Brookton Rail Siding Native Vegetation Clearing Permit Supporting Document

Cooperative Bulk Handling Group (CBH)

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

Project Name	Brookton Rail Siding Native Vegetation Clearing Permit Supporting Document
Project Number	600-22PER1833
Project Manager	Libby Payne
Prepared by	Libby Payne
Reviewed by	Jeremy Mitchell
Approved by	Jeremy Mitchell
Status	**Choose an item.**
Version Number	**1**
Last saved on	**5 July 2022**

This report should be cited as 'Eco Logical Australia 2022. *Brookton NVCP*. Prepared for CBH.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from CBH

Disclaimer
This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Eco Logical Australia Pty Ltd and CBH. The scope of services was defined in consultation with CBH, by time and budgetary constraints imposed by the client*, and the availability of reports and other data on the subject area. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information. Eco Logical Australia Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party. Information provided is not intended to be a substitute for site specific assessment or legal advice in relation to any matter. Unauthorised use of this report in any form is prohibited.*

Template 2.8.1

Contents

List of Figures

List of Tables

© ECO LOGICAL AUSTRALIA PTY LTD

1. Introduction

The Cooperative Bulk Handling Group (herein 'CBH') is Australia's largest cooperative. It is a Western Australian based grain storage and handling organisation, with operations extending along the value chain from fertiliser to grain storage, handling, transport, marketing and processing. Owned and controlled by approximately 3,700 Western Australian grain growing businesses, the core purpose of the CBH Group is to sustainably create and return value to growers. Its storage and handling system currently receives and exports around 90 per cent of the Western Australian grain harvest.

CBH has total assets of around $2 billion and employs approximately 1,100 permanent employees and up to 1,800 casual employees during the harvest period from October through to January. Since its establishment in Western Australia in 1933, CBH has continuously evolved, innovated and grown, with receival sites and offices throughout Western Australia and port terminals located at Geraldton, Kwinana, Albany and Esperance.

CBH proposes to develop the Brookton Rail Siding (the Project), located at the Brookton Grain Receival Site, Brookton, Western Australia (**Figure 1**).

The Project forms part of the larger CBH grain receival and transport operations in the Wheatbelt region of WA.

To enable construction of the Project, an area of 0.85 ha of native vegetation is proposed to be cleared (within a 2.41 ha Project area), comprising Completely Degraded Eucalyptus *loxophleba* low isolated trees over *Maireana brevifolia,* low sparse chenopod shrubland over low mixed exotic herbs and grasses and *Eucalyptus cladocalyx*, Eucalyptus leucoxylon*, Allocasuarina huegeliana* low fringing isolated trees over low mixed exotic grasses and herbs.

A review of the clearing exemptions listed under Schedule 6 of the EP Act and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (Clearing Regulations) was undertaken with respect to the proposed clearing to determine whether a Native Vegetation Clearing Permit (NVCP) would be required. Upon review, no exemptions were considered to apply to CBH for the proposed clearing, therefore a NVCP has been prepared to seek formal endorsement of the assessment findings.

This document has been prepared to support the granting of an NVCP for the Proposal under Part V Division 2 of the *Environmental Protection Act 1986* (EP Act). This NVCP application includes the following information:

- Justification for the proposal
- An overview of the existing environmental conditions of the site
- An evaluation of the proposed clearing against the ten clearing principles listed under Schedule 5 of the EP Act
- Environmental management activities

Based on the assessment of the clearing against the ten clearing principles, the environmental impacts are considered to be very low and unlikely to be at variance to the principles.

© ECO LOGICAL AUSTRALIA PTY LTD

1.1. Project and site overview

The 2.41 ha project area Project area is located on Lot 29190 on DP 193004, Sewell St, Brookton WA (held on Certificate of Title LR3120/242) and involves the clearing of 0.85 ha of land to construct a rail siding, being an extension to an existing rail line required for operation of the CBH Brookton Grain Receival terminal. The existing rail includes parallel northern and southern lines, with the current southern line truncating at Sewell Street and the northern line crossing Sewell Street eastwards into Lot 29190. The extension is required to support ongoing grain receival and transport operations in the Wheatbelt. The constructed project will include:

- 6 m wide rail track supported by concrete sleepers on rock ballast – including extension of both the northern line within Lot 29190 and southern line across Sewell St into Lot 422 on DP213828 (held on Certificate of Title LR3120/240)
- 3 m wide maintenance track adjacent to the rail line, with looped turnaround at eastern end
- Associated earthworks including installation of surface water drainage.

© ECO LOGICAL AUSTRALIA PTY LTD

2. Environmental context

2.1. Site context

The Project area is located approximately 1.5 km south-east of the Brookton townsite, approximately 117 km south-east of Perth (**Figure 1**). The Project area is located within the Avon Wheatbelt bioregion (Katanning [AVW02] subregion) as defined by the Interim Biogeographic Regionalisation for Australia (IBRA; Department of Agriculture Water and Environment [DAWE] 2022). This region is described as having a semi-arid (dry) and warm Mediterranean Climate (Beecham 2001).

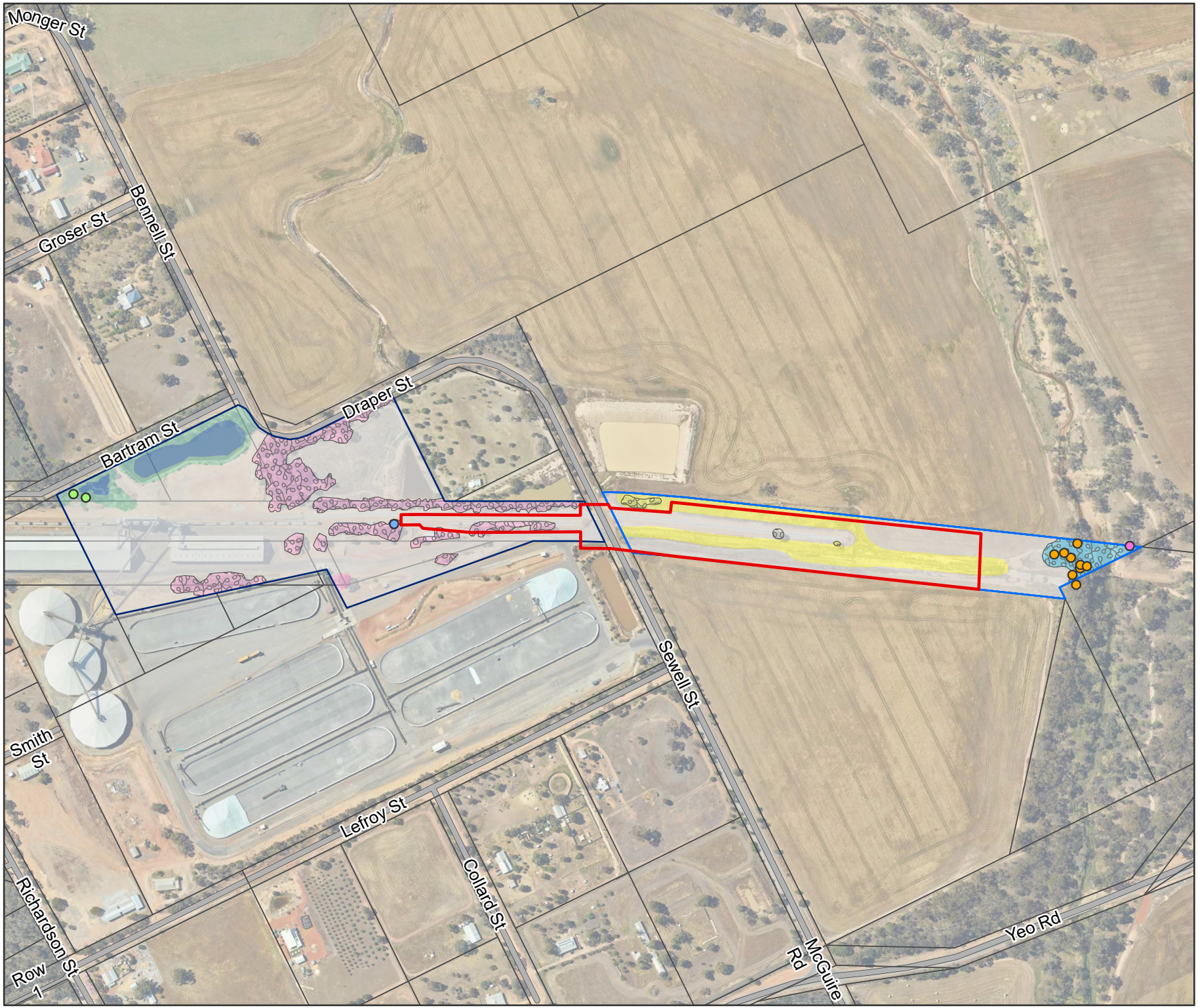
The Project area is located within the Pingelly Land System, characterised by uplands with isolated lateritic remnants expressing as breakaways and soils formed from fresh rock and colluvium, with laterite developing on parent materials and yellow/brown deep sandy duplex.

The survey area is situated within the Avon Wheatbelt IBRA Bioregion and AVW02 Katanning subregion. The Avon Wheatbelt bioregion is described as a dissected plateau of Tertiary laterite in the Yilgarn Craton with a semi-arid (dry) warm Mediterranean climate (Beecham 2001). The AVW02 subregion is further described as being comprised of gently undulating rises to low hills with abrupt breakaways, its drainage is rejuvenated and comprises continuous stream channels that flow in most years. Residual lateritic uplands and derived sandplains are covered by areas of proteaceous scrub-heaths (which are rich in endemic species) and quaternary surfaces of erosional slopes and valley floors support woodlands of Wandoo, York gum, Jam and Casuarina (Beecham 2001).

The Project area is located approximately 100 m west of the Avon River South Branch, with a low gradient fall towards the river. The Avon River South Branch originates in the vicinity of Pingelly and flows north through the Brookton townsite to its confluence with the Avon River (DoW 2008).

Environmentally Sensitive Areas (ESAs) are defined in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005 under s 51B of the EP Act. ESAs include areas declared as World Heritage, included on the Register of the National Estate, defined wetlands, and vegetation containing rare (Threatened) flora and TECs. No ESAs occur within the Project area or immediate surrounds of the Project area.

© ECO LOGICAL AUSTRALIA PTY LTD



Legend

- Clearing Boundary (2.41 ha)
- 2020 ELA Survey Area
- Cadastral boundary
- Cleared

Vegetation community / Fauna habitat (ELA 2020)

- EllT : *Eucalyptus loxophleba* low isolated trees (0.78 ha to be cleared)
- ErW: *Eucalyptus rudis* Woodland
- Mixed isolated *Eucalyptus* spp./ *Allocasuarina* trees (0.07 ha to be cleared)
- Open Water
- Rehabilitation

Black Cockatoo Foraging Quality (ELA 2020)

- Poor

Potential black cockatoo breeding trees (ELA 2022)

- **Eucalyptus cladocalyx*
- *Eucalyptus camaldulensis*
- *Eucalyptus marginata*
- *Eucalyptus rudis*

Figure 1: Brookton Rail Siding - Proposed clearing option

0 50 100 200
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 1833-GM Date: 28/06/2022

N

eco logical AUSTRALIA
A TETRA TECH COMPANY

2.2. Technical studies

A reconnaissance flora and vegetation survey, basic fauna survey and black cockatoo habitat assessment of the Project area and an additional portion of land to the west, was conducted by ELA in June 2020 and June 2021 to confirm key environmental values of the Project area (ELA 2021). The surveys were conducted in accordance with the Environmental Protection Authority (EPA) Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016), EPA Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2020) and the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) *EPBC Act referral guidelines for three threatened black cockatoo species* (SEWPaC 2012).

Results of the survey relevant to the Project area are detailed in the following sections and the complete report is provided in Appendix A (ELA 2021).

2.2.1. Flora and vegetation values

2.2.1.1. Flora

A total of 47 flora species representing 21 families and 36 genera were recorded from the larger survey area. No Threatened flora species as listed under s 178 of the EPBC Act or pursuant to Part 2 of the *Biodiversity Conservation Act 2016* (BC Act) and as listed by the Department of Biodiversity, Conservation and Attractions (DBCA) or Priority flora species as listed by DBCA and WAH were recorded within the survey area.

A total of 62 conservation significant flora species were identified from the desktop assessment as possibly occurring within the survey area; however, none of these are considered likely to occur within the survey area due to unsuitable habitat requirements and historical degradation.

2.2.1.2. Introduced flora

A high proportion (26 of the 47) flora species recorded within the larger survey area are introduced (weed) species. One of these species (**Echium plantagineum*; Paterson's Curse) is listed as a Declared Pest under s 22(2) of the BAM Act. All other introduced (weed) species recorded are listed on the Western Australian Organism List (WAOL) Database as S-11 (permitted) species, indicating that no specific management of these species is required.

2.2.1.3. Vegetation communities

Two vegetation communities occur within the Project area: *Eucalyptus loxophleba* low isolated trees over *Maireana brevifolia* low sparse chenopod shrubland over low mixed exotic herbs and grasses and *Eucalyptus cladocalyx*, Eucalyptus leucoxylon*, Allocasuarina huegeliana* low fringing isolated trees over low mixed exotic grasses and herbs; Plate 1 and Plate 2).

Vegetation condition within the entire survey area was ranked as Completely Degraded based on the Keighery (1994) vegetation condition scale.

Plate 1: *Eucalyptus loxophleba* low isolated trees over *Maireana brevifolia* low sparse chenopod shrubland over low mixed exotic herbs and grasses (Source: CBH)

Plate 2: *Eucalyptus cladocalyx*, Eucalyptus leucoxylon*, Allocasuarina huegeliana* low fringing isolated trees over low mixed exotic grasses and herbs (Source: ELA 2021).

2.2.2. Fauna values

A total of 19 vertebrate fauna species were recorded as occurring within the larger survey area, comprising 16 birds and three mammals. No direct (observations) or indirect (scats, tracks, diggings) evidence of conservation significant fauna species were recorded within the survey area.

Of the 25 conservation listed fauna species identified from the desktop assessment as possibly occurring within the survey area, three species are considered as having the potential to occur within the larger survey area, based on the availability of suitable habitat and proximity of recent records:

- *Calyptorhynchus latirostris* (Carnaby's Cockatoo)
- *Falco peregrinus* (Peregrine Falcon)
- *Platycercus icterotis* subsp. *xanthogenys* (Western Rosella).

Two fauna habitats were recorded in the Project area: *Eucalyptus loxophleba* low isolated trees and Mixed isolated *Eucalyptus* spp./*Allocasuarina* trees. Two *Eucalyptus loxophleba* (York Gum) occur within the Project area, and 0.07 ha of *Eucalyptus* spp./*Allocasuarina* trees, comprising poor quality Black Cockatoo foraging habitat. To the east of the proposed Project area a portion of *Eucalypt rudis* Woodland occurs approximately 70 m from the eastern boundary of the proposed clearing extent. A total of 9 potential black cockatoo breeding trees, comprising *E. rudis* occur within this fauna habitat type. While these are potential breeding trees, no suitable hollows were observed.

2.3. Avoidance and mitigation

CBH has explored a number of alternative options to avoid clearing native vegetation within the Proposal area. This assessment included expanding alternative sites and a range of alternative designs focused on minimising the impact at the Brookton facility.

All alternative designs considered included rail infrastructure moving east closer to the Avon River and in some instances impacting upon the vegetation adjacent to the river and with one option extending over the Avon River following the historic Brookton-Corrigin line.

The final footprint decision, the subject of this permit application, was determined after consultation and consideration with key stakeholders and technical studies. Initially, the extent of the rail design was reduced to remove the proposed crossing of the Avon River and impacts to possible Black Cockatoo foraging and breeding habitat trees lining the Avon River due to their environmental significance. The final decision on the eastern boundary extent was determined after consultation with the traditional owners, representatives of the Gnaala Karla Booja (GKB). The GKB requested the works area is situated to the west behind an *Acacia acuminata* tree located within the rail corridor due to significant cultural and registered heritage sites present closer to the Avon River.

© ECO LOGICAL AUSTRALIA PTY LTD

3. Assessment Against the Ten Principles for Clearing Native Vegetation

Clearing of native vegetation is an offence unless a clearing permit is obtained, in accordance with s 51C of the EP Act, or unless:

- An exemption applies; or
- The proposed clearing was referred to DWER who determined that a permit is not required because the clearing is exempt, or the clearing satisfies all the Permit criteria.

The Clearing Permit process supports a risk-based approach to assessing native vegetation clearing proposals by establishing a pathway to assess very low impact clearing activities that may not require a permit. After consultation with the Department of Water and Environmental Regulation (DWER), it was determined that the referral pathway would not be appropriate, and a clearing permit would be required. An assessment of the proposed clearing against the ten principles for clearing native vegetation has been undertaken (Table 1).

Table 1: EP Act NVCP Clearing Principles

NVCP Clearing Principles	Response to criteria
Principle a – native vegetation should not be cleared if it comprises a high level of biological diversity	The Project area is located within the 'intensive land-use zone' (DPIRD 2016). The proposed clearing would involve the removal of 0.85 ha of completely degraded native vegetation, which is anticipated to result in a very low environmental impact. One vegetation association occurs within the Project area, namely Pingelly 352, described as 'Medium woodland; York gum (Government of Western Australia 2019). This vegetation association has 11.36% (or approximately 9,414.26 ha) of its pre-European extent remaining in the Avon Wheatbelt IBRA bioregion. The Project area comprises 0.85 ha of Completely Degraded native grasses, with two isolated York Gums and *Eucalyptus* spp./*Allocasuarina* trees, grasses and herbs (Plate 1; Plate 2) which represents <0.005% of the remaining extent of the vegetation association. The potential change arising from the clearing is extremely negligible – with no meaningful change to the vegetation association. No flora species listed threatened under the EPBC Act or BC Act recorded no priority or threatened ecological communities have been recorded within the Project area. A high proportion (26 of the 47) flora species recorded within the larger survey area are introduced (weed) species. The proposed clearing is therefore expected to have negligible effect on biological diversity and; therefore, is considered **not at variance** to this principle.
Principle b – Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	The Project area comprises Completely Degraded vegetation, largely isolated from areas of intact vegetation. The proposed clearing occurs adjacent to the existing Brookton Rail Siding that will be extended as part of the Project. The vegetation communities comprise *Eucalyptus loxophleba* low isolated trees over *Maireana brevifolia* low sparse chenopod shrubland over low mixed exotic herbs and grasses and *Eucalyptus cladocalyx*, Eucalyptus leucoxylon*, Allocasuarina huegeliana* low fringing isolated trees over low mixed exotic grasses and herbs. The vegetation communities do not represent threatened, priority, or important vegetation or habitat to significant fauna, and is Completely Degraded.

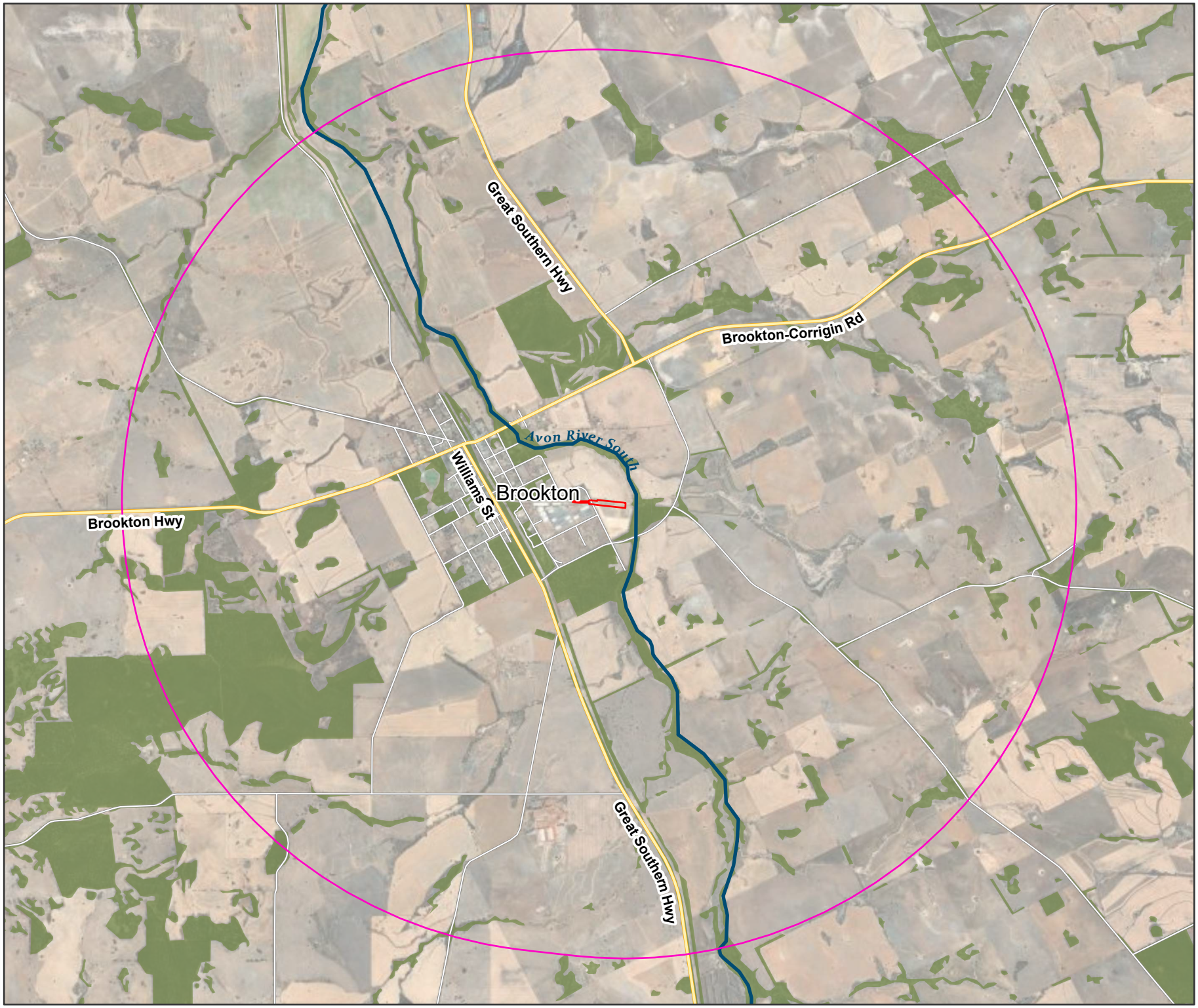
NVCP Clearing Principles	Response to criteria
	Two isolated York Gums and a patch of *Eucalyptus* spp./*Allocasuarina* trees occur within the Project area, adjacent to the existing rail (Plate 1; Plate 2). York Gums and *Eucalyptus* spp./*Allocasuarina* trees are considered potential foraging habitat for Black Cockatoo species; however, the individual trees within the Project area were assessed as providing poor quality foraging habitat (ELA 2020; 2021). Approximately 70 m to the east of the Project area, nine *Eucalyptus rudis* trees providing potential breeding habitat to Black Cockatoos occur within an area of poor-quality foraging habitat. No hollows were identified in the nine *E. rudis* trees. This area of Black Cockatoo habitat is separated from the proposed clearing area and the clearing of 0.07 ha of poor-quality foraging habitat is not expected to significantly impact on the availability of potential foraging habitat for Black Cockatoos within the Project area or local area. No conservation significant flora or fauna species were recorded in the Project area. The immediate area surrounding the Project area is made up of predominantly native grassland in Completely Degraded condition, therefore, the extension of the rail siding into this area requiring 0.85 ha of clearing, is not expected considered to be a significant impact. There are no known or likely significant environmental values within the Project area and the proposed clearing is considered **not at variance** with this principle.
Principle c – Native vegetation should not be cleared if it includes or is necessary for the continued existence of rare flora	The Project area was extensively surveyed by ELA in 2020 and 2021 to identify flora and vegetation values of the site. The complete survey report is provided in Appendix A. No flora species listed threatened under the EPBC Act or BC Act have been recorded within the Project area. The proposed clearing is considered **not at variance** to this principle
Principle d – Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of a threatened ecological community	The proposed clearing area comprises Completely Degraded vegetation. There are no TECs listed under either the BC Act or EPBC Act present within the proposal area. The proposed clearing is therefore considered **not at variance** to this principle.
Principle e - Native vegetation should not be cleared if it is significant as remnant vegetation in an area that has been extensively cleared	One vegetation association occurs within the Project area, namely Pingelly 352, described as 'Medium woodland; York gum (Government of Western Australia 2019). This vegetation association has 11.36% (or approximately 9,414.26 ha) of its pre-European extent remaining in the Avon Wheatbelt IBRA bioregion. The Project area comprises 0.85 ha of completely degraded native grasses, with two isolated York Gums and *Eucalyptus* spp./*Allocasuarina* trees, grasses and herbs (Plate 1; Plate 2) which represents <0.005% of the remaining extent of the vegetation association. The potential change arising from the clearing is extremely negligible – with no meaningful change to the vegetation association. Approximately 1,063 ha of native vegetation occurs within a 5 km buffer of the site, representing approximately 12% of remaining vegetation, which is less than the 30% threshold highlighted for the intensive land-use zone, as shown in Figure 2. Despite the negligible proportional change in extent resulting from the Proposal and the Completely Degraded condition of the vegetation, as the regional and subregional extent of Pingelly 352 is already below 30% of its pre-European extent, the Proposal a potential variance to this principle may be applicable. It is considered however that given the condition and extent of the vegetation within the Project area, clearing of <1 ha will have negligible impact on the vegetation association.

NVCP Clearing Principles	Response to criteria
	The proposed clearing is therefore considered **not likely to be at variance** to this principle.
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	The Project area is located approximately 70 m from vegetation surrounding the Avon River South and the project design was modified to avoid this vegetation. The Avon River South in this area has been historically modified, the rail corridor was part of the historic Brookton-Corrigin railway line route. Remnants of the railway embankment formation and bridge crossing the Avon River south remain. East of the Project area comprises flat to gently sloping riparian zone and surrounds now mostly composed of open agricultural pasture/cropping land along with remnant *E. rudis* trees over weeds and grasses/herbs close to the banks. As the proposed clearing area is small, comprises predominantly grassland species on a gently sloping surface, and is buffered by open paddock, the Project will not introduce new sources of potential impact or otherwise significantly impact on the watercourse, either through direct clearing or indirect impacts such as increased erosion/sedimentation. Furthermore, the proposed clearing would not be expected to result in any changes to water quality associated with the river system. The proposed clearing is therefore considered **not at variance** to this principle.
Principle g - Native vegetation should not be cleared if the clearing of vegetation is likely to cause appreciable land degradation	The clearing area is comprised of native grassland with weed species, two isolated York Gums and *Eucalyptus* spp./*Allocasuarina* trees over grasses and herbs. The area is generally flat, surrounded by agricultural land and located adjacent to existing rail infrastructure. The Proposal is not expected to result in severe water logging, land degradation, water or wind erosion within the proposed clearing area or immediate surroundings. The management of the proposed clearing will be straightforward, including standard dust control and surface water management The proposed clearing is therefore considered **not at variance** to this principle.
Principle h – Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area	The Proposal is not close to any environmental conservation areas. The clearing boundary was initially proposed to be 40 m east toward the Avon River, however following consultation with Traditional Owners of the area, the clearing boundary was moved 40 m west to ensure that any disturbance avoids areas of cultural and historical significance. Through moving the clearing boundary away from the Avon River to accommodate heritage considerations, the potential impacts to the Avon River have been further minimised. The proposed clearing is therefore considered **not at variance** to this principle.
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 Project area is located approximately 70 m from vegetation surrounding the Avon River South and the project design was modified to avoid this vegetation. The depth to groundwater is unknown, however groundwater was not encountered in any geotechnical test pits (maximum pit depth 2.2m) that were carried out in the rail corridor. No Public Drinking Water Supply Areas (PDWSAs) occur within or surrounding the Project area The management of water quality and hydrocarbon and chemical storage will be consistent with 'AS 1940:2017 Storage and handling of flammable and combustible liquids', and the CBH Environmental Management Standard (Appendix B) which outlines minimum requirements for water quality, management of spills, and other mandatory water management measures that must be implemented. The proposed clearing is therefore considered **not at variance** to this principle.
Principle j – Native vegetation should not be cleared if the clearing of	The Project area is located approximately 70 m from vegetation surrounding the Avon River South and the project design was modified to avoid this vegetation.

NVCP Clearing Principles	Response to criteria
vegetation is likely to cause, or exacerbate, the incident of flooding	Surface water management adjacent to the rail formation and access road will be managed to avoid flooding. The works will direct surface water into the existing surface water management structures and exiting drainage system. The proposed clearing is therefore considered **not at variance** to this principle.

3.1. Management

CBH will prepare a Construction Environmental Management Plan (CEMP) to manage the potential environmental impacts associated with clearing and construction. The CEMP will include the management of potential threatening processes such as dust, erosion, waste and hazardous materials, noise and vibration, introduced flora and fauna species and disease to the adjacent vegetation.



Legend

- Clearing boundary
- Clearing Boundary 5km Buffer
- Hydrography
- Native vegetation extent (DPIRD-005)

Figure 2: Native vegetation within 5km of the clearing area

0 0.5 1 2

Kilometres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 1833-GM Date: 24/06/2022

N

ecological AUSTRALIA
A TETRA TECH COMPANY

3.1.1. Conclusions

The Project will result in the clearance of 0.85 ha of Completely Degraded *Eucalyptus loxophleba* low isolated trees over *Maireana brevifolia* low sparse chenopod shrubland over low mixed exotic herbs and grasses and *Eucalyptus cladocalyx*, Eucalyptus leucoxylon*, Allocasuarina huegeliana* low fringing isolated trees over low mixed exotic grasses and herbs. Two isolated York Gums and 0.07 ha of *Eucalyptus* spp./*Allocasuarina* trees considered poor quality Black Cockatoo foraging habitat occur within the Project area.

The proposed clearing is expected to result in a very low environmental impact. Although there is a technical exceedance of one threshold, the Project is not expected to be considered at variance with the native vegetation clearing principle identified in Schedule 5 of the EP Act, as presented above in Table 1 and summarised below:

- The native vegetation within the Project area is Completely Degraded and composed of primarily native grassland and weed species that do not represent a high level of biological diversity.
- No Threatened or Priority flora and fauna or ecological communities occur or are known to occur within the Project area and surrounds.
- Two isolated York Gums and 0.07 ha of *Eucalyptus* spp./*Allocasuarina* trees are present within the site, providing poor quality Black Cockatoo foraging habitat - however, removal of these trees is unlikely to have a significant impact on the availability of potential Black Cockatoo foraging within the local area.
- The proposed clearing occurs within the Pingelly 352 'Medium woodland: York gum' vegetation association which has approximately 11.36% remaining within the Avon Wheatbelt IBRA bioregion, therefore the proposed clearing is technically at variance to this criterion, where no less than 30% of this vegetation association is permitted to be cleared without requiring a clearing permit. The proposed clearing represents less than 0.005% remaining of the vegetation association.
- The Project area occurs 70 m from the vegetation associated with the Avon River South, however the proposed clearing, given the size, structure and quality of the vegetation, and local topography and existing surrounding land use, will not impact the waterway, either directly or indirectly through potential erosion, sedimentation or changes to water quality.
- No PDWSAs occur within or surrounding the Project area.
- Ecological surveys have been undertaken in accordance with relevant Technical Guidance. Extensive information is available for the Project area and surrounds, available in database searches and existing surveys.
- The clearing boundary has been moved from the initial proposed option, a further 40 m west of the Avon River, in response to Traditional Owners concerns regarding the potential impacts on Aboriginal cultural and heritage.
- Further conditions to manage, mitigate or offset impacts associated with the proposed clearing are not anticipated due to very low environmental impacts expected as a result of the Project, with standard construction environmental management sufficient.

4. References

Beecham, B. 2001. *Avon Wheatbelt 2 (AW2 – Re-juvenated Drainage subregion).* In A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Department of Conservation and Land Management.

Department of Agriculture, Water and the Environment (DAWE). 2022. *Australia's bioregions (IBRA)*. Available from: https://www.environment.gov.au/land/nrs/science/ibra. Accessed April 2022.

DPIRD Geographic Information Services. 2016. Intensive land use zone of southwest Western Australia. Department of Primary Industries and Regional Development, Western Australia, Perth. Online: https://researchlibrary.agric.wa.gov.au/gis_maps/17/

Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC). 2012. EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's Cockatoo (Endangered) Calyptorhynchus latirostris, Baudin's Cockatoo (Vulnerable) Calyptorhynchus baudinii, Forest Red-tailed Black cockatoo (Vulnerable) Calyptorhynchus banksii naso. Australian Government Department of Sustainability, Environment, Water, Populations and Communities, Parkes, ACT.

Department of Water (DoW). 2008. *Water resource management series: Priority tributaries of the Avon River basin: a process to priorities tributaries for condition assessment (Volume 1: Avon and Mortlock catchments)*. Government of Western Australia.

EcoLogical Australia Pty Ltd (ELA). 2021. *Biological Survey: CBH Brookton Expansion.* Report prepared for CBH Group, Perth, Western Australia

Environmental Protection Authority (EPA). 2016a. *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment.* Perth, Western Australia.

Environmental Protection Authority (EPA). 2020. *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment*. Perth, Western Australia.

Government of Western Australia. 2019. 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth, https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics

Appendix A Ecological Survey Report

Biological Survey:
CBH Brookton Expansion

CBH Group

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

Project Name	Biological Survey: CBH Brookton Expansion
Project Number	19914
Project Manager	Jeff Cargill
Prepared by	Daniel Panickar and Jeff Cargill
Reviewed by	Jeff Cargill
Approved by	**Daniel Panickar**
Status	**Draft**
Version Number	**Version 1**
Last saved on	**21 December 2021**

This report should be cited as 'Eco Logical Australia 2021. *Biological Survey: CBH Brookton Expansion*. Prepared for CBH Group.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from CBH Group.

Disclaimer
This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Eco Logical Australia Pty Ltd and CBH Group*. The scope of services was defined in consultation with CBH Group, by time and budgetary constraints imposed by the CBH Group, and the availability of reports and other data on the subject area. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information. Eco Logical Australia Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party. Information provided is not intended to be a substitute for site specific assessment or legal advice in relation to any matter. Unauthorised use of this report in any form is prohibited.*

Template 2.8.1

Contents

List of Figures

List of Tables

Abbreviations

Abbreviation	Description
BAM Act	State *Biosecurity and Agriculture Management Act 2007*
BC Act	State *Biodiversity Conservation Act 2016*
BoM	Bureau of Meteorology
CLUSTER	Hierarchical Clustering
CR	Critically Endangered
DRF	Declared Rare Flora
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DPIRD	Department of Primary Industries and Regional Development
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
DWER	Department of Water and Environmental Regulation
ELA	Eco Logical Australia
EN	Endangered
EP Act	State *Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Area
FCT	Floristic Community Type
ha	hectare
IBRA	Interim-Biogeographic Regionalisation for Australia
IUCN	International Union for Conservation of Nature
JTSI	Department of Jobs, Tourism, Science and Innovation
km	kilometre
KSIA	Kemerton Strategic Industrial Area
m	metre
MDS	Multi-Dimensional Scaling
mm	millimetre
NVIS	National Vegetation Information System
P	Priority
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool

© ECO LOGICAL AUSTRALIA PTY LTD

Abbreviation	Description
PRIMER	Plymouth Routines in Multivariate Ecological Research v6
SIMPER	Similarity Percentages
T	Threatened
TEC	Threatened Ecological Community
TSSC	Threatened Species Scientific Committee
VU	Vulnerable
WA	Western Australia
WAH	Western Australian Herbarium
WAM	Western Australian Museum
WoNS	Weeds of National Significance

© ECO LOGICAL AUSTRALIA PTY LTD

Executive Summary

CBH Group (CBH) are proposing to expand their existing facility at Brookton, approximately 1.5 km south-east of the Brookton townsite, in Western Australia (WA).

Eco Logical Australia (ELA) was engaged by CBH to conduct a Reconnaissance flora and vegetation survey, Basic fauna survey and black cockatoo habitat assessment of the proposed extension (survey area; 9.49 hectares [ha]).

A portion of the survey area was assessed by ELA in June 2020 (ELA 2020). Since this time, the size of the potential expansion was increased and ELA re-surveyed the areas assessed in 2020 as well as the new areas as part of the 2021 survey. For the purposes of this report, results from both the 2020 and 2021 surveys have been combined.

The 2020 survey was undertaken over one day on 17 June 2020 and the 2021 survey was conducted over one day on 6 September 2021.

A total of 47 flora species representing 21 families and 36 genera were recorded from the survey area, none of which is a Threatened flora species as listed under s. 178 of the EPBC Act or pursuant to Part 2 of the BC Act and as listed by Department of Biodiversity, Conservation and Attractions (DBCA) (2019) or Priority flora species as listed by DBCA and WAH (2021).

None of the 62 conservation significant flora species are considered likely to occur within the survey area due to unsuitable habitat requirements and historical degradation.

A high proportion (26 of the 47) flora species recorded within the survey area are introduced (weed) species. One of these species (**Echium plantagineum*; Paterson's Curse) is listed as a Declared Pest under s22(2) of the BAM Act. All other introduced (weed) species recorded are listed on the Western Australian Organism List (WAOL) Database as S-11 (permitted) species, indicating that no specific management of these species is required. None of the introduced (weed) species recorded are Weeds of National Significance (WoNS).

A total of six vegetation communities were delineated and mapped within the survey area. The most widespread vegetation community was EllT: *Eucalyptus loxophleba* low isolated trees over *Maireana brevifolia* low sparse chenopod shrubland over low mixed exotic herbs and grasses, which covered 10.72% (1.01 ha) of the survey area. Cleared areas, including roads, tracks and pasture and open water, covered 70.96% (6.73 ha) of the survey area.

Vegetation condition within the entire survey area was ranked as Completely Degraded based on the Keighery (1994) vegetation condition scale provided in the EPA *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessmen*t (EPA 2016a) or Nil (Cleared). Primary disturbances within the survey area included historical clearing and the presence of introduced (weed) species. Majority of native vegetation has been removed within the survey area and grassy weeds have invaded these areas. Riparian vegetation associated with the Avon River South has also been historically modified and is now predominantly comprised of remnant *E. rudis* trees over weeds including **Juncus acutus* and several grasses/herbs.

No TECs or PECs occur or are inferred to occur within the survey area. Whilst six of the seven mapped vegetation communities contained eucalypt species, the type of species present, canopy cover and/or condition of these communities did not meet the key diagnostic characteristics and/or minimum patch size to be considered part of the Eucalypt Woodlands of the Western Australian Wheatbelt TEC.

A total of 19 vertebrate fauna species were recorded as occurring within the survey area, comprising 16 birds and three mammals, none of which are listed as conservation significant under the EPBC Act, the BC Act or by DBCA. fauna species are likely to be associated with vegetation along the Avon River South only. Two of the 19 fauna species recorded are an introduced (pest) species, namely House Mouse (*Mus musculus*) and Red Fox (*Vulpes vulpes*).

Three fauna habitats were recorded within the survey area (not including rehabilitation and cleared areas). In general terms, fauna habitat within the survey area was predominantly comprised of eucalypt woodlands to open woodland containing various Wheatbelt eucalypt species.

There were no black cockatoo individuals observed within the survey area during the field survey.

All suitable black cockatoo foraging habitat within the survey area (1.38 ha) is considered as providing 'Poor' quality foraging habitat for all three black cockatoo species (SEWPaC 2012) due to a lack of density of suitable or preferred foraging species and desktop comparison with other habitat in the local area. No signs of black cockatoo foraging were recorded in the survey area.

The black cockatoo breeding habitat assessment identified 13 potentially suitable breeding trees within the survey area, none of which contained a potentially suitable hollow for black cockatoos. ELA (2020) identified a single *Eucalyptus rudis* tree within the survey area which had a potentially suitable hollow for black cockatoos, however at the time of assessment was only able to be observed from the ground. The 2021 survey confirmed that the potential hollow identified in ELA (2020) was in fact, not an actual hollow and therefore none of the potential black cockatoo breeding trees within the survey area contain hollows.

All potential breeding trees recorded from the survey area also provide potential suitable roosting habitat for black cockatoos as defined by the referral guidelines (SEWPaC 2012). Although not directly observed during the field survey, Carnaby's Cockatoo (*Calyptorhynchus latirostris*) is considered as having the potential to occur within the survey area, due to the availability of potentially suitable breeding and roosting trees, and the nearby proximity of several known records of this species. The survey area occurs at the eastern extremity of the known range of Forest Red-tailed Black Cockatoo (*C. banksii naso*) and given the limited suitable habitat, the species is considered unlikely to occur.

For the purposes of a Reconnaissance level flora and vegetation survey, Basic terrestrial fauna survey and Targeted Black Cockatoo habitat assessment, adequate data was collected to define and assess the presence, extent and significance of flora, vegetation and fauna within the survey area.

Key findings of the biological survey include:

1. No Threatened or Priority species listed under the EPBC Act, BC Act or DBCA were recorded during the survey or are considered likely to occur;
2. No Threatened or Priority Ecological Communities were recorded within the survey area;
3. A total of 1.38 ha within the survey area is considered as providing 'Poor' quality foraging habitat for black cockatoos;
4. A total of 13 potentially suitable breeding trees were recorded within the survey area, none of which contained a potentially suitable hollow for black cockatoos;
5. All of the forementioned potentially suitable breeding trees also provide potential roosting habitat for black cockatoos.

1. Introduction

1.1 Project background

CBH Group (CBH) are proposing to expand their existing facility at Brookton. Eco Logical Australia (ELA) was engaged by CBH to conduct a Reconnaissance flora and vegetation survey, Basic fauna survey and black cockatoo habitat assessment of the proposed extension.

The survey area is located approximately 1.5 km south-east of the Brookton townsite, in Western Australia (WA) and comprises approximately 9.49 hectares (ha) Figure 1.

The scope of work for this survey included the following tasks:

- Undertake a desktop assessment to identify the potential occurrence of any conservation listed flora and fauna species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), State *Biodiversity Conservation Act 2016* (BC Act) and by the Department of Biodiversity, Conservation and Attractions (DBCA);
- Undertake a Reconnaissance vegetation survey to describe dominant vegetation communities, with respect to dominant species, structure and overall condition;
- Undertake a Basic fauna survey and targeted black cockatoo habitat assessment;
- Preparation of a standalone summary report detailing the findings of the desktop assessment and field survey; and
- Provision of data, including relevant mapping at an appropriate scale and associated data files.

A portion of the survey area was assessed by ELA in June 2020 (ELA 2020). Since this time, the size of the potential expansion was increased and ELA re-surveyed the areas assessed in 2020 as well as the new areas as part of the 2021 survey. Figure 1 depicts both the 2020 and 2021 survey areas. For the purposes of this report, results from both the 2020 and 2021 surveys have been combined.

© ECO LOGICAL AUSTRALIA PTY LTD

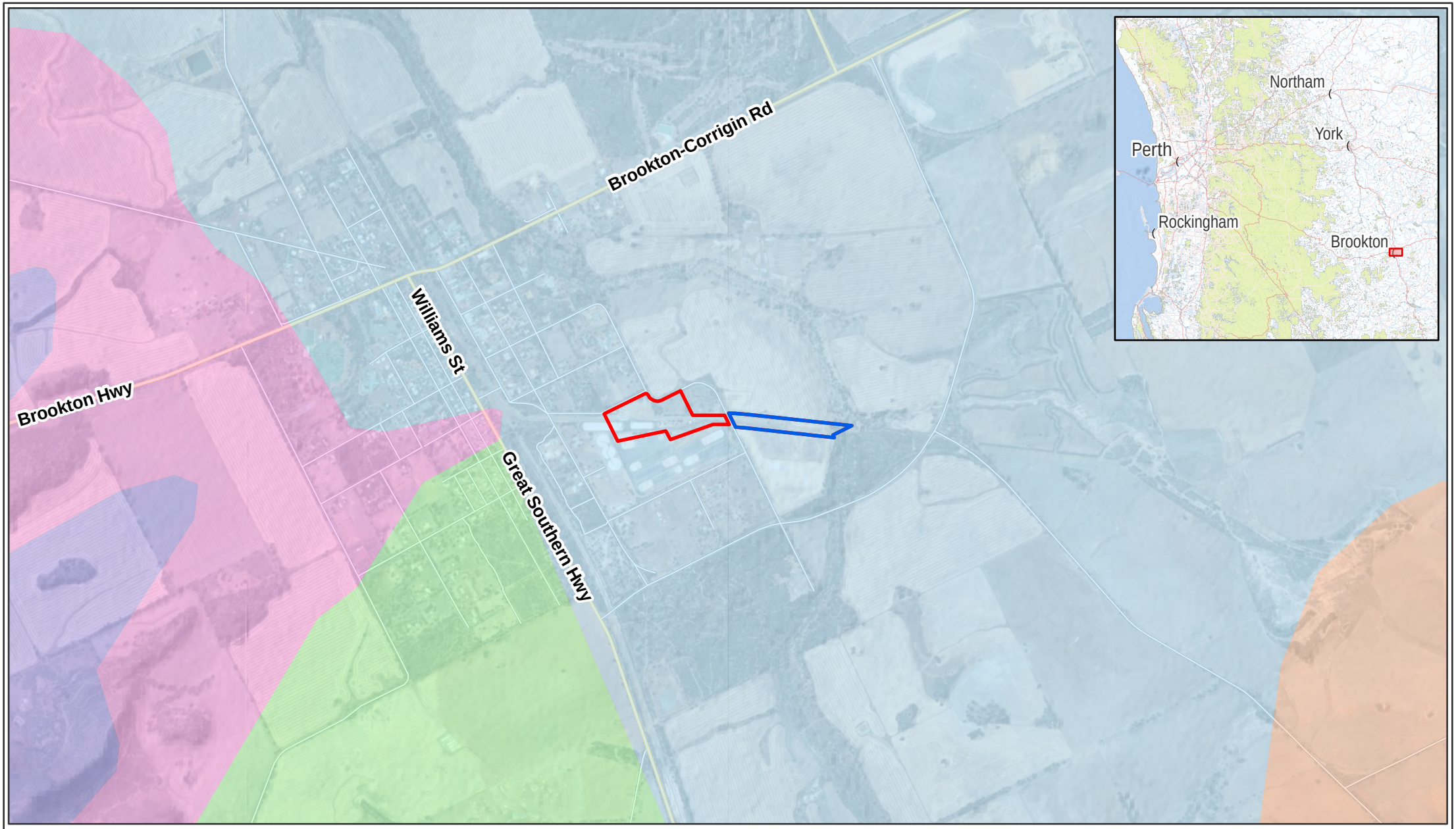


Figure 1: Location of the survey area

2020 Survey Area
2021 Additional Survey Area

Pre-European vegetation association

NARROGIN_352
NARROGIN_946
PINGELLY_1023
PINGELLY_352
PINGELLY_5

0 200 400 800
Metres

Datum/Projection:
GDA 1994 MGA Zone 50
Project: 19914-RD Date: 14/12/2021

ecological AUSTRALIA
A TETRA TECH COMPANY

2. Environmental setting

2.1 Climate

The survey area is located in the Avon Wheatbelt bioregion (Katanning [AVW02] subregion), as defined by the Interim Biogeographic Regionalisation for Australia (IBRA; DAWE 2021). This region is described as having a semi-arid (dry) and warm Mediterranean Climate (Beecham 2001). Based on the nearby Bureau of Meteorology (BoM) Brookton weather station (station number 10524, climate data 1907-present), the area receives, on average, a total of 444.5 mm of rainfall per year, with most rainfall occurring during the winter months of June, July and August (55.1 mm, 64.6 mm and 59.7 mm respectively; BoM 2021; Table 1).

In the 12 months preceding the field survey in June 2020 (ELA 2020), the area received a total of 336.2 mm which is below the long-term average (BoM 2021). In the three months preceding the field survey, a total of 59.7 mm of rainfall was recorded from the survey area, which is below the long-term average for the same time period (99.6 mm).

Table 1: Rainfall data recorded at the Brookton weather station (10524) 12 months prior to the June 2020 field survey, compared to the long-term average (BoM 2021)

Rainfall (mm)	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
Average rainfall (mm) 1999-present	83.7	84.6	62.4	38.3	25.2	14.5	10.4	13.4	15.5	18.1	25.5	56.0	**449.2**
Rainfall (mm) 2019-2020	93.5	45.4	78.6	10.1	9.8	3.9	0.0	0.6	34.6	14.6	8.8	36.3	**336.2**

In the 12 months preceding the 2021 survey (6 September 2021), the area received a total of 492.8 mm, which is above the long-term average (Table 2; BoM 2021). A total of 198.8 mm of rainfall was recorded in the three months prior to the 2021 survey, which is above the long-term average over the same time period (179.4 mm). This resulted in very good survey conditions, with individual plants generally having reproductive material present (e.g. flowers, pods, seed), allowing for positive identification.

Table 2: Rainfall data recorded at the Brookton weather station (10524) 12 months prior to the September 2021 field survey, compared to the long-term average (BoM 2021)

Month	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Total
Total monthly rainfall 2020 – 2021 (mm)	41.0	6.2	53.2	1.2	4.8	40.0	24.0	62.4	61.2	26.8	135.6	36.4	492.8
Average monthly rainfall 1999 – current (mm)	50.0	30.6	23.9	24.0	20.6	15.2	23.2	30.1	48.4	55.1	64.6	59.7	444.5

2.2 Landforms and soils

Soil Landscape Mapping - Systems mapping prepared by the Department of Primary Industries and Regional Development (DPIRD), provides and inventory and condition survey of lands at a 1: 250 000 scale (version April 2018; DPIRD 2020). Two land systems (and associated soil types) occur within the survey area, as outlined in Table 3 and Figure 2.

Table 3: Land systems located within the survey area

Land system	Land system description	Soil type and description
Brookton System	Poorly drained valley flats, in the southern Zone of Rejuvenated Drainage, with grey deep sandy duplex (sometimes alkaline) and saline wet soil. York Gum-Jam-Wandoo-Salmon Gum-Sheoak woodland.	257Br_1 Grey deep sandy duplex
Pingelly System	Uplands surrounding Brookton and Pingelly with isolated lateritic remnants expressing as breakaways and soils formed from fresh rock and colluvium, with laterite developing on these parent materials in places.	257Pn_3u Yellow/brown deep sandy duplex

2.3 Interim-Biogeographic Regionalisation for Australia

The Interim Biogeographic Regionalisation for Australia (IBRA7) currently classifies 89 bioregions across Australia, based on a range of biotic and abiotic factors such as climate, vegetation, fauna, geology and landform (Thackway and Cresswell 1995; DAWE 2021). These bioregions are currently further refined into 419 sub-regions representing more localised and homogenous geomorphological units in each bioregion (DAWE 2021). IBRA divides Western Australia into 26 biogeographic regions and 53 subregions based on dominant landscape characteristics of climate, lithology, geology, landform and vegetation (DAWE 2021).

The survey area is situated within the Avon Wheatbelt IBRA Bioregion and AVW02 Katanning subregion. The Avon Wheatbelt bioregion is described as a dissected plateau of Tertiary laterite in the Yilgarn Craton with a semi-arid (dry) warm Mediterranean climate (Beecham 2001). The AVW02 subregion is further described as being comprised of gently undulating rises to low hills with abrupt breakaways, its drainage is rejuvenated and comprises continuous stream channels that flow in most years. Residual lateritic uplands and derived sandplains are covered by areas of proteaceous scrub-heaths (which are rich in endemic species) and quaternary surfaces of erosional slopes and valley floors support woodlands of Wandoo, York gum, Jam and Casuarina (Beecham 2001).

2.4 Hydrology

The eastern portion of the survey area intersects the Avon River South (Figure 3). The Avon River South Branch originates in the vicinity of Pingelly and flows north through the Brookton townsite to its confluence with the Avon River (DoW 2008).

No other hydrological features (e.g. rivers, wetlands etc.) occur within the survey area.

2.5 Broad-scale vegetation mapping

Vegetation type and extent have been mapped at a regional scale by Beard (1975) who categorised vegetation into broad vegetation associations. Based on this mapping at a scale of 1:1,000,000, the Department of Primary Industries and Regional Development (DPIRD; previously Department of Agriculture and Food Western Australia [DAFWA]) has compiled a list of vegetation extent and types across WA (Shepherd et al. 2002).

One vegetation association occurs within the survey area, namely Pingelly 352, described as 'Medium woodland; York gum (Government of Western Australia 2019). This vegetation association has 11.36% of its pre-European extent remaining in the Avon Wheatbelt subregion (Table 4; Government of Western Australia 2019).

Table 4: Beard (1979) / Shepherd *et. al.* (2002) vegetation associations of the survey area

Vegetation association	Description	Pre-European extent within Avon Wheatbelt IBRA region (ha)	Current extent within Avon Wheatbelt IBRA region (ha)	% remaining within Avon Wheatbelt IBRA region
Pingelly 352	Medium woodland; York gum	82,862.74	9,414.26	11.36

2.6 Areas of conservation significance

Environmentally Sensitive Areas (ESAs) are defined in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005 under section 51B of the State *Environmental Protection Act 1986* (EP Act). ESAs include areas declared as World Heritage, included on the Register of the National Estate, defined wetlands, and vegetation containing rare (Threatened) flora and TECs.

A suite of ESAs exist approximately 4.5 km to the west of the survey area (Figure 4). No information is available regarding the origin of these ESAs, however it is inferred that they relate to populations of Threatened flora.

Further detail regarding TECs and Priority Ecological Communities (PECs; biological flora or fauna communities that are recognised to be of significance, but do not meet the criteria for a TEC and are not protected under legislation.) is provided in Section 4.1.1.

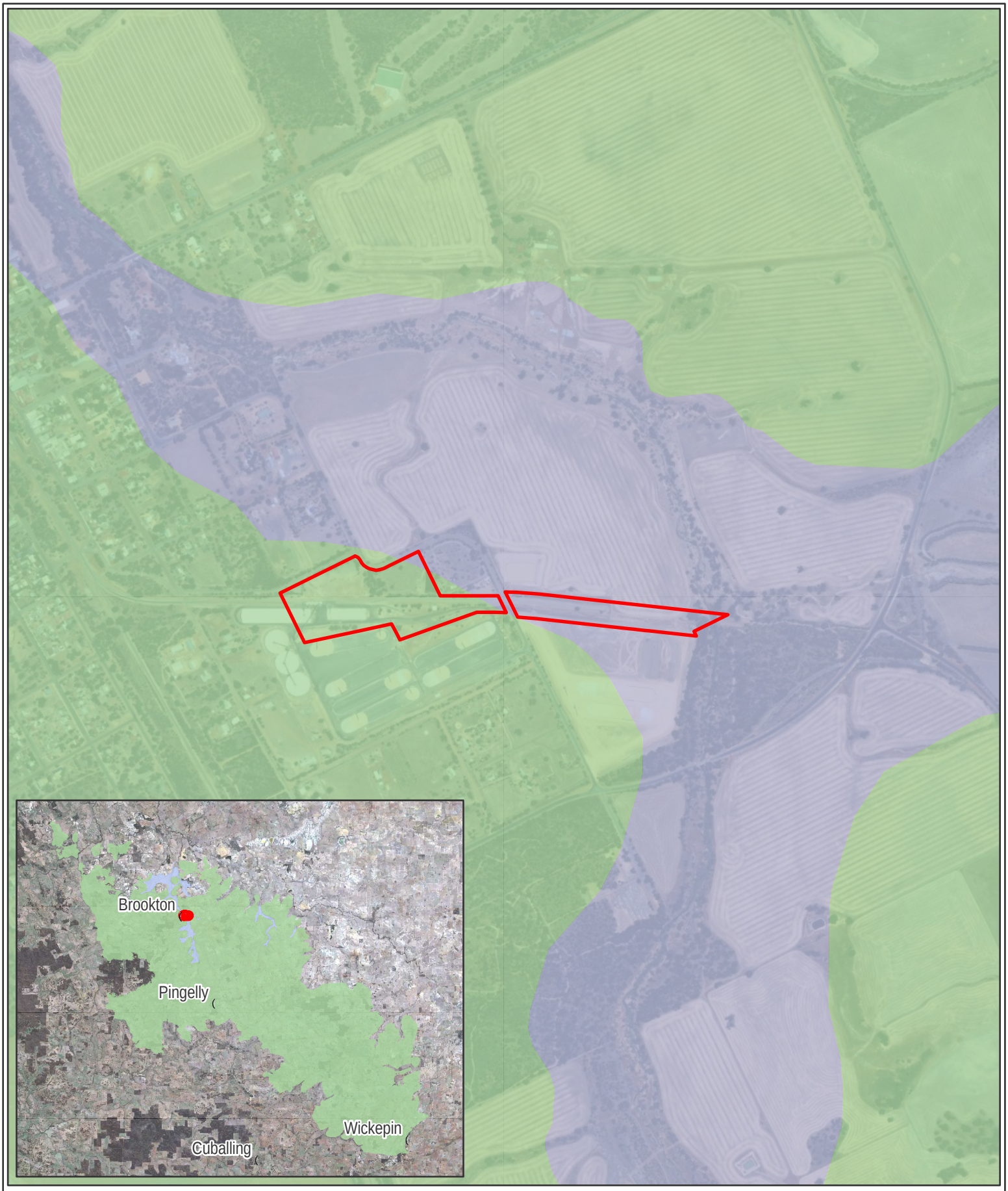


Figure 2: Land System Mapping

Survey Area

Soil Landscape Mapping (DPIRD 2018)

Brookton System

Pingelly System

0 200 400

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 19914-RD Date: 16/12/2021

ecological AUSTRALIA
A TETRA TECH COMPANY

Figure 3: Hydrology

Survey Area

Hydrography, linear (DWER 2018b)

0 200 400

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 19914-RD Date: 16/12/2021

eco logical AUSTRALIA
A TETRA TECH COMPANY

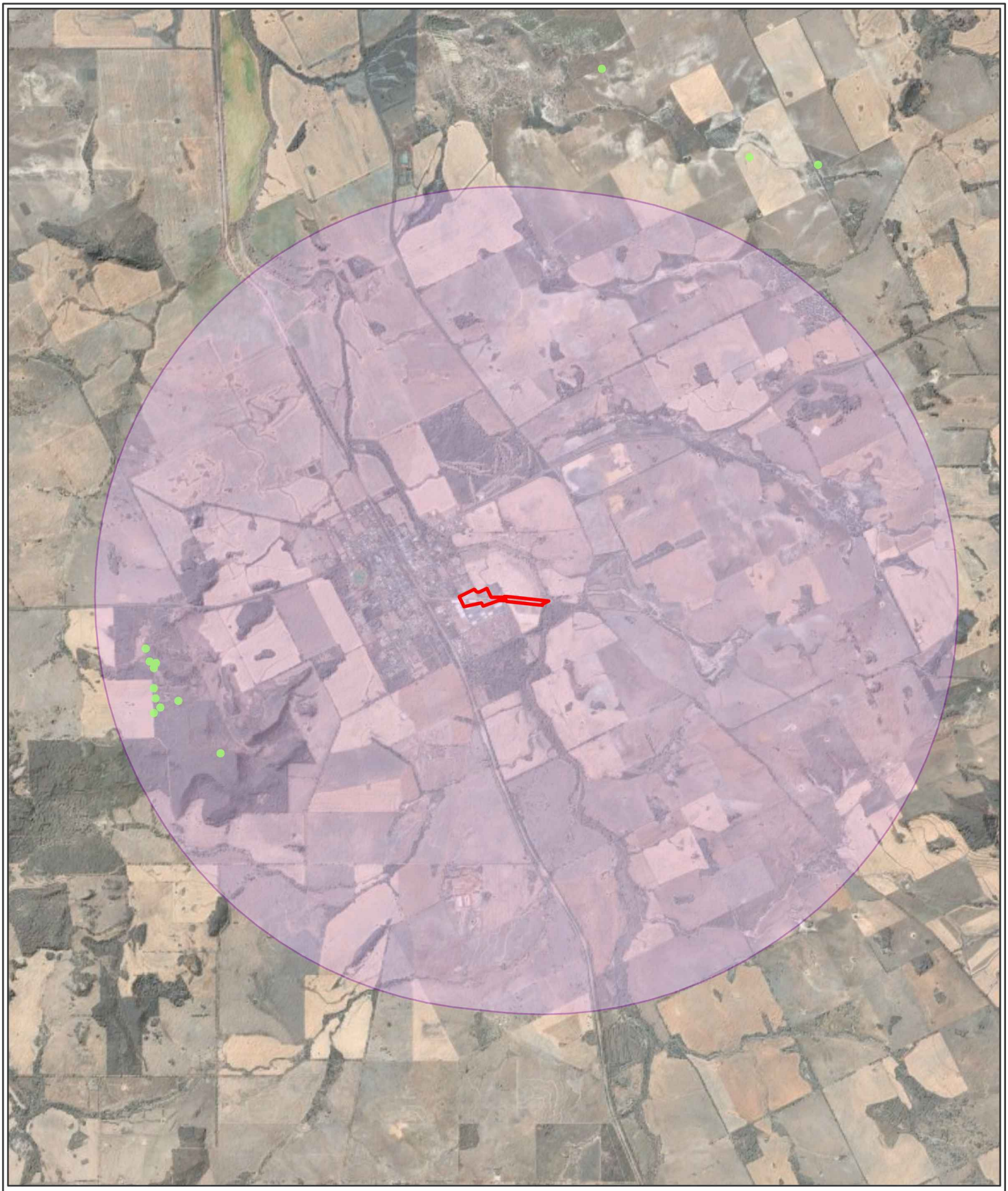


Figure 4: Environmentally Sensitive Areas (ESA)

Survey Area

5 km Survey Area Buffer

Clearing Regulations - Environmentally Sensitive Area (ESA)

0 1 2

Kilometres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 19914-RD Date: 14/12/2021

N

eco logical AUSTRALIA
A TETRA TECH COMPANY

3. Methodology

3.1 Desktop review

3.1.1 Database searches and literature review

The following Commonwealth and State databases were searched for information relating to conservation listed flora and ecological communities in order to compile and summarise existing data to inform the field survey detailed in ELA (2020). No additional database searches were undertaken for the 2021 survey.

Table 5 below presents the database searches undertaken. Applied buffers below are considered suitable based on flora and fauna assemblages expected to occur within the survey area. It should be noted that the buffers for the DBCA database searches are selected by DBCA on a case-by-case basis and are therefore not always consistent with other searches undertaken in the area.

Table 5: Database searches undertaken for the survey area

Database	Reference	Buffer (km)
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool (PMST) for Threatened species and communities listed under the EPBC Act.	DAWE 2020	20
Department of Biodiversity, Conservation and Attractions (DBCA) and Western Australian Museum (WAM) NatureMap online database for Threatened and Priority flora.	DBCA 2007-2020	20
Department of Biodiversity, Conservation and Attractions (DBCA) and Western Australian Museum (WAM) NatureMap online database for Threatened and Priority fauna.	DBCA 2007-2020	20
DBCA Threatened and Priority flora database searches for Declared Rare Flora (DRF) listed under the latest WA Wildlife Conservation (Rare Flora) Notice and Priority flora.	DBCA 2020a	20
DBCA Threatened and Priority Ecological Communities database search.	DBCA 2020b	20
DBCA Threatened and Priority fauna database searches for Scheduled fauna listed under the EPBC Act or latest WA Wildlife Conservation (Specially Protected Fauna) Notice and Priority Fauna.	DBCA 2020c	20

3.1.2 Likelihood of occurrence assessment

A likelihood of occurrence assessment was undertaken to identify conservation listed flora and fauna species that possibly occur within the survey area, identified from a review of key datasets and literature, as specified above. Conservation codes, categories and criteria for flora and fauna protected under the EPBC Act and the BC Act are provided in Appendix A (DBCA 2019). Criteria used for this assessment is presented in Appendix B. The assessment was revised following the field survey to factor in site conditions.

3.2 Field survey

3.2.1 Survey team and timing

The 2020 survey was undertaken over one day on 17 June 2020 by Daniel Panickar.

The 2021 survey was conducted over one day on 6 September 2021 by Dr. Jeff Cargill.

The survey team's relevant qualifications, experience and licences are provided in Table 6.

Table 6: Survey team

Name	Qualification	Relevant experience	Licences
Dr. Jeffry Cargill	BSc. Hons. PhD Environmental Sciences	Jeff has more than 12 years' experience in botanical and ecological studies throughout Western Australia including baseline vegetation studies (Reconnaissance and Detailed surveys), Targeted threatened and priority flora surveys, fauna and black cockatoo surveys, MNES surveys, environmental risk assessments and rehabilitation and vegetation monitoring programs.	Flora scientific collection licence: FB62000138 Declared Rare Flora (DRF) permit: TFL 48-1920
Daniel Panickar	BSc. Hons. Environmental Biology	Daniel has more than 9 years' experience in ecological surveys and environmental services throughout Western Australia. This includes baseline vegetation and fauna studies, threatened and priority flora and fauna surveys, weed surveys, rehabilitation and vegetation monitoring.	Flora scientific collection licence: FB62000256

3.2.2 Flora and vegetation survey

Both the 2020 and 2021 flora and vegetation surveys were undertaken at a Reconnaissance level, in accordance with the Environmental Protection Authority (EPA) *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a).

Seven relevés were established across the survey area (Figure 5). Dominant vegetation communities were described with respect to dominant species, structure and overall condition. The following data was recorded within each relevé:

- Site details (site name, number, observer/s, date and location;
- Broad vegetation type survey based on an assessment of the dominant flora species for the three traditional strata (upper, mid and ground) and mapping extent; and
- Vegetation condition in accordance with the Keighery (1994) vegetation condition scale, as provided in the EPA Technical Guidance (EPA 2016a).

In addition, any encountered Declared Pests listed under the State *Biosecurity and Management Act 2007* (BAM Act) or Weeds of National Significance (WoNS) were recorded and mapped.

Flora specimen identification was undertaken by ELA botanist Daniel Brassington, with assistance from Dr Jeffry Cargill where required. The Western Australian Herbarium (WAH) was also utilised to confirm additional specimens. Species identification utilised taxonomic literature and keys and where required specimens were confirmed using the WAH reference collection. Suitable material that meets WAH specimen lodgement requirements, such as flowering material and range extensions, will submitted along with Threatened and Priority Report forms to DBCA, as required by conditions of collection licences issued under the BC Act.

Nomenclature used for the flora species within this report follows the WA Plant Census as available on FloraBase (DBCA and WAH 2021).

3.2.3 Fauna survey

The 2020 fauna survey was undertaken at a Level 1 intensity in accordance with the now superseded EPA *Technical Guidance: Terrestrial Fauna Surveys* (EPA 2016b).

The 2021 fauna survey was undertaken as a Basic fauna survey in accordance the EPA *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020). An assessment of fauna habitat in terms of its ability to support and sustain populations of fauna, along with an assessment of the likelihood of occurrence of conservation significant fauna species, was undertaken during the survey. The habitat characteristics and fauna database records used in assessing likelihood of occurrence for fauna included:

- Vegetation community, structure and condition;
- Soil and landform type;
- Extent and connectivity of bushland;
- Fauna species habitat preferences;
- Proximity of conservation significant fauna records; and
- Signs of species presence.

Opportunistic recordings of fauna species were made at all times during the field survey. These included visual sightings of active fauna such as reptiles and birds; records of bird calls; and signs of species presence such as tracks, diggings, burrows, scats and any other signs of fauna activity.

Nomenclature used for the vertebrate fauna species within this report follows the Western Australian Museum (WAM) Checklist of the Vertebrates of Western Australia (WAM 2020). Where common names were not stated for certain species, the following references were consulted:

- Amphibians and reptiles: Bush *et al*. (2010);
- Reptiles: Wilson and Swan (2013);
- Birds: Morcombe (2007); and
- Mammals: Menkhorst and Knight (2011).

3.2.3.1 Black cockatoo habitat assessment

Both the 2020 and 201 fauna surveys included an assessment of black cockatoo habitat, undertaken in accordance with the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) *EPBC Act referral guidelines for three threatened black cockatoo species* (SEWPaC 2012). This involved assessing all significant tree species known to support potential suitable breeding, roosting and foraging habitat. Significant breeding trees are defined as trees of suitable species with a Diameter at Breast Height (DBH) greater than 500 millimetres (mm; > 300 mm for salmon gum and wandoo; SEWPaC 2012). Trees with a DBH greater than 500 mm (or >300 mm for Salmon Gum and Wandoo) are large enough to potentially contain hollows suitable for nesting black cockatoos or have the potential to develop suitable hollows over the next 50 years. Trees of this size may also be large enough to provide roosting habitat (i.e. trees which provide a roost or rest area for the birds). All potential breeding trees with a DBH of 500 mm or greater encountered within the survey area were recorded with a GPS.

Hollows were considered 'suitable' if the entrance was >100 mm in diameter, >300 mm deep and aligned near vertical. If it was not possible to determine if a hollow was suitable or not it was categorised as 'potentially suitable'. Hollows that did not meet any of the requirements were categorised as 'unsuitable'. Trees that met the required measurements were inspected from the ground for suitability of hollows for nesting and/or roosting and evidence of current or previous occupancy, including wear and chew marks around the entrance.

Vegetation present within the survey area was assessed for its potential to provide foraging and roosting habitat for black cockatoos as per the SEWPaC guidelines (SEWPaC 2012), and the extent of potential suitable habitat within the survey area was mapped. Observations were also made of any black cockatoo foraging activity or feeding residue such as chewed Banksia or eucalypt nuts, and any black cockatoo individuals observed within the survey area.

3.3 Limitations

The EPA Technical Guidance documents (EPA 2016, 2020) recommend including discussion of the limitations of the survey methods used. These limitations are summarised in Table 7. No limitations were identified.

Table 7: Survey limitations

Potential survey limitation	Impact on survey
Sources of information and availability of contextual information (i.e. pre-existing background versus new material).	**Not a constraint**. Previous reports for the region were provided where applicable. Broad-scale vegetation mapping at a scale of 1:1,000,000 was available. Land system mapping at a scale of 1:2,000,000 and soil and landform mapping was also available. Available information was sufficient to provide context at varying scales.
Scope (i.e. what life forms, etc., were sampled).	**Not a constraint**. The survey requirements of a Reconnaissance flora and vegetation survey, Basic fauna survey and black cockatoo habitat assessment in accordance with relevant State and Commonwealth legislation and EPA guidance documents were adequately met.
Proportion of flora collected and identified (based on sampling, timing and intensity).	**Not a constraint**. A Reconnaissance level survey records the dominant and abundant species, with little requirement for a comprehensive account of species richness. Data recorded was sufficient for this level of survey.
Completeness and further work which might be needed (i.e. was the relevant survey area fully surveyed).	**Not a constraint**. The survey area was fully covered to meet requirements of a Reconnaissance flora and vegetation survey, Basic fauna survey and black cockatoo habitat assessment.
Mapping reliability.	**Not a constraint**. Coverage of the survey area was considered to be good. High quality aerial maps were used for both the survey and subsequent vegetation mapping. Due to the nature of vegetation in the survey area, mapping boundaries of individual communities were discrete, and thus are considered accurate.
Timing, weather, season, cycle.	**Not a constraint**. The 2020 survey was undertaken out of season, as specified by the EPA *Technical Guidance*: *Flora and Vegetation Surveys for Environmental Impact Assessment* (2016a). Rainfall in the three months prior to the survey was significantly below the long-term average, limiting the presence and flowering of species present, however this did not impact the ability to describe the dominant species present to the level of survey required. The 2021 survey was undertaken within season (i.e. spring). Rainfall in the three months prior to the survey was above the long-term average. This resulted in very good survey conditions, with individual plants generally having reproductive material present (e.g. flowers, pods, seed), allowing for positive identification.
Disturbances (fire, flood, accidental human intervention, etc.).	**Not a constraint**: Disturbances within the survey area included fragmentation as a result of agricultural and transport infrastructure, with historical clearing in portions of the survey area, and weeds dominating the understory in areas. Disturbances did not impact the ability to undertake the level of survey required.
Intensity (in retrospect, was the intensity adequate).	**Not a constraint**. The survey effort was adequately met for a Reconnaissance level flora and vegetation survey, Basic fauna survey and black cockatoo habitat assessment.
Resources (i.e. were there adequate resources to complete the survey to the required standard).	**Not a constraint**. The number of personnel conducting this field survey in the given time was adequate to undertake the required level of survey. Additional resources, including equipment available, additional support and personnel were adequate.

Potential survey limitation	Impact on survey
Access problems (i.e. ability to access survey area).	**Not a constraint**. The entire survey area was able to be accessed and surveyed.
Experience levels (e.g. degree of expertise in plant identification to taxon level).	**Not a constraint**. The personnel conducting both the 2020 and 2021 field surveys are suitably qualified to identify specimens, having multiple years of field experience and previously undertaken flora and fauna surveys across Western Australia.

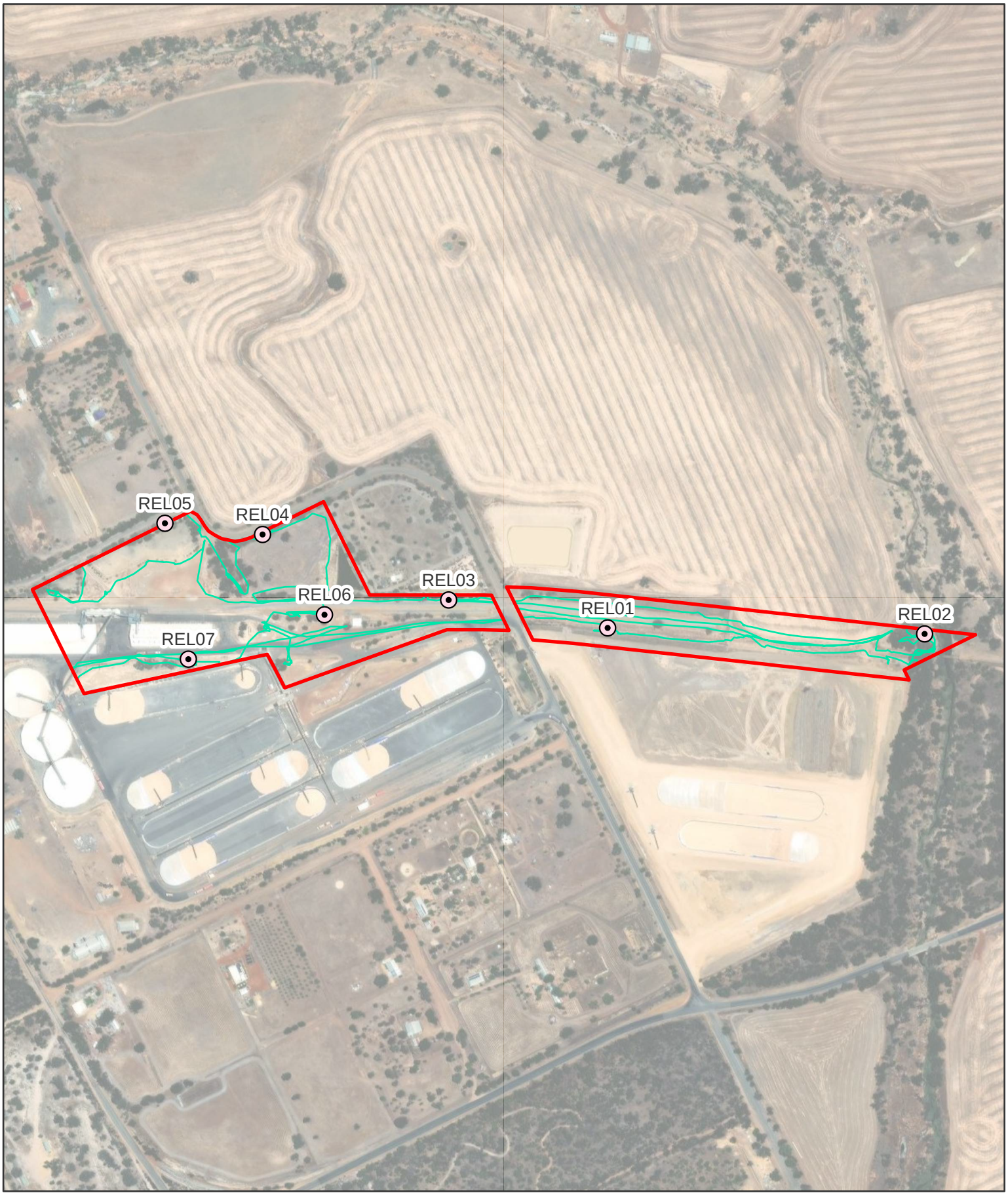


Figure 5: Survey Effort

Survey Area 2021

Relevé

Survey Effort

0 50 100 200

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 19914-RD Date: 16/12/2021

eco logical AUSTRALIA
A TETRA TECH COMPANY

4. Results

4.1 Desktop review

4.1.1 Conservation significant flora, fauna and ecological communities

An initial 62 conservation listed flora species and 24 conservation listed fauna species were identified as possibly occurring within the survey area, based on database searches described in Section 3.1.1 and using criteria outlined in Appendix B

Conservation significant flora species identified from database searches undertaken include 23 species listed under the EPBC Act and/or BC Act as Threatened flora and 39 species listed as Priority flora by DBCA. The flora likelihood of occurrence assessment is presented in Appendix C. Results from the DBCA database search are presented in Figure 6.

Conservation significant fauna species identified from database searches undertaken include 19 species listed under the EPBC Act and/or BC Act as Threatened fauna, and five species listed as Priority fauna by DBCA. The fauna likelihood of occurrence assessment is presented in Appendix D. Results from the DBCA database searches are presented in Figure 7.

Conservation significant Threatened and Priority ecological communities identified from database searches undertaken were limited to the TEC, *Eucalyptus woodlands of the Western Australian Wheatbelt*, listed as Critically Endangered (CR) under the EPBC Act and P3 by DBCA. Results from the DBCA database searches are presented in Figure 8.

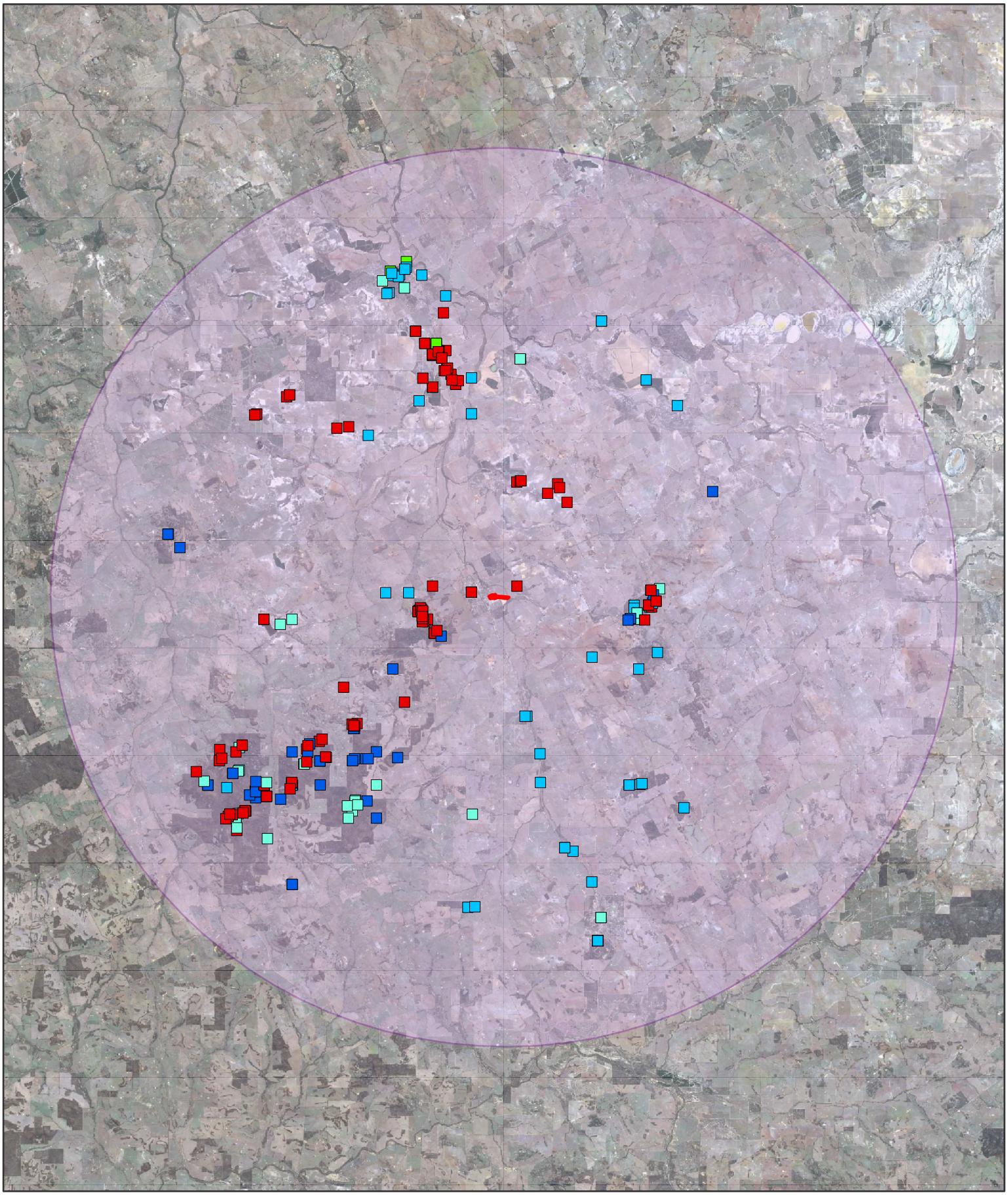


Figure 6: Conservation Significant Flora Species Previously Recorded within 20 kilometres

2021 Survey

20 km Survey Area Buffer

WA Conservation Status

- T
- P1
- P2
- P3
- P4

0 4 8

Kilometres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 19914-RD Date: 16/12/2021

ecological AUSTRALIA
A TETRA TECH COMPANY

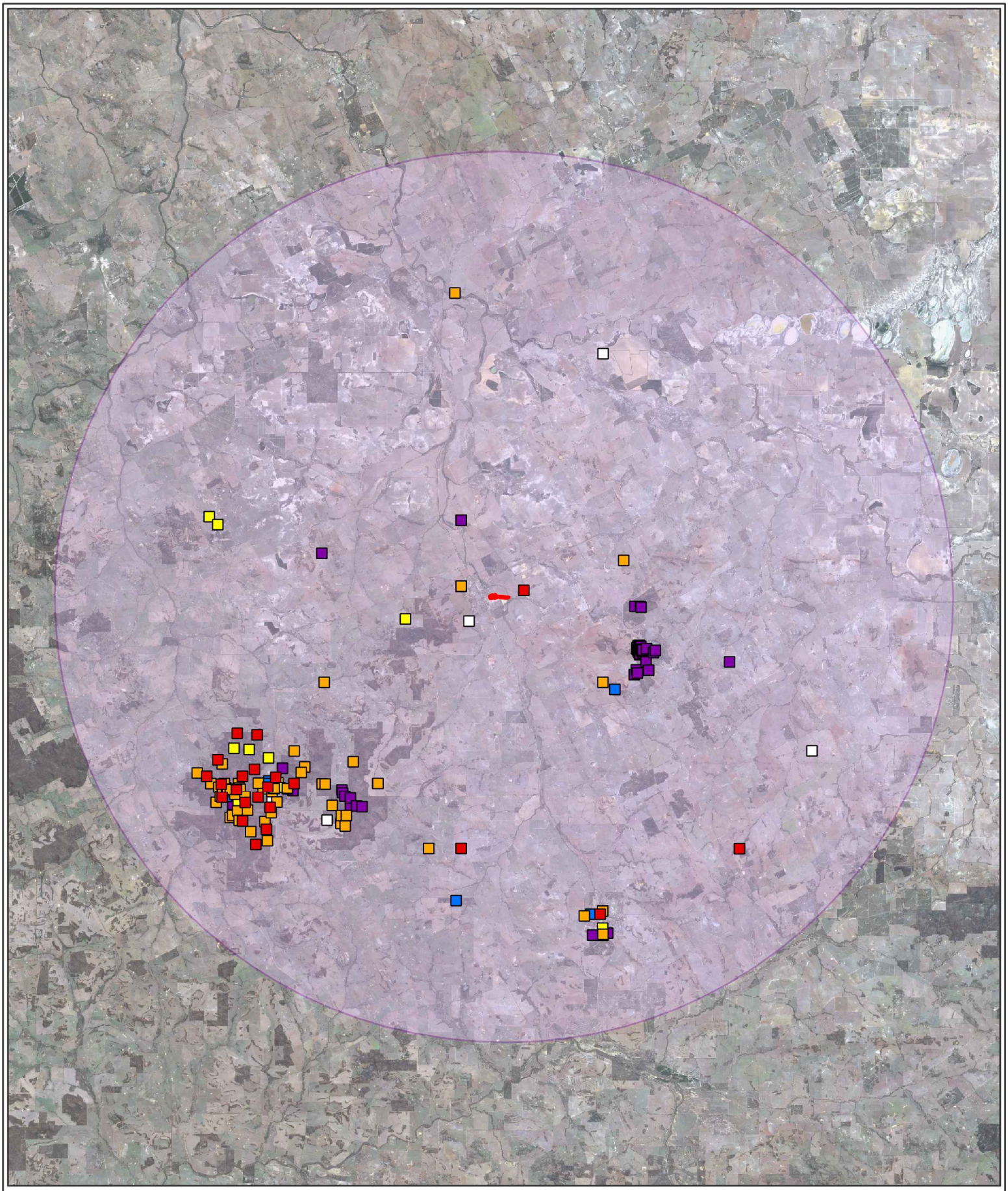


Figure 7: Conservation Significant Fauna Species Previously Recorded within 20 kilometres

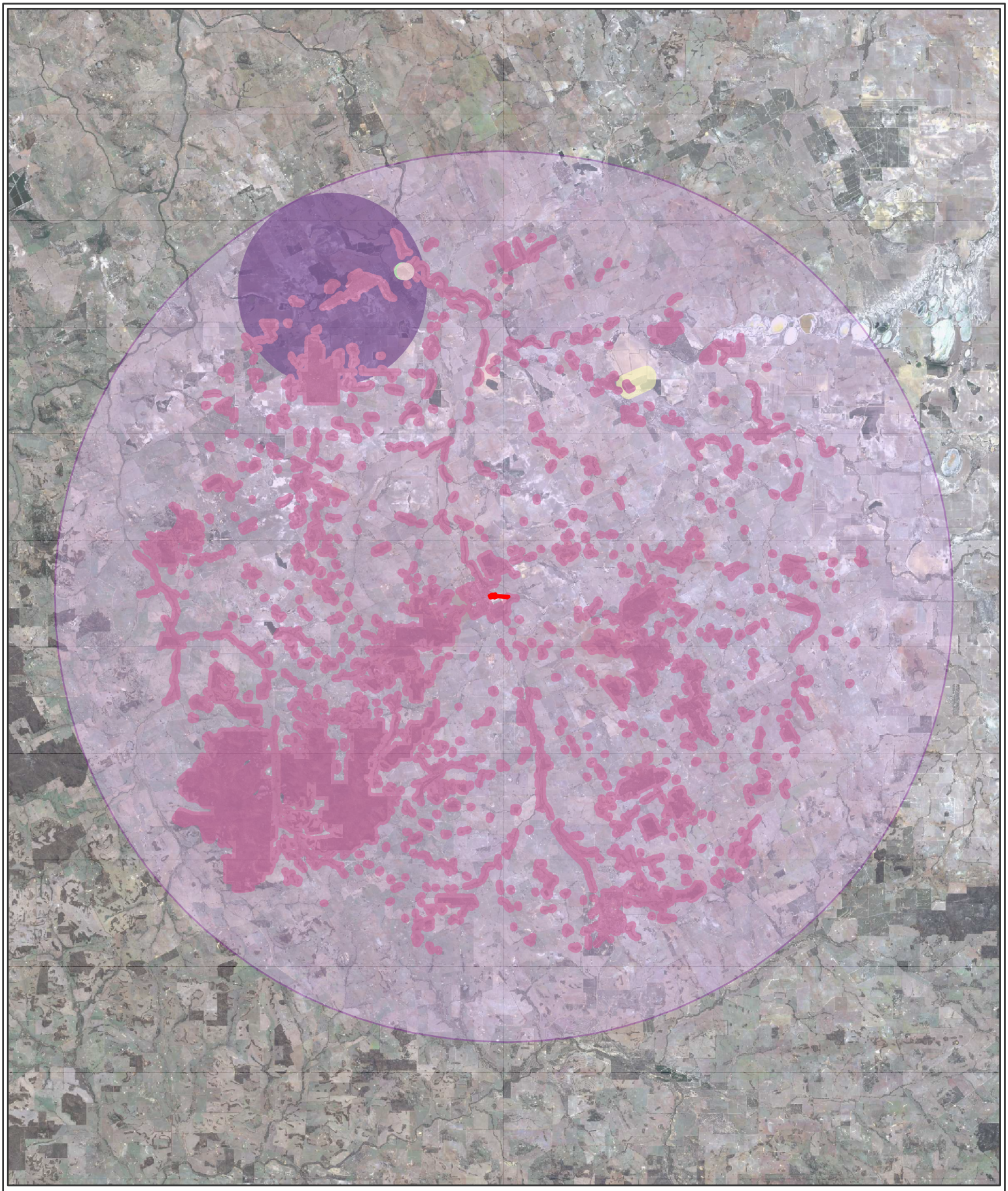


Figure 8: Conservation Significant Ecological Communities Previously Recorded

2021 Survey

20 km Survey Area Buffer

WA Conservation Signficant Ecological Communities

- Toolibin (CR)
- Wheatbelt Woodlands (P1)
- Low level sandplains (P1)
- Red Morrel Woodland (P1)
- Salmon Gum Woodlands (P3)

0 4 8

Kilometres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 19914-RD Date: 16/12/2021

eco logical AUSTRALIA
A TETRA TECH COMPANY

4.2 Flora and vegetation survey

4.2.1 Flora overview

A total of 47 flora species representing 21 families and 36 genera were recorded from the survey area. Families with the highest number of species included Myrtaceae (10 species), Poaceae (10 species) and Fabaceae (4 species). A flora species list is provided in Appendix E.

4.2.2 Conservation significant flora

No Threatened flora species as listed under s. 178 of the EPBC Act or pursuant to Part 2 of the BC Act and as listed by Department of Biodiversity, Conservation and Attractions (DBCA) (2019) or Priority flora species as listed by DBCA and WAH (2021) were recorded within the survey area.

None of the 62 conservation significant flora species are considered likely to occur within the survey area due to unsuitable habitat requirements and historical degradation.

4.2.3 Introduced flora

A high proportion (26 of the 47) flora species recorded within the survey area are introduced (weed) species. One of these species (**Echium plantagineum*; Paterson's Curse) is listed as a Declared Pest under s22(2) of the BAM Act. All other introduced (weed) species recorded are listed on the Western Australian Organism List (WAOL) Database as S-11 (permitted) species, indicating that no specific management of these species is required. None of the introduced (weed) species recorded are Weeds of National Significance (WoNS). The full list of introduced species is detailed in Appendix E.

4.2.4 Vegetation communities

A total of six communities were delineated and mapped within the survey area (Table 8; Figure 9). The most widespread vegetation community was EllT: *Eucalyptus loxophleba* low isolated trees over *Maireana brevifolia* low sparse chenopod shrubland over low mixed exotic herbs and grasses, which covered 10.72% (1.01 ha) of the survey area. Cleared areas, including roads, tracks and pasture and open water, covered 70.96% (6.73 ha) of the survey area.

4.2.5 Vegetation condition

Vegetation condition within the entire survey area was ranked as Completely Degraded based on the Keighery (1994) vegetation condition scale provided in the EPA *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessmen*t (EPA 2016a) or Nil (Cleared). Vegetation condition is presented in Figure 10.

Primary disturbances within the survey area included historical clearing and the presence of introduced (weed) species. Majority of native vegetation has been removed within the survey area and grassy weeds have invaded these areas. Riparian vegetation associated with the Avon River South has also been historically modified and is now predominantly comprised of remnant *E. rudis* trees over weeds including **Juncus acutus* and several grasses/herbs.

4.2.6 Conservation significant ecological communities

One of the vegetation communities described within the survey area, namely ErW: *Eucalyptus rudis* mid woodland over **Juncus acutus* low rushland over low mixed exotic herbs and grasses, has a species composition and structure comprising elements that indicate the potential presence of the Eucalypt Woodlands of the Western Australian Wheatbelt ecological community as indicated in the Department of Environment (DoE) *Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt* (DoE 2015). This assessment is based on the following key diagnostic characteristics for the TEC:

- The distribution of the ecological community is within the Avon Wheatbelt IBRA region;
- The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10%;
- The key species of the tree canopy are species of *Eucalyptus* as identified in Table 2a of the Approved Conservation Advice document (DoE 2015). These are species that typically have a single trunk; and
- A native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs.

Given this community was recorded in Completely Degraded condition within the survey area, it does not meet the minimum condition thresholds to be protected as a TEC under the EPBC Act and is therefore not considered to be representative of the TEC.

None of the other vegetation communities recorded within the survey area are considered to be representative of the TEC either, as detailed below:

- ElIT: Does not meet key diagnostic characteristics – Canopy cover <10%;
- ElAhT: Does not meet key diagnostic characteristics – Canopy cover <10%;
- ErAhT: Does not meet key diagnostic characteristics – Does not contain key species as defined in DoE (2015);
- EcElAhT: Does not meet key diagnostic characteristics – Does not contain key species as defined in DoE (2015); and
- ElElT: Does not meet key diagnostic characteristics – Canopy cover <10%.

Based on the above, no TECs or PECs occur or are inferred to occur within the survey area.

Table 8: Vegetation communities recorded within the survey area

Photo	Relevé/s	Description	Total area (ha)	Proportion of the survey area (%)
	REL01	Code: EllT *Eucalyptus loxophleba* low isolated trees over *Maireana brevifolia* low sparse chenopod shrubland over low mixed exotic herbs and grasses. ELA (2020) code: G1: **Eragrostis curvula, *Cynodon dactylon* and *Poaceae sp. Grassland with very sparse, emergent **Maireana brevifolia* shrubs and **Eucalyptus loxophleba* trees in a drainage channel.	1.01	10.72
	REL02	Code: ErW *Eucalyptus rudis* mid woodland over **Juncus acutus* low rushland over low mixed exotic herbs and grasses. ELA (2020) code: W1: *Eucalyptus rudis* Woodland over **Juncus acutus* rushland over mixed annual exotic herbs fringing the Avon River South.	0.22	2.36

Photo	Relevé/s	Description	Total area (ha)	Proportion of the survey area (%)
	REL03	Code: ElAhT *Eucalyptus loxophleba, Allocasuarina huegeliana* low fringing isolated clumps of trees over low mixed exotic grasses and herbs.	0.24	2.56
	REL04	Code: ErAhT *Eucalyptus redunca, Allocasuarina huegeliana* low isolated clumps of trees over low mixed exotic grasses and herbs.	0.48	5.05
	REL06	Code: EcElAhT **Eucalyptus cladocalyx, *Eucalyptus leucoxylon, Allocasuarina huegeliana* low fringing isolated clumps of trees over low mixed exotic grasses and herbs.	0.27	2.87

© ECO LOGICAL AUSTRALIA PTY LTD

Photo	Relevé/s	Description	Total area (ha)	Proportion of the survey area (%)
	REL07	Code: ElElT *Eucalyptus loxophleba, *Eucalyptus leucoxylon* low isolated clumps of trees over low mixed exotic grasses and herbs.	0.14	1.47
	REL05	Rehabilitation	0.38	4.01
	N/A	Cleared areas / Open water	6.73	70.96
		Total	**9.49**	**100**

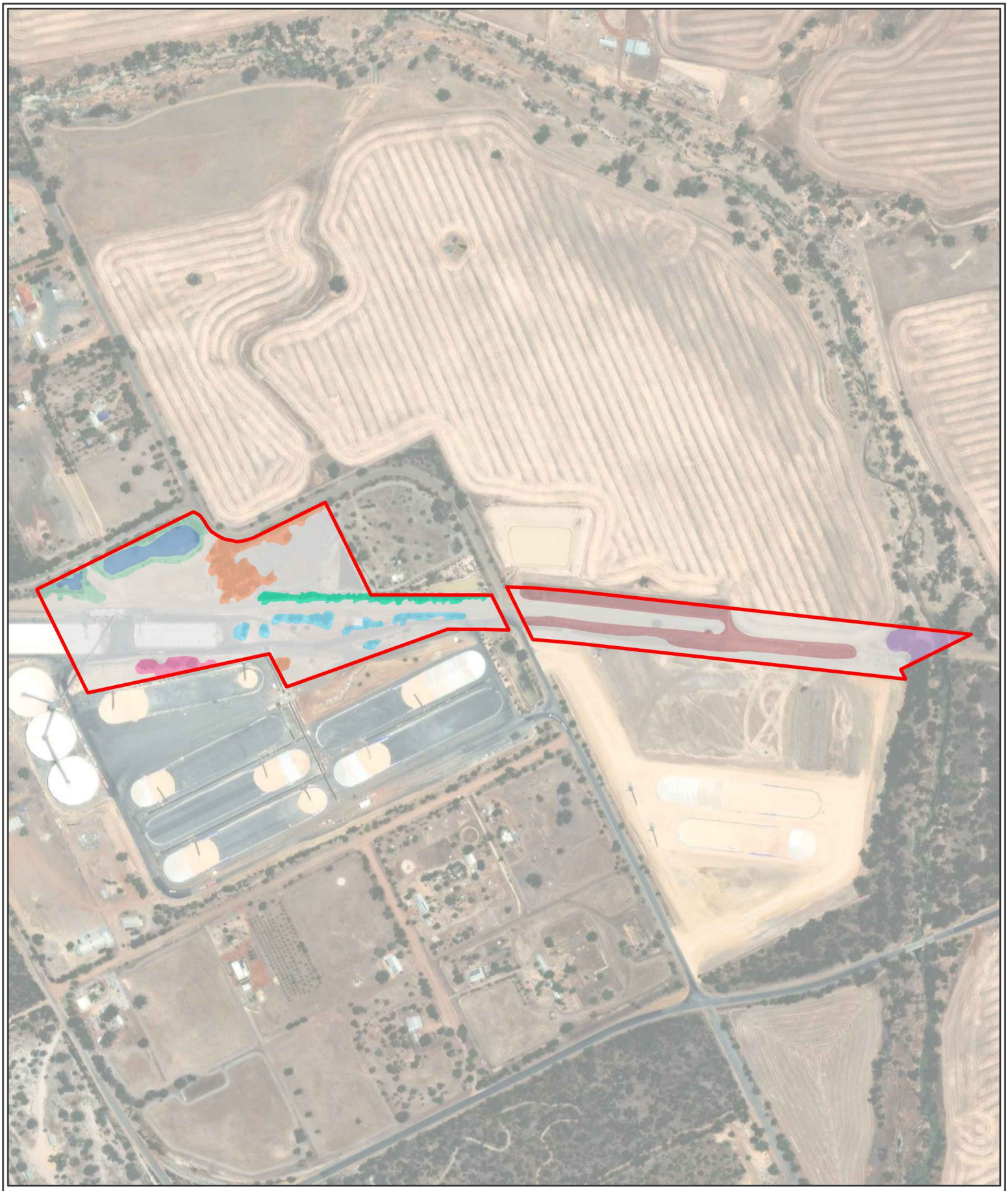


Figure 9: Vegetation Communities

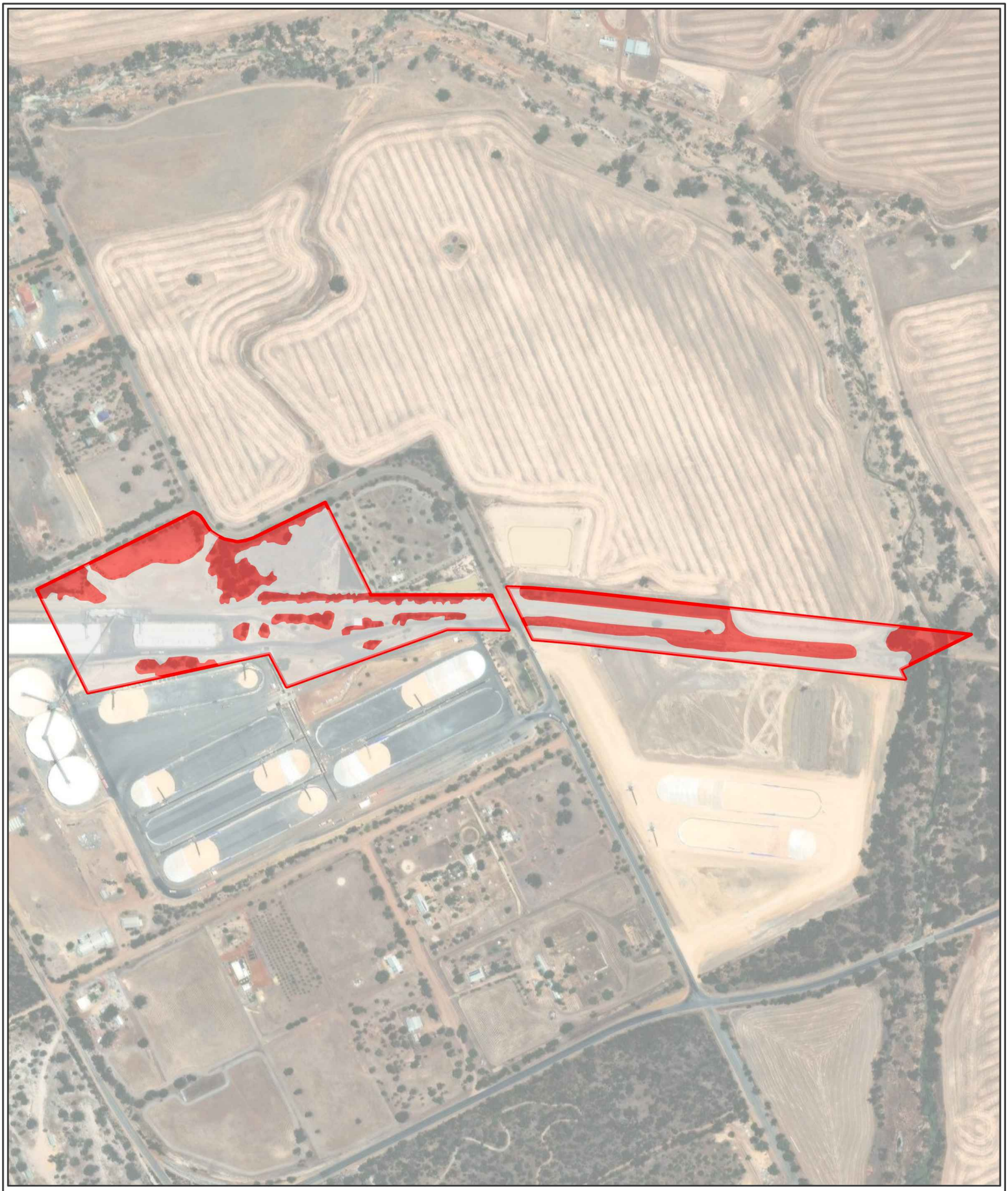


Figure 10: Vegetation Condition

Survey Area 2021

Vegetation Condition

Completely Degraded

Cleared

0 50 100 200

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 19914-RD Date: 14/12/2021

N

eco logical AUSTRALIA
A TETRA TECH COMPANY

4.3 Fauna survey

4.3.1 Fauna overview

A total of 19 vertebrate fauna species were recorded as occurring within the survey area, comprising 16 birds and three mammals. No direct (observations) or indirect (scats, tracks, diggings) evidence of conservation significant fauna species were recorded within the survey area (Appendix F).

Of the 25 conservation listed fauna species identified from the desktop assessment as possibly occurring within the survey area, three species are considered as having the potential to occur within the survey area, based on the availability of suitable habitat and close proximity of recent records:

- *Calyptorhynchus latirostris* (Carnaby's Cockatoo);
- *Falco peregrinus* (Peregrine Falcon); and
- *Platycerus icterotis* subsp. *xanthogenys* (Western Rosella).

The remaining 22 fauna species are considered as unlikely to occur or do not occur within the survey area, based on lack of suitable habitat for these species, adequacy of search effort undertaken within the survey area and proximity of previous records (DBCA 2007-2020). The fauna likelihood of occurrence assessment is provided in Appendix D. Similar to the conservation significant flora; if present, these fauna species are likely to be associated with vegetation along the Avon River South only.

Two of the 19 fauna species recorded are an introduced (pest) species, namely House Mouse (*Mus musculus*) and Red Fox (*Vulpes vulpes*).

4.3.2 Fauna habitat

Three fauna habitats were recorded within the survey area (Table 9; Figure 11). Rehabilitation and cleared areas are not considered to represent quality fauna habitat.

In general terms, fauna habitat within the survey area was predominantly comprised of eucalypt woodlands to open woodland containing various Wheatbelt eucalypt species.

Table 9: Extent of each fauna habitat in the survey area

Fauna habitat	Extent of fauna habitat in the survey area
Eucalyptus rudis woodland	0.22ha (2.36%)
Eucalyptus loxophleba low isolated trees	1.02 ha (10.72%)
Mixed isolated *Eucalyptus* spp./Allocasuarina trees	1.13 ha (11.96%)
Rehabilitation	0.38 ha (4.01%)
Cleared areas / Open water	6.73 ha (70.96%)
Total	9.49 ha (100%)

4.3.3 Black cockatoo habitat assessment

There were no black cockatoo individuals observed within the survey area during the field survey.

4.3.3.1 Foraging habitat

Foraging habitat for black cockatoos is generally defined as the availability of plant food sources within an area (Finn 2012). Food availability for black cockatoos is a function of the diversity, abundance, distribution, energetic and nutritional qualities, and seasonality (phenology) of the food sources within a particular area. Black cockatoo foraging habitat within the survey area has been determined using vegetation associations defined in the vegetation assessment, ground-truthing in the field and availability and density of plant food sources. Local context was also considered (i.e. the relative value of the habitat in comparison to other areas within the 'local area' [nominally a 5 km buffer']).

All suitable black cockatoo foraging habitat within the survey area (1.38 ha) is considered as providing 'Poor' quality foraging habitat for all three black cockatoo species (SEWPaC 2012) due to a lack of density of suitable or preferred foraging species and desktop comparison with other habitat in the local area. Cleared and other areas within the survey area (8.11 ha) provide 'Nil' foraging habitat for black cockatoo species.

No signs of black cockatoo foraging were recorded in the survey area.

Table 10: Definition and extent of black cockatoo foraging habitat quality within the survey area

Foraging quality	Justification	Extent (ha) within survey area	% of survey area
Poor	Low density of species suitable for foraging by black cockatoos (i.e. foliage cover of suitable species 10-20%) and presence of food sources at only one stratum (i.e. canopy)	1.38	14.50
Nil	Cleared areas or no suitable vegetation present.	8.11	85.50
Total		**9.49**	**100**

4.3.3.2 Breeding and roosting habitat

The black cockatoo breeding habitat assessment identified 13 potentially suitable breeding trees within the survey area, none of which contained a potentially suitable hollow for black cockatoos. ELA (2020) identified a single *Eucalyptus rudis* tree within the survey area which had a potentially suitable hollow for black cockatoos, however at the time of assessment was only able to be observed from the ground. The 2021 survey confirmed that the potential hollow identified in ELA (2020) was in fact, not an actual hollow and therefore none of the potential black cockatoo breeding trees within the survey area contain hollows. An overview of potentially suitable black cockatoo breeding trees is provided in Table 11 and Figure 12.

All potential breeding trees recorded from the survey area also provide potential suitable roosting habitat for black cockatoos as defined by the referral guidelines (SEWPaC 2012). Although not directly observed during the field survey, Carnaby's Cockatoo (*Calyptorhynchus latirostris*) is considered as having the potential to occur within the survey area, due to the availability of potentially suitable breeding and roosting trees, and the nearby proximity of several known records of this species. The survey area occurs at the eastern extremity of the known range of Forest Red-tailed Black Cockatoo (*C. banksii naso*) and given the limited suitable habitat, the species is considered unlikely to occur.

Table 11: Potential black cockatoo breeding trees within the survey area

Tree species	Suitability for breeding (SEWPaC 2012)	Suitability for night roosting (SEWPaC 2012)	Number of trees	Number with suitable hollows
Eucalyptus camaldulensis	Carnaby's Cockatoo	Carnaby's Cockatoo	2	0
Eucalyptus rudis (Flooded Gum)	Carnaby's Cockatoo	Carnaby's Cockatoo	9	0
Eucalyptus marginata (Jarrah)	Carnaby's Cockatoo, Forest Red-tailed Black Cockatoo	Carnaby's Cockatoo, Forest Red-tailed Black Cockatoo	1	0
**Eucalyptus cladocalyx*	Carnaby's Cockatoo	Carnaby's Cockatoo	1	0
Total			**13**	**0**

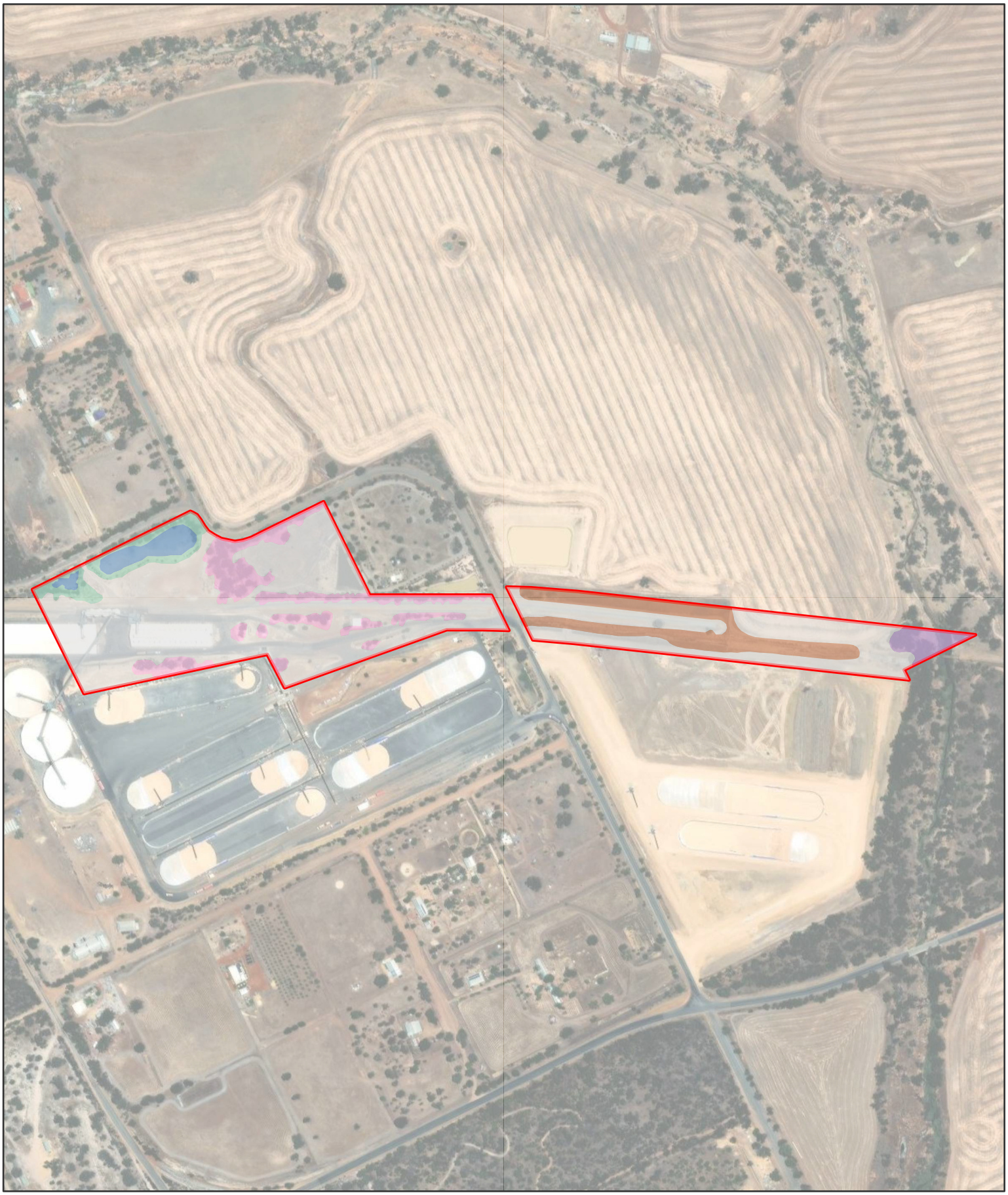


Figure 11: Fauna Habitat

Survey Area 2021

Fauna Habitat

- *Eucalyptus loxophleba* low isolated trees
- *Eucalyptus rudis* Woodland
- Mixed isolated *Eucalyptus* spp./*Allocasuarina* trees
- Cleared
- Open Water
- Rehabilitation

0 50 100 200

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 19914-RD Date: 16/12/2021

eco logical AUSTRALIA
A TETRA TECH COMPANY

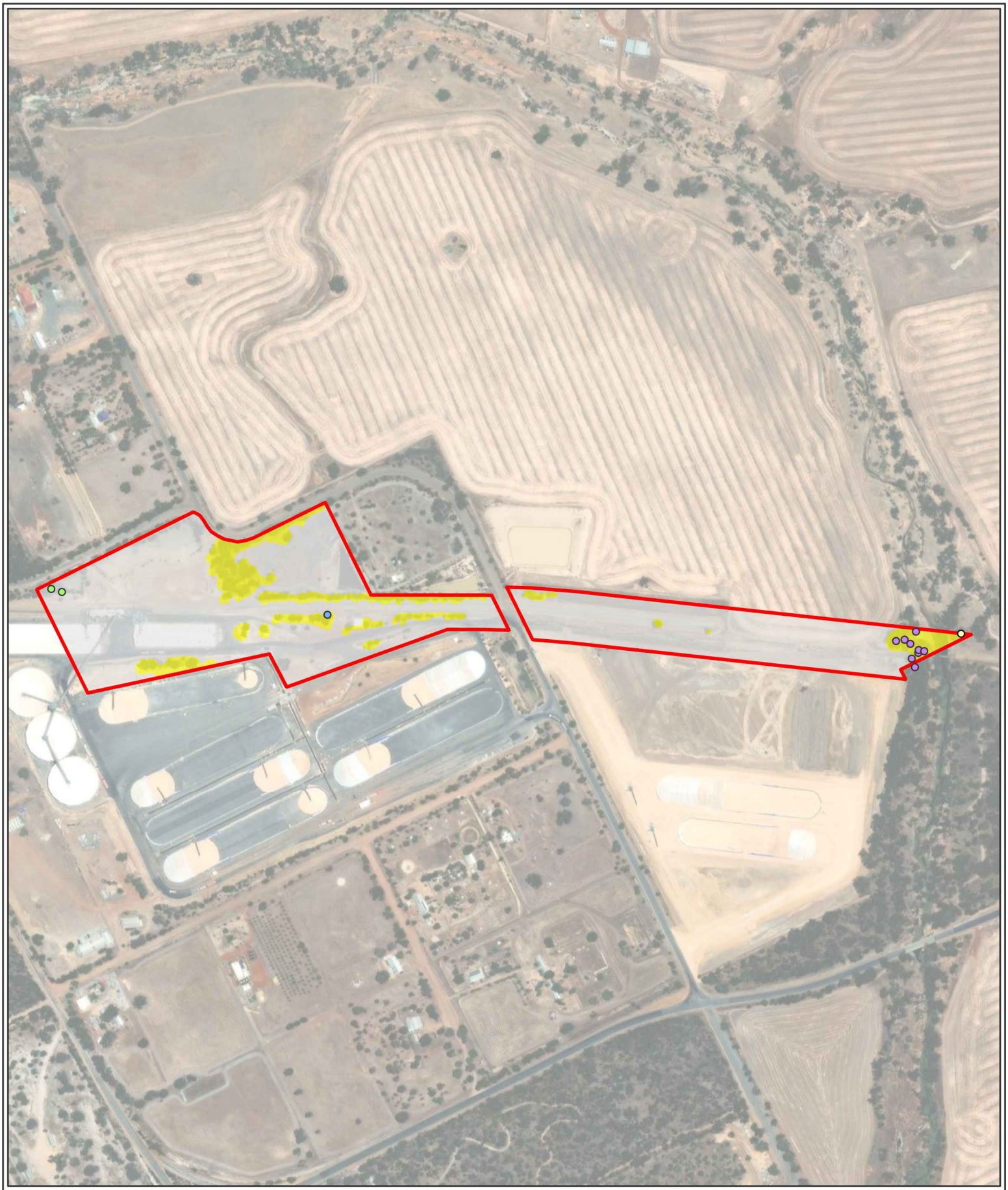


Figure 12: Black Cockatoo Potentially Suitable Habitat

Survey Area 2021

Black Cockatoo Foraging Quality

- Poor
- Nil

Potential black cockatoo breeding trees

- **Eucalyptus cladocalyx*
- *Eucalyptus camaldulensis*
- *Eucalyptus marginata*
- *Eucalyptus rudis*

0 50 100 200

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

Project: 19914-RD Date: 21/12/2021

N

eco logical AUSTRALIA
A TETRA TECH COMPANY

5. Discussion

5.1 Flora

A total of 47 flora species representing 21 families and 36 genera were recorded from the survey area. Families with the highest number of species included Myrtaceae (10 species), Poaceae (10 species) and Fabaceae (4 species).

A high proportion (26 of the 47) flora species recorded within the survey area are introduced (weed) species. One of these species (**Echium plantagineum*; Paterson's Curse) is listed as a Declared Pest under s22(2) of the BAM Act. All other introduced (weed) species recorded are listed on the Western Australian Organism List (WAOL) Database as S-11 (permitted) species, indicating that no specific management of these species is required. None of the introduced (weed) species recorded are Weeds of National Significance (WoNS).

5.1.1 Conservation significant flora

No Threatened flora species as listed under s. 178 of the EPBC Act or pursuant to Part 2 of the BC Act and as listed by DBCA (2019) or Priority flora species as listed by DBCA and WAH (2021) were recorded within the survey area.

None of the 62 conservation significant flora species are considered likely to occur within the survey area due to unsuitable habitat requirements and historical degradation

5.2 Vegetation

At a broad level, the survey area is comprised of historically cleared land used for agricultural purposes with small, isolated pockets of highly modified vegetation remaining. Vegetation along the Avon River South is the most contiguous area of vegetation within he survey area, however aside from the canopy, vegetation in this area has also been modified and impacted by historical land uses.

A total of six communities were delineated and mapped within the survey area. The most widespread vegetation community was EllT: *Eucalyptus loxophleba* low isolated trees over *Maireana brevifolia* low sparse chenopod shrubland over low mixed exotic herbs and grasses, which covered 10.72% (1.01 ha) of the survey area. Cleared areas, including roads, tracks and pasture and open water, covered 70.96% (6.73 ha) of the survey area.

Vegetation condition within the entire survey area was ranked as Completely Degraded based on the Keighery (1994) vegetation condition scale provided in the EPA *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessmen*t (EPA 2016a) or Nil (Cleared).

Primary disturbances within the survey area included historical clearing and the presence of introduced (weed) species. Majority of native vegetation has been removed within the survey area and grassy weeds have invaded these areas. Riparian vegetation associated with the Avon River South has also been historically modified and is now predominantly comprised of remnant *E. rudis* trees over weeds including **Juncus acutus* and several grasses/herbs.

© ECO LOGICAL AUSTRALIA PTY LTD

5.2.1 Conservation significant ecological communities

None of the vegetation communities mapped within the survey area are considered to represent the Eucalypt Woodlands of the Western Australian Wheatbelt TEC. Whilst six of the seven communities contained eucalypt species, the type of species present, canopy cover and/or condition of these communities did not meet the key diagnostic characteristics and/or minimum patch size to be considered part of the TEC.

Based on the above, no TECs or PECs occur or are inferred to occur within the survey area.

5.3 Fauna

A total of 19 vertebrate fauna species were recorded as occurring within the survey area, comprising 16 birds and three mammals, none of which are listed as conservation significant under the EPBC Act, the BC Act or by DBCA. fauna species are likely to be associated with vegetation along the Avon River South only. Two of the 19 fauna species recorded are an introduced (pest) species, namely House Mouse (*Mus musculus*) and Red Fox (*Vulpes vulpes*).

Of the 25 conservation listed fauna species identified from the desktop assessment as possibly occurring within the survey area, three species are considered as having the potential to occur within the survey area, based on the availability of suitable habitat and close proximity of recent records:

- *Calyptorhynchus latirostris* (Carnaby's Cockatoo);
- *Falco peregrinus* (Peregrine Falcon); and
- *Platycerus icterotis* subsp. *xanthogenys* (Western Rosella).

The remaining 22 fauna species are considered as unlikely to occur or do not occur within the survey area, based on lack of suitable habitat for these species, adequacy of search effort undertaken within the survey area and proximity of previous records (DBCA 2007-2020). The fauna likelihood of occurrence assessment is provided in Appendix D. Similar to the conservation significant flora; if present, these

Three fauna habitats were recorded within the survey area (not including rehabilitation and cleared areas). In general terms, fauna habitat within the survey area was predominantly comprised of eucalypt woodlands to open woodland containing various Wheatbelt eucalypt species.

5.3.1 Black cockatoos

There were no black cockatoo individuals observed within the survey area during the field survey.

All suitable black cockatoo foraging habitat within the survey area (1.38 ha) is considered as providing 'Poor' quality foraging habitat for all three black cockatoo species (SEWPaC 2012) due to a lack of density of suitable or preferred foraging species and desktop comparison with other habitat in the local area. No signs of black cockatoo foraging were recorded in the survey area.

The black cockatoo breeding habitat assessment identified 13 potentially suitable breeding trees within the survey area, none of which contained a potentially suitable hollow for black cockatoos. ELA (2020) identified a single *Eucalyptus rudis* tree within the survey area which had a potentially suitable hollow for black cockatoos, however at the time of assessment was only able to be observed from the ground. The 2021 survey confirmed that the potential hollow identified in ELA (2020) was in fact, not an actual

hollow and therefore none of the potential black cockatoo breeding trees within the survey area contain hollows.

All potential breeding trees recorded from the survey area also provide potential suitable roosting habitat for black cockatoos as defined by the referral guidelines (SEWPaC 2012). Although not directly observed during the field survey, Carnaby's Cockatoo (*Calyptorhynchus latirostris*) is considered as having the potential to occur within the survey area, due to the availability of potentially suitable breeding and roosting trees, and the nearby proximity of several known records of this species. The survey area occurs at the eastern extremity of the known range of Forest Red-tailed Black Cockatoo (*C. banksii naso*) and given the limited suitable habitat, the species is considered unlikely to occur.

6. References

Beard, J.S. 1975. *The vegetation survey of Western Australia.* Explanatory notes to Sheet 4, 1:1,000,000 Series Vegetation Survey of Western Australia. University of Western Australia Press, Nedlands.

Beecham, B. 2001. *Avon Wheatbelt 2 (AW2 – Re-juvenated Drainage subregion).* In A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Department of Conservation and Land Management.

Bureau of Meteorology (BoM) 2021. *Climate Data Online*. Accessed online at http://www.bom.gov.au/climate/data/index.shtml

Bush, B., Maryan, B., Browne-Cooper, R. and Robinson, D. 2010. *Field Guide to Reptiles and Frogs of the Perth Region.* Western Australian Museum.

Department of Agriculture, Water and the Environment (DAWE). 2020. *EPBC Act Protected Matters Search Tool*. Available: http://www.environment.gov.au/epbc/pmst/index.html.

Department of Agriculture, Water and the Environment (DAWE). 2021. *Australia's bioregions (IBRA)*. Available from: https://www.environment.gov.au/land/nrs/science/ibra. Accessed August 2021.

Department of Biodiversity, Conservation and Attractions (DBCA). 2019. *Conservation Codes For Western Australian Flora and Fauna*. Department of Biodiversity, Conservation and Attractions, Perth.

Department of Biodiversity, Conservation and Attractions and the Western Australian Herbarium (DBCA and WAH). 2021. *FloraBase—the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. Available from: https://florabase.dpaw.wa.gov.au/. Accessed August 2021.

Department of Biodiversity, Conservation and Attractions (DBCA). 2020a. *Threatened and Priority Flora database search*. Reference number 09-0620FL. Department of Biodiversity, Conservation and Attractions, Perth.

Department of Biodiversity, Conservation and Attractions (DBCA). 2020b. *Threatened and Priority Communities database search*. Reference number 24-0620EC. Department of Biodiversity, Conservation and Attractions, Perth.

Department of Biodiversity, Conservation and Attractions (DBCA). 2020c. *Threatened and Priority Fauna database search*. Reference number FAUNA#6358. Department of Biodiversity, Conservation and Attractions, Perth.

Department of Biodiversity, Conservation and Attractions (DBCA). 2007-2020. *NatureMap*. Department of Biodiversity, Conservation and Attractions. Available at: https://naturemap.dpaw.wa.gov.au/default.aspx

Department of the Environment (DoE). 2015. *Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt*. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/128-conservation-advice.pdf. In effect under the EPBC Act from 04-Dec-2015.

Department of Water (DoW). 2008. *Water resource management series: Priority tributaries of the Avon River basin: a process to prioritise tributaries for condition assessment (Volume 1: Avon and Mortlock catchments)*. Government of Western Australia.

Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC). 2012. *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's Cockatoo (Endangered) Calyptorhynchus latirostris, Baudin's Cockatoo (Vulnerable) Calyptorhynchus baudinii, Forest Red-tailed Black cockatoo (Vulnerable) Calyptorhynchus banksii naso.* Australian Government Department of Sustainability, Environment, Water, Populations and Communities, Parkes, ACT.

Eco Logical Australia (ELA). 2020. *Flora and Fauna Survey of CBH Brookton site*. Report prepared for CBH Group.

Environmental Protection Authority (EPA). 2016a. *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment.* Perth, Western Australia.

Environmental Protection Authority (EPA). 2016b. *Technical Guidance: Terrestrial Fauna Surveys.* Perth, Western Australia.

Environmental Protection Authority (EPA). 2020. *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment*. Perth, Western Australia.

Finn, H. 2012. *Assessment of habitat values for black-cockatoos within selected sites at Newmont Boddington Gold Mine*. Report prepared for Newmont Boddington Gold Pty Ltd.

Government of Western Australia. 2019. *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019.* WA Department of Biodiversity, Conservation and Attractions, Perth, https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics

Keighery, B. J. 1994. Bushland Plant Survey: *A guide to plant community survey for the community.* Wildflower Society of Western Australia, Nedlands.

Menkhorst, P. and Knight, F. 2011. *Field Guide to Mammals of Australia.* Oxford University Press Australia, Melbourne.

Morcombe, M. 2003. *Field Guide to Australian Birds*. Steve Parish Publications, Brisbane.

Shepherd, D. P., Beeston, G. R. and Hopkins, A. J. M. 2002. *Native vegetation in Western Australia. Extent, type and status.* Department of Agriculture, South Perth, WA. Resource Management Technical Report 249.

Western Australian Museum (WAM). 2020. *Checklist of the Terrestrial Vertebrate Fauna of Western Australia*. Updated April 2020. Government of Western Australia.

Wilson, S., and Swan, G. 2010. *A Complete Guide to Reptiles of Australia*. Third Edition. New Holland Publishers, Sydney, Australia.

Appendix A Framework for conservation significant flora and fauna ranking

CATEGORIES OF THREATENED SPECIES UNDER THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (EPBC ACT)

Threatened fauna and flora may be listed in any one of the following categories as defined in Section 179 of the EPBC Act. Species listed as 'conservation dependent' and 'extinct' are not Matters of National Environmental Significance and therefore do not trigger the EPBC Act.

Category	Definition
Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (EW)	Taxa known to survive only in captivity or as a naturalised population well outside its past range; or taxa has not been recorded in its known and/or expected habitat at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered (CE)	Taxa considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Taxa considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Taxa considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	Taxa has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LC)	Taxa has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
Data Deficient (DD)	There is inadequate information to make a direct, or indirect, assessment of taxa's risk extinction based on its distribution and/or population status.
Not Evaluated (NE)	Taxa has not yet been evaluated against the criteria.
Migratory (MI)	Not an IUCN category. Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including: • the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animal) for which Australia is a range state; • the agreement between the Government of Australian and the Government of the People's Republic of China for the Protection of Migratory Birds and their environment (CAMBA); • the agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); or • the agreement between Australia and the Republic of Korea to develop a bilateral migratory bird agreement similar to the JAMBA and CAMBA in respect to migratory bird conservation and provides a basis for collaboration on the protection of migratory shorebirds and their habitat (ROKAMBA).

CONSERVATION CODES FOR WESTERN AUSTRALIA FLORA AND FAUNA

The Wildlife Conservation (Specially Protected Fauna) Notice 2018 and the Wildlife Conservation (Rare Flora) Notice 2018 have been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Specially protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

Threatened species (T)
Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Category	Code	Description
Critically Endangered species	CR	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
Endangered species	EN	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.

Category	Code	Description
Vulnerable species	VU	Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild, as follows:

Category	Code	Description
Extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.
Extinct in the wild species	EW	Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

Categories are detailed below.

Category	Code	Description
Migratory species	MI	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Species of special conservation interest (conservation dependent fauna)	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Other specially protected species	OS	Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

Priority species (P)

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Category	Code	Definition
Priority 1	P1	*Poorly-known species* Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2	P2	*Poorly-known species* Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3	P3	*Poorly-known species* Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4	P4	*Rare, Near Threatened and other species in need of monitoring* (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Appendix B Likelihood of occurrence assessment criteria

Likelihood rating	Criteria
Recorded	The species has previously been recorded within survey area from DBCA database search results and/or from previous surveys of the survey area, and/or the species has been confirmed through a current vouchered specimen at WA Herbarium.
Likely	The species has not previously been recorded from within the survey area. However, (to qualify requires one or more criteria to be met): the species has been recorded in close proximity to the survey area, and occurs in similar habitat to that which occurs within the survey area core habitat and suitable landforms for the species occurs within the survey area either year-round or seasonally. In relation to fauna species, this could be that a host plant is seasonally present on site, or habitat features such as caves are present that may be used during particular times during its life cycle e.g. for breeding. In relation to both flora and fauna species, it may be there are seasonal wetlands present there is a medium to high probability that a species uses the survey area.
Potential	The species has not previously been recorded from within the survey area. However, (one or more criteria requires to be met): targeted surveys may locate the species based on records occurring in proximity to the survey area and suitable habitat occurring in the survey area the survey area has been assessed as having potentially suitable habitat through habitat modelling the species is known to be cryptic and may not have been detected despite extensive surveys the species is highly mobile and has an extensive foraging range so may not have been detected during previous surveys The species has been recorded in the survey area by a previous consultant survey or there is historic evidence of species occurrence within the survey area. However, (one or more criteria requires to be met): doubt remains over taxonomic identification, or the majority of habitat does not appear suitable (although presence cannot be ruled out due to factors such as species ecology or distribution) coordinates are doubtful.
Unlikely	The species has been recorded locally through DBCA database searches. However, it has not been recorded within the survey area and it is unlikely to occur due to the site lacking critical habitat, having at best marginally suitable habitat, and/or being severely degraded it is unlikely to occur due to few historic record/s and no other current collections in the local area. The species has been recorded within the bioregion based on literature review but has not been recorded locally or within the survey area through DBCA database searches. The species has not been recorded in the survey area despite adequate survey efforts, such as a standardised methodology or targeted searching within potentially suitable habitat.

Likelihood rating	Criteria
Does not occur (one or more criteria requires to be met).	The species is not known to occur within the IBRA bioregion based on current literature and distribution. The conspicuous species has not been recorded in the survey area despite adequate survey efforts at an appropriate time of year to detect the species within potentially suitable habitat. The survey area lacks important habitat for a species that has highly selective habitat requirements. The species has been historically recorded within survey area or locally; however, it is considered locally extinct due to significant habitat changes such as land clearing and/or introduced predators.

Appendix C Flora likelihood of occurrence assessment

Species	Conservation status		Source	Likelihood of occurrence
	EPBC Act	BC Act / DBCA		
Guichenotia seorsiflora	CR	CR	PMST	Unlikely
Caladenia williamsiae	CR	EN	DBCA 2020a, PMST, NatureMap	Unlikely
Grevillea dryandroides subsp. *hirsuta*	CR	EN	PMST	Unlikely
Grevillea scapigera	CR	EN	PMST	Unlikely
Acacia cochlocarpa subsp. *cochlocarpa*	EN	CR	PMST	Unlikely
Lasiopetalum pterocarpum	EN	CR	NatureMap	Unlikely
Acacia ataxiphylla subsp. *magna*	EN	EN	PMST	Unlikely
Banksia cuneata	EN	EN	PMST	Unlikely
Banksia oligantha	EN	EN	PMST	Unlikely
Caladenia hoffmanii	EN	EN	PMST	Unlikely
Grevillea christineae	EN	EN	PMST	Unlikely
Lasiopetalum rotundifolium	EN	EN	DBCA 2020a, PMST, NatureMap	Unlikely
Melaleuca sciotostyla	EN	EN	PMST	Unlikely
Acacia brachypoda	EN	VU	DBCA 2020a, PMST, NatureMap	Unlikely
Boronia capitata subsp. *capitata*	EN	VU	DBCA 2020a, PMST, NatureMap	Unlikely
Lechenaultia laricina	EN	VU	DBCA 2020a, NatureMap	Unlikely
Roycea pycnophylloides	EN	VU	PMST	Unlikely

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Conservation status		Source	Likelihood of occurrence
	EPBC Act	BC Act / DBCA		
Verticordia fimbrilepis subsp. *fimbrilepis*	EN	VU	PMST	Unlikely
Hakea aculeata	VU	EN	DBCA 2020a, PMST, NatureMap	Unlikely
Diuris micrantha	VU	VU	PMST	Unlikely
Eleocharis keigheryi	VU	VU	DBCA 2020a, PMST, Naturemap	Unlikely
Pultenaea pauciflora	VU	VU	PMST	Unlikely
Thomasia montana	VU	VU	DBCA 2020a, PMST, NatureMap	Unlikely
Acacia sclerophylla var. *teretiuscula*	-	P1	DBCA 2020a, NatureMap	Unlikely
Eremophila glabra subsp. York (P.G. Wilson 12172 B)	-	P1	DBCA 2020a, NatureMap	Unlikely
Eremophila sp. Beverley (K Kershaw KK 2438)	-	P1	DBCA 2020a, NatureMap	Unlikely
Acacia vittata	-	P2	DBCA 2020a, NatureMap	Unlikely
Banksia dallanneyi subsp. *agricola*	-	P2	DBCA 2020a, NatureMap	Unlikely
Banksia subpinnatifida var. *subpinnatifida*	-	P2	DBCA 2020a, NatureMap	Unlikely
Calytrix sagei	-	P2	DBCA 2020a, NatureMap	Unlikely
Chamelaucium sp. Dryandra (D. Rose 446)	-	P2	DBCA 2020a, NatureMap	Unlikely
Lasiopetalum sp. Weam Reserve (M. Hislop 2755)	-	P2	DBCA 2020a, NatureMap	Unlikely
Leucopogon audax	-	P2	DBCA 2020a, NatureMap	Unlikely
Levenhookia pulcherrima	-	P2	DBCA 2020a, NatureMap	Unlikely
Millotia tenuifolia var. *laevis*	-	P2	DBCA 2020a	Unlikely
Persoonia hakeiformis	-	P2	DBCA 2020a, NatureMap	Unlikely
Synaphea boyaginensis	-	P2	DBCA 2020a, NatureMap	Unlikely
Xanthoparmelia fumigata	-	P2	DBCA 2020a	Unlikely

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Conservation status		Source	Likelihood of occurrence
	EPBC Act	BC Act / DBCA		
Acacia adjutrices	-	P3	DBCA 2020a, NatureMap	Unlikely
Acacia lirellata subsp. *lirellata*	-	P3	DBCA 2020a, NatureMap	Unlikely
Anigozanthos bicolor subsp. *exstans*	-	P3	DBCA 2020a, NatureMap	Unlikely
Austroparmelina macrospora	-	P3	DBCA 2020a	Unlikely
Beaufortia burbidgeae	-	P3	DBCA 2020a, NatureMap	Unlikely
Brachyloma mogin	-	P3	DBCA 2020a, NatureMap	Unlikely
Cryptandra beverleyensis	-	P3	DBCA 2020a, NatureMap	Unlikely
Daviesia nudiflora subsp. *drummondii*	-	P3	DBCA 2020a, NatureMap	Unlikely
Dicrastylis reticulata	-	P3	DBCA 2020a, NatureMap	Unlikely
Eutaxia rubricarina	-	P3	DBCA 2020a, NatureMap	Unlikely
Grevillea roycei	-	P3	DBCA 2020a, NatureMap	Unlikely
Hibbertia glomerata subsp. *wandoo*	-	P3	DBCA 2020a, NatureMap	Unlikely
Lepidosperma sp. Meckering (R. Davis WW 27-32)	-	P3	DBCA 2020a, NatureMap	Unlikely
Stylidium uniflorum subsp. *extensum*	-	P3	DBCA 2020a, NatureMap	Unlikely
Thysanotus tenuis	-	P3	DBCA 2020a, NatureMap	Unlikely
Acacia alata var. *platyptera*	-	P4	DBCA 2020a, NatureMap	Unlikely
Acacia cuneifolia	-	P4	DBCA 2020a, NatureMap	Unlikely
Banksia cynaroides	-	P4	DBCA 2020a, NatureMap	Unlikely
Caladenia x *triangularis*	-	P4	DBCA 2020a, NatureMap	Unlikely
Calothamnus brevifolius	-	P4	DBCA 2020a, NatureMap	Unlikely
Eucalyptus caesia subsp. *caesia*	-	P4	DBCA 2020a, NatureMap	Unlikely
Eucalyptus exilis	-	P4	DBCA 2020a, NatureMap	Unlikely

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Conservation status		Source	Likelihood of occurrence
	EPBC Act	BC Act / DBCA		
Gastrolobium stipulare	-	P4	DBCA 2020a, NatureMap	Unlikely
Stylidium tenuicarpum	-	P4	DBCA 2020a, NatureMap	Unlikely

© ECO LOGICAL AUSTRALIA PTY LTD

Appendix D Fauna likelihood of occurrence assessment

Species	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
Calidris ferruginea	Curlew Sandpiper	CR, M	CR, M	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. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	PMST	Unlikely	Negligible habitat occurs within the survey area.
Bettongia penicillata ogilbyi	Woylie	EN	CR	Inhabits woodlands and adjacent heaths with a dense understorey of shrubs, particularly *Gastrolobium* spp. (poison pea). Woylies rest during the day in a well-concealed nest built over a shallow depression. The nest is most commonly built using long strands of grasses, but other material such as strips of bark are also used (in the forest) or dried seagrass and/or spinifex (in arid coastal areas).	DBCA 2020c, PMST, NatureMap	Unlikely	No suitable habitat occurs within the survey area.
Calyptorhynchus latirostris	Carnaby's Cockatoo	EN	EN	Carnaby's Cockatoo occurs in uncleared or remnant native eucalypt woodlands and in shrubland or kwongan heathland. Forages seasonally in pine plantations, around Perth metropolitan, and forests containing Marri, Karri and Jarrah.	DBCA 2020c, PMST, NatureMap	Potential	The survey area occurs within the known range of this species and the species has been recorded occurring nearby. Suitable roosting and nesting habitat and somewhat marginal feeding habitat is present within the survey area.

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
Myrmecobius fasciatus	Numbat	EN	EN	The numbat's original habitat ranged from *Acacia aneura* (mulga) woodland and sand plain and sand dune areas dominated by *Triodia* spp. (spinifex) hummock grassland in the arid zone to eucalypt woodlands and forests in south-west Western Australia. Numbats seek overnight refuge in hollow logs, tree hollows and burrows, which provide protection from predators.	DBCA 2020c, PMST, NatureMap	Unlikely	No suitable habitat occurs within the survey area.
Rostratula australis	Australian Painted Snipe	EN	EN	Inhabits a variety of freshwater habitats including temporary and permanent wetlands (shallows and mudbanks) where there is emergent low vegetation, tree-lined banks, or fallen or washed-up timber.	PMST	Unlikely	Negligible habitat occurs within the survey area.
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo	VU	VU	Inhabits dense Jarrah, Karri and Marri forests which receive more than 600 mm average annual rainfall. Known to feed in more open agricultural areas and metropolitan Perth.	DBCA 2020c, PMST, NatureMap	Unlikely	The survey area occurs at the eastern extremity of the known range of this species. Foraging habitat for this species within the survey area is marginal.
Dasyurus geoffroii	Chuditch, Western Quoll	VU	VU	Chuditch use a range of habitats including forest, mallee shrublands, woodland and desert. The most dense populations have been found in riparian jarrah forest. Chuditch require adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive.	DBCA 2020c, PMST, NatureMap	Unlikely	No suitable habitat occurs within the survey area. Nearby records for this species are historical.
Lagostrophus fasciatus subsp. *fasciatus*	Banded hare-wallaby	VU	VU	Restricted to the offshore Bernier and Dorre Islands in Shark Bay, Western Australia.	DBCA 2020c, NatureMap	Unlikely	Likely incorrect record given the species only occurs on the offshore Bernier and Dorre Islands in Shark Bay.

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
Leipoa ocellata	Malleefowl	VU	VU	Occurs in scrubland and woodland dominated by mallee and wattle species. In Western Australia they are also found in some shrublands dominated by acacia, and occasionally in woodlands dominated by eucalypts such as Wandoo *E. wandoo*, Marri *Corymbia calophylla* and Mallet *E. astringens*.	DBCA 2020c, PMST, NatureMap	Unlikely	Habitat within the survey area is not suitable and would not provide enough cover and shelter for this species.
Macrotis lagotis	Bilby	VU	VU	The remaining populations of the greater bilby occupy three main habitats: open tussock grassland on uplands and hills, *Acacia aneura* (mulga) woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas.	DBCA 2020c, NatureMap	Unlikely	Likely incorrect record given the species distribution.
Phascogale calura	Red-tailed Phascogale	VU	CD	Historically widespread throughout woodland habitats, however, now they are restricted to remnant mature *Eucalyptus wandoo* or *Allocasuarina huegeliana* woodlands in the south of the wheatbelt. A preference for unburnt habitat with a continuous canopy and the presence of tree hollows.	DBCA 2020c, PMST, NatureMap	Unlikely	No suitable habitat for this species occurs within the survey area.
Westralunio carteri	Carter's Freshwater Mussel	VU	VU	Freshwater streams, rivers, reservoirs and lakes within 50-100 km of the coast, from Gingin Brook southward to the Kent River, Goodga River and Waychinicup River.	DBCA 2020c, NatureMap	Unlikely	The conservation advice for this species shows this species is absent from the survey area.
Actitis hypoleucos	Common Sandpiper	M	M	Wide range of coastal wetlands and some inland wetlands. Is mostly found around muddy margins or rocky shores and rarely on mudflats.	DBCA 2020c, PMST	Unlikely	Negligible habitat occurs within the survey area.

Species	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
Apus pacificus	Fork-tailed Swift	M	M	In Australia, they mostly occur over 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. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes.	PMST	Unlikely	This species, although has a wide variety of habitat requirements, is rarely recorded inland.
Calidris acuminata	Sharp-tailed Sandpiper	M	M	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms.	PMST	Unlikely	Negligible habitat occurs within the survey area.
Calidris melanotos	Pectoral Sandpiper	M	M	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	PMST	Unlikely	Negligible habitat occurs within the survey area.

Species	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
Motacilla cinerea	Grey Wagtail	M	M	This species inhabits fast-flowing mountain streams and rivers with riffles and exposed rocks or shoals, often in forested areas. It is also found in more lowland watercourses, even canals, where there are artificial waterfalls, weirs, millraces or lock gates. Outside of the breeding season it occupies a wider variety of habitats, including farmyards, sewage farms, forest tracks, tea estates and even town centres.	PMST	Unlikely	No suitable habitat occurs within the survey area.
Falco peregrinus	Peregrine Falcon	-	S	Peregrine falcons prefer open habitats, such as grasslands, tundra, and meadows. They are most common in tundra and coastal areas and rare in sub-tropical and tropical habitats. They nest on cliff faces and crevices. They have recently begun to colonize urban areas because tall buildings are suitable for nesting in this species, and because of the abundance of pigeons as prey items.	DBCA 2020c, NatureMap	Potential	This species has a wide range and preferred habitat type.
Phascogale tapoatafa wambenger	Brush-tailed Phascogale	-	CD	Inhabits dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover.	DBCA 2020c	Unlikely	No suitable habitat occurs within the survey area.
Acanthopis antarcticus	Southern Death Adder	-	P3	Inhabits a wide variety of habitats in association with deep leaf litter, including rainforests, wet sclerophyll forests, woodland, grasslands, chenopod dominated shrublands, and coastal heathlands.	DBCA 2020c, NatureMap	Unlikely	No suitable habitat occurs within the survey area.

© ECO LOGICAL AUSTRALIA PTY LTD

Species	Common name	Conservation status		Habitat	Source	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA				
Isoodon fusciventer	Quenda	-	P4	Inhabits scrubby, often swampy, vegetation with dense cover up to 1 m high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses.	DBCA 2020c, NatureMap	Unlikely	Some suitable habitat occurs within the survey area, however is degraded and frequented by predators.
Notamacropus eugenii subsp. *derbianus*	Tammar Wallaby	-	P4	Inhabits dense, low vegetation for daytime shelter and open grassy areas for feeding. This species inhabits coastal scrub, heath, dry sclerophyll forest and thickets in mallee and woodland.	DBCA 2020c, NatureMap	Unlikely	No suitable habitat occurs within the survey area.
Notamacropus irma	Western Brush Wallaby	-	P4	Inhabits open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest..	DBCA 2020c, NatureMap	Unlikely	No suitable habitat occurs within the survey area.
Platycercus icterotis subsp. xanthogenys	Western Rosella	-	P4	The south-west subspecies is found in eucalypt forests and woodlands among the wetter areas of Jurien to Green Range including areas containing flooded gum (*Eucalyptus rudis*), karri (*E. diversicolor*), marri (*Corymbia calophylla*) and paperbark (*Melaleuca* spp). The inland subspecies is found in eucalypt and sheoak woodlands and scrubs, especially those containing wandoo (*E. wandoo*), flooded gum, salmon gum (*E. salmonophloia*), tall mallee and rock sheoak (*Allocasuarina huegeliana*). Hybrid birds, with characteristics of both subspecies, are found in areas between the two subspecies.	DBCA 2020c, NatureMap	Potential	Potential habitat for this species occurs within the survey area.

Appendix E Flora species list

Family	Species
Asparagaceae	*Dichopogon capillipes*
Asteraceae	**Arctotheca calendula*
Asteraceae	**Lactuca serriola*
Asteraceae	**Sonchus oleraceus*
Boraginaceae	**Echium plantagineum*
Brassicaceae	**Brassica x napus*
Brassicaceae	**Raphanus raphanistrum*
Casuarinaceae	*Allocasuarina huegeliana*
Chenopodiaceae	*Maireana brevifolia*
Crassulaceae	*Crassula decumbens*
Cyperaceae	*Lepidosperma costale*
Euphorbiaceae	**Euphorbia terracina*
Fabaceae	*Acacia acuminata*
Fabaceae	*Acacia colletioides*
Fabaceae	*Acacia saligna*
Fabaceae	*Gastrolobium spinosum*
Geraniaceae	**Erodium botrys*
Hemerocallidaceae	*Dianella revoluta*
Iridaceae	**Moraea miniata*
Juncaceae	**Juncus acutus subsp. acutus*
Malvaceae	**Malva parviflora*
Marsileaceae	*Marsilea drummondii*
Myrtaceae	**Eucalyptus cladocalyx*
Myrtaceae	**Eucalyptus leucoxylon*
Myrtaceae	*Callistemon sp.*
Myrtaceae	*Eucalyptus camaldulensis*
Myrtaceae	*Eucalyptus loxophleba*
Myrtaceae	*Eucalyptus marginata*
Myrtaceae	*Eucalyptus redunca*
Myrtaceae	*Eucalyptus rudis*
Myrtaceae	*Melaleuca viminea subsp. viminea*
Myrtaceae	*Taxandria linearifolia*
Oxalidaceae	**Oxalis corniculata*
Oxalidaceae	**Oxalis pes-caprae*

© ECO LOGICAL AUSTRALIA PTY LTD

Family	Species
Oxalidaceae	**Oxalis purpurea*
Papaveraceae	**Fumaria capreolata*
Poaceae	**Avena barbata*
Poaceae	**Bromus diandrus*
Poaceae	**Cynodon dactylon*
Poaceae	**Ehrharta calycina*
Poaceae	**Ehrharta longiflora*
Poaceae	**Eragrostis curvula*
Poaceae	**Hordeum leporinum*
Poaceae	**Lolium rigidum*
Poaceae	**Poaceae* sp.
Poaceae	*Neurachne alopecuroidea*
Proteaceae	*Hakea preissii*

Appendix F Fauna species list

Species	Common name	Type of observation
Birds		
Anas superciliosa	Pacific black duck	Observed
Cacatua sanguinea	Little Corella	Observed/Heard
Calamanthus campestris	Rufous Fieldwren	Heard
Chenonetta jubata	Australian wood duck	Observed
Corvus bennetti	Little Crow	Observed/Heard
Corvus coronoides	Australian Raven	Observed/Heard
Cracticus nigrogularis	Pied Butcherbird	Observed/Heard
Cracticus tibicen	Australian Magpie	Observed/Heard
Eolophus roseicapilla	Galah	Observed/Heard
Grallina cyanoleuca	Magpie-lark	Observed/Heard
Manorina flavigula	Yellow-throated miner	Observed/Heard
Ocyphaps lophotes	Crested Pigeon	Observed/Heard
Rhipidura leucophrys	Willie Wagtail	Observed/Heard
Smicrornis brevirostris	Weebill	Heard
Spilopelia senegalensis	Laughing Dove	Observed/Heard
Zosterops lateralis	Silvereye	Heard
Mammals		
Macropus fuliginosus	Western Grey Kangaroo	Scats
**Mus musculus*	House mouse	Observed
**Vulpes vulpes*	Red Fox	Diggings / Old den

© ECO LOGICAL AUSTRALIA PTY LTD

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

Appendix B CBH Environmental Management Standard

OVERVIEW

This document provides the mandatory requirements to support conformance with Environmental Management as part of the CBH Integrated Management System (IMS).

PERFORMANCE REQUIREMENTS

We meet performance requirements by:

- Placing value on sustainability and continually striving for outcomes that benefit the environment.
- Determining key environmental risks through our experience and analysing these to identify where our greatest risk exposures to potentially causing environmental harm are.
- Eliminating risks through use of the “Hierarchy of Controls”, and where this is not possible implement other controls.
- Ensuring all CBH personnel understand our environmental risks and how they are managed.
- Having an environmental and sustainable vision that manages our environmental risks effectively, so we deliver value to all our stakeholders by protecting, sustaining and enhancing the natural resources needed for the future.

References

Title	STORE ID
Health, Safety and Environment Policy	STORE-1473931053-383

CONTENTS

INTRODUCTION

The Environmental Management Standard is a set of mandatory minimum environmental management requirements that apply to all CBH Group activities.

The Standard defines the critical environmental controls required to manage key environmental risks. It has been designed to emphasise the most important requirements to manage risks that have the potential to cause environmental harm.

The Environmental Management Standard is a practical reference to assist you with implementing the required controls into every element of planning and execution of work that involves environmental risks.

Scope

This standard applies to all CBH sites, operations, project sites and associated tasks.

Exemption

Where a part of the business deems it is not reasonably practicable to meet one or more of the requirements defined within this Group Procedure, they can apply for a dispensation for a specific period which requires endorsement by the relevant General Manager, Head or Principal.

The dispensation must be documented by completing a High-Level Risk Assessment, which outlines:

- The reason for the request
- The part of the business that the dispensation applies to
- The specific duration of the dispensation
- An assessment of the risk of not complying with a requirement defined in the Environmental Management Standard, and
- Other controls that will be put in place as an alternative.

Definitions

Acronym / Term	Definition
Bunded	Infrastructure or equipment to contain substances in the event of a spill or leak. A bund might normally be a walled structure around a holding tank
Carbon Dioxide	Carbon dioxide (CO2) is gas formed by combustion of carbon and in the respiration of living organisms and is considered a greenhouse gas
Competent persons	Having the skills, knowledge and attitudes required to perform the task as required in the workplace
Emission	A substance – usually a dust or gas – which is created as a by-product of a physical process and released to the atmosphere
Fauna	The animals of a region, habitat or geological period
Flora	The plants of a region, habitat or geological period
Greenhouse Gas	A gas that contributes to the greenhouse effect by absorbing infrared radiation. Carbon dioxide and chlorofluorocarbons are examples of greenhouse gases
Hazardous Waste	Component of the waste stream which by its characteristics poses a threat or risk to public health, safety of the environment (includes substances such as asbestos, lead, chemicals). Hazardous wastes are generally unsuitable for landfill disposal and should only be transported by and to suitably licensed providers.
Hydrocarbons	Hydrocarbons are substances that contain hydrogen (H) and carbon (C) such as lubricating oils, petrol and diesel fuels, monocyclic aromatic hydrocarbons and polycyclic

Acronym / Term	Definition
	aromatic hydrocarbons (PAHs), and are considered a hazard to environment when released in an uncontrolled manner
Incandescent Lighting	Source of electrical light generated by the heating of a filament
Licensed Waste Carrier	An organisation licensed by the regulating authority to collect, transport and/or receive waste/s
Native Vegetation	Plants that are indigenous to the region including trees, shrubs herbs and grasses. Native vegetation provides habitat for plants and animals and delivers ecosystem and biodiversity benefits
Potable Water	Water fit for human consumption

1. AIR QUALITY

Application

Adverse impacts on local or regional air quality from CBH generated air emissions (such as dust, odour or combustion emissions) are to be minimised.

Critical Controls

- All air quality related emission impacts (such as dust, odour and combustion emissions) must be assessed and mitigation measures put in place where the potential exists for adverse community impacts or legislative non-compliances
- All activities involving excavation or disturbance of soils and vegetation must explore preventive controls and then implement physical controls (e.g. covering of stockpiles, water spraying, containment fencing) to prevent and/or minimise the generation of dust
- All new or refurbished infrastructure (including plant and equipment) must comply with appropriate legislative requirements with respect to Air Quality
- All heavy trafficked areas such as roadways shall be sealed or treated where practicable to reduce dust lift and dust emissions
- All Abrasive Blasting activities are to be undertaken to the requirements of Worksafe Code of Practice for Abrasive Blasting and the Environmental Protection (Abrasive Blasting) Regulations 1998
- All complaints shall be reported as per CBH's Incident Management Procedure.

2. NOISE EMISSIONS

Application

The impact on communities, people and fauna from CBH related noise emissions is to be minimised.

Critical Controls

- Prior to purchasing or hiring plant and equipment, noise emission data is to be obtained from the supplier or manufacturer. Maximum noise emission limits to ensure the workplace can remain below excessive noise levels are to be stated in specifications for the purchase or hire of plant or equipment. As far as practicable, preference shall be given to plant and equipment with low noise emissions (levels lower than 85 dB(A))
- Where possible, noise levels in areas where new plant or equipment is installed is not to exceed 85 dB(A)
- Where the purchase of equipment involves installing more than one item in the same location, the combined noise level is not to exceed 85 dB(A) (where practicable)
- Inspect, maintain and repair all plant, equipment and vehicles regularly to minimise noise levels during operation
- Following any complaint, the source of any excessive noise or vibration will be identified and work practices modified or re-scheduled to reduce or eliminate the risk of future events
- All new or refurbished infrastructure (including plant and equipment) must comply with appropriate legislative requirements with respect to Noise Emissions
- All complaints related to noise shall be reported as per CBH's Incident Management Procedure.

3. FLORA AND FAUNA

Application

Any impact on flora and/or fauna from CBH related activities is to be avoided or minimised.

Critical Controls

- Unauthorised clearing of native vegetation is not permitted. If clearing of native vegetation is necessary for any purpose or sized area (e.g. maintenance, new developments, fire breaks etc.) the project must be referred to the Environment and Sustainability Manager for assessment.
- Only suitably trained, qualified and authorised personnel are to intervene where snakes and other fauna are identified on site
- Any death, injury or damage to native fauna on a CBH site is to be reported as an incident as per CBH's Incident Management Procedure.

4. WATER QUALITY AND CONSUMPTION

Application

Water contamination and pollution causing events are to be prevented and water use efficiencies maximised on all CBH sites, projects and controlled activities.

Critical Controls

Water Quality

- No discharge of materials into the marine environment is permitted, including grain and liquid or solid wastes
- Incidents of an unauthorised discharge into the marine environment are to be reported as an incident as per CBH's Incident Management Procedure
- All equipment servicing is to be undertaken in designated areas and in a manner that ensures containment of all hydrocarbons and chemicals
- Equipment and vehicle wash-down facilities must comply with the requirements of the *Water Quality Protection Note 68 Mechanical Equipment Wash-down* (Department of Water 2006).

Water Consumption

- All mains drinking water should be metered to allow site mains and potable water use to be monitored and logged
- Any project requiring large water use requirements (i.e. 5000 kilolitres or above) should be referred to the Environment and Sustainability Manager for assessment.

5. CARBON EMISSIONS

Application

CBH is committed to reducing greenhouse gas emissions and the carbon intensity of our business and activities.

Critical Controls

- All mains electricity used should be metered to allow site energy consumption to be monitored and logged
- All incandescent lighting is to be phased out and replaced with an energy efficient lighting alternative
- Unnecessary running of plant or equipment is to be avoided to reduce energy or fuel use and minimise greenhouse gas emissions
- Unnecessary idling of vehicles and mobile plant or equipment is to be avoided to reduce fuel usage and minimise greenhouse gas emissions
- Energy efficiency shall be considered as a key factor when sourcing new plant and equipment
- Supplementary energy generation via permanent/stationary/fixed generators requires pre site installation inspection, formal asset tracking via logging in SAP, and sign off by CBH Engineering. Where practicable the most efficient/lowest emission option should be sourced.

6. LAND CONTAMINATION

Application

Ground contamination events are to be prevented from all CBH sites, projects or activities.

Critical Controls

Refuelling

- All chemical and hydrocarbon storage tanks or containers are to be double skinned or must be contained within impervious bunding that contains as a minimum 110% loss of the largest container in the bunded area in the event of a spill
- Bund walls must be at least 1 metre from the edge of fixed tanks
- Separation distances between hydrocarbons and other storage facilities (including grain stacks) are to be maintained
- Refuelling of mobile plant and equipment is to be undertaken on designated hardstand areas or provided with temporary bunding to contain spillages. Provision of spill kits must be available when refuelling
- Emergency fuel flow shut off capability are required for all bulk fuel supplies
- No new underground bulk fuel storage tanks are to be installed on CBH owned or leased sites
- Fuel dispenser nozzles must have the ability to be secured and have a means of drip containment
- All chemical and hydrocarbon storage tanks require signage including labelled contents, safe fill levels, and HAZCHEM signage as needed

Mechanical Equipment Wash Down and Servicing

- Mechanical equipment wash-down facilities must comply with the requirements of the *Water Quality Protection Note 68 Mechanical Equipment Wash-down* (Department of Water 2006)
- Mechanical equipment servicing is to be undertaken in designated areas and in a manner that ensures containment of all hydrocarbons and chemicals
- All hydrocarbon waste from servicing including rags and filters must be disposed of appropriately

Spills

- Spill kit/s must be provided and maintained in all workplaces with contents consistent with the type, nature and scale of the potential spills that could occur, and key personnel should be trained in spill response

- All vehicles transporting fuel must have a documented spill response plan and spill response kit capable of containing and absorbing fuel spills
- All hydrocarbon spills must be reported in SHARE, with any hydrocarbon spill of 25 litres or above to be reported as an incident to the relevant responsible line management (RLM) or Contracts Manager as soon as possible after the incident but no later than the end of the shift

Earth Works and Ground Disturbance

- Any site activities that involve soil or groundwater disturbance where the contamination levels of the soil and groundwater are either unknown, or where evidence of possible contamination is presented, must cease until competent persons are able to determine the contamination status or risk
- All excavation, movement, treatment, processing or remediation of contaminated soils or groundwater must be planned and conducted in accordance with the requirements of a permit that identifies the hazards and controls as per CBH's Critical Risk Control Standard.

7. WASTEApplication

The generation of waste shall be minimised where practical, and sustainable opportunities to maximise resource recovery and recycling in preference to landfill disposal are to be implemented on all CBH sites and projects.

Critical Controls

- A suitably licensed waste contractor must be used for the collection and transport of all non-domestic or industrial wastes for either offsite processing and/or disposal to an appropriately licensed facility
- All solid waste and liquid wastes generated onsite must be stored to prevent unauthorised access and uncontrolled release. All wastes removed and disposed from these structures must be done so via a suitably licensed contractor
- All excavated natural, non-contaminated soil, aggregate or rock should be separately stockpiled and re used on site where possible or offsite. Landfill disposal of clean excavated natural materials should be avoided
- No waste is to be burnt or buried on site
- All hazardous waste storage and removal must be undertaken by a suitably licensed contractor. Confirmation of licences, and waste acceptability criteria at disposal site must be confirmed prior to any removal from site. Traceability of hazardous waste via waste removal and/or disposal certificates is required.

8. CULTURAL HERITAGE

Application

All uncontrolled impacts are to be avoided, and opportunities to enhance cultural and heritage values are to be sought whenever work is undertaken on a CBH controlled site or project.

Critical Controls

- All items of heritage, cultural and or archaeological significance should be signposted and protected in accordance with regulatory requirements
- Any excavations, intrusive works or other operations that have the potential to impact areas of known heritage, cultural or archaeological items must ensure works are performed in accordance with a heritage assessment and regulatory requirements. Such areas should be signposted and segregated by physical barriers to prevent unauthorised entry

- Any activity that involves the discovery of items that may be of cultural or archaeological significance must cease until competent persons are able to determine the status of any potential artefact(s).

9. DOCUMENT CONTROL

Authorities

Approved By	Head of Safety and Environment	**Approval Date**	18/02/2021
Review Frequency	Bi-annual	**Next Review Date**	18/02/2023
Owner(s)	Head of Safety and Environment	**Custodian**	Environment and Sustainability Manager
Division	CBH Group	**Department**	Safety and Environment

Review History

Version	Date	Author	Description of Revision
1.0	13/11/2018	Environment and Sustainability Manager	Approved, published
1.1	06/04/2020	Environment and Sustainability Manager	Scheduled review, updated to new IMS template
1.2	29/01/2021	Environment and Sustainability Manager	Scheduled review, sign off by Document Owner
2.0	18/02/2021	Environment and Sustainability Manager	Issued for Use.

Appendix C Authority to access and clear native vegetation