) Policy 1992</i> .
The areas covered by the <i>Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002</i> .
The areas covered by the lakes to which the <i>Environmental Protection (Swan Coastal Plain Lakes) Policy 1992</i> (EPP Lakes) applies.
Protected wetlands as defined in the <i>Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998</i> .

Reserves and conservation areas

Bush Forever

Bush Forever, which was released in December 2000 and proclaimed in 2010, is a Government initiative aimed to retain and protect regionally significant bushland on the Swan Coastal Plain within the Perth Metropolitan Region. Bush Forever aims to protect more than 51,000 hectares of regionally significant bushland within 287 sites across the metropolitan portion of the Swan Coastal Plain (Government of Western Australia (GoWA) 2000). Bush Forever sites constitute ESAs as declared by a notice under Section 51B of the EP Act.

Department of Biodiversity, Conservation and Attractions managed lands and waters

DBCA manages lands and waters throughout Western Australia to conserve ecosystems and species, and to provide for recreation and appreciation of the natural environment. DBCA managed lands and waters include national parks, conservation parks and reserves, marine parks and reserves, regional parks, nature reserves, State forest and timber reserves. Access to, or through, some areas of DBCA managed lands may require a permit or could be restricted due to management activities. Proposed

land use changes and development proposals that abut DBCA managed lands will generally be referred to DBCA throughout the assessment process.

Wetlands

Wetlands include not only lakes with open water, but areas of seasonally, intermittently or permanently waterlogged soil.

Ramsar Wetlands (Wetlands of International Importance)

The Convention of Wetlands of International Importance was signed in 1971 at the Iranian town of Ramsar. The Convention has since been referred to as the Ramsar Convention. Ramsar Listed wetlands are “sites containing representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity ... because of their ecological, botanical, zoological, limnological or hydrological importance” (DAWE 2020b). Once a Ramsar Listed Wetland is designated, the country agrees to manage its conservation and ensure its wise use. Under the Convention, wise use is broadly defined as “maintaining the ecological character of a wetland” (DAWE 2020b).

Nationally important wetlands

Wetlands of national significance are listed under the Directory of Important Wetlands in Australia. Nationally important wetlands are wetlands which meet at least one of the following criteria (DAWE 2020a):

- It is a good example of a wetland type occurring within a biogeographic region in Australia
- It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex
- It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail
- The wetland supports one percent or more of the national populations of any native plant or animal taxa
- The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level
- The wetland is of outstanding historical or cultural significance.

Geomorphic wetlands

Categorisation of wetlands has been conducted by Hill et al. (1996), delineating Swan Coastal Plain wetlands into levels of protection and management categories. Conservation Category Wetlands are wetlands that support high levels of attributes and functions. Resource Enhancement Wetlands are those that have been partly modified but still support substantial functions and attributes. Multiple Use Wetlands are classified as those wetlands with few attributes that still provide important wetland functions. Multiple Use wetlands have few important ecological attributes and functions remaining.

The Geomorphic Wetlands Swan Coastal Plain dataset displays the location, boundary, geomorphic classification (wetland type) and management category of wetlands on the Swan Coastal Plain.

Vegetation extent and status

The National Objectives and Targets for Biodiversity Conservation 2001–2005 (Commonwealth of Australia 2001) recognise that the retention of 30 percent or more of the pre-clearing extent of each ecological community is necessary if Australia’s biological diversity is to be protected. This is the threshold level below which species loss appears to accelerate exponentially and loss below this level should not be permitted. This level of recognition is in keeping with the targets recommended in the

review of the National Strategy for the Conservation of Australia's Biological Diversity (ANZECC 2000).

The extent of remnant native vegetation in WA has been assessed by Shepherd et al. (2002) and the GoWA (2019), based on broadscale vegetation association mapping by Beard (various publications). The GoWA produces Statewide Vegetation Statistics Reports that are used for a number of purposes including conservation planning, land use planning and when assessing development applications. The reports are updated every 2-3 years.

Vegetation condition

The vegetation condition can be assessed in accordance with the vegetation condition rating scale for the South West and Interzone Botanical Provinces (EPA 2016a). The scale recognises the intactness of vegetation and consists of six rating levels as outlined below.

Vegetation condition rating scale for the South West and Interzone Botanical Provinces

Condition	South West and Interzone Botanical Provinces description
Pristine	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Conservation codes

Species of significant flora, fauna and communities are protected under both Federal and State Acts. The Federal EPBC Act provides a legal framework to protect and manage nationally important flora and communities. The State BC Act is the primary wildlife conservation legislation in Western Australia. Information on the conservation codes is summarised in the following sections.

Ecological communities

Significant communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English and Blyth 1997). Federally listed Threatened Ecological Communities (TECs) are protected under the EPBC Act. The BC Act provides for the Minister to list an ecological community as a TEC (section 27), or as a collapsed ecological community (section 31) statutory listing of State TECs by the Minister. The legislation also describes statutory processes for preparing recovery plans for TECs, the registration of their critical habitat, and penalties for unauthorised modification of TECs.

Possible TECs that do not meet survey criteria are added to the DBCA Priority Ecological Community (PEC) List under Priorities 1, 2 and 3. These are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in Priority 5. PECs are not listed under any formal Federal or State legislation, however, may be listed as TECs under the EPBC Act.

Codes and definitions for TECs listed under the EPBC Act and/ or BC Act

Categories	Definition
Federal Government Conservation Categories (EPBC Act)	
Critically Endangered (CR)	An ecological community if, at that time, is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Endangered (EN)	An ecological community if, at that time: A) is not critically endangered; and B) is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Vulnerable (VU)	An ecological community if, at that time: A) is not critically endangered or endangered; and B) is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria (as outlined in Environment Protection and Biodiversity Conservation Regulations 2000)
Western Australia Conservation Categories (BC Act)	
<u>Threatened Ecological Communities</u>	
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

Categories	Definition
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Collapsed ecological communities

An ecological community is eligible for listing as a collapsed ecological community at a particular time if, at that time –

(a) there is no reasonable doubt that the last occurrence of the ecological community has collapsed); or

(b) the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover –

(i) its species composition or structure; or

(ii) its species composition and structure.

Section 33 of the BC Act provides for a collapsed ecological community to be regarded as a threatened ecological community if it is discovered in a state that no longer makes it eligible for listing as a collapsed ecological community.

Categories and definitions for PECS as listed by the DBCA

Category	Description
Priority 1	<p>Poorly known ecological communities.</p> <p>Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.</p>
Priority 2	<p>Poorly known ecological communities.</p> <p>Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.</p>

Category	Description
Priority 3	<p>Poorly known ecological communities.</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
Priority 4	<p>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
Priority 5	<p>Conservation Dependent ecological communities.</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

Other significant vegetation

Vegetation may be significant for a range of reasons other than a statutory listing. The EPA (2016a, b) states that significant vegetation may include vegetation that includes the following:

- Restricted distribution
- Degree of historical impact from threatening processes
- A role as a refuge
- Providing an important function required to maintain ecological integrity of a significant ecosystem
- Local endemism in restricted habitats
- Novel combinations of taxa
- A role as a key habitat for Threatened species or large population representing a significant proportion of the local to regional total population of a species
- Being representative of a vegetation unit in 'pristine' condition in a highly cleared landscape, recently discovered range extensions, or isolated outliers of the main range.

This may apply at a number of levels, so the unit may be significant when considered at the fine-scale (intra-locality), intermediate-scale (locality or inter-locality) or broad-scale (local to region).

Flora and fauna

Significant flora and fauna

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the BC Act can warrant referral to DAWE and/or the EPA.

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act. The significance levels for flora and fauna used in the EPBC Act align with the International Union for Conservation of Nature (IUCN) Red List criteria, which are internationally recognised as providing best practice for assigning the conservation status of species. The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II)
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA)
- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)

The State conservation level of flora and fauna species and their significance status also follows the IUCN Red List criteria. Under the BC Act flora and fauna can be listed as Threatened, Extinct and as Specially Protected species.

Threatened species are those are species which have been adequately searched for and are deemed to be, in the wild, either rare, under identifiable threat of extinction, or otherwise in need of special protection, and have been gazetted as such. The assessment of the conservation status of Threatened species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria. Specially protected species meet one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as Threatened or Extinct species under the BC Act cannot also be listed as Specially Protected species.

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

For the purposes of this assessment, all species listed under the EPBC Act, BC Act and DBCA Priority species are considered significant.

Categories and definitions for EPBC Act and BC Act listed flora and fauna species

Conservation category	Definition
Threatened species	
Critically Endangered (CR)	<p>Threatened species considered to be “facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.</p>
Endangered (EN)	<p>Threatened species considered to be “facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines.</p>
Vulnerable (VU)	<p>Threatened species considered to be “facing a high risk of extinction in the wild in the medium term future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines.</p>
Extinct species	
Extinct (EX)	Species where “there is no reasonable doubt that the last member of the species has died”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).
Extinct in the Wild (EW)	Species that “is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).
Specially protected species	
Migratory (MI)	<p>Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).</p> <p>Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.</p>

Conservation category	Definition
Species of special conservation interest (conservation dependent fauna) (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Other specially protected fauna (OS)	Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Codes for DBCA listed Priority flora and fauna

Priority category	Definition
Priority 1	<p>Poorly-known taxa</p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.</p>
Priority 2	<p>Poorly-known taxa</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p>
Priority 3	<p>Poorly-known taxa</p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.</p>
Priority 4	<p>Rare, Near Threatened and other taxa in need of monitoring</p> <p>A. Rare: Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.</p> <p>B. Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>C. Taxa that have been removed from the list of threatened taxa during the past five years for reasons other than taxonomy.</p>

Other significant flora

Flora species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than a statutory listing. The EPA (2016a, b) states that significant flora may include taxa that have/are:

- A keystone role in a particular habitat for Threatened or Priority flora or fauna species, or large populations representing a considerable proportion of the local or regional total population of a species
- Relictual status, being representation of taxonomic or physiognomic groups that no longer occur widely in the broader landscape
- New species or anomalous features that indicate a potential new species
- Being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- Unusual species, including restricted subspecies, varieties, or naturally occurring hybrids
- Local endemism (a restricted distribution) or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)

Other significant fauna

Fauna species may be significant for a range of reasons other than those protected by international agreement or treaty, Specially Protected or Priority Fauna. Significant fauna may include short-range endemic species, species that have declining populations or declining distributions, species at the extremes of their range, or isolated outlying populations, or species which may be undescribed (EPA 2010).

Introduced plants (weeds)

Declared Pests

Information on species considered to be Declared Pests is provided under *State Biosecurity and Agriculture Management Act 2007*.

Weeds of National Significance

The spread of weeds across a range of land uses or ecosystems is important in the context of socio-economic and environmental values. The assessment of Weeds of National Significance (WoNS) is based on four major criteria:

- Invasiveness
- Impacts
- Potential for spread
- Socio-economic and environmental values.

Australian state and territory governments have identified thirty-two Weeds of National Significance (WoNS); a list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012.

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Appendix C – Desktop searches

Flora and Vegetation Desktop

Definitions

Term	Description
Desktop area	A 10 km buffer around the project area
Project area	The potential project footprint of the alignment options
Cr	Critically endangered
En	Endangered
T	Threatened
Vu	Vulnerable
P1 – P4	Priority 1 – Priority 4
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
DBCA	Department of Biodiversity and Conservation Attractions 2018. WA Government, Department of Parks and Wildlife Threatened (Declared Rare) and Priority Flora List
BC Act	Biodiversity Conservation Act 2016

Conservation significant flora desktop assessment and likelihood of occurrence

<i>Taxon</i>	Conservation status	Flowering Period	Description and closest record information (if available) (WA Herbarium 1998-2020)	Likelihood of occurrence
<i>Acacia flagelliformis</i>	P4	May-Sep	Rush-like, erect or sprawling shrub, 0.3-0.75(-1.6) m high. Fl. yellow. Sandy soils. Winter-wet areas.	Possible
<i>Acacia semitrullata</i>	P4	May-Oct	Slender, erect, pungent shrub, (0.1-)0.2-0.7(-1.5) m high. Fl. cream, white. White/grey sand, sometimes over laterite, clay. Sandplains, swampy areas.	Possible
<i>Andersonia gracilis</i>	T (EN)	Sep-Nov	Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple. White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Unlikely
<i>Angianthus drummondii</i>	P3	Oct-Dec	Erect annual, herb, to 0.1 m high. Fl. yellow. Grey or brown clay soils, ironstone. Seasonally wet flats.	Unlikely
<i>Aponogeton hexatepalus</i>	P4	Jul-Oct	Rhizomatous or cormous, aquatic perennial, herb, leaves floating. Fl. green, white. Mud. Freshwater: ponds, rivers, claypans.	Possible
<i>Austrostipa bronwenae</i>	T (EN)	Sep-Oct	Perennial grass, 0.6 m high x 0.3 m wide. Flowers green. Grows in calcareous, winter-wet grey-brown sandy-loam or dark brown loam over clay.	Possible
<i>Austrostipa jacobiana</i>	T (CR)	Aug-Sep	Perennial rhizomatous grass to 1.2 metres tall (with flower spikes). Leaves to 45 cm long, folded and swollen giving a terete appearance, abaxial surface strongly ribbed. Inflorescence 10-20 cm long. Flowering in October through November. Low-lying areas on the fringe of a seasonally wet depressions on calcareous clay to fine sandy clay.	Unlikely
<i>Banksia nivea</i> subsp. <i>uliginosa</i>	T (EN)	July-Sep	Dense, erect, non-lignotuberous shrub, 0.2–1.5 m high. Fl. yellow, brown. Sandy clay, gravel.	Unlikely
<i>Banksia squarrosa</i> subsp. <i>argillacea</i>	T (VU)	Jun-Nov	Erect, open, non-lignotuberous shrub, 1.2–4 m high. Fl. yellow, Jun–Nov. White/grey sand, gravelly clay or loam. Winter-wet flats, clay flats.	Unlikely
<i>Brachyscias verecundus</i>	T (CE)	Nov	Annual (or ephemeral), herb, 0.012-0.022 m high, entirely glabrous. Fl. white/cream. In a moss sward. On a granite outcrop.	Unlikely
<i>Caladenia huegelii</i>	T (EN)	Sep-Oct	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green, cream, red. Grey or brown sand, clay loam.	Unlikely
<i>Caladenia speciosa</i>	P4	Sep-Oct	Tuberous, perennial, herb, 0.35-0.6 m high. Fl. white, pink. White, grey or black sand.	Possible

<i>Taxon</i>	Conservation status	Flowering Period	Description and closest record information (if available) (WA Herbarium 1998-2020)	Likelihood of occurrence
<i>Carex tereticaulis</i>	P1	Sep-Oct	Monoecious, rhizomatous, tufted perennial, grass-like or herb (sedge), 0.7 m high. Fl. brown. Black peaty sand.	Possible
<i>Chamaescilla gibsonii</i>	P3	Sep	Clumped tuberous, herb. Fl. blue. Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.	Unlikely
<i>Chamelaucium</i> sp. S Coastal Plain (R.D. Royce 4872)	T (VU)	Oct-Dec	Winter-wet areas, loams and ironstone.	Unlikely
<i>Chamelaucium</i> sp. Yoongarillup (G.J. Keighery 3635)	P4	Jul-Oct	Non-lignotuberous shrub, to 2.5 m high. Fl. cream, yellow. Jarrah-marri forest. Loams, sandy clays. Riverbanks, lower slopes, below laterite breakaways.	Unlikely
<i>Craspedia</i> sp. Waterloo (G.J. Keighery 13724)	P2	Aug-Sep or Oct	Completely glabrous. Fl. Bright yellow. Growing in water on seasonally inundated heavy soils of the Pinjarra plain near Waterloo.	Unlikely
<i>Diuris drummondii</i>	T (VU)	Nov-Jan	Tuberous, perennial, herb, 0.5-1.05 m high. Fl. yellow. Low-lying depressions, swamps.	Possible
<i>Diuris micrantha</i>	T (VU)	Sep-Oct	Tuberous, perennial, herb, 0.3–0.6 m high. Fl. yellow, brown. Brown loamy clay. Winter-wet swamps, in shallow water.	Unlikely
<i>Diuris purdiei</i>	T (EN)	Sep-Oct	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow. Grey-black sand, moist. Winter-wet swamps. Found between Perth and Yarloop.	Possible
<i>Drakaea elastica</i>	T (EN)	Oct-Nov	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red, green, yellow. White or grey sand. Low-lying situations adjoining winter-wet swamps.	Possible
<i>Drakaea micrantha</i>	T (VU)	Sep-Oct	Tuberous, perennial, herb, 0.15–0.3 m high. Fl. red, yellow. White-grey sand.	Possible
<i>Eleocharis keigheryi</i>	T (VU)	Aug-Nov	Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. green. Clay, sandy loam. Emergent in freshwater: creeks, claypans	Unlikely
<i>Eucalyptus rudis</i> subsp. <i>cratyantha</i>	P4	Jul-Sep	Tree, 5-20 m high, bark rough, box-type. Fl. white. Loam. Flats, hillsides.	Possible
<i>Gastrolobium whicherense</i>	P2	Oct	Slender, open shrub, to 1.6 m high. Fl. orange/yellow/red. Red-grey sandy clay over quartzite. Steep westerly slopes.	Unlikely
<i>Grevillea rosieri</i>	P2	Jul-Sep	Shrubs, 0.5 m high. Flowers red or brown. Gravelly soil, or sand; sandplains; gravel pits.	Unlikely

<i>Taxon</i>	Conservation status	Flowering Period	Description and closest record information (if available) (WA Herbarium 1998-2020)	Likelihood of occurrence
<i>Lambertia echinata</i> subsp. <i>occidentalis</i>	T (EN)	Feb/May-Jun/Oct	Prickly, much-branched, non-lignotuberous shrub, to 3 m high. Fl. yellow. White sandy soils over laterite, orange/brown-red clay over ironstone.	Unlikely
<i>Lasiopetalum membranaceum</i>	P3	Sep-Dec	Multi-stemmed shrub, 0.2-1 m high. Fl. pink, blue, purple. Sand over limestone.	Unlikely
<i>Platysace ramosissima</i>	P3	Oct-Nov	Perennial, herb, to 0.3 m high. Fl. white, cream. Sandy soils.	Possible
<i>Puccinellia vassica</i>	P1	Sep-Nov	Caespitose annual or perennial, grass-like or herb, 0.41–0.55 m high. Saline soils. On the outer margins of coastal saltmarshes	Unlikely
<i>Pultenaea skinneri</i>	P4	Jul-Sep	Slender shrub, 1-2 m high. Fl. yellow, orange, red. Sandy or clayey soils. Winter-wet depressions.	Likely
<i>Rumex drummondii</i>	P4		Erect perennial, herb, 0.6-0.9 m high. Winter-wet disturbed areas.	Possible
<i>Schoenus benthamii</i>	P3	Oct-Nov	Tufted perennial, grass-like or herb (sedge), 0.15-0.45 m high. Fl. brown. White, grey sand, sandy clay. Winter-wet flats, swamps.	Possible
<i>Schoenus capillifolius</i>	P3	Oct-Nov	Semi-aquatic tufted annual, grass-like or herb (sedge), 0.05 m high. Fl. green. Brown mud. Claypans.	Unlikely
<i>Stylidium longitubum</i>	P4	Oct-Dec	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. Pink. Sandy clay, clay. Seasonal wetlands.	Unlikely
<i>Stylidium paludicola</i>	P3	Oct-Dec	Reed-like perennial, herb, 0.35-1 m high, Leaves tufted, linear or subulate or narrowly oblanceolate, 0.5-4 cm long, 0.5-1.5 mm wide, apex acute, margin entire, glabrous. Scape mostly glabrous, inflorescence axis glandular. Inflorescence racemose. Fl. pink. Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	Possible
<i>Synaphea odocoileops</i>	P1	Aug-Oct	Tufted, compact shrub, 0.2–0.5 m high. Fl. yellow. Brown-orange loam & sandy clay, granite. Swamps, winter-wet areas.	Unlikely
<i>Synaphea</i> sp. Fairbridge Farm (D. Papenfus 696)	T (CR)	Oct	Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. Yellow. Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	Unlikely
<i>Synaphea</i> sp. Pinjarra Plain (A.S. George 17182)	T (EN)	Sep to Nov	Erect, clumped shrub (sub-shrub), to 0.8 m high. Fl. yellow. Grey sandy loam or clay, grey-brown clayey sand, brown clayey loam, laterite. Flats, seasonally wet areas, railroad reserves often with wet depressions or drains.	Unlikely
<i>Synaphea</i> sp. Serpentine	T (CR)	Sep-Oct	Shrublands and woodlands on loamy soils	Unlikely

<i>Taxon</i>	Conservation status	Flowering Period	Description and closest record information (if available) (WA Herbarium 1998-2020)	Likelihood of occurrence
<i>Synaphea stenoloba</i>	T (EN)	Aug-Oct	Caespitose shrub, 0.3–0.45 m high. Fl. Yellow. Sandy or sandy clay soils. Winter-wet flats, granite. Shrublands and woodlands on loamy soils.	Unlikely
<i>Verticordia attenuata</i>	P3	Dec-May	Shrub, 0.4–1 m high. Fl. pink. White or grey sand. Winter-wet depressions	Unlikely

Note: The BC Act Conservation Status is shown, EPBC Act status, where relevant, is in brackets.

Likely – Known to occur within one kilometres of the Survey Area with suitable habitat within the Survey Area.

Possible – Suitable habitat within the Survey Area.

Unlikely – No suitable habitat present within the Survey Area.

Unknown – Data deficient.

Fauna Desktop

A likelihood of occurrence assessment was conducted for all conservation significant fauna species identified in the desktop assessment. This assessment was based on species biology, habitat requirements and observed habitat. No assumptions were made on the transient potential of these species

Parameters of fauna likelihood of occurrence assessment

Assessment outcome	Description
Present	Recorded during the current survey either as direct observation or indirect evidence (scats, possum drey, Black cockatoo foraging residue)
Likely	Species are likely to occur in the project area where there is suitable habitat within the project area and there are recent records of occurrence of the species in close proximity to the project area. OR Species known distribution overlaps with the project area and there is suitable habitat within the project area.
Unlikely	Species assessed as unlikely include those species previously recorded within 5 km of the project area however: <ul style="list-style-type: none"> There is limited (i.e. the type, quality and quantity of the habitat is generally poor or restricted) habitat in the project area. The suitable habitat within the project area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the project area. OR Those species that have a known distribution overlapping with the project area however: <ul style="list-style-type: none"> There is limited habitat in the project area (i.e. the type, quality and quantity of the habitat is generally poor or restricted). The suitable habitat within the project area is isolated from other areas of suitable habitat and species has no capacity to migrate into the project area.
Highly unlikely	Species that are considered highly unlikely to occur in the project area include: <ul style="list-style-type: none"> Those species that have no suitable habitat within the project area. Those species that have become locally extinct, or are not known to have ever been present in the region of the project area.

Definitions

Term	Description
Desktop area	A 10 km buffer around the project area
Project area	The potential project footprint of the alignment options
Cr	Critically endangered
En	Endangered
Vu	Vulnerable
IA	International agreement
OS	Other specially protected fauna
P1 – P4	Priority 1 – Priority 4. Threatened and Priority fauna rankings
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
DBCA	Department of Biodiversity and Conservation Attractions
BC Act	Biodiversity Conservation Act 2016

Fauna likelihood of occurrence assessment of conservation significant fauna identified in the desktop assessment as potentially occurring within the project area.

TAXON	COMMON NAME	STATUS		DESCRIPTION AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE WITHIN THE SURVEY AREA	SOURCE
		BC Act	EPBC Act			
Birds						
<i>Botaurus poiciloptilus</i>	Australasian bittern	EN	EN	In Western Australia, Australasian bitterns feed and breed in generally large, fresh to moderately brackish wetlands with pH levels ranging from 5.5 to 8.5. Extensive areas of water plants, especially rushes, reeds and sedges, provide habitat for the bitterns and support abundant prey (Pickering, 2013). Shallow water, less than 30cm deep with a low to medium density of water plants mixed with, or near short fine sedges are favoured for foraging while higher density emergent vegetation is preferred for nesting (Jaensch, 1982; A. Clarke, pers. comm., 2017).	Unlikely No deep fresh water habitat is present with connectivity to watercourses is present.	NatureMap
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-Cockatoo	VU	VU	The Forest Red-tailed Black Cockatoo inhabits the dense jarrah, karri, and marri forests receiving more than 600 mm annual average rainfall but also occurs in a range of other forest and woodland types, including Blackbutt (<i>E. patens</i>), Wandoo (<i>E. wandoo</i>), Tuart (<i>E. gomphocephala</i>), Albany Blackbutt (<i>E. staeri</i>), Yate (<i>E. cornuta</i>), and Flooded Gum (<i>E.</i>	Likely Suitable foraging and potential	NatureMap PMST TPFL

TAXON	COMMON NAME	STATUS		DESCRIPTION AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE WITHIN THE SURVEY AREA	SOURCE
		BC Act	EPBC Act			
				<i>rudis</i>) (DotE 2017). Habitats tend to have an understorey of balga (<i>Xanthorrhoea</i> spp.), kingia (<i>Kingia australis</i>), snottygobble (<i>Persoonia</i> spp.), parrot bush (<i>Banksia sessilis</i>), holly-leaved mirbelia (<i>Mirbelia dilatata</i>), bull banksia (<i>B. grandis</i>), bullich (<i>Taxandria</i> spp.) and sheoak (<i>Allocasurina fraseriana</i>). They are most common in the jarrah forest region of the northern Darling Range from Collie north to Mundaring and are very local throughout the lower south-west. They can be found on the Swan Coastal Plain, mainly in search of food the exotic white cedar (<i>Melia azedarach</i>). There are also several small isolated populations in the eastern parts of its range (DEE 2016j).	roosting habitat is available within the survey area to support this species	
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo,	EN	EN	Baudin's Black Cockatoo mainly occurs in eucalypt forests, especially jarrah, marri and karri forest that receives 750 mm of annual rainfall. The species is less frequently in woodlands of wandoo (<i>E. wandoo</i>), blackbutt (<i>E. patens</i>), flooded gum (<i>E. rudis</i>), yate (<i>E. cornuta</i>), partly cleared farmlands and urban areas. The range of the species extends from Albany northward to Gidgegannup and Mundaring (east of Perth), and inland to the Stirling Ranges and near Kojonup. Preferred roosts are in areas with a dense canopy close to permanent sources of water (DotE 2016k).	Likely Suitable foraging and potential roosting habitat is available within the survey area to support this species	Naturemap PMST TPFL
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo,	EN	EN	Carnaby's Cockatoo occurs in uncleared or remnant native eucalypt woodlands, especially those that contain salmon gum, wandoo, marri, jarrah and karri, and in shrubland or kwongan heathland dominated by Hakea, Dryandra, Banksia and Grevillea species. Breeding activity is restricted to eucalypt woodlands mainly in the semiarid and subhumid interior, from Kalbarri in the north, Three Springs District south to the Stirling Range, west to Cockleshell Gully and east to Manmanning. The species has expanded its breeding range westward and south into the jarrah-marri forests of the Darling Scarp and into the tuart forests of the Swan Coastal Plain, including the Yanchep area, Lake Clifton and near Bunbury. It nests in trees older than 120-150 years (DotE 2016l).	Likely Suitable foraging and potential roosting habitat is available within the survey area to support this species	Naturemap PMST TPFL
<i>Falco peregrinus</i>	Peregrine Falcon	OS		The Peregrine Falcon is found on and near cliffs, gorges, timbered watercourses, riverine environments, wetlands, plains, open woodlands, and pylons and spires of buildings, though less frequently in desert	Likely	Naturemap

TAXON	COMMON NAME	STATUS		DESCRIPTION AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE WITHIN THE SURVEY AREA	SOURCE
		BC Act	EPBC Act			
				regions (Morcombe 2004; Pizzey and Knight 2012). They are not common but can be found almost anywhere throughout WA and in the southwest, including particularly at Fitzgerald River, Stirling Range, Porongurup National Parks, Kondinin, and Peak Charles, with many more locations north of Perth (Nevill 2013).	This species may use the survey area for opportunistic foraging. It is also known to breed in tall eucalyptus trees such as Jarrah (RBC pers.ops)	
<i>Ixobrychus dubius</i>	Australian little bittern	P4		The black-backed bittern, also known as the black-backed least bittern or Australian little bittern, is a little-known species of heron in the family Ardeidae found in Australia and vagrant to southern New Guinea	Unlikely No deep freshwater habitat is present with connectivity to watercourses is present.	NatureMap
<i>Ixobrychus flavicollis australis</i> (southwest subpop.)	Black bittern (southwest subpop.)	P2		The Black Bittern is a sooty black or dark brown bittern with a yellow patch on the sides of the neck, extending from the throat to the wing. The feathers on the crown and lower neck are almost plumes. The legs are dark. The Black Bittern is sometimes called the Yellow-necked Bittern. Black Bitterns are found in coastal south-western, northern and eastern Australia south to far eastern Victoria.	Unlikely No deep freshwater habitat is present with connectivity to watercourses is present.	NatureMap
<i>Oxyura australis</i>	Blue-billed Duck	P4		The blue-billed duck is a small Australian almost entirely aquatic duck (Morcombe 2004). The blue-billed duck is endemic to Australia's temperate regions, ranging from the south west of WA, extending to southern Queensland, through New South Wales and Victoria, to Tasmania. The species is readily seen on freshwater lakes and billabongs where deep fresh water is present (Morcombe 2004).	Possible Suitable habitat may be present within the survey	NatureMap TPFL

TAXON	COMMON NAME	STATUS		DESCRIPTION AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE WITHIN THE SURVEY AREA	SOURCE
		BC Act	EPBC Act			
					area to support this species.	
<i>Pandion cristatus</i>	Eastern Osprey	P4		The eastern osprey is a diurnal, fish-eating bird of prey. They live in Oceania at coastal regions of the Australian continent, the Indonesian islands, New Guinea, and the Philippines. It is usually sedentary and pairs breed at the same nest site, building up a substantial structure on dead trees or limbs. The species resides in habitat close to coasts and estuaries that provide opportunities for fishing. (ALA 2020)	Unlikely Distance to a marine environment mean this species is unlikely to be present.	NatureMap
<i>Psophodes nigrogularis subsp. nigrogularis</i>	Western Whipbird	T		The black-throated whipbird (<i>Psophodes nigrogularis</i>) is a passerine bird found in several scattered populations in Southwest Australia. It is predominantly olive green in colour. The Western heath subspecies is now restricted to a small patch east of Albany, having disappeared from large parts of its range due to land clearance Garnett, S. (1993).	Unlikely The survey area does not occur near this species known range.	NatureMap
<i>Tringa nebularia</i>	Common Greenshank	MI	MI	The Common Greenshank is found in a wide variety of inland wetlands and coastal habitats of varying salinity. It occurs in sheltered coastal areas typically with large mudflats and saltmarsh, mangroves or seagrass, including embayments, harbours, river estuaries, deltas and lagoons, but less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats, and artificial wetlands. They occur around most of the coast from Cape Arid in the south to Carnarvon in the north-west (DotE 2020c), and are moderately common here given suitable habitat. They can be found in areas including Wannamal Lake, many Perth lakes, Alfred Cove, Peel Inlet, Vasse and Harvey Estuaries, and the Albany and Esperance regions (Nevill 2013).	Unlikely No deep freshwater habitat is present with connectivity to watercourses is present.	NatureMap TPFL
Mammals						

TAXON	COMMON NAME	STATUS		DESCRIPTION AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE WITHIN THE SURVEY AREA	SOURCE
		BC Act	EPBC Act			
<i>Bettongia penicillata</i>	Brush-tailed Bettong/Woylie	CR	EN	The woylie is a small kangaroo-like marsupial. They are also known as brush-tailed bettongs because of the distinctive black brush they have at the end of the long tail. Woylies are nocturnal and forage primarily for underground fungi (native truffles). Woylie once occupied most of the Australian mainland south of the tropics including the arid and semi-arid zones of Western Australia, the Northern Territory, New South Wales and Victoria. However, they are now only found in two small areas: Upper Warren and Dryandra Woodland.	Unlikely Restricted to conservation enclosures and locally extinct within the LGA (Bunbury)	PMST
<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	VU	VU	The Chuditch inhabits eucalypt forest (especially Jarrah, <i>E. marginata</i>), dry woodland, mallee shrublands, heaths, and desert, particularly in the south coast of WA. They also occur at lower densities in drier woodland and mallee shrubland in the goldfields and wheatbelt, as well as in Kalbarri National Park (translocated). Chuditch require adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) to survive (DEC 2012a). In Jarrah forest, Chuditch populations occur in both moist, densely vegetated, steeply sloping forest and drier, open, gently sloping forest (Van Dyck and Strahan 2008). The species can travel large distances, and for this reason requires habitats that are of a suitable size and not excessively fragmented.	Unlikely While the species is known from the wider region, the habitat is relatively isolated, and the species may only infrequently visit	Naturemap PMST TPFL
<i>Falsistrellus mackenziei</i>	Western False Pipistrelle	P4		The Western False Pipistrelle occurs in wet sclerophyll forest dominated by Karri (<i>Eucalyptus diversicolor</i>), and in the high rainfall zones of the Jarrah (<i>E. marginata</i>) and Tuart (<i>E. gomphocephala</i>) dry sclerophyll forests. The species is restricted to areas in or adjacent to stands of old growth forest. It has also been recorded in mixed Tuart-Jarrah tall woodlands on the adjacent coastal plain. Marri (<i>E. calophylla</i>), Sheoak (<i>Casuarina huegeliana</i>) and Peppermint (<i>Agonis flexuosa</i>) trees are often co-dominant at its collection localities (Churchill 2008; McKenzie and Start 1999).	Possible Suitable habitat may be present within the survey area to support this species.	Naturemap TPFL
<i>Hydromys chrysogaster</i>	Water-rat	P4		<i>Hydromys chrysogaster</i> individuals live mainly near permanent fresh water. They live on land but depend on the water for food. Also present along the coastline, <i>H. chrysogaster</i> do not need completely fresh water.	Likely Suitable habitat is available within the survey	Naturemap TPFL

TAXON	COMMON NAME	STATUS		DESCRIPTION AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE WITHIN THE SURVEY AREA	SOURCE
		BC Act	EPBC Act			
				They can also survive in areas where rivers and streams have become polluted or are brackish. (Watts and Aslin, 1981)	area to support this species. Signs of foraging typical of this species was observed.	
<i>Isoodon fusciventer</i>	Quenda	P4		The Quenda prefers dense scrubby, often swampy, vegetation with dense cover up to one metre high. However, it also occurs in woodlands, and may use less ideal habitat where this habitat occurs adjacent to the thicker, more desirable vegetation. The species often feeds in adjacent Jarrah and Wandoo forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover (DEC 2012e; Van Dyck & Strahan 2008).	Likely Suitable habitat may be available within the survey area to support this species.	NatureMap TPFL
<i>Myrmecobius fasciatus</i>	Numbat	T		The numbat <i>Myrmecobius fasciatus</i> is a small marsupial with a distinctive striped appearance, and because of its specialised diet, it is the sole animal placed in the family Myrmecobiidae. The numbat has a long, narrow face with a pointed nose, and an exceptionally long tongue that can extend to at least 5cm beyond the tip of its nose (DBCA 2020). Currently, numbats are only known to be surviving in a small area of WA's Jarrah forest and Wheatbelt, notably at Dryandra Woodland and the Upper Warren area. They have been successfully reintroduced to other locations within the Jarrah forest and Wheatbelt, and to sites in South Australia and New South Wales (DBCA 2020)	Unlikely The survey area is located a large distance from this species known and very limited populations.	PMST
<i>Notamacropus irma</i>	Western Brush Wallaby	P4		The Western Brush Wallaby is found primarily in open forest or woodland, particularly favouring open, seasonally-wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest (DEC 2012c; Van Dyck and Strahan 2008).	Likely Suitable habitat may be available within the survey area to support this species.	TPFL

TAXON	COMMON NAME	STATUS		DESCRIPTION AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE WITHIN THE SURVEY AREA	SOURCE
		BC Act	EPBC Act			
<i>Phascogale tapoatafa</i> subsp. <i>wambenger</i>	South-western Brush-tailed phascogale	CD		The South-western Brush-tailed Phascogale is found in dry, open sclerophyll forests and woodlands with a generally sparse ground-storey, which contain suitable nesting resources such as tree hollows, rotted stumps and tree cavities. In northern Australia all sightings are in drier habitats with recent records occurring in tall open forest of <i>Eucalyptus miniata</i> and <i>E. tetradonta</i> . Records are less common in high rainfall areas in both the north and south of WA (DEC 2012d). Foraging success is greatest on mature trees, large logs and dead standing trees with rough bark. An individual can use more than 40 nests in a single year, including hollow trees, rotted stumps, house ceilings and bird nests (Van Dyck & Strahan 2008).	Likely Suitable habitat may be available within the survey area to support this species.	TPFL
<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum	CR	CR	Ideal habitat for the Western Ringtail Possum comprises long unburnt mature remnants of peppermint (<i>Agonis flexuosa</i>) woodlands with high canopy continuity; others comprise of jarrah (<i>Eucalyptus marginata</i>)/marri (<i>Corymbia calophylla</i>) forests and woodlands with adequate hollows, coastal heath, myrtaceous heaths and shrublands, Bullich (<i>E. megacarpa</i>) dominated riparian zones and karri forests. Populations are associated with swamps, water courses or floodplains, and at topographic low points which provide cooler, often more fertile conditions. Their current distribution is patchy and largely restricted to the moister south-western corner of WA, especially in the Australind/Eaton area to Waychinicup National Park. The Upper Warren area east of Manjimup is the only place the possum survives in the absence of coastal peppermint. Persistence in translocation sites has only been at Karakamia Sanctuary, Perup Sanctuary and Yalgorup National Park (DPaW 2014; TSSC 2013; Van Dyck & Strahan 2008).	Present Suitable habitat is available within the survey area to support this species. One individual was recorded	NatureMap PMST TPFL
<i>Setonix brachyurus</i>	Quokka	VU	VU	The current distribution of the Quokka includes Rottnest and Bald Islands, and at least 25 sites on the mainland, including Two Peoples Bay Nature Reserve and Torndirrup, Mt Manypeaks and Walpole-Nornalup National Parks, and swamp areas through the south-west forests from Jarrahdale to Walpole. The last known population on the Swan Coastal Plain occurs in Muddy Lakes near Bunbury. Quokkas have also been reintroduced to Karakamia Sanctuary (DEC 2012e). They occupy dense forests and thickets, streamside vegetation, heaths, shrublands, <i>Agonis linearifolia</i>	Highly unlikely The survey area does not contain suitable habitat to support this species	PMST

TAXON	COMMON NAME	STATUS		DESCRIPTION AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE WITHIN THE SURVEY AREA	SOURCE
		BC Act	EPBC Act			
				dominated swamps in the Jarrah (<i>Eucalyptus marginata</i>) forest, and sometimes tea-tree thickets on sandy soils along creek systems. The northern extent on the mainland is in the Jarrah forest immediately south-east of the Perth metropolitan area, from where it extends southward through the southern Jarrah, Marri and Karri forests to the south coast, but largely confined throughout to areas receiving an annual rainfall of 1,000 mm or more (DEC 2012e; Van Dyck & Strahan 2008).		
Reptiles						
<i>Ctenotus ora</i>	Coastal Plains Skink	P3		The Coastal Plains Skink is locally restricted the sandy regions of the Swan Coastal Plain south of Perth. It inhabits open eucalypt woodland over Banksia, as well as sandy coastal plain and coastal dunes between Pinjarra and Yallingup Brook (Wilson & Swan 2013).	Likely The survey area may contain suitable habitat to support this species.	NatureMap TPFL
<i>Lerista lineata</i>	Perth Slider Lined Skink	P3		The fossorial skink <i>Lerista lineata</i> is largely restricted to the Swan Coastal Plain where its distribution is centred on the highly disturbed southern Perth metropolitan area. As a consequence, much of this species' former habitat has disappeared Maryan, Brad & Gaikhorst, Glen & O'Connell, Morgan & Callan, Shae. (2015).	Likely The survey area may contain suitable habitat to support this species.	NatureMap TPFL
Other						
<i>Idiosoma sigillatum</i>	Swan Coastal Plain shield-backed trapdoor spider	P3		<i>Idiosoma sigillatum</i> is the dominant idiopid trapdoor spider on the Swan Coastal Plain, where it occurs from Dalyellup north to at least Ledge Point (including Rottnest Island and Garden Island) with the eastern limit of its range along the sandy foothills of the Darling Escarpment, from Boyanup north to at least Gingin (refer (refer Figure 6, Figure 7) (WAM 2018b, Rix et al. 2018). Many of these records are historical in nature and occur within the Perth metropolitan area. It is highly likely that much of the habitat for this species within the Perth metropolitan area has been cleared for urban development and the species is unlikely to occur through much of its historical distribution in urban areas except in	Likely The survey area may contain suitable habitat to support this species.	NatureMap TPFL

TAXON	COMMON NAME	STATUS		DESCRIPTION AND HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE WITHIN THE SURVEY AREA	SOURCE
		BC Act	EPBC Act			
				remnant habitats (e.g. Kings Park, Bold Park, and Shenton Park bushland) (Rix et al 2018).		
<i>Galaxiella nigrostriata</i>	Black-stripe minnow, black-striped dwarf galaxias	EN	EN	A tiny dark olive-brown to paler greyish-brown galaxias with a bright yellow to reddish mid-lateral stripe bounded by narrow black stripes above and below, and a silvery-white belly. The Blackstriped Dwarf Galaxias inhabits coastal wetlands of south-west Western Australia. During summer when ephemeral pools dry out, individuals burrow into the moist soil below to aestivate until the rains return in autumn	Possible Suitable habitat may be present within the survey area to support this species.	NatureMap
<i>Geotria australis</i>	Pouched lamprey	P3		The pouched lamprey, also known as wide-mouthed lamprey, is an Eel-like fish with two dorsal fins near the tail, seven pairs of pore-like gill openings, and a disc-like mouth fringed with skin flaps and armed with many small, horny teeth. It is the only species in genus <i>Geotria</i> , which is in turn the only genus in the family Geotriidae. It is native to the southern hemisphere. It spends the early part of its life in fresh water, migrating to the sea as adult, and returning to fresh water to spawn and die.	Highly unlikely The survey area does not contain suitable habitat to support this species	PMST

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 05/11/20 23:13:22

[Summary](#)

[Details](#)

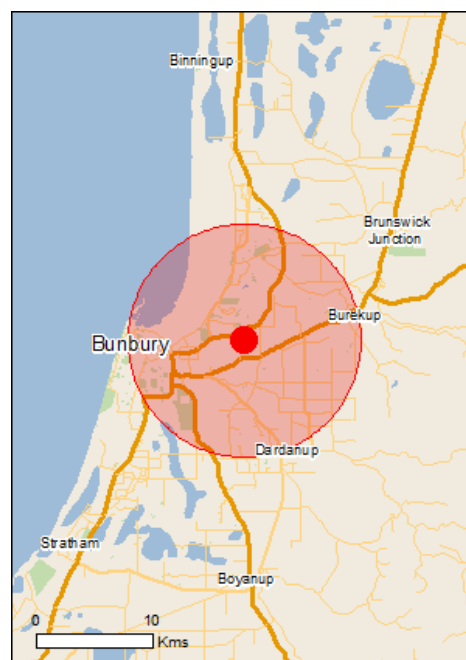
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

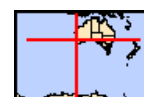
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 10.0Km



Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	64
Listed Migratory Species:	44

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	69
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	5
Regional Forest Agreements:	1
Invasive Species:	29
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area
Corymbia calophylla - Xanthorrhoea preissii woodlands and shrublands of the Swan Coastal Plain	Endangered	Community known to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species

[\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species

Name	Status	Type of Presence
05/08/2022	Attachment 2	habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence area
05/08/2022 Attachment 2		
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fish		
Nannatherina balstoni Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Dasyurus geoffroi Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat may occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat known to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat may occur within area
Other		
Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Austrostipa bronwenae [87808]	Endangered	Species or species habitat known to occur within area
Austrostipa jacobsoniana [87809]	Critically Endangered	Species or species habitat known to occur within area
Banksia nivea subsp. uliginosa Swamp Honeypot [82766]	Endangered	Species or species habitat may occur within area
Banksia squarrosa subsp. argillacea Whicher Range Dryandra [82769]	Vulnerable	Species or species habitat may occur within area
Brachyscias verecundus Ironstone Brachyscias [81321]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
<div>05/08/2022</div> <div>Attachment 2</div>		
Caladenia hughesii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Chamelaucium sp. S coastal plain (R.D.Royce 4872) Royce's Waxflower [87814]	Vulnerable	Species or species habitat may occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat known to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area
Drakaea elastica Glossy-leaved Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat known to occur within area
Lambertia echinata subsp. occidentalis Western Prickly Honeysuckle [64528]	Endangered	Species or species habitat may occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area
Synaphea sp. Pinjarra Plain (A.S. George 17182) [86878]	Endangered	Species or species habitat may occur within area
Synaphea sp. Serpentine (G.R. Brand 103) [86879]	Critically Endangered	Species or species habitat may occur within area
Synaphea stenoloba Dwellingup Synaphea [66311]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area

05/08/2022

Attachment 2

Name	Status	Type of Presence
Spharodon sarcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Hydroprogne caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area

05/08/2022

Attachment 2

Name	Threatened	Type of Presence
Thalassarche inopavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadyi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species

Name	Threatened	Type of Presence
05/08/2022	Attachment 2	habitat may occur within area
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Limosa lapponica		
Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus		
Osprey [952]		Breeding known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Defence - BUNBURY TRAINING DEPOT

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species

Name	Threatened	Type of Presence
05/08/2022	Attachment 2	
Apus pacificus Fork-tailed Swift [678]		habitat may occur within area Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
05/08/2022 Merops ornatus Rainbow Bee-eater [670]	Attachment 2	Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna anaethetus Bridled Tern [814]		Foraging, feeding or related behaviour likely to occur within area
Sterna caspia Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophrys Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species

Name	Threatened	Type of Presence
05/08/2022	Attachment 2	habitat likely to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish		Species or species

Name	Threatened	Type of Presence
05/08/2022 Attachment 2		
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		habitat may occur within area Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area

Name	Status	Type of Presence
05/08/2022 Eubalaena australis Southern Right Whale [40]	Attachment 2 Endangered	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]	Vulnerable	Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves		[Resource Information]
Name		State
Leschenault Peninsula		WA
Morangarell		WA
NTWA Bushland covenant (0146)		WA
Unnamed WA40552		WA
Unnamed WA46108		WA
Regional Forest Agreements		[Resource Information]
Note that all areas with completed RFAs have been included.		
Name		State
South West WA RFA		Western Australia
Invasive Species		[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.		
Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
<div>05/08/2022</div> Passer domesticus House Sparrow [405]	Attachment 2	Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus declinatus Bridal Veil, Bridal Veil Creeper, Pale Berry Asparagus Fern, Asparagus Fern, South African Creeper [66908]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within

Name	Status	Type of Presence
05/08/2022 Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]	Attachment 2	area Species or species habitat may occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.32817 115.7236

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Department of Land and Resource Management, Northern Territory](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- [Australian Tropical Herbarium, Cairns](#)
- [eBird Australia](#)
- [Australian Government – Australian Antarctic Data Centre](#)
- [Museum and Art Gallery of the Northern Territory](#)
- [Australian Government National Environmental Science Program](#)
- [Australian Institute of Marine Science](#)
- [Reef Life Survey Australia](#)
- [American Museum of Natural History](#)
- [Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Appendix D – Flora survey results

Flora recorded within the project area

Family	Species	Naturalised	Conservation status
Apiaceae	<i>Daucus glochidiatus</i>		
Apiaceae	<i>Foeniculum vulgare</i>	x	
Apiaceae	<i>Trachymene pilosa</i>		
Apiaceae	<i>Xanthosia huegelii</i>		
Apocynaceae	<i>Alyxia buxifolia</i>		
Asparagaceae	<i>Lomandra hermaphrodita</i>		
Asparagaceae	<i>Lomandra nigricans</i>		
Asparagaceae	<i>Lomandra purpurea</i>		
Asparagaceae	<i>Lomandra sonderi</i>		
Asparagaceae	<i>Thysanotus manglesianus</i>		
Asparagaceae	<i>Thysanotus tenellus</i>		
Asphodelaceae	<i>Trachyandra divaricata</i>	x	
Asteraceae	<i>Cirsium vulgare</i>	x	
Asteraceae	<i>Conyza parva</i>	x	
Asteraceae	<i>Cotula coronopifolia</i>		
Asteraceae	<i>Hypochaeris glabra</i>	x	
Asteraceae	<i>Ixiolaena viscosa</i>		
Asteraceae	<i>Sonchus asper</i>	x	
Asteraceae	<i>Sonchus oleraceus</i>	x	
Asteraceae	<i>Ursinia anthemoides</i>	x	
Brassicaceae	<i>Raphanus raphanistrum</i>	x	
Campanulaceae	<i>Monopsis debilis</i>	x	
Colchicaceae	<i>Burchardia congesta</i>		
Convolvulaceae	<i>Ipomea cairica?</i>	x	
Crassulaceae	<i>Crassula colorata</i>		
Crassulaceae	<i>Crassula natans</i>		
Cyperaceae	<i>Baumea articulata</i>		
Cyperaceae	<i>Baumea juncea</i>		
Cyperaceae	<i>Eleocharis acuta</i>		
Cyperaceae	<i>Isolepis cernua</i> var. <i>setiformis</i>		
Cyperaceae	<i>Isolepis marginata</i>		
Cyperaceae	<i>Isolepis prolifera</i>	x	
Cyperaceae	<i>Lepidosperma longitudinale</i>		
Cyperaceae	<i>Lepidosperma pubisquameum</i>		
Cyperaceae	<i>Lepidosperma squamatum</i>		
Cyperaceae	<i>Mesomelaena tetragona</i>		
Cyperaceae	<i>Tetraria octandra</i>		
Dennstaedtiaceae	<i>Pteridium esculentum</i>		
Dilleniaceae	<i>Hibbertia racemosa</i>		

Family	Species	Naturalised	Conservation status
Elaeocarpaceae	<i>Platytheca galioides</i>		
Ericaceae	<i>Styphelia pallida</i>		
Ericaceae	<i>Conostephium pendulum</i>		
Ericaceae	<i>Styphelia racemulosa</i>		
Euphorbiaceae	<i>Euphorbia peplus</i>	x	
Euphorbiaceae	<i>Euphorbia terracina</i>	x	
Euphorbiaceae	<i>Ricinus communis</i>	x	
Fabaceae	<i>Acacia huegelii</i>		
Fabaceae	<i>Acacia iteaphylla</i>	x	
Fabaceae	<i>Acacia longifolia</i>	x	
Fabaceae	<i>Acacia pulchella</i>		
Fabaceae	<i>Aotus gracillima</i>		
Fabaceae	<i>Bossiaea eriocarpa</i>		
Fabaceae	<i>Daviesia divaricata</i>		
Fabaceae	<i>Daviesia physodes</i>		
Fabaceae	<i>Gompholobium capitatum</i>		
Fabaceae	<i>Gompholobium tomentosum</i>		
Fabaceae	<i>Hardenbergia comptoniana</i>		
Fabaceae	<i>Hovea trisperma</i>		
Fabaceae	<i>Jacksonia horrida</i>		
Fabaceae	<i>Kennedia prostrata</i>		
Fabaceae	<i>Lotus subbiflorus</i>	x	
Fabaceae	<i>Lupinus angustifolius</i>	x	
Fabaceae	<i>Ornithopus compressus</i>	x	
Fabaceae	<i>Trifolium dubium</i>	x	
Fabaceae	<i>Trifolium repens</i>	x	
Goodeniaceae	<i>Dampiera linearis</i>		
Goodeniaceae	<i>Lobelia anceps</i>		
Haemodoraceae	<i>Conostylis aculeata</i> subsp. <i>preissii</i>		
Haemodoraceae	<i>Haemodorum spicatum</i>		
Haemodoraceae	<i>Phlebocarya ciliata</i>		
Hemerocallidaceae	<i>Agrostocrinum hirsutum</i>		
Iridaceae	<i>Patersonia occidentalis</i>		
Iridaceae	<i>Romulea rosea</i>	x	
Iridaceae	<i>Watsonia meriana</i> var. <i>bulbifera</i>	x	
Juncaceae	<i>Juncus bufonius</i>	x	
Juncaceae	<i>Juncus pallidus</i>		
Juncaceae	<i>Juncus subsecundus</i>		
Juncaginaceae	<i>Triglochin lineare</i>		
Lamiaceae	<i>Hemiandra pungens</i>		
Liliaceae	<i>Dasypogon bromeliifolius</i>		
Loranthaceae	<i>Nuytsia floribunda</i>		
Lythraceae	<i>Lythrum hyssopifolia</i>	x	

Family	Species	Naturalised	Conservation status
Myrtaceae	<i>Agonis flexuosa</i>		
Myrtaceae	<i>Astartea scoparia</i>		
Myrtaceae	<i>Corymbia calophylla</i>		
Myrtaceae	<i>Hypocalymma angustifolia</i>		
Myrtaceae	<i>Kunzea glabrescens</i>		
Myrtaceae	<i>Melaleuca lateritia</i>		
Myrtaceae	<i>Melaleuca osullivanii</i>		
Myrtaceae	<i>Melaleuca preissiana</i>		
Myrtaceae	<i>Melaleuca raphiophylla</i>		
Myrtaceae	<i>Melaleuca teretifolia</i>		
Myrtaceae	<i>Melaleuca thymoides</i>		
Myrtaceae	<i>Pericalymma ellipticum</i>		
Myrtaceae	<i>Synaphea spinulosa</i>		
Orchidaceae	<i>Caladenia flava</i>		
Orchidaceae	<i>Cyrtostylis</i> sp. <i>sterile</i>		
Orchidaceae	<i>Disa bracteata</i>	x	
Orchidaceae	<i>Elythranthera emarginata</i>		
Orchidaceae	<i>Microtis media</i> subsp. <i>media</i>		
Orchidaceae	<i>Pyrorchis nigricans</i>		
Orchidaceae	<i>Thelymitra macrophylla</i>		
Orobanchaceae	<i>Orobanche minor</i>	x	
Papaveraceae	<i>Fumaria capreolata</i>	x	
Phyllanthaceae	<i>Poranthera microphylla</i>		
Plantaginaceae	<i>Callitriche stagnalis</i>	x	
Poaceae	<i>Anthoxanthum odoratum</i>	x	
Poaceae	<i>Austrostipa compressa</i>		
Poaceae	<i>Avena barbata</i>	x	
Poaceae	<i>Briza maxima</i>	x	
Poaceae	<i>Briza minor</i>	x	
Poaceae	<i>Bromus diandrus</i>	x	
Poaceae	<i>Ehrharta calycina</i>	x	
Poaceae	<i>Holcus setiger</i>	x	
Poaceae	<i>Lachnagrostis filiformis</i>		
Poaceae	<i>Lolium multiglumis</i>	x	
Poaceae	<i>Lolium perenne</i>	x	
Poaceae	<i>Lolium rigidum</i>	x	
Poaceae	<i>Polypogon monspeliensis</i>	x	
Poaceae	<i>Vulpia bromoides</i>	x	
Polygonaceae	<i>Rumex acetosella</i>	x	
Polygonaceae	<i>Rumex crispus</i>	x	
Primulaceae	<i>Samolus juncea</i>		
Proteaceae	<i>Adenanthos meisneri</i>		
Proteaceae	<i>Banksia attenuata</i>		

Family	Species	Naturalised	Conservation status
Proteaceae	<i>Banksia grandis</i>		
Proteaceae	<i>Banksia ilicifolia</i>		
Proteaceae	<i>Banksia littoralis</i>		
Proteaceae	<i>Persoonia longiflora</i>		
Proteaceae	<i>Petrophile linearis</i>		
Proteaceae	<i>Stirlingia latifolia</i>		
Proteaceae	<i>Xylomelum occidentale</i>		
Restionaceae	<i>Desmocladius fascicularis</i>		
Restionaceae	<i>Hypolaena exsulca</i>		
Restionaceae	<i>Hypolaena pubescens</i>		
Restionaceae	<i>Lyginia imberbis</i>		
Restionaceae	<i>Schoenus efoliatus</i>		
Restionaceae	<i>Schoenus rigens</i>		
Rubiaceae	<i>Opercularia hispidula</i>		
Rutaceae	<i>Boronia dichotoma</i>		
Santalaceae	<i>Santalum acuminatum</i>		
Solanaceae	<i>Solanum nigricans</i>	x	
Stylidiaceae	<i>Stylidium brunonianum</i>		
Typhaceae	<i>Typha orientalis</i>		
Xanthorrhoeaceae	<i>Xanthorrhoea brunonis</i>		
Zamiaceae	<i>Macrozamia riedlei</i>		

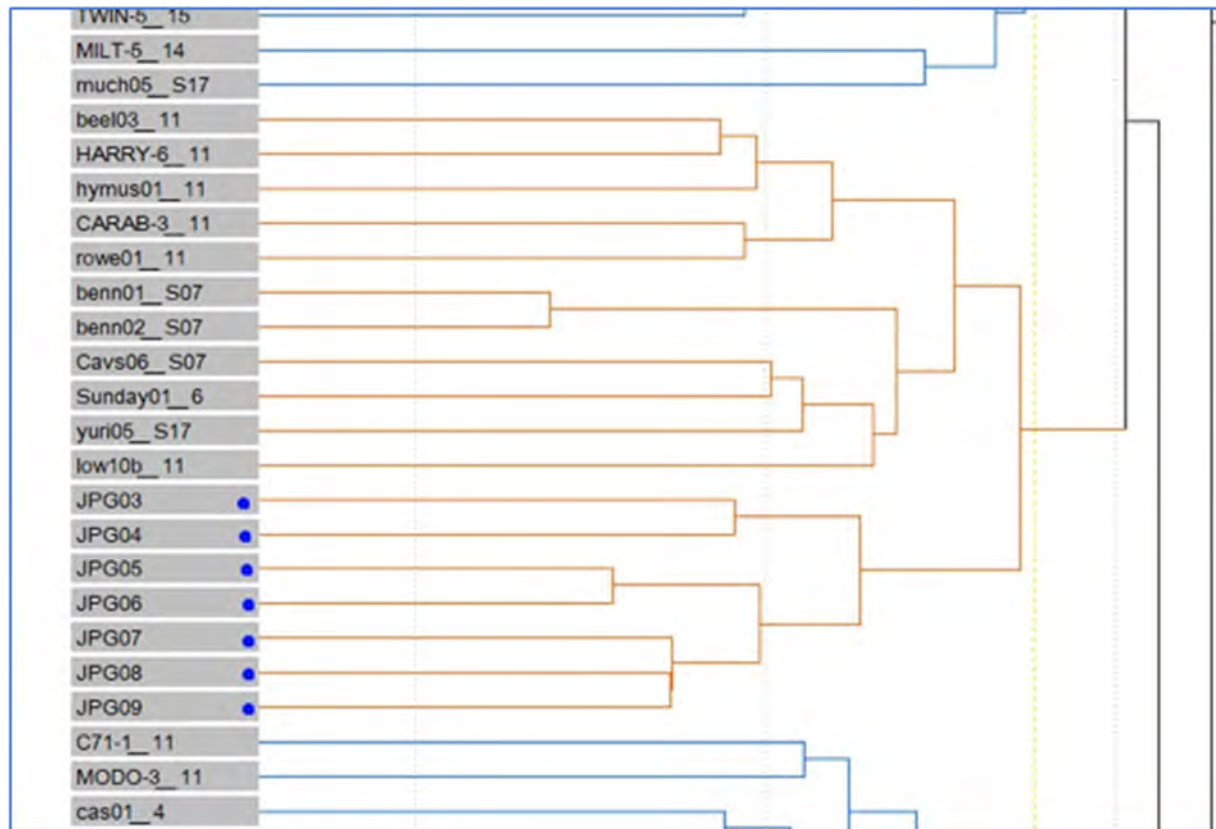
* Introduced (weed) species

DP Declared Pest

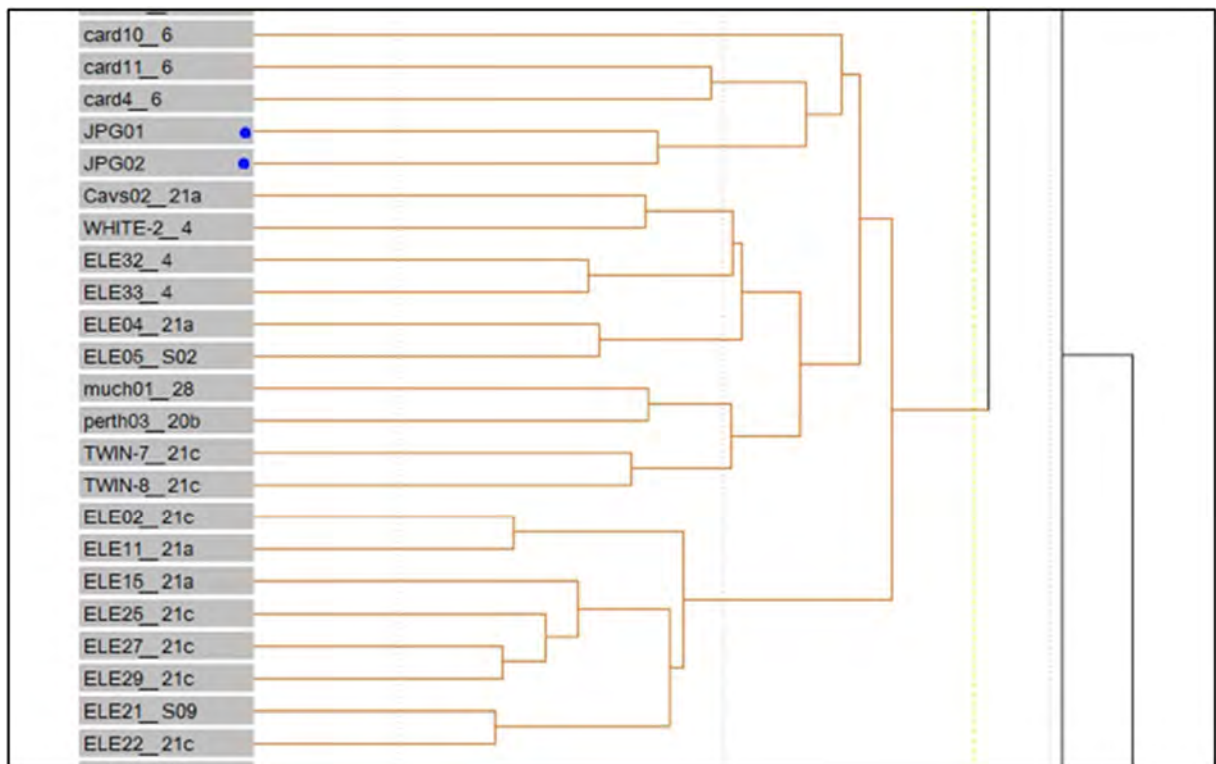
WONS Weed of National Significance

P4 Priority 4

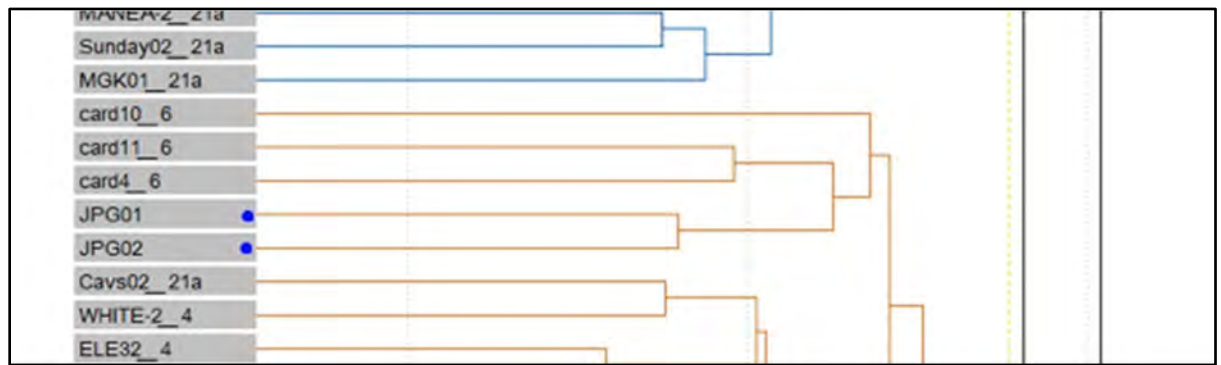
Quadrat floristic analysis



Extract of MVA dendrogram showing the clustering of JPG03-JPG09.



Extract of MVA dendrogram showing the clustering of JPG01-JPG02.



Extract of MVA dendrogram showing the clustering of JPG01

Appendix E - Fauna survey results

Family	Taxon	Common name	Status EPBC Act	Status BC Act
Birds				
Alcedinidae	<i>Dacelo novaeguineae</i>	Laughing kookaburra	Int	
Anatidae	<i>Chenonetta jubata</i>	Australian Wood Duck		
Anatidae	<i>Anas superciliosa</i>	Pacific Black Duck		
Artamidae	<i>Gymnorhina tibicen</i>	Australian magpie		
Artamidae	<i>Cracticus nigrogularis</i>	Pied butcherbird		
Cacatuidae	<i>Calyptorhynchus banksii</i>	Red-tailed Black-Cockatoo	VU	VU
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing		
Corvidae	<i>Corvus coronoides</i>	Australian raven		
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel		
Meliphagidae	<i>Anthochaera carunculata</i>	Red wattlebird		
Pardalotidae	<i>Pardalotus striatus</i>	Striated Pardalote		
Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	Little Pied Cormorant		
Psittaculidae	<i>Barnardius zonarius</i>	Australian ringneck		
Psittaculidae	<i>Purpureicephalus spurius</i>	Red-capped parrot		
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willie wagtail		
Rhipiduridae	<i>Rhipidura albiscapa</i>	Grey Fantail		
Strigidae	<i>Ninox boobook</i>	Australian Boobook		
Threskiornithidae	<i>Threskiornis moluccus</i>	Australian white ibis		
Mammals				
Canidae	<i>Vulpes vulpes</i>	European red fox	Int	
Felidae	<i>Felis catus</i>	House cat	Int	
Leporidae	<i>Oryctolagus cuniculus</i>	Rabbit	Int	
Macropodidae	<i>Macropus fuliginosus</i>	Western grey kangaroo		
Muridae	<i>Hydromys chrysogaster</i>	Rakali (Water Rat)		P4
Phalangeridae	<i>Pseudocheirus occidentalis</i>	Western ringtail possum	Cr	Cr
Phalangeridae	<i>Trichosurus vulpecula</i>	Common brushtail possum		
Reptiles				
Gekkonidae	<i>Christinus marmoratus</i>	Marbled Gecko		
Scincidae	<i>Menetia greyii</i>	Common dwarf skink		
Scincidae	<i>Tiliqua rugosa</i>	Bobtail lizard		
Varanidae	<i>Varanus rosenbergi</i>	Rosenberg's monitor		
Amphibians				
Limnodynastidae	<i>Heleioporus eyrei</i>	Moaning frog		
Pelodyadidae	<i>Ranoidea moorei</i>	Motorbike frog		

Cr = Critically endangered under the *WA Biodiversity Conservation Act 2016*

En = Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*


Vu = Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*

Int = Introduced species

*

Appendix F – Black Cockatoo breeding tree assessment

Trees inspected with Pole Camera

Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection	Tree images
16	2	381321	6311411	<i>Eucalyptus marginata</i>	105	4	Yes	
18	2	381336	6311379	Other	120	4	Yes	
23	2	381358	6311360	Other	65	4	Yes	




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Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection	Tree images
25	2	381375	6311399	<i>Eucalyptus marginata</i>	180	4	Yes	
33	2	381268	6311320	Other	70	4	Yes	
34	2	381258	6311309	Other	120	4	Yes	

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Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection	Tree images
35	2	381258	6311299	Other	110	4	Yes	
44	2	380960	6311304	<i>Eucalyptus marginata</i>	140	4	Yes	
51	2	381254	6311272	Other	85	3	Yes	

Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection	Tree images
61	2	381240	6311223	Other	90	4	Yes	
62	2	381227	6311240	Other	100	4	Yes	No image
67	2	381357	6311093	<i>Eucalyptus marginata</i>	90	4	Yes	
71	2	381230	6311065	Other	75	4	Yes	No image




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Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection	Tree images
73	2	381273	6311085	<i>Eucalyptus marginata</i>	105	4	Yes	
76	2	381351	6311067	Other	85	4	Yes	
98	10	381385	6311648	<i>Corymbia calophylla</i>	80	4	Yes	

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Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection	Tree images
109	10	381424	6311901	<i>Eucalyptus marginata</i>	105	4	Yes	
135	10	381200	6311935	<i>Eucalyptus marginata</i>	90	4	Yes	
149	10	381234	6311652	Other	70	4	Yes	

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Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection	Tree images
157	10	381187	6311854	Other	75	4	Yes	
168	10	380987	6312000	<i>Eucalyptus marginata</i>	90	4	Yes	No image
190	10	381404	6311509	<i>Corymbia calophylla</i>	140	4	Yes	

Not inspected with Camera

Date	Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection
16/12/2020	1	2	380985	6311346	<i>Eucalyptus marginata</i>	60	5	No
16/12/2020	2	2	380973	6311358	<i>Corymbia calophylla</i>	70	5	No
16/12/2020	3	2	381040	6311377	<i>Eucalyptus marginata</i>	55	5	No
16/12/2020	4	2	381069	6311390	Other	70	4	No
16/12/2020	5	2	381072	6311373	<i>Eucalyptus marginata</i>	55	5	No
16/12/2020	6	2	381178	6311369	<i>Eucalyptus marginata</i>	55	5	No
16/12/2020	7	2	381195	6311365	<i>Eucalyptus marginata</i>	80	5	No
16/12/2020	8	2	381215	6311393	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	9	2	381264	6311405	<i>Eucalyptus marginata</i>	90	4	No
16/12/2020	10	2	381268	6311402	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	11	2	381281	6311402	<i>Eucalyptus marginata</i>	60	5	No
16/12/2020	12	2	381281	6311379	<i>Corymbia calophylla</i>	65	5	No
16/12/2020	13	2	381277	6311391	<i>Corymbia calophylla</i>	60	5	No
16/12/2020	14	2	381309	6311399	<i>Corymbia calophylla</i>	70	5	No
16/12/2020	15	2	381307	6311409	<i>Corymbia calophylla</i>	65	5	No
16/12/2020	17	2	381326	6311385	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	19	2	381354	6311401	<i>Corymbia calophylla</i>	70	5	No

Date	Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection
16/12/2020	20	2	381364	6311399	<i>Corymbia calophylla</i>	75	4	No
16/12/2020	21	2	381361	6311389	<i>Eucalyptus marginata</i>	65	5	No
16/12/2020	22	2	381358	6311371	<i>Corymbia calophylla</i>	70	5	No
16/12/2020	24	2	381359	6311388	<i>Eucalyptus marginata</i>	65	5	No
16/12/2020	26	2	381394	6311400	<i>Corymbia calophylla</i>	100	4	No
16/12/2020	27	2	381376	6311344	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	28	2	381378	6311339	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	29	2	381393	6311315	<i>Corymbia calophylla</i>	70	5	No
16/12/2020	30	2	381329	6311345	<i>Corymbia calophylla</i>	52	5	No
16/12/2020	31	2	381314	6311332	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	32	2	381304	6311344	Other	85	4	No
16/12/2020	36	2	381230	6311331	Other	65	5	No
16/12/2020	37	2	381225	6311312	Other	70	4	No
16/12/2020	38	2	381060	6311335	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	39	2	381054	6311325	<i>Corymbia calophylla</i>	100	5	No
16/12/2020	40	2	381041	6311326	<i>Corymbia calophylla</i>	55	4	No
16/12/2020	41	2	381030	6311319	<i>Corymbia calophylla</i>	115	4	No
16/12/2020	42	2	381010	6311327	<i>Corymbia calophylla</i>	55	5	No

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Date	Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection
16/12/2020	43	2	380965	6311326	<i>Corymbia calophylla</i>	65	5	No
16/12/2020	45	2	380957	6311295	<i>Corymbia calophylla</i>	65	5	No
16/12/2020	46	2	380947	6311277	<i>Corymbia calophylla</i>	75	5	No
16/12/2020	47	2	380953	6311269	Other	60	4	No
16/12/2020	48	2	380971	6311287	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	49	2	380984	6311293	<i>Eucalyptus marginata</i>	60	5	No
16/12/2020	50	2	380998	6311299	<i>Corymbia calophylla</i>	90	5	No
16/12/2020	52	2	381320	6311262	Other	80	4	No
16/12/2020	53	2	381350	6311296	<i>Corymbia calophylla</i>	100	5	No
16/12/2020	54	2	381372	6311287	Other	50	4	No
16/12/2020	55	2	381372	6311286	<i>Corymbia calophylla</i>	50	5	No
16/12/2020	56	2	381371	6311292	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	57	2	381326	6311228	Other	90	4	No
16/12/2020	58	2	381316	6311214	Other	55	5	No
16/12/2020	59	2	381300	6311201	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	60	2	381263	6311216	<i>Corymbia calophylla</i>	55	5	No
16/12/2020	63	2	381226	6311198	<i>Corymbia calophylla</i>	65	5	No
16/12/2020	64	2	381263	6311173	<i>Corymbia calophylla</i>	85	4	No
16/12/2020	65	2	381384	6311142	<i>Eucalyptus marginata</i>	105	5	No

Date	Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection
16/12/2020	66	2	381389	6311145	<i>Eucalyptus marginata</i>	90	5	No
16/12/2020	68	2	381223	6311100	Other	65	4	No
16/12/2020	69	2	381170	6311146	<i>Eucalyptus marginata</i>	60	5	No
16/12/2020	70	2	381172	6311134	Other	65	4	No
16/12/2020	72	2	381258	6311069	<i>Corymbia calophylla</i>	55	4	No
16/12/2020	74	2	381279	6311087	<i>Corymbia calophylla</i>	70	4	No
16/12/2020	75	2	381342	6311074	Other	52	4	No
16/12/2020	77	2	381385	6311060	<i>Corymbia calophylla</i>	65	5	No
16/12/2020	78	2	381395	6311016	Other	60	4	No
16/12/2020	79	2	381387	6311014	<i>Corymbia calophylla</i>	55	4	No
16/12/2020	80	2	381340	6311005	Other	65	4	No
16/12/2020	81	2	381254	6310998	<i>Corymbia calophylla</i>	65	5	No
16/12/2020	82	2	381037	6310960	Other	65	4	No
16/12/2020	83	2	381022	6310950	<i>Corymbia calophylla</i>	70	5	No
16/12/2020	84	2	381018	6310948	<i>Corymbia calophylla</i>	65	5	No
17/12/2020	85	10	381357	6311449	<i>Corymbia calophylla</i>	150	5	No
17/12/2020	86	10	381426	6311483	<i>Eucalyptus marginata</i>	110	5	No
17/12/2020	87	10	381425	6311493	<i>Eucalyptus marginata</i>	70	5	No
17/12/2020	88	10	381412	6311497	<i>Corymbia calophylla</i>	100	5	No

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Date	Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection
17/12/2020	89	10	381404	6311504	<i>Eucalyptus marginata</i>	50	5	No
17/12/2020	90	10	381387	6311500	<i>Corymbia calophylla</i>	60	5	No
17/12/2020	91	10	381375	6311504	<i>Corymbia calophylla</i>	65	5	No
17/12/2020	92	10	381370	6311518	<i>Eucalyptus marginata</i>	70	4	No
17/12/2020	93	10	381353	6311521	<i>Corymbia calophylla</i>	80	5	No
17/12/2020	94	10	381353	6311531	<i>Corymbia calophylla</i>	70	5	No
17/12/2020	95	10	381424	6311600	<i>Corymbia calophylla</i>	100	5	No
17/12/2020	96	10	381359	6311627	<i>Corymbia calophylla</i>	65	5	No
17/12/2020	97	10	381369	6311620	<i>Corymbia calophylla</i>	70	4	No
17/12/2020	99	10	381421	6311707	<i>Eucalyptus marginata</i>	100	4	No
17/12/2020	100	10	381350	6311735	<i>Eucalyptus marginata</i>	90	5	No
17/12/2020	101	10	381407	6311759	<i>Corymbia calophylla</i>	70	5	No
17/12/2020	102	10	381416	6311763	<i>Corymbia calophylla</i>	70	5	No
17/12/2020	103	10	381408	6311779	<i>Eucalyptus marginata</i>	80	5	No
17/12/2020	104	10	381407	6311847	<i>Corymbia calophylla</i>	90	4	No
17/12/2020	105	10	381405	6311878	<i>Corymbia calophylla</i>	85	5	No
17/12/2020	106	10	381415	6311885	<i>Corymbia calophylla</i>	90	4	No

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Date	Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection
17/12/2020	107	10	381384	6311879	<i>Eucalyptus marginata</i>	60	4	No
17/12/2020	108	10	381404	6311898	<i>Corymbia calophylla</i>	80	5	No
17/12/2020	110	10	381337	6311789	<i>Corymbia calophylla</i>	70	5	No
17/12/2020	111	10	381319	6311739	<i>Corymbia calophylla</i>	80	5	No
17/12/2020	112	10	381334	6311713	<i>Eucalyptus marginata</i>	80	5	No
17/12/2020	113	10	381334	6311687	<i>Eucalyptus marginata</i>	100	4	No
17/12/2020	114	10	381324	6311679	<i>Eucalyptus marginata</i>	100	4	No
17/12/2020	115	10	381315	6311670	<i>Corymbia calophylla</i>	80	5	No
17/12/2020	116	10	381339	6311636	<i>Corymbia calophylla</i>	60	5	No
17/12/2020	117	10	381282	6311578	<i>Corymbia calophylla</i>	55	5	No
17/12/2020	118	10	381289	6311676	<i>Corymbia calophylla</i>	50	5	No
17/12/2020	119	10	381287	6311686	<i>Corymbia calophylla</i>	60	5	No
17/12/2020	120	10	381250	6311722	<i>Corymbia calophylla</i>	70	5	No
17/12/2020	121	10	381263	6311746	Other	75	4	No
17/12/2020	122	10	381283	6311742	<i>Corymbia calophylla</i>	95	5	No
17/12/2020	123	10	381284	6311753	<i>Corymbia calophylla</i>	75	5	No
17/12/2020	124	10	381286	6311754	<i>Corymbia calophylla</i>	70	5	No
17/12/2020	125	10	381275	6311990	<i>Corymbia calophylla</i>	75	5	No

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Date	Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection
17/12/2020	126	10	381266	6311995	<i>Eucalyptus marginata</i>	105	4	No
17/12/2020	127	10	381278	6312001	<i>Corymbia calophylla</i>	55	5	No
17/12/2020	128	10	381297	6312024	<i>Eucalyptus marginata</i>	90	4	No
17/12/2020	129	10	381320	6312019	<i>Corymbia calophylla</i>	53	5	No
17/12/2020	130	10	381323	6312014	<i>Corymbia calophylla</i>	55	5	No
17/12/2020	131	10	381212	6312003	<i>Corymbia calophylla</i>	80	5	No
17/12/2020	132	10	381191	6311999	Other	80	5	No
17/12/2020	133	10	381214	6311970	<i>Eucalyptus marginata</i>	60	5	No
17/12/2020	134	10	381214	6311944	<i>Corymbia calophylla</i>	80	5	No
17/12/2020	136	10	381222	6311923	<i>Corymbia calophylla</i>	55	5	No
17/12/2020	137	10	381228	6311917	<i>Corymbia calophylla</i>	55	5	No
17/12/2020	138	10	381235	6311894	<i>Corymbia calophylla</i>	60	5	No
17/12/2020	139	10	381242	6311888	<i>Corymbia calophylla</i>	100	4	No
17/12/2020	140	10	381235	6311882	<i>Corymbia calophylla</i>	55	5	No
17/12/2020	141	10	381226	6311850	<i>Corymbia calophylla</i>	90	4	No
17/12/2020	142	10	381205	6311789	<i>Corymbia calophylla</i>	55	5	No
17/12/2020	143	10	381212	6311739	Other	60	4	No
17/12/2020	144	10	381234	6311732	<i>Corymbia calophylla</i>	55	5	No

Date	Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection
17/12/2020	145	10	381208	6311706	<i>Corymbia calophylla</i>	60	5	No
17/12/2020	146	10	381205	6311691	<i>Corymbia calophylla</i>	70	5	No
17/12/2020	147	10	381210	6311664	<i>Corymbia calophylla</i>	55	5	No
17/12/2020	148	10	381224	6311651	<i>Corymbia calophylla</i>	50	5	No
18/12/2020	150	10	381188	6311669	<i>Corymbia calophylla</i>	70	5	No
18/12/2020	151	10	381192	6311683	<i>Corymbia calophylla</i>	75	4	No
18/12/2020	152	10	381185	6311709	<i>Corymbia calophylla</i>	90	5	No
18/12/2020	153	10	381184	6311723	Other	90	4	No
18/12/2020	154	10	381191	6311741	<i>Corymbia calophylla</i>	100	5	No
18/12/2020	155	10	381183	6311751	<i>Eucalyptus marginata</i>	55	5	No
18/12/2020	156	10	381178	6311828	<i>Corymbia calophylla</i>	80	5	No
18/12/2020	158	10	381148	6311947	<i>Corymbia calophylla</i>	60	5	No
18/12/2020	159	10	381172	6312004	<i>Eucalyptus marginata</i>	70	5	No
18/12/2020	160	10	381112	6311905	<i>Corymbia calophylla</i>	80	5	No
18/12/2020	161	10	381111	6311825	<i>Corymbia calophylla</i>	90	4	No
18/12/2020	162	10	381084	6311884	<i>Corymbia calophylla</i>	65	5	No
18/12/2020	163	10	381048	6312039	<i>Eucalyptus marginata</i>	60	5	No
18/12/2020	164	10	381034	6312027	<i>Corymbia calophylla</i>	65	5	No

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Attachment 2

Date	Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection
18/12/2020	165	10	381034	6312024	<i>Eucalyptus marginata</i>	80	5	No
18/12/2020	166	10	381031	6312009	<i>Eucalyptus marginata</i>	80	4	No
18/12/2020	167	10	380997	6312009	<i>Eucalyptus marginata</i>	52	5	No
18/12/2020	169	10	380974	6312007	<i>Eucalyptus marginata</i>	70	5	No
18/12/2020	170	10	380953	6312005	<i>Eucalyptus marginata</i>	60	5	No
18/12/2020	171	10	380965	6311996	<i>Eucalyptus marginata</i>	100	5	No
18/12/2020	172	10	380949	6311993	<i>Eucalyptus marginata</i>	85	5	No
18/12/2020	173	10	380942	6312009	<i>Eucalyptus marginata</i>	55	5	No
18/12/2020	174	10	380938	6312015	<i>Eucalyptus marginata</i>	55	5	No
18/12/2020	175	10	380939	6312009	<i>Eucalyptus marginata</i>	95	5	No
18/12/2020	176	10	380943	6311831	<i>Eucalyptus marginata</i>	57	5	No
18/12/2020	177	10	380945	6311814	<i>Eucalyptus marginata</i>	51	5	No
18/12/2020	178	10	380941	6311807	<i>Eucalyptus marginata</i>	60	5	No
18/12/2020	179	10	380949	6311800	<i>Corymbia calophylla</i>	55	5	No
18/12/2020	180	10	380950	6311798	<i>Corymbia calophylla</i>	60	5	No
18/12/2020	181	10	380944	6311787	<i>Corymbia calophylla</i>	70	4	No
18/12/2020	182	10	380946	6311784	<i>Corymbia calophylla</i>	60	5	No

Date	Tree ID	Lot	Easting	Northing	Tree Species	DBH (cm)	Tree score	Pole Camera Inspection
18/12/2020	183	10	380995	6311711	<i>Corymbia calophylla</i>	60	5	No
18/12/2020	184	10	380996	6311712	<i>Eucalyptus marginata</i>	55	5	No
18/12/2020	185	10	381005	6311725	<i>Eucalyptus marginata</i>	60	4	No
18/12/2020	186	10	381005	6311732	<i>Corymbia calophylla</i>	85	4	No
18/12/2020	187	10	380999	6311745	<i>Corymbia calophylla</i>	80	5	No
18/12/2020	188	10	380996	6311748	<i>Corymbia calophylla</i>	65	5	No

Tree Score	Description
1	Active nest observed; adult (or immature) bird seen entering or emerging from hollow. The rank of 1 is retained if a hollow is known to have been used within the previous three years.
2	Hollow of suitable size and angle (i.e. near-vertical) visible with chew marks around entrance. While it cannot with certainty be assumed that such chew marks were made by a Black-Cockatoo, they indicate activity of a parrot at a hollow potentially suitable for use by Black-Cockatoos.
3	Potentially suitable hollow visible but no chew marks present; or potentially suitable hollow present (as suggested by structure of tree, such as large, vertical trunk broken off at a height of > 10 m).
4	Tree with large hollows or broken branches that might contain large hollows but hollows or potential hollows are not vertical or near-vertical; thus a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by Black-Cockatoos.
5	Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown.
0	Dead or stunted tree meeting the DBH requirement but with no potential to form a suitable hollow at a suitable height

Appendix G – Black Cockatoo Foraging Habitat Assessment

Starting Score	Foraging habitat for Carnaby's Cockatoo	Foraging habitat for Baudin's Cockatoo	Foraging habitat for Forest Red-tailed Black cockatoo	Habitat type						
				1	2	3	4	5	6	7
10 (Very high quality)	Foraging habitat that is being managed for black cockatoos such as habitat that is the focus of successful rehabilitation , and/or has some level of protection from clearing, and/or is quality habitat described below with attributes contributing to meet a score of ≥ 10 .	Foraging habitat that is being managed for black cockatoos such as habitat that is the focus of, successful rehabilitation , and/or has some level of protection from clearing, and/or is quality habitat described below with attributes contributing to meet a score of ≥ 10 .	Foraging habitat that is being managed for black cockatoos such as habitat that is the focus of successful rehabilitation , and/or has some level of protection from clearing, and/or is quality habitat described below with attributes contributing to meet a score of ≥ 10 .	-	-	-	-	-	-	-
7 (High quality)	Native shrubland, kwongan heathland and woodland dominated by proteaceous plant species such as <i>Banksia</i> spp. (including <i>Dryandra</i> spp.), <i>Hakea</i> spp. and <i>Grevillea</i> spp., as well as native eucalypt woodland and forest that contains foraging species, including along roadsides. Does not include orchards, canola, or areas under a RFA.	Native eucalypt woodlands and forest, and proteaceous woodland and heath, particularly marri, including along roadsides. Does not include orchards or areas under a RFA.	Jarrah and marri woodlands and forest, and edges of karri forests, including wandoo and blackbutt, within the range of the subspecies, including along roadsides. Does not include areas under a RFA.	7	7	7	7	-	-	-
5 (Quality)	Pine plantation or introduced eucalypts.	Pine plantation or introduced eucalypts.	Introduced eucalypts as well as the introduced Cape lilac (<i>Melia azedarach</i>).	-	-	-	-	-	-	-

1 (Low quality)	Individual foraging plants or small stand of foraging plants.	Individual foraging plants or small stand of foraging plants.	Individual foraging plants or small stand of foraging plants.	-	-	-	-	1	1	1
Additions	Context adjustor - attributes improving functionality of foraging habitat	Context adjustor - attributes improving functionality of foraging habitat	Context adjustor - attributes improving functionality of foraging habitat							
+3	Is within the Swan Coastal Plain (important foraging area).	Is within the known foraging area (see map).	Jarrah and/or marri show good recruitment (i.e. evidence of young trees).	3	3	3	3	3	3	3
+3	Contains trees with suitable nest hollows.	Contains trees with suitable nest hollows.	Contains trees with suitable nest hollows.	3	-	-	-	-	-	-
+2	Primarily comprises marri.	Primarily comprises marri.	Primarily contains marri and/or jarrah.	2	-	2	2	-	-	-
+2	Contains trees with potential to be used for breeding (dbh ≥ 500 mm or ≥ 300 mm dbh for salmon gum and wandoo).	Contains trees with potential to be used for breeding (dbh ≥ 500 mm or ≥ 300 mm dbh for salmon gum and wandoo).	Contains trees with potential to be used for breeding (dbh ≥ 500 mm or ≥ 300 mm dbh for salmon gum and wandoo).	2	2	2	2	-	-	-
+1	Is known to be a roosting site.	Is known to be a roosting site.	Is known to be a roosting site.	-	-	-	-	-	-	-
Subtractions	Context adjustor - attributes reducing functionality of foraging habitat	Context adjustor - attributes reducing functionality of foraging habitat	Context adjustor - attributes reducing functionality of foraging habitat quality							
-2	No clear evidence of feeding debris.	No clear evidence of feeding debris.	No clear evidence of feeding debris.	-	-	-	-	-2	-2	-2
-2	No other foraging habitat within 6 km.	No other foraging habitat within 6 km.	No other foraging habitat within 6 km.	-	-	-	-	-	-	-
-1	Is > 12 km from a known breeding location.	Is > 12 km from a known breeding location.	Is > 12 km from a known breeding location.	-	-	-	-	-	-	-
-1	Is > 12 km from a known roosting site.	Is > 12 km from a known roosting site.	Is > 12 km from a known roosting site.	-	-	-	-	-	-	-
-1	Is > 2 km from a watering point.	Is > 2 km from a watering point.	Is > 2 km from a watering point.	-	-	-	-	-	-	-

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Attachment 2

-1	Disease present (e.g. <i>Phytophthora cinnamomi</i> or marri canker).	Disease present (e.g. <i>Phytophthora cinnamomi</i> or marri canker).	Disease present (e.g. <i>Phytophthora cinnamomi</i> or marri canker).	-	-	-	-	-	-	-
Total				17	12	14	14	2	2	2

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Group Ecological Survey.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Rev A	Andrew Fry	J Collins	On file	Fionnuala Hannon	On file	18/02/2021

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APPENDIX C – Black Cockatoo Habitat Assessment for Lot 2148

Greg Harewood
Zoologist
PO Box 755
BUNBURY WA 6231
18 May 2021

Cleanaway Solid Waste Pty Ltd
Lot 2 Banksia Rd
DARDANUP WA 6236
E: sally.carlton@cleanaway.com.au

Dear Sally

RE: Habitat Tree Survey - Lot 2148 Ferguson Road – Wellington Forest

The letter report details the results of a black cockatoo breeding habitat survey carried out over Lot 2148 Ferguson Road. Lot 2148 has an area of about 37 hectares (ha) and contains jarrah and marri forest. The area is being considered as an offset for proposed clearing to be undertaken at Cleanaway's Dardanup landfill site.

The aim of the survey was primarily to provide an estimate of the number of black cockatoo breeding habitat trees present within the Lot. The Department of Agriculture, Water and the Environment (DAWE) have defined black cockatoo breeding habitat as any suitable tree species with a Diameter at Breast Height (DBH) of over 50 centimetres (cm) (Commonwealth of Australia 2012). Due to the total size of the survey area and the likely large number of trees involved it was deemed impractical to record all trees present that have a DBH >50cm. Therefore, to estimate the number of trees with a DBH of >50cm present, six 100 metre by 100 metre quadrats (1 ha each) were established across area and the number of trees with a DBH >50cm present counted. These figures were then used to estimate the total number of trees with a DBH >50cm present in the total survey area. The DBH of each tree within each quadrat was estimated using a pre-made 50 cm "caliper".

Comments of the value of the site as foraging and roosting habitat are also provided in addition to the likely presence of other fauna of conservation significance known to frequent the wider area.

The habitat tree survey was carried out by Greg Harewood (Zoologist) and Kurtis Harewood (Field Assistant) on the 19 April 2021.

The result of the habitat tree survey is shown in the attached figure. Based on the results it is estimated that Lot 2148 contains about 1,286 habitat trees (i.e. trees with a DBH >50cm). Most of the trees present appear to be regrowth from historical logging. Given their relatively young age very few appear to contain hollows of any size though exceptions are present and some appear to have large hollows that may represent existing potential black cockatoo breeding trees.



Vegetation across the entire Lot can be considered as representing black cockatoo foraging habitat given the dominance of marri and jarrah. Foraging evidence was observed at several location. This evidence was attributed to either the forest red-tailed black cockatoo (marri, jarrah and blackbutt debris) and Baudin's black cockatoo (marri debris) depending on the nature of the evidence observed.

No evidence of black cockatoos roosting with the Lot was observed however it may be used for this purpose at times.

With represent to overall fauna habitat values and despite the Lots logging history the area appears to contain relatively good fauna habitat which is supplemented by the presence of large areas of similar vegetation directly adjoining.

Based on the habitat present and the current documented distributions the following fauna species of conservation significance are considered as having the potential to be utilise Lot 2148 at times, if only infrequently:

- Baudin's Black Cockatoo – Endangered (WA/Federal);
- Carnaby's Black Cockatoo – Endangered (WA/Federal);
- Forest Red-tailed Black Cockatoo – Vulnerable (WA/Federal);
- Quenda – P4 (DBCA Priority Species);
- Western Brush Wallaby – P4 (DBCA Priority Species); and
- Western False Pipistrelle – P4 (DBCA Priority Species)
- Darling Range Heath Ctenotus – P4 (DBCA Priority Species);
- Peregrine Falcon – Schedule 7 (WA);
- Masked Owl – P3 (DBCA Priority Species);
- South-western Brush-tailed Phascogale - Schedule 6 (WA);
- Chuditch - Vulnerable (WA/Federal);
- Western Ringtail Possum – Critically Endangered (WA/Federal).



If you have any questions or queries relating the information provided here, please contact the undersigned on 0402 141 197 / gharewood@iinet.net.au


Greg Harewood
Zoologist

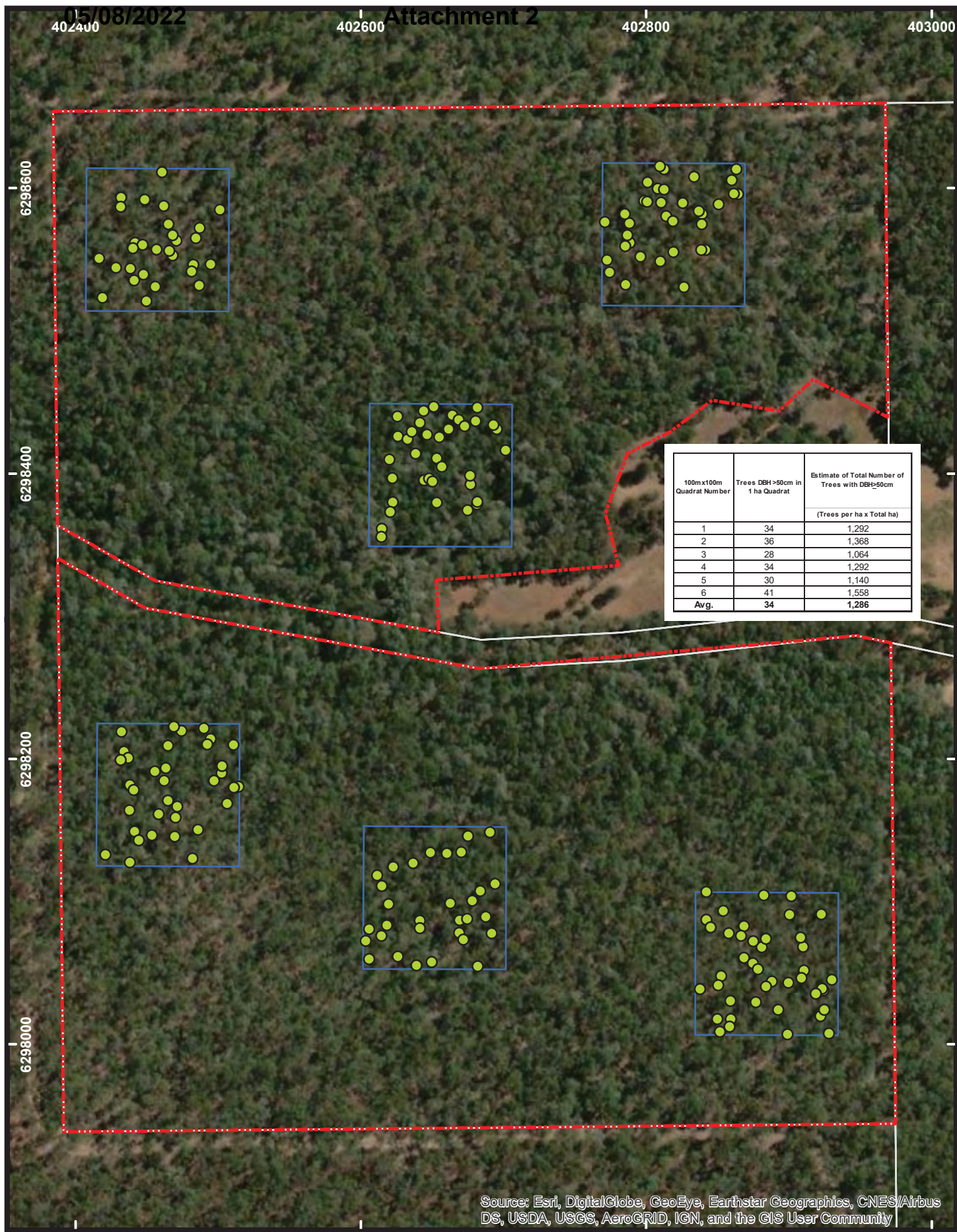


05/08/2022

Attachment 2

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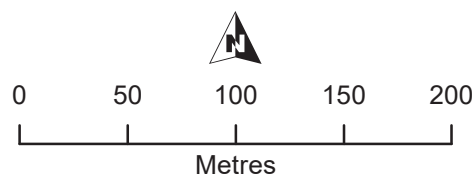
403000



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Offset Area
- Offset Quadrats
- Habitat Trees



Drawn: G. Harewood

Date: April 2021

Scale: 1:3,500

Projection/Coordinate System: UTM/MGA Zone 50

Cleanaway Solid Waste Pty Ltd
Lot 2148 Ferguson Road

Quadrats and Habitat Trees (DBH > 50cm)

Figure: 1

APPENDIX D - EPBC Act Offset Calculations

Matter of National Environmental Significance	
Name	
EPBC Act status	Endangered
Annual probability of extinction <small>Based on IUCN category definitions</small>	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Attachment 2

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	No		Area			
				Quality			
				Total quantum of impact	0.00		
	Threatened species habitat						
	Area of habitat	Yes		Area	16.8	Hectares	
				Quality	7	Scale 0-10	
				Total quantum of impact	11.76	Adjusted hectares	
	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Number of features e.g. Nest hollows, habitat trees	No					
	Condition of habitat Change in habitat condition, but no change in extent	No					
	Threatened species						
	Birth rate e.g. Change in nest success	No					
	Mortality rate e.g. Change in number of road kills per year	No					
	Number of individuals e.g. Individual plants/animals	No					

Offset calculator																					
Offset calculator	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
	Ecological Communities																				
	Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset	0.0	Risk of loss (%) with offset	0.0								
										Future area without offset (adjusted hectares)		Future area with offset (adjusted hectares)									
						Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)									
	Threatened species habitat																				
	Area of habitat	Yes	11.76	Adjusted hectares	Lot 10 Temple Road, East Picton	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	5.22	Risk of loss (%) without offset	30%	Risk of loss (%) with offset	5%	1.31	95%	1.24	0.98	1.12	9.56%	No	
										Future area without offset (adjusted hectares)	3.7	Future area with offset (adjusted hectares)	5.0								
						Time until ecological benefit	1	Start quality (scale of 0-10)	8	Future quality without offset (scale of 0-10)	7	Future quality with offset (scale of 0-10)	8	1.00	95%	0.95	0.94				
	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value		Future value without offset		Future value with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
	Number of features e.g. Nest hollows, habitat trees	No																			
	Condition of habitat Change in habitat condition, but no change in extent	No																			
	Threatened species																				
	Birth rate e.g. Change in nest success	No																			
	Mortality rate e.g Change in number of road kills per year	No																			
	Number of individuals e.g. Individual plants/animals	No																			

Summary							
Summary	Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost (\$)	
						Direct offset (\$)	Other compensatory measures (\$)
	Birth rate	0				\$0.00	\$0.00
	Mortality rate	0				\$0.00	\$0.00
	Number of individuals	0				\$0.00	\$0.00
	Number of features	0				\$0.00	\$0.00
	Condition of habitat	0				\$0.00	\$0.00
	Area of habitat	11.76	1.12	9.56%	No	\$0.00	#DIV/0!
	Area of community	0				\$0.00	\$0.00
						\$0.00	#DIV/0!

Matter of National Environmental Significance	
Name	
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Attachment 2

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	No		Area			
				Quality			
				Total quantum of impact	0.00		
	Threatened species habitat						
	Area of habitat	Yes		Area	16.8	Hectares	
				Quality	7	Scale 0-10	
				Total quantum of impact	11.76	Adjusted hectares	
	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Number of features e.g. Nest hollows, habitat trees	No					
	Condition of habitat Change in habitat condition, but no change in extent	No					
	Threatened species						
	Birth rate e.g. Change in nest success	No					
	Mortality rate e.g. Change in number of road kills per year	No					
	Number of individuals e.g. Individual plants/animals	No					

Offset calculator																							
Offset calculator	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
	Ecological Communities																						
	Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset											
										Future area without offset (adjusted hectares)		0.0											Future area with offset (adjusted hectares)
						Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)											
	Threatened species habitat																						
	Area of habitat	Yes	11.76	Adjusted hectares	Onsite offset (vegetation buffer)	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	7.86	Risk of loss (%) without offset	40%	Risk of loss (%) with offset	5%	2.75	95%	2.61	2.06	2.53	21.53%	No			
										Future area without offset (adjusted hectares)	4.7	Future area with offset (adjusted hectares)	7.5										
						Time until ecological benefit	1	Start quality (scale of 0-10)	7	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	8	2.00	95%	1.90	1.88						
	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start value		Future value without offset		Future value with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value		% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
Number of features e.g. Nest hollows, habitat trees	No																						
Condition of habitat Change in habitat condition, but no change in extent	No																						
Threatened species																							
Birth rate e.g. Change in nest success	No																						
Mortality rate e.g Change in number of road kills per year	No																						
Number of individuals e.g. Individual plants/animals	No																						

Offset guide

05/08/2022

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*

2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Attachment 2

Impact calculator							
Impact calculator	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Ecological communities						
	Area of community	No		Area			
				Quality			
				Total quantum of impact	0.00		
	Threatened species habitat						
	Area of habitat	Yes		Area	16.8	Hectares	
				Quality	7	Scale 0-10	
				Total quantum of impact	11.76	Adjusted hectares	
	Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
	Number of features e.g. Nest hollows, habitat trees	No					
	Condition of habitat Change in habitat condition, but no change in extent	No					
	Threatened species						
	Birth rate e.g. Change in nest success	No					
	Mortality rate e.g. Change in number of road kills per year	No					
	Number of individuals e.g. Individual plants/animals	No					

Offset calculator																						
Offset calculator	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
	Ecological Communities																					
	Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)			Risk of loss (%) without offset		Risk of loss (%) with offset									
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0										
						Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)										
	Threatened species habitat																					
	Area of habitat	Yes	11.76	Adjusted hectares	Lot 2148 Ferguson Road	Time over which loss is averted (max. 20 years)	20	Start area (hectares)		38	Risk of loss (%) without offset	30%	Risk of loss (%) with offset	5%								
									Future area without offset (adjusted hectares)	26.6	Future area with offset (adjusted hectares)	36.1	9.50	95%	9.03	7.11						
						Time until ecological benefit	1	Start quality (scale of 0-10)	8	Future quality without offset (scale of 0-10)	7	Future quality with offset (scale of 0-10)	8	1.00	95%	0.95	0.94					
	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start value		Future value without offset		Future value with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source	
Number of features e.g. Nest hollows, habitat trees	No																					
Condition of habitat Change in habitat condition, but no change in extent	No																					
Threatened species																						
Birth rate e.g. Change in nest success	No																					
Mortality rate e.g. Change in number of road kills per year	No																					
Number of individuals e.g. Individual plants/animals	No																					

Carnaby's Black Cockatoo

EPBC Act Status: Endangered Annual Probability of Extinction: 1.2%

Impact Calculator					
Protected Matter Attributes	Attribute Relevant to Case	Description	Quantum of Impact		Information Source
Threatened Species Habitat					
Area of habitat	Yes	16.8 ha of remnant vegetation will be cleared.	Area	16.8 ha	Quality is based on the following: <u>Site condition:</u> Vegetation condition within Lot 2 ranged from ‘degraded’ to ‘very good to excellent’ for the majority of the vegetated area (Astron 2014). For Lot 81, the habitat quality was identified as being ‘good’ to ‘very good’ (Harewood 2015). A rating of 7 is provided. <u>Site context:</u> The clearing footprint does provide suitable foraging habitat for Carnaby’s Cockatoo which is supported by evidence of foraging obtained during recent surveys (Astron 2014 and Harewood 2015). While no breeding was recorded within the clearing footprint, it is located within the breeding range for the species and potential habitat trees suitable for black cockatoos have been identified (Harewood 2015 and Astron 2014). However, extensive areas of preferential foraging, nesting and roosting habitat are available adjacent to the clearing footprint, indicating that the subject site is likely to be of limited significance for the species. The current ongoing threat associated with the degradation of the subject site is the current land use (waste facility). A rating of 5 is provided. <u>Species Stocking Rate:</u> Evidence of the species foraging within the clearing footprint has been recorded (Astron 2014 and Harewood 2015) however, no breeding was recorded within the clearing footprint. The species stocking rate is unlikely to be high (given that availability of more suitable habitat nearby), however the species has the potential to occur in the area in low numbers. A rating of 6 is provided. <u>References:</u> Harewood 2015. <i>Fauna Assessment – Lot Banksia Road, Dardanup</i> . Unpublished. Astron 2014, <i>Banksia Road Dardanup Level 2 Vegetation and Flora Survey and Level 1 Fauna Assessment</i> Unpublished.
			Quality	7.0	
			Total Quantum of Impact	11.76 ha	

OFFSETS RATIONALE

Offset Area Rationale – 5.22 ha Offset Site		
Component	Value	Rationale
Time over which loss is averted	20	Provision of offset for protection in perpetuity.
Time until ecological benefit	1	Ecological benefit would be realised immediately as a direct offset would be provided.
Start quality	8	Quality is based on the following: <u>Site condition:</u> 'Very High' quality foraging habitat for Habitats 1, 2 and 4 contained within offset area. In addition, along surveyed transects (not within the entire area), 51 potential black cockatoo habitat trees were identified within the proposed offset area (GHD 2021). <u>Site context:</u> The offset site provides preferential foraging and potential breeding habitat for the species in a highly cleared landscape. The current ongoing threat associated with the degradation of the Lot 10 is land development. <u>Species Stocking Rate:</u> The offset site does provide a high density of foraging resources (given the prevalence of Banksia spp.) hence 'Very High' quality foraging habitat rating.
Risk of loss without offset	30%	The site is currently zoned "Rural" under the Greater Bunbury Region Scheme and "General Farming" pursuant to the Town Planning Scheme (TPS) No. 3. Without management activities the current land use increases the risk of damage to the site through grazing and weed incursion. Other potential risks to the site if left unmanaged include unsympathetic fire regimes and rural activities. These degrading processes will be expected to continue over time leading to progressive loss of habitat value and foraging.
Future quality without offset	7	With no active management (e.g. fire, weeds, grazing and expanding rural activities) the future quality of the site is likely to be reduced.
Risk of loss with offset	5%	Formal protection of the offset site will ensure that the risk of loss is minimised as much as possible.
Future quality with offset	8	Formal protection of the offset will ensure that the quality is maintained.
Confidence in Result	95%	A value of 95% has been selected as there is a very high probability that the introduction of a conservation covenant over the offset site would lead to the maintenance of the existing quality of habitat, and habitat quality would otherwise continue to decline over time without such protection.

Offset Area Rationale – 38 ha Offsite Vegetation Retention		
Component	Value	Rationale
Time over which loss is averted	20	Provision of offset for protection in perpetuity.
Time until ecological benefit	1	Ecological benefit would be realised immediately as a direct offset would be provided.
Start quality	8	Quality is based on the following: <u>Site condition:</u> This area is primarily in a 'Very Good' to 'Excellent' condition and is comprised of mature marri-jarrah forest. <u>Site context:</u> This area of remnant vegetation is likely to provide very high value habitat for Carnaby's. The current ongoing threat associated with the degradation of the site is rural activities. <u>Species Stocking Rate:</u> This vegetation is likely to have a very high capacity to support Carnaby's for foraging and breeding.
Risk of loss without offset	30%	The site is currently zoned "Rural" under the Greater Bunbury Region Scheme and "General Farming" pursuant to the Town Planning Scheme (TPS) No. 3. Without management activities the current land use increases the risk of damage to the site through grazing and weed incursion. Other potential risks to the site if left unmanaged include unsympathetic fire regimes and possible rural activities. These degrading processes will be expected to continue over time leading to progressive loss of habitat value and foraging.
Future quality without offset	7	With no active management (e.g. fire, weeds, grazing and expanding rural activities) the future quality of the site is likely to be significantly reduced. If grazing livestock is introduced into the vegetated areas this will substantially impact the quality of habitat.
Risk of loss with offset	5%	Formal protection of the offset site will ensure that the risk of loss is minimised as much as possible.
Future quality with offset	8	Formal protection of the offset will ensure that the quality is maintained.
Confidence in result	95%	A value of 95% has been selected as there is a very high probability that the introduction of a conservation covenant over the offset site would lead to the maintenance of the existing quality of habitat, and habitat quality would otherwise continue to decline over time without such protection.

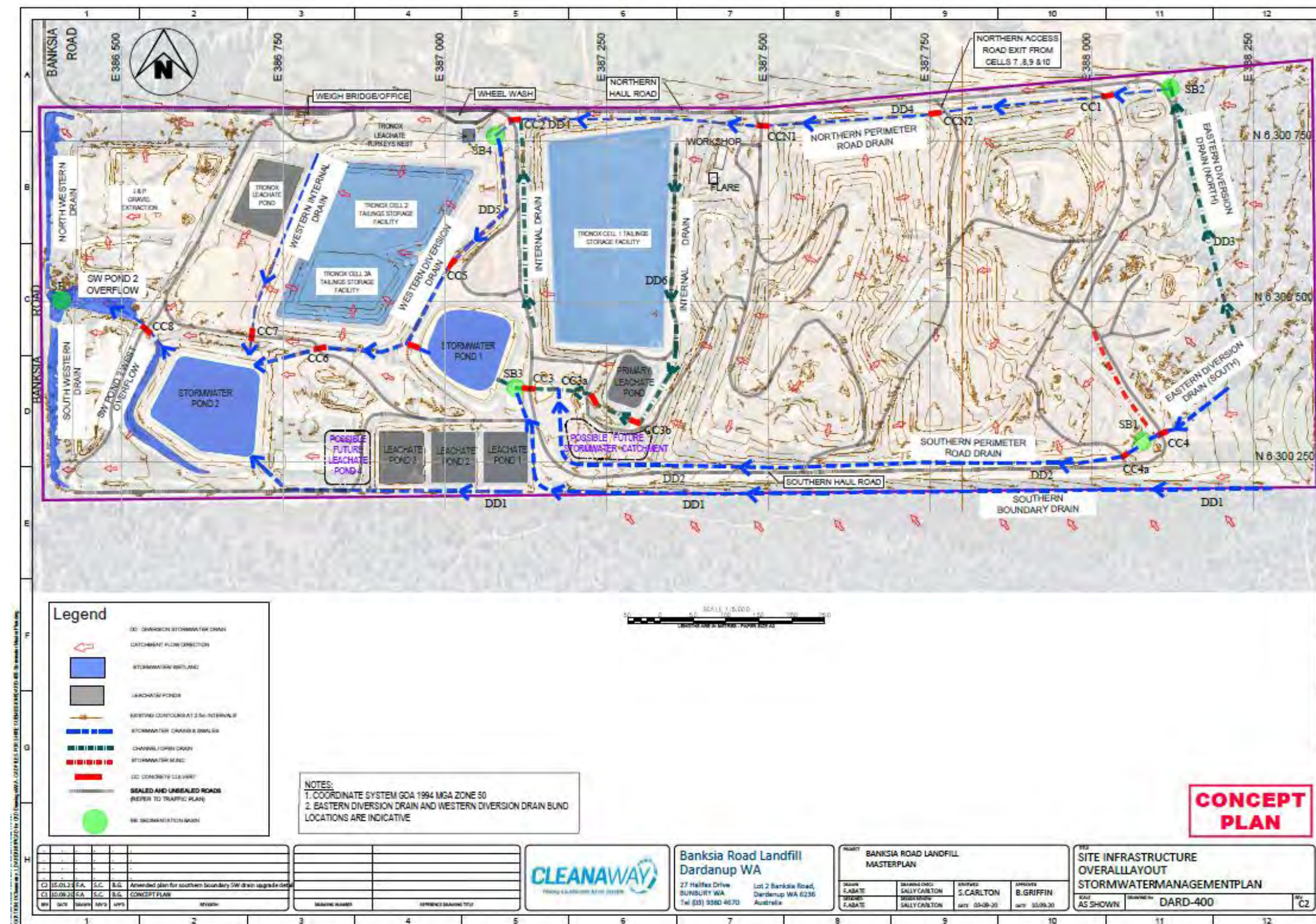
Offset Area Rationale – 7.86 ha Onsite Vegetation Retention		
Component	Value	Rationale
Time over which loss is averted	20	Provision of offset for protection in perpetuity.
Time until ecological benefit	1	Ecological benefit would be realised immediately as a direct offset would be provided.
Start quality	7	<u>Site condition:</u> Vegetation condition within Lot 2 ranged from 'degraded' to 'very good to excellent' and 'very good' for the majority of the vegetated area (Astron 2014). For Lot 81, the habitat quality was identified as being 'good' to 'very good' (Harewood 2015). <u>Site context:</u> The clearing footprint does provide suitable foraging habitat for Carnaby's Cockatoo which is supported by evidence of foraging obtained during recent surveys (Astron 2014 and Harewood 2015). While no breeding was recorded within the clearing footprint, it is located within the breeding range for the species and potential habitat trees suitable for black cockatoos have been identified (Harewood 2015 and Astron 2014). However, extensive areas of preferential foraging, nesting and roosting habitat are available adjacent to the clearing footprint, indicating that the subject site is likely to be of limited significance for the species. The current ongoing threat associated with the degradation of the subject site is anthropogenic disturbances. <u>Species Stocking Rate:</u> Evidence of the species foraging within the clearing footprint has been recorded (Astron 2014 and Harewood 2015) however, no breeding was recorded within the clearing footprint. The species stocking rate is unlikely to be high (given that availability of more suitable habitat nearby), however the species has the potential to occur in the area in low numbers.
Risk of loss without offset	40%	The vegetation buffer is zoned "Rural" under the Greater Bunbury Region Scheme and "General Farming" pursuant to the Town Planning Scheme (TPS) No. 3. In accordance with the Shire of Dardanup's Local Planning Strategy, it is zoned 'Waste Disposal/Processing'. Accordingly, without protection this vegetation would likely be subject to clearing to accommodate the expansion of the current waste facility which is supported by Plans submitted to the Shire of Dardanup. A report commissioned by the Shire of Dardanup which involved community and government agency engagement determined that suitable land uses for Lot 81 and Lot 2 included waste storage facility, waste disposal facility and Industry – Extractive (Urbaqua 2020). This determination was made in consideration of environmental, planning and social impacts with consultation undertaken between the Department of Planning, Land and Heritage (DPLH), Department of Water and Environmental Regulation (DWER) and Department of Biodiversity, Conservation and Attractions (DBCA).
Future quality without offset	6	Without formal protection, it is likely that this area will be developed for the proposed land used (i.e. waste facility).

Risk of loss with offset	5%	Formal protection of the offset site will ensure that the risk of loss is minimised as much as possible.
Future quality with offset	8	Management measures will be implemented to improve the current condition of this vegetation. This will involve access control (fencing to prohibit vehicles and foxes), weed control and revegetation in disturbed areas. These management measures will be documented within the EMP. This value is consistent with previously approved values for areas where it is proposed to improve the condition of vegetation.
Confidence in result	95%	A value of 95% has been selected as there is a very high probability that the introduction of a conservation covenant over the offset site would lead to the maintenance of the existing quality of habitat, and habitat quality would otherwise continue to decline over time without such protection.

APPENDIX O | Stormwater Management Plan

Schedule 3: Plans

Plan 1: Proposed stormwater management layout



05/08/2022

Attachment 2.1

Our Ref: 22910

29 July 2022

Planning Officer- Shire of Dardanup
PO Box 7016
Eaton WA 6232

Dear Planning Officer,

RE: JDAP Application for Extractive Industry

This correspondence relates to the submitted JDAP application for an Extractive Industry at Lot 2 Banksia Road, Crooked Brook. It is understood that the Shire requires further information to progress this application.

The requested further information has been provided in the attached Further Information document, dated 27 July 2022. To complement this document, three modified plans have also been enclosed with this letter, being plan 22910-04B (to be considered as Appendix H), plan 22910-03C (to be considered as Appendix I), and plan titled 'Site Infrastructure Overall Layout Stormwater Management Plan' (to be considered as Appendix O).

I trust this responds to your queries. Should you require any further any further information, please feel welcome to be in contact with the undersigned.

Yours sincerely



Mikaela Kerwin
Planner
Harley Dykstra Pty Ltd

E-mail: mikaelak@HarleyDykstra.com.au

Encl:
Further Information Document
Plan 22910-03C
Plan 22910-04B
Plan titled Site Infrastructure Overall Layout Stormwater Management Plan

ADDITIONAL INFORMATION

27 July 2022

This document has been prepared in response to the Shire of Dardanup's request for further information relating to the JDAP application for an Extractive Industry at Lot 2 Banksia Road, Crooked Brook.

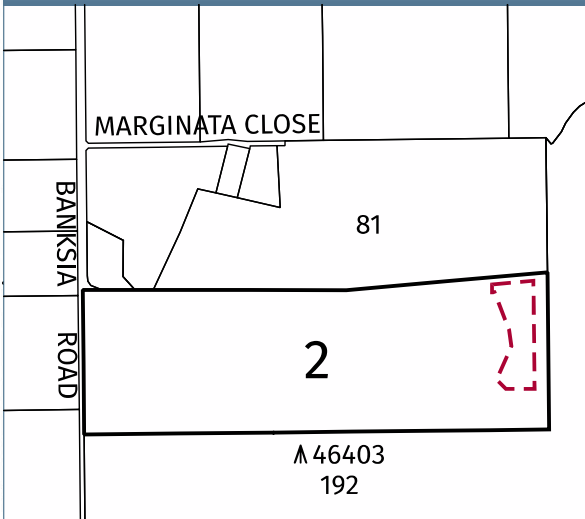
Inconsistency	Clarification
Appendix N (page 6) states ' <i>No stockpiling of topsoil or other material is to occur outside of the clearing boundary.</i> '	The final paragraph of Part 3 (page 8) of the planning report shall prevail, and stockpiling of some material will occur outside of the clearing boundary, as indicated on the Excavation Site Plan.
Appendix D states ' <i>...once compacted and crushed...</i> '	Part 3.1.1 of the planning report shall prevail, which states that no crushing or screening is proposed as part of this application.
Appendix F states ' <i>stockpiles of topsoil will be subject to suitable stabilisation techniques based on environmental conditions e.g. watering or seeded mulching.</i> ' Further, Section 3.2.1 (topsoil management) identifies hydroseeding of the stockpile is to occur.	Part 3.2.1 (stockpile management) of the planning report shall prevail, whereby stockpiles are to subject to suitable stabilisation techniques by way of hydro mulching.
Further information in terms of stormwater management.	Confirmation from IW Projects has found that the existing stormwater system has the capacity to accommodate the proposed development. Water will follow existing drainage paths to the stormwater basins at the western side of the lot. Appendix O demonstrates the existing stormwater infrastructure at the site. This infrastructure is capable of hosting the proposed development. Eastern diversion drain (north) and eastern diversion drain (south) will be re-routed to follow the stormwater diversion bund demonstrated in plan 22910-04B.

Appendix B and Appendix N make reference to inconsistent clearing footprints. Appendix B refers to 7.1ha of clearing, while Appendix N refers to 6.06ha of clearing.	Part 4.3.1 of the planning report states that 5.95ha of vegetation is to be cleared to accommodate the proposed development. This area is to prevail.
Appendix F makes reference to ' <i>clearing vegetation and excavating material for reuse in advance of the construction of new landfill cells</i> '.	<p>This application does not relate to the construction of new landfill cells. The report at Appendix F was initially prepared to complement application for new landfill cells, however this is not the purpose of this application.</p> <p>The findings of this report are critical for the proposed development, and therefore this report has been included with this Extractive Industry application.</p>

This further information response is complemented by plan 22910-04B, which is to replace 22910-04A (Appendix H), and plan 22910-03C, which is to replace plan 22910-03B (Appendix I). Finally, this plan is complemented by plan titled 'Site Infrastructure Overall Layout Stormwater Management Plan' (to be considered as Appendix O).

05/08/2022

LOCATION MAP



LEGEND

- Extractive Industry Footprint (5.95ha)
- Toe Line (1:6 Batter)
- Hydro-mulched Area
- Revegetation Area
- Existing Contours
- Proposed Contours
- Stormwater Diversion Bund
- Drain

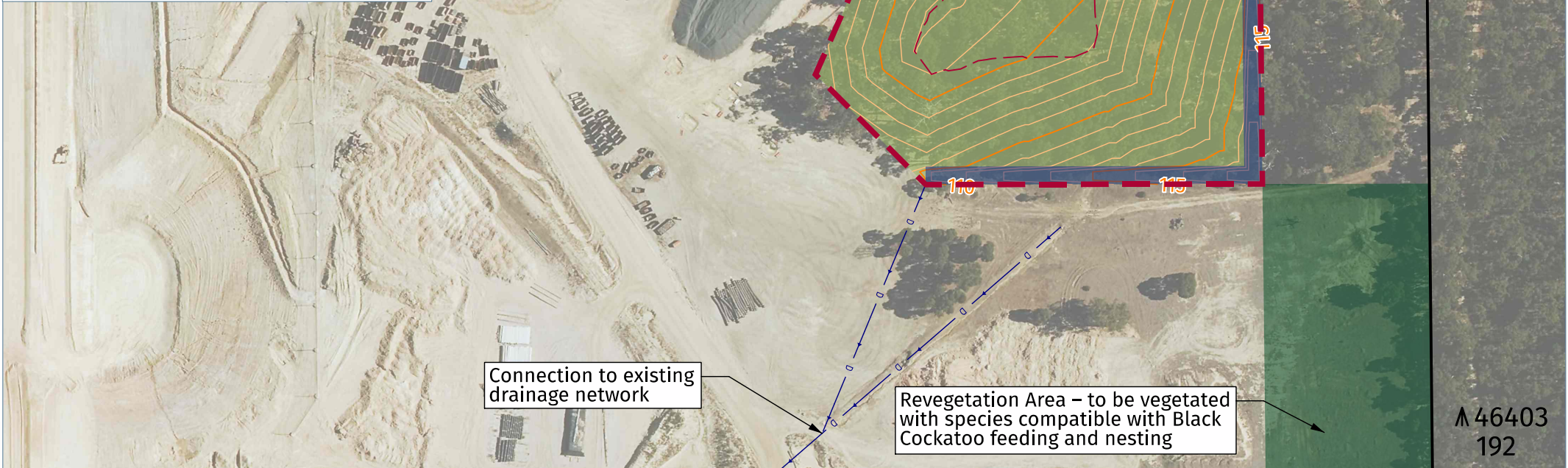
NOTES

PERSONS RESPONSIBLE

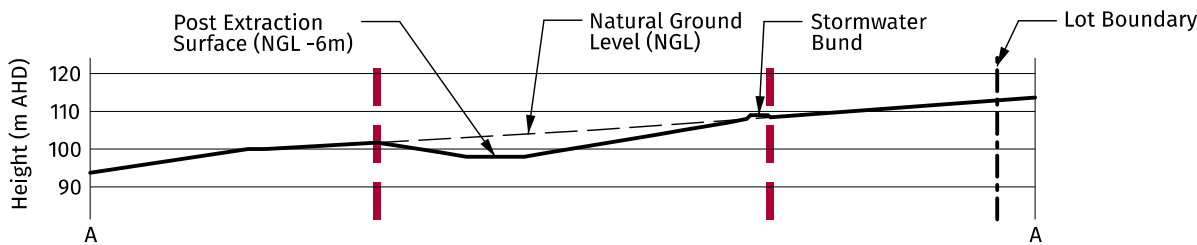
Sally Carlton
Engineering Manager
Cleanaway Pty Ltd
0401 222 508
sally.carlton@cleanaway.com.au

REHABILITATION

- All batters no greater than 1 in 6.
- Final contours as per this plan.
- Finished extraction to have 100mm soil and hydro-mulch with perennial rye grass.
- Rehabilitation to occur progressively as stages are excavated and typically in the same order as the extraction. As each stage is excavated and the next is commenced, then rehabilitation is to follow.
- No provision for fencing of rehabbed areas unless required for other purposes.
- Works to achieve final contours are to be completed within 6 months of the extractive industry use being finalised.
- Hydromulch seeding of the extraction site is to be completed within 12 months of the extractive industry being finalised.
- Seeded areas are to be watered at least every fortnight for the first 3 months from seeding.



CROSS SECTION



REHABILITATION PLAN

Lot 2 on Diagram 65891 Banksia Road,
CROOKED BROOK

Plan No. | 22910-04
Date | 29/07/22
Drawn | NP
Checked | MK
Revision | B

BUNBURY OFFICE:
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BUNBURY WA 6230
T: 08 9792 6000
E: bunbury@harleydykstra.com.au
W: www.harleydykstra.com.au

ALBANY | BUNBURY | BUSSELTON | FORRESTDALE | PERTH

Scale | 1:2000@A3

0 20m 40m 60m

NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey

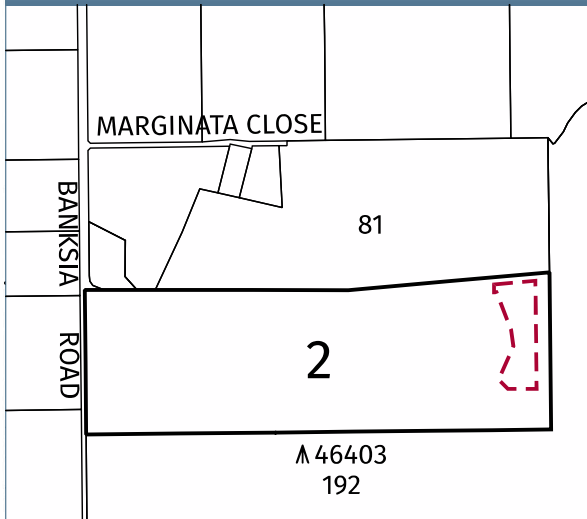
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Harley Dykstra
PLANNING & SURVEY SOLUTIONS

05/08/2022

LOCATION MAP

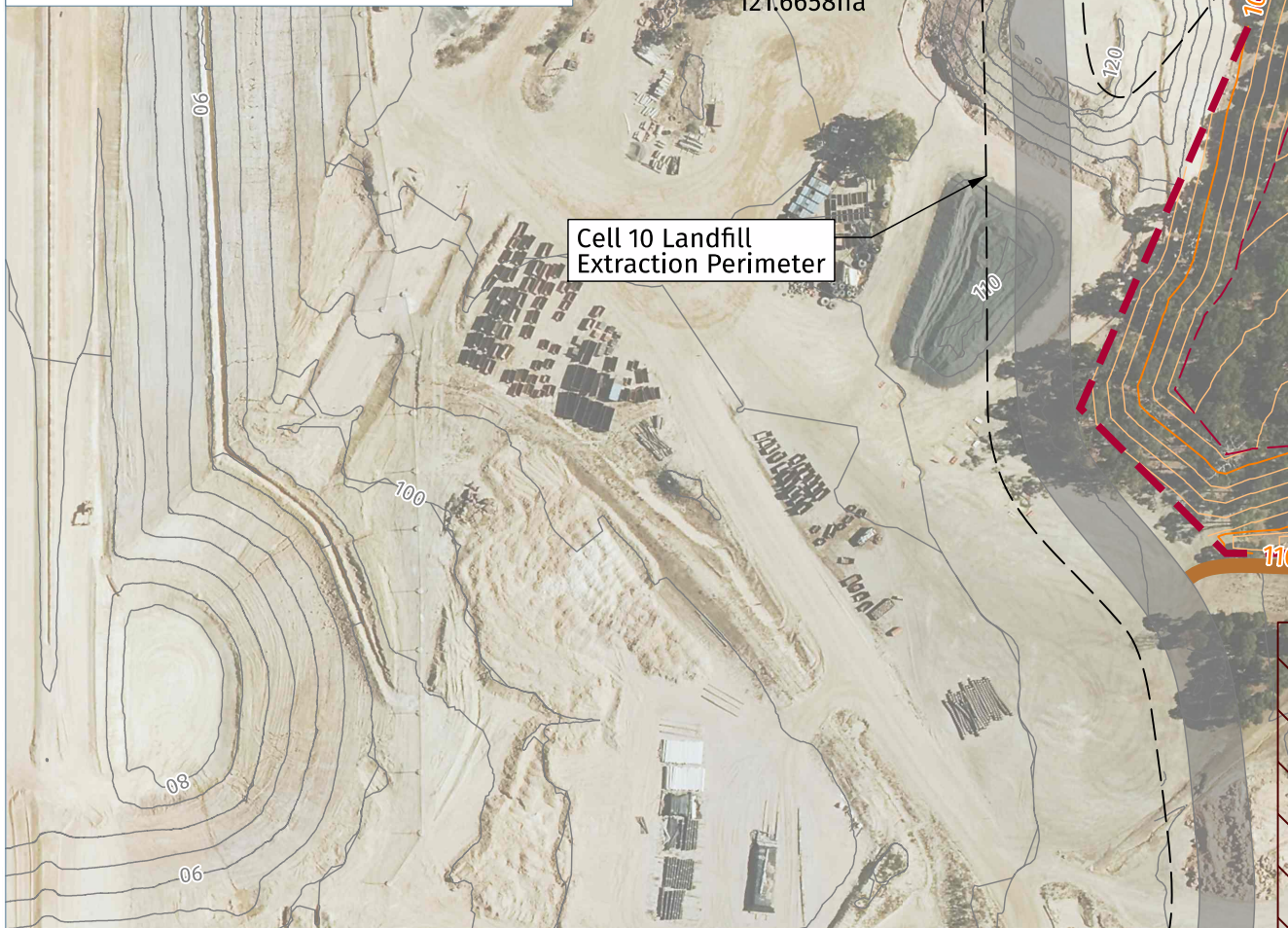


LEGEND

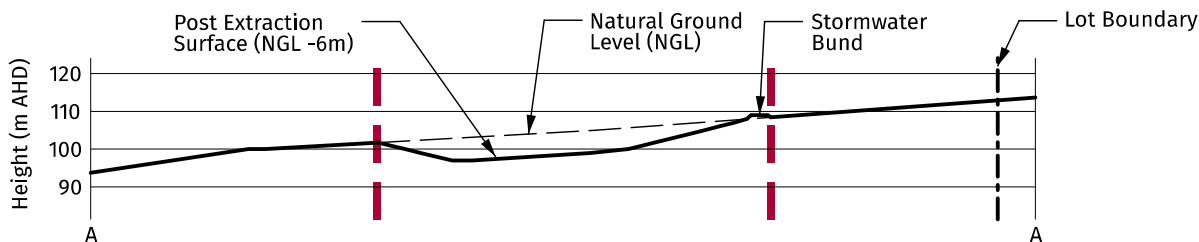
- Extractive Industry Footprint (5.95ha)
- Toe Line (1:4 Batter)
- Landfill Cell
- Top Soil Stockpile
- Mulched Vegetation Stockpile
- Temporary Excess Material Stockpile
- Excess Material Stockpile
- Existing Contours
- Proposed Contours
- Stormwater Diversion Bund
- Future Landfill Perimeter Road
- Internal Road (10m wide)

NOTES:

- Excess material stockpiles to be exhausted within 18 months from the completion of extraction activities
- Temporary excess material stockpiles are to be exhausted before extraction activities finish



CROSS SECTION



EXCAVATION SITE PLAN

Lot 2 on Diagram 65891 Banksia Road,
CROOKED BROOK

Plan No. | 22910-03
Date | 29/07/22
Drawn | NP
Checked | MK
Revision | C

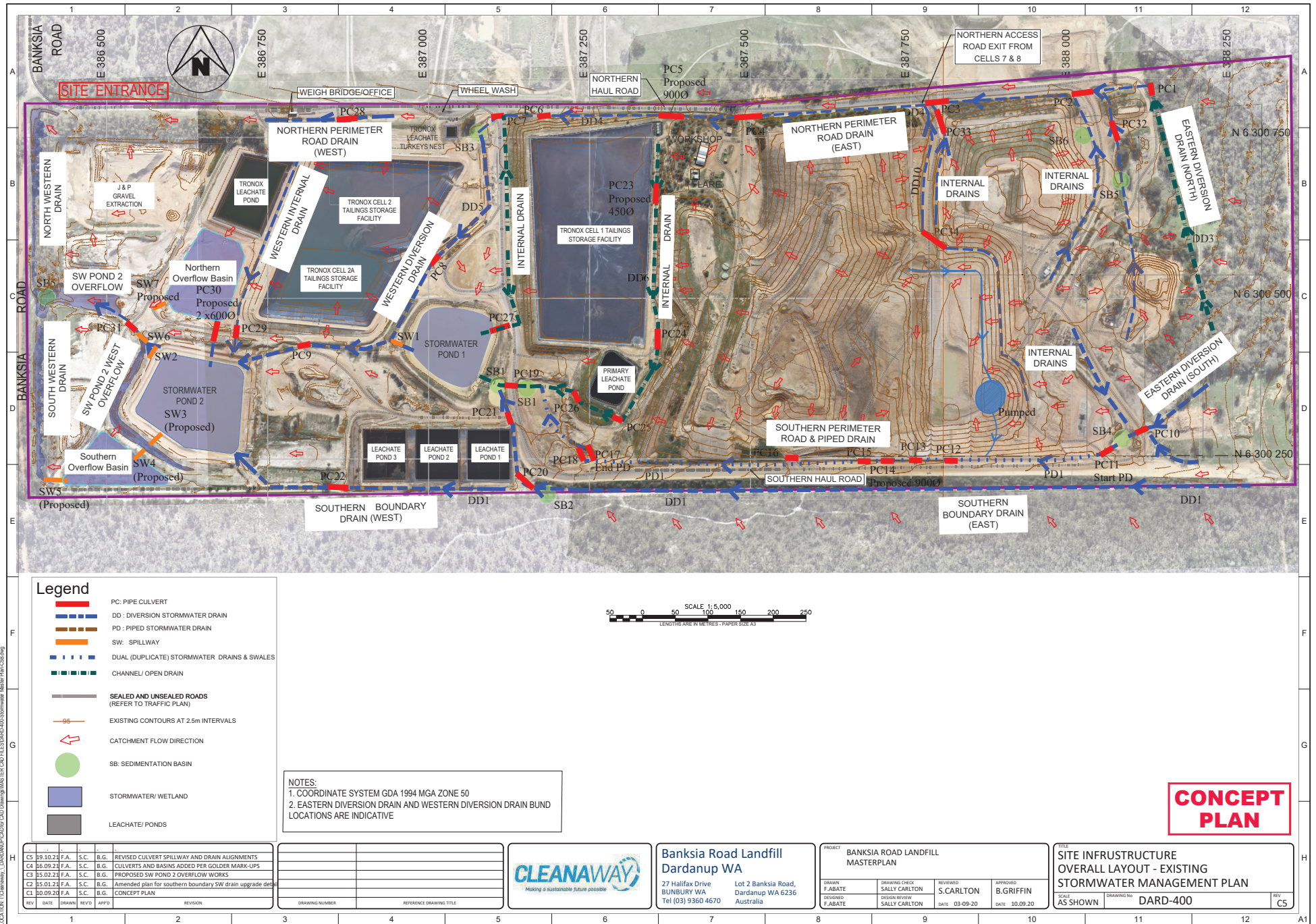
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Scale | 1:2000@A3

0 20m 40m 60m

NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey



Applicant response to further information request

16 November 2022

This document has been prepared in response to the Shire of Dardanup's request for further information dated 6th October 2022 in relation to the JDAP Application for Extractive Industry at Lot 2 Banksia Road, Crooked Brook.

<i>Information required</i>	<i>Applicant response</i>
<i>Confirmation of the intended use of the materials to be extracted and how this relates to the existing approved waste cells or whether extraction should be staged if materials are to be used in cells that have not been approved yet.</i>	<p>The extracted materials will be used in different manners, dependent on their composition.</p> <p>Sand Sand will be used on the landfill face as an all-weather trafficable surface.</p> <p>Gravel Gravel will be used:</p> <ul style="list-style-type: none"> - On landfill roading, - Off landfill roading, on the internal road networks, - On larger gravel to be used in stormwater drains for erosion control and mitigation. <p>Version 7 of the Accendo report clarifies that the purpose of the clearing permit application & the JDAP is for extraction purposes. This revised version has been distributed to DWER for consideration, and is enclosed with this response.</p>
<i>In principle approval from DWER for the clearing permit based on the end use being an extractive industry and not landfill.</i>	<p>Correct, the relevant approvals are currently being obtained from DWER.</p> <p>Please know that the application with DWER is progressing, and updated calculations have been distributed to DWER for their consideration. These calculations have been developed alongside DWER.</p> <p>Advice from the environmental consultant suggests that DWER's collaboration on this project is a positive sign for the outcome of the application, and should be considered in principle approval. The attached offset calculations have been prepared by DWER, and is evidence of their collaboration on this project. Please know the document quality is as distributed by DWER.</p>
<i>DWER requirement for rehabilitation (back to pasture or native vegetation), this will be based on the end use.</i>	At completion of the extractive industry, the site is to be rehabilitated to pasture. This is consistent with the zoning at the site.
<i>Whether the vegetation where stockpiles are</i>	Vegetation demonstrated in the stockpile area is included within the clearing permit application. Revised clearing permit plan is included with this response to further information.

<i>proposed would need a clearing permit as well.</i>	This plan demonstrates that the vegetation strip to be retained along the northern boundary of the site is now 50m wide, rather than the previously proposed 15m. This change has resulted from consultation with DWER.
<i>Confirmation of size and area to be cleared on Lot 2 as differing area sizes are mentioned in the supporting documentation.</i>	As the clearing application is concurrently being assessed by DWER, this footprint is undergoing an iterative process. Revised clearing footprint is shown in the attached plan, which achieves all requirements of DWER. This demonstrates a clearing footprint of 6.6066ha.
<i>Timeframes for the clearing of vegetation.</i>	Vegetation is to be cleared in three stages. This the demonstrated on the attached plan. Each stage of clearing is expected to take a maximum of two weeks.
<i>The application states that vegetation will be transported off-site to a sawmill supplier and also for firewood purposes. There is no indication of the traffic generation associated with taking the vegetation off-site.</i>	The removal of vegetation from the site is expected to generate a maximum of twelve (12) additional vehicle movements over the duration of the three stages of clearing. This has been calculated by taking the volume of logwood (400m ³), finding out the weight of the logwood (787.75kg/m ³) which totals 315.1t, and then dividing this by the weight capacity of each type of vehicle (42t for semi-trailer). This calculation finds that only eight (8) vehicle movements will be required, however for conservative purposes an assumption of 12 is being used. If larger vehicles are used, less vehicle trips will be generated.
<i>Information is lacking on the noise associated with the vegetation removal and the chipping equipment to be used.</i>	The following is advice has been provided by Herring Storer Acoustics. <i>The clearing would be classified under "Construction" activities. Therefore, under the Regulations, noise would not need to meet the assigned noise levels if the construction activities are carried out between 07:00 and 17:00 hours weekdays and Saturdays.</i> <i>If the construction activities are carried out outside of these times, they can still be exempt, provided an Out of Hours Construction Noise Management Plan (OHCNMP) is developed and approved by the CEO of the LGA (Shire Dardanup).</i> All clearing will be undertaken between 07:00 and 17:00 weekdays and Saturdays.
<i>Information to quantify water requirements for all aspects of the proposed extraction and evidence of secure water source.</i>	Water required for the proposed extraction is associated with dust mitigation measures. The DMP prescribes that dust omitted from stockpiles will be managed either by watering or seeded mulching. Should water cart be used, this would generally be a 20kL water cart. Recent approval in relation to Lot 2 has resulted in the current volume of water able to be stored at the site being increased by 82,500m ³ of water in the South West Pond 2 as the storm water capacity created outside the pond.

Attachment 2.2

	Therefore, this water quantity has capacity to fill 4,125, 20k water carts. This is considered enough capacity to accommodate both the existing water requirements as well as the proposed extractive industry.
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ATTACHMENT 1

DWER Offset Calculations

Attachment 2.2

7

Attachment A: Preliminary offset calculations and comments on rationale

Direct Offset 1: Lot 10 Temple Road

calculator

Impact calculator					
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source
Ecological communities					
Area of community <div>Clear row</div>	No		Area		
			Quality		
			Total quantum of impact	0.00	
Threatened species habitat					
Area of habitat <div>Clear row</div>	No		Area	16.81	
			Quality	7	
			Total quantum of impact	11.77	
Atrian (2014) Accenda (2020) Harwood (2015) Harwood (2021) Harwood (2021) GHD (2021) DWER Site visit (2)					

calculator

Offset calculator																		
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset					
Ecological Communities																		
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Risk of loss (%) with offset	0.0	0.0								
					Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset	Future quality with offset										
Threatened species habitat																		
Area of habitat	Yes	11.77	Adjusted hectare	Land acquisition: Lot 10 Temple Road, East Pictou	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	5.22	Risk of loss (%) without offset	20%	Risk of loss (%) with offset	10%	0.52	90%	0.47	0.37	0.26	2.20%
					Future area without offset (adjusted)	4.2	Future area with offset (adjusted)	4.7										
					Time until ecological benefit	1	Start quality (scale of 0-10)	7	Future quality without offset	7	Future quality with offset	7	0.00	90%	0.00	0.00		

Lot 10 Temple Road	Accendo	DWER	Comments
ACQUISITION	5.22ha	✓	
IUCN Criteria	EN	✓	Black cockatoo foraging and breeding habitat
Area of impact	16.8	✓	
Quality of impacted area	7	✓	Harewood (Quality foraging habitat)
Time over which loss is averted	20	✓	
Time until ecological benefit	1	✓	
Start area	5.22ha	✓	
Start quality	8	7(?)	Foraging: The area (ha) of <i>M. raphiophylla</i> unit (no foraging value) in the offset area has not been calculated. Breeding: 18 potential black cockatoo habitat trees
Future quality without offset	7	7	Canopy foraging habitat or breeding habitat is not expected to decline over time
Future quality with offset	8	7	No management intervention prescribed - No increase in foraging value is expected
Risk of loss (%) without offset	30%	20%	Risk of loss (%) associated with land zoned rural is 20%
Risk of loss (%) with offset	5%	10%	Risk of loss (%) associated with conservation covenant is 10%
Confidence in result (%)	95%	90%	Standard percentage - Moderately high level of confidence that offset will mitigate future risks to the site
Confidence in result (%)	95%	90%	Standard percentage - Moderately high level of confidence that the offset site would remain in at its current quality if protected in perpetuity
% of impact offset	9.56%	2.20%	

Attachment 2.2

8

Direct Offset 2: Lot 2148 Ferguson Road

Impact calculator							Offset calculator																	
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source		Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset				
Ecological communities							Ecological Communities																	
Area of community <div>Clear row</div>	No		Area				Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Risk of loss (%) with offset	0.0	0.0							
			Quality											Future area without offset (adjusted)	Future area with offset (adjusted)									
			Total quantum of impact	0.00										Future quality without offset	Future quality with offset									
Threatened species habitat							Threatened species habitat																	
Area of habitat <div>Clear row</div>	No		Area	16.91		Autran (2014) Accendo (2020b) Herounad (2018) Herounad (2021a) Herounad (2021b) GHD (2021) DWER Site visit (2)	Area of habitat	Yes	11.77	Adjusted hectare	Land acquisition, Lot 2148 Ferguson Road	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	38	Risk of loss (%) without offset	Risk of loss (%) with offset	3.80	90%	3.42	2.69			
			Quality	7													Future area without offset (adjusted)							Future area with offset (adjusted)
			Total quantum of impact	11.77													Future quality without offset							Future quality with offset
			Area									Time until ecological benefit	1	Start quality (scale of 0-10)	7	Risk of loss (%) without offset	Risk of loss (%) with offset	0.00	90%	0.00	0.00			
			Quality													Future area without offset	Future area with offset							
			Total quantum of impact													Future quality without offset	Future quality with offset							

Lot 2148 Ferguson Road	Accendo	DWER	Comments
ACQUISITION	38.00	✓	
IUCN Criteria	EN	✓	Black cockatoo foraging and breeding habitat
Area of impact	16.8	✓	
Quality of impacted area	7	✓	
Time over which loss is averted	20	✓	
Time until ecological benefit	1	✓	
Start area	38.00ha	✓	
Start quality	8	7	Foraging: No assessment - Canopy foraging habitat (Marri-Jarrah) may be comparable to application area? Breeding: Most trees are regrowth from historical logging. Due to their young age very few appear to contain hollows of any size
Future quality without offset	7	7	Canopy foraging habitat or breeding habitat is not expected to decline over time
Future quality with offset	8	7	No management intervention prescribed - no increase in values expected
Risk of loss (%) without offset	30%	20%	Risk of loss (%) associated with land zoned rural is 20%
Risk of loss (%) with offset	5%	10%	Risk of loss (%) associated with conservation covenant is 10%
Confidence in result (%)	95%	90%	Standard percentage - Moderately high level of confidence that offset will mitigate future risks to the site
Confidence in result (%)	95%	90%	Standard percentage - Moderately high level of confidence that the offset site would remain in at its current quality if protected in perpetuity
% of impact offset	69.6	16.03%	

Attachment 2.2

9

Direct Offset 3: Lot 81 and Lot 2 Buffer

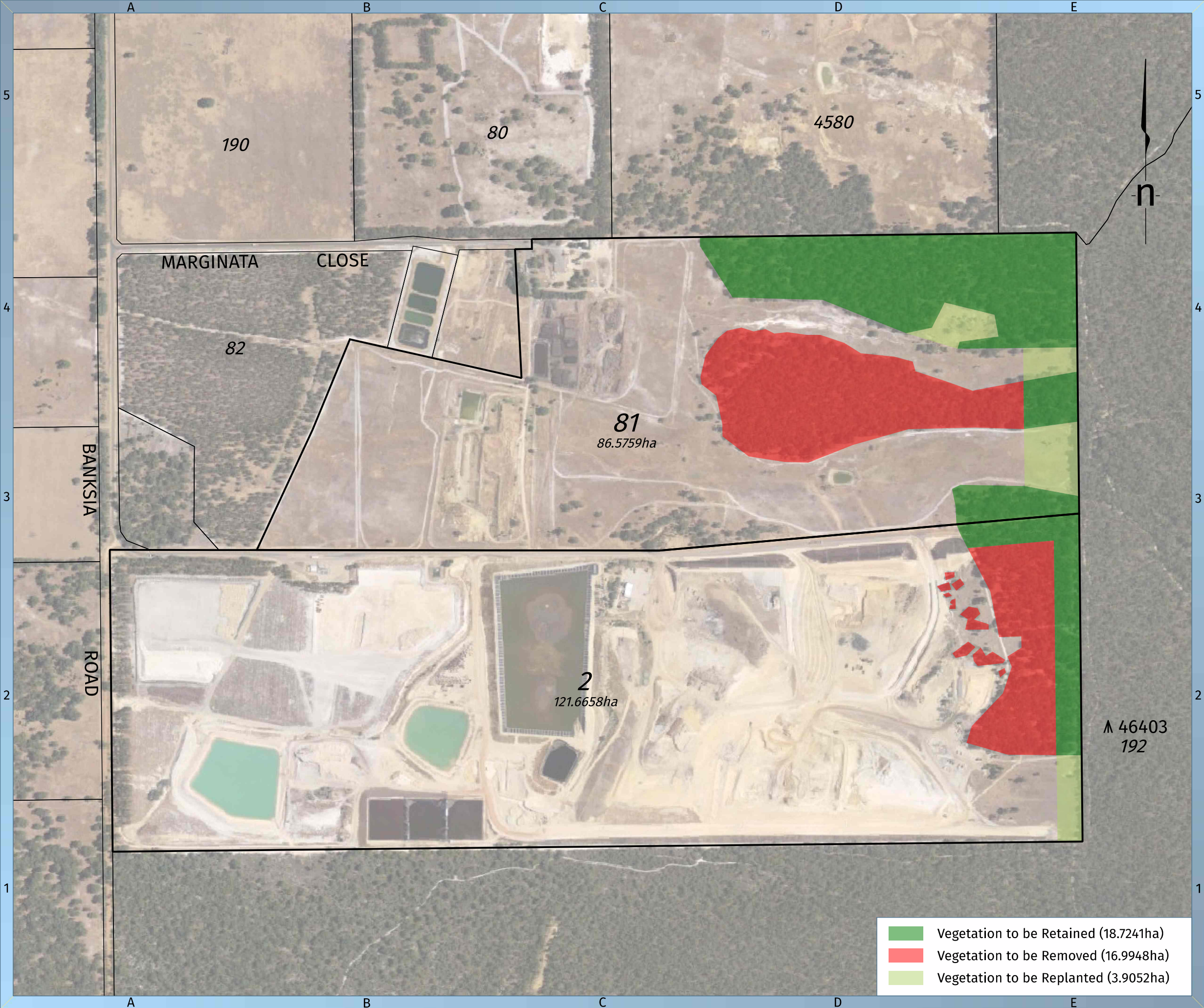
Impact calculator							Offset calculator																		
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source		Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset					
Ecological communities							Ecological Communities																		
Area of community <div>Clear row</div>	No		Area				Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Risk of loss (%) with offset	0.0	0.0								
			Quality											20%	Future area with offset (adjusted)										
			Total quantum of impact	0.00										Future quality without offset	Future quality with offset										
Threatened species habitat							Threatened species habitat																		
Area of habitat <div>Clear row</div>	No		Area	16.8		Artrion (2014) Accendo (2020b) Horwood (2015) Horwood (2021a) Horwood (2021b) GHD (2021) DWER Site visit (2)	Area of habitat	Yes	11.76	Adjusted hectares	Buffer area of Lot 2 and Lot 81	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	7.86	Risk of loss (%) without offset	20%	Risk of loss (%) with offset	10%	1.57	90%	1.41	1.11	1.25	10.67%
			Quality	7													5.5	Future area with offset (adjusted)							
			Total quantum of impact	11.76													Future quality without offset	Future quality with offset							
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source		Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start value	Future value without offset	Future value with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset					


Lot 81 and Lot 2 Buffer	Accendo	DWER	Comments
REVEGETATION	7.86	✓	
IUCN Criteria	EN	✓	Black cockatoo foraging and breeding habitat
Area of impact	16.8	✓	
Quality of impacted area	7	✓	
Time over which loss is averted	20	✓	
Time until ecological benefit	1	5	Revegetation to represent foraging value will take 5 years
Start area	7.86ha	✓	
Start quality	7	7	
Future quality without offset	6	7	Canopy foraging habitat or breeding habitat is not expected to decline over time
Future quality with offset	8	8	Improvement to mid storey foraging species
Risk of loss (%) without offset	40%	30%	Zoned 'Rural' under the Greater Bunbury Region Scheme and 'General Farming' under TPS No. 3. Zoned 'Waste Disposal/Processing' under the Local Planning Strategy
Risk of loss (%) with offset	5%	10%	Risk of loss (%) associated with conservation covenant is 10%
Confidence in result (%)	95%	90%	Standard percentage - Moderately high level of confidence that offset will mitigate future risks to the site
Confidence in result (%)	95%	70%	Lower confidence value due to likely success of revegetation within 5 years
% of impact offset	21.53	10.67%	

ATTACHMENT 2

Revised Clearing Footprint

Attachment 2.2





C	Updated Areas	MK	28/10/22
B	Updated Areas	SB	17/10/22
A	Original drawing	MK	12/08/22

rev	details	approved	date
survey	N/A	cad file	20464-27C.dgn
drawn	NP 12/08/22	checked	MK 12/08/22
horiz datum	MGA94 Z50	level datum	N/A

scale at A3

1 : 7500

all distances are in metres

0

100

200

plan type

VEGETATION PLAN

client

J & P Corporation

description

Lot 2 on DP 65861 and
Lot 81 on DP 403943
CROOKED BROOK

drawing no

20464-27C


BUNBURY OFFICE:


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NOTE:

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-  Vegetation to be Retained (18.7241ha)
-  Vegetation to be Removed (16.9948ha)
-  Vegetation to be Replanted (3.9052ha)

Attachment 2.2



ATTACHMENT 3

Staged Clearing Plan

LOCATION MAP

LEGEND

Extractive Industry Footprint (5.38ha)

Clearing Stage 1

Clearing Stage 2

Clearing Stage 3

Mulched Vegetation Stockpile

Future Landfill Perimeter Road

Internal Road (10m wide)



STAGED CLEARING PLAN

Lot 2 on Diagram 65891 Banksia Road, CROOKED BROOK

Plan No. | 22910-02
Date | 04/11/22
Drawn | NP
Checked | MK
Revision | B

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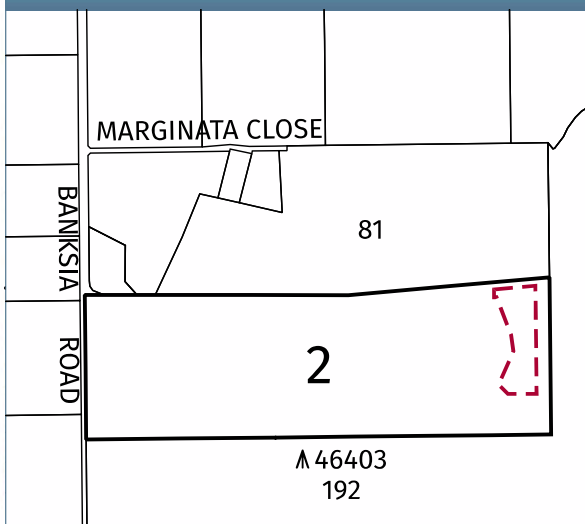
Scale | 1:2000@A3

0 20m 40m 60m

PLANNING & SURVEY SOLUTIONS

05/08/2022

LOCATION MAP

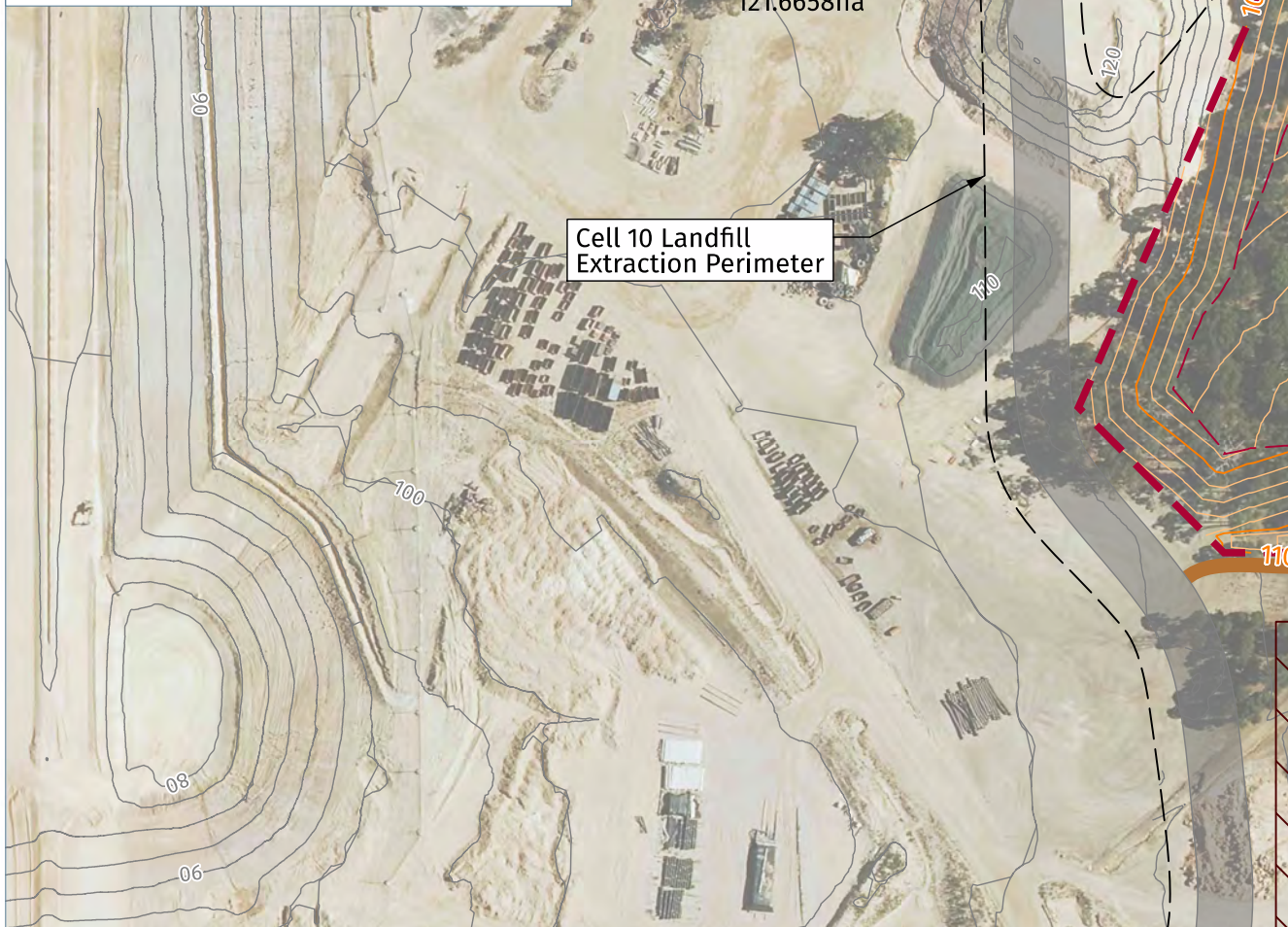


LEGEND

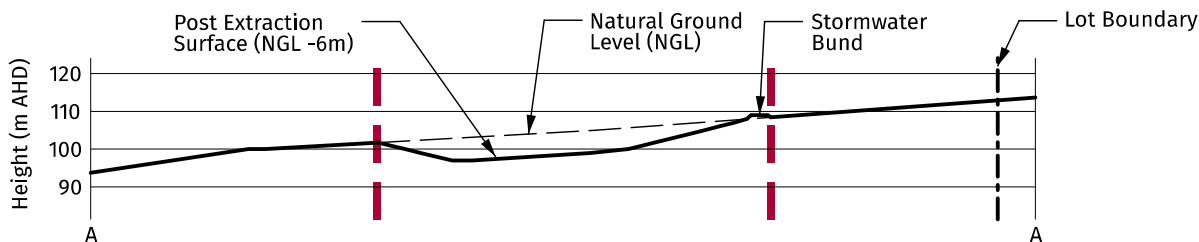
- Extractive Industry Footprint (5.95ha)
- Toe Line (1:4 Batter)
- Landfill Cell
- Top Soil Stockpile
- Mulched Vegetation Stockpile
- Temporary Excess Material Stockpile
- Excess Material Stockpile
- Existing Contours
- Proposed Contours
- Stormwater Diversion Bund
- Future Landfill Perimeter Road
- Internal Road (10m wide)

NOTES:

- Excess material stockpiles to be exhausted within 18 months from the completion of extraction activities
- Temporary excess material stockpiles are to be exhausted before extraction activities finish



CROSS SECTION



EXCAVATION SITE PLAN

Lot 2 on Diagram 65891 Banksia Road, CROOKED BROOK

Plan No. | 22910-03
Date | 04/07/22
Drawn | NP
Checked | MK
Revision | B

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Scale | 1:2000@A3



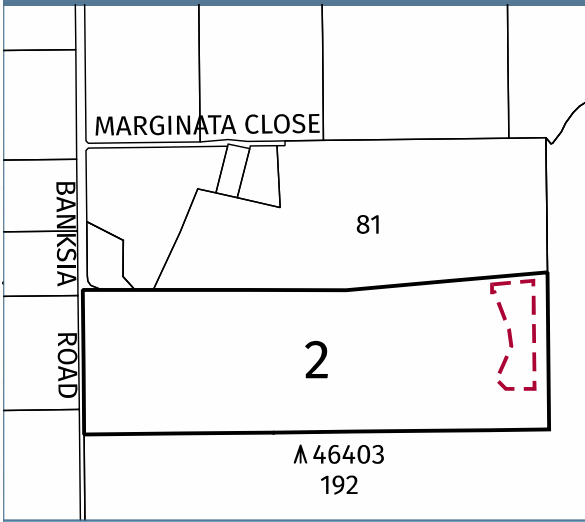
NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey

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05/08/2022

LOCATION MAP



LEGEND

- Extractive Industry Footprint (5.95ha)
- Toe Line (1:6 Batter)
- Existing Contours
- Proposed Contours
- Stormwater Diversion Bund

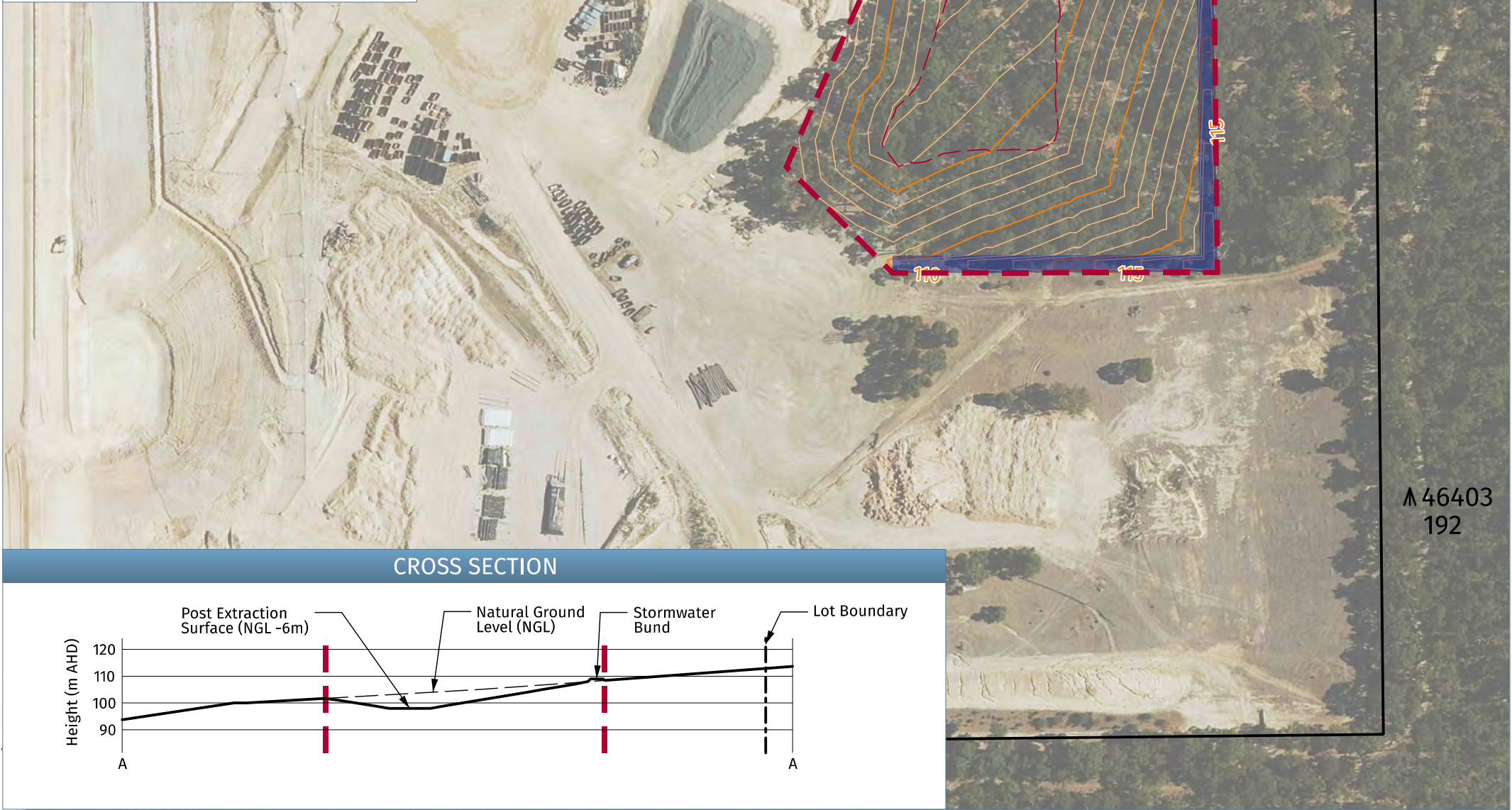
NOTES

PERSONS RESPONSIBLE

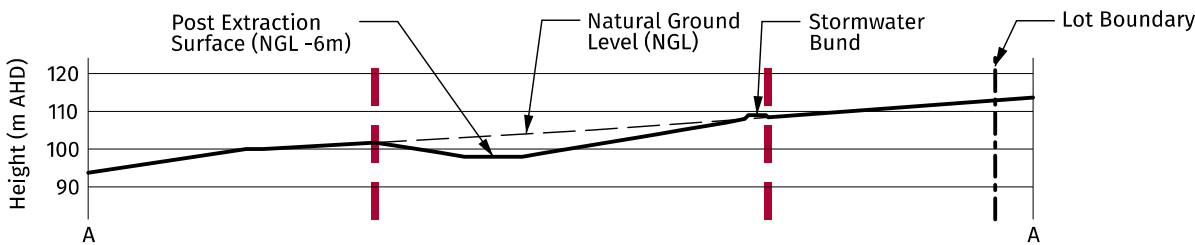
Sally Carlton
Engineering Manager
Cleanaway Pty Ltd
0401 222 508
sally.carlton@cleanaway.com.au

REHABILITATION

- All batters no greater than 1 in 6.
- Final contours as per this plan.
- Finished extraction to have 100mm soil and hydroseeded with perennial rye grass.
- Rehabilitation to occur progressively as stages are excavated and typically in the same order as the extraction. As each stage is excavated and the next is commenced, then rehabilitation is to follow.
- No provision for fencing of rehabbed areas unless required for other purposes.
- Works to achieve final contours are to be completed within 6 months of the extractive industry use being finalised.
- Hydromulch seeding of the extraction site is to be completed within 12 months of the extractive industry being finalised.
- Seeded areas are to be watered at least every fortnight for the first 3 months from seeding.



CROSS SECTION



REHABILITATION PLAN

Lot 2 on Diagram 65891 Banksia Road,
CROOKED BROOK

Plan No. | 22910-04
Date | 12/07/22
Drawn | NP
Checked | MK
Revision | A

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Harley Dykstra
PLANNING & SURVEY SOLUTIONS

Attachment 4



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deaginc@gmail.com P.O. Box 205 Dardanup WA 6236

Development Assessment Panels Secretariat
c/- Andre Schonfeldt
Chief Executive Officer
Shire of Dardanup
PO Box 7016
Eaton WA 6232
submissions@dardanup.wa.gov.au

13 September 2022

Dear Mr Schonfeldt,

Submissions - Development Assessment Panel application DAP/ for Cleanaway Landfill Facility - Lot 2 on Diagram 65861, Banksia Road, Crooked Brook

The DEAG is an association of members in the Dardanup community that aims to maintain, preserve, and improve the community's quality of life and to protect and conserve Dardanup's natural environment.

Our submissions in opposition to the Development Application are set out below.

The Development Application is inconsistent with:

Schedule 2, Part 9 - Clause 67, Procedure for dealing with applications for development approval, Deemed provisions for local planning schemes Consideration of application by local government subclause 2 of the Planning and Development (Local Planning Schemes) Regulations 2015.

Compatibility and Character of the setting

Clause (1) *the effect of the proposal on the cultural heritage significance of the area in which the development is located;*

- (m) *the compatibility of the development with its setting,*
 - (ii) *the relationship of the development to development on adjoining land or on other land in the locality including, but not limited to, the likely effect of the height, bulk, scale, orientation and appearance of the development;*
- (n) *the amenity of the locality including the following —*
 - (ii) *the character of the locality*

1. Lot 2 is zoned 'Rural' under the Greater Bunbury Region Scheme and 'General Farming' under LPS 3. It is acknowledged Cleanaway operates a landfill on Lot 2 and that Lot 2 Local development Plan was put in place by the Dardanup Council to improve management of emissions and set minimum standards, due to numerous complaints from the public and ongoing issues with impacts from Lot 2.
2. Figure 1 of the Harley Dykstra Report highlights that this facility is discordant with its setting. The primary and dominant land use in the surrounding area is agriculture and tourism, supporting grazing, dairy, a range of other intensive agricultural pursuits, wineries, tourism facilities, festivals, and accommodation. The current use of Lot 2 is a non-conforming use. There are currently no other non-conforming uses in the locale.

Attachment 4



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Figure 1: Lot 2 Banksia Road context

3. Cleanaway Solid Waste Pty Ltd (Cleanaway) has applied for the Development Application on the basis that the activity compliments the existing waste activities in the area. They cite Depiazzi's Depot as a waste facility. This is incorrect. Depiazzi's website states that they are landscape suppliers. *'At TJ Depiazzi & Sons, we deal directly with plant nurseries, landscapers, city councils, and landscape suppliers. As the largest producers of soils, potting mixes and mulches in WA, we can supply anything from 15 cubic meters to 10,000 cubic meters, when you want it!'*
4. The current *'height, bulk, scale, orientation and appearance of the development'* do not comply with requirements for regional facilities under SPP 2.5 and the visual impacts of the application need to be considered from more than the one vantage point as has been presented by the proponent. Consideration needs to be made of surrounding viewsheds more elevated than 105m and further afield, which will look down on the site. Visual impact and scale is a significant issue in the community and impacts on tourism and rural aspects.
5. Unresolved SAT Hearings on Cell 9, 10, 12a could impact on any decision on this clearing application, including questions raised by Glen McLeod Legal ref: DAP/21/02063 with regard to whether Cleanaway's operations are wrongly listed as "use Not Listed" or should be characterised as "industry – noxious or hazardous" which is a prohibited use in the 'General Farming Zone' under TPS 3. Even if it is correctly characterised as "use Not Listed," TPS3 6.1(a) prohibits extension beyond the boundary of the site when the use is non-conforming. This Development Application includes clearing of vegetation which impact significantly on Lot 81 in addition to Lot 2

Environmental Impacts

Attachment 4



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Clause (l) the effect of the proposal on the cultural heritage significance of the area in which the development is located;

(n) the amenity of the locality including the following —

(i) environmental impacts of the development;

1. The extractive industry footprint identifies removal of 7.1ha of vegetated bush on Lot 2 containing Regionally significant species of remnant bushland endemic of the Whicher Scarp which contains endangered species of flora and fauna.
2. The Harley Dykstra report does not acknowledge or address the value of rare flora which will be affected by this proposal or the significance of the remnant habitat.
Floristic Survey of the Whicher Scarp – BJ Keighery 2008.
This Report for Dept of Environment and Conservation identified the high biological diversity of the North Whicher Scarp: Dardanup Conservation Park.
It concludes:

- a) The remnant vegetation has been overestimated.
- b) It is recommended **that the significance of the Dardanup Conservation Park is such that the boundaries should be expanded.**

‘The findings described in this report (section 5.1), have established that the Whicher Scarp is an area of outstanding flora values. The values described for the proposed ‘Whicher Range reserve’ (Figures 4 and 5) in the System 1 (CTRC 1974 and DCE 1976) area are a characteristic of the entire Whicher Scarp’

This Report for Dept of Environment and Conservation identified:

*53 significant declared rare flora taxa (species, subspecies and varieties) listed for WA.
2 internationally (IUCN) listed taxa which were critically endangered
1 internationally (IUCN) listed taxa endangered
4 internationally (IUCN) listed taxa vulnerable
3 commonwealth(COM) listed taxa endangered
3 commonwealth(COM) listed taxa vulnerable*

3. Department of Parks and Wildlife have recorded threatened fauna, recorded within the park which would, logically, also be found in the proposed extractive industry footprint, as it is congruent to the Conservation Park. These include:
 - a. *South western brush tailed phascogale*
 - b. *South western brown bandicoot*
 - c. *Forest red-tailed black cockatoo*
 - d. *Carnaby’s cockatoo*
 - e. *Western ringtail possum*
 - f. *Western quoll*
4. Accento’s conclusion that the nesting trees are not being utilized does not address the habitat requirements for an increase in numbers of the species. For numbers of threatened fauna to grow it is vital that habitat increase, not be bulldozed. It appears very shortsighted to assume that just because they are not presently being used for nesting that they will not be in the future, particularly as anecdotal information indicates that large numbers of cockatoos are being observed in the park. The habitat of other species should also be considered.

Attachment 4



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Aerial Map showing
Lot 2 and Lot 81
bushland and
connection to
Conservation Park,
bushland and general
farming land.

Environmental Protection Act Pt V Division 2

1. While it is acknowledged that the environmental assessment of this proposal will be done by DWER and EPA under Pt V or Part 1V of the EP Act. The CEO, in deciding about a clearing permit application under section 51O of the EP Act, shall have regard to the clearing principles contained in Schedule 5 of the EP Act so far as they are relevant to the matter under consideration.
2. This proposal does not meet the following requirements of:
A guide to the assessment of applications to clear native vegetation Under Part V Division 2 of the Environmental Protection Act 1986, December 2014
 - Principle (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.
 - Principle (b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.
 - Principle (c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora
 - Principle (d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.
 - Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.
3. The offsets proposed are not representative of the value of remnant vegetation of Whicher Scarp, which is an identified and proclaimed Conservation region for a reason. Degraded swamp land and a bush block in the Darling Scarp do not offset the loss of the vegetation congruent with the Conservation Park. This stand of trees, abutting the landfill site, ameliorate landfill impacts on the Conservation Park. Excavation activities and associated noise and dust would further compromise the habitat and increase stress on fauna and flora in the vicinity.

Attachment 4



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Landscaping and Vegetation Preservation

Clause (l) the effect of the proposal on the cultural heritage significance of the area in which the development is located;

(p) whether adequate provision has been made for the landscaping of the land to which the application relates and whether any trees or other vegetation on the land should be preserved;

1. Harley Dykstra's report, presented by the proponent, identifies an area for revegetation, but it is an area outside of the extractive industry footprint!
2. The extractive industry footprint rehabilitation cites **simply putting 100mm of soil and Hydro-mulching the area with perennial rye grass after extraction** and three-monthly watering. This does not constitute rehabilitation of the area. This is an area adjacent to a Conservation Park and exotic grasses will migrate from this site to the Park and cause appreciable degradation to the Park.
3. The Rehabilitation Plan, with no attempt to level the void, does not adequately landscape the land and address whether trees and other vegetation should be preserved.
4. Areas of remnant vegetation, outside of the excavation footprint, where the stockpiles are to be located, will be directly impacted by the excavation Application. (See map page 4)
5. The offsets proposed are not representative of the value of remnant vegetation of Whicher Scarp, which is an identified and proclaimed Conservation region for a reason.
6. The loss of this particular stand of vegetation is significant as it assists in ameliorating landfill emissions and impacts from entering the Conservation Park and reduces ongoing issues with litter, dust, runoff and noise that have historically affected the Park from this site.

Risk Management

Clause (l) the effect of the proposal on the cultural heritage significance of the area in which the development is located;

(q) the suitability of the land for the development taking into account the possible risk of flooding, tidal inundation, subsidence, landslip, bush fire, soil erosion, land degradation or any other risk;

Planners must consider this clause and determine the risk of fire, erosion, subsidence and land degradation in their decision-making.

1. Fire

The development application ignores addressing fire risk. This 22-year-old site has experienced almost yearly tip fires and failed to have any fire plan until last year. As the tip face creeps closer to the forest, fires will more easily escape into the forest.

More importantly, however, is that the Site Fire Plan only looks at fires in the context of State Planning Policy 3.7 – Planning in bushfire Prone Areas and protecting the site and infrastructure from bushfire. It has not assessed the causes and probability of fires originating from the site. The Fire plan was criticized strongly by DFES.

No fire risk consideration has been given to whether planning approval should be permitted for any expansion into this section of Lot 2. It would be prudent to assess at this time the suitability of the eastern portion of Lot 2 for excavation, clearing and landfill cell construction

Attachment 4



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and the extent to which this is tolerable.

2. Water resources

SPP 2.5 Section 4 Policy Objectives includes the following clause;

(g) protect and sustainably manage environmental, landscape and water resource assets.

Harley Dykstra claims numerous specialist consultants have been engaged to monitor and model the groundwater below the subject site.

However, the hydrogeology of the area is complicated and not fully understood (Golder 2015). The proponents fail to explain that the monitoring bores were neither located or constructed according to the licence, and this has only now been rectified. Therefore, there are no meaningful water testing results as these bores failed to separate aquifers and were generally inadequate (Golder 2015). The data collected to date can provide no meaningful analysis as to the impact on the quality of the groundwater aquifers and the claims made by the proponent should be considered as spurious.

Social Amenity

- (n) *the amenity of the locality including the following —*
 - (iii) *social impacts of the development;*

Noise Accumulation.

The application includes a noise study that is outdated and collated prior to further developments were approved for the site. These Approvals have added to the noise emanating from the site. It has been very noticeable. Noise from the site is impacting more residents as the facility increases in height. People who previously experienced nuisance noise on occasion, are now impacted daily (6am – 9pm, 24x7)

The sheer amount of noise and duration of impacts has grown to the point where Planners must consider whether this site is compatible with the values of a rural environment as per planning considerations.

Visual Impacts

The visual impacts of the site, *“the likely effect of the height, bulk, scale, orientation and appearance of the development”* are having such impacts on the community that it is causing residents to sell their properties and risking tourism. In a picturesque, undulating, bucolic setting, this growing eyesore is seen as more than a huge scar on the ridgeline.

The proponent’s history of underestimation of the visual pollution, incremental development applications and justification by presenting likely impacts from certain selective vistas is being repeated. The effect of any additional visual impacts of expansion on this highly sensitised and frustrated community need to be considered by planners.

Orderly and Proper Planning

Orderly and proper planning requires the JDAP, in exercising its discretion to approve or refuse a development application, to have regard to any applicable legislation, subsidiary legislation and planning schemes and policy instruments.

State Planning Policy 2.5

The development Application is inconsistent with SPP 2.5

Attachment 4



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The purpose of SPP 2.5 is to protect and preserve Western Australia's rural land assets and applies to rural land and rural land uses, this includes land zoned for agricultural purposes such as the General Farming zone under LPS 3.

1. Section 5.10 of SPP 2.5

'Environmental and landscaping attributes will be managed and improved by:

Supporting and promoting private conservation areas within Western Australia in addition to State and local Government conservation reserves.'

This application will have environmental impacts on Dardanup Conservation Reserve and rare flora and fauna habitat.

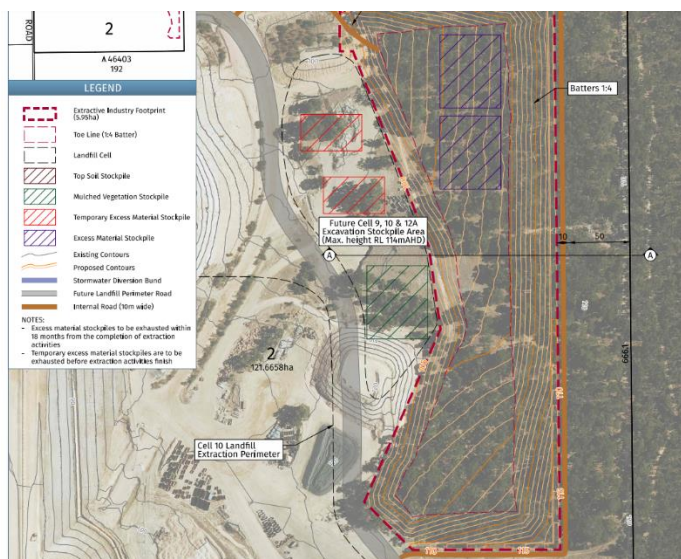
2. Section 4 of SPP 2.5 Policy Objectives include the following clause:

(e) Avoid and minimize land use conflicts;

Cleanaway has been unable to avoid land uses conflicts with the rural and Conservation Park land uses, which surround it, during 16 years of operation, despite conditions put in place to mitigate ongoing problems. Ongoing complaints relate to non-compliance of conditions, odour, noise, dust, traffic and runoff.

In 2021 another development application by J&P for sand and gravel extraction, to serve Cleanaway's onsite needs, was approved for Lot 2 and still operates. Additionally, Cleanaway have a massive stockpile on Lot 81, which has been a matter for the Courts, and Cleanaway have been ordered to remove, as it was illegal dumping. Therefore, there are resources available to the proponent currently and their need is not 'critical'. This site is an exposed, highly visible location and has been allowed by Planners to expand beyond its capacity.

3. **SPP 2.4 (m) potential impacts on fragmentation and connectivity of remnant vegetation'**
Harley Dykstra Report does not acknowledge additional loss of vegetation which is outside of the extractive industry footprint. This Location Map shows 7.1h to be cleared and other additional vegetation areas which will be utilized for stockpiles. The remnant bushland which is shown hatched in the map highlights the proponent's intention – to use the extractive application to remove vegetation. The total remnant vegetation area to be removed on Lot 2 is greater than 5.95h.



Attachment 4



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The stockpile areas hatched out in the map are also remnant vegetation. Harley Dykstra report states *'no fragmentation of vegetation is proposed as part of this application'*. These pockets of vegetation would be impacted by becoming disconnected if the extractive footprint clearing was approved.

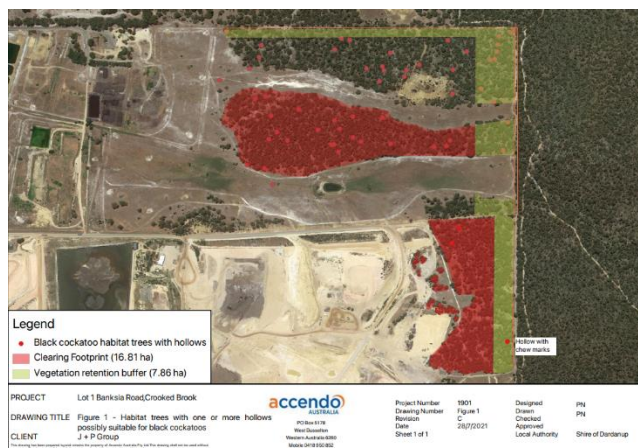
Outstanding Planning issues

To ensure proper and orderly planning the outstanding planning issues which are currently under consideration and unresolved by Planning Regulators for this site and this proponent should be addressed prior to consideration of this application as they could have bearing on any planning decision. These include:

- Current illegally dumped overburden on Lot 81 which will not be removed until 2023.
- Unresolved SAT negotiations on Lot 2 Local Development Plan for the site, which was Approved by Council in May 2021, and Cleanaway's challenge to this Regulation.
- DWER response to whether this proposal to clear 16ha of remnant bush requires approval under Pt V of the EP Act or is of such significance that it requires referral under Pt 1V of the EP Act.
- Unresolved SAT Hearings on Cell 9, 10, 12a, which could impact on any decision on this clearing application.
- Outstanding EPA assessment on Cells 9, 10, 12a.
- Hydrogeological assessment of the site required by DWER in new Licence conditions to increase understanding of perched aquifers on Lot 2 and the site.
- Questions raised by Glen McLeod Legal ref: DAP/21/02063 with regard to (d) whether Cleanaway's operations are wrongly listed as "use Not Listed" or should be characterised as "industry – noxious or hazardous" which is a prohibited use in the 'General Farming Zone' under TPS 3. Even if it is correctly characterised as "use Not Listed," TPS3 6.1(a) prohibits extension beyond the boundary of the site when the use is non-conforming. This Development Application includes clearing of vegetation which impact significantly on Lot 81 in addition to Lot 2.

Although this DA only refers to Lot 2, the illegal stockpile and 10 hectares of clearing on Lot 81, included in the proponent's offset rationale, must be factored in.

Inclusion of Lot 81 is inconsistent with TPS3 6.1



Attachment 4



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Attachment 4

From: alex williams <alex.williams2000@outlook.com>
Sent: Thursday, 15 September 2022 11:35 AM
To: Submissions Planning
Subject: Development Assessment - Lot 2 Banksia Rd

⚠ CAUTION: This email originated from outside the Shire of Dardanup.
Do NOT click links or open attachments unless you recognize the sender and know the content is safe. Do NOT enter any username or passwords and report any suspicious content.

Good Morning

I would like to lodge my firm objection to the proposed extraction of material from the eastern side of Cleanaway Waste Facility site.

The facility has expanded well beyond its original intended use, with an operator that has continually failed to behave in a responsible manner, and is not to be trusted.

The facility should be closed, not expanded.

Regards

Alex Williams
Crooked Brook Wines
Lot 566 Crooked Brook Road
+61 (0)409 132 698

Attachment 4

From: The Birch's <b1rchy1@bigpond.com>
Sent: Friday, 16 September 2022 10:03 AM
To: Submissions Planning
Subject: Fwd Banksia road extraction permit

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We request the shire to not only refuse the gravel extraction application, but vigourously oppose the clearing application they have lodged with DWER for Lots 2 Banksia Road and Lot 82 Marginata Drive for the following reasons.

1. The offsets offered are not representative of the value of the remnant vegetation of the Whicher scarp. How can degraded swamp land in Picton and a bush block in the Darling scarp, where there is plenty of forest representing that environment, be seen as a replacement for the Whicher scarp environment that has been heavily diminished and recognised as environmentally sensitive by Keightly et Al when proposing the Dardanup Conservation Park declaration.
2. There is a current ongoing EPA assessment being done on the block, so no decisions should be made on any future developments until that is handed down and all appeal processes completed.
3. Noise accumulation. The application includes a revised noise study that uses data that is outdated. Since the data used was collated further developments have been approved for the site that have added to the amount of noise emanating from the site. The sheer amount of noise has grown to question if this development is compatible with the values of a rural environment as per the planning considerations. To suggest that the proposal will not create any additional noise is erroneous especially as the proposals are high in the landscape and generated noise is carrying further

Attachment 4

4 Dust monitoring. The dust monitoring plan relies on data from monitoring sites that will have very little relevance to the proposed operations. Monitors 5 below the leachate dam and NW below the tailings dam (fig 5 JBS&G dust plan) would be sheltered from any dust raised from high in the landscape as it would be still airborne in any reasonable breeze. Therefore any reliance on this data should be dismissed.

5. If this proposal is approved, the applicant acknowledges that they will not rely on J&P's extraction material on the western boundary. Assuming J&P's will still want to retail the material from that pit, that will potentially add a large number of trucks onto the local road system and the license held by J&P's will need to be reviewed.

6. The current illegal stockpile on Lot 81 was sited for use as cover material on tipping faces and capping. These are the same as the uses the proponent puts forward as reasons for the license. This stockpile should be made to used before any further extraction is allowed.

7. There is a potential conflict of opinions in the value of the nesting trees identified by Harewood. With the amount of Red tailed black, white tailed black and Carnaby cockatoos that have been observed frequenting the conservation park and surrounding properties, Accendo's conclusion that they aren't being used seem to a very short-sighted conclusion that they won't be utilised in the future. Many trees in the area are used by these species of birds as both roosting and nesting areas.

8 Stormwater redirection. There is no data to lead to the conclusion that the stormwater drainage system will handle any further diverted flows. The silt traps on the Southern boundary are already filling up and will overflow in the near future and the redirected water on the firebreak on the South east corner is showing signs of erosion into the Conservation park.

9. The vistas offered of the Whicher scarp, where remnant bushland blends into the Conservation Park, will be lost if Lot 81, in particular, is allowed to be cleared.

As the nearest residents to the proposal, over the life of the landfill site we have seen the complete degradation of the rural ambience of the area and to the lifestyle that we had hoped it would bring.

Planning and development in any zoning area should enhance the zone, not completely change the nature of the surroundings. Just because development can legally take place in a zoning doesn't mean that it should and we urge council refuse this application and stop the relentless expansion on Lot 2 and the expansion into

Attachment 4

Lot 81.

David and Raelene Birch

268 Banksia Road

Crooked Brook

Get [Outlook for Android](#)

Attachment 4

Mr Andre Schonfeldt
Chief Executive Officer
Shire of Dardanup
PO Box 7016
Eaton WA 6232

Dear Andre,

Submission - Development Assessment Panel application DAP/ for Cleanaway Landfill Facility - Lot 2 Banksia Road, Crooked Brook

I am opposed to the gravel extraction application for the above for the following reasons.

The offsets proposed do not represent the environmental loss of native vegetation from 5.95ha of clearing at Lot 2 Banksia Road and proposed 10.75ha of clearing at Lot 81 Marginata Close. This native vegetation on Lot 2 Banksia Rd adjoins the Dardanup Conservation Park containing threatened flora and fauna so any adjoining native vegetation is of high value. The offset 1 is a swamp in Picton, Lot 2148 Ferguson Rd already has plenty of native vegetation in the area due to the proximity to the Wellington Forest and the offset 3 will take many years to be established for use by the threatened flora and fauna and there is little evidence of how this vegetation will be established and cared for into the future in the Harley Dykstra report. The 2 of the 3 offsets are already remnant vegetation so what work is going to be done in the future to ensure the growth of the native vegetation so that it becomes an environmental benefit. Nothing mentioned in Harley Dykstra report.

This strip of native vegetation on Lot 2 currently provides a valuable buffer to the Dardanup Conservation Park. The threatened flora and fauna in the Conservation Park is offered some protection from light from the towers, dust, litter and noise. Without this vegetation there is nothing to protect the threatened flora or fauna and in fact the plants and animals will be very exposed to all of these elements.

There is a current ongoing EPA assessment being done on Lot 2 Banksia Rd, so no decisions should be made on any future developments until that is handed down and all appeal processes completed.

The Herring Storer noise assessment on Lot 2 Banksia Rd was carried out in March 2020. Since that time the Landfill has expanded in height and more noise can be heard at our home on 513 Crooked Brook Rd, Crooked Brook. Our home at 513 Crooked Brook Rd has never been assessed for noise by Herring Storer and is just as close to this extraction proposal as David and Raelene Birchs home, however in a different direction. The Birch home is considered sensitive by Herring Storer however no mention of our property. WHY IS THAT? The accumulation of noise over extended periods has not been considered and this proposal to extract gravel will only add to the continuation of noise from Lot 2 Banksia Rd and will impact negatively on the rural environment we live in. This has to be considered in the planning. We are exposed to noise from 6am – 6pm, 7 days per week and this is not what anyone expects when you live in a rural area.

The Harley Dykstra report acknowledges that Cleanaway will not be using sand from J&Ps extraction site on the western boundary of Lot 2. J&Ps extraction permit said their sand would be only used on site so where will the sand from J&Ps site be going in the future if it isn't to be used on site. If J&Ps sand is to be used offsite then more trucks will be travelling on the local roads and the J&Ps extraction permit will require reviewing by the Shire.

Attachment 4

I would like to see the overburden currently illegally stored on Lot 81 Marginata used before any further extraction on Lot 2 Banksia.

Yours sincerely

Jill Cross

513 Crooked Brook Rd

Crooked Brook

Attachment 5

From: Cecilia Muller
Sent: Thursday, 1 June 2023 4:27 PM
To: Gabriella Hayward
Subject: FW: status of clearing permit (purpose permit) application CPS 8327/1
Attachments: CPS 8327-1 - location of area b and c.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

SharePointLocationUrl: http://tardis.dardanup.wa.gov.au/Function/TownPlan/CT_AppDev/JDAP - Extractive Industry - Lot 2 Banksia Road, Crooked Brook

SharePointAbsoluteFileUrl: http://tardis.dardanup.wa.gov.au/Function/TownPlan/CT_AppDev/JDAP - Extractive Industry - Lot 2 Banksia Road, Crooked Brook/DWER - status of clearing permit.msg

Please add this to the submissions combined doc [RAR Attachment 5 - Agency Comments](#)

Regards

Cecilia Muller

Principal Planning Officer



A: 1 Council Drive | PO Box 7016 | Eaton WA 6232
T: 08 9724 0386 | **E:** Cecilia.Muller@dardanup.wa.gov.au
W: www.dardanup.wa.gov.au



From: Jessica Burton <jessica.burton@dwer.wa.gov.au>
Sent: Wednesday, April 19, 2023 10:36 AM
To: Cecilia Muller <Cecilia.Muller@dardanup.wa.gov.au>
Subject: RE: status of clearing permit (purpose permit) application CPS 8327/1

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Do NOT click links or open attachments unless you recognize the sender and know the content is safe. Do NOT enter any username or passwords and report any suspicious content.

Hi Cecilia,

Thank you for your email. I apologise that you were not able to reach me, I have been on leave. The status of the application is currently 'under assessment' and 'waiting on applicant'. The applicant has further reduced the application area to 14.99 hectares (see map attached).

The assessment has determined that a significant residual impact to three black cockatoo species listed as Threatened under the *Biodiversity Conservation Act 2016* (BC Act) and the EPBC Act will occur and that the proposed clearing within Lot 81 (Area B on attached map) is unlikely to be supported given the presence of critical breeding habitat for these species. It is considered unlikely that the proposed offsets can counterbalance the loss of this critical habitat.

Attachment 5

Therefore, only the clearing within Lot 2 (total of 5.99 hectares) is expected to be environmentally acceptable. Correspondence in regards to this determination has not yet been sent to the applicant but they are aware of this issue. Correspondence from DWER is expected to be sent to the applicant in the next two weeks.

Further information will also be requested from the applicant regarding the clearing within Lot 2, including further information on offsets. This information will have to be provided prior to a decision of 'agreement in principle' for Lot 2 being made.

Kind regards

Jessica Burton
Senior Environmental Officer
Native Vegetation Regulation

Department of Water and Environmental Regulation
Prime House, 8 Davidson Terrace, JOONDALUP WA 6027
Locked Bag 10, JOONDALUP DC WA 6919
E: jessica.burton@dwer.wa.gov.au | T: (08) 6364 7100 | Reception: (08) 6364 7000

Work Days: Mondays, Tuesday AM only, Wednesdays, Thursdays

From: Cecilia Muller <Cecilia.Muller@dardanup.wa.gov.au>
Sent: Tuesday, 18 April 2023 2:50 PM
To: 'Andre Schmitz' <Andre.Schmitz@dwer.wa.gov.au>; Jessica Burton <jessica.burton@dwer.wa.gov.au>
Subject: status of clearing permit (purpose permit) application CPS 8327/1

You don't often get email from cecilia.muller@dardanup.wa.gov.au. [Learn why this is important](#)

Good afternoon, Jessica

Would you please confirm the status of the clearing permit is at. Is it close to receiving an in principal approval?

I am the assessing officer of the JDAP application, and I need to know whether the sizes of the areas to be cleared have been confirmed.

This information is crucial for the assessment and for finalisation of the RAR for the JDAP.

Would you please provide an update. I have tried phoning you, but it appears that you may be out of the office.

Regards

Cecilia Muller
Principal Planning Officer



A: 1 Council Drive | PO Box 7016 | Eaton WA 6232
T: 08 9724 0386 | E: Cecilia.Muller@dardanup.wa.gov.au
W: www.dardanup.wa.gov.au



From: Andre Schmitz <Andre.Schmitz@dwer.wa.gov.au>
Sent: Thursday, 29 September 2022 5:16 PM
To: Cecilia Muller <Cecilia.Muller@dardanup.wa.gov.au>
Subject: Development Assessment Panel Application Extractive Industry - Lot 2 Banksia Road

Attachment 5

From: Andre Schmitz <Andre.Schmitz@dwer.wa.gov.au>
Sent: Thursday, 29 September 2022 5:16 PM
To: Cecilia Muller
Subject: Development Assessment Panel Application Extractive Industry - Lot 2 Banksia Road

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Good afternoon Cecilia,

Thank you for the recent discussion in regard to the status of clearing permit (purpose permit) application CPS 8327/1, in relation to a recent Development Application over Lot 2 Banksia Road, Crooked Brook. On 11 January 2019 the Department of Water and Environmental Regulation (DWER) received an application for a clearing permit (purpose permit) (CPS 8327/1) under section 51E(1) of the *Environmental Protection Act 1986* (the EP Act) for the proposed clearing of 26.4 hectares of native vegetation with Lot 2 on Diagram 65861 (Lot 2) and Lot 81 on Deposited Plan 403943 (Lot 81), Crooked Brook, for the purpose of sand extraction and gravel extraction.

The application has been assessed as a 'controlled action' by the *Department of Climate Change, Energy, the Environment and Water (DCCEEW)* under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (EPBC 2018/8270), and is being assessed by DWER under an accredited environmental assessment process between the Commonwealth and State governments, pursuant to a Bilateral Agreement established under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

On 12 August 2021 the proposed clearing area was revised down to 16.8 hectares, in part to avoid impacts to a Priority 1 (P1) Priority Ecological Community (PEC). That is, the Dardanup Jarrah and Mountain Marri woodland on laterite (Whicher Scarp woodlands of coloured sands and laterites floristic community C5).

The revised 16.8 hectare application area covers both Lot 2 (the subject of the Development Application currently being assessed by the Shire of Dardanup), as well as Lot 81, immediately adjacent to the north (Figure 1 below).

The status of the application is currently 'under assessment' and 'waiting on applicant'. A preliminary assessment has determined that a significant residual impact is likely to impact three black cockatoo species listed as Threatened under the *Biodiversity Conservation Act 2016* (BC Act) and the EPBC Act.

On 18 July 2022 a request for further information was sent to the applicant. For the assessment to proceed the applicant has been asked to provide satisfactory environmental offsets as detailed in the *WA Environmental Offsets Policy (2011)* and *WA Environmental Offsets Guidelines (2014)*. A preliminary review of offsets provided by the applicant to DWER and reflected in the Development Application, in accordance with the Commonwealth offset assessment guide and the WA Offset Policy (2011) has determined that the offset proposal as submitted is unlikely to be sufficient to counterbalance the impacts to 16.81 hectares of black cockatoo foraging and potential nesting habitat in very good condition.

Further information requested from the applicant included clarification of offset site boundaries and relevant biological survey data relating to the proposed offset sites that require submission in accordance with the Environmental Protection Authority's (EPA) Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA).

If revegetation is to be considered as mitigation, or an offset, the applicant has also been requested to submit a revegetation plan consistent with DWER's *A guide to preparing revegetation plans for clearing permits*.

Under section 51O(4) of the EP Act a delegated officer shall have regard to any development approval, planning instrument, or other matter, considered relevant to a native vegetation clearing application. Based on the information provided by the applicant to DWER, proposed clearing is for the purpose of sand extraction and gravel extraction, with a subsequent use as landfill cells (Lot 81), or to expand a current landfill facility (Lot 2).

Additional planning approvals are required before the purpose of the clearing can commence. If the approval for the identified purpose is not granted, it would be unnecessarily harmful to the environment for DWER to authorise native vegetation clearing when such clearing may not be required.

Attachment 5

The applicant has been requested to demonstrate planning approvals for the purpose of the proposed land clearing over both Lot 2 and Lot 81. It is noted that the Development Application is for an Extractive Industry over Lot 2 (only), with materials to be used on site to improve the operations of the existing landfill, with rehabilitation of disturbed areas to pasture only (Appendix H). If approvals for landfill expansion are not a consideration, rehabilitation (revegetation) of the site should be back to native vegetation consistent with DWER standards in respect to sand and gravel extraction in areas supporting native vegetation.

Please note that the information provided in this communication does not prejudice and must not be considered to infer the outcome of the EP Act clearing permit process.



Andre Schmitz

Environmental Officer

Native Vegetation Regulation

Department of Water and Environmental Regulation

Prime House, 8 Davidson Terrace, JOONDALUP WA 6027

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Twitter: @DWER_WA



Please consider the environment before printing this email

From: Cecilia Muller <Cecilia.Muller@dardanup.wa.gov.au>

Sent: Tuesday, 27 September 2022 4:41 PM

To: Andre Schmitz <Andre.Schmitz@dwer.wa.gov.au>

Subject: HPE CM: FW: Development Assessment Panel Application Extractive Industry - Lot 2 Banksia Road

Attachment 5

Good afternoon Andre

Thank you for taking the time to have a chat with Murray Connell and me.

I have also attached the DWER submission form from Brendan Kelly who has been very helpful in this regard.

I will send you the application report in a separate email as it is a large file.

Regards

Cecilia Muller

Principal Planning Officer



A: 1 Council Drive | PO Box 7016 | Eaton WA 6232

T: 08 9724 0386 | **E:** cecilia.muller@dardanup.wa.gov.au

W: www.dardanup.wa.gov.au



From: Ella Rafferty <Ella.Rafferty@dardanup.wa.gov.au>

Sent: Friday, 19 August 2022 3:59 PM

To: bunbury.admin@water.wa.gov.au

Cc: Cecilia Muller <Cecilia.Muller@dardanup.wa.gov.au>

Subject: Development Assessment Panel Application Extractive Industry - Lot 2 Banksia Road

Good afternoon

Please see attached letter from Principal Planning Officer – Cecilia Muller.

Kind regards

Ella Rafferty

Governance Coordinator



A: 1 Council Drive | PO Box 7016 | Eaton WA 6232

T: 08 9724 0314 | **E:** Ella.Rafferty@dardanup.wa.gov.au

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1: 15,356

Legend

- CPS areas applied to clear
- Roads - State Roads
- Roads - Major Roads
- Roads - Minor Roads
- Local Government Authorities
- Cadastre (LGATE_218) - SLIP

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986



Attachment 5



Department of
Primary Industries and
Regional Development

Your reference: DAP-F0309656

Our reference: LUP 1437

Enquiries: Grant Stainer

Mr André Schönfeldt
Chief Executive Officer
Shire of Dardanup
PO Box 7016
Eaton WA 6232
submissions@dardanup.wa.gov.au

Date: 27 September 2022

Dear Mr Schönfeldt,

Development assessment panel application: Extractive industry - Lot 2 Banksia Road, Crooked Brook

Thank you for inviting the Department of Primary Industries and Regional Development (DPIRD) to comment on the above proposal.

DPIRD objects to the proposal and offer the following comments.

Rehabilitation planning

- It is noted that the proposal intends to rehabilitate the land to pasture instead of the original native vegetation. Native vegetation is DPIRD's preferred option.
- The rehabilitation plan should ensure that the land is returned to the same or better condition than prior to excavation, so that pasture can be successfully established and maintained.
- The proposed extraction of the sand and gravel gives rise to concerns about how the proponent will be able to achieve the establishment of pastures after extraction, as removal would leave no suitable available substrate for the pastures to grow on.
- There should be enough sandy material retained on site to achieve a uniform minimum of 500 mm of sandy soil cover plus 150 mm of retained topsoil on top of that.
- DPIRD recommends the pasture rehabilitation plan should be developed by a qualified agronomist. As well as information on pasture establishment, the plan needs to consider ongoing pasture maintenance to ensure groundcover is maintained above 70 per cent to minimise the risk of soil erosion.

75 York Road Northam 6401
PO Box 483 Northam WA 6401
Telephone +61 (0)8 9690 2000 landuse.planning@dpird.wa.gov.au
dpird.wa.gov.au
ABN: 18 951 343 745

Geology and groundwater

- The drill logs show a significant amount of sandy material is present. Whilst there is also clay material to act as an aquiclude, this may not be consistent and contiguous. The sand gives rise to the potential for hydraulic connectivity to deeper aquifers. The layers of sand should be checked for any connectivity to deeper aquifers, such as through using tracers.

Native vegetation

- The proposed location of the sand and gravel extraction is currently occupied by native vegetation that forms the vast majority of the remaining native vegetation on the property.
- It is not proposed to rehabilitate the land with native vegetation. Pasture has higher runoff coefficient than native vegetation and this will alter the amount of stormwater from the site. As per the notes¹ in the Shire of Dardanup Council Agenda 26/5/2021, the Department of Biodiversity, Conservation and Attractions (DBCA) expressed opposition to the clearing of this vegetation, as it is contiguous with, and provides a buffer to, the Dardanup Conservation Park. This is in addition to having significant conservation values itself.
- DBCA's preference¹ would be that the existing native vegetation within the eastern portion of Lot 2 be retained to protect the poorly reserved native vegetation and black cockatoo habitat, while also providing a buffer to the adjoining Dardanup Conservation Park.
- DBCA also advised¹ that any clearing would require the appropriate permits from the Department of Water and Environmental Regulation (DWER) and should also be referred to the Federal Government's Department of Agriculture, Water and the Environment for assessment under the EPBC Act.
- As noted by the DBCA, any clearing must have the required permits from DWER.

Other comments

- Whilst there are unlikely to be any human impacts of the noise generated (except for workers at the site), the noise contours in Figure 2 (page 13) of the proposal extend well into the adjoining Dardanup Conservation Park, which could impact native wildlife and the area available to them.

The proposal must at all times be compliant with the Department of Water and Environmental Regulation's (DWER) [Water Quality Protection Guidelines](#) for Basic Raw Materials Extraction.

Attachment 5

For more information, please contact Grant Stainer on 90813 113 or grantley.stainer@dpird.wa.gov.au.

Yours sincerely,

A handwritten signature in dark ink, reading "Melanie Strawbridge". The signature is written in a cursive, flowing style.

Dr Melanie Strawbridge
**Director Agriculture Resource Management Assessment
Sustainability and Biosecurity**

References

¹ Shire of Dardanup, 26/5/2021, *Agenda: Ordinary Council Meeting to be held Wednesday the 26th of May 2021*, Shire of Dardanup, pages 26-27

Attachment 5

Cecilia Muller

From: Brendan Kelly <brendan.kelly@dwer.wa.gov.au>
Sent: Wednesday, 21 September 2022 2:49 PM
To: Records
Cc: Cecilia Muller; Murray Connell; Stephen Checker
Subject: Land Use Planning Referrals (2) - Lot 2 Banksia Road, Crooked Brook

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Our Reference: PA050934, RF9949~9 and PA051436, DWERTV107861~1

Your Reference: DAP-F0309575 and DAP-F0309656

To: Shire of Dardanup

From: Department of Water and Environmental Regulation

Date: 21 September 2022

Attention: Cecelia Mueller and Murray Connell

cc: Steve Checker, Department of Water and Environmental Regulation

Re: Land Use Planning Referrals (2) - Lot 2 Banksia Road, Crooked Brook

Thank you for providing these two interrelated referrals for the Department of Water and Environmental Regulation (Department) to consider.

BACKGROUND

The Department has received two individual development referrals from the Shire of Dardanup (Shire), for Lot 2 Banksia Road, Crooked Brook (Lot 2). Specifically:

- Shire Reference: DAP-F0309575 - Application for Development Approval - Stormwater Infrastructure, Lot 2 Banksia Road, Crooked Brook (**the DA**), and
- Shire Reference: DAP-F0309656 - Development Assessment Panel Application - Extractive Industry - Lot 2 Banksia Road, Crooked Brook (**the EI**).

Both the DA and the EI are supported by individual documentation prepared by Harley Dykstra:

- DA documentation: *'Banksia Road Landfill Stormwater Overflow Basins Application – Lot 2 Banksia Road, Crooked Brook (v.E), Harley Dykstra, July 2022'*
- EI documentation: *'Development Application Extractive Industry - Lot 2 Banksia Road, Crooked Brook (v.I), Harley Dykstra, July 2022'*

Further information was provided at the request of the Shire and received by the Department:

- Additional Correspondence: *'JDAP Application for Extractive Industry, Harley Dykstra, 29 July 2022'*, and
- Email: *'Stormwater Management Technical Letter, IW Projects, 14 September 2022'*.

Attachment 5

The two separate referrals are located within Lot 2 Banksia Road, which includes the Banksia Road Waste Management Facility (WMF), regulated by the Department as a prescribed premises (for waste management) under Part V of the 'Environmental Protection Act 1986' (EP Act).

PREAMBLE

As discussed with Shire officer Cecelia Mueller (20 September 2022), drainage infrastructure related to the DA is vital to the best practise management of the WMF and has the potential to be impacted upon by activities associated with the EI, e.g. extraction, stockpiles, haul roads, EI stormwater management infrastructure.

Particularly, if the EI is approved to include land clearing of native vegetation and extraction earthworks, the upstream catchment profile will be modified, which has the potential to impact on the stormwater drainage infrastructure that is key to the management of the WMF.

The risk is that modification to the upstream catchment affected by the EI will impact upon the DA, to the extent that existing and proposed stormwater infrastructure could be compromised.

As such the two referrals cannot be viewed in isolation and it is imperative to demonstrate that stormwater management of the EI (upstream) does not result in a change to the flows that are being managed by the DA stormwater infrastructure (downstream).

ADVICE

- The DA

This referral for modifications to existing stormwater basins at the western side of Lot 2 relates to an existing activity already licensed (Licence No. L8904) by the Department as a prescribed premises under Part V of the EP Act (for the purposes of waste management).

The Department has received an application from the licence holder for a works approval that will accommodate the modifications, which is currently being assessed.

If as a result of the EI proposal there are to be changes to the upstream flows, affecting the DA stormwater management system, then this will require consideration under Part V before the EI can be progressed.

Inquiries on the works approval should be referred to Stephen Checker, Waste Industries, telephone 97264198 or stephen.checker@dwer.wa.gov.au

- The EI

The Department has identified that the proposed extractive industry activities have the potential for impact on the environment and water resource values and management.

The proposed extraction is to be implemented in accordance with the Department's Water Quality Protection Note (WQPN) No. 15 'Basic raw materials extraction', where appropriate to the site situation, to ensure environmental risks are appropriately mitigated.

Attachment 5

Advice is based on a desktop analysis of the information provided in referral documentation and as such, prior to approval of the EI, the Shire is advised to check for matters raised in this response to ensure appropriate conditions are imposed.

It is understood that no crushing or screening of material will occur on site.

Key issues and advice are provided below, and these matters should be addressed:

1. Issue: Native Vegetation

Advice: Under section 51C of the Environmental Protection Act 1986 (EP Act), clearing of native vegetation is an offence unless:

- i. it is undertaken under the authority of a clearing permit,
- ii. it is done after the person has received notice under Section 51DA(5) that a clearing permit is not required,
- iii. the clearing is subject to an exemption.

Exemptions for clearing that are a requirement of written law, or authorised under certain statutory processes, are contained in Schedule 6 of the EP Act.

Exemptions for low impact routine land management practices outside of environmentally sensitive areas (ESAs) are contained in the 'Environmental Protection (Clearing of Native Vegetation) Regulations 2004' (the Clearing Regulations).

The Department has received a Clearing Permit application CPS 8327/1 from the applicant to clear native vegetation at this location for the purposes of extractive industry, which is currently waiting on information from the applicant.

For additional advice relating to the assessment of this application please contact Ray Carvalho on 63647350.

2. Issue: Stormwater Management

Advice: A detailed 'Stormwater Management Plan' (SMP) for the EI area is to be prepared and approved to the satisfaction of the Shire, in consultation with the Department, consistent with WQPN 15.

The SMP shall include detailed design of the proposed extraction area, stockpile and lay down areas, and haulage routes within the EI footprint and property boundary, and an EI staging plan*.

*N.B. although the proponent advised that the process of excavation will not follow a specific staging plan, the Department strongly supports the provision of a staging plan.

Detailed design shall include but not be limited to bunds, drains, swales, sediment and erosion control measures (basins and spillways), and management and maintenance protocols for all associated road and drainage infrastructure.

The SMP shall take into account and be commensurate with the receiving stormwater infrastructure associated with Licence L8904 under Part V of the 'Environmental Protection Act 1986' (EP Act).

3. Issue: Water Supply

Attachment 5

Advice: The proponent is to quantify their water requirements for all aspects of the proposed extraction and provide evidence of a secure water source, to the satisfaction of the Shire.

4. Issue: Dust Management

Advice: EI activities shall be subject to an approved 'Dust Management Plan', to the satisfaction of the Shire.

5. Issue: Site Rehabilitation

Advice: A Rehabilitation Plan is to be implemented to the satisfaction of the Shire consistent with WQPN 15 and the 'Guidelines for Preparing Mine Closure Plans'.

The proponent is to adhere to the intended staging plan and ensure successful rehabilitation to the final landform and landuse.

It should be noted that final landform and landuse may be subject to the outcomes of Clearing Permit application CPS 8327/1, currently being considered by the Department.

6. Issue: Chemical Tanks and Servicing

Advice: Management of all activities involving hazardous chemicals (including plant refuelling and/or servicing) shall be in accordance with the Department's WQPN 56 – 'Toxic and Hazardous Substance Storage and Use'.

Please note that the advice provided in this communication does not prejudice and must not be considered to infer the outcome of the EP Act licence and/or works approval process.

In the event there are modifications to the proposal that may have implications on aspects of environment and/or water management, the Department should be notified to enable the implications to be assessed.

Should you require any further information on the comments please contact Brendan Kelly on 97264194.

Regards,

Brendan Kelly
Senior Natural Resource Management Officer
Department of Water & Environmental Regulation,
Planning Advice, South West Region
Telephone: 08 97264194 | Mobile: 0407219515
Email: brendan.kelly@dwer.wa.gov.au

Work days are Tuesday, Wednesday, Thursday, however I am available on the mobile most times.

Attachment 5

Cecilia Muller

From: Veronica Martin <Veronica.Martin@dplh.wa.gov.au>
Sent: Tuesday, 27 September 2022 11:01 AM
To: Submissions Planning; Renee Milbanke
Cc: Cecilia Muller
Subject: FW: Development Assessment Panel application - Lot 2 Banksia Road, Crooked Brook - extractive industry

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Good morning Renee,

Thank you for referring this Development Assessment Panel (DAP) application to the Department of Planning, Lands and Heritage (the Department). As DAP is the decision making authority, the Department has not undertaken formal assessment of the application. Please see the Department's referral comments below.

Under the Greater Bunbury Region Scheme, Lot 2 Banksia Road, Crooked Brook is zoned Rural, abuts Regional Open Space reservation and is within the Strategic Minerals and Basic Raw Materials Resource Policy area. In accordance with clauses 1 and 10 of Schedule 2 of Delegation Powers of Local Governments (DEL 2014/01), it is noted that at this stage, the local government is the authority preparing the Responsible Authority Report (RAR). If after referral and assessment the local government believes that it does not have delegation to prepare the RAR, please advise the Department immediately in order for it to prepare the RAR.

It is noted that the proposed development area is within the *Environment Protection and Biodiversity Conservation Act 1999* referral area and is subject to the *Environmental Protection Act 1986*. It is expected that appropriate consultation is undertaken with state and federal agencies to ensure that any impacts on the environment are fully considered, and that appropriate buffers are provided to the Regional Open Space reservation, consistent with environmental guidance.

Please do not hesitate to contact me if there is anything else I can assist you with.

Kind regards,

Veronica Martin | Senior Planning Officer | Land Use Planning
Bunbury Tower, Level 6, 61 Victoria Street, Bunbury WA 6230
9791 0587 |
www.dplh.wa.gov.au



We're on a Roll, WA

Keep doing 3 simple things

Wear a mask when necessary | Update your vaccinations | Wash hands regularly.

Your ref: DAP-F0309656

Our ref: 49274 2019/000800

Enquiries: Tracy Teede

Phone: 9725 4300

Email: swlanduseplanning@dbca.wa.gov.au

Chief Executive Officer
Shire of Dardanup
PO Box 7016
EATON WA 6232

Attention: Cecilia Muller

EXTRACTIVE INDUSTRY (GRAVEL & SAND EXTRACTION) – LOT 2 BANKSIA ROAD CROOKED BROOK – EASTERN PORTION OF LOT

I refer to your letter dated 17 August 2022 seeking the Department of Biodiversity, Conservation and Attractions' (DBCA) Parks and Wildlife Service's comments on an extractive industry application for Lot 2 Banksia Road Crooked Brook.

Parks and Wildlife Service's South West Region provides the following advice.

Advice to Shire

The Dardanup Conservation Park (DCP) adjoins the Lot 2 southern and eastern boundaries and is managed by DBCA to maintain and restore the natural environment and to protect native flora and fauna. There should be no impacts from the proposed extraction works on the biodiversity values and management of the DCP.

Biodiversity values

The eastern portion of Lot 2 contains conservation significant Whicher Scarp vegetation complexes, including Whicher Scarp (WCv), which are known to support priority flora species and threatened fauna. The Whicher Scarp (WCv) vegetation complex is considered to be poorly retained with only 574ha of the pre-1750 extent remaining. This is below the recommended 1500ha threshold for the retention of remnant vegetation.

The eastern portion of Lot 2 is within the buffer of the Priority Ecological Community (PEC), namely the "*Dardanup Jarrah and Mountain Marri woodland on laterite*" (Priority 1). This PEC is located on an unusual surface of quartzite and laterite in the Dardanup forest where the Whicher Scarp, Blackwood Plateau and Darling Scarps interface.

The following Priority flora species have been located either close to the Lot 2/Dardanup Conservation park boundary, or within 1.4km of Lot 2.

Logania wendyea (P1)
Stylidium perplexum (P1)
Gastrolobium whicherensis (P2)
Lomandra whicherensis (P3)

Synaphea polypodioides (P3)
Acacia semitrullata (P4)
Acacia flagelliformis (P4)
Chamelaucium sp. Yoongarillup (P4)

South West Region

PO Box 1693, Bunbury, Western Australia 6230
Phone: (08) 9725 4300 Email: bunbury@dbca.wa.gov.au
dbca.wa.gov.au

Attachment 5

The Lot 2 native vegetation provides habitat for threatened black cockatoos and western ringtail possums (WRP). Black cockatoos and WRP are listed as threatened species under the *Biodiversity Conservation Act 2016* (BC Act) and the *Environmental Protection Biodiversity Conservation Act 1999* (EPBC Act).

WRP are listed as critically endangered under both the BC Act and the EPBC Act. Other fauna of conservation significance that are likely to use the site include quenda and south-western brush-tailed phascogales.

The Lot 2 eastern native vegetation is contiguous with, and provides a buffer to, the Dardanup Conservation Park in addition to having significant conservation values itself.

Clearing permit

Section 4.3.1 *Existing Environmental Values* (page 16) of the application refers to the applicant applying for a Department of Water and Environmental Regulation (DWER) clearing permit. DBCA expects that the environmental values that are likely to be impacted by the proposed sand and gravel extraction will be adequately considered through the assessment of the clearing permit, through which DBCA may provide advice to DWER.

The Harley Dykstra (July 2022) *Excavation Site Plan* (22910-03) depicts areas for a Topsoil Stockpile, a Mulched Vegetation Stockpile and Temporary Excess Material Stockpiles. These stockpile areas appear to require clearing of native vegetation.

The Accendo Australia, July 2021, *Figure 1 Habitat Trees with one or more hollows possibly suitable for black cockatoos*, depicts the proposed native vegetation clearing footprint however the proposed Topsoil Stockpile does not appear to be included in the clearing footprint. The DWER clearing permit application should include all areas of proposed native vegetation clearing.

Topsoil Stockpile

The Lot 2 Banksia Road landfill site is subject to an agreement with DBCA for adequate drainage management along the southern boundary. This agreement formed part of an earlier Shire of Dardanup development application.

The buffer between the Topsoil Stockpile and the DCP adjacent to the Lot 2 southern boundary appears to be approximately 20 metres and is sparsely vegetated. DBCA's preference would be that the Topsoil Stockpile is located to provide a larger vegetated buffer to the DCP and designed to ensure there is no run-off to the DCP.

Federal referral

The proposed extractive industry works will involve likely impacts on Matters of National Environmental Significance as listed under the EPBC Act. The proponent should investigate the need for approvals under this Act.

A decision on this application should await the outcomes of communications with the Department of Climate change, Energy, the Environment and Water (DCCEEW).

An Accendo Australia, June 2022, *Environmental Offset Proposal*, was provided with the proposal to offset the proposed clearing of native vegetation.

DBCA suggests that Shire of Dardanup development approval is not provided until after the decision of the DWER clearing permit to ensure any allowed clearing in the development design and the suitability of proposed offsets have been determined by DWER and the DCCEEW.

Attachment 5

Thank you for the opportunity to comment on this application. Please contact Tracy Teede at the Parks and Wildlife Service South West Region office on 9725 4300 if you have any queries regarding this advice.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Simon Martin'.

Simon Martin
Acting Regional Manager
Parks and Wildlife Service

4 October 2022

Attachment 5

From: HAMDORF, David <David.HAMDORF@dmirs.wa.gov.au>
Sent: Wednesday, 28 September 2022 1:01 PM
To: Submissions Planning
Subject: DMIRS Response - Lot 2 Banksia Road Crooked Brook - Extractive Industry - Eastern Side

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Your Ref: DAP-F0309656
Our Ref: A2130/202101

Thank you for your referral dated 17 August 2022.

The Department of Mines, Industry Regulation and Safety has determined that this proposal raises no significant issues with respect to mineral and petroleum resources, geothermal energy, and basic raw materials.

Kind Regards

David Hamdorf | Senior Geologist - Mineral Resources
Geological Survey and Resource Strategy Division

Department of Mines, Industry Regulation and Safety
100 Plain Street East Perth WA 6004
Tel: +61 8 9222 3533
david.hamdorf@dmirs.wa.gov.au | www.dmirs.wa.gov.au



Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

*We're working for
Western Australia.*

We acknowledge Aboriginal people as the Traditional Custodians of the lands on which we deliver our services. We pay our respects to elders and leaders past, present and emerging.

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Attachment 5

From: Daniel Lawrence <Daniel.Lawrence@watercorporation.com.au>
Sent: Wednesday, 28 September 2022 10:54 AM
To: Submissions Planning
Cc: Renee Milbanke
Subject: RE: Shire of Dardanup

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Hi Renee,

Thanks for the opportunity to comment, Water Corporation have no objection to this proposal.

Kind Regards

Daniel Lawrence
Snr Plnr – Land Planning
Development Services

E Daniel.Lawrence@watercorporation.com.au

From: Renee Milbanke <Renee.Milbanke@dardanup.wa.gov.au>
Sent: Tuesday, 16 August 2022 4:15 PM
To: Land Planning <LandPlanning@watercorporation.com.au>
Subject: Shire of Dardanup

Good afternoon,

I have attached a letter on behalf of Cecilia Muller regarding:

DEVELOPMENT ASSESSMENT PANEL APPLICATION
EXTRACTIVE INDUSTRY - LOT 2 BANKSIA ROAD, CROOKED BROOK

Kind Regards,

Renee Milbanke
Governance Officer



A: 1 Council Drive | PO Box 7016 | Eaton WA 6232
T: (08) 9724 0000 | **E:** Renee.Milbanke@dardanup.wa.gov.au
W: www.dardanup.wa.gov.au



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6 Anembo Close
DUNCRAIG
WA 6023
iwatkins@iwprojects.com.au
Mobile 0402 909 291

14 September 2022

Harley Dykstra
21 Spencer Street
BUNBURY
WA 6230

Sent via email only "mikaelak@harleydykstra.com.au"

Attention: Mikaela Kerwin

Re: Extractive Industries Application Lot 2 Banksia Road – Stormwater Management

Dear Mikaela,

Further to your request for clarification as to the existing and future stormwater management in the vicinity of the proposed Extractive Industries Area and the potential impact on the overall site stormwater management system, I provide the following information:

Existing Stormwater Management

Golder has undertaken an extensive assessment of the stormwater management across the site, including all upstream catchments that are external to the site. Golder produced a comprehensive Stormwater Management Plan (*Dardanup Landfill Stormwater Management Plan – October 2021 – Updated 4 May 2022*), which is an attachment to the original extractive industries application. This stormwater management plan included the stormwater catchment in the vicinity of the proposed extractive industries activities. Section 5.1 Catchment Delineation confirms that this catchment has been included in the assessment. Attachment A of the Golder plan indicates the configuration of stormwater drains across the site.

Based on the current, relatively undisturbed nature of the proposed extractive industries area, all surface water simply follows the natural topography and flows to the west, into the Eastern Diversion Drain (North), which then flows into the northern portion of the site stormwater drainage system.

Attachment 6

The Golder Stormwater Management Plan, in Section 9 Conclusion states that “*the site can retain runoff fully within the designated storage areas for storm events up to and including a 1% AEP with a minimum of 0.5 m freeboard*”, which confirms that the existing site stormwater system, including the proposed extractive industries catchment area, is able to adequately manage an extreme rainfall event (1% AEP or 1 in 100 year) without any surface water exiting the site boundaries.

Extractive Industries Stormwater Management

Stormwater management within the excavation void will include the following:

- There will be a perimeter access road constructed around the excavation void. The road will be progressively constructive as the void develops, using suitable construction material excavated from within the void. The road will be raised approximately 500 mm above the surrounding natural ground level to prevent external stormwater from flowing into the void. A V-drain of approximately 1 m deep will be constructed on the outside of the perimeter road (opposite side to the void) to direct any surface water run-off to the surrounding stormwater management system - Eastern Diversion Drain (North).
- Where the void is developed such that the stormwater cannot flow out of the void, then low points will be excavated within the void floor to collect stormwater and keep it away from the area being excavated and the associated haul roads. If necessary, the accumulated surface water will be pumped out of the void and into the surrounding stormwater drainage system.
- The final void will be developed such that accumulated stormwater can flow out of the void. The void floor will be developed with a slight slope falling to the northwest where the stormwater will exit the void. The floor of the void will incorporate a number of silt traps through which the stormwater will flow to reduce the silt loading of the stormwater before it enters the surrounding stormwater drainage system.

During the excavation activities, stormwater external to the extractive industry area will be diverted around the void and be unaffected by the excavation activities. As the excavation area increases and more and more surface water is collected and retained within the void, there will be a reduction in stormwater runoff into the surrounding site stormwater drainage system during storm events.

Attachment 6

Ultimately, when the excavation activities have been completed, stormwater landing directly within the void will flow through numerous silt traps in the void floor and eventually overflow into the site stormwater drainage system. Again, the silt traps in the void floor will slow down and reduce the surface water flow entering the site stormwater system and hence, reduce the peak flow during storm events. In reality, the vast majority of stormwater will be retained within the silt traps and not enter the site stormwater drainage system.

Should you have any further queries, please do not hesitate to contact the undersigned.

Yours sincerely

A handwritten signature in purple ink, appearing to read 'I. Watkins'.

Ian Watkins
IW Projects

cc Cleanaway



Cleanaway Solid Waste Pty Ltd
Dust Management Plan

Banksia Road Landfill
Crooked Brook, WA 6236

22 April 2021

58071/126,854 (Rev 5)

JBS&G Australia Pty Ltd T/A Strategen-JBS&G

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Document control

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Document Status

Rev No.	Author	Reviewer	Approved for Issue			Version
		Name	Name	Signature	Date	
A	C.Ingram	J.Bailes	J.Bailes	JMB	14/01/2020	Draft document issued for Cleanaway review.
0	C.Ingram	J.Bailes	J.Bailes	JMB	16/01/2020	Final draft document issued for Cleanaway and Shire of Dardanup review.
1	C.Ingram	J.Bailes	J.Bailes	JMB	21/02/2020	Document updated to consider Shire of Dardanup comments; final version issued for public advertisement, external peer review and Department of Water and Environmental Regulation (DWER) review.
2	C.Ingram	J.Bailes	J.Bailes	JMB	07/08/2020	Document updated to consider peer review and DWER review comments; revised version issued for Shire of Dardanup review.
3	J.Bailes	C.Ingram / P.Forster	J.Bailes	JMB	11/09/2020	Document updated to consider Shire of Dardanup review comments; revised version issued for public advertisement and Shire of Dardanup Council review.
4	C.Ingram	J.Bailes	J.Bailes	JMB	10/03/2021	Document updated to include construction activities and revised monitoring parameter and trigger levels.
5	J.Bailes	J.Bailes	J.Bailes		10/03/2021	Document updated to include Shire of Dardanup CEO comments.

Attachment 7

Definitions and abbreviations

Term	Definition
Ambient air	The external air environment, it does not include the air environment inside buildings or structures.
DMP	Dust management plan.
Dust	The generic term used to describe solid airborne particles generated and dispersed into the air by processes such as handling, crushing and grinding of organic or inorganic materials such as rock, ore, metal, coal, wood or grain and stockpiling of materials and windblown dust.
Dust event	The occurrence of visible fugitive dust from a source or activity at the site that exits a boundary of the site for a duration of greater than one (1) minute.
Dust generating development	Means development referred to in clause 3.1 of the Shire of Dardanup's 2011 Dust Control Local Law.
Dust Risk Areas	The areas highlighted as having moderate to high risk of dust generating potential as shown on Figure 4
DWER	Department of Water and Environmental Regulation.
EPA	Environmental Protection Authority.
EP Act	<i>Environmental Protection Act 1986</i> .
Fugitive dust	Dust which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent openings.
NEPM	National Environmental Protection (Ambient Air Quality) Measure 2015.
PM ₁₀	Dust particles/particulate matter with an equivalent aerodynamic diameter of up to 10 micrometres.
PM _{2.5}	Dust particles/particulate matter with an equivalent aerodynamic diameter of up to 2.5 micrometres.
QA/QC	Quality assurance/quality control
Sensitive receptor	Individuals/communities/components of the environment which could be adversely affected by dust emissions, such as people in dwellings, schools, hospitals, nursing homes, childcare facilities, offices, public recreation areas that exist now and in the future and protected wetlands. Some individuals may be more susceptible to adverse air quality, such as, children, the elderly and people with pre-existing medical conditions such as asthma or heart disease.
Total suspended particles (TSP)	All particles entrained/suspended in the atmosphere and includes the fine, respirable particles (PM ₁₀ and PM _{2.5}) and larger size particles that may settle out of the air causing nuisance impacts, usually measured as those particles having an equivalent aerodynamic diameter of 50 micrometres or less.
Trigger level	The 'corrective action' trigger level is the ambient boundary air dust level which if exceeded will result in corrective action being taken to reduce dust emissions until the dust levels fall below the trigger level. The 'stop work' trigger level is the ambient boundary dust level which will result in site activities ceasing until the dust levels fall below the trigger level.

1. Introduction

Cleanaway Solid Waste Pty Ltd (Cleanaway) operates the Banksia Road Waste Landfill (the site) located at Lot 2 on Plan 65861, Banksia Road, Crooked Brook in the Shire of Dardanup approximately 10 km southeast of the City of Bunbury and 3.8 km southeast of the town of Dardanup (Figure 1).

The use of the land as a waste disposal facility has been determined by the Shire of Dardanup (the Shire) to constitute 'dust generating development'. Therefore, this dust management plan (DMP) has been prepared to meet obligations under the Shire's Dust Control Local Law 2011.

1.1 Objective

The objective of this DMP is to provide a framework for the management and mitigation of dust from the activities and operations conducted at the site to minimise the risk of dust emissions crossing the site boundary.

The DMP consists of the following:

- introduction outlining site background, context and purpose of the DMP
- a description of the existing environmental setting, regulatory obligations, site characteristics and significant environmental aspects to be managed
- details of the proposed dust management measures.

The purpose of this plan is to prevent dust-related impacts, including amenity impacts, on workers, surrounding residences and the environment from activities associated with the operation of the site.

1.2 Site background

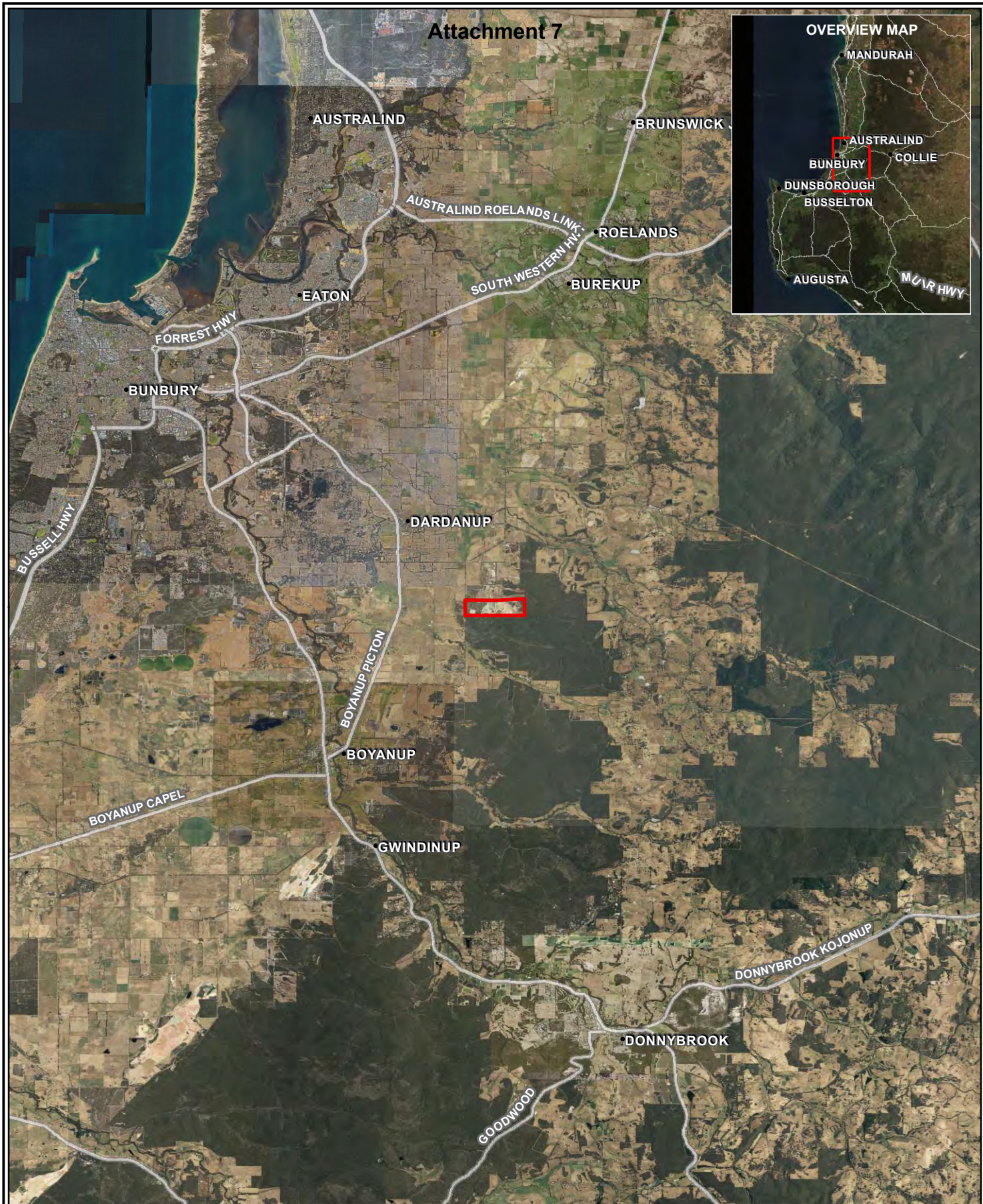
The site is a putrescible landfill and liquid waste facility operated under *Environmental Protection Act 1986* (EP Act) Licence L8904/2015/1 (the licence) granted by the Department of Water and Environmental Regulation (DWER). The site accepts general (household and commercial) waste and tailings¹.

1.3 Stakeholder consultation

This DMP has been developed in consultation with relevant stakeholders, including the Shire of Dardanup and DWER; and has also been advertised to the public and subject to third-party peer review (refer to Document Control page).

The DMP will continue to be updated in consultation with relevant stakeholders where appropriate in accordance with the document review schedule described in Section 10.

¹ Cleanaway is currently authorised to accept and store tailings from mineral sands processing within defined cells at the site.



Legend: <div><div></div> Premises boundary</div> <div><div></div> Suburb boundary</div> <div><div></div> Roads (MRWA)</div>	Scale 1:200,000 at A4 <div><div>02.55</div><div>Kilometres</div></div>		Banksia Road Landfill Crooked Brook, WA 6236
	Coord. Sys. GCS GDA 1994 <div><div></div></div>		
	Job No: 58071		
	Client: Cleanaway		FIGURE 1
	Version: A	Date: 31-Jul-2020	
	Drawn By: hsullivan	Checked By: JB	
	<div><div></div><div>strategen JBS&G</div></div>		

2. Environmental setting

The environmental setting and proximity of surrounding environmental features and nearby sensitive receptors to the site are shown in Figure 2.

2.1 Existing land use

The 121 ha site is zoned 'General Farming' under Shire of Dardanup Town Planning Scheme No. 3. The site is privately owned and leased by Cleanaway. The site has been operated by Cleanaway since the landfill was first granted approval in 1999.

A portion of the western part of the site not under the control of Cleanaway is currently used by a third-party for sand extraction (see Figure 3). DWER has confirmed that this activity is not a prescribed premises category specified in Schedule 1 of the *Environmental Protection Regulations 1987* and is not regulated by the department under the works approvals and licensing provisions of the *Environmental Protection Act 1986* (EP Act).

2.2 Surrounding land use

Land uses surrounding the site include rural properties, other waste management facilities and conservation areas. Surrounding land uses include:

- North: Dardanup Landfill Site (closed)
- East: State Forest (Regional Open Space)
- South: State Forest (Regional Open Space)
- West: Banksia Road and rural properties.

Other waste management facilities are located approximately 400 m north of the site and include the Bunbury Harvey Regional Council Banksia Road Organics Processing Facility, the Shire of Dardanup Waste Transfer Station and a Water Corporation wastewater treatment plant.

Table 2.1 below provides a summary of the potential human and environmental receptors that may be impacted as a result of dust-generating activities at the site.

Table 2.1: Sensitive human and environmental receptors

Human receptors	Distance from site
Closest residential receptors	<ul style="list-style-type: none"> • 0.5 km south of the southwest corner of the site boundary, separated by the Dardanup Conservation Park and Boyanup State Forest • 0.9 km due west of the site boundary • 1 km west southwest of the southwest corner of the site boundary • 1.5 km due south of the site boundary, separated by the Dardanup Conservation Park and Boyanup State Forest • 1.5 km northwest of the northwest corner of the site boundary • 1.5 km northeast of the northeast corner of the site boundary separated by the Dardanup Conservation Park and Boyanup State Forest • 1.75 km east northeast from the eastern boundary of the site boundary separated by the Dardanup Conservation Park and Boyanup State Forest.
Environmental receptors	Distance from site
Dardanup Conservation Park and Boyanup State Forest	Immediately adjacent south and east of the site boundary.
Threatened Ecological Communities	Four priority Threatened Ecological Communities are present within the adjacent Dardanup Conservation Park.
Geomorphic wetland: Multiple use Palusplain and Dampland (flat, seasonally waterlogged)	Approximately 400 m southwest through northwest of the site boundary.
Crooked Brook (including Registered Aboriginal Heritage Places)	Approximately 1,100 m south/southwest of the site boundary flowing in a generally east to west direction. A minor watercourse located approximately 750 m south of the site boundary flows into Crooked Brook.

2.3 Physical environment

2.3.1 Climate and meteorology

The Southwest of WA experiences a Mediterranean type climate with cool, wet winters and hot, dry summers, with the majority of the rain falling in the winter. The nearest Bureau of Meteorology (BoM) climate station, which records wind speed and direction is Bunbury (Site number:9965), located approximately 14 km to the northwest of the site.

The average maximum temperatures (1995-2018) for Bunbury range from 17.3°C in July to 30.0°C in February. The average minimum temperatures range from 7.1°C in July to 15.9°C in February.

The majority of rainfall is received between April and October. Rainfall averages 726.1 mm/year and mean monthly rainfall varies from 7.2 mm in February to 142.5 mm in July.

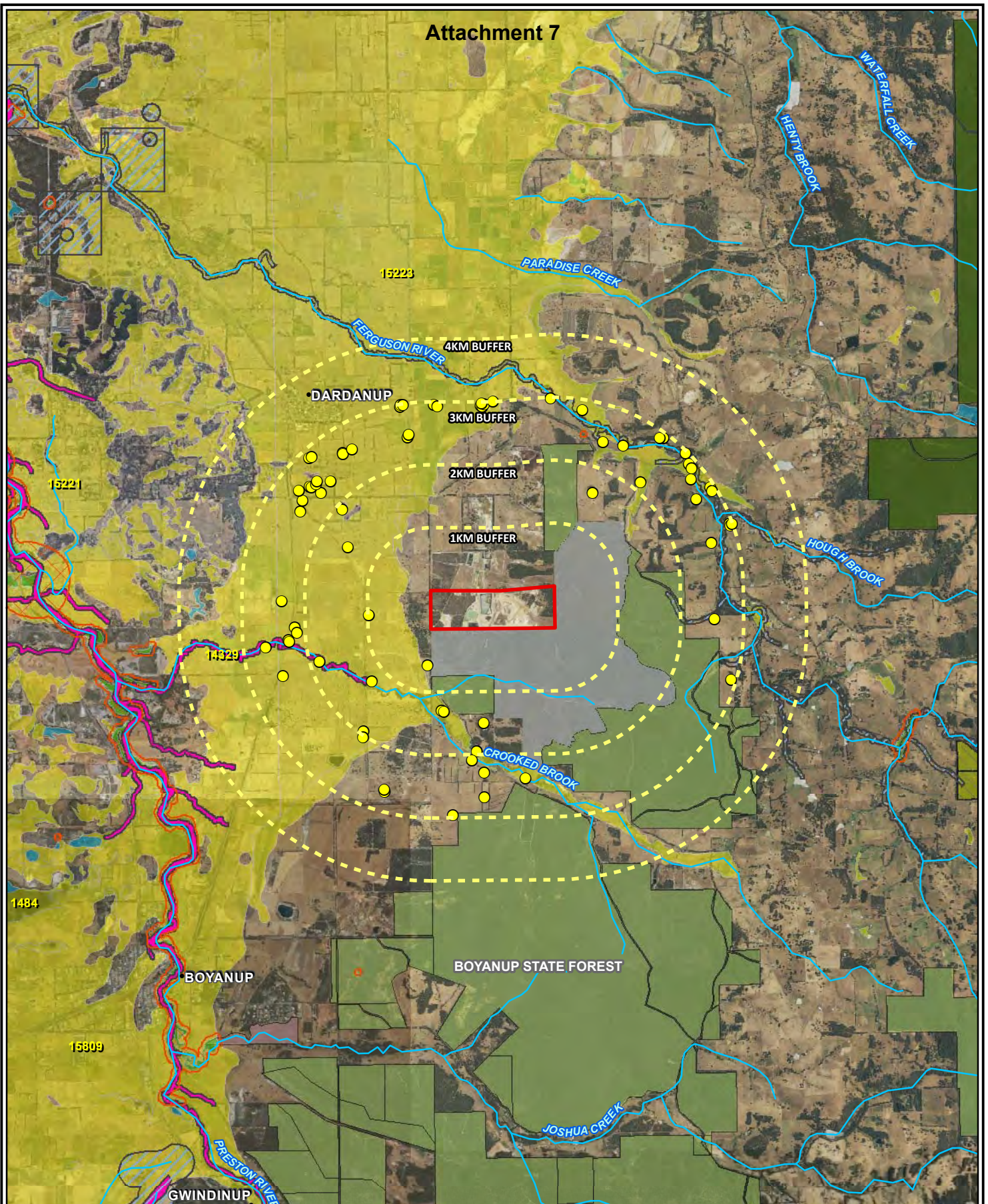
At the Bunbury BOM station, the average morning (9 am) wind speed reported during summer is 4.3 m/s, prevailing predominately from the east and southeast. Wind speed typically increases in the afternoon (3 pm) with an average wind speed 5.6 m/s reported, which prevails from a westerly direction. During winter, winds abate to an average of 3.5 m/s during the morning prevailing from the east and northeast. Afternoon winds increase to an average of 5.1 m/s during winter and range in direction from the west, northwest and north.

In order to characterise the local wind influences at the site, monitoring of the meteorology on-site commenced at the end of June 2019. Monthly wind roses to date are contained in Appendix A.


2.3.2 Topography

The site is situated along the boundary between the Swan Coastal Plain and the western facing slope of the Whicher Scarp. Due to its location on the scarp, the ground surface falls from approximately 125 mAHD in the southeast of the site to 45 mAHD at the western boundary. The natural ground surface has been modified due to landfilling activities.

Attachment 7



- | | |
|---|---|
| <ul style="list-style-type: none"> Premises boundary 1km interval buffers Aboriginal Heritage Places (DAA-001) Registered Site Other Heritage Place Geomorphic Wetlands (DBCA) Conservation Resource Enhancement Multiple Use Watercourses | <ul style="list-style-type: none"> Environmentally sensitive areas (DWER) Legislated Lands and Waters (DBCA) National Park Section 34A Freehold Section 5(1)(h) Reserve Nature Reserve State Forest Other Reserves ● Sensitive receptor - residence |
|---|---|

Scale 1:80,000 at A4		0 1 2 Kilometres
Coord. Sys. GDA 1994 MGA Zone 50		
Job No: 58071		
Client: Cleanaway		
Version: A	Date: 23-Jul-2020	
Drawn By: cthatcher	Checked By: JB	

Banksia Road Landfill
Crooked Brook, WA 6236

ENVIRONMENTAL SETTING AND SENSITIVE RECEPTORS

FIGURE 2



3. Regulatory Framework

3.1 Environmental Protection Act 1986

The site is regulated by DWER under Part V of the EP Act. Cleanaway holds Licence L8904/2015/1 for prescribed premises categories 61 and 64, as shown in Table 3.1.

Table 3.1: Current prescribed premises categories

Category	Description	Category production or design capacity	Premises production or design capacity
<i>Existing categories</i>			
61	Liquid waste facility: premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	100 tonnes or more per year	353,000 tonnes per year
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" is accepted for burial.	20 tonnes or more per year	350,000 tonnes per year

The licence is prescriptive of the control of fugitive dust emissions (conditions 1.4.15 to 1.4.22) and includes a dust risk area map reproduced in Figure 4.

The Dust Risk Areas were identified by their potential for fugitive dust generation, considering orientation, exposed surfaces, topography and vehicle movements as detailed in the figure notes. The DMP includes management actions consistent with the licence conditions related to dust, as indicated in Section 7.

3.2 National Environmental Protection (Ambient Air Quality) Measure

The *National Environment Protection Council (NEPC) (Commonwealth) Act 1994* established the National Environmental Protection Council (NEPC) which determines and evaluates National Environment Protection Measures (NEPMs) for the nation. The *National Environment Protection Council (Western Australia) Act 1996* is mirror legislation of the commonwealth act and implements the NEPMs in Western Australia.

The National Environmental Protection (Ambient Air Quality) Measure 2015 (the ambient air quality NEPM; NEPC 2015) provides air quality standards applicable to urban airsheds. In the absence of guidance specifically for rural settings, the ambient air quality NEPM is adopted.

3.3 Shire Local Laws

The site is required to comply with the Shire of Dardanup Dust Control Local Law 2011 (the Local Law). The Local Law requires a dust management plan to be accepted by the local government and operations to be conducted within any terms and conditions to which the accepted dust management plan is subject.

3.4 Separation guidance

Environmental Protection Authority (EPA) Guidance Statement No. 3 (GS3) (EPA 2005) provides advice on the use of generic separation distances for a range of industrial land uses. In determining the separation distances emissions – including gaseous and particulate emissions, noise, dust and odour – that may affect the amenity of nearby sensitive land uses were considered. Separation distances are not intended to replace actions to mitigate emissions and offsite impacts.

Recommended separation distances for category 64 putrescible landfill sites (Class II & III) is 500 m for sensitive uses (subdivisions), 150 m for single residences with an internal buffer of 35 m from the site boundary. There are no single residences within 150 m of the site boundary (see Table 2.1).

3.5 Dust management guidelines

The Department of Environment and Conservation (DEC 2011) document, *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*, is applicable to the dust management bulk handling, stockpiling and disposal of materials activities conducted at the site.

It is understood that DWER is preparing a new guideline on dust emissions. This DMP will be reviewed when the new guideline is published to ensure it meets the relevant requirements (see Section 10).

4. Site activities

4.1 Normal operations

Activities conducted at the site associated with the operation of the landfill include vehicle movements on sealed and unsealed surfaces and transport, bulk handling, stockpiling and burial of waste. The layout of the site is shown in Figure 3.

4.1.1 Hours of operation

The hours of operation for the disposal of solid waste at the site, as agreed with Council currently, are:

- weekdays and weekends: 6.00 am to 6.00 pm
- Public Holidays: open, unless otherwise posted.

4.1.2 Equipment

Equipment used on-site may include, but is not limited to:

- two landfill compactors (greater than 50 tonnes) to compact the waste
- bulldozer to spread and cover the waste and for general earthmoving activities
- two track loaders for cleaning the landfill floor, spreading, processing and covering waste
- front end loader and articulated dump truck for moving cover soils from stockpiles, supplying materials for access roadways and other earthmoving activities
- two excavators to assist in excavating landfill areas and to load aggregate materials and cover soils from stockpiles
- water truck and water cart for dust mitigation and for emergency fire response
- diesel generators for power supply and water pumps for managing stormwater
- street sweeper for use on bitumised haul roads for managing fugitive dust.

4.1.3 Solid waste handling procedures

The working face is the area where solid waste is unloaded from the incoming vehicles, levelled, compacted, and cover material is applied. The site limits the number of working faces in use at any one time – generally, there will only be one active disposal area in operation. However, some circumstances require additional disposal areas to be open-ended (e.g. in response to adverse weather conditions and for receipt of special waste materials).

The size of the working face depends on the number of vehicles that need to be managed and the landfill equipment that is available to place and cover the waste. The area of the working face is kept as small as practical, minimising potential environmental impacts and requirement for cover material.

Trucks can be unloaded from either the top or bottom of the working face. Where possible, trucks are unloaded at the bottom of the working face, which is shielded from wind, unless surface water and muddy conditions during wet weather hinder truck movement and cause mud-tracking issues. Drop/tip heights are also minimised as far as practicable.

The deposited waste is spread in layers no greater than 500 mm thick using a bulldozer, track loader or compactor and then compacted by a compactor, which makes several passes over each layer. The waste is compacted and covered with inert material or approved alternate materials at the end of each working day. The cover material is also placed in a progressive manner through the day on the side slopes and top deck areas, and an amount is retained for fire control.

4.2 Construction activities

Construction activities associated with extending the landfill capacity (following grant of the appropriate works approval) involves the establishment of new cells to accommodate waste and rehabilitation of completed cells (refer to Figure 3 for cell layout). Current construction and rehabilitation areas are shown on the dust risk area map (Figure 4).

4.2.1 Hours of operation

Construction activities generally occur on:

- weekdays: 7.00 am and 5.00 pm
- Saturday: occasionally as needed, typically 7.00 am to 3.00 pm.

No construction work is carried out on Sundays or Public Holidays.

4.2.2 Equipment

Equipment employed for the earth works required for the construction of new landfill cells includes the following:

- two excavators (45 t and 30 t)
- four dump trucks (40 t)
- one bulldozer
- one front-end loader
- one grader
- one compact track loader.

Typically, up to seven pieces (occasionally eight) of plant are operated for construction activities at one time.

4.2.3 Cell construction

The construction of a new landfill cell entails the excavation of a void and subsequent installation of a plastic liner. Excavation starts at the natural/existing ground surface, progressing down to approximately 18 m to 20 m depth.

Excavated soil is stockpiled as close to the site of excavation as practicable to minimise the impacts of haulage. Historic construction of cells required up to 300,00 m³ of soil to be excavated taking up to six months to complete. Future cells are planned to be wider requiring more volume to be removed, likely pushing construction time out to up to nine months.

Attachment 7

SITE ENTRANCE/EXIT

OFFICE, WEIGH BRIDGE
AND CARPARK

WHEEL WASH

MIC CELL
LEACHATE POND

ACCESS ROAD

CRISTAL
POND

CRISTAL CELL 2

MIC CELL

12A

12

15

16

17

18

19

20

1 & 2

4B

LANDFILL

3 & 4

5

7

8

9

10

11

13

14

SECONDARY
STORMWATER
DAM

PRIMARY
STORMWATER
DAM

LEACHATE
EVAPORATION POND

PRIMARY LEACHATE
POND

Legend:

- Premises boundary
- Landfill cells - future
- Landfill cells - existing
- Cadastral boundary
- Sand extraction area (excluded from DMP)
- Cristal - sealed road
- Waste - sealed road
- Waste alt - unsealed



Job No: 58071

Client: Cleanaway

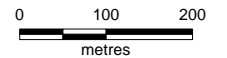
Version: A

Date 11/03/2021

Drawn By: cthatcher

Checked By: JB

Scale 1:8,750



Banksia Road Landfill
Crooked Brook, WA 6236

SITE LAYOUT

FIGURE 3

Attachment 7

Legend:

- Premises boundary
- Grid
- Dust risk - high
- Dust risk - moderate
- Minor road
- Track



Job No: 58071

Client: Cleanaway

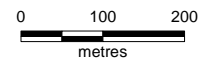
Version: A

Date 12/03/2021

Drawn By: cthatcher

Checked By: JB

Scale 1:9,250



**Banksia Road Landfill
Crooked Brook, WA 6236**

DUST RISK AREA MAP

FIGURE 4



Dust risk area map notes:

1. Northern haul route C1-I1:

The main haul route carries traffic to and from the active face and, whilst being sealed, is within a designated waste precinct, at a low elevation, and carries significant traffic on the site boundary.

2. Laydown H1, I1 and I4-I5:

Large area of unsealed road and flat spaces at elevation, presenting increased opportunity for fugitive dust.

3. Southern haul route G7-I7:

The unsealed road carries only minor operational traffic, not waste vehicles. As future landfill cells are developed, the waste vehicles will progressively travel east along this road. The road will progressively be sealed as required to accommodate waste vehicles.

4. Active cells G2-G6:

At elevation and the site of tipping loads until mid-2021.

5. Future active cells H3-H6:

Active use of Cell 8 to commence in mid-2021.

6. Construction site F2-F3:

Cell 12A construction estimated to October 2021.

7. Active works F5-F6:

Cell 5 capping and rehabilitation.

5. Potential impacts

5.1 Parameters of interest

The operational activities conducted at the site have the potential to result in airborne dust (fugitive dust), including the Total Suspended Particulates (TSP) and PM₁₀ fractions, which could impact upon human health and amenity. Impacts to amenity from dust include:

- regular dust events over several weeks leading to a gradual build-up of dust on surfaces
- short period dust events of very high concentrations which cause a rapid build-up of dust on surfaces, or soiling, if dust deposition rates are high.

Dust may impact upon the environment where surface deposition affects vegetation growth.

5.1.1 Particles

PM₁₀ is particulate matter of 10 micrometres or less in diameter, which is the fine particle fraction of TSP. PM₁₀ includes inhalable particles that are small enough to penetrate the thoracic region of the lungs, where they can have a direct physical (inflammatory) effect and/or be absorbed into the bloodstream. All people are continuously exposed to PM₁₀ from naturally occurring and anthropogenic dust emissions in urban and industrial areas.

The TSP fraction comprises particles each having an equivalent aerodynamic diameter of up to nominal 50 micrometres. Upper respiratory tract health effects from TSP inhalation can arise in sensitive individuals; however, the primary issue with TSP emissions relates to impacts on amenity from a visible dust perspective and deposition onto surfaces.

PM_{2.5} is particulate matter of 2.5 micrometres or less in diameter. PM_{2.5} is not considered in this DMP as it is typically associated with combustion emissions. This particle size is expected to form a small fraction of the particulate matter emitted from the site and will be managed in accordance with the management actions defined for the control of PM₁₀ emissions.

5.1.2 Contaminated waste

The site is a Class III landfill and is licensed to accept contaminated materials (solids) in accordance with the acceptance criteria for Class III landfills (DWER 2019).

Contaminated wastes are subject to specific management in accordance with conditions of the licence including contaminated waste must be accompanied by documentation (thus identifying hazard to operators) and must only be disposed of by burial to the active landfill area. Following the application of controls, it is expected that species arising from contaminated wastes are not expected to occur in fugitive dust in concentrations that will pose a human health risk.

5.1.3 Radiation

The tailings accepted at the site contain technically enhanced trace levels of naturally occurring radioactive materials thorium and uranium. Radiation risks at the facility are managed under a Radiation Management Plan. The plan was approved in November 2018 by the Radiological Council under Permit number RS77/2018.

Radiation management is governed by the Environmental Health Directorate of the Department of Health, in accordance with the *Radiation Safety Act 1975*. Radiation is therefore not considered further in this DMP.

5.1.4 Asbestos

The DWER licence for the site (L8904/2015/1) prescribes the requirements for handling of asbestos containing waste. Under the licence, asbestos containing waste is handled as Special Waste Type 1 in order to mitigate the potential discharge of asbestos containing material or asbestos fibres.

Asbestos containing materials are managed under the site Asbestos Management Plan and, therefore, are not considered further in this DMP.

5.2 Emissions sources

The dust-generating sources and activities identified the site are described in Table 5.1.

Table 5.1: Potential dust sources and dust-generating activities

Activity	Description	Dust generation and exposure potential
Wind erosion and dust lift-off from dry waste material, soil stockpiles or unsealed surfaces	As the active landfill cell is filled there may be areas of fine material on the surface. Natural residual soils are stockpiled on-site, and there are large areas of unsealed exposed surfaces.	Airborne dust generated by action of wind on exposed ground, stockpile surfaces, or dry waste material surfaces.
Vehicles movements	Heavy plant/earthwork vehicles, trucks and light vehicles will be traversing the site.	Vehicle movements on paved and unpaved roads could suspend fine particles in air. Vehicles exiting site can track material out onto the public road which could become airborne once dried out.
Vehicle unloading	Emptying of waste trucks at active landfill working face by tipping.	Dust generation during tipping of waste from trucks either from fine waste material from within truck or fine material disturbed from receiving surface.
Heavy plant activity spreading and compacting waste in the active landfill area	In the process of spreading, combining and compacting waste materials, heavy plant may traverse over dry soil or dry waste material.	Dust generated by soil or dry fine waste material disturbance during dozer movement. Dust generated by action of wind over exposed dry ground or dry fine waste material.
Construction activities	Landfill cell construction requiring excavation, haulage and stockpiling of soil.	Dust generation during excavation and soil handling is limited due to moisture content. Vehicle movements associated with construction.

5.3 Relevant air quality criteria

5.3.1 TSP

As discussed previously, health effects associated with TSP mainly arise from the PM₁₀ fraction. Given this, any particulate monitoring results would be compared to air quality standards for PM₁₀ (see Section 5.3.2).

5.3.2 PM₁₀

The standards in the ambient air quality NEPM will be adopted as a basis against which to compare monitoring results for particulates. The air quality standards are applicable to urban airsheds, and include criteria for particles as PM₁₀ at 50 µg/m³ on a 24-hr averaging period, and an annual limit of 25 µg/m³ derived from 24-hr measurements across a year.

6. Dust risk assessment

A site risk assessment/classification was conducted by Strategen-JBS&G in accordance with the framework provided in the DEC (2011) guideline (Appendix B) to determine the level of dust management and monitoring required for the site as follows.

Part A Nature of site

Item	Comment	Score
Nuisance potential of soil/waste when disturbed	Dust is largely expected to be windblown uncontaminated crustal particles; therefore, the nuisance potential is considered primarily to amenity. Potential for contaminated dust is low due to specific procedures in place to manage hazardous substances, i.e., asbestos and radiation.	2
Topography and protection provided by undisturbed vegetation	Some parts of the site are less exposed (lower down or within pits); however, the elevated topography of the eastern end of the site means little protection is afforded to exposed surfaces and ground level.	18
Area of site disturbed by the works	More than 10 ha.	9
Type of work being done	Bulk earthworks – this is conservative as handling of waste is largely below the level of the surface and construction activities are a minor aspect in comparison to operational waste handling aspects. The waste material being handled generally has lower dust-generating potential than soils.	9
Total part A score		38

Part B Proximity of site to other land uses

Item	Commentary	Score
Distance of other land uses from site	The nearest residence is approximately 500 m from the site boundary.	12
Effects of prevailing wind direction (at time of construction) on other land uses	The residential properties are isolated land uses affected by one wind direction.	6
Total Part B score		18

Site classification score

The site classification score is the product of the Part A and Part B scores. The total score is used to determine the site classification score as follows:

- Site classification 1 — under 199
- Site classification 2 — 200 to 399
- Site classification 3 — 400 to 799
- Site classification 4 — over 800.

Based on a site classification score of $38 \times 18 = 684$, the site is considered Classification 3 and medium risk for potential dust impacts. The dust management and monitoring requirements in this DMP have been determined in accordance with those recommended for Classification 3 sites in the DEC (2011) guideline.

7. Dust control measures

The following dust control measures (referenced to the relevant licence conditions where applicable) are implemented at the site as part of normal operations to mitigate dust generation. The control measures aim to achieve a residual level of risk of fugitive dust emission that is as low as reasonably practicable.

7.1 General management

General management measures pertaining to fugitive dust mitigation are:

- weather forecasts will be used to minimise dust generating activities during adverse meteorological conditions
- wind speed and direction will be checked throughout the day and used to plan and modulate active landfill operations. The outcome of the air monitoring campaign will inform specific controls measures for implementation on-site (see Section 8.2)
- where wind speed and direction indicate a likelihood of fugitive dust emission, site speed limits will be reduced for Dust Risk Areas (Figure 4)
- stormwater dams have capacity and are maintained in order to provide sufficient water for dust suppression
- leachate, where available, will be used for dust suppression in the wetting down of the active landfill areas only (as authorised by licence condition 1.4.17 (b))
- a 15 kL water cart will be available for application of water for dust suppression and priority will be given to high-risk Dust Risk Areas (Figure 4); the use and frequency of the water cart will be determined using wind speed and direction observations, use of trafficable areas and active tipping areas, observations of visible dust and effectiveness of water application
- dust suppressant will be applied to the Dust Risk Areas identified to have potential for fugitive dust-generating including non-vegetated areas, landfill batters and within in the laydown area as identified in the dust risk area map (Figure 4), when such areas have the potential to generate fugitive dust (licence condition 1.4.19); the frequency of dust suppressant application will be set based on the effectiveness of the applied suppressant and the current risk associated the relevant Dust Risk Area.

7.2 Management of trafficable areas

In accordance with licence conditions:

- the Main Haul Road and Southern Haul Road were bitumised before 31 July 2020 (licence condition 1.4.15)
- prior to commencement of and during work activities:
 - a water cart will be used to apply water from primary and secondary stormwater dams to trafficable areas (licence condition 1.4.16 (a)); and
 - a street sweeper will be used on the bitumised Main Haul Road and Southern Haul Road (licence condition 1.4.16 (b))
- a wheel wash operates in the northwest of the site and will be used by all operational vehicles exiting the site (licence condition 1.4.22); the area between the wheel wash and the public road is sealed

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- the area between the wheel wash and the public road will be inspected daily to ensure that the wheel wash is operating effectively, and that mud is not being tracked on to the public roads
- The daily inspection of the wheel wash and the public road will be recorded.

7.3 Operation of vehicles

Vehicle movements across the site may disturb soils and generate dust. The following measures are adopted during all operational activities to prevent excessive dust generation:

- all loads will be contained in sealed or covered vessels prior to acceptance - uncovered vehicles or vessels for which cover is not effective must not proceed beyond the weighbridge; where effective cover cannot be achieved, loads will be rejected in accordance with the site rejected waste procedure
- records will be kept of vehicles that are rejected because effective cover cannot be achieved; and the vehicle owner will be contacted to ensure future loads are adequately covered
- speed restrictions exist within the site – the appropriate speed limit, up to a maximum of 25 km/h, will be determined by weighbridge staff and will be based on the activities being undertaken, location and site conditions at the time
- vehicles will keep to designated access roads as far as reasonably practicable; vehicles deviating from designated access routes will do so only as required for specific work activities and under appropriate permissions.

7.4 Landfill areas

- dust emissions from the active tipping area are managed by applying water using the water cart during working hours (licence condition 1.4.17(a))
- material with potential to generate fugitive dust will be wet down during disposal and burial at the active tipping area (licence condition 1.4.18)
- waste will be covered with a minimum of 150 mm of Type 1 inert waste or clean fill as soon as practicable after tipping and no later than the end of the working day
- as far as practicable, the active landfill area will be positioned away from the edge of the active cell
- as far as practicable, loads will not be tipped oblique to the wind, with dust being more likely to travel further where this is case
- material drop/tip heights will be minimised where possible
- where waste processing is approved, wastes processed by crushing, shredding or screening will be wet down during processing
- Exposed soil surfaces and stockpiles in non-active area will be stabilised (e.g. with chemical surfactants) or temporarily covered (e.g. with mulch) prior to permanent re-vegetation or restoration.

7.5 Construction activities

- during construction activities, the contractor will provide an additional water cart, which waters down construction haulage roads and any areas associated with construction as required
- dust generation will be monitored by construction personnel and water cart utilised in the construction area as required.

7.6 Administrative controls

- operational personnel will be trained with respect to dust mitigation; training will include mechanisms of the generation of dust emissions, the importance of and responsibility of individuals to implement mitigation measures and reporting of visible dust emissions
- personnel and contractors will be required to report observations of visible dust emissions that appear to cross the boundary of the site, including date, time, location and extent of the visible plume
- fugitive dust emission inspections will be conducted monthly in accordance with a documented site operational procedure; the results of all inspections will be documented and recorded
- an annual assessment of the potential for dust emissions from within the site will be carried out, and proposed controls for high-risk Dust Risk Areas will be detailed (Condition 1.4.20); the annual review will be submitted to DWER (licence condition 1.4.21)
- adjoining landowners and the Shire will be notified in writing at least 48 hours in advance of any activities outside of normal or regular site operations that have the potential to generate dust; records of such notifications will be maintained.

7.7 Incident and complaints management

- fugitive dust events will be raised as an Environmental Incident and an event report entered into the site incident management system with corrective actions identified and allocated
- the following information will be recorded in the site incident management system in relation to complaints received by the site (whether received directly from a complainant or forwarded by the Shire or DWER) about any alleged emissions from the premises:
 - the name and contact details of the complainant (if provided)
 - the time and date of the complaint
 - the complete details of the complaint and any other concerns or other issues raised
 - the complete details and dates of any action taken to investigate or respond to any complaint
 - the effectiveness of any action taken in response to the complaint to reduce or eliminate the risk of future events.

8. Dust monitoring

8.1 Visual monitoring

Visual assessments of fugitive dust emissions will be conducted by operational personnel during working hours. A 'dust event' is defined as the occurrence of visible fugitive dust from a source or activity at the site that exits a boundary of the site for a duration of greater than one (1) minute. A windsock will be installed at the site to indicate wind direction and approximate wind strength to aid visual monitoring.

When a 'dust event' is observed and reported on-site, the following corrective actions will be implemented:

- the site operational personnel will review the working methodology of the dust-generating activity and ensure that the appropriate measures listed in the DMP have been implemented
- if the dust event continues following implementation of the above measures, the activity will be controlled, and water will be applied at the source of the dust generation to damp down soils; work will not recommence until the dust event is under control
- spraying of water will be carried out at a frequency sufficient to keep surface soils damp throughout the dust-generating activity without resulting in run-off.

8.2 Dust monitoring

In addition to existing management already in place, the implementation of the added measures in this DMP will result in a further reduction in the likelihood of any airborne dust exiting the site.

Air quality monitoring will be conducted to assist in further understanding of the effectiveness of the control of dust emissions from the site operations. The monitoring will be initially carried out for six months between November 2020 and April 2021 to encompass the dryer months of the year.

The PM₁₀ fraction was initially selected for the monitoring program as this is relevant to human health and has criteria to assess against (NEPM). If required, the sampled particle fraction can be changed to TSP during the sampling campaign by changing the sampling head. The current parameter being measured is recorded in Appendix D, which allows for it be easily updated outside of formal review of the DMP (refer to Section 10).

The purpose of the monitoring program is to establish data regarding existing ambient air quality surrounding the site. This will allow an assessment of the effectiveness of the management of emissions during site operation activities and confirm that off-site impacts are being minimised.

8.2.1 Monitoring equipment

The air quality monitoring program utilises three real-time nephelometer dust monitoring instruments, each equipped with sensors to monitor wind speed and direction at the sampling location. Each monitoring location is fitted with telemetry to enable remote interrogation of the monitoring data and to allow alarms when trigger levels (See Section 8.2.3) are exceeded to be set with SMS text notification to a nominated phone number. The instruments are powered by solar panels with battery storage.

8.2.2 Monitoring locations

The monitoring instruments are located according to an analysis of the prevailing winds expected for the time of year the monitoring program is being conducted. This analysis includes current data from the on-site meteorology monitoring station and data from the BOM station in Bunbury.

The monitors are located on boundary locations most likely to be impacted by dust, which is informed by analysis of wind direction and available information on visual observation of dust emissions. If appropriate to the prevailing wind directions, one monitor will be set upwind and two downwind to allow comparison of dust concentrations between the three sites.

Siting of monitoring instruments is subject to a site inspection and assessment of feasible locations. The stations are sited, to the extent possible, in accordance with AS/NZS 3580.1.1:2007 *Methods for sampling and analysis of ambient air, Part 1.1: Guide to siting air monitoring equipment*.

The locations of the monitoring instruments are shown on Figure 5 in Appendix C, which will be updated if and when monitors are relocated in response to changing site operations or prevailing weather conditions.

8.2.3 Performance criteria (trigger levels)

Trigger levels have been set at the monitoring locations for the duration of the monitoring program as follows.

Corrective action trigger

The corrective action trigger level is used to set alarm notifications that will be received by the responsible site employee (refer to Section 9). If the corrective action trigger level is exceeded, corrective actions will be implemented as required, including, but not limited to:

- the site operational personnel will review the working methodology of any dust-generating activities and ensure that the appropriate measures have been implemented
- if the dust event continues following implementation of the above measures, the activity will be controlled, and water will be applied at the source of the dust generation to damp down soils; work will not recommence until the dust event is under control and dust levels have reduced below the corrective action trigger level
- spraying of water will be carried out at a frequency sufficient to keep surface soils damp throughout the dust-generating activity without resulting in run-off.

The corrective action trigger level was established after the first month of monitoring, considering measured concentrations of dust and is designed to protect the air quality criteria at the site boundary. Prior to this during the first month of monitoring, an initial trigger level was set. The level set is below the threshold of a visible dust event and provide an early warning.

Stop work trigger level

The stop work trigger level is the ambient dust level which will result in a stop work alarm being dispatched. Actions in response to stop work alarms include:

- all site activities generating visible dust will cease
- the site operational personnel will review the working methodology of any dust-generating activities and ensure that the appropriate measures can be implemented
- water will be applied at the source of the dust generation to damp down soils; work will not recommence until the dust event is under control and dust levels have reduced below the corrective action trigger level
- spraying of water will be carried out at a frequency sufficient to keep surface soils damp throughout the dust-generating activity without resulting in run-off.

The stop work trigger level was established after the first month of monitoring informed by the measured data. Prior to this, an initial trigger level was set.

The current corrective action and stop work trigger levels are contained in Appendix D, which allows for the value to be easily updated outside of formal review of the DMP (refer to Section 10).

The trigger levels will be periodically reviewed as required to determine their adequacy in protecting sensitive receptors from dust and to ensure they are relevant to actual dust events and do not result in multiple false-alarms that can distract from and disturb site operations.

8.2.4 Data analysis, QA/QC and reporting

During the monitoring period, continuous data will be routinely downloaded weekly from each station, recorded and securely archived. The data will be used for assessment and comparison to the adopted trigger criteria and to confirm satisfactory implementation of dust management practices at the site.

Validated data, which has been subject to QA/QC checks, will be delivered to the Shire on a monthly basis (or as required/requested if a dust event requires investigation). A valid data capture rate of greater than 90% is expected. Instruments will be subject to maintenance in accordance with Australian Standards and manufacturers' guidelines.

Should a dust event be recorded by on-site monitoring; or community complaints are received; or exceedances of the NEPM recorded at the monitoring locations, the source of the dust will be investigated via analysis of the wind direction data. The data will be utilised to inform and improve the implementation of this plan.

Upon on completion of the six month monitoring program, a summary report will be provided to the Shire within 30 calendar days that will include, but not be limited to:

- the locations of the monitoring instruments
- the specifications of the monitoring equipment
- tabular and graphical representation of the monitoring data
- summary of any exceedances of and performance against the trigger levels (including number of SMS text alarms) and any corrective action taken
- summary of any exceedances of the NEPM criteria and identification of dust source(s)
- evaluation of the effectiveness of the applied dust controls and recommendations for any amended or additional controls as informed by the monitoring and assessment of dust emissions generated
- recommendation on the need for, or specification of, ongoing dust monitoring
- summary of complaints received
- summary of any notifications provided to adjacent landowners and the Shire regarding activities outside of normal or regular site operations that have the potential to generate dust.

The need for or specification of any ongoing instrumental monitoring of dust will be reviewed after the first six month monitoring program and will be informed by:

- monitoring data and trends
- performance against trigger levels
- verified complaints
- review of the site classification score and associated management and monitoring requirements (see dust risk assessment in Section 6)

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- risk-based assessment carried out in accordance with DWER guidelines (DER 2017) to assess the consequence of emissions at the levels measured impacting sensitive receptors and the likelihood of those impacts occurring.

The outcomes of the above review and the use of ongoing instrumental monitoring will be determined in consultation with relevant stakeholders, including the Shire (see Section 1.3). Visual monitoring of dust-generating site activities will continue as a primary mechanism for ongoing dust monitoring (refer to Section 8.1).

9. Roles and responsibilities

Roles and responsibilities with respect to management of fugitive dust emissions are outlined in Table 9.1 below:

Table 9.1: Site roles and responsibilities

Role	Responsibilities
All personnel	Monitor and report instances of fugitive dust by raising an incident report as required.
Operations Manager	Develop and allocate resources to provide for a level of risk of fugitive dust that is as low as reasonably practicable and conduct and review fugitive dust inspections. Ensure compliance obligations are met, including annual reporting on the assessment of the potential for dust emissions and proposed controls within the required timeframe. Investigate and document complaints as required.
Leading Hand	Monitor wind speed, direction and incoming and nature of incoming loads throughout the day. Incorporate appropriate controls into planning and modulation of active landfill operations, including guidance and coaching of personnel and allocation of water cart routes and waste processing activities. Intervene in and modify/stop active landfill operations in response to notification of exceedances of trigger levels in order to prevent triggering and stop any dust event. Investigate complaints as required.
Customer Service Officer	Maintain site complaints register.
Weighbridge Operator	Monitor and control incoming loads and advise Leading Hand of any oncoming loads consisting of soil or fine particulate. Monitor dust concentrations at the monitoring locations throughout the day and respond to any alarms notifying an exceedance of trigger levels by advising UHF channel 31 and Leading Hand. Advise incoming drivers of any reduction in speed limits.
Landfill Operator	Monitor wind speed, direction and contents of tipped loads throughout the day and modulate active landfill operations accordingly. This is to include communication with tippers to ensure appropriate tipping direction. Modify/stop own machine operation and influence carrier activities in response to notification of exceedances of trigger levels in order to prevent triggering and stop any dust event.
Construction contractor	Comply with all onsite dust management requirements as set out in the DMP. Provide a water cart to adequately manage all dust generating activities associated with construction. Monitor dust generation within the construction areas and prevailing and forecast weather conditions in order to adapt construction activities to minimise the generation of dust. Modify or cease construction activities in order to prevent exceedances of trigger levels and stop any dust event. Work closely with operational site staff to ensure comprehensive dust management across the whole site.

10. Review

This DMP will be subject to, at a minimum, twelve-monthly review to ascertain its relevancy for ongoing site management and allow for continual improvement. Reviews may also be implemented:

- at the direction of the Shire of Dardanup
- after completion of the initial six month monitoring campaign
- as a corrective action resulting from an investigation into a dust impacts
- after completion of the annual review required by Condition 1.4.20 of the licence
- prior to any significant change to site activities and operations
- on publication of a new dust emission guideline by DWER.

11. Limitations

Scope of services

This report ("the report") has been prepared by Strategen-JBS&G in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen-JBS&G. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen-JBS&G has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen-JBS&G has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen-JBS&G has also not attempted to determine whether any material matter has been omitted from the data. Strategen-JBS&G will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen-JBS&G. The making of any assumption does not imply that Strategen-JBS&G has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen-JBS&G disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

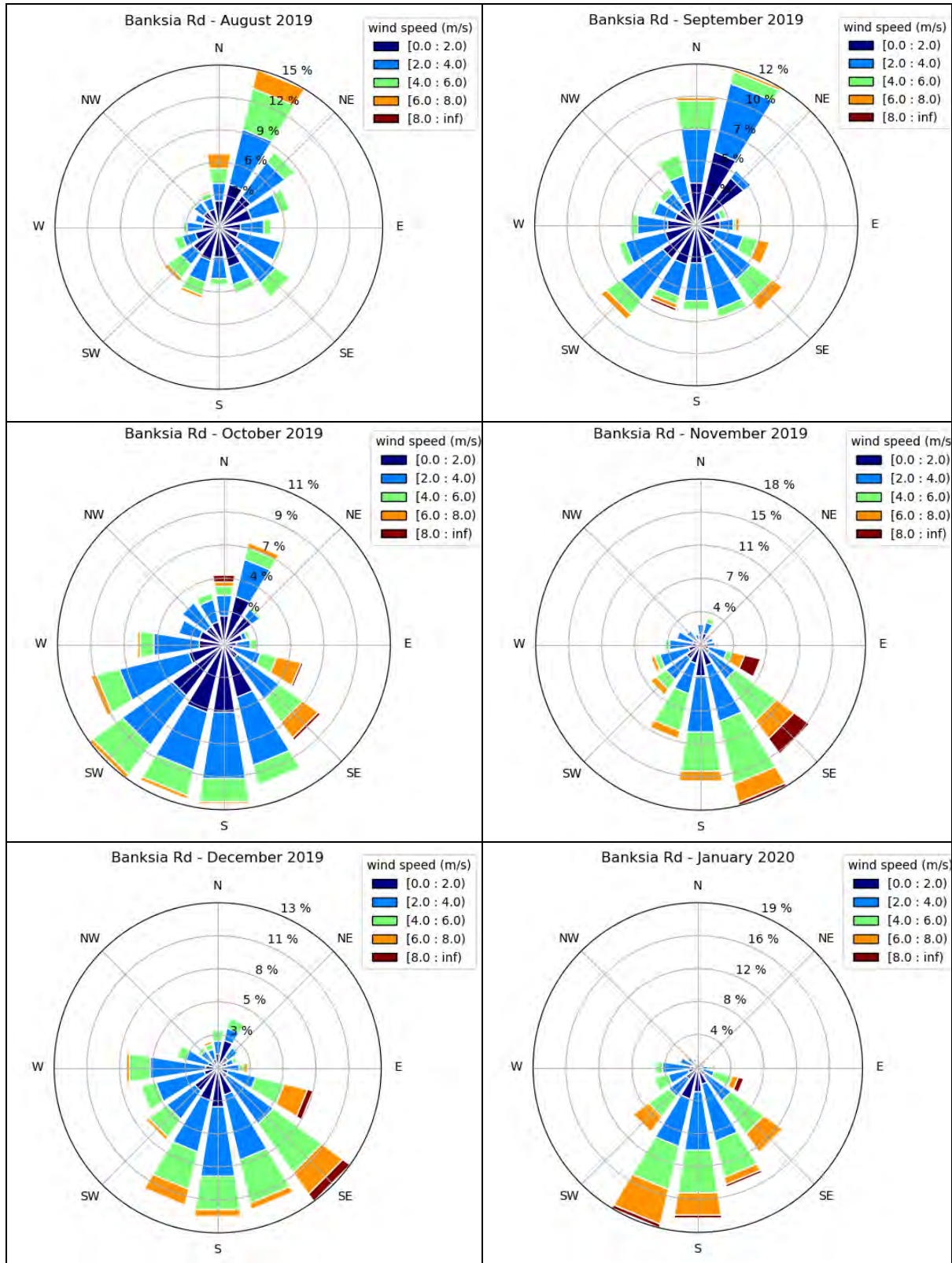
The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

Strategen-JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by Strategen-JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

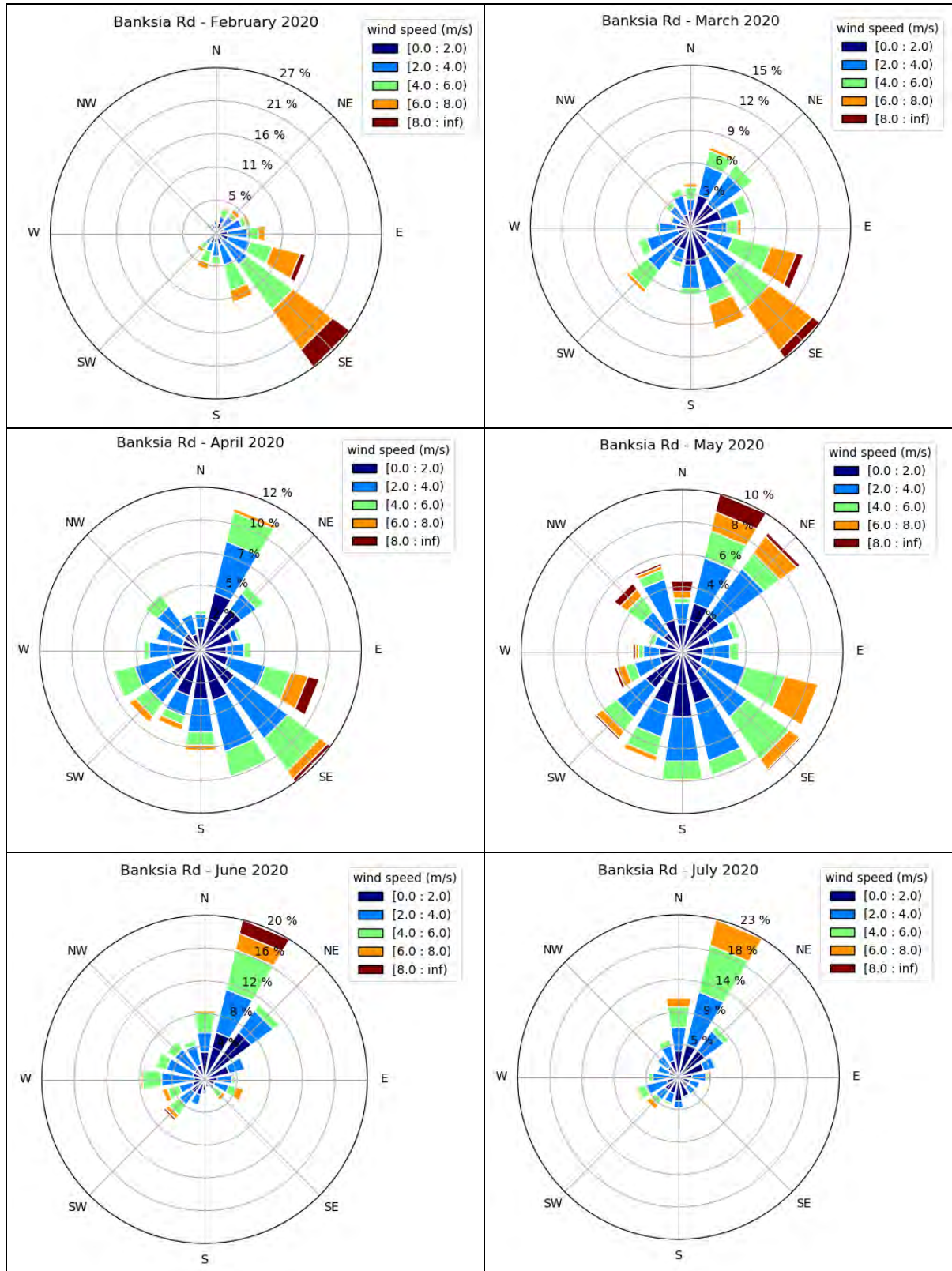
12. References

- DEC (2011). *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*. Department of Environment and Conservation. Perth, Western Australia.
- DER (2017). *Guidance Statement: Risk Assessments*. Department of Environment Regulation. Perth, Western Australia.
- DWER (2019). *Landfill Waste Classification and Waste Definitions 1996 (as amended 2019)*. Retrieved from <https://www.der.wa.gov.au/images/documents/our-work/licences-and-works-approvals/WasteDefinitions-revised.pdf>.
- EPA (2005). *Guidance for the Assessment of Environmental Factors (in accordance with the Environmental Protection Act 1986) Separation Distance between Industrial and Sensitive Land Uses No. 3*. Environmental Protection Authority. Perth, Western Australia.
- National Environmental Protection Council (NEPC) (2015). National Environmental Protection (Ambient Air Quality) Measure. Accessed from <https://www.legislation.gov.au/Details/F2016C00215>.

Appendix A Wind roses (on-site station)



Attachment 7



Attachment 7

Appendix B Site risk assessment/classification (DEC 2011)

Attachment 7 ADDENDUM

The Department of Environment and Conservation (DEC) released an updated dust guideline in January 2011, “*A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities, January 2011*”. An error was identified in Appendix 1 on page 35. This error has since been corrected (See below). This document is the corrected version published in March 2011.

Appendix 1: Site risk assessment/classification for activities generating uncontaminated dust

Sheet 1: Site classification assessment chart

Part A. Nature of site

Item	Score options				Allocated score
1. Nuisance potential of soil, when disturbed	Very low.....1	Low.....2	Medium.....4	High.....6	
2. Topography and protection provided by undisturbed vegetation	Sheltered and screened.....1	Medium screening....6	Little screening.....12	Exposed and wind prone.....18	
3. Area of site disturbed by the works	Less than 1ha.....1	Between 1 and 5ha..3	Between 5 and 10ha.....6	More than 10ha.....9	
4. Type of work being done	roads or shallow trenches.....1	roads, drains and medium depth sewers.....3	Roads, drains, sewers and partial earthworks.....6	Bulk earthworks and deep trenches.....9	
TOTAL score for Part A					

Part B. Proximity of site to other land uses

Item	Score options				Allocated score
1. Distance of other land uses from site	More than 1km.....1	Between 1km and 500m.....6	Between 100m and 500m.....12	Less than 100m.....18	
2. Effect of prevailing wind direction (at time of construction) on other land uses	Not affected.....1	Isolated land uses affected by one wind direction.....6	Dense land uses affected by one wind direction.....9	Dense/sensitive land uses highly affected by prevailing winds.....12	
TOTAL score for Part B					

SITE CLASSIFICATION SCORE (A X B) =

Appendix C Monitoring locations

Attachment 7

Legend:

- Premises boundary
- Cadastral boundary
- Sand extraction area (excluded from DMP)
- Dust monitoring location



Job No: 58071

Client: Cleanaway

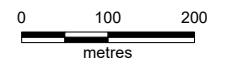
Version: A

Date 10/12/2020

Drawn By: cthatcher

Checked By: JB

Scale 1:8,750



**Banksia Road Landfill
Crooked Brook, WA 6236**

DUST MONITORING LOCATIONS

FIGURE 5



Appendix D Trigger levels

The current trigger levels described in Section 8.2.3 are shown in Table D.1 and Table D.2.

Table D.1: Trigger level

Date	Parameter	Corrective action trigger level	Units	Averaging period	Comment
11/09/2020	PM ₁₀	600	µg/m ³	10-minute	Initial trigger level set prior to completion and review of one month of monitoring data
08/02/2021	PM ₁₀	150	µg/m ³	10-minute	Revised trigger level established after first month of monitoring
17/02/2021	TSP	150	µg/m ³	10-minute	All monitor sampling heads changed to TSP

Table D.2: Stop work trigger level

Date	Parameter	Stop work trigger level	Units	Averaging period	Comment
11/09/2020	PM ₁₀	1,200	µg/m ³	10-minute	Initial trigger level set prior to completion and review of one month of monitoring data
08/02/2021	PM ₁₀	300	µg/m ³	10-minute	Revised trigger level established after first month of monitoring
17/02/2021	TSP	300	µg/m ³	10-minute	All monitor sampling heads changed to TSP

Local Development Plan

This Local Development Plan (LDP) has been prepared pursuant to clause 47(d) of the Deemed Provisions (Schedule 2) of the Planning and Development (Local Planning Schemes) Regulations 2015, as the Commission and the Shire of Dardanup has identified an LDP is required for the purposes of orderly and proper planning.

In accordance with Part 6 of the Deemed Provisions, this LDP sets out guidance for the future development of Lot 2 Banksia Road, Crooked Brook (the subject site) over the period of 10 years as from the date of this LDP is endorsed, up to 2031. This LDP is not intended to apply to development beyond that timeframe, which is intended to be the subject of either future amendments to this LDP or a future replacement of this LDP.

The objectives of this LDP are to:

- ensure onsite development and associated operations are undertaken in an orderly manner;
- ensure that any impacts from development on surrounding sensitive land uses are minimised; and
- provide guidance and a general understanding of current and future development(s), and the key considerations applicable to any future development applications.

Background

The subject site has been operated as a resource extraction area and landfill facility since the 1990's, and via a series of development and environmental approvals. The site accommodates gravel and sand extraction, landfill disposal, liquid and tailings waste disposal and associated site infrastructure.

Subject Site Context

The subject site is identified on the LDP and is described as Lot 2 Banksia Road, Crooked Brook. The site is located:

- to the immediate north and west of the Dardanup Conservation Park;
- approximately 3.5km to the south-east of the Dardanup Townsite;
- approximately 1.5km to the north and north-east of the Crooked Brook Creek.

Statutory Framework

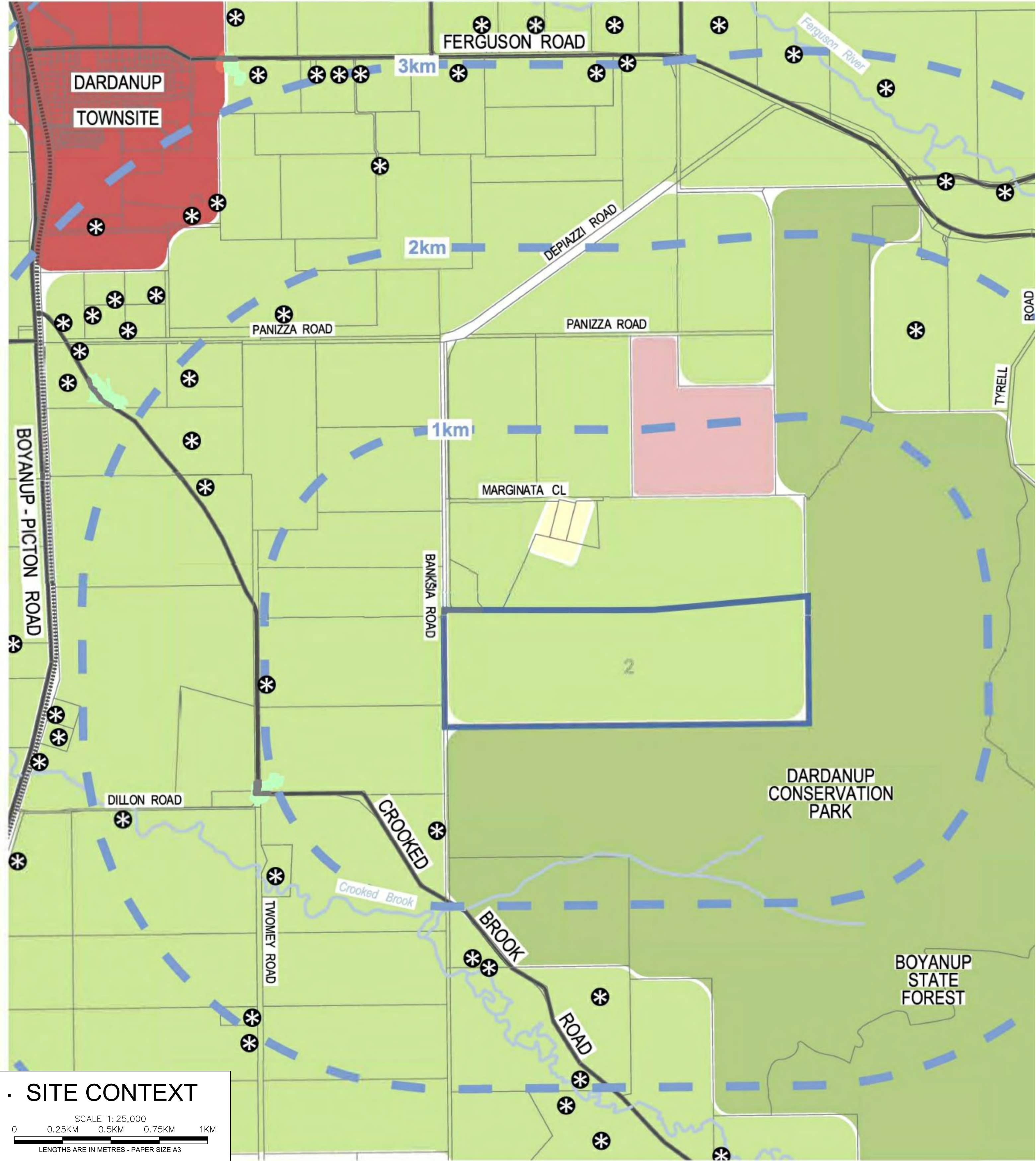
Applications for development approval relating to the subject site must be decided having due regard to, but are not bound by, the provisions of this LDP in accordance with the Deemed Provisions.

Sufficient information should be provided with all development applications so that the local government can assess the cumulative impacts of previous/existing development.

Endorsement Table

This Local Development Plan was:

- (a) approved by resolution of the Council of the Shire of Dardanup at the ordinary council meeting held on the 26th day of May 2021; and
- (b) amended by order of the State Administrative Tribunal made on the 13th day of October 2022.



Local Development Plan

Development Applications

Applications for development approval are to clearly detail all development, including any temporary, staged and/or incidental works, with all development to occur within the boundary of the subject site.

Any applications for development approval that proposes to vary from:

- the LDP;
- management plans, and/or other technical reports that are being implemented as part of obligations under development approvals relied on for the use of the subject site; and/or
- environmental approvals relied on for the use of the site,

are to include justification for that variation and are to be accompanied by relevant technical reports, which include details of any variations.

Boundary Setbacks

Development is to be setback from site boundaries a minimum of 30m to the Primary Street (Banksia Road) and a minimum of 20m to all other boundaries unless otherwise approved.

Height

Development is not to exceed a maximum height of 130m AHD (top of waste – 128m plus 2m capping), as outlined in the Cross Section for the term of this LDP.

This height limitation will apply to any structure on site, inclusive of buildings, plant or equipment, and any temporary or permanent bulk earthworks, stockpiles occurring on site.

Site Access and Circulation

The primary site access is to occur via Banksia Road at the location shown on the Site Plan, with internal circulation of all vehicles not to encroach on the 20m landscaped boundary interface.

Heavy vehicles associated with the landfill facility are to access the site via Ferguson Road, Depiazzi Road, and the sealed portion of Banksia Road but shall not use Crooked Brook Road, Panizza Road or Dillon Road.

Any application for development approval including a proposal that will result in additional traffic generation to the subject site is to be accompanied by:

- a Traffic Impact Assessment or Traffic Impact Statement consistent with the Department of Transport Guidelines to outline the relevant transport considerations and demonstrate the suitability of the proposed site access and vehicle circulation; and
- where additional Heavy Vehicles are proposed to access and egress the site, an assessment of the standard and suitability of the public road network to accommodate these vehicles, and an overview of the necessary upgrades and/or potential additional maintenance costs to accommodate these vehicle movements.

Landscaping Requirements

Development is to be appropriately screened from key viewpoints via the installation of a minimum 20m landscaping strip adjacent the subject site boundary which includes:

- Native tree plantings as per any endorsed landscaping plan for the relevant portions of the site.
- A variety of smaller shrubs and plantings to provide greater density of foliage to the understorey of any trees.

Applications for development approval are to be supported by a landscaping plan outlining the proposed landscape design and its effectiveness to screen the development proposed.

Fencing

All boundaries of the site are to be fenced with chain mesh fencing to a minimum of 2m in height and to include wildlife egress points.

Environmental Management

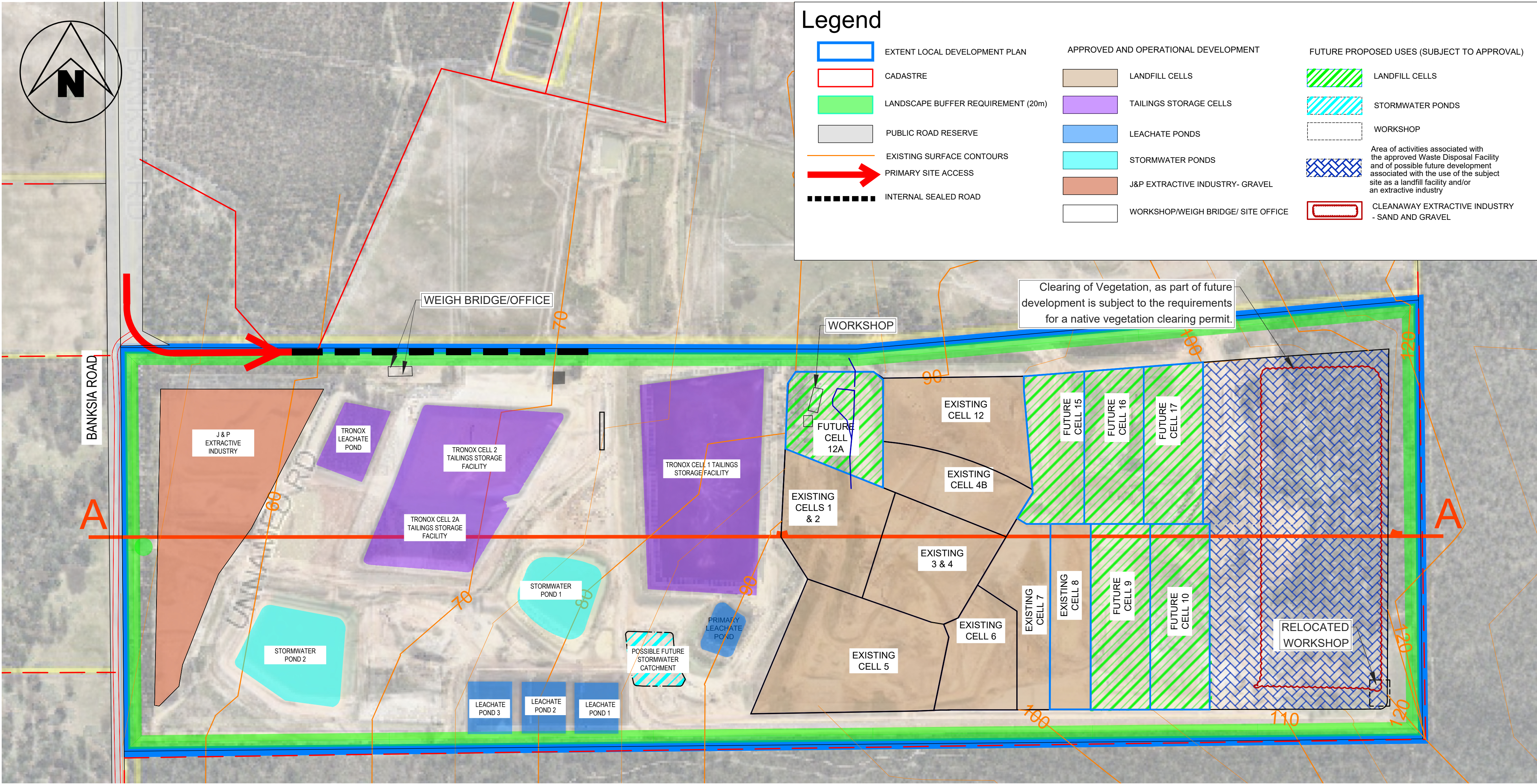
Applications for development approval are to demonstrate consistency with any environmental approvals for the subject site, and where relevant should be supported by technical assessment and management plans including but not limited to:

- A Stormwater Management Plan where the development will impact upon the management of stormwater on site and should address the mitigation of the off-site impacts of stormwater, including water erosion risk on neighbouring properties.
- An Environmental Management Plan that addresses vegetation clearing, hydrogeological impacts on surrounding land uses and the investigation and management of contamination or acid sulfate soils.
- A Bushfire Management Plan prepared in accordance with the guidance provided by State Planning Policy 3.7 where the development proposed is considered to pose a risk to human life or property.
- A Dust Management Plan where the development is considered likely to generate dust which will impact on surrounding landholdings.
- A Visual Impact Assessment where the development is considered likely to impact views from key locations within the surrounding locality.
- An Acoustic Report and Noise Management Plan where the development is considered likely to result in noise which impacts the amenity and operations of surrounding landowners.

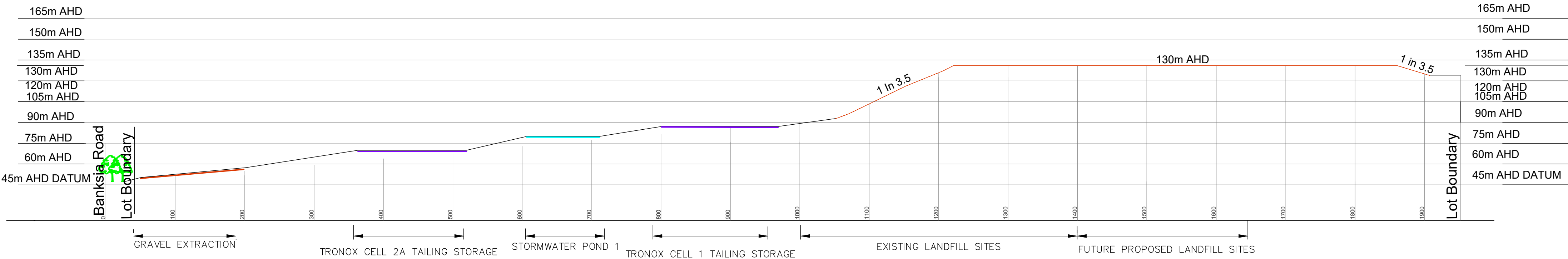
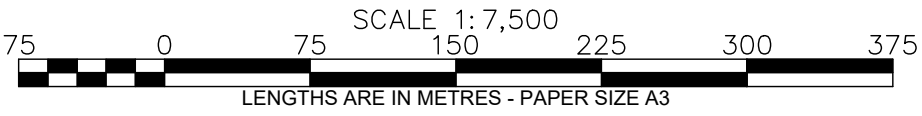
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SITE PLAN



CROSS SECTION A-A

