Clearing Permit Application Supporting Document

320 Gull Road, Keralup

Prepared for C-Wise

27 November 2023

Project Number: TW21124

DOCUMENT CONTROL

Version	Description	Date	Author	Reviewer	Approver
1.0	Draft Release	06/10/23	TH	RC	RC
2.0	First Approved Release	19/10/2023	TH/MH	RC	RC
3.0	Updated Release	09/11/23	TH/MH	RC	RC
4.0	Updated Release	27/11/23	TH/MH	MH	RC

Approval for Release

Name	Position	File Reference
Ronan Cullen	Director and Waste Section Leader	TW21124_C-Wise_ClearingPermitApplication_4.0
Signature		

Table of Contents

Tables

Figures

Appendices

1 Introduction

C-Wise Holdings Pty Ltd (C-Wise) is currently seeking approval to develop a new Carbon Recycling Facility (the Facility) located at 320 Gull Road, Keralup, a portion of Lot 9500 on Deposited Plan 414516 (the Site). The Site is situated approximately 10 kilometres (km) northeast of the Mandurah town centre (Figure 1). The total area of the Site is 269.4 hectares (ha) of which the Development Footprint occupies approximately 17.12ha. The Site boundary and Development Footprint are shown Figure 2.

A range of organic materials will be accepted at the Facility for composting and its operation 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). Recognising the importance of the Facility, C-Wise was successful in obtaining funding from both the State and Federal governments through the Food Waste for Healthy Soils Fund (Section 1.1.1).

While the Facility will be primarily located in a historically cleared part of the Site, some clearing of native vegetation will be required for its establishment. The Facility has been sited and designed to minimise the extent of clearing required, where possible, however additional clearing for bushfire management and Site access is unavoidable. The Facility will be constructed in two stages, and C-Wise is seeking to secure all the necessary approvals for the Facility concurrently.

This document has been prepared to support C-Wise's application for Purpose Clearing Permit for the Site under Section 51E of the *Environmental Protection Act 1986* (EP Act). C-Wise is proposing to clear up to 6.55ha of native vegetation at the Site in order to establish the Facility. Much of the vegetation at the Site is in poor condition, with 75.07% of the vegetation to be cleared classified as Completely Degraded or Degraded. The Facility has been sited and designed to both minimise the extent of clearing required, as well as clearing only isolated patches of vegetation in Good condition, in order to minimise the potential impacts of clearing as much as possible.

1.1 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 outcomes. Recognising that the remaining lifetime of the existing facility is limited, C-Wise has been actively seeking an alternative long-term location to establish a best practice facility for over a decade.

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. 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.

1.1.1 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, indicating that the State and Federal governments recognise the need for and importance of the Facility and are supportive of the project.

1.2 Access

A dedicated access road to the Site has been constructed by Main Roads WA and connects to Gull Road, west of the Site. There is a potential for the access road to be extended further to the east and connect to a second access point in the future, however this option is still being investigated at this stage.

1.3 Development Footprint

The Development Footprint (Figure 2) includes the initial operations and areas for future expansion of the Facility. C-Wise intends to submit an application for a Works Approval to the Department of Water and Environmental Regulation (DWER), inclusive of both the initial operations and future expansion, following submission of this Clearing Permit Application. C-Wise is seeking approval to clear the maximum extent of vegetation required to establish both stages of the Facility within this application to reduce future administrative burden.

The proposed location of infrastructure is shown in Drawing C-100 (Appendix A). The key infrastructure to be established for each stage is listed below:

Stage 1:

- Carbon storage area;
- Liquid waste receival area and tanks;
- Receival building;
- Cocoons;
- Mobile Aerated Floor System (MAFS) area;
- Final maturation area;
- Screening and dispatch area;
- Two leachate ponds;
- Stormwater pond;
- Fuel store and service areas;
- Workshop and office;
- Access driveway;
- Administration and education facility; and
- Gatehouse and weighbridge.

Stage 2:

- Carbon storage area;
- Liquid waste tanks;
- Receival building;
- Cocoons;

- Mobile Aerated Floor System (MAFS) area;
- Final maturation area;
- Screening and dispatch area;
- Two leachate ponds; and
- Stormwater pond.

In addition to this, C-Wise is also proposing to construct a fence between the wetland and bushfire protection buffers. The fence will be located 50m away from any mapped Conservation Category Wetlands and, where possible, 50m from any Resource Enhancement or Multiple Use Wetlands to provide additional protection to the wetlands within and surrounding the Site.

The total extent of vegetation that C-Wise is seeking approval to clear is 6.55ha and includes the entire Development Footprint of the Facility, including earthworks and both Stages referred to above.

2 Environmental Attributes

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

As mentioned previously, the Site is 269.4ha in size and consists of both native vegetation and historically cleared areas which were previously used for agricultural purposes.

The following reports were prepared for the Department of Communities to establish the baseline environmental status of the Site and inform contractual agreements between the landowner and potential lessee:

- Lot 9500 Gull Road Keralup – Flora, Vegetation and Fauna Survey (PGV Environmental, 2021);
- 320 Gull Road, Keralup – Baseline Environmental Report (Western Environmental, 2021); and
- Baseline Environmental Report, Keralup Landholding – Site 4 (Coterra Environment, 2021).

These reports have been used to understand the ecological values of the Site.

2.1 Climate

The average and 90th percentile rainfall data was sourced from the Bureau of Meteorology (BoM) for the period 2000 to 2022 for the nearest weather station located at Hopelands (No. 9253) located approximately 10km north of the Site.

Table 2-1: Average Rainfall (2000-2022)

Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average (mm)	16.0	15.7	19.2	44.5	85.4	124.3	143.1	122.2	74.6	37.4	25.6	10.8	746.1
90th percentile Rainfall (mm)	47.2	45.9	41.0	66.8	119.7	190.4	215.1	180.6	116.4	63.4	54.0	28.1	895.7

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 June to August. The driest months are December to March.

2.2 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 4. An unnamed sumpland wetland is located in the southeast corner and excluding the small sections of Multiple Use Wetlands and cleared pasture areas where the Facility infrastructure is to be located, most of 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, with the changes outlined in Appendix B. Both the original and updated wetland mapping has been considered in the development of the project and in the preparation of this Clearing Permit application.

The Facility has been positioned 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 following clearing. Most infrastructure will be located at least 100m from the mapped wetlands with the exception of access roads and stormwater and leachate management infrastructure, which will be located at least 50m from wetlands.

This ensures that no clearing of vegetation within the Conservation Category Wetlands will occur and that clearing of vegetation within Resource Enhancement Wetlands is minimised as far as practicable.

2.3 Watercourses

The nearest major watercourse to the Site is the Serpentine River, located approximately 3km to the west (Figure 5). 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. The Gull Road Drain enters the Lower Serpentine River approximately 3.1km west of the Development Footprint. Nutrient concentrations at the drain are recorded as being very high and the highly modified nature of the drainage system means that nutrients can be quickly washed from soils into waterways. No clearing of vegetation between the Gull Road Drain and the Development Footprint is required. The clearing activities of the Proposal are therefore not expected to impact Gull Road Drain. As discussed in Section 2.6.5, extensive engineering controls have also been incorporated into the design of the Facility to minimise the risk of leachate being released to the surrounding environment. These controls include a comprehensive stormwater and leachate management system to ensure that all stormwater and leachate generated at the Site is captured in appropriately lined ponds and reused in the composting process, where possible. These controls are expected to be sufficient to ensure that the establishment of the Facility does not significantly impact nutrient concentrations at the drain.

Due to the distance from the Site to nearby major and minor watercourses, the clearing requirements of the Facility are not anticipated to result in impacts to watercourses. Potential impacts on surface water resulting from the Facility unrelated to the clearing of native vegetation will be addressed in the Works Approval application.

2.3.1 Floodplain Mapping

Floodplain mapping data indicates that the Site is not located in a floodplain area. 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.

2.4 Water Resources

No public drinking water sources are located at or surrounding the Site. The nearest public drinking water source area to the Site is the North Dandalup Dam Catchment Area, located approximately 15km to the east. Due this distance, the clearing of vegetation at the Site is not anticipated to impact water resources.

2.5 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 6. 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 6).

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).

2.6 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. PGV Environmental (PGV) completed a flora and vegetation survey at the Site in October and November 2021 to outline the vegetation units, classify the condition of vegetation and identify the presence of any conservation significant species (PGV, 2021). The vegetation units within the Site are listed within Table 2-2 and shown in Figure 7.

Table 2-2: Vegetation Units

Code	Description	Area (ha)	% of site
Aa	*Astartea affinis* Closed Heath	15.71	5.84
EmXo	*Eucalyptus marginata* Woodland over *Xylomelum occidentale* Low Open Woodland over *Hibbertia hypercoides* Low Shrubland	3.07	1.14
ErCcMp	*Eucalyptus rudis* Open Forest over *Kunzea glabrescens* Tall Shrubland over *Astartea affinis* Open Shrubland over *Lepidosperma longitudinale* Very Open Sedgeland	1.81	0.67
ErKg	*Eucalyptus rudis/Corymbia callophylla* Open Forest over *Melaleuca preissiana* Low Open Woodland over *Astartea affinis* Shrubland over *Lepidosperma longitudinale*	1.04	0.39
Jp	*Juncus pallidus* Sedgeland	0.27	0.10

Kg	*Kunzea glabrescens* Scattered Shrubs	15.81	5.87
KgAa	*Kunzea glabrescens* Tall Open Scrub over *Astartea affinis* Open Heath	76.05	28.25
MpKg	*Melaleuca pressiana* Open to Low Open Forest over *Kunzea glabrescens* Tall Open Shrubland over *Astartea affinis/Regelia cillata* Open Heath over *Lepidosperma longitudinale* Sedgeland	13.71	5.09
Mr	*Melaleuca rhaphiophylla* Low Open Forest over *Kunzea glabrescens* Tall Open Shrubland over *Astartea affinis/Regelia cillata* Open Heath over *Lepidosperma longitudinale* Sedgeland	3.24	1.20
C	Cleared with potential for presence of native annual herb *Podotheca gnaphaliodes*	133.58	49.61
W	Water	4.97	1.84

Source: Information sourced from PGV Environmental (2021)

PGV notes that the cleared areas within the Site are, at times, covered in *Podotheca gnaphaliodes*, a native annual herb. While the exact extent of *Podotheca gnaphaliodes* was not mapped by PGV, the potential to clear a portion of this herb has been considered within this application.

The majority of the Development Footprint is located in the cleared pasture area, however some clearing of the following vegetation types will be required for the Facility, including within the Asset Protection Zone (APZ):

- 0.10ha of EmXo, 1.52% of total clearing;
- 3.65ha of Kg, 55.82% of total clearing;
- 1.78ha of KgAa, 27.13% of total clearing;
- 0.02ha of MpKg, 0.25% of total clearing; and
- Up to 1ha of cleared pasture, 15.28% of total clearing, to account for isolated trees and potential *Podotheca gnaphalioides*.

2.6.1 Vegetation Condition

The condition of vegetation at across the Site ranges from Completely Degraded to Very Good (Figure 8) and is summarised in Table 2-3.

Table 2-3: Summary of Vegetation Condition

Vegetation Condition	Proportion of Site		Proportion of Proposed Clearing	
	ha	%	ha	%
Completely Degraded	137.5	51.07	1.27	19.33
Degraded	47.15	17.51	3.64	55.74
Degraded to Good	8.64	3.21	0.02	0.25
Good	58.92	21.88	1.62	24.68

Good to Very Good	13.32	4.95	-	-
Very Good	3.72	1.38	-	-

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

- 1.27ha, or 19.33%, of the vegetation to be cleared is classified as Completely Degraded due to historic clearing;
- 3.65ha, or 55.74%, of the vegetation to be cleared is classified as Degraded;
- 0.02ha, or 0.25%, of the vegetation to be cleared is classified as Degraded to Good;
- 1.62ha, or 24.68%, of the vegetation to be cleared is classified as Good; and
- No clearing of vegetation in a Good to Very Good or better condition will occur.

Approximately 4.94ha of vegetation classified as Completely Degraded, Degraded and Degraded to Good will be cleared for the Facility, which represents approximately 75.32% of all vegetation to be cleared. Approximately 21.88% of the vegetation within the Site is in Good condition, of which C-Wise is proposing to clear 1.62ha, or 2.75% of this vegetation condition type. This is limited to two small, isolated patches of Good vegetation surrounded by Completely Degraded and Degraded vegetation, therefore the clearing of this vegetation is not expected to have a significant impact on the ecological value of the region.

Given the small extent and generally poor condition of vegetation to be cleared, the proposed clearing is not expected to significantly impact the overall condition of vegetation at the Site.

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).

2.6.2 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 north-east of the Site is mapped as having a moderate confidence of being infested (Figure 10).

As dieback is not known to occur at the Site, the clearing of vegetation for the Facility is not expected to result in impacts relating to the spread of dieback.

2.6.3 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 11).

The clearing of vegetation at the Site will therefore not impact any conversation significant flora.

2.6.4 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 any clearing required for the Facility.

2.6.5 Conservation Reserves

The Conservation Category Wetlands located on the western and the southern sides of the Site are classified as Environmentally Sensitive Areas and are discussed further in Section 2.2.

The Site is located within the Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992 area (Figure 12), 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.

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. Additionally, the design of the Facility has considered the potential for leachate generation and has been developed to minimise this as far as practicable. The design of the Facility has been developed with consideration of the Better Practice Organics Recycling Guideline (DWER, 2022) (Composting Guidelines) and an aim to minimise the volume of leachate generated from high-risk feedstocks. All high-risk feedstock processing areas will be roofed to minimise leachate generation. 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.

Low risk leachate will be generated from the carbon storage area as well as the product screening and dispatch area. Any low-risk leachate generated at these areas will be captured in lined leachate ponds and evaporated. The lining system of the leachate ponds will include Geosynthetic Clay Liner (GCL) and High-Density Polyethylene (HDPE) layers and will be constructed to a similar standard as a typical landfill cell. 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. The leachate ponds have been designed to cater for a 1-in-100-year, 24-hour storm event and in the event of a more significant storm event, will overtop into the Facility's stormwater drainage system to be further diluted prior to being released into the environment. This limits the potential for the leachate to be released into the environment and therefore the potential for the Facility to contribute to the nutrient enrichment of the Harvey Estuary.

The proposed leachate management measures will be discussed in more detail in the Works Approval application for the Facility. Within the Works Approval for the Facility, the DWER will include controls and conditions that C-Wise must comply with during construction to ensure that any emissions from the Facility do not cause adverse impacts to the environment. These conditions are likely to also be applied to C-Wise's operational Licence to the Facility and additional controls may be applied at this time. The DWER's assessment process is therefore anticipated to be sufficient to manage risks relating to the nutrient loading of the Harvey Estuary.

2.7 Fauna

A fauna assessment of the Site was undertaken in 2021 by PGV and led to the identification of six fauna habitats (PGV, 2021):

- Open paddock with Juncus pallidus (*Juncus pallidus* in paddock with occasional *Astartea scoparia*, often on edge of wetland area);
- Paddock with mixed shrubland (mixed shrubland up to 3m dominated by *Astertea affinis*, some of which is regrowth);
- Remnant woodland on sand (open woodland with Jarrah, Marri woodland with a dry understorey);
- Remnant woodland with dense wetland understorey (woodland comprising moist, dense understorey with Flooded Gums, Marri trees or some *Melaleuca preissiana*);
- Melaleuca remnant woodland with wetland understorey (woodland dominated by Melaleuca and Flooded Gums, with moist, dense understorey); and
- Open water habitat (emergent *Melaleuca rhaphiophylla* in water).

PGV found that a large proportion of habitat is in a degraded condition and consider that the ecosystems within the Site have a low ecological value.

2.7.1 Conservation Significant Fauna

According to the Department of Biodiversity, Conservation and Attractions (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-south west (Figure 11).

PGV undertook a search of the DBCA database, the NatureMap Species Report and 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 2-4).

Table 2-4: Preferred Habitat of Conservation Significant Fauna Species (PGV, 2021)

Scientific Name	Common Name	Habitat*	Likelihood of Occurring on the Site
Schedule 1 - CR			
Bettongia penicillata ogilbyi	Woylie	The Woylie habitat types ranged from forest to grassland, coastal and inland. During the day the Woylie shelters under patches of dense undergrowth, logs and rock-cavities and occasionally in burrows.	May be in wooded areas
Calidris ferruginea	Curlew Sandpiper	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms.	No – not coastal habitat

Scientific Name	Common Name	Habitat*	Likelihood of Occurring on the Site
Limosa lapponica menzbieri	Bar-tailed Godwit (northern Siberian)	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh.	No – not coastal habitat
Numenius madagascariensis	Eastern Curlew	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets.	No – not coastal habitat
Pseudocheirus occidentalis	Western Ringtail Possum, Ngwayir	The Western Ringtail Possum is a medium sized nocturnal marsupial. This species occurs in and near coastal Peppermint Tree (*Agonis flexuosa*) forest and Tuart (*Eucalyptus gomphocephala*) dominated forest with a Peppermint Tree understorey.	No – no suitable habitat on the site
Schedule 2 – EN			
Botaurus poiciloptilus	Australasian bittern	The Australasian Bittern occurs mainly in densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands.	Potentially occurs intermittently on the site
Calidris canutus	Red Knot	In Australasia the Red Knot mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs.	No – not coastal habitat
Calyptorhynchus baudinii	Baudin's Black Cockatoo	Baudin's Black-Cockatoo mainly occurs in eucalypt forests, especially Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*), also Karri (*E. diversicolor*) forest, often feeding in the understorey on proteaceous trees and shrubs, especially banksias (SEWPaC, 2012).	Potentially occurs intermittently on the site
Calyptorhynchus latirostris	Carnaby's Black Cockatoo	Carnaby's Cockatoo is found in the south west of Australia from Kalbarri through to Ravensthorpe. It has a preference for feeding on the seeds of Banksia, Hakea, Eucalyptus,	Potentially occurs intermittently on the site

Scientific Name	Common Name	Habitat*	Likelihood of Occurring on the Site
		Grevillea, Pinus and Allocasuarina spp. It is nomadic often moving toward the coast after breeding. It breeds in tree hollows that are 2.5 - 12m above the ground and have an entrance 23-30cm with a depth of 1-2.5m. Nesting mostly occurs in smooth barked trees (e.g. Salmon Gum, Wandoo, Red Morrell) (SEWPaC, 2012).	
Myrmecobius fasciatus	Numbat, Walpurti	Numbats occur in eucalypt forests and woodlands dominated by *Eucalyptus marginata, Corymbia calophylla and Eucalyptus wandoo*.	Highly Unlikely – the site doesn't contain the preferred habitat and the species hasn't been recorded since 1974
Rostratula australis (Rostratula benghalensis australis)	Australian Painted Snipe	The Australian Painted Snipe has been recorded at wetlands in all states of Australia but is most common in eastern Australia. It generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. It also uses inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include a cover of vegetation, including grasses.	Potentially occurs intermittently on the site
Schedule 3 - VU			
Calyptorhynchus banksii naso	Forest Red tailed Black Cockatoo	Forest Red-tailed Black Cockatoos frequent the humid to sub-humid south west of Western Australia from Gingin in the north, to Albany in the south and west to Cape Leeuwin and Bunbury (SEWPaC, 2012). It nests in tree hollows with a depth of 1-5m, that are predominately Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata*) and Karri (*E. diversicolor*) and it feeds primarily on the seeds of Marri.	Possible intermittent visitor to the site
Dasyurus geoffroii	Chuditch, Western Quoll	The Chuditch have been known to occupy a wide range of habitats including woodlands, dry sclerophyll forests, riparian vegetation, beaches and deserts. They are opportunistic feeders, and forage on the ground at night, feeding on invertebrates, small mammals, birds and reptiles.	Possible but hasn't been trapped on the site historically.

Scientific Name	Common Name	Habitat*	Likelihood of Occurring on the Site
Falco hypoleucos	Grey Falcon	The Grey Falcon favours timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined watercourses, but frequents other grassland and woodland habitats (Birdlife International, 2014).	Possibly intermittently present on the site
Leipoa ocellata	Mallee Fowl	Mallee fowl have been found in mallee regions of southern Australia from approximately the 26th parallel of latitude southwards in mallee bushland.	No – no mallee habitat
Limosa lapponica baueri	Bar-tailed Godwit (western Alaskan)	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh.	No – not coastal habitat
Setonix brachyurus	Quokka	Quokkas were originally very common on the Swan Coastal Plain, however, their distribution is now limited to Rottnest Island and a few isolated areas in the south-west of WA. On the mainland, they prefer densely vegetated areas around wetlands and streams, whereas on Rottnest Island they inhabit low scrubby coastal vegetation where water is not readily available year-round.	Highly Unlikely – thought to be locally extinct
Westralunio carteri	Carter's Freshwater Mussel	Carter's Freshwater Mussel is South-West Western Australia's only freshwater mussel (Murdoch University & SERCUL, 2012). Carter's Freshwater Mussel occurs in freshwater streams, rivers, reservoirs and lakes (ICUN, 2015b) and is intolerant to dehydration for more than three days and salinity (Murdoch University & SERCUL, 2012).	No – no permanent water on the site
Schedule 3 – VU and Schedule 5 – AI			
Haradrius leschenaultii	Greater Sand Plover	In Australasia, the Greater Sand Plover is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons.	*Highly Unlikely not suitable habitat*

Scientific Name	Common Name	Habitat*	Likelihood of Occurring on the Site
Schedule 5 - AI			
Actitis hypoleucos (Tringa hypoleucos)	Common Sandpiper	The Common Sandpiper is mostly found around muddy margins or rocky shores. Generally, the species forages in shallow water and on bare soft mud at the edges of wetlands.	Possible intermittent visitor to the site
Anous stolidus	Common Noddy	The Common Noddy feeds on small fish, squid, pelagic molluscs, insects and even Pandanus fruit. Most items are skimmed from the surface of the ocean by dipping and breeds on islands (Birdlife Australia, 2014).	No – not coastal habitat
Apus pacificus	Fork-tailed Swift	The Fork-tailed Swift is almost exclusively aerial and is not known to breed in Australia. They are seen in inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. *Apus pacificus subsp. pacificus* is the only subspecies to migrate to Australia.	No – not coastal habitat – possibly could fly over the site but unlikely to land
Calidris acuminata	Sharp-tailed Sandpiper	The Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	Possible intermittent visitor to the site
Calidris melanotos	Pectoral Sandpiper	The Pectoral Sandpiper prefers shallow fresh to saline wetlands and is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	Possible intermittent visitor to the site
Calidris ruficollis	Red-necked Stint	The Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores.	No – not coastal habitat
Calidris subminuta	Long-toed Stint	The Long-toed Stint prefers shallow freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds. The species is also fond of areas of muddy shoreline, growths of short grass, weeds, sedges, low or floating aquatic	Possible intermittent visitor to the site

Scientific Name	Common Name	Habitat*	Likelihood of Occurring on the Site
		vegetation, reeds, rushes and occasionally stunted samphire.	
Limosa lapponica	Bar-tailed Godwit	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays.	No – not coastal habitat
Limosa limosa	Black-tailed Godwit	The Black-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh.	No – not coastal habitat
Motacilla cinerea	Grey Wagtail	The Grey Wagtail is mostly recorded in coastal areas in Western Australia (ALA, 2015) however is widespread. There is non-breeding habitat only in Australia and the species has a strong association with water, particularly rocky substrates along water courses but also lakes and marshes.	Possible intermittent visitor to the site
Pandion cristatus (Pandion haliaetus)	Osprey	Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They feed on fish, especially mullet where available, and rarely take molluscs, crustaceans, insects, reptiles, birds and mammals.	No – not coastal
Philomachus pugnax	Ruff	The Ruff is found on generally fresh, brackish of saline wetlands with exposed mudflats at the edges and is found in terrestrial wetlands including lakes, swamps, pools, lagoons, tidal rivers, swampy fields and floodlands.	Possible intermittent visitor to the site
Plegadis falcinellus	Glossy Ibis	The Glossy Ibis is the smallest ibis known in Australia. This species preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation but do not breed in South-west Western Australia.	Possible intermittent visitor to the site
Thalasseus bergii (Sterna bergii)	Crested Tern	The Crested Tern occurs in coastal areas (Birdlife Australia, 2018).	No – not coastal

Scientific Name	Common Name	Habitat*	Likelihood of Occurring on the Site
Tringa brevipes	Grey Tailed Tattler	The Grey-tailed Tattler is often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. It can also be found at intertidal rocky, coral or stony reefs as well as platforms and islets that are exposed at low tide.	No – not coastal habitat
Tringa glareola	Wood Sandpiper	The Wood Sandpiper uses well vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. They are typically associated with emergent, aquatic plants or grass, and dominated by taller fringing vegetation, such as dense stands of rushes or reeds, shrubs, or dead or live trees, especially Melaleuca and River Red Gums Eucalyptus camaldulensis and often with fallen timber.	Possible intermittent visitor to the site
Tringa nebularia	Common Greenshank	The Common Greenshank is a wader and does not breed in Australia. This species can be found in many types of wetlands and has the widest distribution of any shorebird in Australia. This species typically feeds on molluscs, crustaceans, insects, and occasionally fish and frogs.	Possible intermittent visitor to the site
Tringa stagnatilis	Marsh Sandpiper, Little Greenshank	The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks.	Possible intermittent visitor to the site
Schedule 7 - CD			
Phascogale tapoatafa wambenger	South-western brush-tailed phascogale, wambenger	Southern Brush-tailed Phascogales are arboreal marsupials which require tree hollows in suitable woodland or forest and rely on abundant invertebrate prey to sustain populations (Pescott, 2012).	May be in wooded areas
Marine			
Ardea alba (Ardea modesta)	Great Egret, White Egret	The Eastern Great Egret has been reported in a wide range of wetland habitats and usually frequents shallow waters. This species feeds on fish, insects, crustaceans, molluscs,	Possible intermittent visitor to the site

Scientific Name	Common Name	Habitat*	Likelihood of Occurring on the Site
		frogs, lizards, snakes and small birds and mammals.	
Ardea ibis	Cattle Egret	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands with breeding in Western Australia recorded in the far north in Wyndham in colonies in wooded swamps such as mangrove forest. This species forages away from water on low lying grasslands, improved pastures and croplands generally in areas that have livestock eating insects, frog, lizards and small mammals.	Possible intermittent visitor to the site
Haliaeetus leucogaster	White-bellied Sea-eagle	The White-bellied Sea-Eagle is found in coastal habitats with large areas of open water, especially those close to the sea shore. This species feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans, and on carrion and offal.	No – not coastal habitat
Merops ornatus	Rainbow Bee eater	Populations of the Rainbow Bee-eater that breed in northern Australia are considered to be resident, and in many northern localities the Rainbow Bee-eater is present throughout the year. The Rainbow Bee-eater nests in a burrow dug in the ground. It is found across the better-watered parts of WA including islands preferring lightly wooded, sandy country near water.	Known as an intermittent visitor to the site
Priority 3			
Idiosoma sigillatum	Swan Coastal Plain shield backed trapdoor spider	The Swan Coastal Plain Shield-backed Trapdoor Spider arranges fallen twigs from the sheoak tree around the rim of its burrow entrance, enabling it to feel the vibrations of unsuspecting prey that wander by (Curtin, 2018).	Unlikely to occur as the habitat is not suitable
Lerista lineata	Perth Slider, Lined Skink	The Lined Skink is a burrowing species that occurs in pale sandy soils with coastal heath and shrubland areas in isolated populations in the south-west and mid-west coast of Western Australia. It feeds on termites and other small insects (AROD, 2014).	No- not coastal heath or shrubland habitat
Neelaps calonotos	Black Striped Snake	The Black-striped snake has a limited distribution, inhabiting areas with sandy soils that support heathlands	No – habitat not suitable

Scientific Name	Common Name	Habitat*	Likelihood of Occurring on the Site
		and Banksia/Eucalypt Woodlands (Nevill, 2005) on the Swan Coastal Plain generally in the lower west coast from Lancelin to Mandurah (Storr *et al*, 1999).	
Priority 4			
Hydromys chrysogaster	Water Rat, Rakali	This species is found in coastal heaths and shrublands on the lower west coast between Perth and Mandurah, including Rottnest Island, with isolated populations on the mid-west coast and Busselton.	No – not coastal environment
Isoodon fusciventer	Southern Brown Bandicoot, Quenda	Southern Brown Bandicoots are small grey marsupials that prefer dense scrub (up to one metre high). Their diet includes invertebrates (including earthworms, adult beetles and their larvae), underground fungi, subterranean plant material, and very occasionally, small vertebrates (DEC, 2012).	Known to occur on the site
Oxyura australis	Blue-billed Duck	The Blue-billed Duck is found on terrestrial wetlands in temperate regions, that are freshwater to saline, and may be natural or artificial. It nests in rushes, sedges, *Lignum Muehlenbeckia cunninghamii* and paperbark Melaleuca (Birdlife International, 2015). The species is almost completely aquatic and is seldom seen on land. Non-breeding flocks, often with several hundred individuals, congregate on large, deep open freshwater dams and lakes in autumn. The daylight hours are spent alone in small, concealed bays within vegetation or communally in large exposed rafts far from the shore (Birds in Backyards, 2015).	No – open water habitat is limited
Thinornis rubricollis (Charadrius rubricollis)	Hooded Plover	The Hooded Plover primarily inhabits sandy, ocean beaches, with the highest densities on beaches with large amounts of beach-washed seaweed that are backed by extensive open dunes. In Western Australia the species also inhabits inland and coastal salt lakes (Birdlife International 2014).	No – not coastal or coastal salt lakes

* Habitat descriptions from DoEE (2016) SPRAT Database unless otherwise denoted

PGV reviewed a survey conducted by Coffey Environments (2009) across the Site and the wider Lot 9500 area. 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 clearing of vegetation for the Facility is not anticipated to result in significant impacts to fauna.

2.8 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 13):

- 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 at 1-2 m;
- 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 1.5 m by clay or less frequently a strong iron-organic hardpan.

The Conservation Category Wetlands present on the western and southern sides of the Site are mapped as occurring primarily over Bassendean B3 Phase soils, over which no clearing will occur. Most of the Resource Enhancement Wetlands within the Site and near the Development Footprint occur over Bassendean B4 Phase soils, over which approximately 3.00ha of vegetation will be cleared for the Facility. The majority of clearing will occur in Bassendean 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 no clearing in Bassendean B3 Phase soils will occur, these wetlands are not expected to be impacted by the proposed clearing.

Surface geology at the Site is classified as predominantly Qdcb – dune quartz sand with heavy mineral concentrations and local basal conglomerate (Figure 14).

It is recognised that alluvial plains are typically prone to erosion, which is most likely to occur directly to the west of Facility infrastructure as this is the lowest point of the Site. Vegetation clearing in this area will be limited to clearing for bushfire management purposes and to establish an access road to the Facility. As this area has been historically cleared, the extent of vegetation to be cleared for access and bushfire management purposes will be limited. The clearing of vegetation at the Site is therefore not anticipated to result in appreciable land degradation, including in relation to erosion.

2.8.1 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. As an active composting facility, C-Wise's existing facility at 139 Nambeelup Road, directly south of the Site, is classified as a contaminated site (Figure 15).

The Site itself is not currently classified as a contaminated site.

The risk of encountering contaminated soils at the Site is considered to be low and as no clearing of the vegetation between Facility infrastructure and C-Wise's existing site will occur, impacts relating to the disturbance of contaminated soils are not expected to occur.

2.8.2 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 14.

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).

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).

2.9 Aboriginal Cultural Heritage

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-south east. 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 proposed clearing is not expected to impact Aboriginal cultural heritage.

2.10 Summary of Environmental Attributes

A summary of the environmental attributes of the Site is provided in Table 2-5.

Table 2-5: Summary of Environmental Attributes

Aspect	Findings
Climate	Dry summers and mild, wet winters with most rainfall occurring between June and August. The average annual rainfall is 746.1mm.
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.
Watercourses	The Serpentine River is located approximately 3km west of the Site and two minor watercourses are located 0.75km to the north west and 1.25km to the east, respectively. 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.
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.
Vegetation Condition	While the vegetation condition at the Site ranges from Completely Degraded to Very Good, the vegetation within the Clearing Area is classified as Completely Degraded to Good: 1.27ha, or 19.33% of the vegetation to be cleared, is classified as Completely Degraded; 3.65ha, or 55.74% of the vegetation to be cleared, is classified as Degraded; 0.02ha, or 0.25% of the vegetation to be cleared, is classified as Degraded to Good; and 1.62ha, or 24.68% of the vegetation to be cleared, is classified as Good.
Dieback	Dieback is not known to occur at the Site, however a portion of land directly to the north east 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-south west of the Site.
Geology and Soils	The Site consists of four soil landscape units (Bassendean B1 to B4 Phases) and surface geology is classified as predominantly Qdcb – dune quartz sand with heavy mineral concentrations 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. No infrastructure is 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. Given this, an ASS investigation will be undertaken and an ASSMP prepared prior to the commencement of any clearing or construction activities at 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.

3 Clearing Works

The total extent of vegetation that C-Wise is proposing to clear is 6.55ha, 2.43% of the Site. Through careful siting and design, the extent of clearing required for the Facility has been minimised as far as practicable and has been limited to:

- 1.27ha of Completely Degraded vegetation, 19.33% of the proposed clearing;
- 3.65ha of Degraded vegetation, 55.74% of the proposed clearing;
- 0.02ha of Degraded to Good vegetation, 0.25% of the proposed clearing; and
- 1.62ha of Good vegetation, 24.68% of the proposed clearing.

The Development Envelope and proposed extent of clearing is shown in Figure 17 and provided as a ESRI shapefile.

C-Wise will aim to minimise disturbance through 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.

4 Native Vegetation Clearing Principles

To determine the potential impacts of clearing for the Facility, the Site was assessed against the ten Native Vegetation Clearing Principles outlined in Schedule 5 of the EP Act. The assessment against each principle is outlined in Table 4-1 below.

Table 4-1: Assessment Against 10 Clearing Principles

Principle		Assessment	Variance
a)	Native vegetation should not be cleared if it comprises a high level of biological diversity.	The Development Footprint occurs primarily on historically cleared pasture, which as noted by PGV, may contain *Podotheca gnaphaliodes*. As the exact extent of this herb within the Site is unknown, C-Wise has allowed for the clearing of up to 1ha in the cleared pasture areas to account for the presence of *Podotheca gnaphaliodes* or isolated trees that may need to be removed. Small portions of the EmXo (01.ha), Kg (3.65ha), KgAa (1.78ha) and MpKg (0.02ha) vegetation types also require clearing for the establishment of the Facility. Most of the vegetation to be cleared is classified as Completely Degraded or Degraded, although some Kg and KgAa vegetation classified as Good will be cleared for the establishment of Stage 2 of the Facility. The vegetation in Good condition is surrounded by cleared pasture and is isolated from other patches of Good vegetation, including portions of KgAa vegetation in Good condition to the east, south and north of the proposed clearing area. A portion of Kg vegetation in Good condition is located to the north of the proposed clearing area. Of note is the KgAa and Kg vegetation in Good condition to the north, which is within a larger area classified as being in Good condition and is adjacent to other vegetation types that are also in Good condition. Given the larger extent of this area and the presence of multiple vegetation types, it is expected to be more likely to hold a higher level of biological diversity than the proposed areas to be cleared. The Facility has been sited and designed to avoid this area and limit the proposed clearing to areas less likely to hold a high level of biological diversity. Given the condition and location of the vegetation to be cleared, it is not expected to have a high level of biological diversity and the proposed clearing is therefore not considered to be at variance to this principle.	Not at variance
b)	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for	A fauna assessment was undertaken by Coffey Environments in 2009 to identify fauna species and potential habitat at the Site. The fauna assemblages at the Site were found to be typical of fauna species that occur on the Swan Coastal Plain. Six conservation significant species were observed at the Site during the fauna assessment, however Coffey Environments suggested that due to the degraded nature of vegetation at the Site, the Site provides limited fauna value.	Not at variance

Principle		Assessment	Variance
	fauna indigenous to Western Australia.	The Facility has been positioned to minimise the extent of clearing required to establish the Facility as far as practicable, with primarily vegetation classified as Completely Degraded or Degraded proposed to be cleared. Some vegetation in Good condition will be cleared, however these are small (1.62ha), isolated patches of Good vegetation and there are other patches of the same vegetation types (KgAa and Kg) within the Site in Good condition that will not be cleared. As a result, the vegetation that will be cleared is not expected to comprise the whole or a part of, or be necessary for the maintenance of, a significant habitat for fauna indigenous to WA. The proposed clearing is therefore not at variance to this principle.	
c)	Native vegetation should not be cleared if it includes, or is necessary for, the continued existence of rare flora.	No Threatened or Priority Flora were recorded during the vegetation review and field assessment undertaken by FVC in 2017 and 2019. A desktop review of the DBCA's Priority Flora records indicated that the nearest Priority Flora to the Site is a Priority 4 species located approximately 300m to the west. As there are no records of Threatened or Priority Flora occurring at the Site, rare flora is not expected to be impacted by the proposed clearing. Impacts from the proposed clearing are therefore not at variance to this principle.	Not at variance
d)	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.	The Banksia Woodlands of the Swan Coastal Plain/Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region TEC is mapped as occurring over the Site, however no Banksia species were identified within the Site during FVC's vegetation review and field assessment. The native vegetation to be cleared is not considered to comprise the whole or a part of, or is necessary for the maintenance of a TEC. Therefore, the proposed clearing is not at variance to this principle.	Not at variance
e)	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an	The vegetation to be cleared for the establishment of the Facility is surrounded by historically cleared pasture and is classified as being in primarily Completely Degraded or Degraded condition. The vegetation units to be cleared include small portions of the EmXo, Kg, KgAa and MpKg vegetation types, of which some Kg and KgAa	Not at variance

Principle		Assessment	Variance
	area that has been extensively cleared.	vegetation is in Good condition. Given that there are other sections of Kg and KgAa vegetation in Good condition elsewhere within the Site, it is not expected to be significant as a remnant of native vegetation. Approximately 5% of the vegetation on the Site is classified as native remnant vegetation (Coterra, 2021), located on the eastern side of the Site. C-Wise is not proposing to clear this vegetation as infrastructure will be located on the western side of the Site to minimise the extent of clearing required. Native regrowth will be cleared for the Facility, however it is noted that this regrowth does not represent endemic species and instead represents novel assemblages dominated by one or two species (Coterra, 2021). The native vegetation to be cleared is therefore not considered to be significant and impacts from the proposed clearing are not at variance to this principle.	
f)	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	There are two unnamed palusplain Conservation Category Wetlands located on the western and southern boundaries of the Site. The Conservation Category Wetlands at the Site are associated primarily with Bassendean B3 Phase soils, over which no clearing will occur at a minimum distance of 50m from the wetlands. This suggests that the vegetation to be cleared in this area, while close to the mapped Conservation Category Wetlands, is not growing in association with the wetlands. While this vegetation is not considered to be growing in association with the mapped Conservation Category Wetlands, the Facility has been sited and designed to minimise the extent of clearing required and allows for a minimum 50m separation distance from the wetlands. The Draft Guideline for the Determination of Wetland Buffer Requirements (WAPC, 2005) outlines recommended separation distances for several activities, including habitat modification. A separation distance of 6-50m for firebreaks is recommended for Conservation Category Wetlands, which has been implemented for the Facility. A 100m separation distance is recommended to minimise edge effects, which has been considered for the Facility, with only stormwater and leachate management infrastructure to be located within 100m of the mapped wetlands. Given the Completely Degraded nature of the vegetation bordering the Conservation Category Wetlands within the Site, edge effects	May be at variance

Principle		Assessment	Variance
		are expected to already be occurring and the proposed clearing for the Facility is not expected to significantly increase the intensity of this effect. It is noted that the updated Conservation Category Wetlands mapping data, following the DBCA's 2021 review, outlines a reduced extent of the wetlands on the western and southern boundaries of the Site. This results in a greater separation distance between Facility infrastructure and the mapped wetlands compared to the original dataset, however both datasets have been considered when setting the 50m separation distance. The vegetation located between the 50m buffer and the Development Footprint is classified as either Degraded or Completely Degraded, therefore the actual extent of vegetation cleared in this area will be minimal and its removal is not expected to impact the nearby Conservation Category wetlands. Some clearing of vegetation within the mapped Resource Enhancement Wetlands will be required to establish the Facility. The condition of this vegetation ranges from Degraded to Good and is classified as native regrowth by FVC, which notes that the native regrowth does not represent endemic species. Some clearing of vegetation in Good condition is required, however this is limited to two isolated patches of vegetation totalling 1.62ha, approximately 2.75% of all vegetation in Good condition within the Site and a small portion of the Good condition vegetation within the Resource Enhancement Wetland. The area to be cleared represents a small portion of the Resource Enhancement Wetland within the Site (4.02%), so the clearing of this vegetation is not expected to result in significant impacts to the health or integrity of the wetland. As with the Conservation Category Wetlands, the proposed clearing is not expected to result in increased edge effects to the Resource Enhancement Wetlands due to the degraded condition of vegetation bordering the wetlands currently. The exposed boundary of the Resource Enhancement Wetlands will be minimised as far as practicable to ensure that edge effects are managed appropriately. In addition to this, it is possible that up to 1ha of *Podotheca gnaphaliodes* or isolated trees growing in the mapped Resource Enhancement Wetlands is also cleared. Given that any instances of *Podotheca gnaphaliodes* or isolated trees to be cleared will be present in an area classified as Completely Degraded, the removal of this	

Principle		Assessment	Variance
		vegetation is not anticipated to impact the overall health or integrity of the Resource Enhancement Wetlands within the Site. A small amount of clearing (0.63ha) within the mapped Multiple Use Wetlands in the northwest corner of the Site is required for access and bushfire management purposes. The vegetation to be cleared is classified as primarily Degraded or Completely Degraded, with an additional 0.02ha of Degraded to Good vegetation also to be cleared. The removal of this vegetation is not expected to significantly impact the wetlands, particularly given the large extent of the mapped Multiple Use Wetlands surrounding the Site. There are no watercourses within the Site boundary, with the nearest major watercourse, the Serpentine River, located 3km to the west. There are two minor watercourses near the Site, located approximately 0.75km to the west and 1.25km to the east, respectively. Given their distance from the Site, the required clearing is not expected to impact these watercourses. Gull Road Drain is located approximately 125m south of the Development Footprint and runs along the southern boundary of the Site, entering the Lower Serpentine River to the west. As the Facility has been sited to avoid unnecessary clearing, no clearing between the Development Footprint and Gull Road Drain is required to establish the Facility. The proposed clearing activities are therefore not expected to impact the drain. The proposed clearing may be at variance with this principle, however soil mapping indicates that the vegetation to be cleared near the Conservation Category Wetlands is not growing in association with these wetlands. In addition, the condition of the vegetation to be cleared ranges from Completely Degraded to Degraded to Good and its removal is not expected to significantly harm the health or integrity of the wetlands. Given this, the proposed 50m minimum separation distance from wetlands and the distance from the nearest watercourses, significant impacts to wetlands are not expected to occur.	
g)	Native vegetation should not be cleared if the clearing of the vegetation	The surface geology at the Site is classified as predominantly alluvial sand, which is typically prone to erosion. The risk of erosion is greatest directly to the west of the Facility infrastructure, the lowest point of the Site, as this area includes the steepest incline. Erosion in this area may lead to sedimentation in the nearby	May be at variance

Principle		Assessment	Variance
	is likely to cause appreciable land degradation.	Conservation Category Wetland and if significant, alterations to landform shapes. Minor clearing to the west of the Facility may be required for bushfire management and Site access purposes, however as much of this vegetation has been previously cleared, the proposed clearing is not expected to significantly increase the current risk of erosion at the Site. As the Site is not classified as a contaminated site, the risk of encountering contaminated soils during clearing is expected to be low. The proposed clearing is located in an area with a moderate to low risk of ASS, however results taken from two monitoring bores at the Site in 2021 showed exceedances in ASS parameters. As there is a risk of encountering ASS at the Site, an ASS investigation will be undertaken and an ASSMP prepared and implemented prior to commencing any clearing or other activities. The ASSMP will outline proposed management measures to either avoid or minimise potential impacts relating to ASS, in accordance with the DWER's ASS Guideline. The proposed clearing may be at variance to this principle. While there is a moderate to low risk of encountering ASS, appropriate management measures will be undertaken as required to control the risk of impacts relating to the disturbance of ASS. These measures are expected to be sufficient to ensure that significant impacts relating to land degradation will not occur as a result of the proposed clearing.	
h)	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	There are two Conservation Category Wetlands located on the western and southern sides of the Site, with some clearing to occur nearby. No vegetation within 50m of the mapped Conservation Category Wetlands will be cleared, with only vegetation classified as Degraded or Completely Degraded to be cleared near these wetlands. The extent of vegetation to be cleared within 100m of these wetlands has been minimised as far as practicable and is primarily limited to clearing for bushfire management and Site access purposes, with the exception of the establishment of stormwater and leachate management infrastructure. The proposed clearing is also not expected to increase the intensity of edge effects near these wetlands due to the degraded nature of the existing vegetation. The environmental values of the Conservation Category Wetlands are subsequently not expected to be impacted as a result of the proposed clearing.	Not at variance

Principle		Assessment	Variance
		The Site is located within the Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992 area, which was introduced to address the nutrient enrichment of the Harvey Estuary as a result of clearing. As the Site is located at least 0.75km from the nearest watercourse, the proposed clearing is not expected to result in nutrient enrichment of the Harvey Estuary. The Gull Road Drain is located approximately 125m south of the Development Footprint. It enters the Lower Serpentine River approximately 3.1km west of the Development Footprint. While no vegetation will be cleared between infrastructure and the Gull Road Drain, there is a potential for the establishment of the Facility to contribute to the nutrient enrichment of the Harvey Estuary, particularly if leachate is released into the drain. Recognising this, the Facility has been designed to minimise leachate generation and maximise the capture of any leachate that is generated as far as practicable. Controls include the roofing of all areas containing high-risk feedstocks (as defined by the Composting Guidelines) and through the incorporation of a comprehensive stormwater and leachate management system to minimise the risk of leachate being released into the surrounding environment. These controls will minimise the risk of the Facility to contribute to the nutrient enrichment of the Harvey Estuary and are expected to be sufficient to ensure that no significant environmental impacts occur. The clearing of vegetation is not expected to have an impact on the environmental values of any adjacent or nearby conservation area and therefore the proposed clearing is not at variance to this principle.	
i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	The depth to groundwater at the Site is recorded as ranging from 1.9mbgl to 2.8mbgl. Groundwater is recorded to be fresh and acidic, with a pH ranging from 3.73 to 4.5. There is a potential to encounter low pH waters or ASS soils during clearing activities, however the presence of the partial aquitard below most of the Site limits the potential for extensive impacts to groundwater. The extent of the proposed clearing is also small (6.55ha) and is not expected to result in impacts to groundwater quality at the Site. The nearest major watercourse to the Site is the Serpentine River, located approximately 3km to the west. Two minor watercourses are located 0.75km east and 1.25km west of the Site, respectively. Due to distance between these watercourses and the Site, they are not expected to be impacted by the proposed clearing.	Not at variance

Principle		Assessment	Variance
		The proposed clearing is not expected to cause the deterioration in the quality of surface or underground water and therefore impacts are considered to be unlikely to be at variance to this principle.	
j)	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	The Site is not located in a floodplain, with the nearest floodplain located approximately 1.25km to the east. In addition, the extent of vegetation to be cleared is not expected to be large enough to cause or exacerbate the incidence of flooding. Impacts are therefore not considered to be at variance to this principle.	Not at variance

5 Environmental Risk Management

The Facility has been carefully sited and designed to minimise the extent of native vegetation that needs to be cleared, as far as practicable. Where clearing could not be avoided, native vegetation associated with higher value environmental attributes, such as the nearby Conservation Category Wetlands has been prioritised so that no clearing in these areas will take place. This includes the establishment of the 50m buffer between the mapped Conservation Category Wetlands and the edge of clearing.

While clearing has been minimised as much as possible, some clearing is still required for the establishment of the Facility, which poses potential risks to the environment. The key potential risks from the clearing of native vegetation at the Site include:

- Generation of dust;
- Introduction and/or spread of weeds; and
- Safety risks.

Each of these aspects and the proposed management is discussed in the following sections.

5.1 General Management Measures

Several general management measures will be implemented during clearing activities to minimise the risk of environmental impacts or unnecessary clearing, including:

- Prior to activities commencing, the areas to be cleared will be marked and confirmed through a topographical survey;
- Areas to be cleared will be clearly marked on the ground to ensure that only necessary clearing is undertaken; and
- Any topsoil removed during clearing activities will be stored at the Site for future revegetation purposes.

5.2 Dust

Dust may be generated during clearing activities which can cause reduced visibility and nuisance. To minimise the risk of impacts relating to dust, the following controls will be implemented:

- Contractors will be required to prepare and implement an Environmental Management Plan for the management of potential impacts from the generation of dust;
- All clearing and other earthworks activities will cease during periods of high winds;
- Mobile water carts will be used as required to suppress potential dust emissions;
- Speed limit controls will be adopted across the Site to minimise the potential for dust generation;
- 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 during clearing activities.

5.3 Weed Control

To avoid the introduction and/or spread of weeds, the following management measures will be adopted:

- A fence will be established between the Development Footprint and surrounding wetlands to minimise the risk of weeds being spread from the Site;
- Earth-moving machinery shall be clean of soil and vegetation prior to entering and leaving the area to be cleared;
- Soils shall only be moved in dry conditions;
- Ensure that no weed-affected soil, mulch, fill or other material is brought into the area to be cleared; and
- Restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

5.4 Safety

To ensure the safety of personnel and the environment, the following controls are proposed:

- Pre-operation weather check to ensure conditions are suitable for activities;
- All personnel to undertake a Job Hazard Assessment (JHA) at the morning daily pre-start meetings prior to commencement of activities;
- All personnel involved in the clearing works will conform to fitness to work criteria;
- All plant/equipment to be subject to a daily pre-start check;
- Site supervisor to inspect area to identify and assess for any further hazards;
- A Take 5 or similar job observation system will be conducted for new/other hazards if required;
- Clear communication between operators, supervisor to be maintained at all times;
- Operation of machinery will occur according to the contractors' method statements and safe-work procedures; and
- Correct PPE will be worn by all personnel at all times.

5.5 Clearing Records

The following information will be recorded during and post clearing activities:

- Date of clearing;
- Size of area cleared;
- Location using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020 (GDA2020), expressing the geographical coordinates in Easting and Northing;
- Actions taken to avoid, minimise and reduce the impacts and extent of clearing activities; and
- Actions taken to minimise the risk of the introduction and spread of weeds.

6 Summary

The information in this document has been provided to support C-Wise's application for a Purpose Clearing Permit for the Site. C-Wise is seeking permission to clear 6.55ha of vegetation at the Site for the purposes of establishing the Facility. Through careful consideration of siting and design, the clearing of vegetation in Good condition has been limited to two small, isolated patches and no vegetation in a Good to Very Good or better condition is required to be cleared to establish the Facility. The extent of clearing has been minimised as far as practicable and includes:

- 1.27ha of Completely Degraded vegetation;
- 3.65ha of Degraded vegetation;
- 0.02ha of Degraded to Good vegetation; and
- 1.62ha of Good vegetation.

This represents approximately 2.43% of the Site and given the generally poor condition of the vegetation to be cleared, the removal of this vegetation is not anticipated to result in significant environmental impacts.

An assessment against the ten Native Vegetation Clearing Principles was completed and found that the proposed clearing was not at variance with eight of the ten principles. The proposed clearing may be at variance with the following principles due to the presence of wetlands within the Site and the potential to encounter ASS during clearing activities:

- Principle F – Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland; and
- Principle G – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

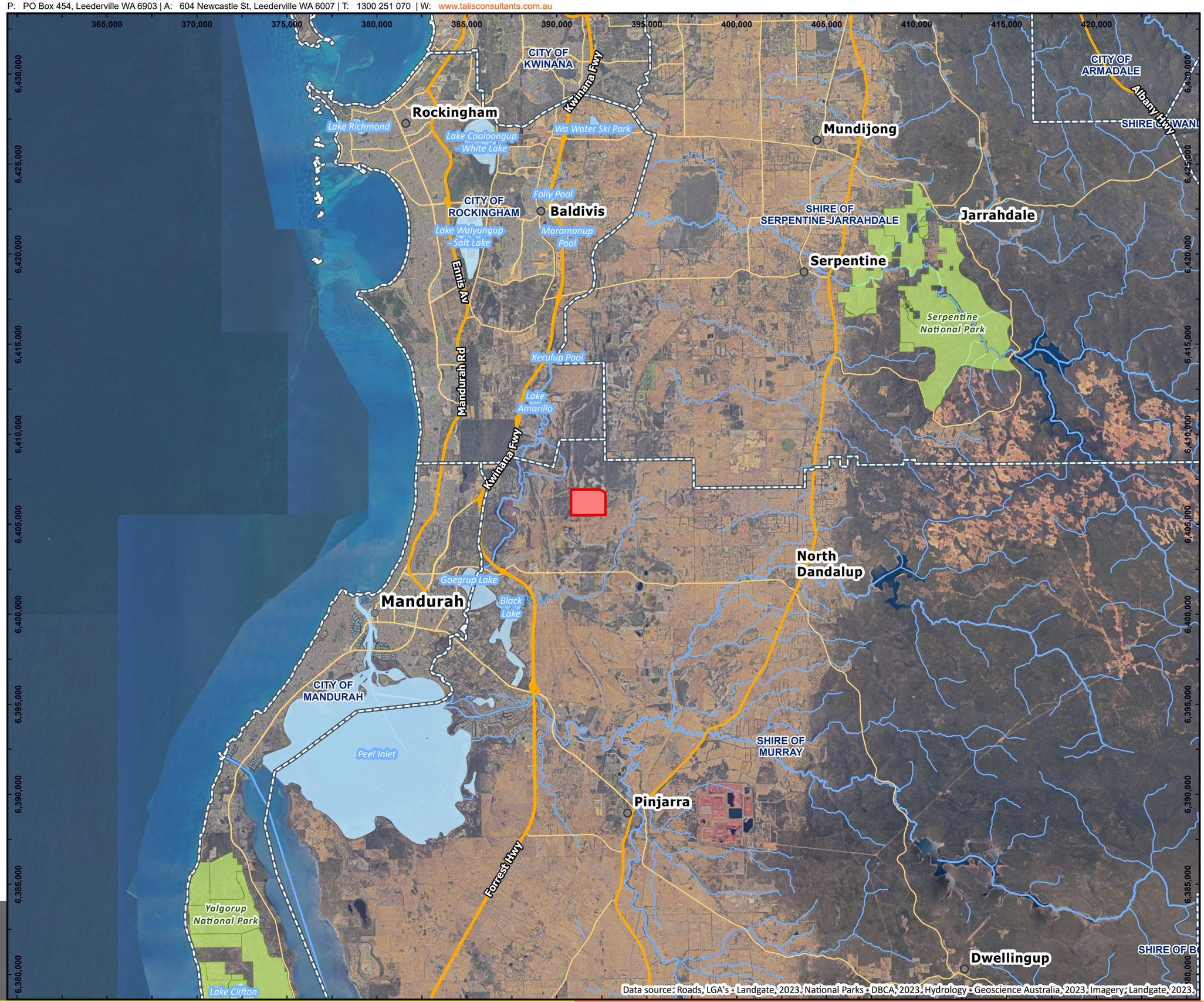
Clearing within wetlands has been minimised as far as practicable by siting the Facility primarily in previously cleared pasture areas, noting that no clearing of Conservation Category Wetlands will be required. Minor clearing of Resource Enhancement and Multiple Use Wetlands will be required, however the vegetation to be cleared is in generally poor condition, While some vegetation in Good condition will be cleared, this is limited to 1.62ha of isolated vegetation surrounded by Completed Degraded and Degraded cleared pasture and Kg and KgAa vegetation, which is prevalent elsewhere within the Site. Given this, the proposed clearing is not expected to significantly impact the health or integrity of the wetlands on and surrounding the Site.

As there is a risk of encountering ASS at the Site during clearing activities, an ASS investigation will be undertaken and an ASSMP prepared prior to any clearing taking place. These measures are anticipated to be sufficient to ensure that there will be no significant impacts relating to land degradation as a result of the proposed clearing.

Where the proposed clearing may be at variance to one of the Native Vegetation Clearing Principles, the proposed management measures are expected to be sufficient to ensure that no significant environmental impact occurs. All proposed clearing will be undertaken as outlined within this document to ensure that all environmental impacts are minimised and managed appropriately.

7 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

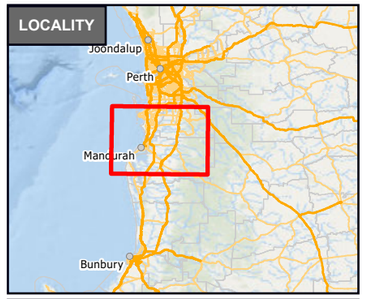
Hydrography

- Lakes
- Major Watercourse
- Minor Watercourse

Western Australian Roads

- Freeway / Highway
- Main Road

LOCALITY



0 50 100 150 200 250 km

LOCALITY

Clearing Permit Application

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

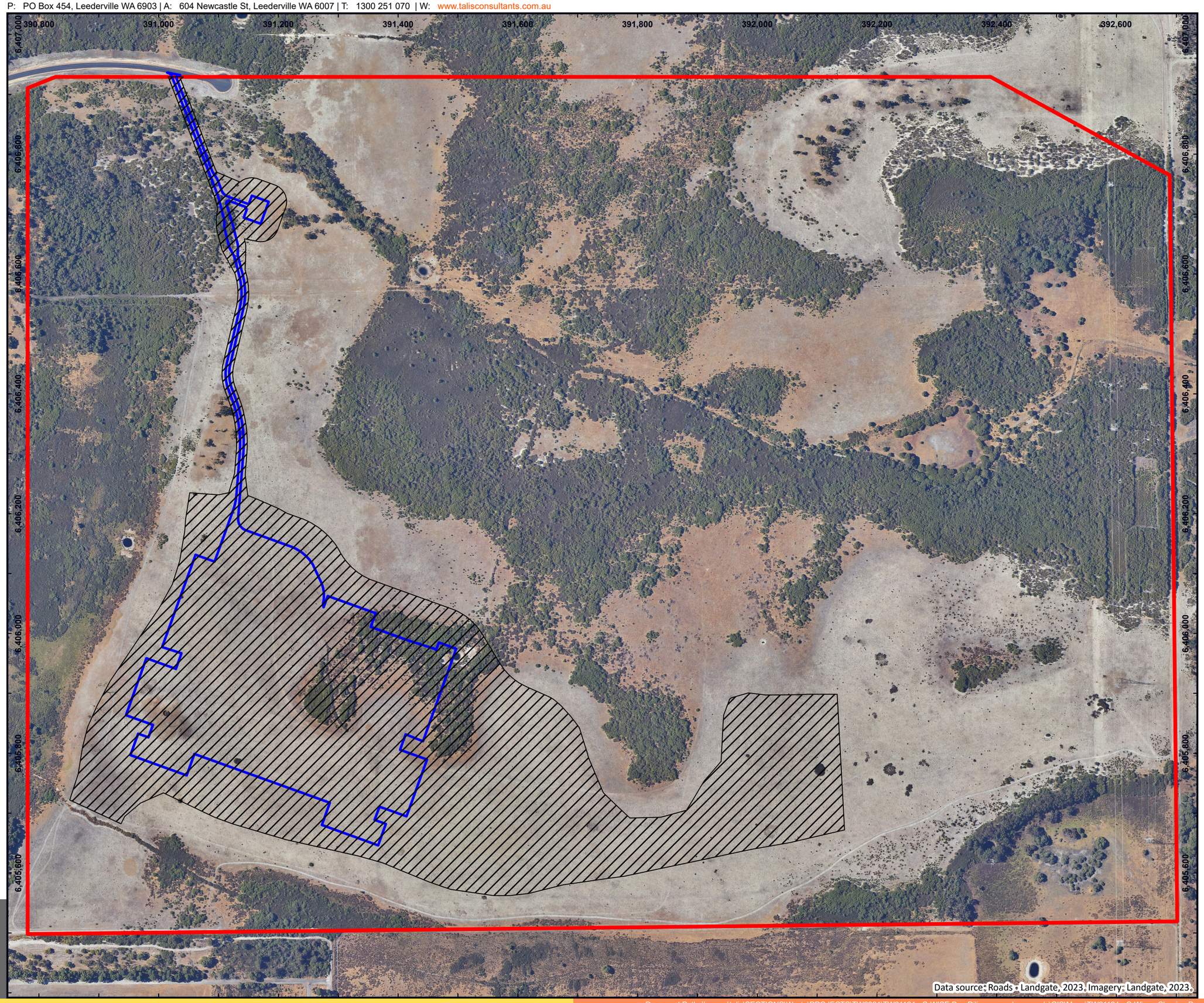
Prepared:	E Jackson	Date:	22/09/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 01

Document Path: \\server\talis\SECTIONS\Waste\PROJECTS\TW2021\TW21124 - C-WISE Due Diligence and approvals\GIS\Maps\TW21124 - C-Wise - Clearing Permit Application\TW21124 - C-Wise - Clearing Permit Application.aprx

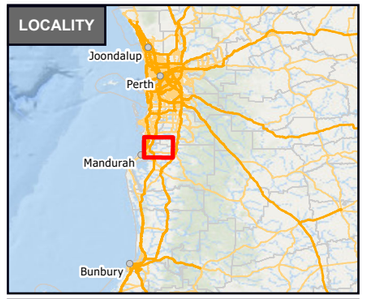
P: PO Box 454, Leederville WA 6903 | A: 604 Newcastle St, Leederville WA 6007 | T: 1300 251 070 | W: www.talisconsultants.com.au



LEGEND

- Site Boundary
- Development Footprint
- Development Envelope

LOCALITY



0 50 100 150 200 250 km

PROPOSED LOCATION

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

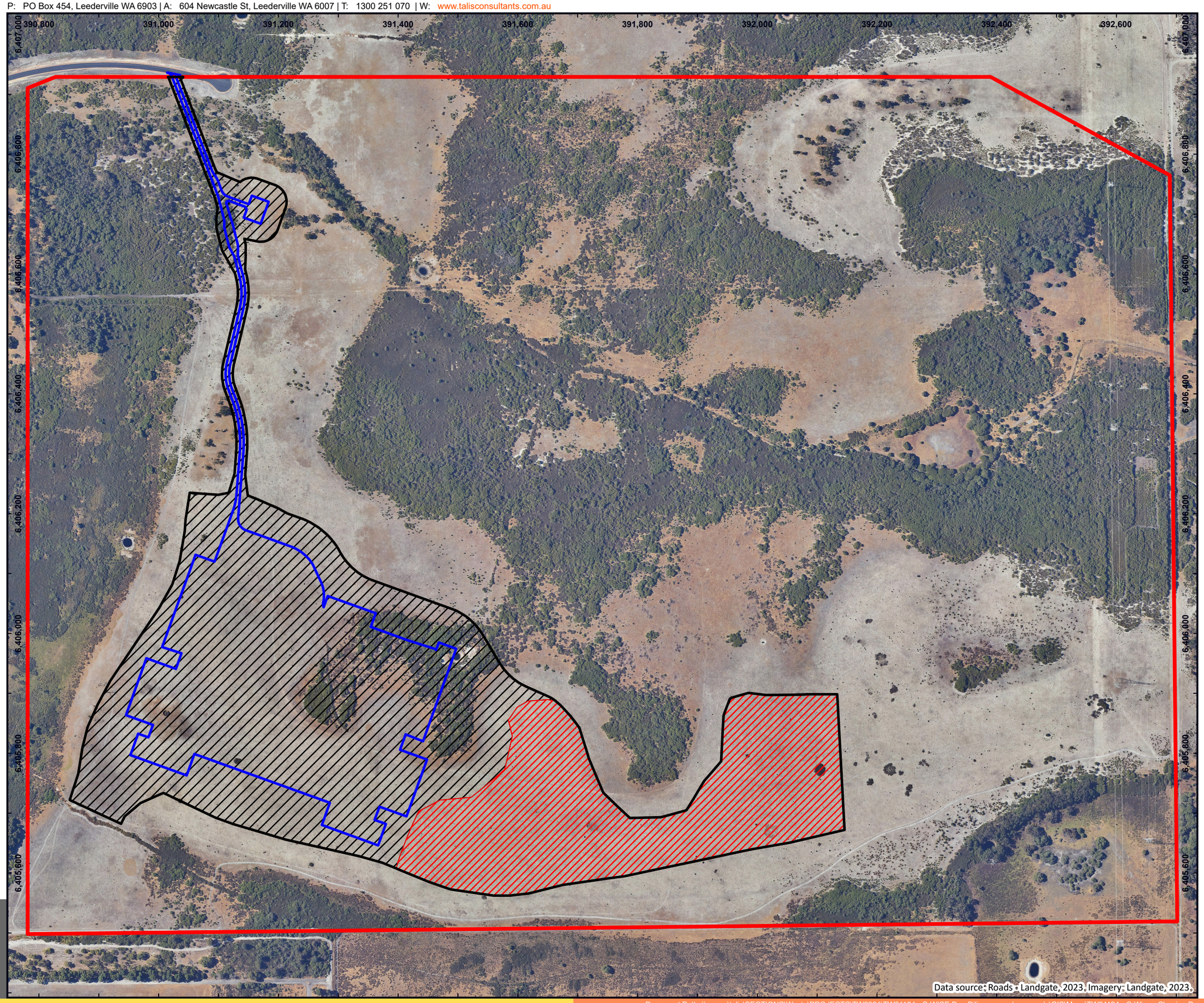
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	22/11/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 02

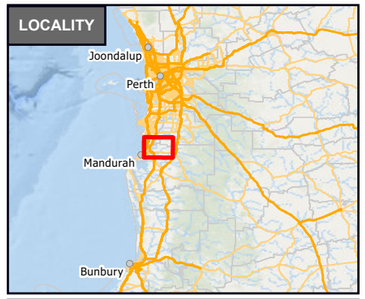
P: PO Box 454, Leederville WA 6903 | A: 604 Newcastle St, Leederville WA 6007 | T: 1300 251 070 | W: www.talisconsultants.com.au



LEGEND

- Site Boundary
- Development Envelope
- Development Footprint
- DF Buffer
- Excavation Area

LOCALITY



0 50 100 150 200 250 km

CLEARING AREAS

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

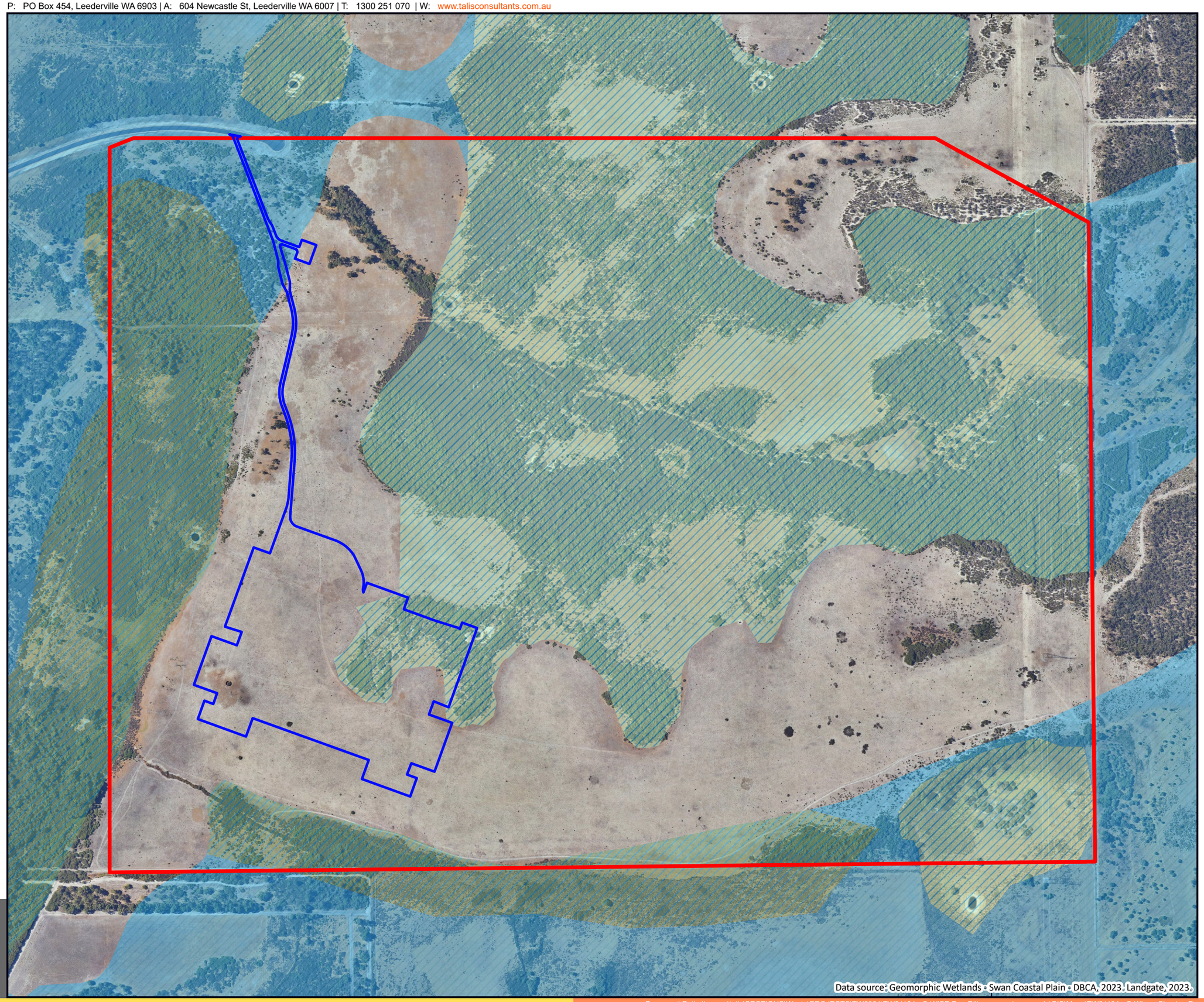
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	24/11/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 03

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



LEGEND

- Site Boundary
- Development Envelope

Geomorphic Wetlands - Swan Coastal Plain

- Conservation
- Multiple Use
- Resource Enhancement

LOCALITY

0 50 100 150 200 250 km

WETLANDS AND FLOOD MAPPING

C-Wise
320 Gull Road
Keralup WA 6182

N

0 100 200 300 m

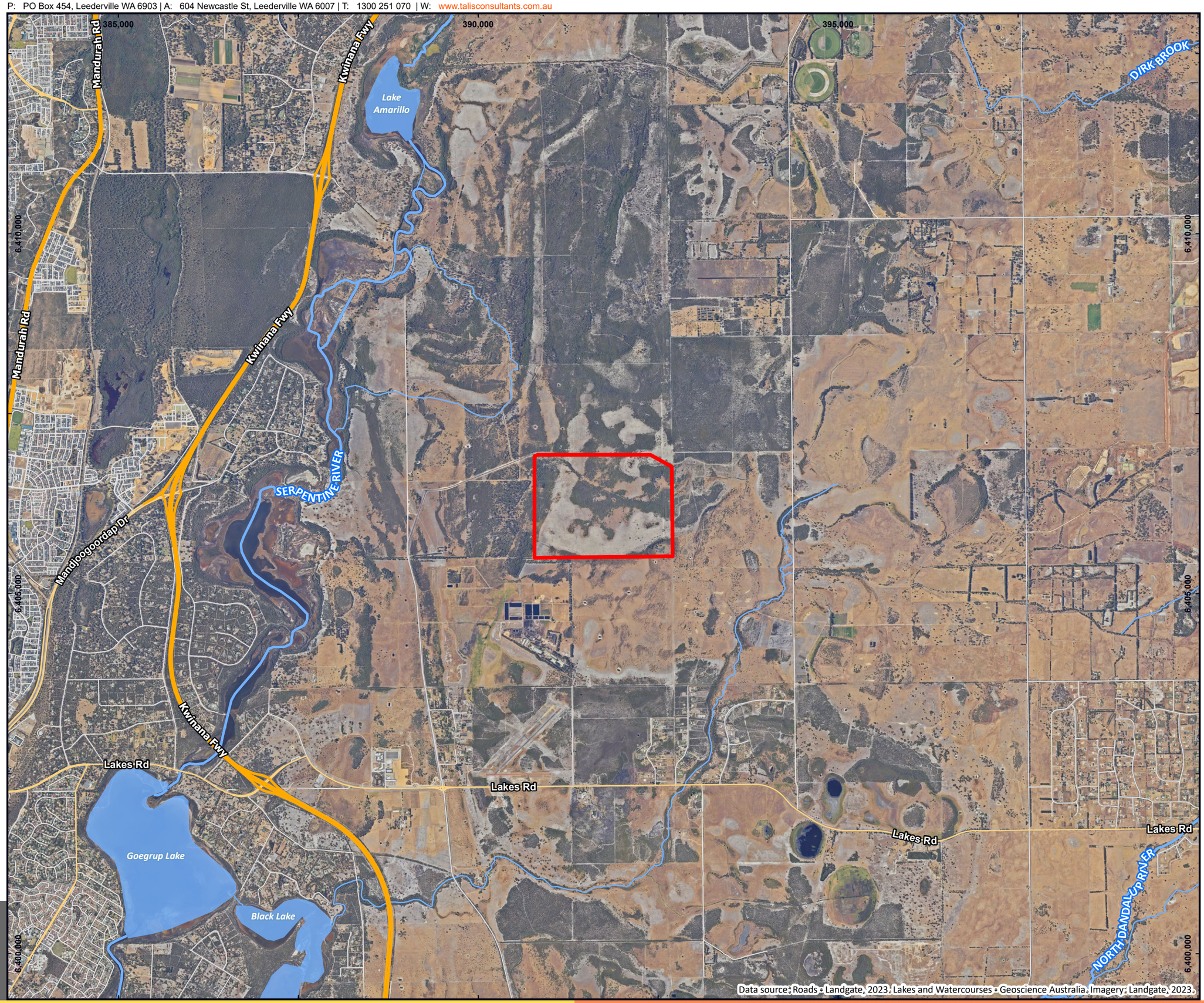
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:7,000

Prepared:	E Jackson	Date:	18/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 04

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 - Landgate, 2023. Lakes and Watercourses - Geoscience Australia. Imagery: Landgate, 2023.

LEGEND

- Site Boundary

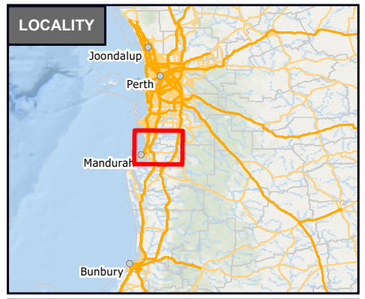
Hydrography

- Lakes
- Major Watercourse
- Minor Watercourse

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

WATERCOURSES

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

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

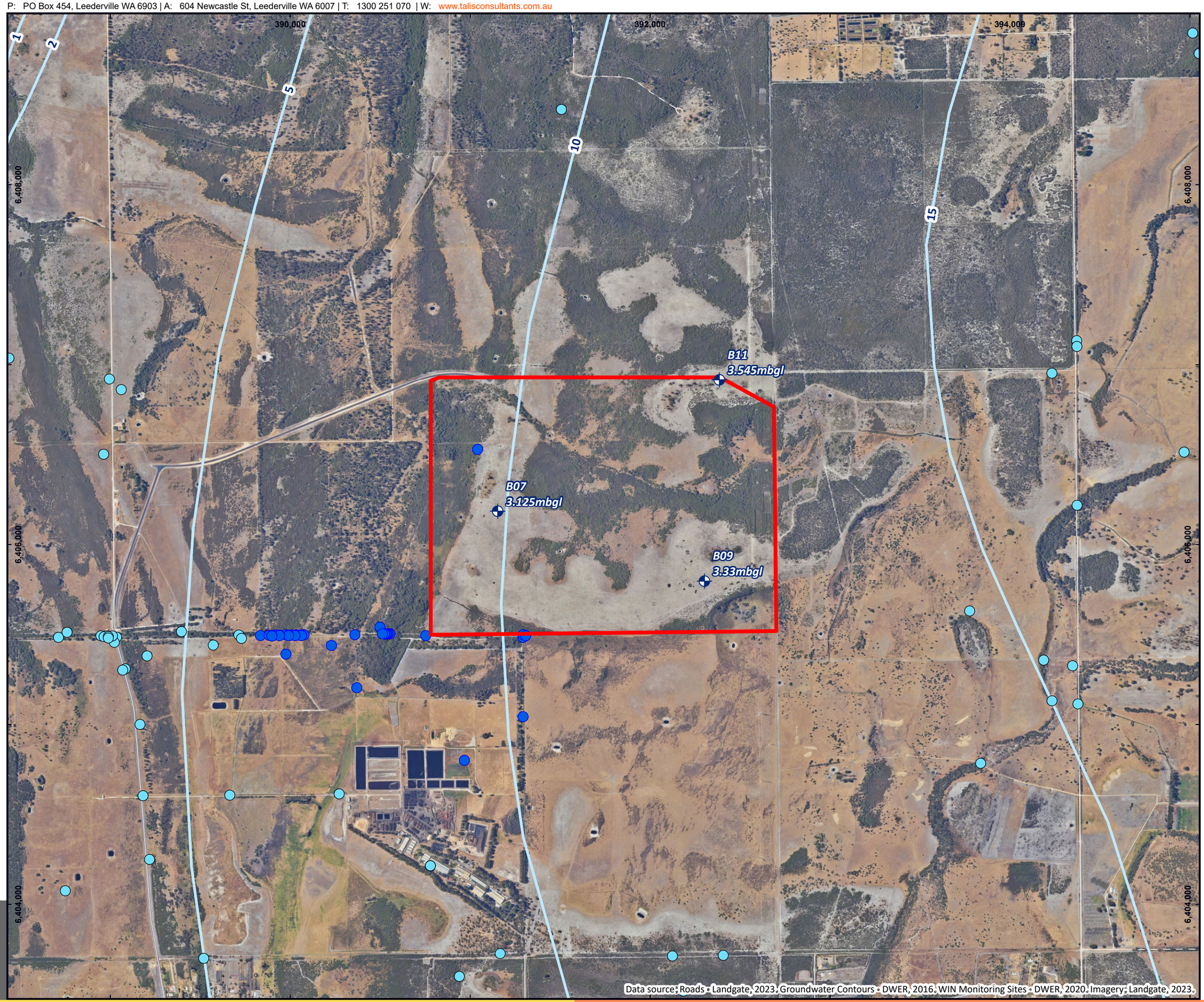
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	26/09/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 05

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

LEGEND

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

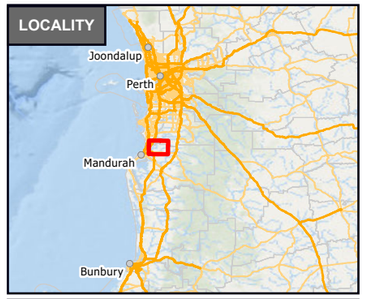
WIN Monitoring Sites

- 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

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

0 200 400 600 800 m

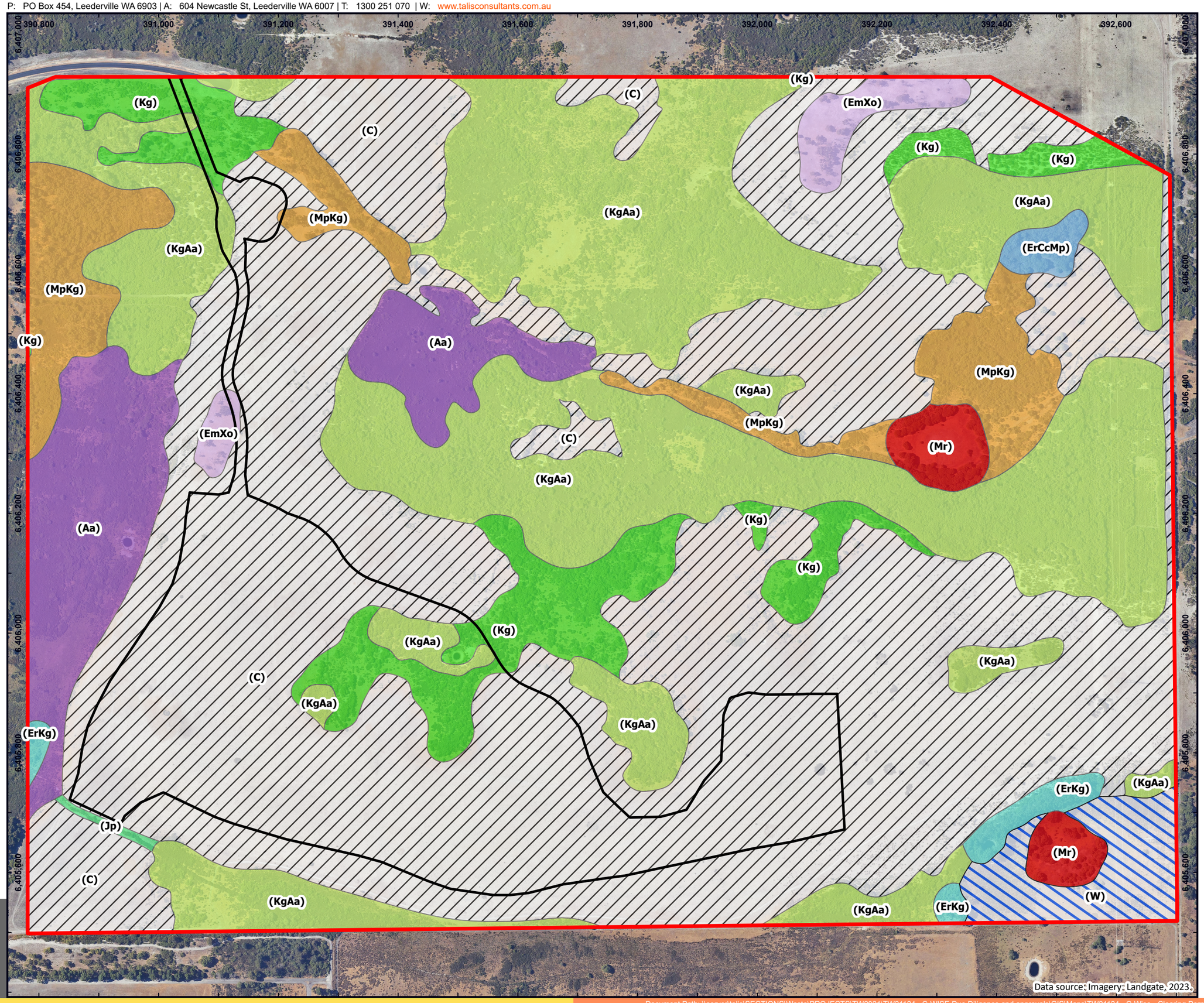
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:20,000

Prepared:	E Jackson	Date:	26/09/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 06

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: Imagery: Landgate, 2023.

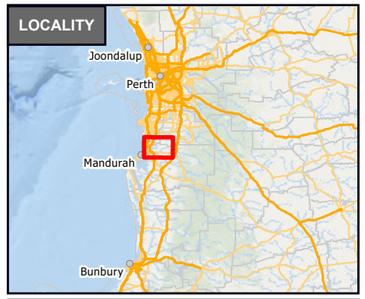
LEGEND

- Site Boundary
- Development Envelope

Vegetation Units

- (Aa): Astartea affinis Closed Heath
- (EmXo): Eucalyptus marginata Woodland over Xylomelum occidentale Low Open Woodland over Hibbertia hypericoides Low Shrubland
- (ErCcMp): Eucalyptus rudis/Corymbia calophylla Open Forest over Melaleuca preissiana Low Open Woodland over Astartea affinis Shrubland over Lepidosperma longitudinale
- (ErKg): Eucalyptus rudis Open Forest over Kunzea glabrescens Tall Shrubland over Astartea affinis Open Shrubland over Lepidosperma longitudinale Very Open Sedgeland
- (Jp): Juncus pallidus sedgeland
- (Kg): Kunzea glabrescens Scattered Shrubs
- (KgAa): Kunzea glabrescens Tall Open Scrub over Astartea affinis Open Heath
- (MpKg): Melaleuca preissiana Open to Low Open Forest over Kunzea glabrescens Tall Open Shrubland over Astartea affinis/ Regelia ciliata Open Heath over Lepidosperma longitudinale Sedgeland
- (Mr): Melaleuca rhaphiophylla Low Open Forest over Melaleuca teretifolia/Kunzea glabrescens Tall Shrubland over Juncus pallidus Open Sedgeland
- (C): Cleared
- (W): Water

LOCALITY



0 50 100 150 200 250 km

VEGETATION UNITS

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

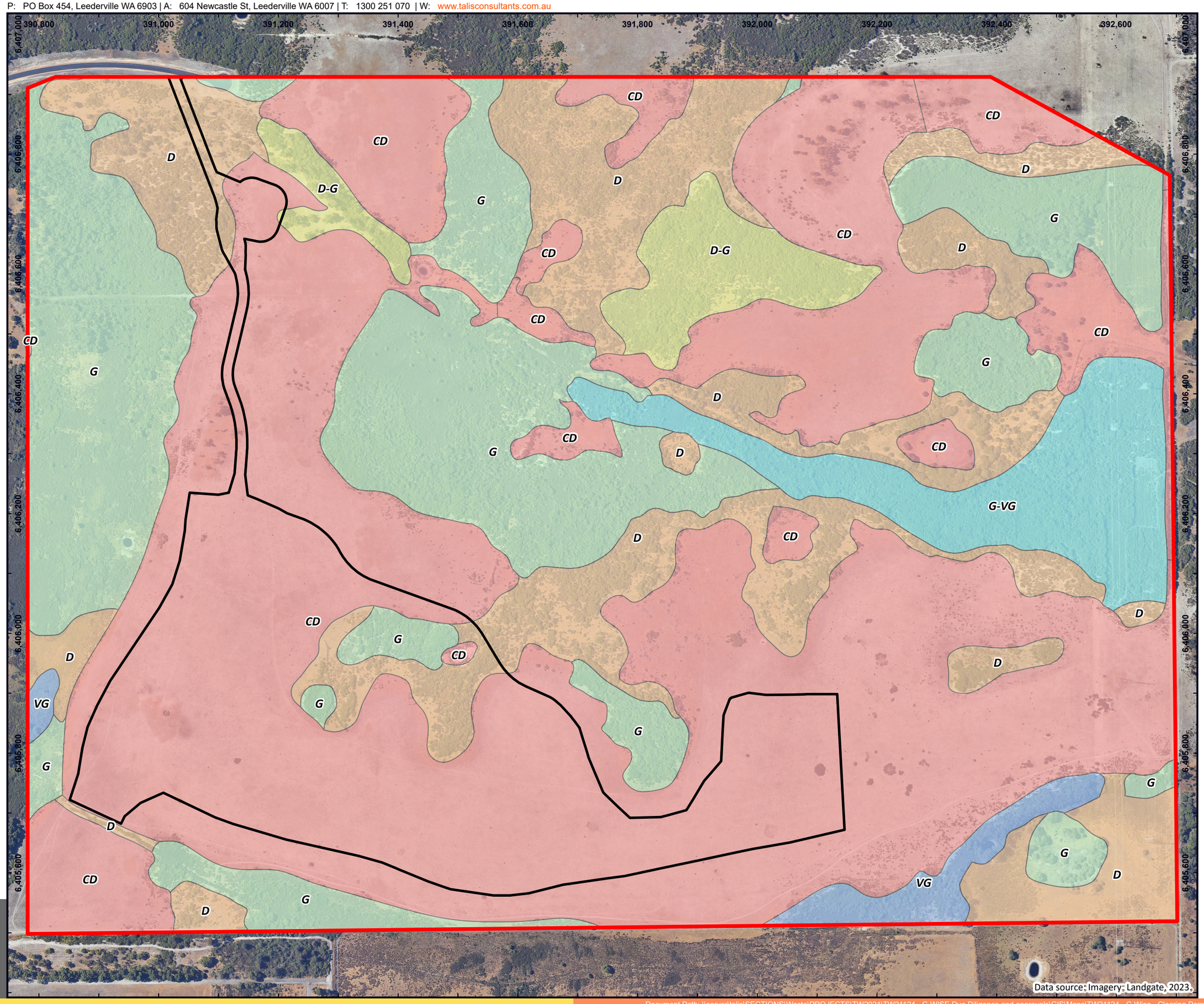
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	23/11/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 07

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



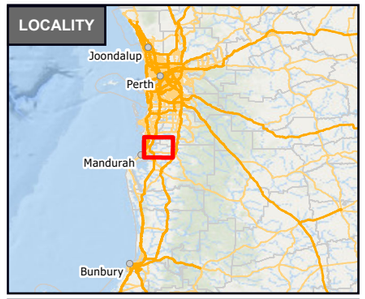
LEGEND

- Site Boundary
- Development Envelope

Vegetation Condition

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

LOCALITY



0 50 100 150 200 250 km

VEGETATION CONDITIONS

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

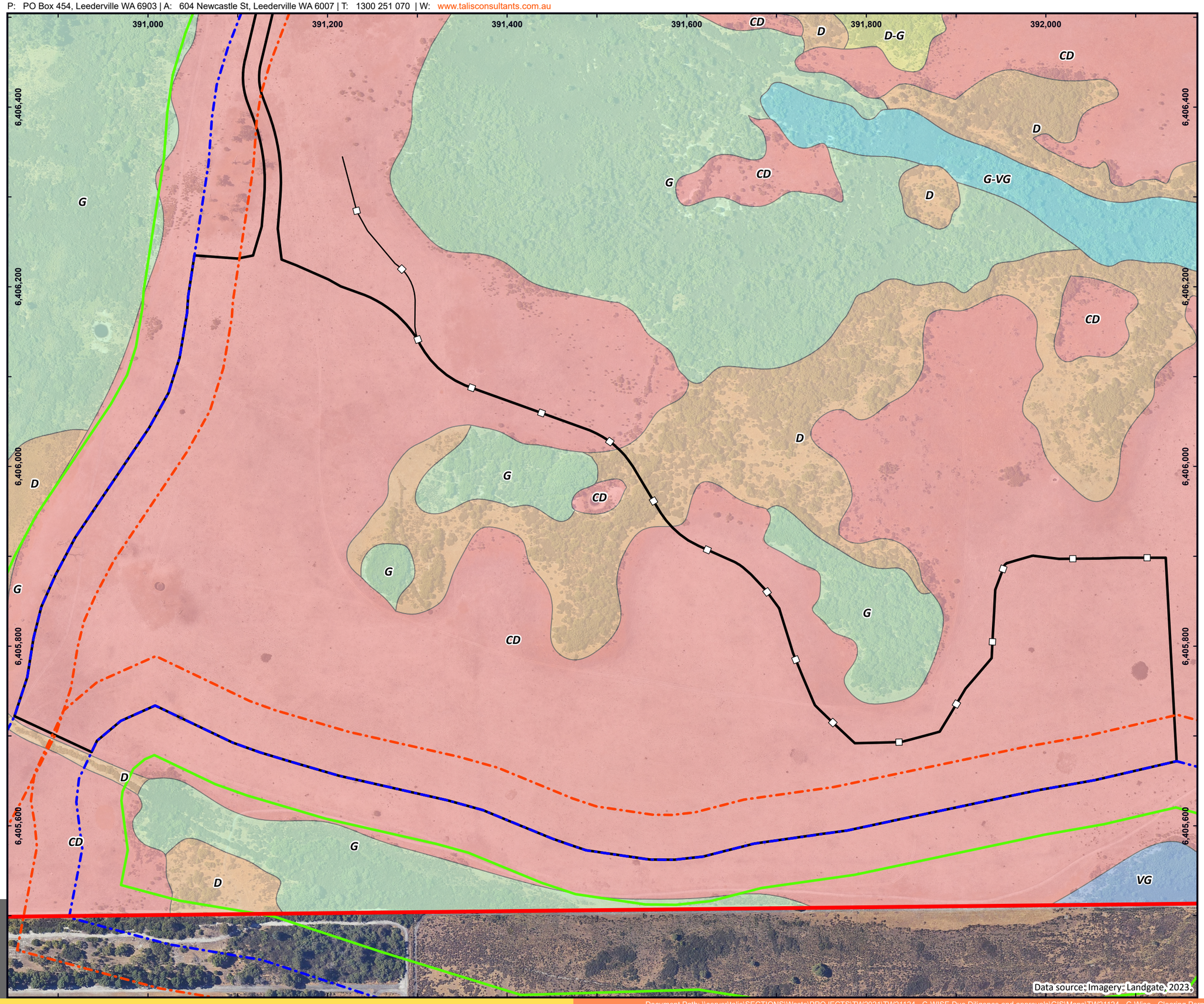
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	23/11/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 08

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



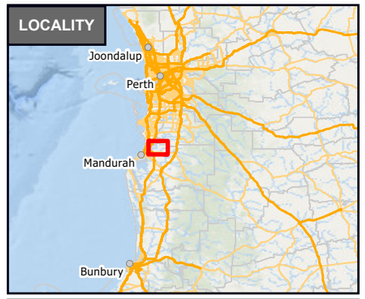
LEGEND

- Site Boundary
- Development Envelope
- Wetland Boundary
- Wetland 100m Fire Buffer
- Wetland 50m Buffer
- Fenceline

Vegetation Condition

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

LOCALITY



0 50 100 150 200 250 km

VEGETATION CONDITIONS & CLEARING AREAS

C-Wise
320 Gull Road
Keralup WA 6182

N

0 40 80 120 160 m

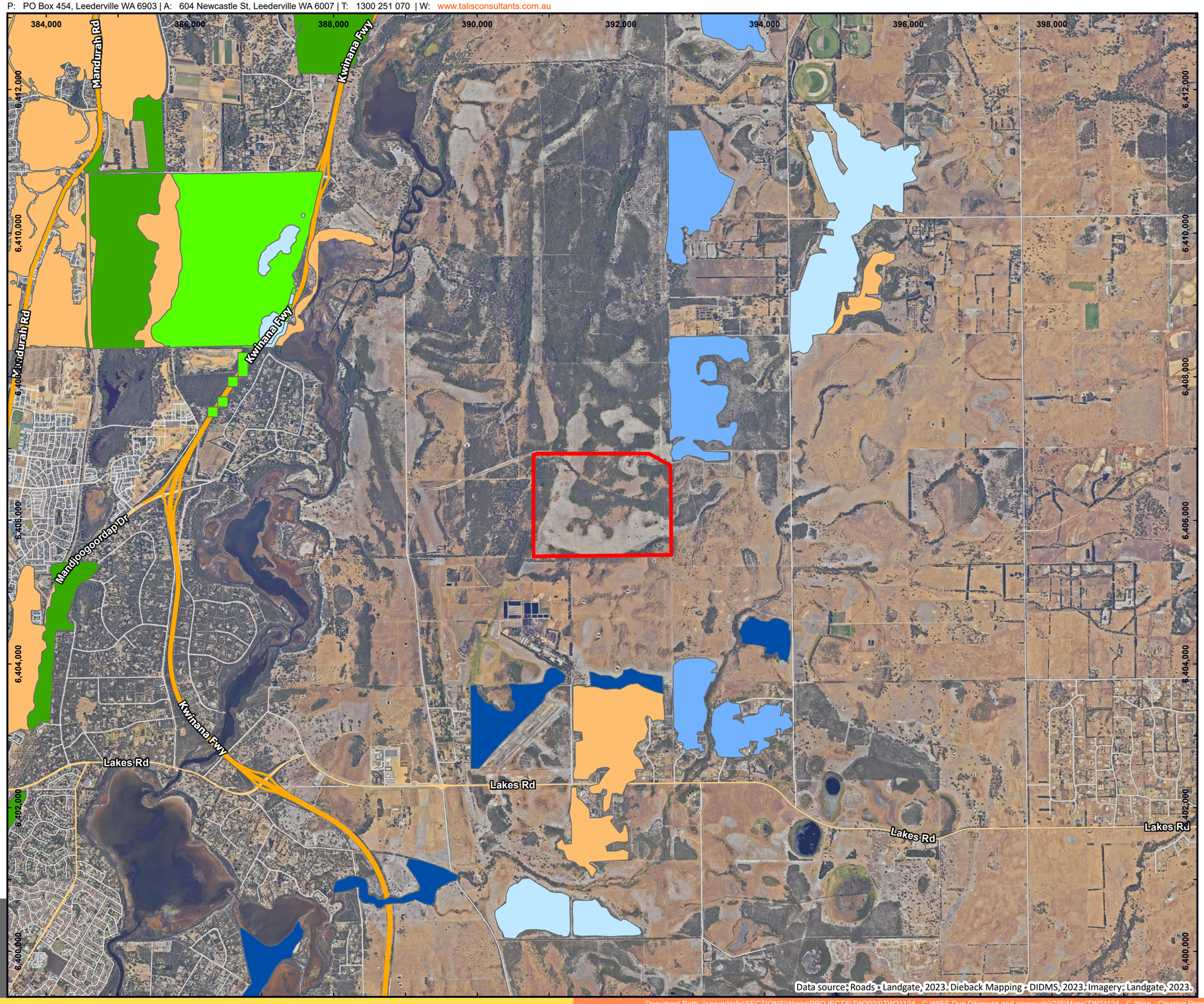
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:4,000

Prepared:	E Jackson	Date:	23/11/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 09

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 - Landgate, 2023. Dieback Mapping - DIDMS, 2023. Imagery: Landgate, 2023.

LEGEND

Site Boundary

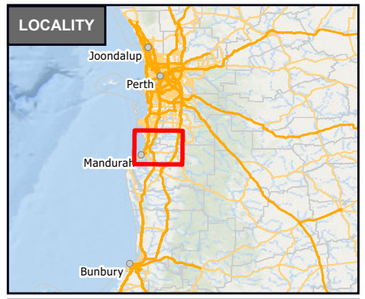
Dieback Confidence Mapping

- 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

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

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

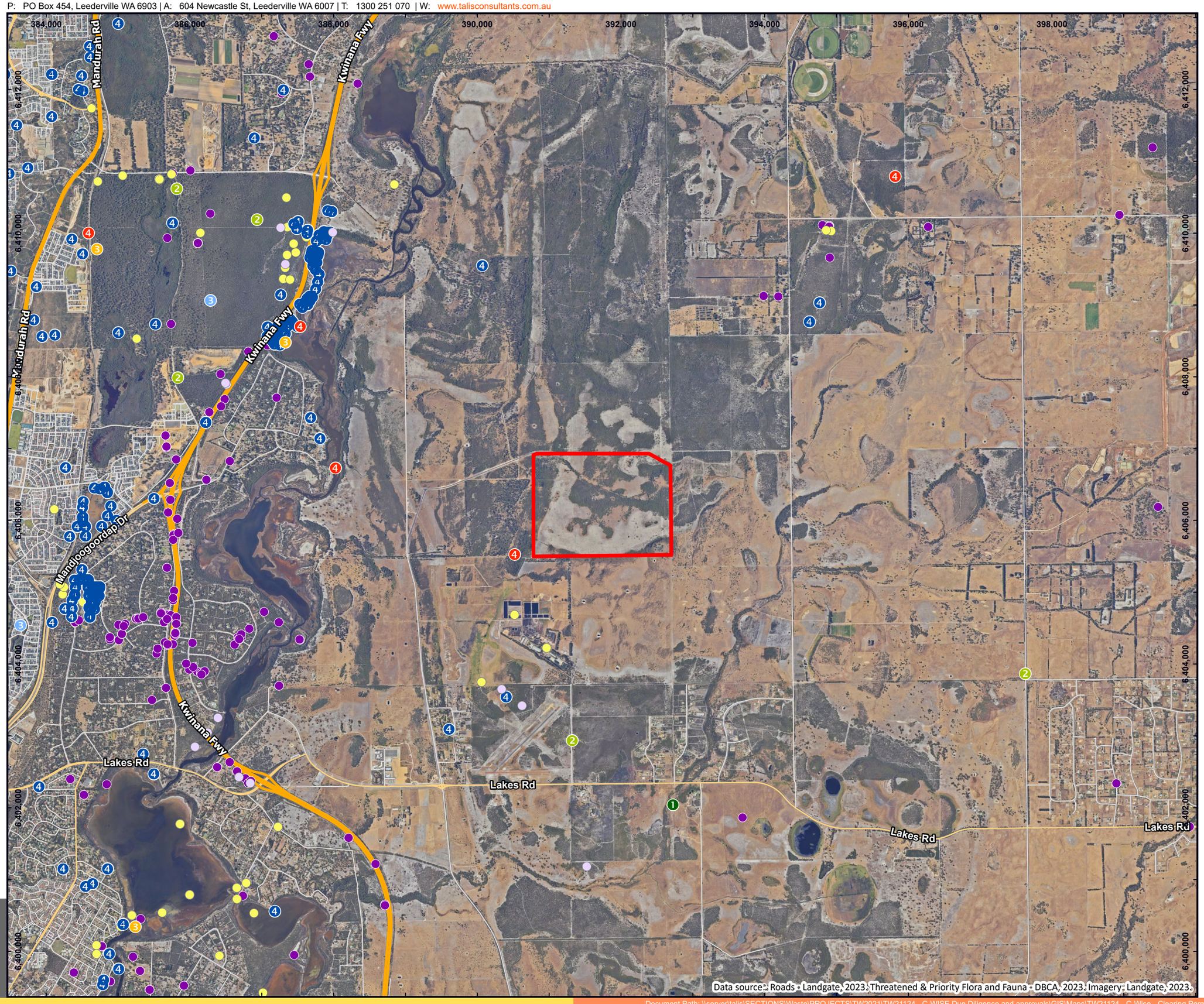
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	26/09/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 10

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 - 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

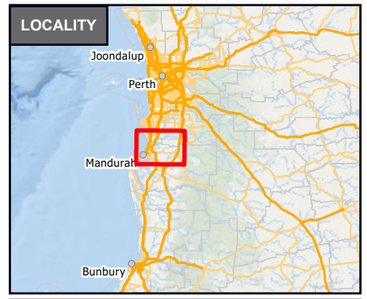
Threatened and Priority Fauna

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

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

THREATENED AND PRIORITY FLORA AND FAUNA

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

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

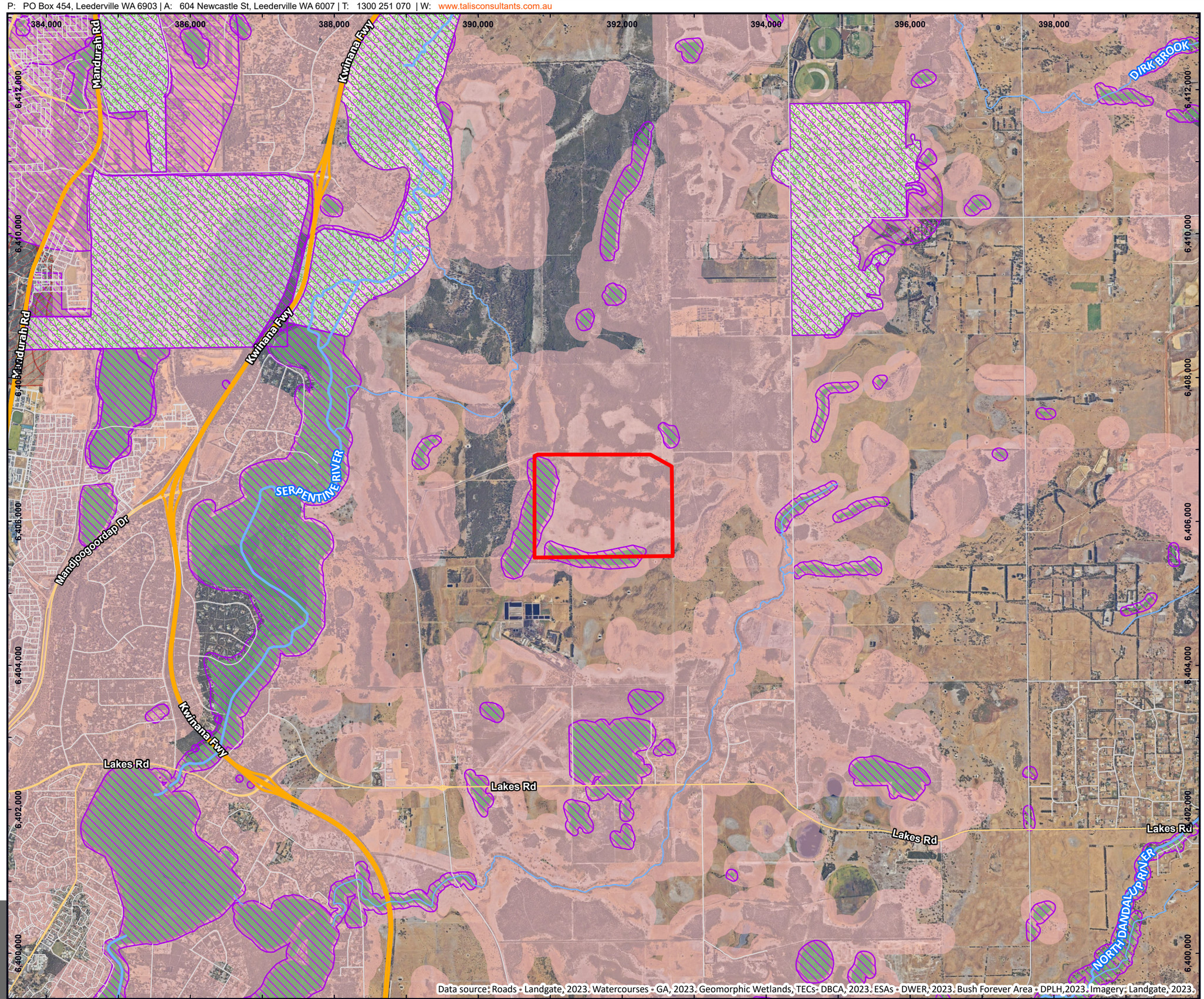
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	26/09/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 11

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 - 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

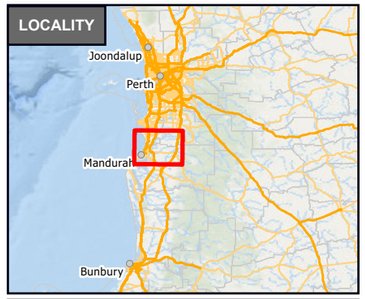
Threatened Ecological Communities

- Priority
- Threatened

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

THREATENED ECOLOGICAL COMMUNITIES & CONSERVATION RESERVES

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

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

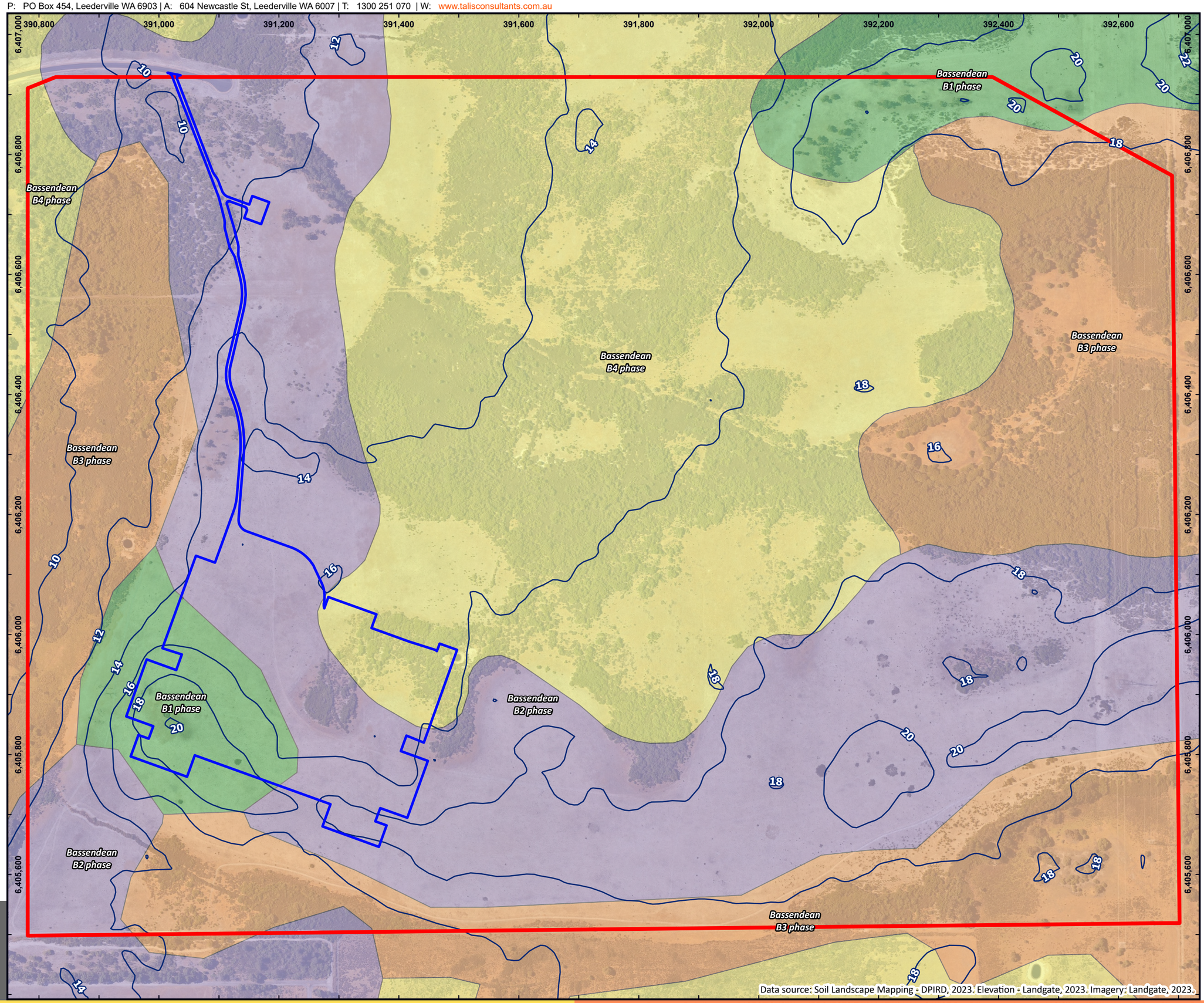
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	26/09/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 12

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

LEGEND

- Site Boundary
- Development Envelope
- 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

LOCALITY

0 50 100 150 200 250 km

TOPOLOGY & SOIL LANDSCAPE MAPPING

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

0 50 100 150 200 250 m

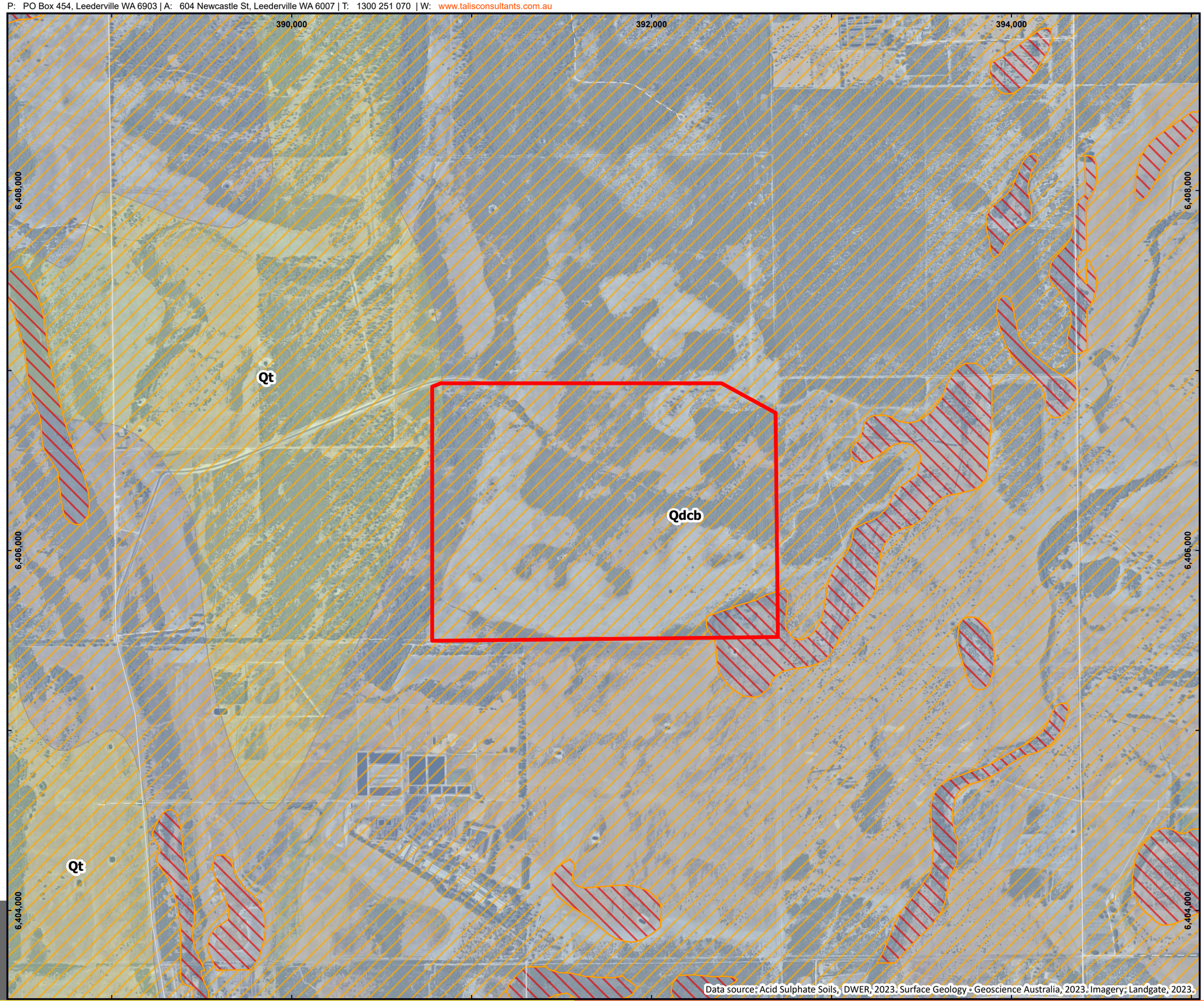
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:6,000

Prepared:	E Jackson	Date:	18/10/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 13

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: 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

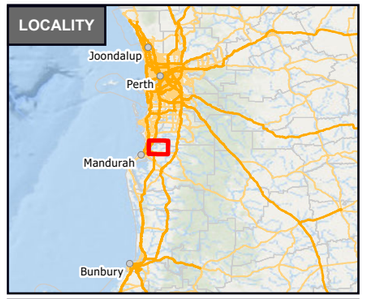
Qt: Lake and swamp deposits; mud, silt, evaporites, limestone; minor sand, peat

Western Australian Roads

Minor Road

Other

LOCALITY



0 50 100 150 200 250 km

SURFACE GEOLOGY & ACID SULPHATE SOILS

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

0 200 400 600 800 m

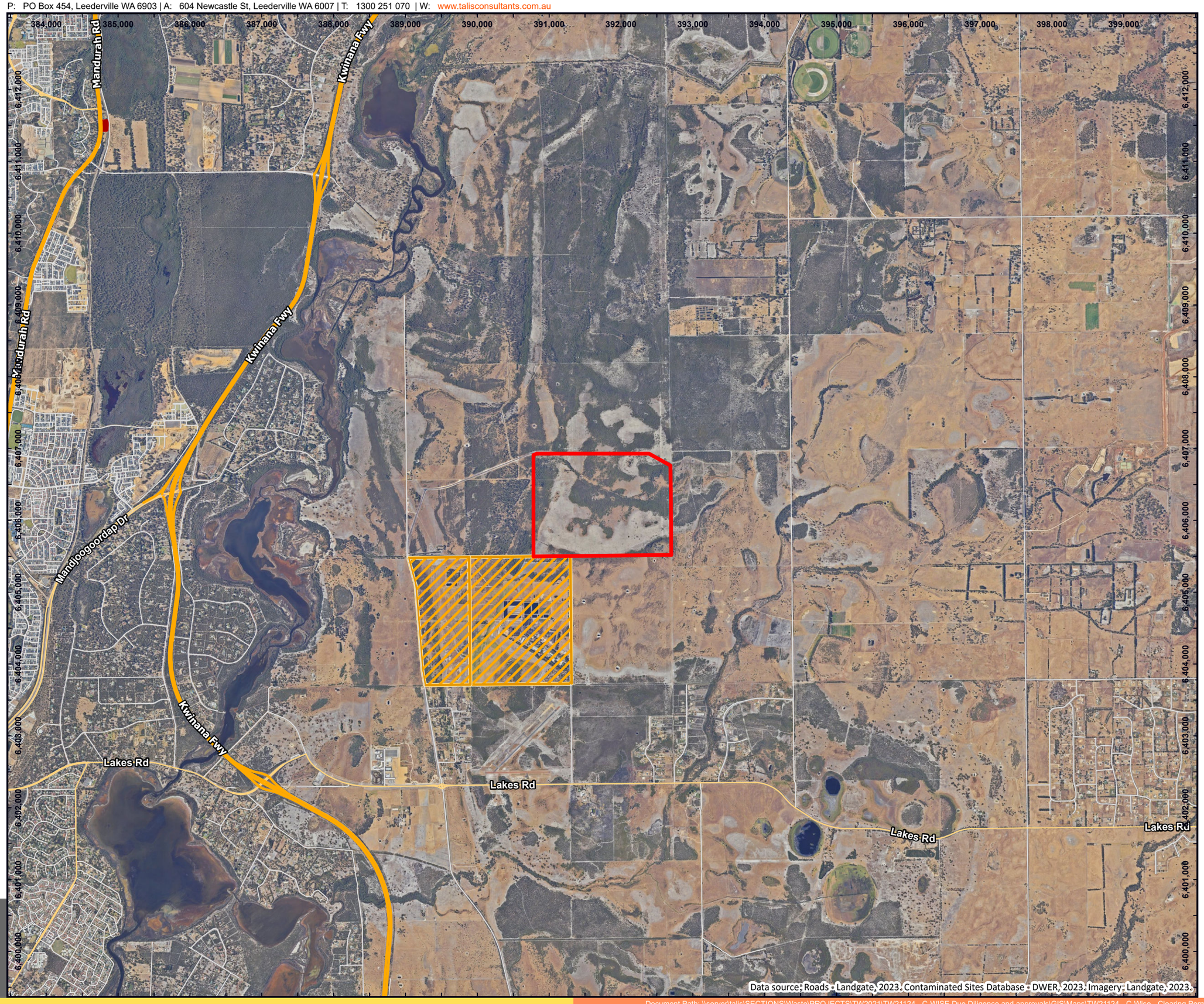
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:20,000

Prepared:	E Jackson	Date:	26/09/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 14

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 - Landgate, 2023. Contaminated Sites Database - DWER, 2023. Imagery: Landgate, 2023.

LEGEND

- Site Boundary

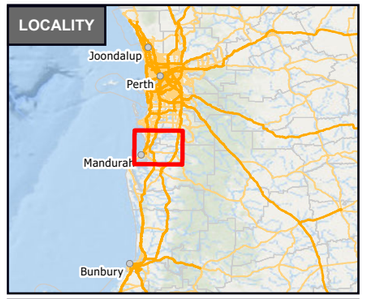
Contaminated Sites Database

- 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

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

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

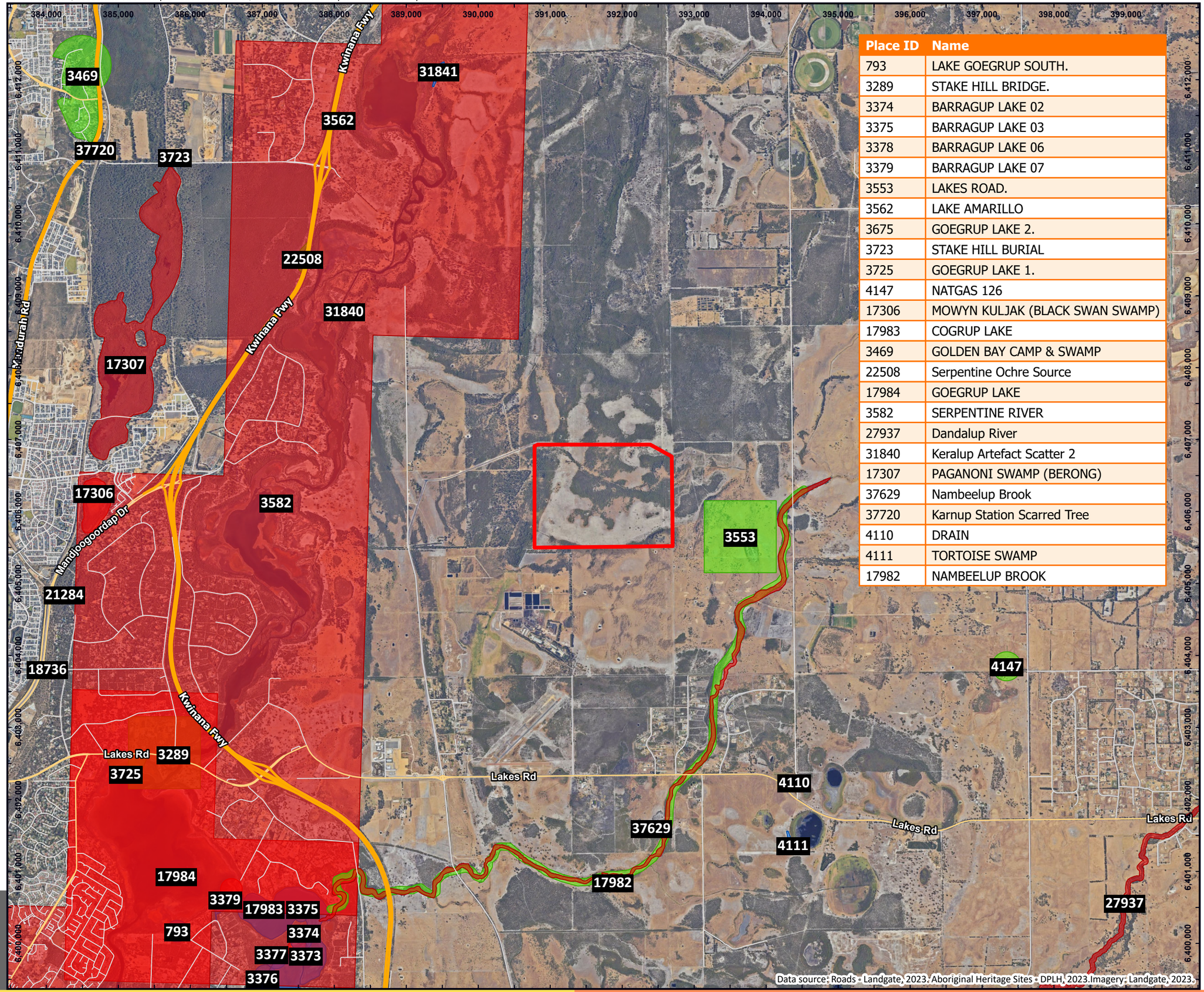
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	26/09/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 15

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



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

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

LEGEND

- Site Boundary

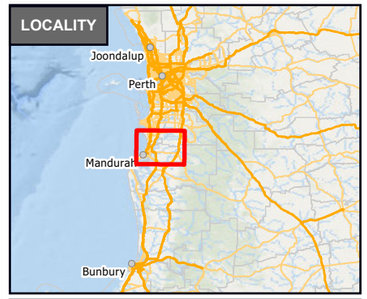
Aboriginal Heritage

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

Western Australian Roads

- Freeway / Highway
- Main Road
- Minor Road

LOCALITY



0 50 100 150 200 250 km

ABORIGINAL HERITAGE

Clearing Permit Application

C-Wise
320 Gull Road
Keralup WA 6182

N

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

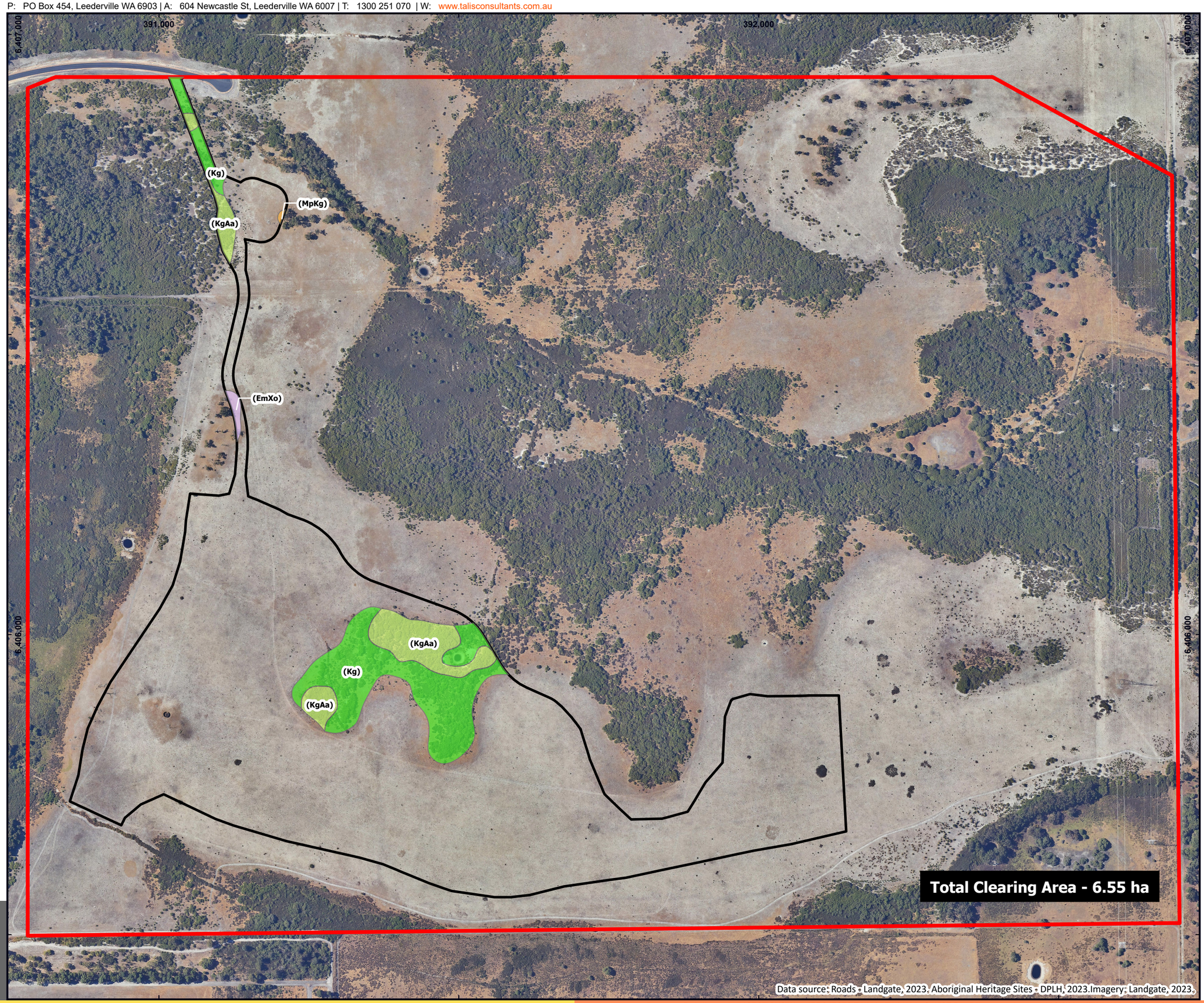
Coordinate System: GDA2020 MGA Zone 50
Scale @ A3: 1:50,000

Prepared:	E Jackson	Date:	26/09/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 16

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



LEGEND

Site Boundary

Development Envelope

Vegetation Units to be Cleared

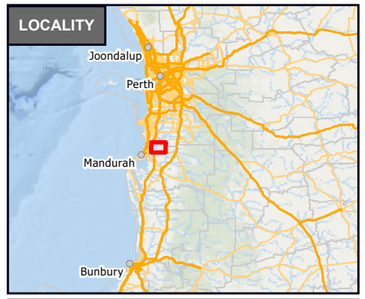
(EmXo): Eucalyptus marginata Woodland over Xylomelum occidentale Low Open Woodland over Hibbertia hypericoides Low Shrubland

(Kg): Kunzea glabrescens Scattered Shrubs

(KgAa): Kunzea glabrescens Tall Open Scrub over Astartea affinis Open Heath

(MpKg): Melaleuca preissiana Open to Low Open Forest over Kunzea glabrescens Tall Open Shrubland over Astartea affinis/Regelia ciliata Open Heath over Lepidosperma longitudinale Sedgeland

LOCALITY



0 50 100 150 200 250 km

CLEARING AREA

Clearing Permit Application

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:	24/11/2023
Reviewed:	T Hunter	Revision:	A
Project:	TW21124		

talis consultants

Figure 16

8 References

Coffey Environments, 2009. *Stage 1 of the Preliminary Acid Sulfate Soils Investigation – Keralup*. Report prepared for Department of Housing, Perth, Western Australia.

Coterra Environment, 2021, *Baseline Environmental Report, Keralup Landholding – Site 4*. Report prepared for Department of Communities, East Perth, Western Australia.

Department of Water and Environmental Regulation, 2015, *Treatment and Management of Soil and Water an Acid Sulfate Soil Landscapes*. Retrieved from: https://www.wa.gov.au/system/files/2023-04/Treatment-and-management-of-soil-and-water-in-acid-ss-landscapes.pdf.

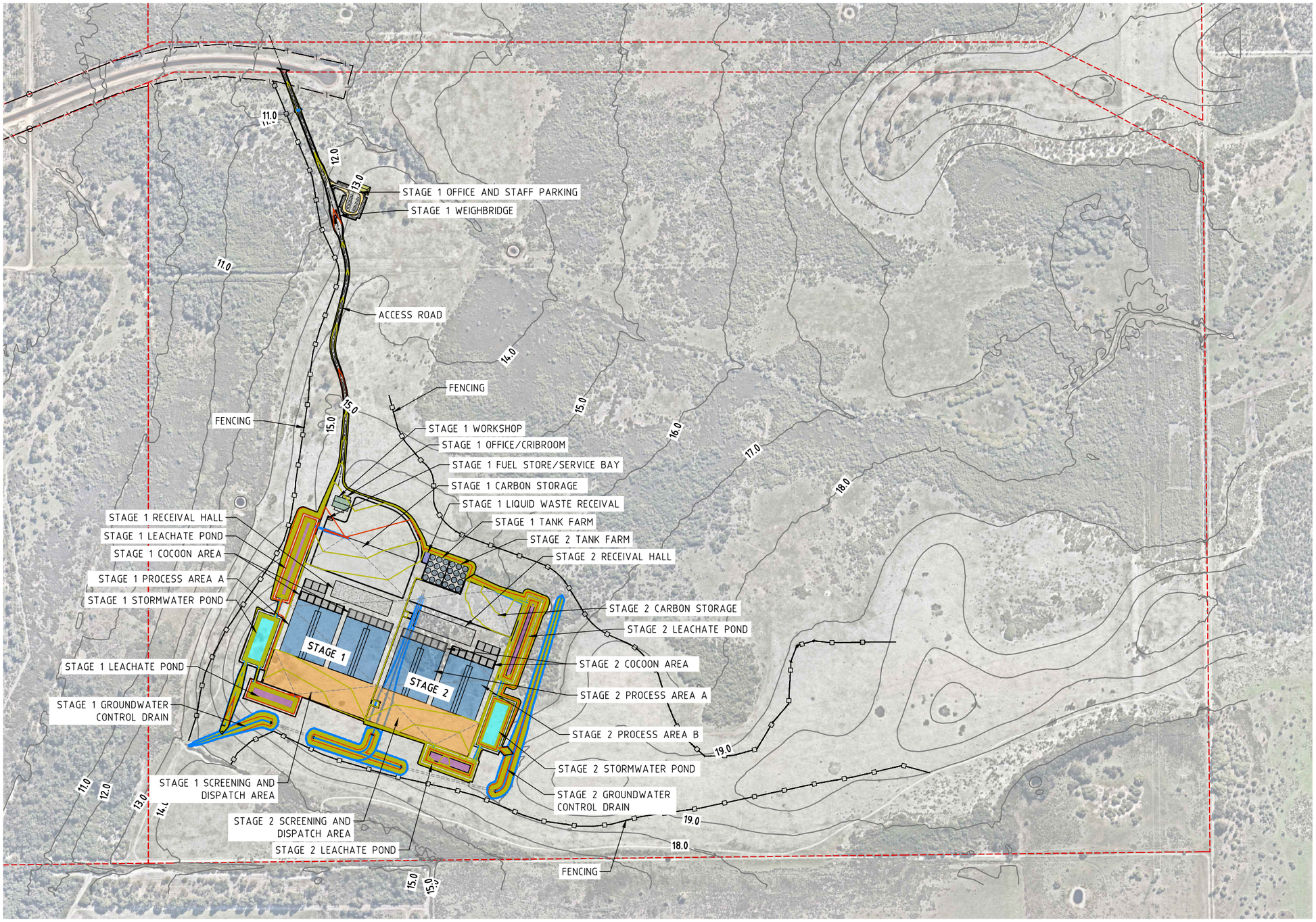
Department of Water and Environmental Regulation, 2022, *Better Practice Organics Recycling Guideline*. Retrieved from: https://www.wa.gov.au/system/files/2022-11/Guideline-Better-practice-organics-recycling.pdf

PGV Environmental, 2021, *Lot 9500 Gull Road Keralup – Flora, Vegetation and Fauna Survey*. Report prepared for Development WA and the Peel Development Commission.

Western Australian Planning Commission, 2005, *Draft Guideline for the Determination of Wetland Buffer Requirements*. Retrieved from: https://www.wa.gov.au/system/files/2021-07/DRAFT_GD_determination_wetland_buffer_requirements.pdf.

Western Environmental, 2021, *320 Gull Road, Keralup – Baseline Environmental Report*. Report prepared for Coterra Environment, West Perth, Western Australia.

APPENDIX A
Drawings



LEGEND:

- LEASE BOUNDARY
- ACCESS ROAD
- LEACHATE POND
- RECEPTION/OFFICES
- WORKSHOP
- STORMWATER POND
- SCREENING/DISPATCH
- LIQUID WASTE RECEIVAL
- FUEL STORE/SERVICE BAY
- TANK FARM
- RECEIVAL HALL
- COCOON AREA
- CARBON STORAGE
- OPEN DRAIN
- EXISTING FENCING
- FENCING

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

150m 0m 150m 300m

1:7500 @ A3

VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM
HORIZONTAL DATUM: MGA 94 ZONE 50

talis consultants
www.talisconsultants.com.au
T: 1300 251 070
ASSET
ENGINEERING
ENVIRONMENT
NOISE
SPATIAL
WASTE
PERTH
604 Newcastle Street Leederville WA 6007
PO Box 454 Leederville WA 6903

Client: C·WISE™ Soil Carbon Solutions

NOTES

1. This drawing is the property of Talis Consultants Pty Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. DO NOT SCALE, use figured dimensions only, if in doubt please contact Talis Consultants.
3. Parts of this drawing is intended to be IN COLOUR. Black & White Printing may cause errors or omissions. If this text is not GREEN, please contact Talis Consultants

No.	Date	Drwn.	Chk.	Amendment / Issue	App.
G	23.11.2023	YJ	AB	ACCESS ROAD DESIGN	MH
F	26.09.2023	YJ	AB	EARTH WORK VOLUME UPDATED	MH
E	10.07.2023	JS	AB	SITE LAYOUT UPDATED	MH
D	16.01.2023	MM	AB	SITE LAYOUT UPDATED	MH
C	15.11.2022	AB	MH	BOUNDARIES UPDATED	MH
B	03.02.2022	YJ	AB	SECTIONS AND ISOPACHYTE LAYOUT ADDED	MH
A	15.11.2021	YJ	AB	PRELIMINARY ISSUE	MH

Project: C-WISE DUE DILIGENCE AND APPROVALS

Title: GENERAL ARRANGEMENT

Scale: 1:7500 @ A3 | Date: 02.03.2022
Drawn: YJ | Checked: AB | Approved: MH
Job No: TW21124 | Drg. No: C-100 | Rev: G
Filename: TW21124-SET.DWG

APPENDIX B

East Keralup Wetland Evaluations

East Keralup Wetland Evaluations
Justification for Manual Evaluation to Draft WESCP-V2

16/04/2021 By DBCA Wetlands Section Fiona Felton and Michael Coote

The Draft WESCP dataset was created by applying a spatial multi criteria evaluation (MCE) model to attribute a number value to wetland polygons using an aggregation of known mapped environmental values. The range of these values was then analysed to attribute wetlands in number ranges to the wetland evaluation categories; Conservation (CCW), Resource Enhancement/Requires Evaluation (REW) and Multiple Use (MUW). The dataset has been developed iteratively, with the latest iteration used in this investigation being draft WESCP-V2.

Due to the varied and intensive past land uses at the East Keralup site, the area has required considerable survey and desktop validation to ensure that the wetland evaluations accurately reflect values on the ground. For this purpose, site visits were conducted to:

- establish general trends of vegetation condition and cover and
- establish points of reference and visual patterns on aerial photography.

Information collected from the field surveys was combined with the focused vision mapping and other available data. The intent of this investigation was to broadly correct obvious errors in attribution of the value mapping. Note, that the entire area has not been ground-truthed and further site visits may be required.

As a result of investigations, manual evaluations have been applied to the East Keralup portion of the dataset. The following two tables outline the justification for manual evaluation which resulted in amendments to version 2 of the dataset (i.e., Draft WESCP-V2).

- The first table documents the reasons for amendments to the dataset post WESCP-V2.
- The second is manual evaluations attributed prior to WESCPV2 which resulted in amendment to WESCP-V2.

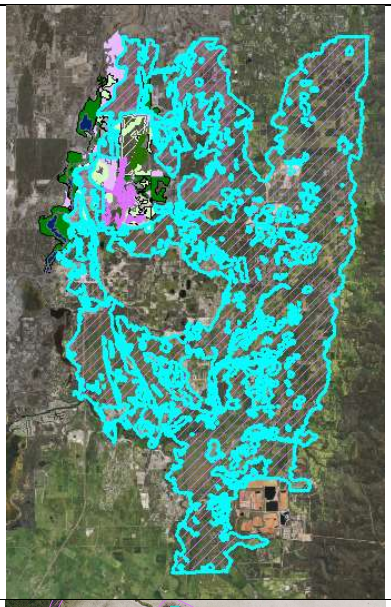
Large portion of East Keralup have been historically cleared and/or used as a blue gum plantation. In many areas native vegetation has regenerated creating a 70-100% cover of native vegetation, but with very low species diversity, often with large monocultures of *Astartea affinis* or *Kunzea glabrescens*. Although these areas retained some patches of/wilding Blue gums, weed burden is otherwise very low. Further investigation as to the value of these low diversity patches may be required to determine the appropriate wetland evaluation category for some areas.

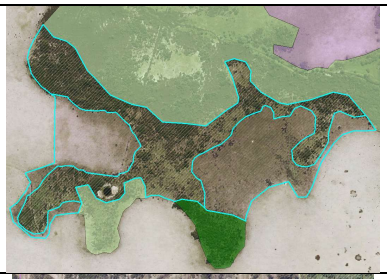
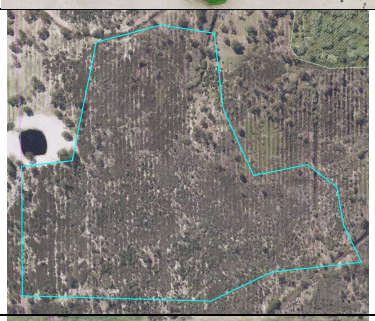
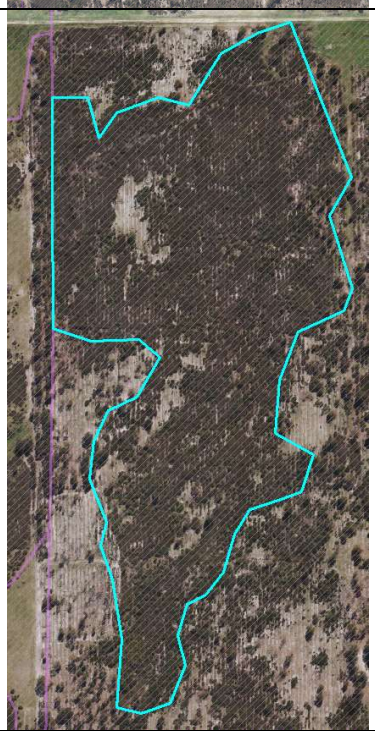
Note - Some discrepancies were noted between historic Focused Vision mapping and observed conditions. It appears that this is due to ongoing natural regeneration and the difficulty in evaluating condition in areas of low species diversity.

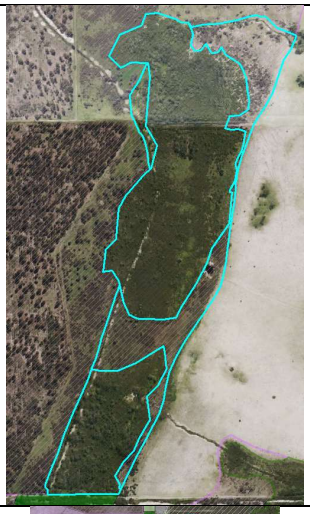
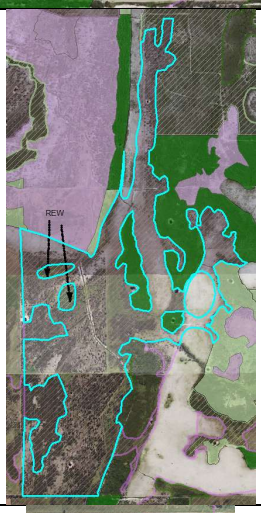
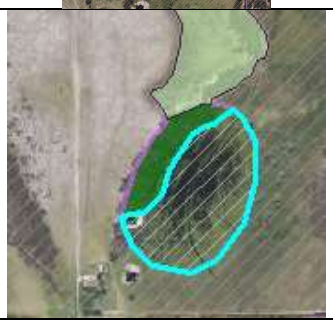
The following codes are used in the tables below:

- UID = Unique Identification Number
- MCE= Multi-Criteria Evaluation – it is the score attributed to the polygon but the model
- CCW= Conservation Category Wetland, REW = Requires evaluation/Resource Enhancement Wetland MUW= Multiple Use Wetland
- FV = Focused Vision Mapping,
- VG = Very Good, G= Good, D=Degraded, CD = Completely Degraded,
- NVL = DPIRD Native Vegetation Layer.

Table 1 – Amendment to draft WESCP dataset post WESCP-V2.

UID	V2 Eval (MCE)	Screen Shot of dataset – Note highlighted boundary = target UID (note scale varies significantly between sites)	Reasoning	Final Evaluation categories/changes
3905_7141	MUW		Very large palusplain wetlands. Small areas of better-quality wetland identified in the FV mapping and field visit. Some minor boundary changes increasing and decreasing the boundary.	MUW – Minor boundary changes adjacent to other UID
3905_7333	REW (ME from CCW in V1.3 – 0.490822)		Manually evaluated in V 1.3 to REW. Partial FV mapping G-VG. Field visit agreed G-VG from N boundary. Boundary modified to include vegetation observed in the field. Reverted to CCW considering G-VG and that rest of imagery for the UID appears similar.	CCW – with minor boundary changes
3905_7336	REW (ME from CCW in V1.3 – 0.592696)		Manually evaluated in V 1.3 to REW UID Mostly covered by FV mapping. The majority of the UID showed variable land use history – FV mapping was Native regrowth, Plantation with NR, Plantation and Native Remnant. The majority of the very low diversity with parches of better vegetation but with very no to nil weeds. Changed to REW. A portion along the south east was not mapped with FV mapping. The Dec 2020 field trip found it was in very good to excellent condition which was obviously better condition than the rest of the UID. This area was divided off the UID, generally along the FV mapping line, reverted to CCW. Quenda and quenda activity noted in the on near	REW & CCW

			the track running NW-SE thorough the wetland.	
3905_7345	REW (ME from CCW in V1.3 – 0.574512		Manual Evaluation V1.3 to REW Variable condition. FV mapping plantation with native regrowth, cleared and native remnant. Field visit shows some areas have significant introduced over storey with little to no understorey. Area mapped as native remnant and areas visited that had better condition regrowth have been separated from the UID and retained the evaluation of REW (3 portions) The remainder was ME as MUW (1 portion central)	REW and MUW
3905_7359	REW (0.363789)		FV mapping D to CD. Aerial imagery and site visit indicate variable condition with clear potions on either side. Separated into 3 portions, Cleared areas have been removed from the polygon and assigned MUW, remainder to stay REW.	MUW and REW
3905_7365	REW (ME from CCW in V1.3 – 0.5875)		Higher value was derived from the Native veg mapping layer i.e., Habitat, habitat buffer, veg com and surrounding bushland viability. No evidence for these values appears ex-plantation in poor condition Therefore changed to MUW.	MUW
3905_7366	CCW (0.585683)		FV mapping Native regrowth and plantation with native regrowth.	REW

3905_7367	REW (ME from CCW V1.3 – 0.542907)		FV mapping G, VG and degraded. The G and better section at south and north were separated and attributed CCW. The rest D and CD changed to MUW. There were some boundary changes into the adjoining UID 3905_7368.	CCW and MUW
3905_7368	REW (0.410831		Part of a large UID. some boundary changes. Justified in UID 3905_7368. Also 2 areas of likely melaleuca overstorey identified from aerial imagery. Separated as REW	MUW and REW
3905_7376			Field visit confirmed monoculture interspersed with clearing. Changed to MUW	MUW
6079_7401	MUW (0.033883)		Seasonal open water connected to vegetation buffer probably under mapped habitat. Some altered hydrology (drain)and largely cleared. ME to REW	REW

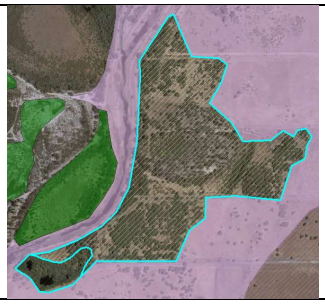
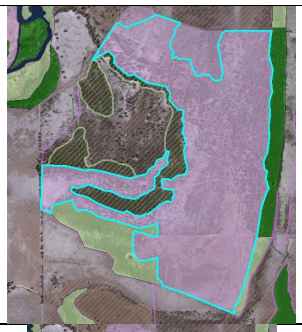
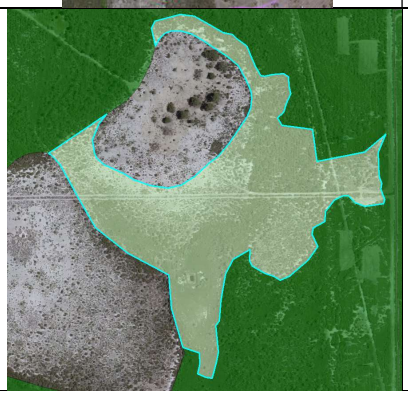
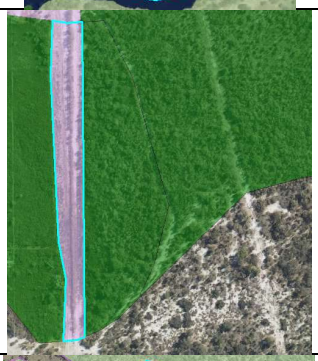
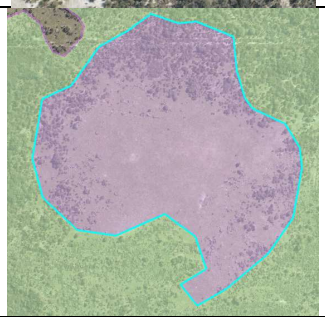
3474_7491	REW (ME to maintain REW V1.3 0.463207)		Vegetation cover is variable REW, Sumpland at south confirmed with lidar - basin. Separated sumpland at southern end based on lidar CCW	REW and CCW

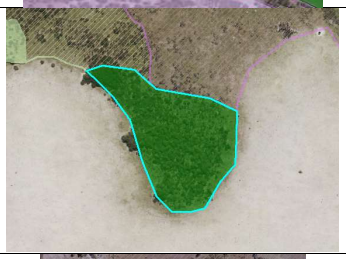
Table 2 – Manual evaluations attributed prior to WESCPV2 resulting in amendment to WESCPV2.

(in order the following order - from CCW, From REW from MUW)

UID	From	Screen Shot of dataset – Note highlighted boundary = target UID	Reasoning	Manual Evaluation To
3905_7347	CCW		FV mapped as plantation and Plantation with native regrowth	MUW
3905_7343	CCW		FV Plantation with Native Regrowth	MUW
3905_7351	CCW		FV Cleared and Native Regrowth mainly D condition	MUW
3905_7339	CCW		FV – mostly plantation	MUW

3905_7337	CCW		FV - mapped as plantation	MUW
3474_7463	CCW		Variable condition	REW
1270_7341	CCW		No FV mapping, was divided off prior to V2. No FV mapping, looks in poorer condition the original southern portion. NVL regrowth above 20%. Field visit confirmed younger regrowth with lower diversity (looking from the southern end)	REW
3905_7338	CCW		FV mapping mainly plantation. Imagery appears to be more variable vegetation.	REW
3905_7335	CCW		No FV mapping Historic imagery = previous plantation NVL = 20% Regrowth. Condition looks variable.	REW
3905_7352	CCW		Manually evaluated in V 1.3 to REW. FV - D and D-CD, Half the area is also mapped in the plantation, the section marked as cleared in this area now appears to have cover. The remainder is Plantation with native regrowth. The southern portion of this polygon appears to be in better condition.	REW

3905_7340	REW		FV mapping mostly plantation. Aerial imagery shows poorer condition. Field visit showed poor native cover at western extent.	MUW
3905_7344	REW		FV Plantation with Native Regrowth	MUW
3474_7409	REW		Mostly Cleared	MUW
6082_7369	REW		Mostly cleared track.	MUW
3905_7361	REW		FV D-CD Mostly cleared	MUW

3905_7470	REW		Better quality vegetation separated from the UFI	CCW
3905_7355	REW		FV mapping - approx. 90% good	CCW
3905_7411	MUW		Southern end showed greater diversity. Condition appears variable. Some portions may be commensurate with CCW.	REW
6066_5100	MUW		1/2 mapped in FV mapping. FV mapping in good or better condition. Habitat appears undervalued.	REW
6113_5141	MUW		Tributary with some vegetation	REW

Assets | Engineering | Environment | Noise | Spatial | Waste

Talis Consultants

Head Office
Level 1, 604 Newcastle Street,
Leederville
Western Australia 6007

PO Box 454,
Leederville
Western Australia 6903

NSW Office
5/62 North Street, Nowra
New South Wales, 2541

PO Box 1189, Nowra
New South Wales, 2541

P: 1300 251 070
E: info@talisconsultants.com.au