Carbon Recycling Facility

Environmental Assessment and Management Plan

Prepared for C-Wise

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Signature		

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1 Introduction

C-Wise Holdings Pty Ltd (C-Wise) is currently seeking approval to develop a new Carbon Recycling Facility (the Facility) for the acceptance and processing of a range of solid and liquid organic wastes to produce compost and similar products (the Project). The Project will be located at 320 Gull Road, Keralup, a portion of Lot 9500 on Deposited Plan 414516 (the Site). The Site is situated approximately 11 kilometres (km) northeast of the Mandurah town centre (Figure 1). The total area of the Site is approximately 269.4 hectares (ha) of which the Development Footprint occupies approximately 17.12ha. The Site boundary and Development Footprint are shown Figure 2.

Operation of the Facility will support the diversion of organic waste from landfill, including the implementation of Food Organics and Garden Organics (FOGO) kerbside collections in the Perth and Peel regions, as outlined in the Waste Avoidance and Resource Recovery Strategy 2030 (Waste Authority, 2020) (Waste Strategy 2030). Recognising the importance of the Facility, C-Wise was successful in obtaining $5.6 million in funding from both the State and Federal governments through the Food Waste for Healthy Soils Fund (Section 2.2).

Due to the activities of the Project, it will be classified as a Prescribed Premises under Part V of the *Environmental Protection Act 1986* (EP Act) and therefore requires approval from the Department of Water and Environmental Regulation (DWER) prior to construction and operation. This Environmental Assessment and Management Plan (EAMP) has been developed to support a Works Approval application to the DWER and the Development Approval from the Shire of Murray.

1.1 Objectives

The objectives of EAMP are to provide the following details in relation to the Project:

- Describe the environmental and social values on and surrounding the Site;
- Describe in detail the Project, including design and operation;
- Identify any potential impacts to environmental aspects associated with the Project;
- Summarise the community consultation undertaken and key findings;
- Outline environmental engineering and management measures to ensure that all potential impacts are managed to appropriate standards; and
- Assess the residual risks following the proposed management measures.

2 Background

C-Wise has been operating its existing composting facility in Nambeelup for 25 years and has been proactive in continually enhancing its composting technique and environmental management measures to achieve the best possible environmental and social outcomes. This includes the development of a technology that incorporates their own mobile air floor (MAF) system in combination with other known and proven techniques to produce compost. C-Wise has become a leader in the development of carbon-based soil amendments, providing smart natural solutions to farms, communities and industry. This has been recognised on multiple occasions with the following awards:

- Telstra's WA winner of the 2024 Best of Business Award for promoting sustainability;
- Andy Gulliver (Founding Director) wins AORA Legend Award in 2016 for his contribution to the composting industry;
- Organic Consumer Choice Awards 2014, Best Organic Input Supplier;
- Resource and Waste Management Awards 2012, for the New Perth Bunbury Highway Soil Manufacturer for Landscaping and Construction; and
- The Western Australian Environment Awards 2005, Overall Winner and Small Business Leading by Example.

Recognising that the remaining lifetime of the existing composting facility is limited, C-Wise has been actively seeking an alternative long-term location to establish a modern, better practice facility for over a decade. The Site was determined to be a suitable location for a new facility due to its proximity to C-Wise's existing operations and the large extent of historically cleared land, which provides an opportunity to significantly expand C-Wise's current production capacity.

Through development of the Project, C-Wise is seeking to progressively move all operations to the Facility and eventually cease operation of the existing Nambeelup composting facility. Due to the extensive engineering and operational management measures that have been incorporated into the design of the Project, the risk of significant environmental impacts is considered to be low and particularly in comparison to C-Wise's existing operations.

Moving C-Wise's operations to the new, modern and better practice Facility presents an opportunity for C-Wise to continue to expand while also affording the surrounding environment greater protection from potential impacts. C-Wise is proposing to implement a wide range of better-practice infrastructure and operational measures, including clean floor policies in FOGO receival areas, fully enclosed composting cocoons, and significant roofing to eliminate leachate generation.

2.1 Department of Housing Residential Development Plan

The Department of Housing purchased a 4,000ha parcel of land, which included the Site and much of the surrounding area, through public tender in 1992. The Department of Housing intended to clear this land and develop it into a residential area that could house up to 90,000 people. However, this plan was discontinued in 2014 and the focus turned to alternative uses. The State Government subsequently undertook a Registration of Interest (ROI) in 2018 and 2019 to identify future land use options for the area. C-Wise submitted a response to this ROI outlining its intention to construct and operate the Facility at the Site. C-Wise was successful in the ROI process which culminated with a lease agreement being executed between C-Wise and DevelopmentWA (the land owner) in August 2021 to allow for the establishment of the Facility. Under the agreement, C-Wise have lease rights at the Site for up to 50 years.

2.2 Grant Funding

In May 2023, the State and Federal governments awarded $11.25M in funding for three new organic recycling infrastructure projects through the Food Waste for Healthy Soils Fund. C-Wise received approval for $5.75M in funding for the establishment of the Facility at the Site, which was the most funding received out of the three grant recipients. This indicates the State and Federal governments support and recognition of the need for and importance of the Facility.

In addition, C-Wise also received $100,000 in funding from the State government in October 2023 through the WasteSorted Grants for the introduction of specialist equipment to its existing Nambeelup Composting Facility. This equipment will reduce the amount of physical contamination in C-Wise's compost product and minimise the risk of litter entering soils and waterways. This demonstrates C-Wise's ongoing commitment to minimising the potential for environmental harm as a result of its operations, as well as the State government's ongoing support for C-Wise's operations.

2.3 Project Benefits

There are significant benefits from establishing the Facility, including:

- Alignment with the Waste Strategy 2030;
- Resource recovery;
- Reducing environmental impacts; and
- Job opportunities.

2.3.1 Alignment with the Waste Strategy 2030

The Waste Authority released the Waste Strategy 2030 in February 2019. The Waste Strategy 2030 sets the overarching objectives of 'avoid', 'recover' and 'protect'. The Project will support the Waste Strategy 2030's 'avoid', 'recover' and 'protect' objectives through the processing of organic materials such as solid and liquid wastes into usable compost products. This in turn diverts these organic materials from landfill, delivering upon the circular economy ethos of the State Waste Strategy.

The Waste Strategy 2030 provides new targets for the recovery of waste, outlined in Table 2-1.

Table 2-1: Waste Strategy 2030 Targets

Objectives	Community	Government	Industry
Avoid	• 2025 – Reduction in MSW generation per capita by 5%; and • 2030 – Reduction in MSW generation per capita by 10%.	• Reduction in C&D waste generation per capita by 15% by 2025, 30% by 2030; and • Reduction in C&I waste generation per capita by 5% by 2025, 10% by 2030.	• 2030 – All waste is managed and/or disposed using better practice approaches.
Recover	• 2020 – Increase MSW material recovery to 65% in the Perth and	• C&I sector – Increase material recovery to 70% by 2020, 75% by	• 2030 – All waste facilities adopt resource recovery better practice.

Objectives	Community	Government	Industry
	Peel regions, 50% in major regional centres; • 2025 – Increase MSW recovery to 67% in the Perth and Peel regions, 55% in major regional centres; and • 2030 – Increase MSW material recovery to 70% in the Perth and Peel regions, 60% in major regional centres.	2025, 80% by 2030; and • C&D sector – Increase material recovery to 75% by 2020, 77% by 2025, 80% by 2030.	
Protect	• 2030 – Move towards zero illegal dumping; and • 2030 – Move towards zero littering.	• 2030 – Move towards zero illegal dumping.	• 2030 – No more than 15% of Perth and Peel regions' residual waste is disposed to landfill; and • 2030 – All waste facilities adopt environmental protection better practice.

Recognising these targets, there is a collective and positive national shift towards diverting more materials from landfill and aligning waste management practices with the waste hierarchy. The recovery of organic materials through the operation of the Facility will support the achievement of the Waste Strategy 2030 targets.

The Project also supports the Waste Strategy 2030's headline strategy for "*a consistent three bin kerbside collection system, which includes separation of food organics and garden organics from other waste categories, to be provided by all local governments in the Perth and Peel region by 2025 and supported by State Government through the application of financial mechanisms*." The Project will increase the available capacity for processing organic waste which will be vital to ensuring this strategy can be achieved.

The Project supports the idea of a circular economy through the recovery of materials by implementing waste management options high up in the waste hierarchy. By using organic waste materials to generate compost and similar products, the Project directly contributes to a circular economy as the compost can be used to regenerate the environment.

The Project also supports a key principle within the State Waste Strategy; 'Better practice'. Better practice is defined in the Waste Strategy 2030 as "*practices and approaches that are considered by the Waste Authority to be outcomes-focussed, effective and high performing, which have been identified based on evidence and benchmarking against comparable jurisdictions*." This is further emphasised with the industry targets including:

- 2030 Avoid Industry Target: All waste is managed and/or disposed using better practice approaches;
- 2030 Recover Industry Target: All waste facilities adopt resource recovery better practice; and

- 2030 Protect Industry Target: All waste facilities adopt environmental protection better practice.

The Projects delivered upon all these three industry targets. Of particularly relevant to planning and environmental approvals and this EAMP, is the protect target and C-Wise commitment to deliver a modern, better practice facility (as will be outlined within this document).

2.3.2 Resource Recovery

The Project will help facilitate the recovery of valuable resources, thereby increasing recycling rates and the diversion of 'waste' from landfill. When fully operational, the Facility will have the capacity to process 200,000 tonnes of solid organic materials and 60,000 tonnes of liquid wastes for recycling. The organic material to be accepted will be processed into compost which will be supplied to a variety of markets including agricultural, horticultural and landscaping to improve soil quality and nutrient retention. They key benefits of this are the diversion of waste from landfill, protection of ecosystems by reducing the requirement to extract virgin resources and using fewer chemical fertilisers, as well as lower carbon emissions.

2.3.3 Reducing Environmental Impacts

Landfilling waste can result in environmental impacts through the clearing of vegetation, generation of leachate and landfill gas, attraction of vermin and feral animals, as well as amenity issues including dust, odours and visual impacts. In particular, landfilling organic waste results in higher volumes of carbon emissions compared to recovering as compost. Diverting organic materials away from landfill for processing at the Facility will help to reduce these impacts.

2.3.4 Employment

Jobs will be created both directly and indirectly through the construction and operation of the Facility. Skills and services required will include:

- Civil contracting;
- Material handling;
- Administration;
- Accounting;
- Equipment and Earthworks suppliers; and
- Operators.

It is estimated that the Project will support 24 temporary construction jobs and create 36 ongoing positions.

3 Approval Pathway

C-Wise will require a variety of environmental and planning approvals before construction and operation of the Project can commence. Talis Consultants Pty. Ltd. (Talis) was engaged by C-Wise to assist with seeking the relevant approvals for the Project, which include:

- DWER:
  - Works Approval;
  - Licence; and
  - Area Clearing Permit.
- Shire of Murray approvals:
  - Planning approval.

While the Project will be delivered in two stages, C-Wise is seeking approval for both stages of the Project within each application. Stage 1 of the Project will involve the processing of primarily FOGO materials, whereas Stage 2 represents the complete shift from C-Wise's operations at its existing Nambeelup composting facility to the Carbon Recycling Facility.

3.1 Works Approval

Certain industrial premises with the potential to cause emissions and discharges to air, land or water are classified as 'Prescribed Premises' and trigger regulations and associated approvals under Part V of the EP Act. DWER is responsible for the regulation of Prescribed Premises under Part V of the EP Act, approval under which is granted in the form of Works Approvals for construction and Licences for operation.

The Prescribed Premises categories relevant to the Project are outlined in Table 3-1.

Table 3-1: Summary of Prescribed Premises Categories

Category No.	Name	Description	Production or Design Capacity
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
67A	Compost manufacturing and soil blending	Premises on which organic material (excluding silage) or waste is stored pending processing, mixing, drying or composting to produce commercial quantities of compost or blended soils.	1,000 tonnes or more per year

As part of this application, C-Wise is requesting to undertake time-limited operations for a period of 180 days. C-Wise wishes to commence the operational period for the Project as soon as practicable to support the diversion of organic materials from landfill.

3.2 Licence

A Licence is required to operate Prescribed Premises under Part V of the EP Act. Licences stipulate a range of conditions for each Prescribed Premises category relating to a range of activities,

infrastructure, management measures, monitoring and reporting requirements. A Licence provides strict conditions to minimise or mitigate environmental impacts from any discharges and emissions.

Following completion of construction and during the time limited operations, C-Wise will seek a Licence from the DWER for the operation of both stages of the Project.

3.3 Clearing Permit

While the Facility will be primarily located in a historically cleared part of the Site and has been sited and designed to avoid unnecessary clearing, some clearing of native vegetation will be required for its establishment. Approximately 45.51ha of vegetation clearing will be required for the Project, including for required asset protection zones and earthworks necessary to achieve groundwater separations across the Facility. It is noted that the condition of this vegetation ranges from Completely Degraded to Degraded to Good as summarised in Table 3-2.

Table 3-2: Summary of Vegetation Condition

Vegetation Condition	Proportion of Site		Proportion of Clearing Area	
	ha	%	ha	%
Completely Degraded	123.14	45.71	39.28	86.31
Completely Degraded to Degraded	17.85	6.62	-	-
Degraded	35.95	13.34	4.23	9.30
Degraded to Good	27.31	10.14	2.00	4.39
Good	51.89	19.26	-	-
Good to Very Good	7.74	2.87	-	-
Very Good to Excellent	5.56	2.06	-	-

Through careful consideration for the siting and design of the Facility:

- 86.31% of the vegetation within the Clearing Area is classified as Completely Degraded due to historic clearing;
- No clearing of Completely Degraded to Degraded vegetation will occur;
- 9.30% of the vegetation within the Clearing Area is classified as Degraded;
- 4.39% of the vegetation within the Clearing Area is classified as Degraded to Good; and
- No clearing of vegetation in a Good or better condition will occur.

An application for an Area Clearing Permit for the necessary clearing was submitted to the DWER in October 2023. While the Project will be delivered in two stages, C-Wise is seeking approval to clear the maximum extent of clearing required for the Project within the Area Clearing Permit application.

3.4 Planning Approval

Planning approval is required under the *Planning and Development Act 2005* (PD Act) and are regulated by the Western Australian Planning Commission (WAPC). Approval is given by the relevant local government when a development in the City of Perth has a value of less than $20 million or has a value of less than $10 million and is elsewhere in the state. Developments that exceed this threshold are instead required to be determination to the Development Assessment Panel (DAP). As the

estimated cost of the Project is over $10 million, it will be determined by the Metro Outer Joint Development Assessment Panel (JDAP).

Development Approval applications to be determined by JDAPs are first lodged with the relevant local government, which in this instance is the Shire of Murray, and will be forwarded to the JDAP by the local government for final determination. The JDAP is typically a five-person panel consisting of three independent experts and two local government council representatives who will determine the outcome of the application.

C-Wise is proposing to submit the application for planning approval in November 2023 and therefore run the environmental and planning approval processes concurrently.

4 Environmental and Social Attributes

The following sections outline the key environmental attributes on, and surrounding, the Site.

4.1 Site Location and Ownership

The Project will be located on 270ha of land at 320 Gull Road, Keralup, within a portion of Lot 9500 on Deposited Plan 414516 in Certificate of Title Volume 2991 Folio 741, of which the Development Footprint encompasses approximately 20.5ha (Figure 2).

A lease agreement was executed between C-Wise and DevelopmentWA, the current landowner, in August 2021.

4.2 Surrounding Land Use and Zoning

The Site is zoned 'Rural' under the Peel Region Scheme (PRS) and the Shire of Murray's Local Planning Scheme No. 4 (LPS), as shown in Figure 3.

Most of the land immediately surrounding the Site has been historically cleared and is used for grazing purposes, which is also zoned as 'Rural' under both the Peel Region Scheme and Shire of Murray Local Planning Scheme (No. 4). C-Wise's existing Nambeelup composting facility is directly south of the Site, zoned as 'Rural' under the Shire of Murray Local Planning Scheme (No. 4) and 'Industrial' under the Peel Region Scheme.

4.3 Sensitive Receptors

The Environmental Protection Authority's (EPA's) Guidance Statement No. 3 - Separation Distances between Industrial and Sensitive Land Uses (EPA, 2005) outlines the recommended separation distances between industrial activities and sensitive land uses. Sensitive land uses are defined within Guidance Statement No. 3 as those that are potentially sensitive to emissions from industry and other infrastructure, and include residential developments, schools, shopping centres and some public buildings.

The recommended separation distances for the relevant Prescribed Premises categories for the Project are outlined in Table 4-1.

Table 4-1: Recommended Separation Distance

Category No.	Name	Impacts				Recommended Separation Distance (m)
		Gaseous	Noise	Dust	Odour	
61	Liquid waste facility		✓		✓	Case by case
67A	Compost manufacturing and soil blending		✓	✓	✓	500 for manures, mixed food/putrescible & vegetative food waste; 250 for biosolids & 150 for green waste

In addition to the above, the DWER's Guideline: Better Practice Organics Recycling (Organics Recycling Guideline) indicates that a separation distance of 1km should be considered for receiving high-risk feedstocks.

As illustrated in Figure 4, the nearest sensitive receptor to the Site is approximately 2.56km to the southeast, significantly higher than any set separations distances referenced in the aforementioned guidelines.

Receptors to the south of the Site have the following classification in the Shire of Murray's *Local Planning Scheme No. 4 (June 2023)*:

- K – Special Use: Kennels;
- V – Special Use: Various;
- N – Nambeelup Industrial Development;
- HB – Special Use: Home Business;
- A – Special Use: Abattoir; and
- Rural.

Though some of these receptors contain homes associated with businesses, they are located on rural, isolated blocks and these are generally industrial, agricultural and special use zonings. A separation distance of 2.56km is therefore expected to be sufficient to mitigate potential impacts.

4.4 Climate

The average and 90th percentile rainfall data was sourced from SILO, a database of Australian climate data from 1889 to the present day that is hosted by the Queensland Department of Environment and Science. It provides daily meteorological datasets for a range of climate variables in ready-to-use formats suitable for biophysical modelling, research, and climate applications. The datasets are constructed from observational data obtained from BOM, using mathematical interpolation techniques to infill gaps in time series and construct spatial grids. The spatial grid selected (Latitude: -32.50, Longitude: 115.85) is for Keralup, WA and encompasses the majority of the Site.

Table 4-2: Average Rainfall in Millimetres (1971-2022)

Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average (mm)	14.4	14.2	18.6	41.9	111	145	154	121	83.9	43.3	29.2	10.8	788
90th Percentile	0.2	2.7	22.4	43.5	245	222	65.1	127	115	78.6	20.4	13.4	955

The Site experiences a subtropical climate with distinctly dry summers and mild, wet winters. Rainfall in the area mainly occurs during the winter months of May to September. The driest months are December to March.

4.5 Topography

The topography at the Site ranges from 10m Australian Height Datum (AHD) to the northeast to 18mAHD to the southeast. The topography within the Development Footprint currently ranges from 14mAHD to 20mAHD, with a steep drop to 12mAHD on the western side. This Development Footprint has been selected to maximise the separation distance to groundwater. The current topography is shown in Figure 5.

It is noted that following construction, the topography in the Development Footprint will be altered. The base of the Development Footprint, following earthworks, will sit at approximately 17.5mAHD.

4.6 Geology and Soils

The Department of Primary Industries and Regional Development (DPIRD) maintain a soil landscape mapping database that incorporates surveys at various scales between 1:20,000 and 1:3,000,000. Soil mapping of the Site indicates that it consists of four soil landscape units (Figure 5):

- Bassendean B1 Phase – extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2m; banksia dominant;
- Bassendean B2 Phase – flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan at 1-2m;
- Bassendean B3 Phase – closed depressions and poorly defined stream channels with moderately, poorly to very poorly drained bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam; and
- Bassendean B4 Phase – broad poorly drained sandplain with deep grey siliceous sands or bleached sands, underlain at depths generally greater than 1.5m by clay or less frequently a strong iron-organic hardpan.

The Development Envelope occurs primarily over Bassendean B1 and B2 Phase soils, with a portion of the Stage 2 development occurring over B4 Phase soils. The Conservation Category Wetlands present on the western and southern sides of the Site (Section 4.9) are mapped as occurring primarily over Bassendean B3 Phase soils, over which minimal activities will occur, limited to the establishment of a fence to form a wetland protection buffer. Most of the Resource Enhancement Wetlands within the Site and near the Development Footprint occur over Bassendean B4 Phase soils.

The majority of construction and operational activities will occur over Bassendean B1 and B2 Phase soils, which have minimal overlap with the mapped wetlands at the Site. The similarities between the soil and wetland mapping at the Site suggests that the soils and wetlands at the Site are closely associated with one another. Given that there will be minimal disturbance to Bassendean B3 Phase soils, the corresponding Conservation Wetlands are not expected to be impacted by the Project.

Surface geology at the Site and over the Development Footprint is classified as predominantly Qag – Alluvial sand and clay with shallow marine and estuarine lenses and local basal conglomerate (Figure 6).

4.6.1 Contaminated Sites

The DWER Contaminated Sites Database was reviewed to identify any sites classified under the *Contaminated Sites Act 2003* within or adjacent to the Site. The Site itself is not currently classified as a contaminated site.

Due to the historical use of the site as a piggery, C-Wise's existing facility at 139 Nambeelup Road, directly south of the Site, is classified as a contaminated site (Figure 7).

4.6.2 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring soils that contain iron sulphide (iron pyrite) minerals that, if disturbed by soil excavation, dewatering or drainage, can then oxidise resulting in the release of contaminants and potentially cause environmental impacts.

A review of the Perth Groundwater Map (PGM) indicates that the entire Site is located in an area with a moderate to low risk of ASS and a small portion in the southeast corner of the Site has a high to moderate risk as shown in Figure 6.

During the intrusive investigation undertaken by Western Environmental in February 2021, groundwater samples were taken from existing groundwater monitoring bores, of which two are located within the Site (B07 and B09). The results from these wells showed exceedances in ASS parameters which is consistent with the surrounding areas which were previously investigated in 2008 (Western Environmental, 2021).

Proposed measures to manage risks associated with ASS are discussed in Section 7.11.

4.7 Groundwater

Regional groundwater flows in a westerly direction towards the Serpentine River (Coterra Environment, 2021). Two bores (B07 and B08) are located within the Site boundary. Groundwater data gathered from these bores indicates the depth the groundwater in the vicinity is 2.8 metres below ground level (mbgl) at B07 and 1.9mbgl at B08. The bore locations and inferred groundwater depths based on this data are shown in Figure 8. The DWER Water Information Reporting (WIR) tool indicates that there are multiple groundwater wells to the west and downgradient of the Site. One DWER monitoring site is located within the north-western portion of the Site (Figure 8).

Groundwater flow between adjoining aquifers is limited by a partial aquitard, layer of low permeability underlying a significant portion of the Site, resulting in extended periods of waterlogging during the winter months (Coterra Environment, 2021).

According to Perth Groundwater Map, the salinity of groundwater at the Site ranges from 250 to 500 mg/L indicating that it is fresh. Groundwater parameters such as pH and electrical conductivity (EC) were recorded during the intrusive investigations undertaken by Western Environmental which indicated that the groundwater is acidic (B07 – pH 4.5 and B09 – pH 3.73). EC ranged from 185.3µs/cm at B07 and 149.2µs/cm at B09, confirming that the groundwater is fresh. The EC results exceed the Freshwater Guidelines for slightly to moderately disturbed systems (Western Environmental, 2021).

4.7.1 Groundwater Studies

A detailed Keralup District Water Management Strategy (KDWMS) was prepared by Emerson Stewart in 2008-2009, which assessed the groundwater levels at the Site and determined that a coffee rock

layer was present across the Site, resulting in the presence of a perched aquifer. The DWER provided comments on the KDWMS and disagreed with this conclusion.

WSP Australia Pty Ltd (WSP) was subsequently engaged by C-Wise to assess the groundwater levels and behaviours at the Site and determine whether the perched aquifer was beneath the Site and Development Footprint (WSP, 2023).

Continuing from this work, FSG-Geotechnical was engaged to provide advice on the final design of the Facility in relation to the proposed Controlled Groundwater levels and sub-soil drainage system. This is discussed further in Section 5.5, and the Groundwater Control Level Study undertaken by FSG-Geotechnical is provided in Appendix B..

4.7.1.1 *Perched Aquifer*

WSP notes that "*a perched water table or aquifer is an aquifer that occurs above the regional water table or aquifer. The perched aquifer forms when there is an impermeable layer (aquitard) above the regional aquifer but below the land surface, which makes water perch on top of this layer. Typically for perched water there would be an unsaturated zone between the perched aquifer and the regional aquifer.*" To determine whether a perched aquifer was present at the Site, WSP reviewed the borelogs for three boreholes drilled within the Site. The relevant geology and well construction details are outlined in Table 4-3.

Table 4-3: Geology and Well Construction Details

Well ID	Ground Elevation (mAHD)	Bore Hole Depth (m)	Screened Interval (mbgl)	Screened Geology	Coffee Rock (mbgl) [mAHD]	Screen in Relation to Coffee Rock	Groundwater Level Range (mbgl) [mAHD]
EB07	16.59	8.9	5.9 to 8.9	Geology only described to 5m	3.8 [12.8)	Below	2.4 to 3.5 [13.0 to 13.9]
EB08	19.00	5.4	2.4 to 5.4	White medium sand (Bassendean Sand)	4.8 [14.2]	Across	2.3 to 2.9 [16.1 to 16.7]
EB09	21.91	6.1	2.7 to 5.7	White medium sand (Bassendean Sand)	Possibly at 6.1 [15.8]	Above	3.3 to 4.0 [18.0 to 18.7]

The borelogs indicate that EB07 is screened below the coffee rock layer, however the recorded groundwater levels are above the coffee rock. A hand auger borehole was drilled next to EB07 in November 2022, during which groundwater was encountered at the same depth as measures in EB07. As a result, WSP concludes that "*perched groundwater is not present above the coffee rock at EB07*."

WSP also reviewed the recorded groundwater levels from two DWER monitoring wells approximately 2km south of the Site, Well 61410678 and Well 61410677. Well 61410678 is installed to a depth of 3.5mbgl and screened above the coffee rock layer, whereas Well 61410677 is installed to a depth of 8.3mbgl and screened below the coffee rock. It was found that the groundwater levels in each well was above the coffee rock layer, indicating that there is no unsaturated zone below the coffee rock and that perched groundwater is not present above the coffee rock at these wells.

Based on the results of the investigation, WSP agrees with the DWER and considers that "*the observed groundwater levels form part of the regional Superficial Aquifer*" rather than a large-scale perched aquifer, as suggested in the KDWMS.

4.7.1.2 *Groundwater Level*

As part of the Groundwater Level Study, WSP was tasked with determining the Design Groundwater Levels to support the design of the Project and set the levels. The DGWL was estimated using historic groundwater levels, hydrogeological features and key parameters such as climate, surface water, drains, groundwater abstraction and land use. WSP developed two sets of DGWL contours:

- Average Annual Maximum Groundwater Level (AAMGL), 50% Annual Exceedance Probability (AEP):
  - The AAMGL ranges from reduced level (RL) 9mAHD at the northwestern Site boundary to RL 19mAHD at the eastern boundary;
  - The AAMGL within the Stage 1 Development Footprint ranges from RL 13mAHD RL 14.5mAHD; and
  - The AAMGL within the Stage 2 Development Footprint ranges from RL 14.5mAHD RL 16mAHD.
- 50 Year DGWL, 2% AEP:
  - The 50 Year DGWL ranges from RL 9.5mAHD at the northwestern boundary Site to RL 19.5mAHD at the eastern boundary;
  - The 50 Year DGWL within the Stage 1 Development Footprint ranges from RL 13.9mAHD RL 15.2mAHD; and
  - The 50 Year DGWL within the Stage 2 Development Footprint ranges from RL 15.1mAHD RL 16.5mAHD.

Based on these works, WSP prepared a Controlled Groundwater Level study to determine the engineering measures required to maintain a suitable separation distance to groundwater beneath the Development Footprint (Section 5.5).

4.8 Surface Water

To protect water sources, surface water proclaimed areas have been allocated under the *Rights in Water and Irrigation Act 1914* (RIWI Act). Surface water areas are proclaimed for the purpose of controlling the taking of water from watercourses and wetlands in order to systematically management their use. The Site is located in a Surface Water Proclaimed Area; the Serpentine River System (Figure 9).

4.8.1 Watercourses

The nearest major watercourse to the Site is the Serpentine River, located approximately 3km to the west (Figure 9). A minor watercourse connecting to the Serpentine River is located approximately 0.75km northwest from the Site and a second minor watercourse connected to Black Lake is located approximately 1.25km to the east.

The Gull Road Drain is located along the southern boundary of the Site, approximately 125m south of the Development Footprint. It enters the Lower Serpentine River approximately 3.1km west of the Development Footprint.

4.8.1.1 *Floodplain Mapping*

Floodplain mapping data indicates that the Site is not located in a floodplain area (Figure 10). The nearest floodplain is located 1.25km east of the Site around the minor watercourse connected to Black Lake. The area surrounding the Serpentine River, 3km west of the Site, is also mapped as a floodplain.

4.8.2 Water Resources

The nearest public drinking water source area to the Site is the North Dandalup Dam Catchment Area, located approximately 15km upgradient of the Site to the east and in a separate catchment area. No public drinking water sources are located at or surrounding the Site.

4.9 Wetlands

Most of the mapped wetlands surrounding the Site are classified as Multiple Use Wetlands. There are small portions of Multiple Use Wetlands within the northwest and southeast corners of the Site. A portion of two unnamed palusplain Conservation Category Wetlands are located on the western and southern boundaries of the Site, as shown in Figure 10. An unnamed sumpland wetland is located in the southeast corner and excluding the small sections of Multiple Use Wetlands and cleared pasture areas where most infrastructure is to be located, the remainder of the Site is categorised as Resource Enhancement Wetlands.

A review of the mapped wetlands within and surrounding the Site was completed by the Department of Biodiversity, Conservation and Attractions (DBCA) in 2021 to ensure that the wetland evaluation accurately reflects the mapped extent of the wetlands. As a result of the review, manual changes have been applied to the dataset internally, however these changes have not yet been applied to the publicly available data. The extent of the Conservation Category Wetlands within and surrounding the Site was altered following the DBCA's review. Both the original and updated wetland mapping has been considered during the development of the Project.

The Facility has been sited and designed to ensure a minimum 50m separation distance between infrastructure and the mapped Conservation Category Wetlands, as well as to minimise impacts to nearby Resource Enhancement and Multiple Use Wetlands as far as practicable. Most infrastructure will be located at least 100m from the mapped Conservation Category Wetlands with the exception of access roads and stormwater and leachate management infrastructure, which will be located at least 50m from wetlands. There will be a fence installed at the 50m buffer for all wetlands surrounding the Development Footprint. This buffer is consistent with the Shire's Local Biodiversity Strategy (Shire of Murray, 2013), which outlines minimum separation distances from wetlands and states that "*the Shire will not accept buffers to wetlands of less than 50m for Conservation Category Wetlands*."

Due to the presence of Conservation Category Wetlands within the Site, the Project may be classified as a high risk development under the Shire's Local Planning Policy: Water Sensitive Urban Design (LPP:WSUD) (Shire of Murray, 2018). The Project has therefore been developed in accordance with the principles and strategies outlined within the LPP:WSUD to ensure that the associated risks are managed appropriately. This includes consideration of the Stormwater Management Manual for Western Australia (DWER, 2022) during the development of a Surface Water and Leachate Management Plan for the Site (Section 7.1).

4.10 Flora and Vegetation

Approximately half of the vegetation within the Site has been historically cleared, with infrastructure to be constructed primarily within the cleared areas. Focused Vision Consulting (FVC) undertook a vegetation review and field assessment of the Site in November 2017 and September 2019 to outline the vegetation units, classify the condition of vegetation and identify the presence of any conservation significant species (Coterra Environment, 2021). The vegetation units within the Site are listed within Table 4-4 and shown in Figure 11.

Table 4-4: Vegetation Units

Code	Description	Area (ha)	% of Site
AsKgTS	*Astartea scoparia* and *Kunzea glabrescens* Closed Tall Scrub to 3m over *Juncus pallidus* Very Open Sedgeland to 1.4m over **Lotus subbiflorus* Very Open Herbland to 0.15m.	33.38	12.55
AsTSJpOS	*Astartea scoparia* Tall Shrubland to 2.1m over *Juncus pallidus* Open Sedgeland to 2m over **Hypochaeris glabra*, **Ornithopus pinnatus* and **Lotus subbiflorus* Open Herbland to 0.4m over **Anthoxanthum odoratum* Very Open Grassland to 0.35m.	0.2	0.07
cOF(D)	*Corymbia calophylla* Open Forest to 12m over *Melaleuca preissiana* Low Woodland to 7m over *Regelia ciliata* Closed Tall Scrub to 3.5m over *Xanthorrhoea preissii*, *Hypocalymma angustifolium* and *Acacia pulchella* Open Shrubland to 1.2m over *Dasypogon bromeliifolius* Very Open Herbland to 0.4m.	1.88	0.71
EmLOF	*Eucalyptus marginata* subsp. Marginata (with *Hardenbergia comptoniana*) and *Xylomelum occidentale* Low Open Forest to 8m over *Xanthorrhoea preissii* Open Shrubland to 1m over *Hibbertia hypericoides* Low Open Shrubland to 0.8m over**Briza maxima* and **Vulpia myuros* Open Grassland to 0.3m.	2.59	0.97
ErMpLCF	*Eucalyptus rudis* and *Melaleuca preissiana* Low Closed Forest to 8m over *Astartea scoparia* Tall Open Shrubland to 2.5m over *Juncus pallidus* and *Lepidosperma longitudinale* Sedgeland to 1.2m over **Lotus subbiflorus* and **Hypochaeris glabra* Very Open Herbland to 0.3m over **Vulpia* sp. and **Bromus diandrus* Very Open Grassland to 0.3m.	5.35	2.01
ErMpW	*Eucalyptus rudis* and *Melaleuca preissiana* Woodland to 13m over *Melaleuca rhaphiophylla* Low Open Woodland to 6m over *Kunzea glabrescens* and *Astartea scoparia* Tall Shrubland to 5m over *Juncus*	4.05	1.52

Code	Description	Area (ha)	% of Site
	pallidus Sedgeland to 1m over **Isolepis prolifera* and *Azolla* sp. Herbland to 0.4m.		
JpSAs	*Juncus pallidus* Sedgeland to 1. 8m over **Lotus subbiflorus* and **Moraea flaccida* Open Herbland to 0.5m over **Cynodon dactylon* and **Cenchrus clandestinus* Open Grassland to 0.15m with occasional *Astartea scoparia* to 1.5m.	19.6	7.37
JpSAsMp	Juncus pallidus Sedgeland to 1.8 m over *Lotus subbiflorus and *Moraea flaccida Open Herbland to 0.5 m over *Cynodon dactylon and *Cenchrus clandestinus Open Grassland to 0.15 m with occasional Astartea scoparia to 2.2 m and scattered Melaleuca preissiana to 10 m.	6.13	2.3
KgTOS	*Kunzea glabrescens* Tall Open Shrubland to 2.6m over *Astartea scoparia* Open Heath to 2m over *Juncus pallidus* Open Sedgeland to 2m over **Ornithopus pinnatus* and **Hypochaeris glabra* Very Open Herbland to 0.35m and scattered *Melaleuca preissiana* to 10m.	51.64	19.41
MpLOF/MpLOF(D)	*Melaleuca preissiana* Low Open Forest to 6m over *Astartea scoparia* tall Open Scrub to 2.8m over *Juncus pallidus* Very Open Sedgeland to 2m over **Ornithopus pinnatus* and **Hypochaeris glabra* Herbland to 0.5m.	5.22	1.96
MpWAsS	*Melaleuca preissiana* Woodland to 10m over *Astartea scoparia* Shrubland to 2m over *Juncus pallidus* Open Sedgeland to 1.8m over **Vulpia* sp. Open Grassland to 0.15m over **Lotus subbiflorus* and **Romulea rosea* Open Herbland to 0.2m.	5.22	1.96
Cleared pasture		130.76	49.14

Source: Information sourced from Coterra Environment (2021) – originally sourced from Focused Vision Consulting (2020). Vegetation Review – Keralup. Report prepared for Coterra Environment on behalf of the Department of Communities, Perth, Western Australia

The majority of the Development Footprint is located in the cleared pasture area, however some clearing of the AsKgTS (13.52%), cOF(D) (0.63%) and MpLOF(D) (0.18%) vegetation types will be required for the Facility, including within the bushfire Asset Protection Zone (APZ).

4.10.1 Vegetation Condition

The condition of vegetation across the Site ranges from Completely Degraded to Excellent (Figure 12) and is summarised in Table 4-5.

Table 4-5: Summary of Vegetation Condition

Vegetation Condition	Proportion of Site		Proportion of Development Footprint	
	ha	%	ha	%
Completely Degraded	123.14	45.71	39.28	86.31
Completely Degraded to Degraded	17.85	6.62	-	-
Degraded	35.95	13.34	4.23	9.30
Degraded to Good	27.31	10.14	2.00	4.39
Good	51.89	19.26	-	-
Good to Very Good	7.74	2.87	-	-
Very Good to Excellent	5.56	2.06	-	-

Through careful consideration for the siting and design of the Facility:

- 86.31% of the vegetation within the Clearing Area is classified as Completely Degraded due to historic clearing;
- No clearing of Completely Degraded to Degraded vegetation will occur;
- 9.30% of the vegetation within the Clearing Area is classified as Degraded;
- 4.39% of the vegetation within the Clearing Area is classified as Degraded to Good; and
- No clearing of vegetation in a Good or better condition will occur.

The proposed clearing aligns with the Shire's Local Biodiversity Strategy, which outlines a target to protect all estuarine wetlands with vegetation in Good or better condition.

FVC assessed the extent of native vegetation and regrowth at the Site during the vegetation review and field assessment. Approximately 5% of the vegetation on the Site is comprised of native vegetation, primarily on the eastern side of the Site. Native regrowth (48%) and cleared pasture (47%) make up the remainder of the Site however FVC noted that the native regrowth does not represent endemic species and instead represents novel assemblages typically dominated by one or two species, particularly *Kunzea glabrescens* or *Astartea scoparia* (Coterra Environment, 2021).

As outlined in Section 3.3, C-Wise submitted an Area Clearing Permit for the Project to the DWER's Native Vegetation branch on 19 October.

4.10.2 Conservation Significant Flora

According to the DBCA online individual records of Priority Flora, there are no Threatened or Priority Flora located within the Site. Similarly, FVC did not record any Threatened or Priority Flora species at the Site during the vegetation review and field assessment. The nearest recorded Priority Flora to the Site is a Priority 4 species, located approximately 300m to the west (Figure 14).

Given that no Threatened or Priority flora have been recorded within the Site, the Project is not anticipated conservation significant flora.

4.10.3 Threatened Ecological Communities

One Threatened Ecological Community (TEC) is mapped over the Site, Banksia Woodlands of the Swan Coastal Plain/Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region (Coterra

Environment, 2021). As of September 2016, this TEC is listed as Endangered under the *Environmental Protection and Biodiversity Conservation Act 1999*.

As no Banksia species have been identified within the Site (Coterra Environment, 2021), this TEC is not expected to be impacted by the Project.

4.10.4 Conservation Reserves

The Conservation Category Wetlands located on the western and the southern sides of the Site are classified as Environmentally Sensitive Areas as discussed further in Section 4.9.

The Site is located within the Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992 area (Figure 15), which sets out environmental quality objectives for the Harvey Estuary and outlines the means by which these objectives are to be achieved and maintained. It was introduced to address the nutrient enrichment of the Harvey Estuary caused by the clearing of native vegetation and by land uses that result in nutrients leaching into waterways. The Shire's LPP:WSUD also states that a proposal where phosphorous input is likely to exceed 15kg per hectare per annum or nitrogen input is likely to exceed 150kg per hectare per annum may be considered a high risk development.

As the Site is located at least 0.75km from the nearest watercourse, the clearing of vegetation for the Facility is not expected to result in impacts relating to the nutrient enrichment of the Harvey Estuary. The proposed management measures (Section 7) for the Project are expected to be sufficient to ensure that phosphorus and nitrogen inputs are minimal and below the thresholds outlined within the LPP:WSUD. Additionally, the design of the Facility has looked to eliminate the generation of leachate and ensure that all discharges are from the stormwater system (Section 7.1).

4.10.5 Dieback

The Project Dieback and Southcoast Natural Resources Management – Dieback Public Map provides information on the extent of *Phytophthora cinnamomi* dieback as of June 30, 2008. Dieback at the Site has not been mapped, however a portion of land directly to the northeast of the Site is mapped as having a moderate confidence of being infested (Figure 13).

Dieback is not known to occur at the Site, therefore the Site is not expected to result in significant environmental impacts relating to dieback.

4.11 Fauna

A fauna assessment of the Site was undertaken in 2009 by Coffey Environments and led to the identification of two fauna habitats (Coterra Environment, 2021):

- Open paddock with Juncus pallidus (*Juncus pallidus* in paddock with occasional *Astartea scoparia*, often on the edge of wetland area); and
- Melaleuca remnant woodland with wetland understorey (woodland dominated by Melaleuca and Flooded Gums, with moist, dense understorey).

The results of the fauna assessment indicated that the fauna assemblages at the Site were typical of fauna species that occur on the Swan Coastal Plain.

4.11.1 Conservation Significant Fauna

According to the DBCA online individual records of Priority Fauna, there are no records of Threatened or Priority Fauna being located within the Site. The nearest recorded Priority Fauna to the Site is a Priority 4 species, located approximately 2km to the south-southwest (Figure 14).

During the fauna assessment, 134 fauna species were observed at the Site, six of which were conservation significant species. Coffey Environments undertook a search of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool and determined the likelihood of some significant species occurring at the Site (Table 4-6).

Table 4-6: Significant Fauna Species Recorded at the Site (Coffey Environments, 2009)

Species	EPBC Act Conservation Status	Biodiversity Conservation Act Status	Type of Presence	Potential to be found in Project Area
Birds				
Actitus hypoleucos (Common Sandpiper)	Migratory		Species or species habitat likely to occur within area	
Apus pacificus (Fork-tailed Swift)	Migratory	Migratory	Species or species habitat likely to occur within area	
Ardea alba (Great Egret)	Migratory		Breeding known to occur within area	Recorded on site
Botaurus poiciloptilus (Australian Bittern)	Endangered		Species or species habitat likely to occur within area	
Calidris acuminata (Sharp tailed Sandpiper	Migratory	Migratory	Species or species habitat known to occur within area	Possible
Calidris canutus (Red Knot, Knot)	Endangered	Endangered	Species or species habitat known to occur within area	
Calidris ferruginea (Curlew Sandpiper)	Critically Endangered		Species or species habitat may occur on site	Possible
Calidris melanotus (Pectoral Sandpiper)	Migratory		Species or species habitat known to occur within area	
Calidris ruficollis (Red-necked Stint)	Migratory	Migratory		Possible
Calyptorhynchus banksii naso (Forest Red-tailed Black Cockatoo)	Vulnerable	Vulnerable	Species or species habitat likely to occur within area	Recorded on site – feeding
Calyptorhynchus baudinii (Baudin's Black Cockatoo)	Endangered		Species or species habitat likely to occur within area	Unlikely

Species	EPBC Act Conservation Status	Biodiversity Conservation Act Status	Type of Presence	Potential to be found in Project Area
Calyptorhynchus latirostris (Carnaby's Black Cockatoo)	Endangered	Endangered	Breeding likely to occur within area	Likely (foraging)
Motacilla cinerea (Grey Wagtail)	Migratory	Migratory	Species or species habitat may occur on site	
Merops ornatus (Rainbow Bee-eater)	Migratory			Recorded on site
Numenius madagascariensis (Eastern Curlew)	Critically Endangered	Critically Endangered	Species or species habitat may occur within area	Possible
Pandion haliaetus (Osprey)	Migratory	Migratory	Species or species habitat likely to occur within area	
Phaps elegans (Brush Bronzewing)		Priority 4		Recorded on site
Pluvialis squatarola (Grey Plover)	Migratory	Migratory		Possible
Rostratula australis (Australian Painted Stripe)	Endangered		Species or species habitat likely to occur within area	
Sternula nereis nereis (Australian Fairy Tern)	Vulnerable		Species or species habitat may occur within area	
Thinornis rubricollis (Hooded Plover)	Priority 4			Possible
Tringa nebularia (Common Greenshank)	Migratory	Migratory	Species or species habitat likely to occur within area	Recorded on site
Tringa stagnatilis (Marsh Sandpiper)	Migratory	Migratory		Possible
Mammals				
Dasyurus geoffroi (Chuditch,Western Quoll)	Vulnerable	Priority 4	Species or species habitat likely occur within area	Unlikely
Falsistrellus mackenziei (Western False Pipistrelle)		Priority 4		Possible
Hydromys chrysogaster (Water –rat, Rakali)		Priority 4		Possible
Isoodon fusciventer (Southwestern Brown Bandicoot)		Priority 4		Recorded on site
Notamacropus irma (Western Brush Wallaby)		Priority 4		Unlikely

Species	EPBC Act Conservation Status	Biodiversity Conservation Act Status	Type of Presence	Potential to be found in Project Area
Phascogale tapatafa wambenger (Brush-tailed Phascogale		Conservation Dependent		Possible
Pseudocheirus occidentalis (Western Ringtail Possum)	Critically Endangered		Species or species habitat likely occur within area	Unlikely
Reptiles				
Lerista lineata (Lined Skink)		Priority 3		Possible
Neelaps calonotus (Black striped Snake)		Priority 3		Possible

Coffey Environments suggested that, due to the results of previous fauna studies, the degraded nature of potential habitat and a review of conservation significant species that may occur at the Site, the Site provides limited fauna value (Coffey Environments, 2009). Habitat for Black Cockatoos at the Site was also noted to be minimal as it is generally limited to Eucalypt woodland areas which occur further to the west along the Serpentine River.

As the results of the fauna assessment suggest that fauna assemblages at the Site are typical of the area and the Site was determined to provide limited fauna value. Therefore, the Project is not anticipated to result in significant impacts to fauna.

4.12 Aboriginal Heritage Sites

A search for relevant Aboriginal Heritage was conducted using the Department of Aboriginal Affairs (DAA) online Aboriginal Cultural Heritage Inquiry System (ACHIS), which incorporates both the Heritage Site Register and the Heritage Survey Database, which lists the following sites:

- Registered Aboriginal Sites;
- Other Heritage Places; and
- Heritage Survey Areas.

The Site has been previously subject to an ethnographic and archaeological survey (27409) that covered approximately 4,000 ha of the Keralup area. No registered sites were identified within the Site boundary. The nearest registered site (3582) is located approximately 2.3km west of the Site and a smaller artefacts/scatter registered site (4110) is located approximately 2.1km to the south-southeast. A number of other sites that have been lodged or are classified as ‘stored data/not a site’ are located in the region (Figure 16).

As there are no known or registered sites within the Site, the Project is not expected to impact Aboriginal cultural heritage.

4.13 Summary of Environmental and Social Attributes

A summary of the environmental attributes of the Site is provided in Table 4-7.

Table 4-7: Summary of Environmental and Social Attributes

Aspect	Summary
Site Location and Ownership	The Project will be located on 269.4ha of land at 320 Gull Road, Keralup, of which the Development Footprint encompasses approximately 17.12ha. A lease agreement was executed between C-Wise and DevelopmentWA, the current landowner, in August 2021.
Surrounding Land Use and Zoning	The Site is zoned 'Rural' under the PRS and the Shire's LPS, as is most of the land surrounding the Site. C-Wise's existing Nambeelup composting facility is directly south of the Site and is zoned as 'Rural' under the Shire's LPS and 'Industrial' under the PRS.
Sensitive Receptors	The edge of the facility is located approximately 2.56km to the nearest sensitive receptor, a residential property to the southeast. Other properties include a boarding kennel approximately 2.56km southwest, and a residential community approximately 3.2km west.
Climate	Dry summers and mild, wet winters with most rainfall occurring between June and August. The average annual rainfall is 788mm.
Topography	The topography at the Site ranges from 10mAHD to the northeast to 18mAHD to the southeast, and from 14mAHD to 20mAHD within the Development Footprint. The base of the Development Footprint, following earthworks, will sit at 17.5mAHD.
Geology and Soils	The Site consists of four soil landscape units (Bassendean B1 to B4 Phases) and surface geology is classified as predominantly Qag - Alluvial sand and clay with shallow marine and estuarine lenses and local basal conglomerate. The Development Footprint lies primarily over Bassendean B1 and B2 Phase soils, as well as a small portion of B4 Phase soil. Apart from a small part of the proposed boundary fence, no infrastructure will be located within B3 Phase soils.
Contaminated Sites	The Site is not classified as a contaminated site. The nearest contaminated site is C-Wise's existing Nambeelup facility, located directly south of the Site.
Acid Sulfate Soils	The Development Footprint and the majority of the Site is located in an area with a moderate to low risk of ASS and groundwater samples taken from wells at the Site in 2021 indicated exceedances in ASS parameters.
Groundwater	Groundwater at the Site flows in a westerly direction towards the Serpentine River and is limited by a partial aquitard, resulting in extended periods of waterlogging during the winter months. The recorded depth to groundwater ranges from 1.9mbgl to 2.8mbgl and groundwater at the Site is noted to be fresh and acidic, with a pH ranging from 3.73 to 4.5. The AAMGL ranges from RL 9mAHD at the northwestern Site boundary to RL 19mAHD at the eastern boundary and the 50 Year DGWL ranges from RL 9.5mAHD to RL 19.5mAHD. An investigation undertaken by WSP determined that a large-scale perched aquifer is not present at the Site.
Watercourses	The Serpentine River is located approximately 3km west of the Site and two minor watercourses are located 0.75km to the northwest and 1.25km to the east, respectively. The Gull Road Drain is located along the southern boundary of the Site, approximately 125m south of the Development Footprint, and enters the Lower Serpentine River 3.1km to the west.

Aspect	Summary
	The nearest floodplain is located around the minor watercourse 0.75km east of the Site.
Water Resources	The nearest public drinking water source to the Site is the North Dandalup Dam Catchment Area, located approximately 15km to the east and in a separate catchment area.
Wetlands	Two Conservation Category Wetlands are located on the western and southern boundaries of the Site. Small sections of Multiple Use Wetlands are located within the northwestern and southeastern corners of the Site. Excluding the cleared pasture areas, the remainder of the Site is classified as Resource Enhancement Wetlands. Most infrastructure will be located at least 100m from Conservation Category Wetlands with the exception of access roads and stormwater and leachate management infrastructure, which will be located at least 50m from these wetlands. Part of the Development Footprint is located within Resource Enhancement wetlands, and a small portion of the access to the Site will be through a Multiple Use Wetland.
Vegetation Condition	While the vegetation condition at the Site ranges from Completely Degraded to Excellent, the vegetation within the Development Footprint is classified as Completely Degraded to Degraded to Good: • 86.31% is classified as Completely Degraded; • 9.3% is classified as Degraded; and • 4.39% is classified as Degraded to Good.
Dieback	Dieback is not known to occur at the Site, however a portion of land directly to the northeast is mapped as having a moderate confidence of being infested.
Conservation Significant Flora	There are no Threatened or Priority Flora species within the Site, with the nearest recorded species located 300m to the west.
Threatened Ecological Communities	Banksia Woodlands of the Swan Coastal Plain/Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region are mapped as occurring at the Site, however no Banksia trees are present at the Site.
Conservation Reserves	The Conservation Category Wetlands located to the west and south of the Site are classified as Environmentally Sensitive Areas and the Site is located within the Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992 area. The Conservation Category Wetlands are not within the Development Footprint.
Fauna	No Threatened or Priority fauna species have been recorded within the Site. The nearest record of a Threatened or Priority fauna species is 2km to the south-southwest of the Site.
Aboriginal Cultural Heritage	There are no known or registered sites within the Site, with the nearest registered site (3582) located approximately 2.3km to the west.

5 Project Design and Operations

The Project will be a modern, better practice facility that recycle organic waste, including FOGO collections, into composter and similar products. A description of the Project design and function is provided in the following sections.

5.1 Waste Sources, Streams and Volumes

C-Wise is proposing to initially accept approximately 100,000 tonnes per annum of solid organic materials for processing, increasing to a total of 200,000 tonnes per annum as the Stage 2 development is delivered. In addition to this, 30,000 tonnes per annum of liquid wastes will be accepted initially, increasing to 60,000 tonnes per annum once the Stage 2 development has been completed. This represents the generation of approximately 70,000 tonnes per annum of composted products in the initial stage, and 140,000 tonnes once the Stage 2 development is complete.

The various waste types to be accepted by C-Wise is provided in Table 5-1.

Table 5-1: Waste Acceptance Volumes

Prescribed Premises Category	Waste Type	Annual Quantity Limit
Solid Wastes		
67A – Soil blending and compost manufacturing	Greenwaste (shredded trees or plants)	200,000 tonnes
	Untreated timber (sawdust and various other wood fractions)	
	Natural fibrous organics (straw, grain husks and other crop waste)	
	Mushroom compost	
	Off-spec dairy products and food wastes	
	Animal mortalities	
	Piggery bedding	
	Animal manures	
	Dewatered screenings from CM Farms wastewater treatment plant	
	Domestic and commercial food organics and garden organics (FOGO)	
Liquid Wastes		
61 – Liquid waste Facility	Piggery wastewater and sludge (animal effluent and residues)	60,000 tonnes
	Fertiliser wash waters	
	Glycols	
	Grease trap wastes	
	Ammonia nitrate	

5.2 Design Status

The Project is currently in the conceptual design stage with these drawings utilised to support the various approval applications. As part of the conceptual design works, specific focus was given to the environmental engineering and operational management controls for the Facility, which are outlined within this document.

C-Wise is proposing to deliver the project through a Design and Construct style Contract. Therefore, the Detailed Design will be delivered by the C-Wise selected construction contractor. Based on the current project timelines, the selection of the Design and Construct contractors is scheduled to occur in late 2023/early 2024. Therefore, the Detailed Design works for the Stage 1 development are not scheduled to be completed until mid-2024. All detailed design will be approved by C-Wise and its Project Consultancy Team prior to the commencement of construction works.

Based on experience with the delivery of similar projects, it is anticipated that there may be some changes to the design of the Facility arising from the detailed design phase. However, C-Wise can confirm that there will be no significant alterations to the design intent or performance standards of the environmental engineering controls included within the conceptual designs and as outlined within this document.

5.2.1 Conceptual Drawings

A range of conceptual drawings have been developed for the Project. These are outlined in Table 5-2 and are provided in Appendix A.

Table 5-2: List of Drawings

Drawing Name	Drawing Description
C-100	General Arrangement
C-101	Site Plan Layout
C-102	Site Plan Layout Isopachyte
C-104	Earth Work Plan Layout
C-105	Staged Layout
C-106	Surface Water and Leachate Management Layout – Stage 1
C-107	Surface Water and Leachate Management Layout – Stage 2
C-108	Proposed Prescribed Premises Boundary Layout
C-110	Environmental Monitoring Point Layout
C-201, C-202, C-203, C-204	Long Sections 1-4
C-300	Ponds and Containment Infrastructure
C-301	Channels and Conveyance Infrastructure
C-302	Groundwater Control Infrastructure

5.3 Staging of Development

The Project will be delivered across two stages to provide C-Wise with an opportunity to progressively relocate all existing operations to the new Facility. The Project will be delivered in two stages, with the Stage 1 development being used to process primarily FOGO materials. The Stage 2 development represents the shift from C-Wise's operations at its existing Nambeelup composting facility to the Carbon Recycling Facility. Following completion of the Stage 2 development and the complete move of operations to the Carbon Recycling Facility, the Nambeelup composting facility will be decommissioned.

The key composting infrastructure included in the Stage 2 development is the same as the Stage 1 development. Most of the ancillary Site infrastructure will be constructed during the Stage 1 development with the exception of one additional surface water pond and two additional leachate management ponds.

The key infrastructure to be constructed for each stage includes:

Stage 1:

- Access Road;
- Weighbridge;
- Administration Office;
- Composting Infrastructure:
  - Carbon storage area;
  - Liquid waste receival area and tanks;
  - Receival building;
  - Process Area, comprising:
    - Cocoons (fully enclosed);
    - MAF area (under cover); and
    - Final maturation area (under cover).
  - Screening and dispatch area;
- Two leachate ponds;
- Stormwater pond;
- Wetland fencing and firebreaks;
- Fuel store and service areas; and
- Workshop, crib room and office.

Stage 2:

- Composting Infrastructure:
  - Carbon storage area;
  - Liquid waste tanks;
  - Receival building;
  - Process Area, comprising:
    - Cocoons (fully enclosed);
    - MAF area (under cover); and

        - Final maturation area (under cover).
    - Screening and dispatch area;
- Two leachate ponds; and
- Stormwater pond.

5.4 Site Access

Access to the Site will be from the northwestern boundary, directly on to Gull Road. The Shire of Murray recently completed the extension works to Gull Road, extending just east of C-Wise's boundary to support the Project's development.

As further development occurs in the area, it is anticipated that Gull Road will continue to extend eastward and eventually connect to with Yangedi Road, providing access from the east and west to the Site, though these plans are not yet finalised.

5.5 Controlled Groundwater Level

FSG Geotechnics was engaged by C-Wise to undertake the design of a controlled groundwater level drainage system across the Facility to ensure a minimum separation distance of 1.5m is maintained between the base of each pond and the estimated 50 Year Design Groundwater Level at the Site. The groundwater drainage system modelled by FSG Geotechnics will be staged with the development of the Facility. Stage 1 will initially comprise an open swale along its eastern and southern site edges, which will control groundwater levels beneath the three ponds to no higher than 14mAHD. At the development of Stage 2, the eastern swale between Stage 1 and Stage 2 will be converted into a sub-soil drain pipe, and Stage 2 will have its own swale installed along the Stage 2 eastern and southern boundaries to control the groundwater level beneath the Stage 2 ponds to no more than 15mAHD.

The investigation found that the groundwater designs for the Facility are able to control groundwater to the required depth underneath all leachate and surface water ponds. The controls within Stage 1 are designed to only remove the seasonal peak groundwater level, with any flows and associated discharge only likely to occur during the wet winter months. The final design of the Stage 2 groundwater control will be refined prior to construction, once additional groundwater data has been gathered across the Site as part of the operation of Stage 1 of the Facility.

5.6 Composting Infrastructure

The proposed layout of the Facility is shown in Drawing C-101. The following section outlines the infrastructure from acceptance through to dispatch. The Facility design has been developed in general accordance with the Organics Recycling Guideline, which provide environmental performance objectives and benchmark controls for the planning, design and operations of organics recycling facilities regulated under Part V of the *Environmental Protection Act 1986* (EP Act).

The composting process will be completed in several stages, each of which will be fully enclosed to minimise potential odour emissions and to assist in the management of leachate. These stages include:

- Receival;
- Stage 1 – Cocoon system (10-14 days);
- Stages 2-4/5 – Pasteurisation (10-14 days each);

- Stage 5/6 – Settling (2-4 days); and
- Screening and Dispatch.

Composting will be completed in general accordance with the Organics Recycling Guideline to ensure that the finished product will satisfy various market requirements.

5.6.1 Carbon Storage Area

Low risk feedstocks such as greenwaste, forestry residues and natural fibrous organics (such as cereal waste) will be stored in the carbon storage area. The carbon storage area is located on the northern side of the composting infrastructure, near the access road, to minimise the distance that waste delivery vehicles need to travel and limit the potential for vehicle interactions with Site personnel. It will consist of a compacted limestone hardstand that is graded to the north to direct all leachate towards the nearby leachate management pond, rather than the surrounding environment. The limestone material will be applied in a minimum 300mm thick layer, which has been shown to achieve an effective permeability of $2.8x10^{-8}$m/s. Any leachate generated at the carbon storage area will free flow across the surface of the hardstand, which will be maintained to ensure ponding of leachate on the surface does not occur. Bunding will be installed at the edge of the hardstand to assist in directing leachate toward the pond.

A second carbon storage area will be constructed as part of the Stage 2 development, also consisting of a compacted limestone hardstand, graded to the associated leachate ponds. It is anticipated that the Stage 2 carbon storage area will be slightly smaller than the Stage 1 carbon storage area due to the space required for the liquid waste receival area and tanks (Section 5.6.1).

It is important to note that in accordance with Table 4 of the Organics Recycling Guideline, leachate generated in this area is defined as low-risk, as it is generated from low-risk feedstocks.

Low risk feedstocks will be received directly on the hardstand and will be transported to the Receival Building prior to being blended into the pre-treated compost mix. Occasional wetting of materials using stormwater or groundwater will occur on this hardstand to minimise wind-driven dispersion of finer materials, and to pre-wet materials prior to inclusion in the composting process.

5.6.2 Receival Building

High risk feedstocks such as FOGO will be delivered by waste vehicles to the receival building and pre-sorted to remove contamination prior to composting. The receival building will be enclosed and roofed to eliminate the risk of clean stormwater coming into contact with waste materials and generating high-risk leachate. Doors will be installed and kept closed when waste materials are not being delivered to minimise the uncontrolled release of odours from the building. A mechanical ventilation system will be installed in the receival building to meet the minimum required four air changes per hour.

The receival building will include a FOGO receival area for vehicles to place waste materials and internal processing equipment for pre-sorting and the removal of contamination. There will also be processing plant to ensure all materials are a consistent or suitable size before progressing into the composting process. Mixers will combine the FOGO stream with materials from the carbon storage area, where appropriate, producing a blend suitable for inclusion in the composting process.

A second receival building will be constructed as part of the Stage 2 development and is expected to contain similar infrastructure, equipment and operations.

Organic materials will be delivered directly to the receival hall for pre-treatment. An initial inspection will be undertaken for all waste loads entering the Site to ensure that the material will be suitable for composting and does not contain unreasonable levels of contamination. Once they have been deposited in the receival building, organic materials will be fed via a hopper into a further sorting process to remove contamination. The material will then be passed through a size-separation process before being stored in a FOGO bunker within the hall. Materials from the carbon storage area will also be brought into the receival building for storage in the material bunkers prior to inclusion in the process, when required.

The organic materials will then be transferred from the bunkers to the mixers where they will be moistened and blended with the desired volume of various feedstocks. Once this process is complete, the blended feedstocks will be transferred to the cocoons to commence the composting process. The receival building will be run with a 'clean floor' policy, with all materials processed and removed from the receival building by the end of each working day.

5.6.3 Liquid Waste Receival Area and Tanks

Liquid wastes will be accepted at the liquid waste receival area for blending into compost products. The liquid waste receival area will and bunded, which minimises the risk of liquid wastes entering the environment in the event of a spill or leak.

The Stage 1 development will include twelve storage tanks, with each tank having a storage capacity of 340,000L. The tanks within the farm for each stage will be arranged in banks of three, with the tank farm bunded to a capacity of 110% that of the volume of a single bank within the bund, in accordance with AS1940. The tanks will also be equipped with monitoring equipment (e.g. high-level alarms) to ensure that they do not overfill. Three of the storage tanks located in this area will be reserved for the temporary storage of high-risk leachate generated from the receival building, cocoon area and process area.

An additional 12 storage tanks will be installed directly to the east of the existing tanks as part of the Stage 2 development, with three reserved for management of high-risk leachate generated in Stage 2. No additional liquid waste receival area will be constructed as part of the Stage 2 development and the existing liquid waste receival area from the Stage 1 development will be used to service all liquid waste tanks.

Vehicles delivering liquid wastes to the Facility will do so in the liquid waste receival area. Liquid wastes will be released into an in-ground pit that contains a pump and filter to separate any solids. The liquid waste will be stored in the adjacent liquid waste storage tanks to minimise potential odour emissions. Liquid waste accepted at the Site, and leachate stored within the tank farm, will be used in the compost manufacturing process.

5.6.4 Cocoons

As part of the C-Wise Smart Composting project, a proprietary composting system using custom-built composting cocoons has been developed for the initial stage of composting for the Project. Both Stage 1 and Stage 2 developments will feature 12 composting cocoons located between the receival building and MAF area within the process area, with an additional three cocoons for surge capacity located adjacent to the receival building.

The cocoons will be fully enclosed and can be managed and operated individually. They will include a tension fabric roof with a structural insulated panel system to protect the piles from contact with stormwater and to minimise leachate generation. The cocoon system is suspended underneath each tension fabric roof and will be lowered over the piles of organic material in the initial stages of the

process. Each cocoon will have a capacity of 500m^3 and be constructed over an effectively impermeable bunded concrete hardstand to minimise the risk of leachate entering soils. The concrete floor of each cocoon will be graded towards a collection pit to allow the extraction of high-risk leachate for storage in the tank farms and will not allow any high-risk leachate to escape.

The initial composting process will take place in the cocoons, which are fully enclosed to minimise odour emissions and the risk of leachate being released into the environment. Air exchanges will occur throughout the process to maintain aerobic conditions and minimise odour generation, with air removed from the process being pumped through the initial MAF compost stack to act as a biofilter and further mitigate odour generation.

This initial composting and pasteurisation stage is expected to take between 10-14 days to complete, during which the piles will be subject to temperatures in excess of 55°C to ensure pasteurisation. This is similar to how enclosed tunnel composting systems work, wherein the initial stage is used for pasteurisation. Following this stage, the partially processed compost will be transferred to the MAF area for additional processing and maturation.

5.6.5 Process Area

Two processing sheds for each stage will be constructed to host the composting process after the material has gone through the initial processing within the cocoon system. Each processing shed will feature a roof, located approximately 6m above the ground level. This roof is a critical and key environmental control at the Site, effectively eliminating rainfall-driven generation of high-risk leachate from the composting process. To allow for operational flexibility, each shed will not have permanent sidewalls, however a series of precast retaining bunkers walls will be used for each stage of the composting process to contain the stockpiles and minimise any rainfall-drive leachate generation.

The floor within each processing shed will be made of an effectively impermeable concrete hardstand and will feature bunds and slopes to contain any leachate generated within and drain it towards leachate collection pits. The concrete floor shall be designed so that the fall ensures no leachate will escape the processing shed. Leachate will then be pumped from the collection pits for storage in the tank farm or for reuse in the composting process.

Each process shed will host five additional stages of the composting process, using a combination of MAF and passive composting maturation to deliver a final compost material to the screening and dispatch area. The following subsections discuss the infrastructure and operational aspects of the two composting processes which occur within the processing sheds.

5.6.5.1 *MAF Area*

Following the initial process within the cocoons, the maturation phase of the composting process will take place in the MAF area, directly south of the cocoons. Though the number of MAF stages will vary depending on operational requirements, it is anticipated that a minimum of three MAF stages will occur as part of the regular composting process. Each stage is anticipated to take between 10-14 days to complete.

The MAF system comprises a perforated pipe which is laid on top of the hardstand processing shed floor prior to the placement of organic material. This will force air through the pile and achieve aeration without the need for turning. At the end of each stage the compost material is inspected and moisture levels are assessed. Master Units (MU) and Sub Units (SU) are disconnected, with any damage or faults are addressed before being placed into position for the next stage of the composting

process. Air Supply (AS) Pipes are extracted from underneath current pile and moved into position with MAF MU and SU units at the next stage. Once connected and tested for correct operation, the compost stockpile is moved from previous MAF stage to this next stage. The front-end loader movement of the compost pile involves additional mechanical breakdown and mixing of the material when transferring to the subsequent MAF stage. This mixing also facilitates additional pasteurisation to that achieved in the cocoon composting stage and further maturation of the compost.

The piles will be monitored to ensure that appropriate temperature and moisture levels are maintained to ensure pasteurisation and achieve further maturation. The MAF stages following the cocoon phase of the composting, allow C-Wise to control the maturity of the compost to be meet its intended market. High maturity composts will require longer maturation times and therefore additional composting stages. Lower maturity composts will have lower timeframe demands.

Any leachate generated during this phase of the composting process will drain across the concrete floor of the processing shed to a collection pit for collection prior to temporary storage in the tank farm.

The pasteurisation process is used to kill plant and animal pathogens, parasites and weeds/seeds within the compost. This stage of the process will occur in the MAF area. Pasteurisation via the MAF system will be completed across a minimum of three stages, between which the piles will be manually turned to ensure that the outer layers of compost reach pasteurisation temperatures. Each stage is anticipated to take between 7-10 days to complete. Once pasteurisation is complete, the pasteurised compost will be transferred to the final maturation area for settling.

The same MAF system and process will be utilised in all process areas across Stage 1 and 2.

5.6.5.2 *Final Maturation Area*

The final stages of the composting process before screening and dispatch will see the final maturation of the compost product in the southmost stages of the processing shed. The product will come from the MAF Area and be formed into stockpiles underneath the processing shed roof, where it will be left to passively sit and settle on the concrete hardstand. As in all areas of the processing shed, any leachates generated from this process will drain to the collection pits for pumping to the tank farm.

It is anticipated that each stage of this process will occur for a minimum 2-4 days, after which the product will be moved to the screening and dispatch area before ultimately being removed from Site.

The maturation area process and infrastructure will be the same in both the Stage 1 and Stage 2 developments.

5.6.6 Screening and Dispatch Area

The screening and dispatch area is where the finished compost product will be stored prior to removal from Site. It is located south of the MAF and final maturation areas, towards the back of the Facility. As this area will only be used for the storage of the finished compost product, it will not be roofed. It will consist of an effectively impermeable bunded asphalt hardstand in accordance with the Organics Recycling Guideline. Any leachate generated in this area will be classified as low-risk in accordance with the Organics Recycling Guideline and will be directed towards the adjacent leachate management pond within each stage.

Once the composting process has been completed, the compost product will be screened to grade the product according to size, as well as allow for the removal of any remaining physical contaminants.

The final product will be tested and classified in accordance with the Organics Recycling Guideline to ensure that it is fit-for-purpose and of a sufficient quality. At this stage, it is unknown if the outputs from the Facility will be classified as either Category A or Category B products, as this is dependent on the feedstocks used to create the products, as outlined in the Organics Recycling Guideline. The quality and type of feedstocks used to create compost at the Facility will be confirmed during operations through appropriate and regular testing. It is noted that C-Wise has a proven history of sourcing appropriate feedstocks for market requirements at its existing Nambeelup composting facility and therefore it is anticipated that both Category A and Category B products may be generated at the Facility.

The final product will be stored in the screening and dispatch area prior to being loaded into vehicles for transport to appropriate markets.

5.6.7 Markets

C-Wise currently produces a range of recycled organic products at its existing Nambeelup composting facility, including compost, soil improvers and mulch. These are supplied to several key markets, including:

- Agriculture:
  - Cropping and pasture;
  - Vegetable production;
  - Fruit and orchards;
  - Viticulture; and
  - Turf production.
- Urban Amenity:
  - Parks and garden management;
  - Landscaping; and
  - Home gardeners.
- Environmental Remediation:
  - Bioremediation;
  - Roadside rehabilitation; and
  - Mining rehabilitation.

It is anticipated that the products generated at the Facility will be supplied to similar markets.

5.7 Ancillary Site Infrastructure

The proposed layout of the Facility is shown in Drawing C-101. The Project will include the following ancillary infrastructure:

- Wetland fencing and firebreaks;
- Fuel store and service areas;
- Administration building;
- Workshop and office;
- Gatehouse and weighbridge;

- Security infrastructure;
- Traffic management;
- Surface water and leachate management ponds; and
- Water supply.

Apart from an additional surface water pond and two leachate management ponds, the ancillary Site infrastructure will all be constructed during Stage 1 of the Project.

5.7.1 Wetland Fencing and Firebreaks

The Facility has been sited and designed to minimise potential impacts to the wetlands and other environmental values within and surrounding the Site. As discussed in Section 4.9, there are several mapped Conservation Category, Resource Enhancement and Multiple Use wetlands within the Site. Wetland buffers have been developed with due consideration given to the Draft Guideline for the Determination of Wetland Buffer Requirements (DWER, 2005) (the Wetland Buffer Guidelines).

For the Conservation Category and Resource Enhancement wetlands, a 50m wetland protection buffer has been allowed for natural revegetation, which will be fenced to prevent access Site operations. For the Resource Enhancement wetlands at the Site, a 50m wetland protection buffer has been implemented and will also be fenced to minimise the impacts of the development on the wetlands. Where the 50m asset protection buffer from the facility has been required, the location of the fence has been relocated, however a minimum 50m distance exists between the edge of the facility to the resource enhancement wetlands. An additional 50m managed asset protection buffer has been included between operational areas of the Site and the edge of the wetland protection buffer for Conservation Category wetlands. This effectively creates a 100m buffer from Site operations to minimise the impacts of the operation on the conservation category wetlands. A firebreak will be developed along the fence within 50m asset protection buffer, and grasses within the asset protection buffer will be managed to minimise the fire risk to the facility. Surface water and leachate ponds will be partially located within the 50m asset protection buffer, however these are not expected to cause significant environmental impacts due to the extensive engineering controls that have been incorporated into the design (Section 5.7.7).

The proposed wetland buffer, fencing and firebreak areas are shown in Drawing C-108.

5.7.2 Fuel Store and Service Areas

Trucks and other vehicles will be stored in the fuel store and service area when not in use.

The fuel store and service area is located near the workshop and office and away from daily operational activities to minimise potential safety risks, such as vehicle collisions and the spread of fires. In the event that equipment is damaged and can be moved, it will be serviced in this area to reduce risks to personnel safety.

5.7.3 Workshop and Office

The workshop and office will be located north of and separated from the key composting infrastructure to minimise potential safety risks to staff from vehicle movements. This area will contain operational controls for the plant and an office area inclusive of a staff kitchen and toilets.

5.7.4 Gatehouse and Weighbridge

On arrival at the Site, all vehicles must enter via the weighbridge. All vehicles will be weighed on entry to and exit from the Site. A computerised weighing system will record the weight of vehicles on entry and exit of the Site. Upon a waste load being accepted, incoming vehicles will be directed to the appropriate section of the Facility.

This area will also contain the staff office and parking bays.

5.7.5 Security

As discussed in Section 5.7.1, a fence will be installed between key Facility infrastructure and the nearby Conservation Category and Resource Enhancement wetlands to provide additional protection. The fence will also reduce the risk of unauthorised personnel accessing the Facility, particularly from the western and southern sides of the Site where the majority of fencing will be installed. A front gate will be installed at the entrance to the Site will be locked outside of operational hours.

Access to the Site and key infrastructure will be available only through the Site entrance near the gatehouse and weighbridge.

5.7.6 Traffic

A Traffic Impacts Statement (TIS) for the Site was prepared by Talis to outline the transport aspects of the proposed development, focusing on traffic operations, loading vehicle operations, access and car parking. The TIS was prepared in accordance with the WAPC Transport Impact Assessment Guidelines: Volume 4 – Individual Developments (WAPC, 2016).

Overall, the TIS made the following conclusions in relation to the development:

- There are no current public transport upgrade plans to provide access within walking distance to the site, however there are plans to provide good active transport accessibility to the Site access, with wide pedestrian footpaths and good shared paths within the surrounding area;
- The Site will generate approximately 78 vehicles during the peak AM and PM periods; and
- There will be 68 parking bays provided for staff and visitors, meeting the required minimum parking requirements.

5.7.7 Surface Water and Leachate Management System

The design of the Facility has been developed with consideration of the Organics Recycling Guideline and an aim to minimise the volume of leachate generated and subsequently maximise the capture of any stormwater or leachate generated at the Site. A comprehensive Surface Water and Leachate Management System (SWLMS) has been developed for the Site to manage surface water and leachate generated across various operational areas.

As part of the SWLMS, one surface water pond and two leachate management ponds will be constructed to support each stage of the Project. Clean surface water will be directed away from The Processing Shed, Cocoon and Receival Hall roofs and into the surface water ponds to eliminate the rainfall-driven generation of high-risk leachate within these areas. The surface water ponds will consist of:

- A 300mm compacted subgrade layer using onsite soil material; and
- A 2mm High Density Polyethylene (HDPE) Geomembrane.

Each surface water pond has been sized to a 1-in-20-year, 24-hour storm event in accordance with the Organics Recycling Guidelines and will include a passive spillway that allows for a controlled release of stormwater offsite.

The leachate management ponds will be used to capture any low-risk leachate generated from the carbon storage area and the product screening and dispatch area. Any high-risk leachate generated at the Site will be collected in a series of collection pits under the roofed area and then pumped to the liquid waste tanks for storage prior to reuse in the composting process.

To prevent low-risk leachate stored in the ponds from percolating into the groundwater system, the ponds will be lined in general accordance with the Composting Guidelines:

- A 300mm Compacted Subgrade Layer;
- A 2mm High Density Polyethylene (HDPE) Geomembrane; and
- Geosynthetic Clay Liner (GCL).

This minimises the risk of leachate leaching from the ponds into soils and groundwater. A minimum separation distance of 1.5m from the base of the ponds to groundwater will also be maintained. A water balance assessment was undertaken on the ponds, which shows that they can safely operate without overtopping in five, consecutive 90th percentile rainfall years. The leachate ponds have also been designed to have an operational capacity to cater for a 1-in-100-year, 24-hour storm event and in the event of a more significant storm event, will safely overtop into the Facility's stormwater drainage system to be further diluted prior to being released into the environment.

The layout for the SWLMS in Stage 1 is shown in Drawing C-106, while Drawing C-107 shows the layout of the SWLMS for Stage 2, available in Appendix A. A Surface Water and Leachate Management Plan was also prepared for the Facility and is presented in Appendix E. A Technical Specification and Construction Quality Assurance (CQA) Plan for the ponds and swales has been developed, and this is available in Appendix F.

5.7.8 Water Supply

C-Wise currently holds a Licence to take Water under Section 5C of the RIWI Act for the existing Nambeelup composting facility (Instrument No. GWL166732(2). The Licence to take Water (Water Licence) allows for the extraction of up to 350,000kL of water each year for the purposes of irrigation and compost production and soil blending.

C-Wise is seeking an amendment to the Water Licence so that it applies to both the existing Nambeelup composting facility and the Site. DWER have previously advised that an amended Water Licence can be issued once a signed lease agreement for the Site can be provided. The lease agreement is expected to be signed once the necessary environmental and planning approvals have been obtained for the Project and will be provided to the DWER once available.

5.8 Project Timeline

The current estimated Project Timeline for the delivery of the Stage 1 Facility is shown in Table 5-3. These timeframes may vary due to approval assessment periods and contractor timetables.

Construction of the Project will be undertaken in two stages and commissioned as each area is completed.

It is anticipated that construction of the Stage 2 development will commence approximately 24 months after operations of the Stage 1 development begin. A more accurate timeframe for the delivery of the Stage 2 development will be confirmed following completion of the Stage 1 construction works.

Table 5-3: Estimated Project Timeline

Stage	Duration	Start	End
DWER Assessment of Application	3 months	27/10/23	31/01/24
Stage 1 Construction	12 months	1/02/24	1/02/25
Critical Containment Report Preparation and Assessment	1 month	1/02/25	1/03/25
Stage 1 Operations under Time Limited Operations Period	180 days	1/03/25	28/08/25
Stage 2 Construction (Proposed)	12 months	1/03/27	1/03/28
Stage 2 Operations under TLO (Proposed)	180 days	1/03/28	28/08/28

5.9 Time Limited Operations

The Guideline: Industry Regulation Guide to Licencing (DWER, 2019) states that time limited operations (TLO) may be authorised under a Works Approval, the maximum period for which is 180 days. Once the DWER is satisfied the Project has been constructed in accordance with the Works Approval conditions and approved designs, C-Wise wishes to operate the Facility under TLO for the maximum allowable period of 180 days.

The proposed volume of waste to be accepted during the TLO period is outlined in Table 5-4.

Table 5-4: Waste Acceptance during Time Limited Operations Period

Category No.	Name	TLO Waste Acceptance	Normal Operations Waste Acceptance
61	Liquid waste facility	15,000 tonnes during TLO	30,000 tonnes per annual period
67A	Compost manufacturing and soil blending	50,000 tonnes during TLO	100,000 tonnes per annual period

6 Stakeholder Consultation

C-Wise recognises the importance of undertaking stakeholder consultation for the Project due to its significance in relation to the Waste Strategy targets and to provide stakeholders the opportunity to provide early input. In relation to the engagement, C-Wise and its Project Consultancy Team has engaged with both government bodies (including approval authorities) and the community. These actions are discussed in the following sections.

6.1 Government Bodies

Recognising the importance of early stakeholder input, C-Wise has undertaken extensive regulatory authority engagement for the Project since it was first proposed to the Department of Communities in 2019.

6.1.1 Department of Communities & Development WA

The Project was first submitted to the Department of Communities as a Registration of Interest (ROI) for the East Keralup – Southern Portion Development Opportunities in 2019 and C-Wise subsequently entered into an option to lease agreement with Development WA for the Site. At this stage, an Intent to Lease Agreement has been executed between C-Wise and Development WA. As per this agreement, Development WA will be provided with a copy of the Development Approval and supporting documentation for approval prior to submission to the Shire of Murray. As per standard practice, the final lease will take effect following receipt of the required approvals.

6.1.2 Department of Water and Environmental Regulation

C-Wise engaged with DWER on 13 June 2022 and held a scoping meeting to introduce the Project. DWER was represented by Hayden Nebel, Tracey Hassel, and Jarrod Abrahams. The potential environmental aspects were discussed in this meeting and it was suggested by DWER that the Department of Biodiversity, Conservation and Attractions (DBCA) should be engaged with due to the Site's proximity to wetlands and potential vegetation clearing requirements. DWER's information and specialist study requirements were also discussed in this meeting and it was determined that an Odour Impact Assessment would be required and that C-Wise should consider cumulative odour impacts of the transitional period between using its existing facility at Nambeelup and the proposed Carbon Recycling Facility. This meeting provided some early guidance that helped shape the siting and design of the Facility.

A second meeting was held with the DWER and DBCA on 26 April 2023, attended by Jarrod Abrahams and Hayden Nebel from the DWER. This meeting focused on the wetlands surrounding the Site and included discussions around wetland protection buffers, bushfire clearing, waste acceptance, leachate and stormwater management as well as groundwater protection and monitoring. This meeting helped shape the detailed design of the key environmental controls for the Facility.

C-Wise took the DWER's feedback onboard and held a final pre-submission meeting on 12 October 2023 with both the DWER and DBCA to present the updates to the Site designs. This meeting covered the increased wetland buffers, controlled groundwater level, and controls for the leachate and surface water ponds. The Community Engagement Strategy was also discussed and is outlined further in Section 6.2. Discussions were also focused on the tight project timelines including the approvals processing timeframe. Following this meeting, C-Wise progressed with finalising the Area Clearing Permit and Works Approval applications for submission.

6.1.3 Department of Biodiversity, Conservation and Attractions

As per the advice of DWER, C-Wise engaged with the DBCA regarding the Project and its proximity to wetlands on 26 April 2023. At the meeting with the DWER and DBCA, the DBCA were represented by Lyndon Mutter, Fiona Felton, and Kathy Bates. At this meeting, clearing and wetland protection buffers were discussed, particularly around the overlap between asset fire protection buffers and wetland protection buffers.

C-Wise implemented feedback from the DBCA, including a minimised clearing area, increased wetland protection buffers, and implementation of a wetland buffer fence. These updates were presented to the DBCA on 12 October 12 2023 at a meeting attended by Lyndon Mutter.

6.2 Community Engagement

C-Wise recognises the importance of engagement with the surrounding community for this Project. C-Wise has discussed the various community engagement processes to devise the final engagement strategy and activities. These activities are scheduled to occur in the coming weeks to ensure the local community has the ability to obtain information on the Project and provide feedback. The proposed community engagement process is summarised as follows:

1. Materials will be prepared to inform the community, and will be made available via an online website;
2. An online questionnaire will also be provided online to gather feedback from the community and provide a method for asking queries and providing feedback;
3. An open day will be held to allow the community and key stakeholders such as the DWER to attend and engage with C-Wise and Talis staff in person; and
4. A letter drop will occur to surrounding premises to inform them of the informative documentation, online feedback form and community open day.

A standalone community engagement report has been prepared to outline the community engagement works undertaken, summarise the feedback obtained received from both the online survey and during the open day, as well as C-Wise and its Project Consultancy team's response. The community engagement report also includes copies of all relevant information supplied and obtained during the community engagement process.

The community engagement report is presented in Appendix D.

7 Environmental Aspects and Management

There are a variety of environmental aspects that have been considered during the development of the Project. They key risks associated with the Project relate to clearing of vegetation, odour, leachate generation and surface and groundwater contamination. However, there are a variety of other environmental factors that warrant careful consideration to ensure that all potential impacts are controlled to appropriate standards.

The Organics Recycling Guideline has been considered during the development of the Project. Table 7-1 provides as summary of how the project complies with the Organics Recycling Guideline Better Practice Benchmarks.

Table 7-1: Organics Recycling Guideline Better Practice Benchmarks

Better Practice Benchmark	Environmental Performance Objective	Relevant Section(s)
Feedstocks	Undertake organics recycling using feedstocks that have a beneficial outcome for product quality.	Section 5.1
Emissions to Land and Water	Protect the environment by preventing and, where that is not possible, minimising emissions to land and water that may cause pollution or environmental harm.	Sections 7.1, 7.2, 7.7, and 7.11
Odour	Protect the environment by preventing and, where that is not possible, minimising odour emissions that may cause pollution or environmental harm.	Section 7.3
Point Source Emissions to Air	Protect the environment by preventing and, where that is not possible, minimising point source emissions to air that may cause pollution or environmental harm.	Section 7.3
Dust	Protect the environment by preventing and, where that is not possible, minimising dust emissions that may cause pollution or environmental harm.	Section 7.9
Noise	Protect the environment by preventing emissions of unreasonable noise and maintaining compliance with the assigned levels in the Environmental Protection (Noise) Regulations 1997 to prevent pollution and environmental harm.	Section 7.8
Emissions of Litter and Debris	Protect the environment by preventing, and where that is not possible, minimising emissions of litter and debris that may cause pollution or environmental harm.	Section 7.12
Fire Prevention and Management	Protect the environment by minimising the risk of fires occurring and be sufficiently prepared in the event of a fire to prevent and, where that is not possible, minimise pollution and environmental harm.	Section 7.6
Vectors	Protect the environment by minimising the risk of attraction, refuge, growth and spread of vermin and pests to prevent pollution and environmental harm.	Sections 7.5 and 7.9
Product Quality	Contaminants in feedstocks are treated effectively and recycled organic products are fit-for-purpose.	Section 5.6.7

7.1 Leachate

Leachate may be generated from the decomposition of the organic materials accepted at the Facility or by stormwater coming into contact with waste. If not adequately managed, leachate may contaminate soils, groundwater or surface water sources at or surrounding the Site. Leachate may also be generated via fire wash waters, which are discussed further in Section 7.7.

A Surface Water and Leachate Management Plan (SWLMP) has been developed for the Site, which outlines the approach to eliminating and reducing the generation of high-risk leachate, and the management and control of low-risk leachate. Where possible, surface water will be diverted from areas with the potential to generate leachate. Each stage will feature roofed processing areas to eliminate rainfall-driven generation of high-risk leachate, and hardstands and collection pits for the collection of high-risk leachates prior to transport to the tank farm for each stage.

Low-risk leachate is the main leachate generated at the Site, and this is collected via a number of HDPE-lined swales and directed to a low-risk leachate pond, lined with both HDPE and a GCL. These ponds have been sized to a 1-in-100-year, 24-hour rainfall event, and are designed to safely overtop via HDPE-lined swales into a surface water pond for further dilution prior to discharge to the environment in extreme rainfall events.

The proposed measures to minimise leachate generation and the potential for impacts to the environment include:

- A fully enclosed building is proposed for the receival building, with an internal concrete floor sloped to a leachate collection pit;
- The composting process areas are all roofed or fully enclosed within cocoons, with sidewalls to minimise rainfall intrusion and concrete hardstands falling toward leachate collection pits;
- All leachate collection pits are pumped out to a tank farm, with tanks arranged in banks of three and bunded to a capacity of 110% that of the volume of a single bank within the bund, in accordance with AS1940;
- Roofed areas will drain to a HDPE-lined surface water pond, sized for a 1-in-20-year, 24-hour storm event in accordance with the Organics Recycling Guideline;
- The external perimeter of all buildings and roof areas will slope away from any doors to prevent stormwater ingress;
- Low-risk leachate generated on hardstands will drain via HDPE-lined channels to leachate ponds;
- Low-risk leachate ponds are sized for a 1-in-100-year rainfall event, higher than the benchmark control within the Organics Recycling Guideline;
- Low-risk leachate ponds will be lined with HDPE and a GCL to minimise the likelihood of leaks;
- A controlled groundwater level has been developed for the Site to minimise the impact of fluctuating groundwater on the pond lining system, and to maintain a minimum groundwater separation;
- Regular inspections and a groundwater monitoring regime will be undertaken to identify any damage to the leachate management system;
- A SWLMP has been prepared for the Site and will be implemented during construction and operation; and
- During extreme rainfall events, the leachate ponds are designed to safely overtop into the surface water pond for further dilution prior to controlled release into the environment.

It is anticipated that these management measures will enable C-Wise to appropriately manage any leachate generated at the Site.

7.2 Surface Water

Precipitation on the Site will result in the generation of stormwater, which may lead to the formation of leachate if it comes into contact with waste materials. Excess surface water at the Site may result in flooding or overflow of contaminated surface water into the surrounding environment.

Surface water will be collected from the roofs of the Facility and other asphalted areas on which processing, and storage of compost or feedstocks does not occur. Surface water will drain from these areas to a HDPE-lined surface water pond.

The proposed measures for the management of surface water and the potential for impacts to the environment include:

- Roofed and asphalted areas graded away from leachate-generating areas to minimise leachate generation;
- A surface water pond lined with HDPE, sized for a 1-in-20-year, 24-hour storm event;
- An overflow channel to allow the safe overtopping of surface water during events larger than a 1-in-20-year, 24-hour storm event; and
- A SWLMP has been prepared for the Site and will be implemented during construction and operation.

It is anticipated that these management measures will enable C-Wise to appropriately manage any surface water generated at the Site.

7.3 Odour

Due to the acceptance and processing of organic waste material types at the Facility, odours will be generated. The generation of odours has the potential to reduce amenity, impacting personnel at the Site and potentially external sensitive receptors if odours are released to the environment.

It is recognised that any odours associated with the Facility are a key concern for DWER and surrounding residents. C-Wise therefore engaged Environmental and Air Quality Consulting (EAQ) to undertake an Odour Impact Assessment (OIA) to understand the potential odour impacts from the Project. EAQ also provided input into the design of the Project and organic process with an aim to eliminate and mitigate odour emissions as far as practicable. The OIA was completed in accordance with the Guideline: Odour Emissions (DWER, 2019) (Odour Guideline) and compared the predicted odour footprint of the Facility to the odour footprint from C-Wise's existing Nambeelup composting facility. The OIA considered both Stage 1 and Stage 2 developments, as well as the progressive closing of the existing Nambeelup composting facility.

To mitigate risks associated with odour, the Project will capture and either re-use or treat the primary odour emissions from the composting activities. The re-use will involve the odours being extracted from the covered composting cocoons and the airstream recirculated back into the MAF system to be used as aeration. The aeration of the odours will be treated within the composting piles. Importantly, the nearest sensitive receptor (rural residence) is approximately 2.57km southeast of the Development Footprint. According to the Odour Guideline, the recommended screening distances for a Category 61 Prescribed Premises is 1,000m and is on a case-by-case basis for a >50,000 tonne per annum (tpa) Category 67A Prescribed Premises with outdoor covered windrows and continuous

aeration. As a result of the separation distance from the Site to the nearest sensitive receptor, the risk of impacts from odours generated at the Site is considered to be low.

Despite this significant separation distance, C-Wise has also designed a process where odour is controlled and minimised to further limit potential risks to amenity. FOGO materials accepting and pre-treatment occurs indoors in the enclosed receival building, which will include a mechanical ventilation system to meet a minimum four air changes per hour to mitigate odour concentrations. The initial stage of the composing process will occur under a cocoon system, which will contain odours during the most volatile stage of the process. Air will be removed from the cocoons and be pumped through compost in subsequent stages of the process, minimising odours generated by a 'biofilter' effect.

The OIA found that, as a result of these controls and the re-use or treatment of the primary odour emissions, the odour footprint from the Project will not be of the same magnitude as the existing C-Wise activities to the south of the Site. Therefore, the cumulative odour footprint arising from the Stage 1 development is unlikely to increase the odour risk profile from existing and proposed C-Wise composting activities. It was concluded in the OIA that the Project, once finalised, will reduce the total odour footprint of C-Wise's operation.

C-Wise will implement the following management measures to ensure that odour emissions are minimised as far as practicable:

- Highly putrescible organic materials such as FOGO, which will generate the most odour emissions, will be processed in an enclosed composting system;
    - Less putrescible organic materials that produce fewer odour emissions, such as greenwaste, will be stored in the carbon storage area.
- Organic materials will be delivered to the receival building for initial inspection, which is enclosed and roofed to minimise potential odour releases;
    - The receival building will include doors that will be kept closed at all times when waste is not being delivered.
    - The receival building will also operate with a 'clean floor' policy, with all received wastes removed by the end of each working day.
- The initial composting stage will occur in the cocoons, which will be fully enclosed. Odorous air will be extracted from the cocoon process and used in the MAF processing area which will provide a biofilter effect;
- The use of the MAF system during the pasteurisation phase will reduce odour emissions through the continuous operation of windrows;
- The MAF and final maturation areas will be roofed to provide optimal processing conditions to mitigate the potential for odour emissions arising from poor maturation;
- Liquid waste accepted at the Site will be stored in enclosed tanks, which will minimise potential odour emissions;
- Vehicles transporting waste materials to the Site and compost products away from the Site will be required to be covered at all times; and
- A complaints register will be maintained and, in the event that a complaint is received, C-Wise will investigate the source and implement appropriate management controls.

7.4 Vegetation

As discussed in Section 4.10, much of the Site has been historically cleared for agricultural uses and the remaining vegetation is in relatively poor condition. The Facility has been sited and designed to minimise the extent of clearing required, as well as prioritise the protection of vegetation in Good or better condition. Approximately 45.51ha of vegetation is required to be cleared for the Project, which includes:

- 39.28ha of Degraded to Completely Degraded vegetation, 31.90% of this vegetation condition type within the Site;
- 4.23ha of Degraded vegetation, 11.77% of this vegetation condition type within the Site; and
- 2.00ha of Degraded to Good vegetation, 7.31% of this vegetation condition type within the Site.

Importantly, no vegetation in Good or better condition will be cleared to establish the Facility or any ancillary infrastructure.

C-Wise recently submitted an application for an Area Clearing Permit for the Facility to DWER under Section 51E of the EP Act, which included the maximum extent of clearing required to establish both Stage 1 and Stage 2 developments.

C-Wise will aim to minimise impacts from clearing through the application of the following management methods:

- Prior to disturbance activities, the clearing and disturbance area will be demarcated. The clearance and disturbance area will be defined using high visibility tape and or spray paint where suitable to ensure operators undertake activities within the clearing boundary;
- Avoid, minimise and reduce the impact of clearing as far as practicable;
- Clearing to be undertaken in a progressive manner to allow fauna to move into adjacent native vegetation ahead of clearing; and
- Undertake measures to minimise the spread of any introduced species within the Site.

7.5 Weeds

The activities of the Project, as well as vehicle movements to and from the Facility, have the potential to result in the spread of weeds, particularly during construction when a higher volume of vehicle movements will occur. There is a potential for weeds to be spread to the wetlands present within and surrounding the Facility if not appropriately managed.

C-Wise has an existing Weed Management Procedure (WMP) for the Nambeelup composting facility, which has been effectively used to manage weeds at that Facility. C-Wise intends to apply the management measures outlined in the WMP to the Facility. A variety of environmental management measures to manage, mitigate and control the potential impacts of weeds at the Facility will be implemented; including the following:

- The main operational areas of the Facility will consist of hardstands or roads, limiting the ability for weeds to grow and spread;
- Vehicles will be required to adhere to existing roads and tracks to minimise the risk of encountering weed seeds or spreading weeds offsite;

- A fence and firebreak between the Development Footprint and surrounding wetlands will be established and maintained, providing physical barriers and significant distance between the Facility and surrounding environment, limiting the potential for weeds to be spread from the Site;
- Regular monitoring for the presence of weeds at the Facility and its surrounds during both construction and operation;
- Where practicable, contractors entering the Site will be required to hold appropriate hygiene certificates relating to weed management;
- Staff inductions will include weed hygiene training and education on environmental impacts relating to the introduction or spread of weeds; and
- Spot sprays will be applied to weeds as required.

It is anticipated that these management measures will enable C-Wise to appropriately manage potential weed impacts relating to the Project. C-Wise will update the existing WMP to include the Facility which will be reviewed periodically to ensure its appropriateness.

7.6 Fire

Fires may occur at the Facility during the composting process, if not managed appropriately. or through faulty equipment, machinery, or arson. In addition, the Site in located within a bushfire prone area and is at risk of being impacted by bushfires originating offsite. Fire may cause damage to infrastructure and pose a threat to staff. Bushfire Prone Planning (BPP) was engaged to prepare a suite of documents to address bushfire risks and emergency procedures. These include:

- Bushfire Management Plan (BMP);
- Bushfire Emergency Plan (BEP); and
- Bushfire Risk Management Plan (BMRP).

These documents are currently being prepared and will be provided to Shire of Murray and the Department of Fire and Emergency Services (DFES) as part of the planning approval for the Project.

Though the specific fire-fighting measures for the Site will be addressed as part of the planning approval for the project, buildings at the Site will comply with the relevant guidelines and codes for fire management at industrial waste-management facilities. Therefore, the management measures to mitigate the risk of fires will include:

- Smoke detectors will be installed in buildings in accordance with relevant standards;
- Fire extinguishers will be located in appropriate locations around the Facility;
- Fire hose reels will be located at all buildings and accessible at all times;
- All prevention/mitigation equipment will be kept in good working order, clearly signed and tested in accordance with the manufacturer's specifications;
- Staff will be adequately inducted and trained to respond to fire and smoke; and
- A Site emergency response procedure and evacuation procedure will be developed.

The proposed controls are anticipated to be sufficient to effectively manage any risks relating to fires at the Facility.

7.7 Fire Wash Water

In the unlikely event that a fire occurs at the Facility, fire wash waters used by firefighting agencies can cause environmental harm, and the management of these waters should be considered. The following management measures have been considered for addressing the management of fire wash waters:

- Concrete, asphalt and crushed limestone hardstands have been implemented in all processing areas at the Facility to minimise any fire wash waters from entering the soils at the Site;
- Hardstands and processing areas feature minimum 1:100 falls towards leachate collection pits and leachate ponds around the Facility for low-risk leachate areas and 1:80 falls for high-risk leachate areas, which will capture any runoff generated by fire wash waters;
- Drains at the Site are connected to appropriate drainage infrastructure, such as leachate pond or surface water pond, minimising the likelihood of fire wash waters entering the environment without detention; and
- The highest risk area for fires, the receival building wherein FOGO will be initially received, is fully enclosed to further mitigate the risk of any fire wash waters contaminating other areas of the Facility.

It is anticipated that these measures will appropriately enable C-Wise to manage the risk associated with fire wash water generation at the Facility.

7.8 Noise

Noise emissions generated from the Project may reduce amenity or impact personnel operating the Facility. Emissions will predominantly be generated from the construction of the Facility the movement of vehicles during construction and operations and the processing of materials.

The Facility is approximately 2.56km from the nearest sensitive receptor, which is greater than the minimum recommended separation distance for the Facility (Table 4-1). Given this, sensitive receptors near the Site are not expected to be impacted by noise generated at the Site. To further minimise the risk of noise impacts, the following management measures will be implemented:

- The key operational areas where composting will take place are roofed, which will minimise potential for noise impacts to nearby receptors;
- All C-Wise-operated trucks and mobile equipment to be fitted with broadband noise reversing alarms to minimise the impact from vehicle reversing alarms;
- Speed limit controls will be adopted across the Site which will be signposted at appropriate locations including the entrance;
- Noise-generating activities outside enclosed areas will be periodic and generally limited to daylight hours, including movement of material around the Facility by front-end loader, traffic movement in and out of the Facility, and screening of product in the screening and dispatch area;
- All equipment and plant will be maintained in good working condition;
- Staff and visitors will be provided with appropriate PPE, as required, to mitigate any noise impacts associated with construction and operation; and
- Operation of the Project will comply with the assigned levels within the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations).

As a result of these management measures, it is anticipated that the risks associated with noise emissions can be adequately managed and ensure compliance with the Noise Regulations.

7.9 Dust

There is the potential for dust generation during the construction and operational stages of the Project. The potential impacts from exposure to the dust that is generated during construction activities includes reduced visual amenity, eye and respiratory irritation and impacts to nearby vegetation. Reduced visual amenity from dust can lead to safety risks or cause general nuisance to personnel, visitors and surrounding land users. Inhalation of dust may result in respiratory impacts such as couching and eye and lung irritation. Dust emissions may result in impacts to nearby vegetation through dust settlement on plants, impacting their ability to photosynthesise.

A number of operational management measures to mitigate the potential for dust generation and potential impacts are proposed. These controls will include:

- All waste and final product loads will be covered during transport to and from the Site;
- Mobile water carts will be used as required during construction and operation to suppress potential dust emissions;
- Hardstand or sealed roads throughout the Site, which will significantly reduce dust generation;
- Speed limit controls will be adopted across the Site, which will be signposted at appropriate locations including the entrance;
- Operators and visitors will use appropriate PPE as required to manage potential impacts from dust emissions; and
- A complaints register will be maintained to record and respond to any complaints regarding dust generated at the Site.

It is anticipated that these management measures will enable C-Wise to appropriately manage potential impacts relating to dust.

7.10 Vermin and Feral Animals

Vermin such as rats, mice, birds and insects may be attracted to waste management facilities, particularly those that handle putrescible waste. If uncontrolled, vermin and feral animals can present a health risk and be a nuisance to staff and surrounding land users.

The management measures proposed to mitigate the potential for impacts relating to feral animals and vermin include:

- All waste and final product loads will be covered during transport to and from the Site, reducing the potential for organic materials to be scattered across the Site which may attract vermin and feral animals;
- The receival building will operate with a clean floor policy, with all waste materials removed by the end of each day;
- Receival, treatment and initial processing of putrescible FOGO waste to occurring indoors, in undercover or sealed areas;
- Regular washdown of the compost processing areas to reduce unintended build-up of organic wastes;

- A fence between the Development Footprint and surrounding wetlands will be established and maintained, limiting the potential for large vermin and feral animals to enter the Site;
- Any suspect and/or known shelters or breeding grounds for vermin will be managed appropriately; and
- In the event that a population of vermin or feral animals becomes problematic, C-Wise will engage a qualified pest control contractor to implement appropriate management measures.

It is anticipated that these management measures will enable C-Wise to appropriately manage potential impacts relating to feral animals and vermin.

7.11 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring soils that contain iron sulphide (iron pyrite) minerals that, if disturbed by soil excavation, dewatering or drainage, can then oxidise resulting in the release of contaminants and potentially cause environmental impacts.

A review of the PGM indicates that the entire Site is located in an area with a moderate to low risk of ASS and a small portion in the southeast corner of the Site has a high to moderate risk. The development of the Facility has been located as far from mapped Acid Sulfate Soils as possible as a primary control, and earthworks below the permanent low water table have been eliminated where possible.

In the event that ASS are encountered during construction, appropriate management measures will be undertaken in accordance with the DWER's guideline Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (DWER, 2015) (ASS Guideline).

7.12 Litter

Litter may be generated if feedstocks are contaminated or as a result of waste acceptance and handling, particularly during windy conditions. As well as reducing visual amenity and causing health problems to wildlife, litter can attract vermin to the Site, which may affect surrounding land uses if these vermin to migrate offsite.

To ensure that the generation of litter is minimised and appropriately managed at the Site, the following management measures will be implemented:

- Waste materials will be received in the receival building, which is enclosed and roofed, minimising the risk of litter being blown across the Site;
- Waste loads will be inspected in the receival building to ensure that there is minimal to no contamination present;
- Regular washdown of operational areas to reduce unintended build-up of litter;
- A fence between the Development Footprint and surrounding wetlands will be established and maintained, limiting the potential for litter to escape from the Site into the wetlands; and
- Any litter generated around and immediately outside the Site will be collected on a regular basis.

These management measures are expected to enable C-Wise to appropriately manage any litter generated at the Site.

7.13 Security

A breach of security of the Site may result in injury to trespassers should interaction with plant and equipment occur. The management measures proposed to minimise security risks include:

- Appropriate warning signs and gates will be installed at the Site entrance;
- A front gate will be installed at the Site entrance and will be locked outside of operational hours;
- All buildings will be locked outside operating hours; and
- All access gates will be locked securely outside of main operational hours.

It is anticipated that these management measures will enable C-Wise to appropriately manage potential security risks.

8 Residual Risk Assessment

The objective of the Residual Risk Assessment is to ensure the potential environmental and social risks associated with the proposed activities are understood and managed appropriately to ensure that there is no unacceptable residual risk. The risk assessment was undertaken in accordance with the Guideline: Risk Assessments (DWER, 2017).

8.1 Sources of Hazards

For the purpose of this assessment, a source is defined as a primary risk with the potential to cause significant contamination or harm to the environment. With regards to the environment and public health, sources and the potential hazards which may arise from the Project have been identified and outlined in Table 8-1.

Table 8-1: List of Potential Hazards

Source	Description of Hazards
Leachate	Leachate may be generated as a result of the decomposition of organic waste at the Site or if clean stormwater comes into contact with waste materials or areas where waste has been held.
Stormwater	Excessive stormwater that is not properly managed can lead to flooding onsite. Stormwater that comes into contact with waste or an area that holds waste is classified as leachate.
Odour	Odours generated from the processing of organic waste can cause impacts to amenity on and off site.
Vegetation	Clearing of vegetation may result in impacts to fauna and the surrounding environment.
Weeds	Weeds have the potential to migrate from the Facility and impact surrounding flora.
Fire	Organic materials undergoing the composting process may ignite, or fires may be caused by faulty equipment, mobile machinery or arson.
Fire Wash Water	Chemicals used in firefighting can cause harm if released into the environment during fire-fighting operations.
Noise	Noise emissions can reduce amenity onsite and for nearby sensitive receptors.
Dust	Dust generated during construction works and operational activities can result in reduced visual amenity, cause respiratory issues or other dust impacts.
Vermin and Feral Animals	Food waste can attract vermin and feral animals which may cause nuisance and present health risks.
Acid Sulfate Soils	Disturbance of ASS may result in release of heavy metals or other contaminants to the environment.
Litter	Windblown litter can cause impact to visual amenity, cause impact to wildlife and attract vermin to the Site.

Source	Description of Hazards
Security	Unauthorised personnel may enter the Site resulting in security risks to infrastructure, equipment and staff.

8.2 Pathways for Hazards

For the purpose of this assessment, a pathway for a hazard is defined as the route by which potential emission, contamination or harm can migrate. The key migration pathways generally include the following:

- Air, through which lightweight materials, such as dust, litter, odour emissions can travel;
- Surface, along which the sources of contamination or harm can travel or be present at (e.g. surface water runoff, litter, persons walking or working over the surface); and
- Sub-surface, whereby the underlying soils, bedrock, aquifers, and infrastructure permit stormwater or leachate migration towards the groundwater.

For the purpose of this assessment, a receptor is defined as the location where the impact of the emissions, contamination or harm is registered/received. The possible receptors of the contamination or harm caused by the identified hazards are summarised in Table 8-2.

Table 8-2: Receptors

Receptor	Description of the Receptor
Site Users	• Persons authorised to access the Site, including: o Delivery and collection personnel; o Operational staff; o Contractors carrying out maintenance or monitoring; and o Visitors.
Infrastructure and Plant	• Buildings and plants onsite; and • Surrounding infrastructure.
Surrounding Land Users	• People who work or live beyond the boundary of the Site.
Surface Water	• Surface water bodies surrounding the Site such as wetlands and dams.
Groundwater	• Shallow groundwater that exists beneath the Site.
Soils	• Soils within and surrounding the Site.
Flora	• Flora on and surrounding the Site.
Fauna	• Fauna residing within, or adjacent to the Site.

8.3 Risk Rating Matrix

To assess the various risks, the potential hazards identified in Table 8-1 were classified according to the Guideline: Risk Assessments (DWER, 2017), as shown in Table 8-3.

Table 8-3: Risk Rating Matrix

		Consequence				
		Slight	Minor	Moderate	Major	Severe
Probability	Almost Certain	Moderate	High	High	Extreme	Extreme
	Likely	Moderate	Moderate	High	High	Extreme
	Possible	Low	Moderate	Moderate	High	Extreme
	Unlikely	Low	Moderate	Moderate	Moderate	High
	Rare	Low	Low	Moderate	Moderate	High

8.4 Risk Profile

Risk management measures refers to the key management strategies as outlined within Section 7 that will be implemented to ensure that all hazards, and potential risks identified, are controlled to an appropriate level, and that strategies are in place to react to any potential incidents or accidents. In all cases these risk management measures decrease the probability and/or consequence of identified hazards and therefore lower the risk rating. The current risk rating and revised probability and consequence for each identified hazard following the implementation of management measures for the Project are shown in Table 8-4.

Through the adoption of the management measures are outlined with this EAMP, all potential risks can be managed to risk ratings of moderate and low. All recycling and waste infrastructure have inherent risk associated with their design and operation. In addition, surrounding land use is a key factor in determining the risk profile of operations, and the distance to receptors. This is widely recognised and is why these facilities are regulated pursuant to Part V of the EP Act.

The siting and design of the Facility means that many key risks associated with operations are considered as low in relation to potential impacts on surrounding receptors, even without the comprehensive suite of better-practice controls that C-Wise propose to implement.

Where a moderate residual risk remains, such as for the management of leachate, fire, fire wash water and weeds, a comprehensive suite of environmental management measures have been implemented, which often exceed the requirements of the Organics Recycling Guideline. The likelihood of the risk occurring is significantly reduced by implementing these measures, however the residual risk remains at moderate more associated with the consequence of these risks occurring as opposed to the likelihood.

Table 8-4: Residual Risk Assessment

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Leachate	Groundwater and Soils	Sub-surface	Leachate can ingress into the groundwater if not appropriately captured	Likely	Major	High	• A fully enclosed building is proposed for the receival building, with an internal concrete floor sloped to a leachate collection pit; • The composting process areas are all roofed or fully enclosed within cocoons, with sidewalls to minimise rainfall intrusion and concrete hardstands falling toward leachate collection pits; • All leachate collection pits are pumped out to a tank farm, with tanks arranged in banks of three and bunded to a capacity of 110% that of the volume of a single bank within the bund, in accordance with AS1940; • Roofed areas will drain to a HDPE-lined surface water pond, sized for a 1-in-20-year, 24-hour storm event in accordance with the Organics Recycling Guideline; • The external perimeter of all buildings and roof areas will slope away from any doors to prevent stormwater ingress; • Low-risk leachate generated on hardstands will drain via HDPE-lined channels to leachate ponds; • Low-risk leachate ponds are sized for a 1-in-100-year rainfall event, higher than the benchmark control within the Organics Recycling Guideline; • Low-risk leachate ponds will be lined with HDPE and GCL to minimise the likelihood of leaks; • A controlled groundwater level has been developed for the Site to minimise the impact of fluctuating groundwater on the pond lining system, and to maintain a minimum groundwater separation; • Regular inspections and a groundwater monitoring regime will be undertaken to identify any damage to the leachate management system; • A SWLMP has been prepared for the Site and will be implemented during construction and operation; and • During extreme rainfall events, the leachate ponds are designed to safely overtop into the surface water pond for further dilution prior to controlled release into the environment.	Rare	Major	Moderate
	Surface Water and Flora	Surface	Leachate can flow overland toward adjacent wetlands if not appropriately managed.							
Surface Water	Site Infrastructure	Surface	Surface water that is not properly managed can lead to flooding onsite resulting in damage to infrastructure.	Unlikely	Major	Moderate	• Roofed and asphalted areas graded away from leachate-generating areas to minimise leachate generation; • A surface water pond lined with HDPE, sized for a 1-in-20-year, 24-hour storm event; • An overflow channel to allow the safe overtopping of surface water during events larger than a 1-in-20-year, 24-hour storm event; and • A SWLMP has been prepared for the Site, and will be implemented during construction and operation.	Rare	Minor	Low

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Odour	Site Users and Surrounding Land Users	Air	Waste streams that are accepted onsite can produce strong odours and impact amenity. Leachate generation can result in unpleasant odours.	Possible	Moderate	Moderate	• Highly putrescible organic materials such as FOGO, which will generate the most odour emissions, will be processed in an enclosed composting system; o Less putrescible organic materials that produce fewer odour emissions, such as greenwaste, will be stored in the carbon storage area. • Organic materials will be delivered to the receival building for initial inspection, which is enclosed and roofed to minimise potential odour releases; o The receival building will include doors that will be kept closed at all times when waste is not being delivered. o The receival building will also operate with a 'clean floor' policy, with all received wastes removed by the end of each working day. • The initial composting stage will occur in the cocoons, which will be fully enclosed. Odorous air will be extracted from the cocoon process and used in the MAF processing area which will provide a biofilter effect; • The use of the MAF system during the pasteurisation phase will reduce odour emissions through the continuous operation of windrows; • The MAF and final maturation areas will be roofed to provide optimal processing conditions to mitigate the potential for odour emissions arising from poor maturation; • Liquid waste accepted at the Site will be stored in enclosed tanks, which will minimise potential odour emissions; • Vehicles transporting waste materials to the Site and compost products away from the Site will be required to be covered at all times; and • A complaints register will be maintained and in the event that a complaint is received, C-Wise will investigate the source and implement appropriate management controls.	Unlikely	Slight	Low
Vegetation	Onsite Flora	Surface	Clearing of vegetation will impact onsite flora in clearing areas.	Almost Certain	Moderate	High	• Prior to disturbance activities, the clearing and disturbance area will be demarcated. The clearance and disturbance area will be defined using high visibility tape and or spray paint where suitable to ensure operators undertake activities within the clearing boundary; • Avoid, minimise and reduce the impact of clearing as far as practicable; • Clearing to be undertaken in a progressive manner to allow fauna to move into adjacent native vegetation ahead of clearing; and • Undertake measures to minimise the spread of any introduced species within the Site. •	Almost Certain	Unlikely	Low
Weeds	Onsite and Offsite Flora	Surface & Air	Weeds and weed seeds distributed by air can cause harm to surrounding environments,	Likely	Moderate	High	• The main operational areas of the Facility will consist of hardstands or roads, limiting the ability for weeds to grow and spread; • Vehicles will be required to adhere to existing roads and tracks to minimise the risk of encountering weed seeds or spreading weeds offsite;	Unlikely	Minor	Moderate

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
			including onsite and offsite wetlands.				• A fence and firebreak between the Development Footprint and surrounding wetlands will be established and maintained, providing physical barriers and significant distance between the Facility and surrounding environment, limiting the potential for weeds to be spread from the Site; • Regular monitoring for the presence of weeds at the Facility and its surrounds during both construction and operation; • Where practicable, contractors entering the Site will be required to hold appropriate hygiene certificates relating to weed management; • Staff inductions will include weed hygiene training and education on environmental impacts relating to the introduction or spread of weeds; and • Spot sprays will be applied to weeds as required.			
Fire	Site Users and Site Infrastructure	Surface	Risk of fires onsite from faulty equipment or waste creating risk to personnel and infrastructure.	Possible	Severe	Extreme	• Smoke detectors will be installed in buildings in accordance with relevant standards; • Fire extinguishers will be located in appropriate locations around the Facility; • Fire hose reels will be located at all buildings and accessible at all times; • All prevention/mitigation equipment will be kept in good working order, clearly signed and tested in accordance with the manufacturer's specifications; • Staff will be adequately inducted and trained to respond to fire and smoke; and • A Site emergency response procedure and evacuation procedure will be developed.	Rare	Major	Moderate
Fire Wash Water	Groundwater and Soils	Sub-surface	Fire wash waters can ingress into the groundwater if not appropriately captured	Likely	Major	High	• Concrete, asphalt and crushed limestone hardstands have been implemented in all processing areas at the Facility to minimise any fire wash waters from entering the soils at the Site; • Hardstands and processing areas feature minimum 1:100 falls towards leachate collection pits and leachate ponds around the Facility for low-risk leachate areas and 1:80 falls for high-risk leachate areas, which will capture any runoff generated by fire wash waters; • Drains at the Site are connected to appropriate drainage infrastructure, such as the leachate pond or surface water pond, minimising the likelihood of fire wash waters entering the environment without detention; and • The highest risk area for fires, the receival building wherein FOGO will be initially received, is fully enclosed to further mitigate the risk of any fire wash waters contaminating other areas of the Facility.	Rare	Major	Moderate
	Surface water and Flora	Surface	Fire wash waters can flow overland toward adjacent wetlands if not appropriately managed.							
Noise	Site Users and Surrounding Land Users	Air	Noise impacts form activities onsite can impact Site users and nearby receptors.	Possible	Minor	Moderate	• The key operational areas where composting will take place are roofed, which will minimise potential for noise impacts to nearby receptors; • All C-Wise operated trucks and mobile equipment to be fitted with broadband noise reversing alarms to minimise the impact from vehicle reversing alarms;	Unlikely	Slight	Low

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
							• Speed limit controls will be adopted across the Site which will be signposted at appropriate locations including the entrance; • Noise-generating activities outside enclosed areas will be periodic and generally limited to daylight hours, including movement of material around the Facility by front-end loader, traffic movement in and out of the Facility, and screening of product in the Screening and Dispatch area; • All equipment and plant will be maintained in good working condition; • Staff and visitors will be provided with appropriate PPE, as required, to mitigate any noise impacts associated with construction and operation; and • Operation of the Project will comply with the assigned levels within the Noise Regulations.			
Dust	Site Users	Air	Visibility may be impaired and inhalation of dust may occur during construction activities.	Likely	Slight	Moderate	• All waste and final product loads will be covered during transport to and from the Site; • Mobile water carts will be used as required during construction and operation to suppress potential dust emissions; • Hardstand or sealed roads throughout the Site, which will significantly reduce dust generation; • Speed limit controls will be adopted across the Site, which will be signposted at appropriate locations including the entrance; • Operators and visitors will use appropriate PPE as required to manage potential impacts from dust emissions; and • A complaints register will be maintained to record and respond to any complaints regarding dust generated at the Site.	Unlikely	Slight	Low
Vermin and Feral Animals	Site Users	Surface	Organic waste can attract vermin, presenting health risks, reduced amenity and annoyance.	Likely	Minor	Moderate	• All waste and final product loads will be covered during transport to and from the Site, reducing the potential for organic materials to be scattered across the Site which may attract vermin and feral animals; • The receival building will operate with a clean floor policy, with all waste materials removed by the end of each day; • Receival, treatment and initial processing of putrescible FOGO waste to occurring indoors, in undercover or sealed areas; • Regular washdown of the compost processing areas to reduce unintended build-up of organic wastes; • A fence between the Development Footprint and surrounding wetlands will be established and maintained, limiting the potential for large vermin and feral animals to enter the Site; • Any suspect and/or known shelters or breeding grounds for vermin will be managed appropriately; and • In the event that a population of vermin or feral animals becomes problematic, C-Wise will engage a qualified pest control contractor to implement appropriate management measures.	Unlikely	Slight	Low

Source	Receptor	Pathway	Risk	Probability	Consequence	Risk Rating	Management Measures	Revised Probability	Revised Consequence	Revised Risk Rating
Acid Sulfate Soils	Soils and Groundwater	Surface	Disturbance of ASS may result in release of heavy metals or other contaminants to the environment.	Unlikely	Major	Moderate	• In the event that ASS are encountered during construction, appropriate management measures will be undertaken in accordance with the DWER's ASS Guideline.	Unlikely	Slight	Low
Litter	Fauna & Site Users	Surface & Air	Windblown litter can cause visual amenity issues, and cause harm to fauna.	Likely	Slight	Moderate	• Waste materials will be received in the receival building, which is enclosed and roofed, minimising the risk of litter being blown across the Site; • Waste loads will be inspected in the receival building to ensure that there is minimal to no contamination present; • Regular washdown of operational areas to reduce unintended build-up of litter; • A fence between the Development Footprint and surrounding wetlands will be established and maintained, limiting the potential for litter to escape from the Site into the wetlands; and • Any litter generated around and immediately outside the Site will be collected on a regular basis.	Unlikely	Slight	Low
Security	Site Users and Site Infrastructure	Surface	Unauthorised personnel may enter the Site resulting in security risks to facilities, equipment and staff.	Possible	Moderate	Moderate	• Appropriate warning signs and gates will be installed at the Site entrance; • A front gate will be installed at the Site entrance and will be locked outside of operational hours; • All buildings will be locked outside operating hours; and • All access gates will be locked securely outside of main operational hours.	Unlikely	Minor	Low

9 Conclusion

C-Wise is seeking approval to construct a new Carbon Recycling Facility to compost a range of organic materials into a high-quality compost product. The Project has attracted significant government investment and will support a circular economy and the implementation of a FOGO collection service in Perth and Peel, as outlined within the Waste Strategy 2030.

The key potential environmental aspects and risks associated with the construction and operation of the Facility include:

- Leachate;
- Surface Water;
- Odour;
- Vegetation;
- Weeds;
- Fire;
- Fire Wash Water;
- Noise;
- Dust;
- Vermin and Feral Animals;
- Acid Sulfate Soils;
- Litter; and
- Security.

The current conceptual design of the Facility and operational management measures have been developed to ensure that these risks and potential impacts are managed appropriately. The overall risk of these potential impacts, once the proposed management measures are implemented, is low or moderate. The environmental management controls within this document will be further refined when detailed designs are prepared by a contractor engaged by C-Wise through a Design and Construct contract.

Several benefits are associated with the Project, including alignment with the Waste Strategy 2030 and increasing resource recovery. The Project will support the headline strategy for local governments in the Perth and Peel regions to provide a consistent three bin kerbside collection system through additional FOGO processing capacity, which will also assist in reducing environmental impacts cause by landfilling as materials are diverted. The Carbon Recycling Facility will also provide employment opportunities during construction and operation.

Based on the infrastructure and operational measures outlined within this EAMP, Talis and C-Wise believe that the construction and operation of the Project can be achieved in a manner that ensures that any potential impacts can be managed to appropriate standards.

10 References

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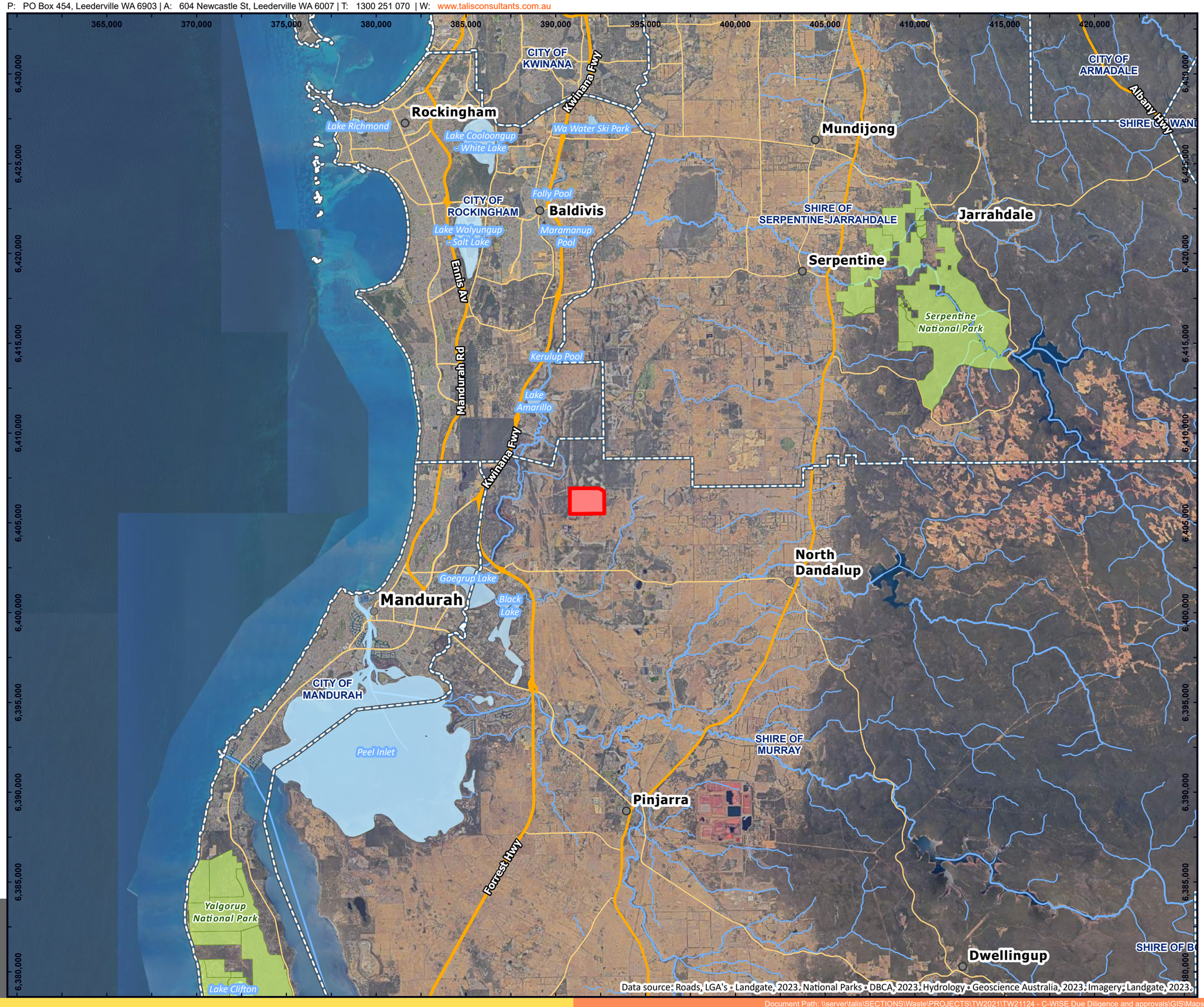
11 Figures

P: PO Box 454, Leederville WA 6903 | A: 604 Newcastle St, Leederville WA 6007 | T: 1300 251 070 | W: www.talisconsultants.com.au



Data source: Roads, LGA's - Landgate, 2023. National Parks - DBCA, 2023. Hydrology - Geoscience Australia, 2023. Imagery: Landgate, 2023.

LEGEND

- Site Boundary
- Local Government Area
- National Park

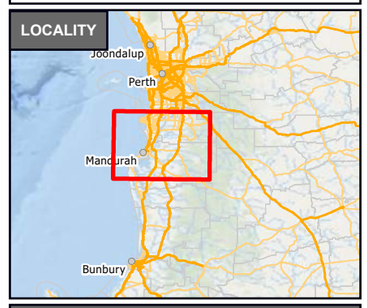
Hydrography

- Lakes
- Major Watercourse
- Minor Watercourse

Western Australian Roads

- Freeway / Highway
- Main Road

LOCALITY



0 50 100 150 200 250 km

LOCALITY

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 2 4 6 8 Km

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:200,000

Prepared:	E Jackson	Date:	11/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 01

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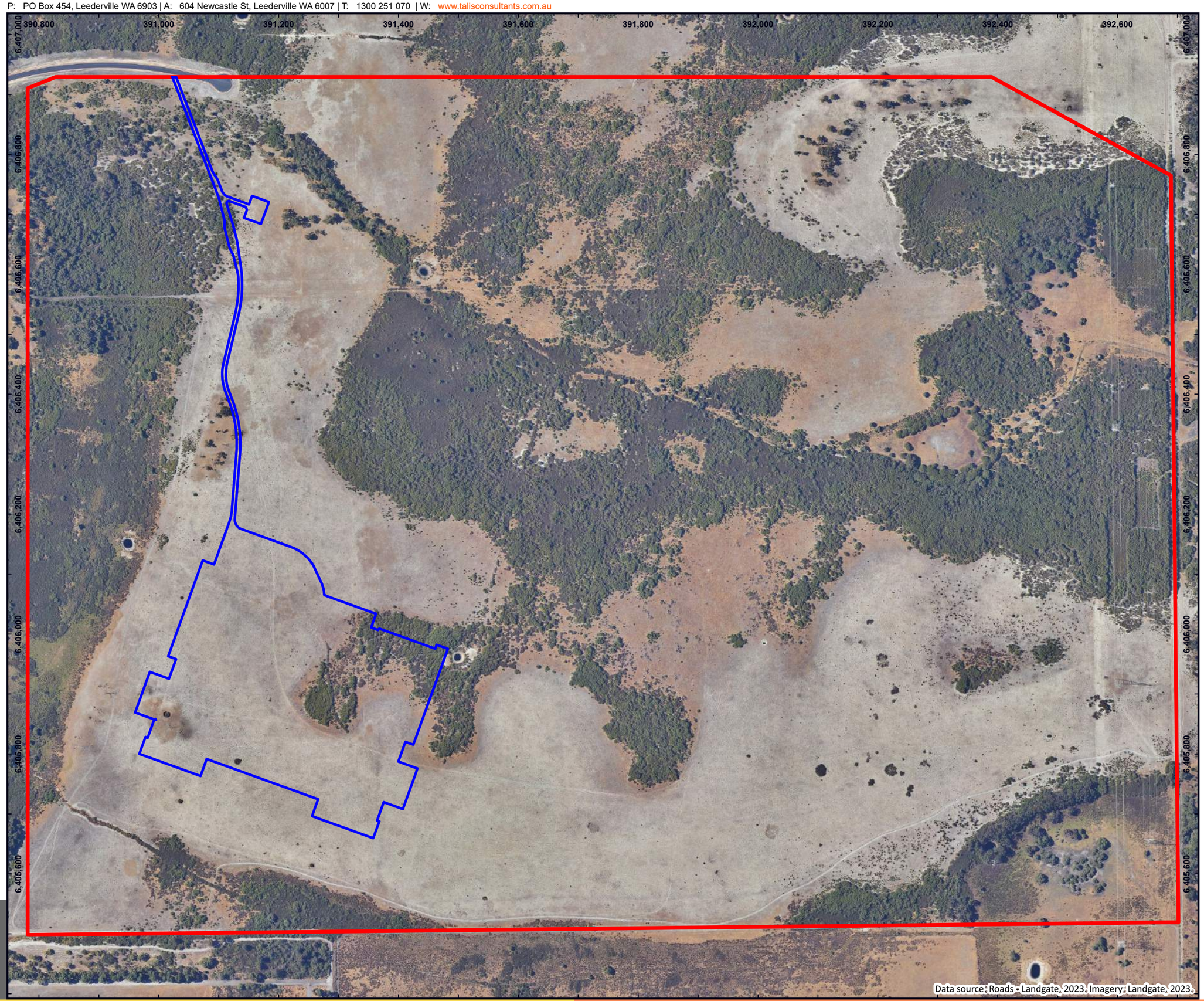
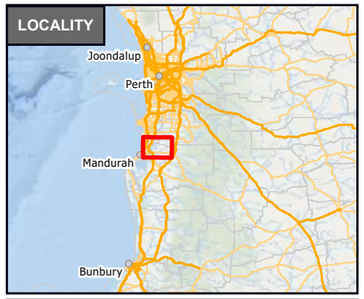


Data source: Roads - Landgate, 2023. Imagery: Landgate, 2023.

LEGEND

- Site Boundary
- Development Envelope

LOCALITY



0 50 100 150 200 250 km

PROPOSED LOCATION

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	11/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 02

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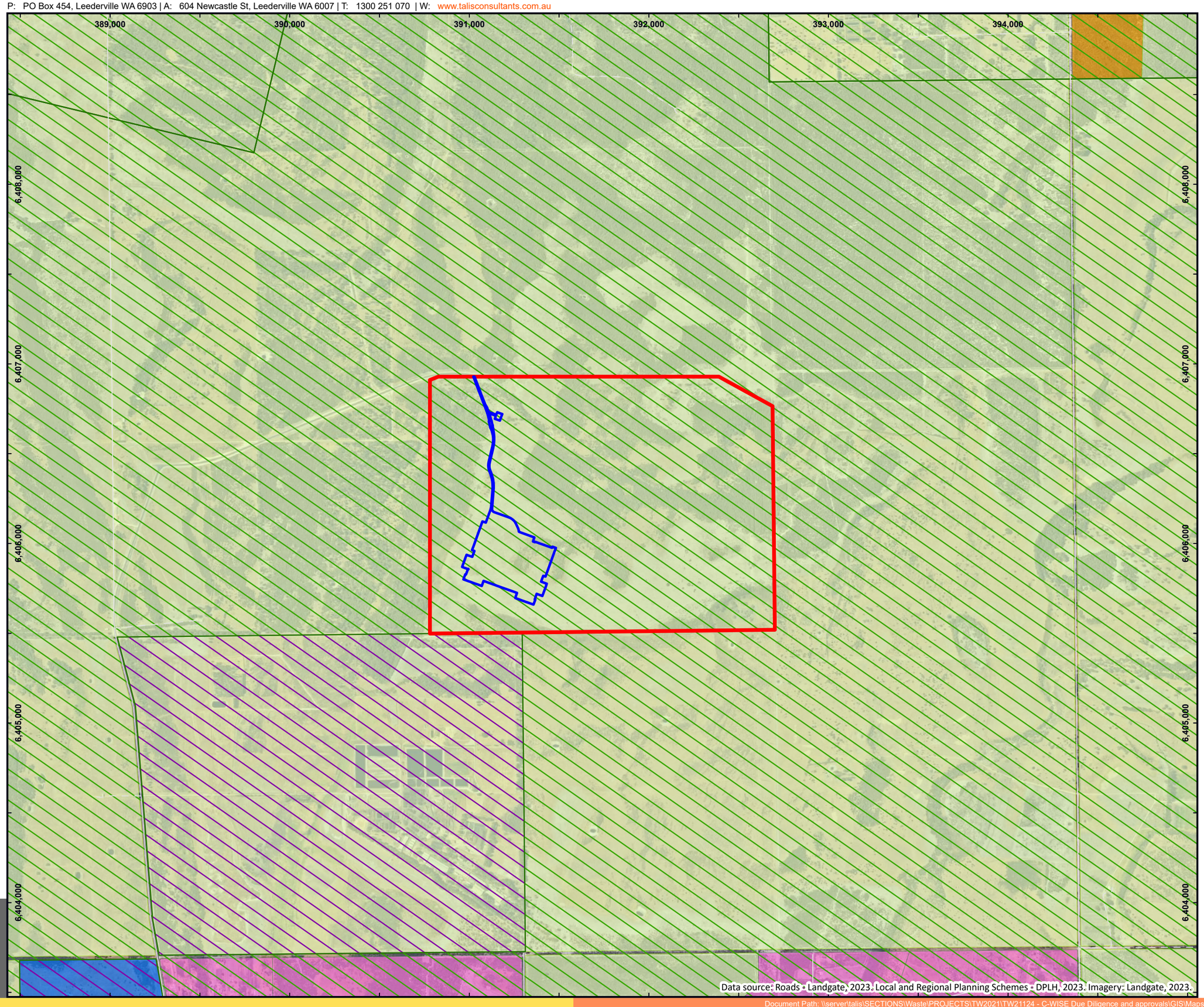


LEGEND

- Site Boundary
- Development Envelope

Local Planning Scheme

- Conservation
- Nambeelup industrial development
- Rural
- Special use

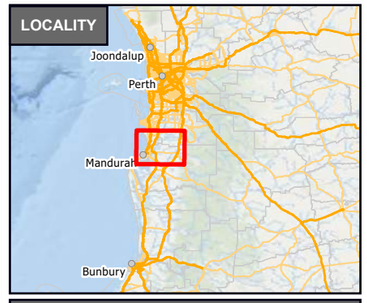
Peel Region Planning Scheme

- Industrial
- Rural

Western Australian Roads

- Minor Road
- Other

LOCALITY



0 50 100 150 200 250 km

ZONING

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 200 400 600 800 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:20,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 03

Data source: Roads - Landgate, 2023. Local and Regional Planning Schemes - DPLH, 2023. Imagery: Landgate, 2023.

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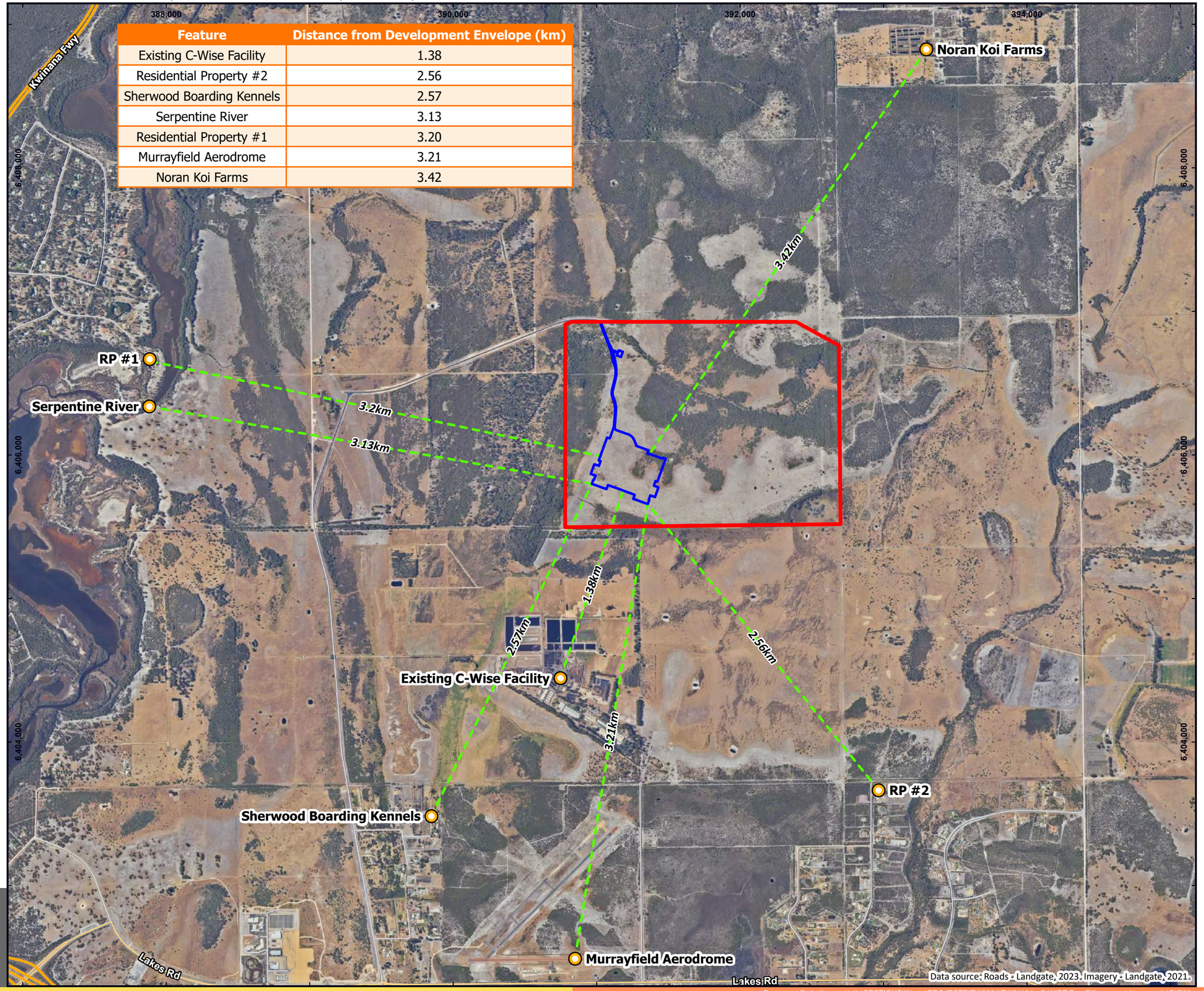
Feature	Distance from Development Envelope (km)
Existing C-Wise Facility	1.38
Residential Property #2	2.56
Sherwood Boarding Kennels	2.57
Serpentine River	3.13
Residential Property #1	3.20
Murrayfield Aerodrome	3.21
Noran Koi Farms	3.42



LEGEND

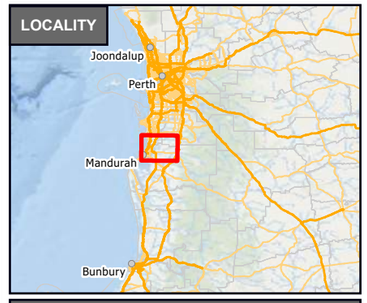
- Site Boundary
- Development Envelope

Sensitive Receptors

- Sensitive Receptors
- Separation Distance

Western Australian Roads

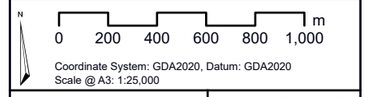
- Freeway / Highway
- Main Road
- Minor Road



SENSITIVE RECEPTORS

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182



Coordinate System: GDA2020, Datum: GDA2020
Scale @ A3: 1:25,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 04

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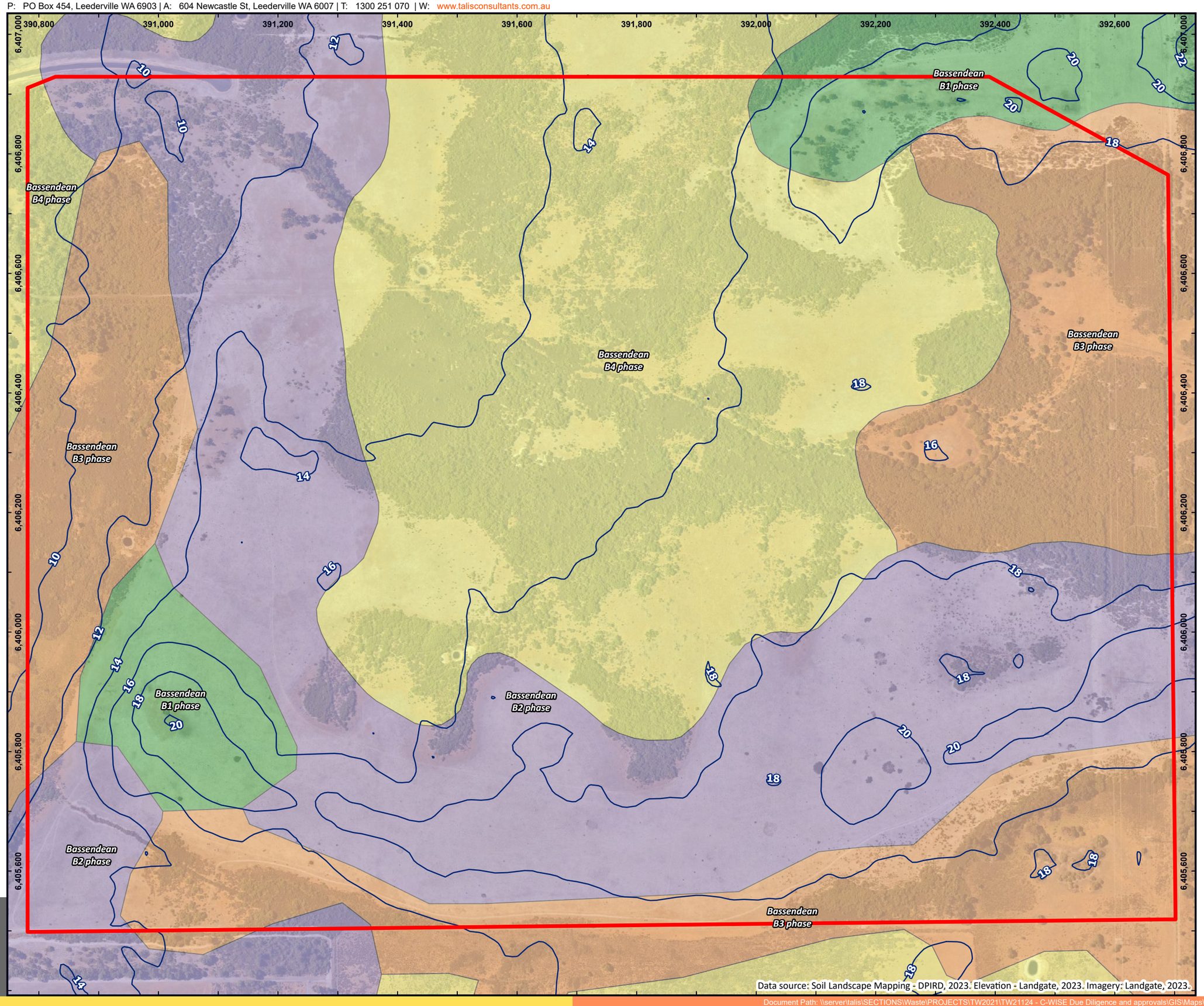


LEGEND

- Site Boundary
- Elevation (m AHD)

Soil Landscape Mapping

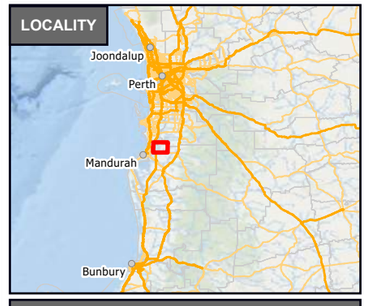
Bassendean B1 phase: Extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2 m; banksia dominant

Bassendean B2 phase: Flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan 1-2 m

Bassendean B3 phase: Closed depressions and poorly defined stream channels with moderately deep, poorly to very poorly drained bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam

Bassendean B4 phase: Broad poorly drained sandplain with deep grey siliceous sands or bleached sands, underlain at depths generally greater than 1.5 m by clay or less frequently a strong iron-organic hardpan

LOCALITY



0 50 100 150 200 250 km

TOPOLOGY & SOIL LANDSCAPE MAPPING

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 05

Data source: Soil Landscape Mapping - DPIRD, 2023. Elevation - Landgate, 2023. Imagery: Landgate, 2023.

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390,000 392,000 394,000

6,408,000 6,406,000 6,404,000

Qt

Qdcb

Qt

Data source: Acid Sulphate Soils, DWER, 2023. Surface Geology - Geoscience Australia, 2023. Imagery: Landgate, 2023.

LEGEND

Site Boundary

Acid Sulfate Soil Risk Map

1 - High to Moderate Risk

2 – Moderate to Low Risk

Surface Geology (GA)

Qdcb: Basal conglomerate overlain by dune quartz sand with heavy mineral concentrations

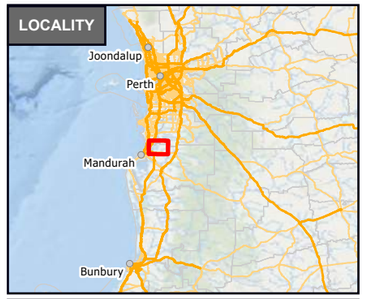
Qt: Lake and swamp deposits; mud, silt, evaporites, limestone; minor sand, peat

Western Australian Roads

Minor Road

Other

LOCALITY



0 50 100 150 200 250 km

SURFACE GEOLOGY & ACID SULPHATE SOILS

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 200 400 600 800 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:20,000

Prepared:	E Jackson	Date:	12/10/2023
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Figure 06

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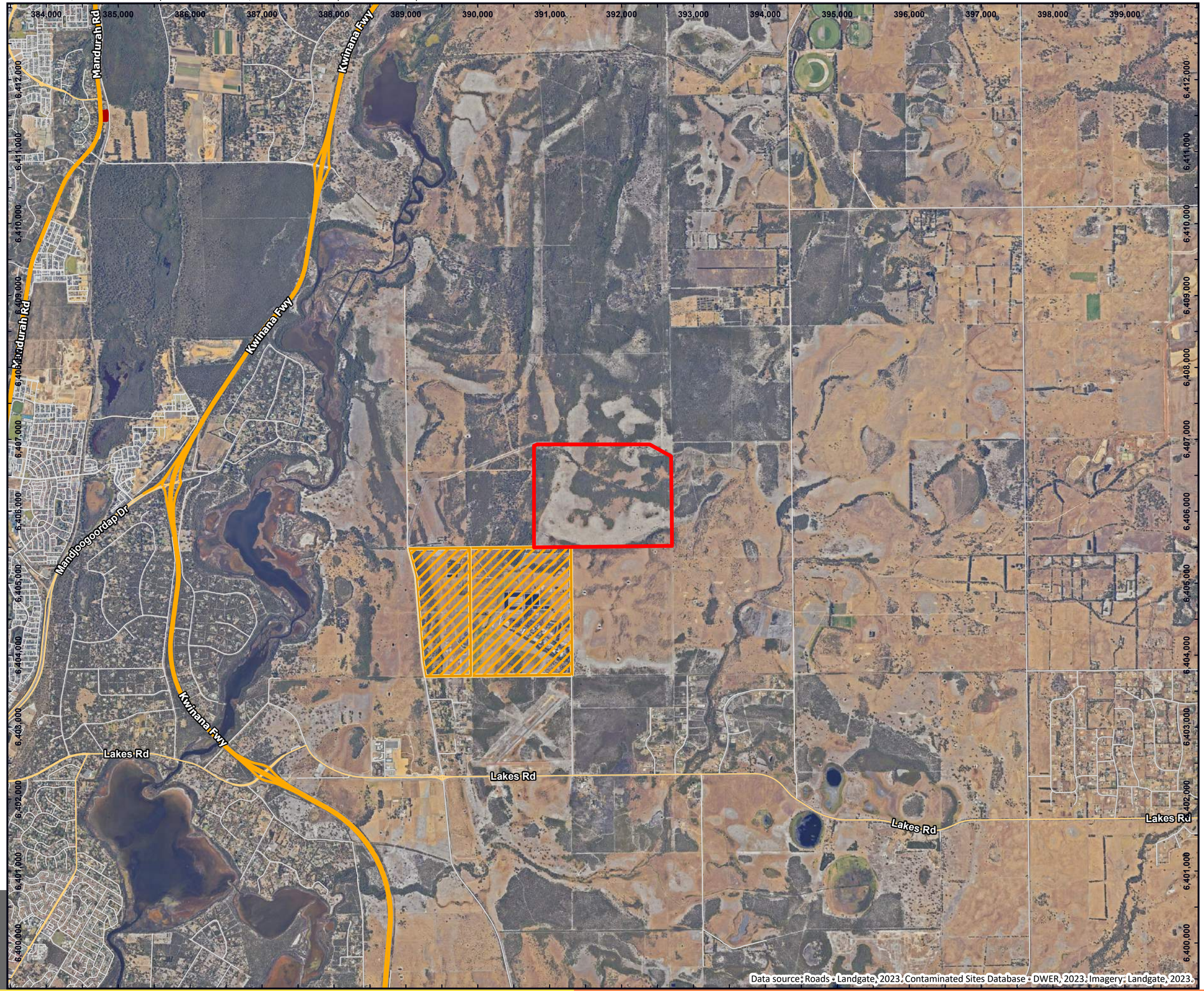


LEGEND

- Site Boundary

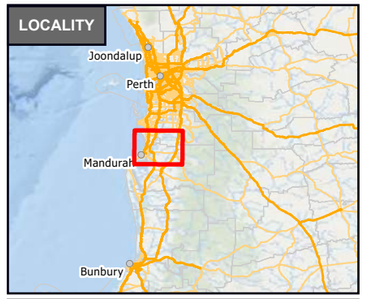
Contaminated Sites Database

- Contaminated - restricted use
- Remediated for restricted use

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

CONTAMINATED SITES

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared: E Jackson	Date: 12/10/2023
Reviewed: T Hunter	Revision: A
Project: TW21124	

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Figure 07

Data source: Roads - Landgate, 2023. Contaminated Sites Database - DWER, 2023. Imagery: Landgate, 2023.

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LEGEND

- Site Boundary
- Groundwater Contour (min, m AHD)

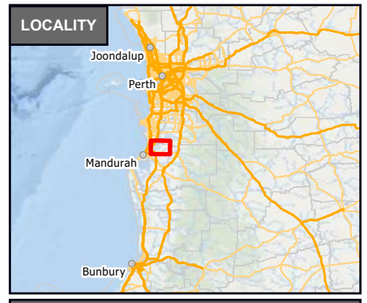
WIN Monitoring Sites

- WIN Monitoring Sites within 1km
- WIN Monitoring Sites outside 1km

Western Australian Roads

- Minor Road
- Other

LOCALITY



0 50 100 150 200 250 km

LOCAL GROUNDWATER

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 200 400 600 800 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:20,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 08

Data source: Roads - Landgate, 2023. Groundwater Contours - DWER, 2016. WIN Monitoring Sites - DWER, 2020. Imagery: Landgate, 2023.

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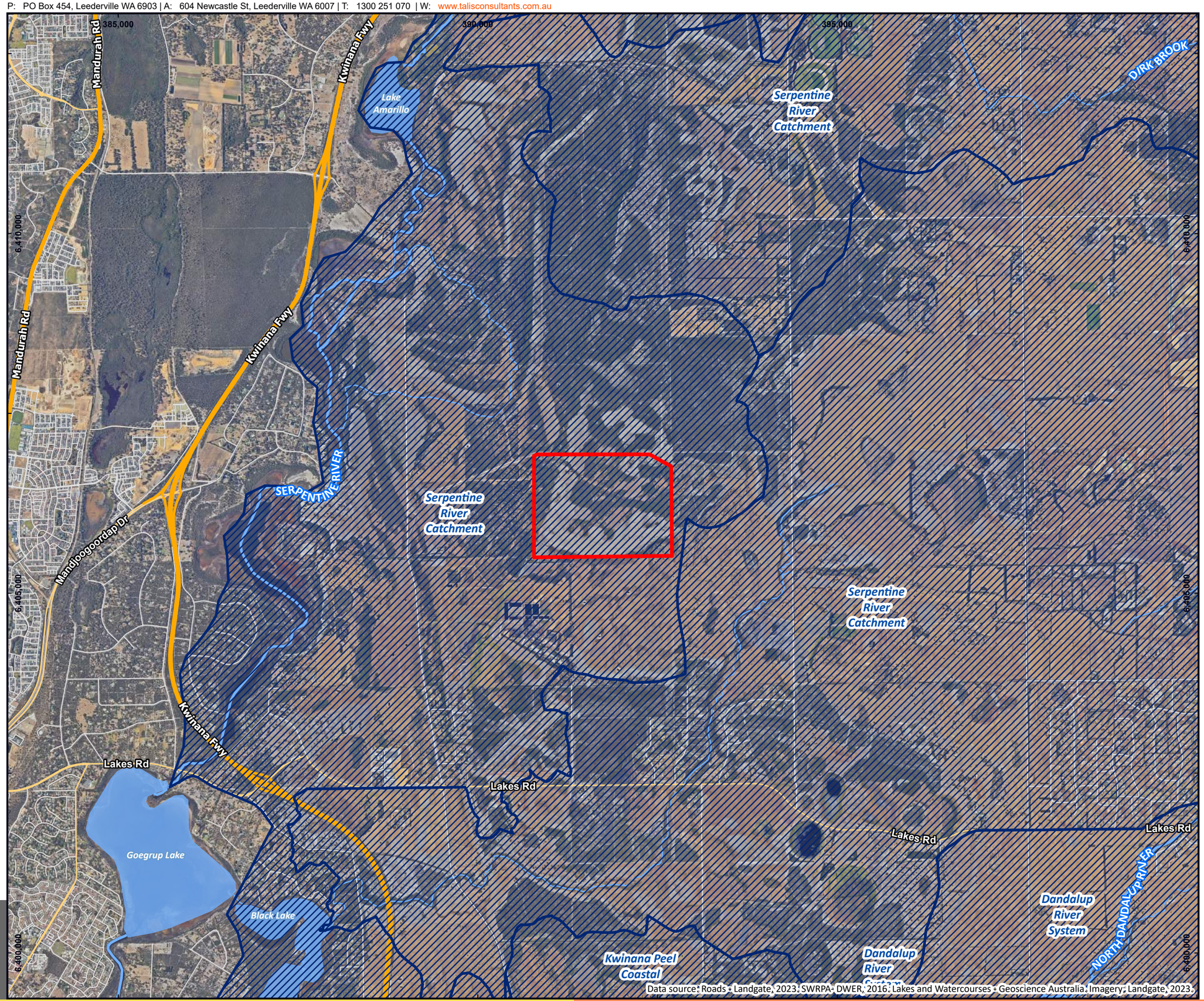


LEGEND

- Site Boundary
- Surface Water Resource Proclaimed Area (RWI Act)

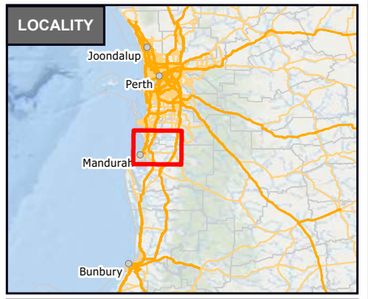
Hydrography

- Lakes
- Major Watercourse
- Minor Watercourse

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

WATERCOURSES

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 09

Data source: Roads - Landgate, 2023. SWRPA- DWER, 2016. Lakes and Watercourses - Geoscience Australia. Imagery: Landgate, 2023.

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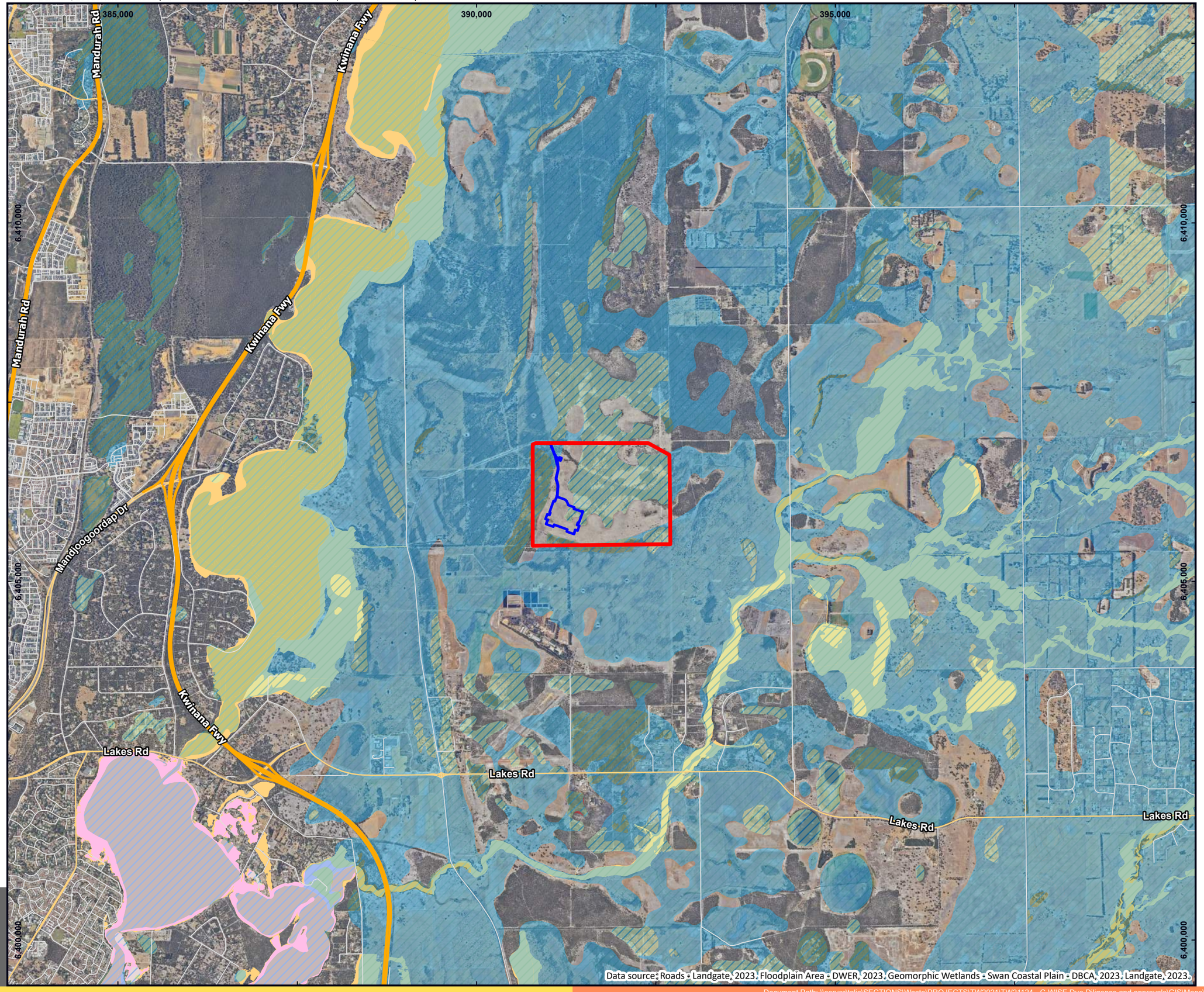


LEGEND

- Site Boundary
- Development Envelope

Geomorphic Wetlands - Swan Coastal Plain

- Conservation
- Multiple Use
- Resource Enhancement
- Not Applicable

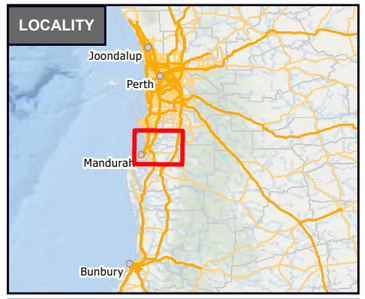
Floodplain Area

- 1 in 10 (10%) AEP floodplain
- 1 in 100 (1%) AEP floodplain

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

WETLANDS AND FLOOD MAPPING

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 10

Data source: Roads - Landgate, 2023. Floodplain Area - DWER, 2023. Geomorphic Wetlands - Swan Coastal Plain - DBCA, 2023. Landgate, 2023.

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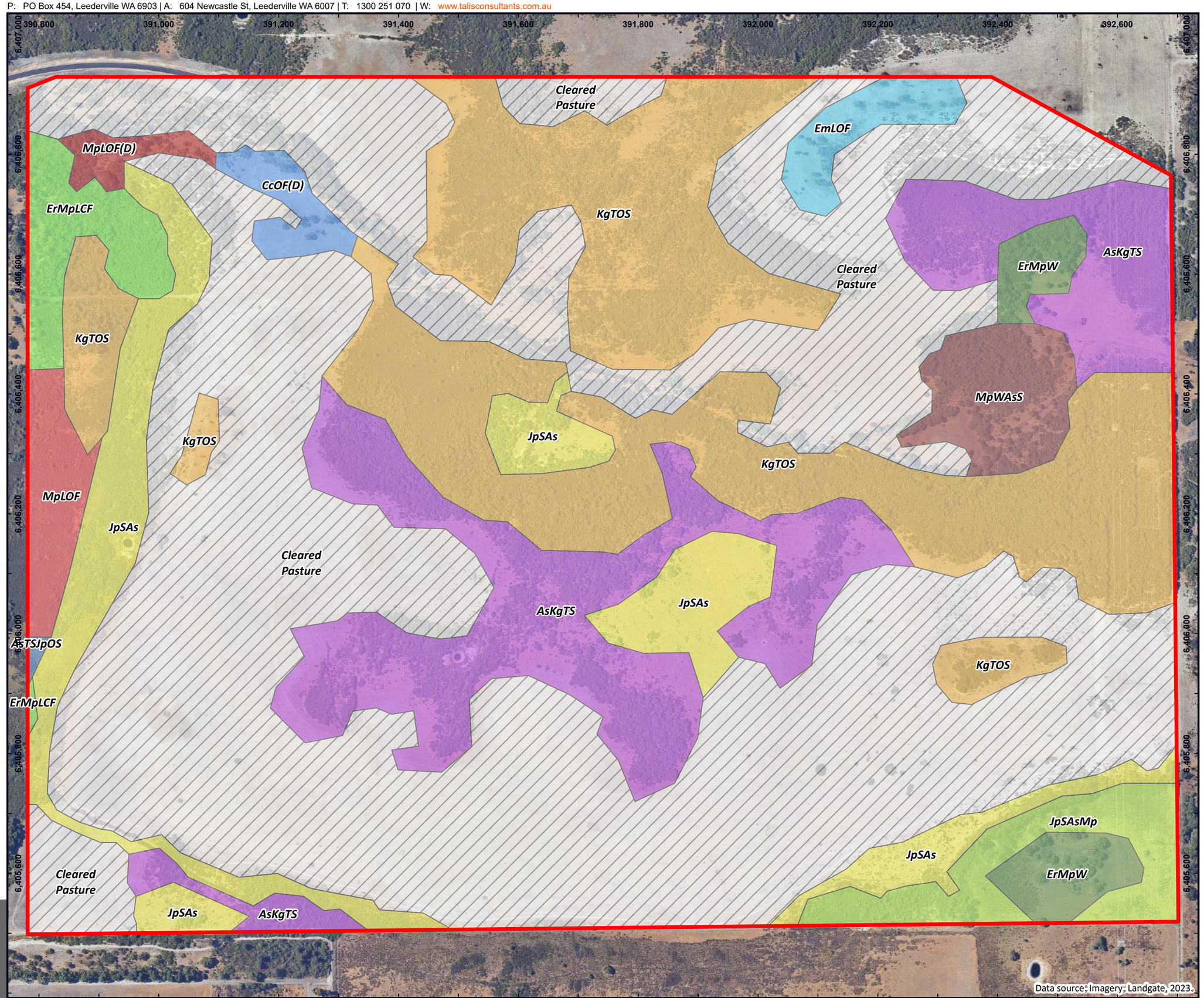


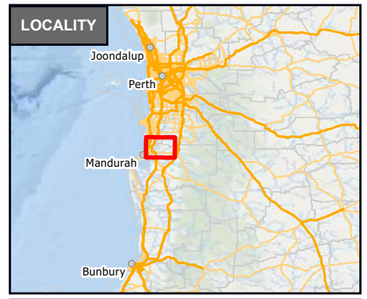
LEGEND

- Site Boundary

Vegetation Unit

- AsKgTS
- AsTSJpOS
- CcOF(D)
- EmLOF
- ErMpLCF
- ErMpW
- JpSAs
- JpSAsMp
- KgTOS
- MpLOF
- MpLOF(D)
- MpWAsS
- Cleared Pasture

LOCALITY



0 50 100 150 200 250 km

VEGETATION UNITS

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	12/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 11

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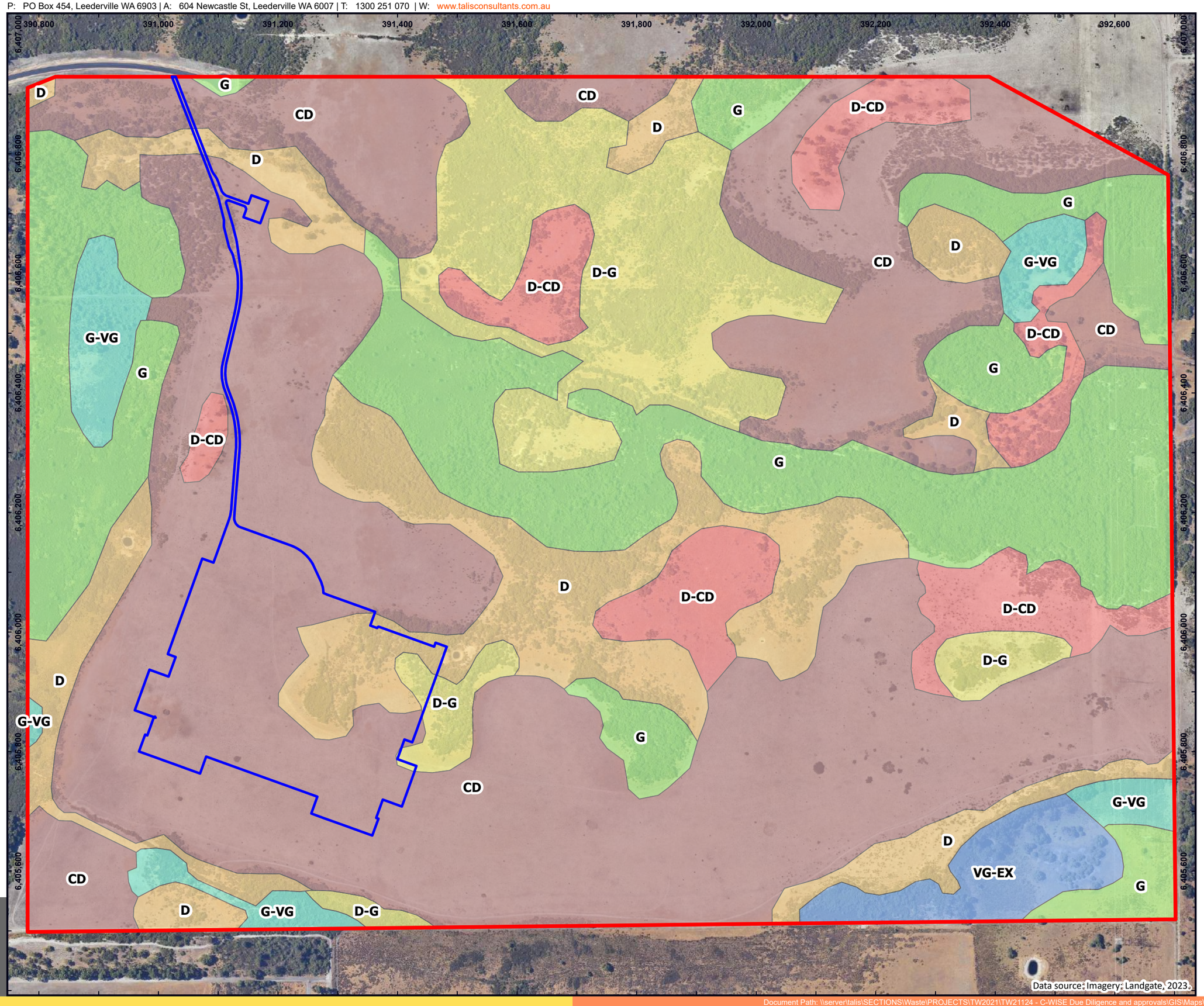


Data source: Imagery: Landgate, 2023.

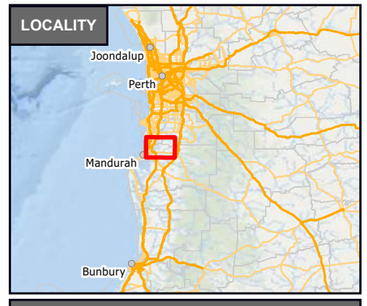
LEGEND

- Site Boundary
- Development Envelope

Vegetation Condition

- (VG-EX) Very Good to Excellent
- (G-VG) Good to Very Good
- (G) Good
- (D-G) Degraded to Good
- (D) Degraded
- (D-CD) Degraded to Completely Degraded
- (CD) Completely Degraded

LOCALITY



0 50 100 150 200 250 km

VEGETATION CONDITIONS

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	12/10/2023
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Figure 12

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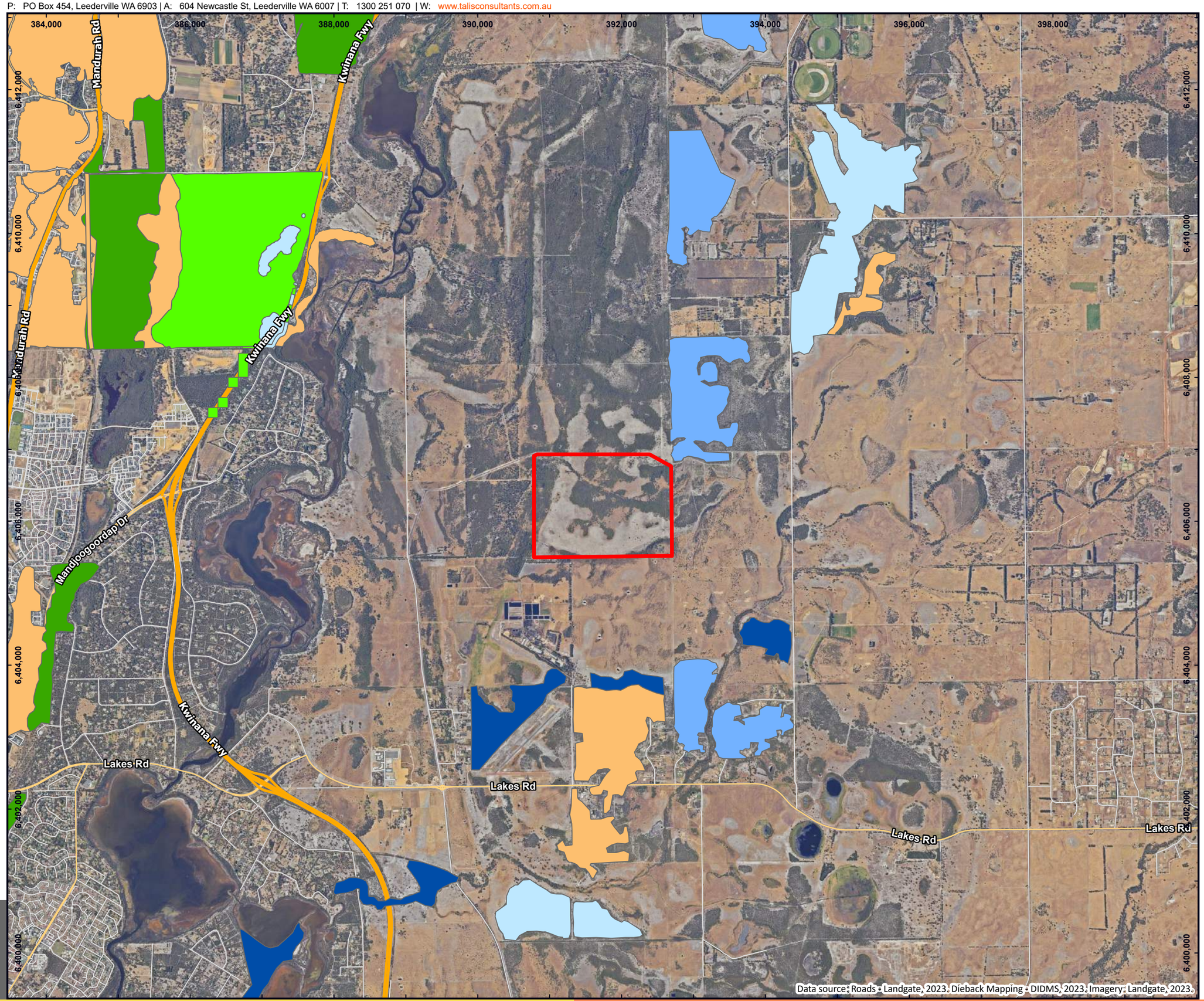


LEGEND

- Site Boundary

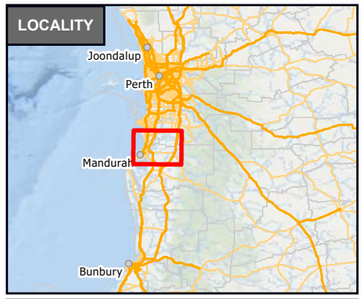
Dieback Confidence Mapping

- Infested; confirmed or likely, Presence of P. cinnamomi most likely, degraded vegetation, strong pattern & chronology of deaths, vector present, positive sample and or previously interpreted infested
- Infested; considered likely, Degradation present, vector present, weak to moderate pattern evident, or previously interpreted suspect
- Infested; likely but lower confidence, Location in the landscape, drainage line, high annual rainfall, extrapolated down slope from infestations, no pattern evident, small area difficult to interpret
- Uninfested; most confident, Large area, little or no signs of disturbance, healthy vegetation, P. cinnamomi very unlikely, previously interpreted uninfested
- Uninfested; least confident, Location in the landscape, low annual rainfall, small area difficult to interpret, lack of vegetation, disturbance present
- Uninterpretable; Natural areas where susceptible plants are absent, or too few to determine P. cinnamomi disease status

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

DIEBACK CONFIDENCE MAPPING

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N 0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	12/10/2023
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Figure 13

Data source: Roads - Landgate, 2023. Dieback Mapping - DIDMS, 2023. Imagery: Landgate, 2023.

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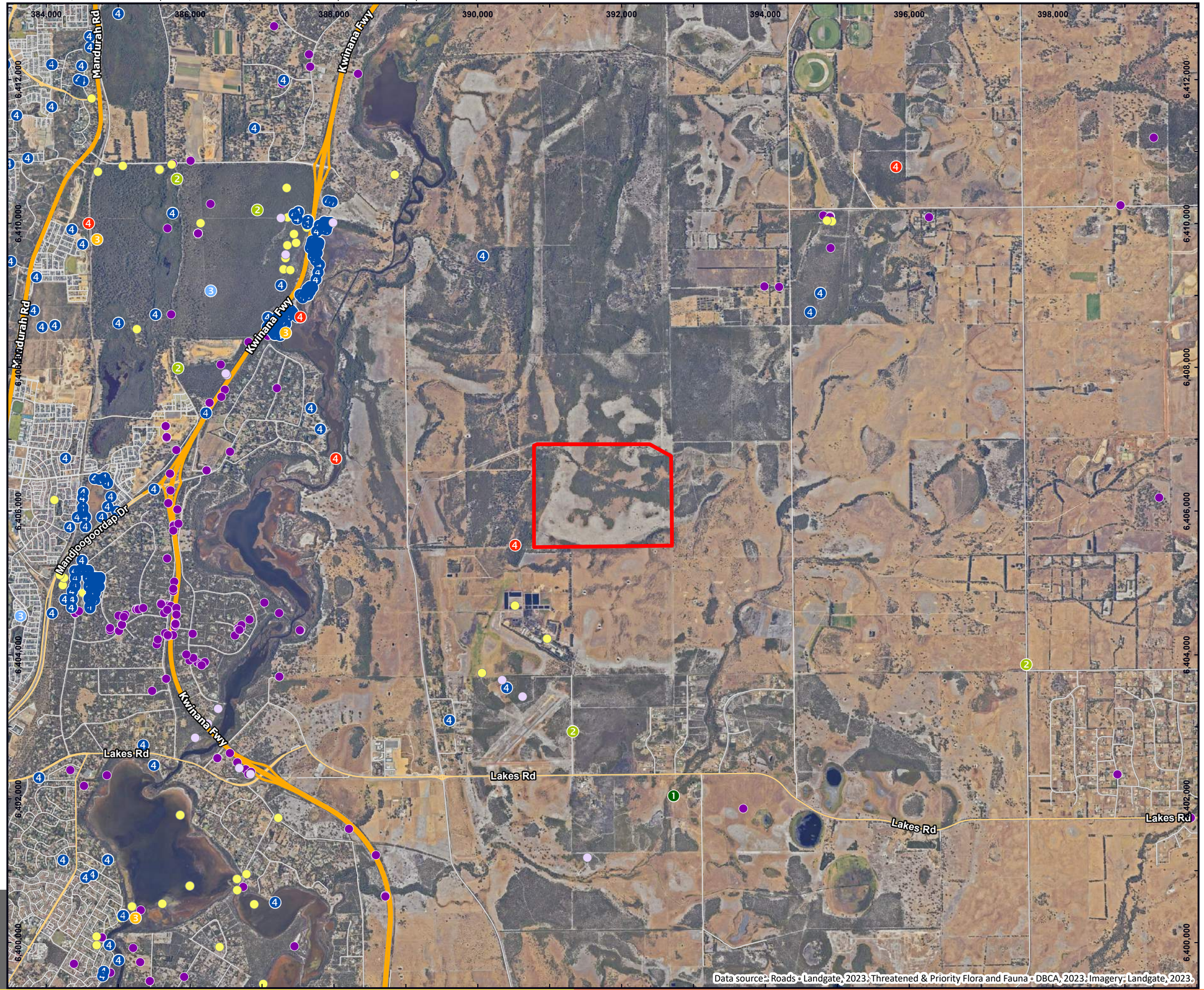


Data source: Roads - Landgate, 2023. Threatened & Priority Flora and Fauna - DBCA, 2023. Imagery: Landgate, 2023.

LEGEND

- Site Boundary

Threatened and Priority Flora

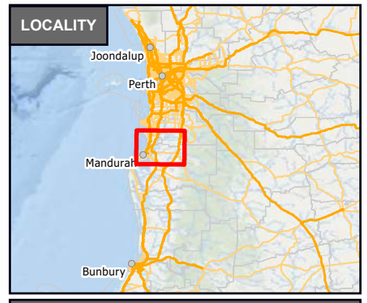
- Priority 1
- Priority 2
- Priority 3
- Priority 4
- Threatened species

Threatened and Priority Fauna

- Priority 3
- Priority 4
- Specially protected species
- Threatened species

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road



THREATENED AND PRIORITY FLORA AND FAUNA

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

N
0 500 1,000 1,500 2,000 m

Coordinate System: GDA2020 MGA Zone 50
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Prepared:	E Jackson	Date:	12/10/2023
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Figure 14

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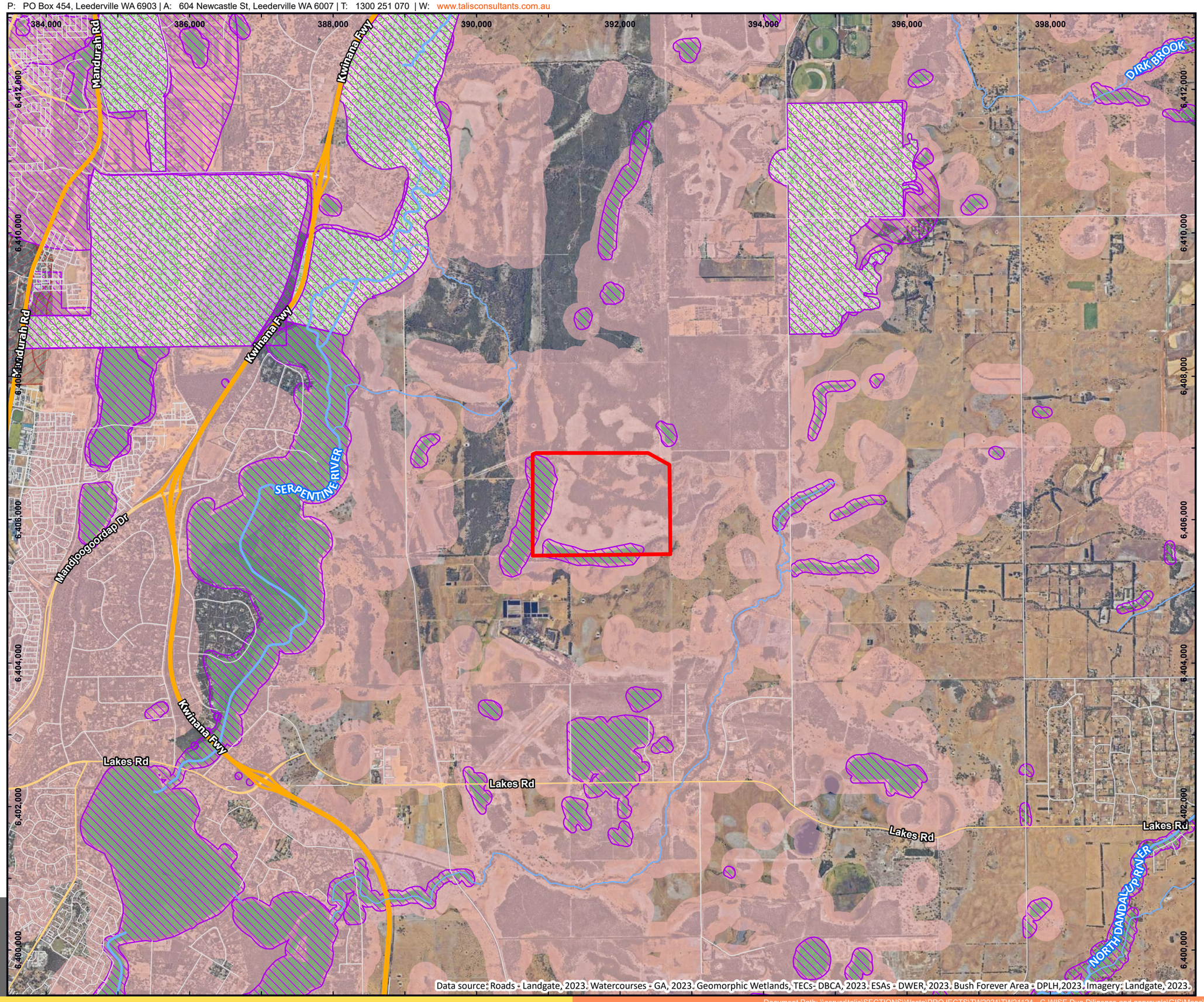


Data source: Roads - Landgate, 2023. Watercourses - GA, 2023. Geomorphic Wetlands, TECs- DBCA, 2023. ESAs - DWER, 2023. Bush Forever Area - DPLH,2023. Imagery: Landgate, 2023.

LEGEND

- Site Boundary
- Environmentally Sensitive Areas
- Bush Forever Areas

Geomorphic Wetlands - Swan Coastal Plain

- Conservation

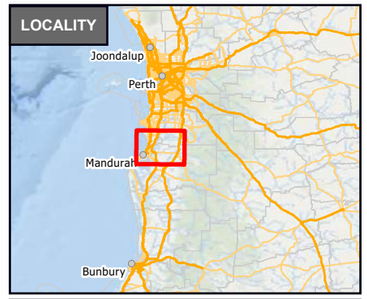
Threatened Ecological Communities

- Priority
- Threatened

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

THREATENED ECOLOGICAL COMMUNITIES & CONSERVATION RESERVES

Environmental Assessment and Management Plan

C-Wise
320 Gull Road
Keralup WA 6182

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Figure 15

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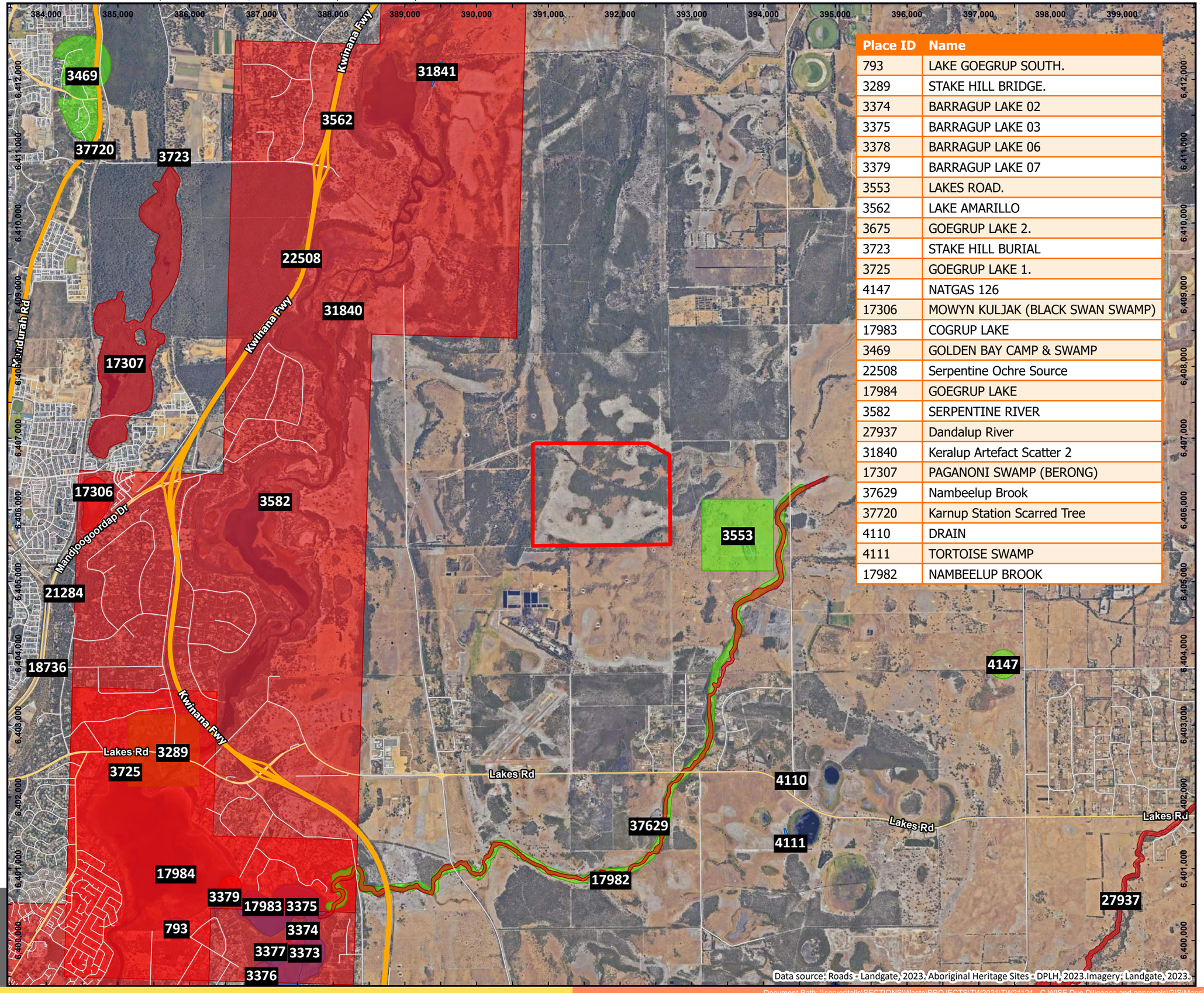


Place ID	Name
793	LAKE GOEGRUP SOUTH.
3289	STAKE HILL BRIDGE.
3374	BARRAGUP LAKE 02
3375	BARRAGUP LAKE 03
3378	BARRAGUP LAKE 06
3379	BARRAGUP LAKE 07
3553	LAKES ROAD.
3562	LAKE AMARILLO
3675	GOEGRUP LAKE 2.
3723	STAKE HILL BURIAL
3725	GOEGRUP LAKE 1.
4147	NATGAS 126
17306	MOWYN KULJAK (BLACK SWAN SWAMP)
17983	COGRUP LAKE
3469	GOLDEN BAY CAMP & SWAMP
22508	Serpentine Ochre Source
17984	GOEGRUP LAKE
3582	SERPENTINE RIVER
27937	Dandalup River
31840	Keralup Artefact Scatter 2
17307	PAGANONI SWAMP (BERONG)
37629	Nambeelup Brook
37720	Karnup Station Scarred Tree
4110	DRAIN
4111	TORTOISE SWAMP
17982	NAMBEELUP BROOK

LEGEND

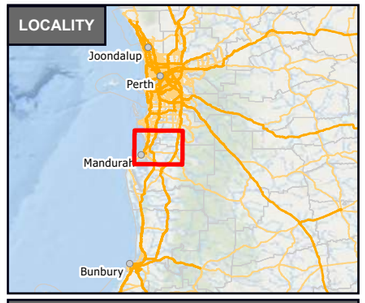
- Site Boundary

Aboriginal Heritage

- Lodged
- Registered Site
- Stored Data / Not a Site

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road



ABORIGINAL HERITAGE

Environmental Assessment and Management Plan

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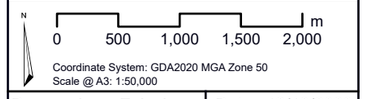

Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

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Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

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Figure 16

Data source: Roads - Landgate, 2023. Aboriginal Heritage Sites - DPLH, 2023.Imagery: Landgate, 2023.

APPENDIX A
Drawings

APPENDIX B

Groundwater Control Level Study

APPENDIX C

Odour Impact Assessment

APPENDIX D

Community Engagement Report

APPENDIX E

Surface Water and Leachate Management Plan

APPENDIX F

Leachate & Surface Water Technical Specification and CQA Plan

Assets | Engineering | Environment | Noise | Spatial | Waste

Talis Consultants
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