TALISON GREENBUSHES LITHIUM OPERATION

TONE BRIDGE OFFSET AREA MANAGEMENT PLAN

Prepared by Onshore Environmental for

Talison Lithium Pty Ltd

ABN: 15 140 122 078

Greenbushes, Western Australia

As part of the Approval for Greenbushes Lithium Mine expansion

Australian Government Department of Energy and Environment Approval (EPBC 2018/8206)

Declaration of Accuracy

In making this declaration, I am aware that section 491 of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed

Full name (please print)

Craig Dawson

Organisation (please print)

Talison Lithium Pty Ltd

Date 9/11/2023

Document Status						
Rev No.	**Author**	**Reviewer/s**	**Date**	**Approved for Issue**		
				Name	**Distributed To**	**Date**
1	D.Brearley	C.Griffin	04/08/20	C.Griffin	DBCA	17/08/20
2	D.Brearley	C.Griffin	20/08/20	C.Griffin	DBCA	21/08/20
3	D.Brearley	DBCA	01/09/20	F.Browne	DBCA	19/04/21

TABLE WITH EPBC APPROVAL CONDITIONS

Approval for Greenbushes Lithium Mine Expansion WA (EPBC 2018/8206)

Condition	Condition Requirement	Plan Reference	Demonstration of how the plan addresses condition requirements and commitments made in the plan to address condition requirements
6	Within six (6) months of commencement of the action the approval holder must provide to the Department and the DBCA finalised management plans for the offsets required under Conditions 4 and 5.		This Plan outlines management actions to be implemented by Talison and DBCA for the Tone Bridge Offset Area. It also outlines monitoring and reporting responsibilities that will be undertaken by Talison.
6	The management plans must be prepared by a suitably qualified field ecologist in accordance with the Department's Environmental Management Plan Guidelines and the EPBC Act Environmental Offsets Policy.	Page iv	The Plan was prepared by Dr Darren Brearley and Ms Jessica Waters from Onshore Environmental. The Plan was prepared in accordance with the Department's Environmental Management Plan Guidelines and the EPBC Act Environmental Offsets Policy.
6	These plans must be initially provided in draft form for feedback by the Department and the DBCA and must include evidence of the arrangements that the approval holder has put in place to ensure that the management plans will be fully implemented.	Page iv	The DBCA was consulted during preparation of the draft Plan, with feedback from meetings, subsequent discussions and report review incorporated into the draft document. The Plan has subsequently been provided to the Department for comment.
6	The management plans for those offset sites must require management of the properties for a period of at least 20 years and deliver improvements in the ability of the offset sites to provide habitat for Protected Matters so that all properties provide very high quality black cockatoo habitat, in line with the offset calculations provided by the approval holder to the Department on 03 September 2019.	Section 3.1 & 3.2, Pages 14-16	The Plan includes requirements that the Tone Bridge Offset Area be managed by DBCA for a period of 20 years. The Plan will deliver improvements to the habitat quality at the Offset Area through the management of threats to existing habitats, specifically dieback and fire management.

Condition	Condition Requirement	Plan Reference	Demonstration of how the plan addresses condition requirements and commitments made in the plan to address condition requirements
6	The finalised management plans must be implemented.	Section 6.1, Page 19	The finalised management plan will be implemented by DBCA and includes performance indicators, monitoring, adaptive management and contingency measures to ensure that the Plan will be effectively implemented.

EXECUTIVE SUMMARY

The Tone Bridge Offset Area Management Plan (the **Plan**) was developed to satisfy Condition 6 of the Department of Agriculture, Water and the Environment's (**DAWE**) previously the Department of Energy and Environment) approval of the Greenbushes Lithium Mine Expansion (EPBC referral 2018/8206). The Talison Lithium Pty Ltd (**Talison, Company**) Greenbushes Lithium Operation (**Site, Mine**) Expansion (the **Project**) involves the clearing of 350 hectares (**ha**) of native vegetation which may impact on Protected Matters including three (3) species of Black Cockatoo, the Western Ringtail Possum and the Chuditch. The Plan was prepared to offset potential impacts to these Protected Matters from the Project.

The key impacts to Protected Matters arising from the Project are associated with the direct clearing of up to 350ha of habitat suitable for three (3) species of Black Cockatoo within the Mine Development Envelope (**MDE**), and the possible direct loss of individuals. Additional indirect impacts include those from the alteration or fragmentation of habitats, the introduction of feral predators or new invasive weed species/infestations, and altered fire regimes, causing injury, death or loss of habitat for Protected Matters.

The objective of the Plan is to protect and enhance habitat condition at the Tone Bridge Offset Area in order to provide high quality habitat for Black Cockatoos. The Plan aims to:

- protect and improve the quality of existing habitat and trees at the Tone Bridge Offset Area that will provide nesting sites for Black Cockatoos in the future; and
- protect existing suitable hollows within the Tone Bridge Offset Area.

The Department of Biodiversity, Conservation and Attractions (**DBCA**) will use the DBCA Disturbance Approval System (**DAS**) or an approved Prescribed Fire Plan (**PFP**) as the planning and control mechanisms for management operations at the Tone Bridge Offset Area. Any operations undertaken at the Tone Bridge Offset Area will be planned and managed in accordance with these documents and processes.

Talison is responsible for undertaking, or providing agreed funds to the DBCA to contribute to the management of the Tone Bridge Offset Area. Talison will also undertake monitoring at Spring 2022, and then at six (6) year intervals for the lifetime of the plan (20 years), i.e. Spring 2028, Spring 2034 and Spring 2040. An Environmental Offset Report will be published by the company following each monitoring event.

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1.0 INTRODUCTION

1.1 Background

Talison owns and operates the Mine within Greenbushes State Forest 20 (**SF20**) in the Shire of Bridgetown-Greenbushes Western Australia (**WA**), approximately 250 kilometres (**km**) south of Perth and 80km southeast of the port of Bunbury (Figure 1).

On 19 August 2019 the WA Minister for Environment authorised the implementation of an expansion of the Mine under section 45 of the *Environmental Protection Act 1986* (WA) (**EP Act**, **Ministerial Statement 1111**). Condition 8 of Ministerial Statement 1111 requires the provision of environmental offsets to counterbalance the significant residual impact to threatened and specially protected species listed under the *Biodiversity Conservation Act 2016* (**BC Act**).

The Project was also approved under sections 130(1) and 133(1) of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) on 14 November 2019 (EPBC 2018/8206). Conditions 4 to 8 of EPBC 2018/8206 require the provision of environmental offsets to counterbalance impacts on Protected Matters.

As part of its implementation of the environmental offset requirements in Ministerial Statement 1111 and EPBC 2018/8206, Talison intends to identify and facilitate the provision of suitable land (**Offset Area**) to the State of WA for management and future reservation as State Forest and classification as a forest conservation area under the *Conservation and Land Management Act 1984* (**CALM Act**). Talison will also provide funds to contribute to the Department of Biodiversity, Conservation and Attractions (**DBCA**) for the management of the Offset Lands.

The DBCA will assist Talison by administering the provision of the Offset Lands to the State of WA and facilitating the future reservation of the Offset Lands as State forest and classification as forest conservation areas under section 62 of the CALM Act.

A Memorandum of Understanding (**MOU**) is in preparation and sets out how Talison and the DBCA will fulfil the above understandings.

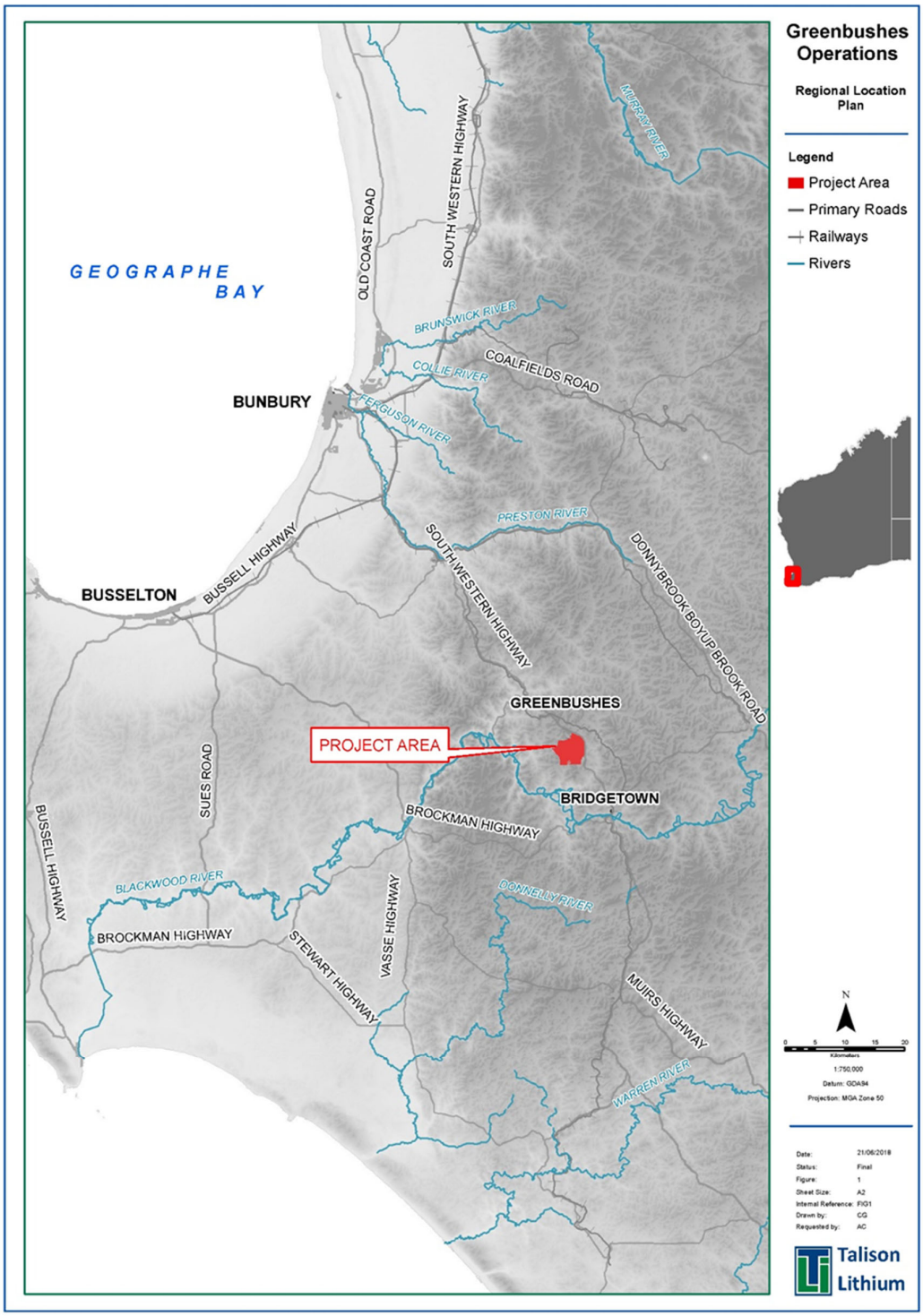

Figure 1: Location of Talison Greenbushes Lithium Operation.

1.2 Environmental Offset

Talison has identified a significant residual impact to five (5) threatened species listed under the EPBC Act (three (3) Black Cockatoo species, Western Ringtail Possum and Chuditch), associated with the proposed clearing of native vegetation for the Project. Talison will counteract these impacts through the implementation of an environmental offset in accordance with the Principles of the WA Government's Environmental Offset Policy (GoWA 2011) and the Australian Government's EPBC Act Environmental Offsets Policy (the **Policy**) (DSEWPAC 2012a).

Talison has been working to identify measures that, in combination, would constitute an acceptable and cost-effective package of environmental offsets that would satisfy the requirements of the Policy, as per the acceptance criteria. The *Offsets Assessment Guide* (DSEWPaC 2012b) was used to characterise and quantify the residual impacts that require offsetting under the policy. The policy requires that a minimum of 90% of the offset package go towards directly offsetting residual impacts to the attribute of the protected matter that will be affected (**'direct offsets'**), with the remainder having the option of including offsets that are less directed towards the specific nature of the impact (**'indirect offsets'**).

Efforts by Talison to identify suitable environmental offsets has included regular liaison with the DBCA. DBCA has a land acquisition program for adding suitable areas of environmental value that meet its selection criteria, to its conservation estate. The criteria include the suitable area being contiguous with existing estate or sufficiently large in its own right relative to the environmental values that the site contains. Potential synergies may arise in circumstances where DBCA's acquisition program and requirements under the Policy coincide. Talison and DBCA have identified four (4) areas of land that in combination satisfy both DBCA's criteria and those of the policy:

- Tone Bridge: Part of Lot 12416 and Part of Lot 12372 On Deposited Plan (DP) 206989 Cootayerup Road, Chowerup (411ha);
- Carlotta: Part Lot 11189 On DP 204910, Mount Leewin Loop Road, Carlotta and Part of Lot 11215 On DP 204910, Mount Leewin Loop Road, Carlotta (145.6ha);
- Wellington Mills: Lot 153 On DP 72265 South Road, Wellington Mills (81ha); and
- Bowelling: Part Lot 4095 (CT1892/724) Bowelling-McAlinden Road, Bowelling (631.3ha).

This Plan details the management measures for the Tone Bridge Offset Area with separate management plans prepared for the other Offset Areas at Carlotta, Wellington Mills and Bowelling. The Plan was prepared in accordance with the DAWE's Environmental Management Plan Guidelines and the EPBC Act Environmental Offsets Policy (2012).

1.3 Purpose of the Offset Management Plan

The purpose of the Plan is to:

- outline the management measures to be undertaken to improve the quality of habitat at the Tone Bridge Offset Area;
- describe monitoring procedures to determine the success of the habitat improvement measures;
- describe reporting requirements for the actions to be implemented in the Plan;
- describe the risks associated with the implementation of the Plan; and
- outline contingency measures and an adaptive management approach that can be utilised to minimise the risks associated with the Plan.

2.0 EXISTING ENVIRONMENT

2.1 Location

The Tone Bridge Offset Area is situated 58 km southeast of Boyup Brook and 77 km south-east of the Mine (Figure 2) and comprises 411 ha of native vegetation. The Tone Bridge Offset Area was initially divided between two (2) adjoining properties (Lot 12416 Cootayerup Road, Chowerup and Lot 12372 Cootayerup Road, Chowerup). A subdivision has been lodged to excise the native vegetation to create a single parcel consisting of 411ha.

2.2 Flora and Vegetation

2.2.1 Regional Vegetation Mapping

Vegetation of the Tonebridge-Frankland area has been broadly mapped by Smith (1972) and Beard (1979), with a combined vegetation systems map (1:1,000,000 scale) produced by Beard (1981).

The Tone Bridge Offset Area occurs in the Jingalup System within the Menzies Sub-district of the Darling Botanical District, in the South-West Botanical Province (Beard 1981). The Menzies Sub-district (southern jarrah forest) covers a total area of 26,572 square kilometres (**km²**), of which 18,715 km² (70%) originally supported jarrah and jarrah-marri forest (Beard 1990). It is estimated that approximately 61% of the total area has been cleared since European settlement, mainly in the valleys which are free of laterite, leaving the forest intact on laterised higher plateau levels.

The Jingalup System is described as a combination of jarrah-marri-wandoo woodland occurring on summit ironstone gravels. Brown mallet *(Eucalyptus astringens)* may occur with jarrah on breakaways, while jarrah, marri and wandoo associate with jam *(Acacia acuminata),* sheoak *(Allocasuarina huegeliana)* and scattered understorey species. Flooded gum *(Eucalyptus rudis)* is the dominant tree species encountered along drainage line with *Melaleuca* (paperbark) species.

The Menzies Sub-district is characterised by Jarrah stands on laterite within some Marri and Wandoo woodlands. Valley soils are often richer and Blackbutt (*Eucalyptus patens)* is more dominant in these areas. Flooded Gum (*Eucalyptus rudis)* is common along stream banks and Bullich (*Eucalyptus megacarpa)* is also present in some areas. Within the Offset Area vegetation is dominated by Jarrah *(Eucalyptus marginata)* and Marri *(Corymbia calophylla)* forest over the tall shrubs bull banksia *(Banksia grandis)* and snotty gobble *(Persoonia longifolia).* The lower understorey strata contains a range of plant genera including *Hakea, Acacia, Xanthorrhoea, Adenanthos, Hovea, Leucopogon, Macrozamia, Leucopogon, Bossiaea, Daviesia, Grevillea, Patersonia, Styphelia* and *Kennedia.*

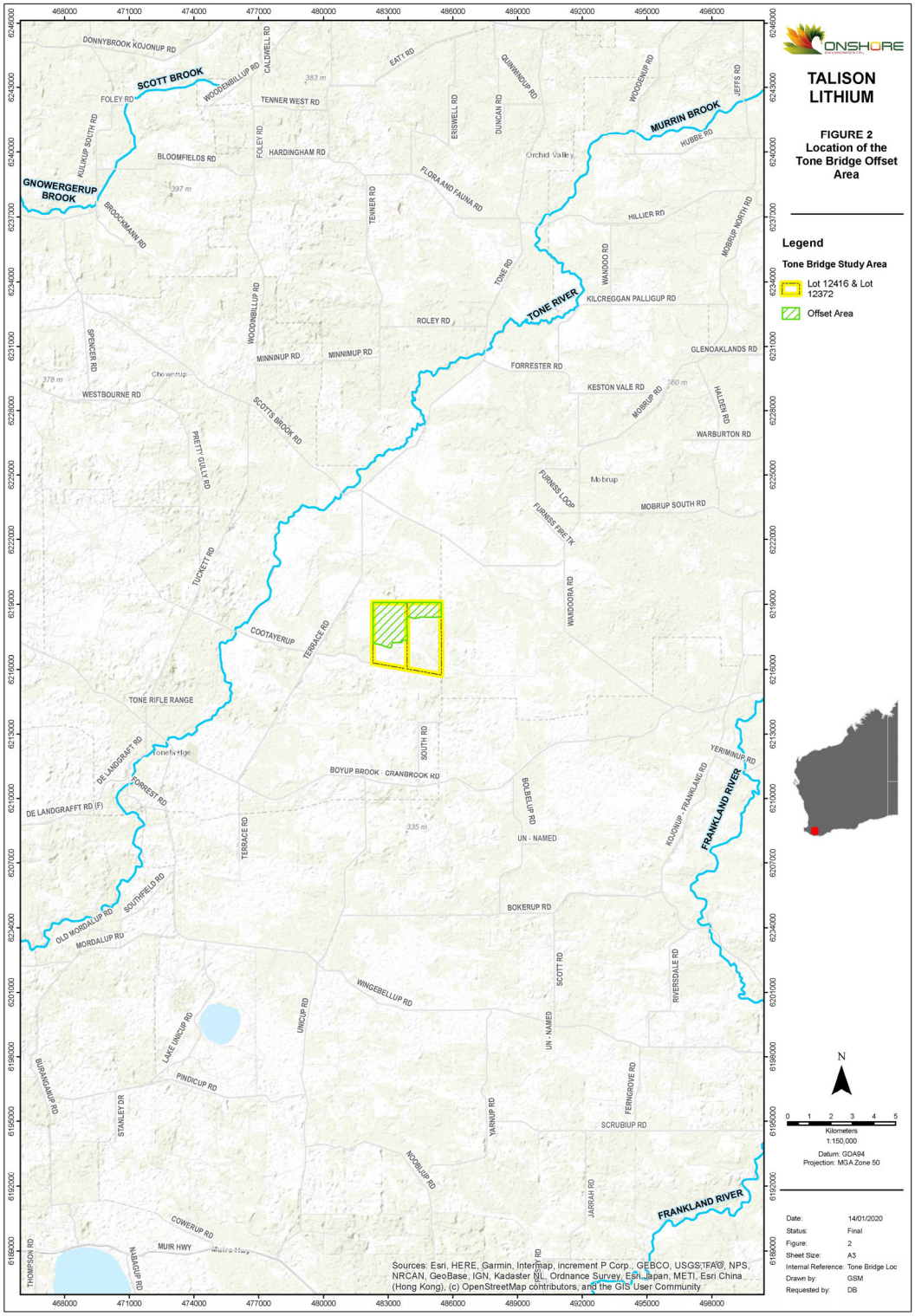

Figure 2: Location of the Tone Bridge Offset Area.

2.2.2 Vegetation Types

Onshore Environmental (**Onshore**) completed a flora and vegetation survey of the Tone Bridge Offset Area as part of Talison's investigation into suitable offset sites in late 2019 (Onshore Environmental 2020, Appendix 1). A total of three (3) vegetation types were described and mapped from the Tone Bridge Offset Area occurring on lateritic undulating hills, lower sandy slopes, and drainage flats (Figure 3, Table 1). Remnant native vegetation covered 411 ha. Native vegetation occurred as a consolidated block across the northern sector of the Tone Bridge Offset Area, where it forms linkages with native vegetation on adjacent lots to the north and west.

Remnant native vegetation within the Tone Bridge Offset Area was predominantly rated as *very good*[1] (363.6 ha or 87%) with historical logging and linear fire breaks being the most obvious disturbances (Figure 4). Historical grazing by domestic stock (sheep) has reduced vegetation condition to a combination of *good* (32.2 ha or 7.7%), *degraded* (4.9 ha or 1%) and *completely degraded* (16.1 ha or 4%) along the intersection with cleared farmland in the southern vegetated part of Lot 12372 (Figure 4).

[1] Vegetation condition scale outlined in Keighery (1994)

Table 1: Vegetation types present within the Tone Bridge Offset Area.

Code	Broad Floristic Formation and Vegetation Type	Area (ha)	Black Cockatoo Habitat Values
	Eucalyptus Forest		
HS Bo	Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* (± Open Scrub of *Banksia grandis* and *Banksia sessilis* var. *sessilis* on hill crests) over Open Low Scrub B of *Xanthorrhoea preissii* and *Macrozamia riedlei* over Low Heath D (to Open Dwarf Scrub D) of *Bossiaea ornata, Leucopogon capitellatus* and *Hakea lissocarpha* on brown loamy sand on lateritic undulating hills	348.9	Foraging, roosting, potentially nesting
	Eucalyptus Woodland		
LS Mt	Woodland of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* over Open Scrub of *Bossiaea linophylla, Persoonia longifolia* and *Xanthorrhoea preissii (Jacksonia furcellata)* over Heath B of *Leptospermum erubescens, Melaleuca thymoides* and *Macrozamia riedlei* over Open Dwarf Scrub D of *Hypocalymma angustifolium, Calytrix flavescens* and *Hibbertia racemosa* over Very Open Low Sedges of *Lyginea barbata* and *Hypolaena exsulca* on grey sand on lower slopes	16.8	Foraging, roosting, potentially nesting
DF Ew	Woodland of *Eucalyptus wandoo (Corymbia calophylla, Eucalyptus marginata* subsp. *marginata)* (± Very Open Tree Mallee of *Eucalyptus decipiens*) over Open Scrub of *Xanthorrhoea preissii* and *Hakea undulata* over Dwarf Scrub C of *Banksia armata, Macrozamia riedlei, Hakea lissocarpha, Xanthorrhoea preissii* and *Petrophile serruriae* over Low Heath D of *Babingtonia camphorosmae, Bossiaea eriocarpa, Trymalium ledifolium* and *Hypocalymma angustifolium (Banksia bipinnatifida, Boronia spathulata)* over Very Open Low Sedges of *Cyathochaeta avenacea, Desmocladus fasciculatus* and *Desmocladus asper* on brown clayey sand on drainage flats	51.6	Foraging, roosting, potentially nesting

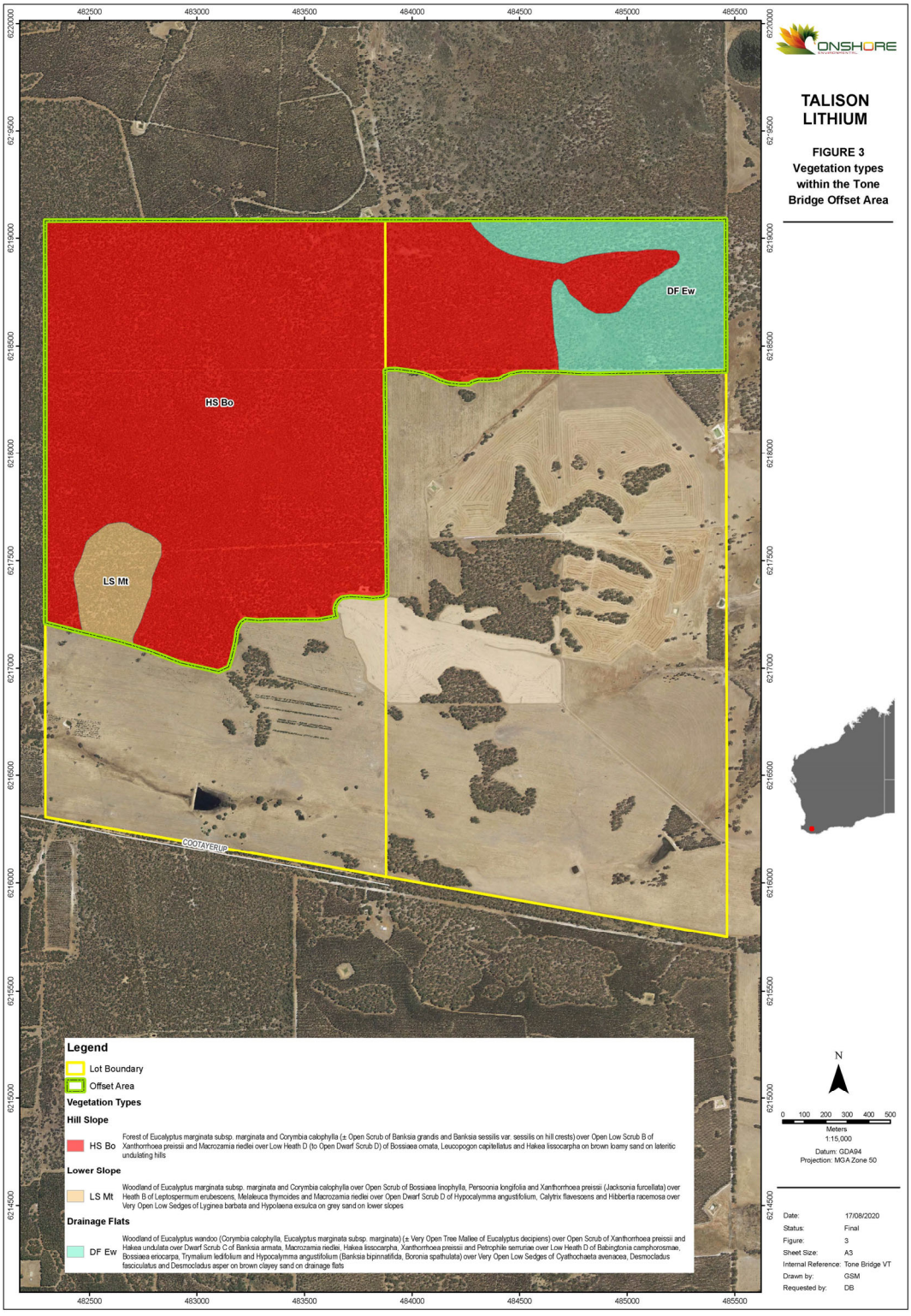

Figure 3: Vegetation types within the Tone Bridge Offset Area.

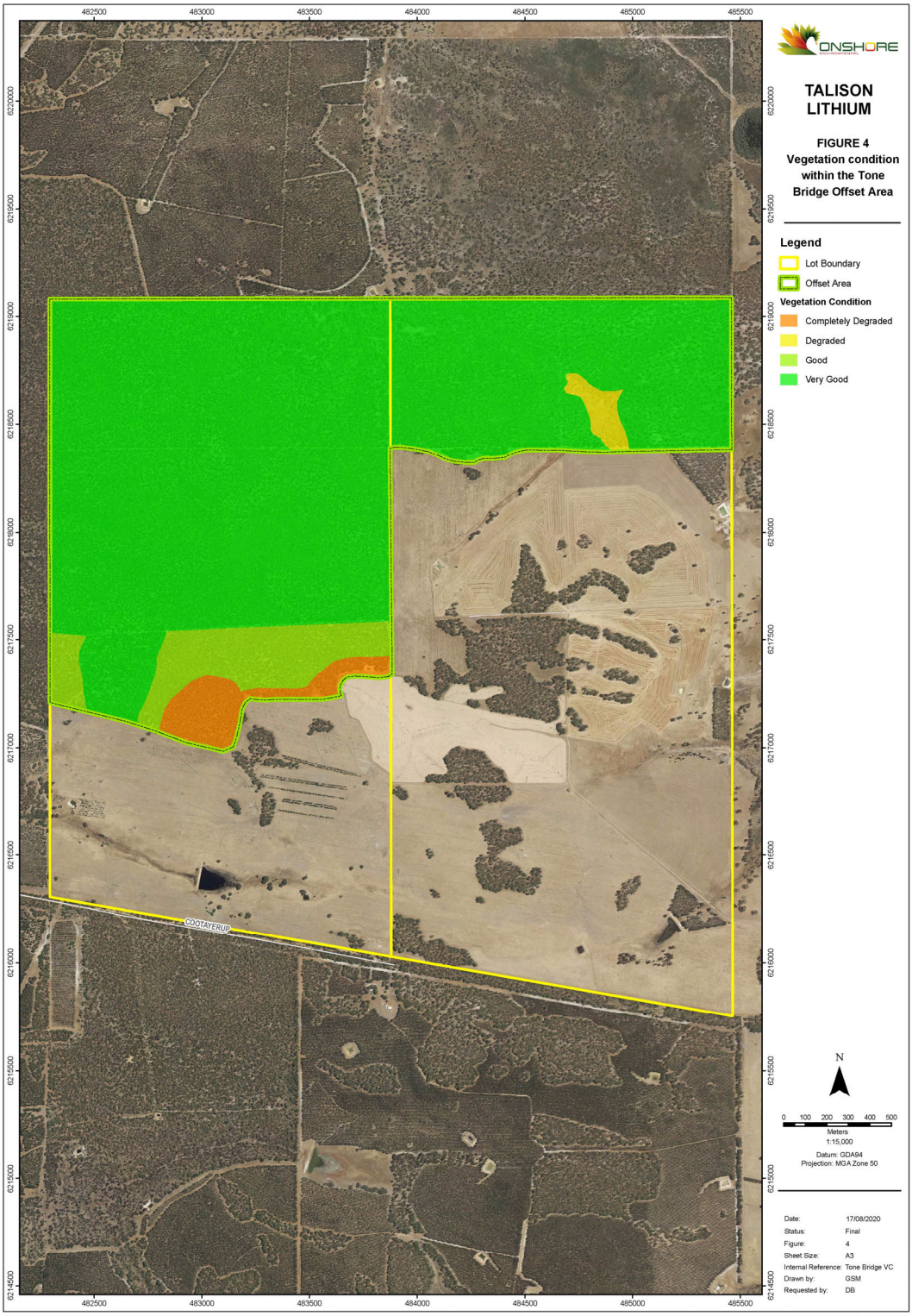

Figure 4: Vegetation condition within the Tone Bridge Offset Area.

2.3 Fauna Habitats

Onshore completed a Level 1 vertebrate fauna survey of the Tone Bridge Offset Area (Onshore Environmental 2020, Appendix 1).

Three (3) main fauna habitats types were identified and mapped within the Tone Bridge Offset Area during the field survey: Hillslope/Hillcrest, Drainage Flat and Sandy Slope (Figure 5; Table 2). The majority of the Tone Bridge Offset Area was mapped as 'Hillslopes/Hillcrests' with Jarrah (*Eucalyptus marginata*), and Marri (*Corymbia calophylla*) forest and an open shrub mid-storey with *Banksia* species (*Banksia sessilis* and *Banksia grandis*).

The 'Drainage Flat' habitat occurred through the north-eastern part of the Tone Bridge Offset Area and supported trees of Wandoo (*Eucalyptus wandoo*), Marri and Jarrah with an open understorey of shrubs and sedges. This habitat provides good potential for hollow formation due to the presence of Wandoo, Marri and Jarrah.

A small area of 'Sandy Slope' habitat was identified on the western side of the Tone Bridge Offset Area. This area provided potential hollows within Marri and Jarrah trees, as well as softer sandy soils favoured by some burrowing species of fauna.

One portion of the 'Hillslope/Hillcrest' and 'Sandy Slope area' was mapped as being degraded habitat due to lack of understorey vegetation from historical disturbance (Figure 5).

Table 2: Fauna habitat mapped within the Tone Bridge Offset Area.

Habitat Type	Description
Hillcrest/Hillslopes	Forest of *Eucalyptus marginata* and *Corymbia calophylla* over open scrub. Soils of brown loamy sand on laterite make this habitat moderately suitable for burrowing fauna species.
Drainage Flat	Woodland of *Eucalyptus wandoo, Eucalyptus marginata* and *Corymbia calophylla* over open scrub, low heath and sedges.
Sandy Slope	Woodland of *Eucalyptus marginata* and *Corymbia calophylla* over open shrubs, heath and sedges. This habitat has sandy soils suitable for burrowing and digging fauna species.

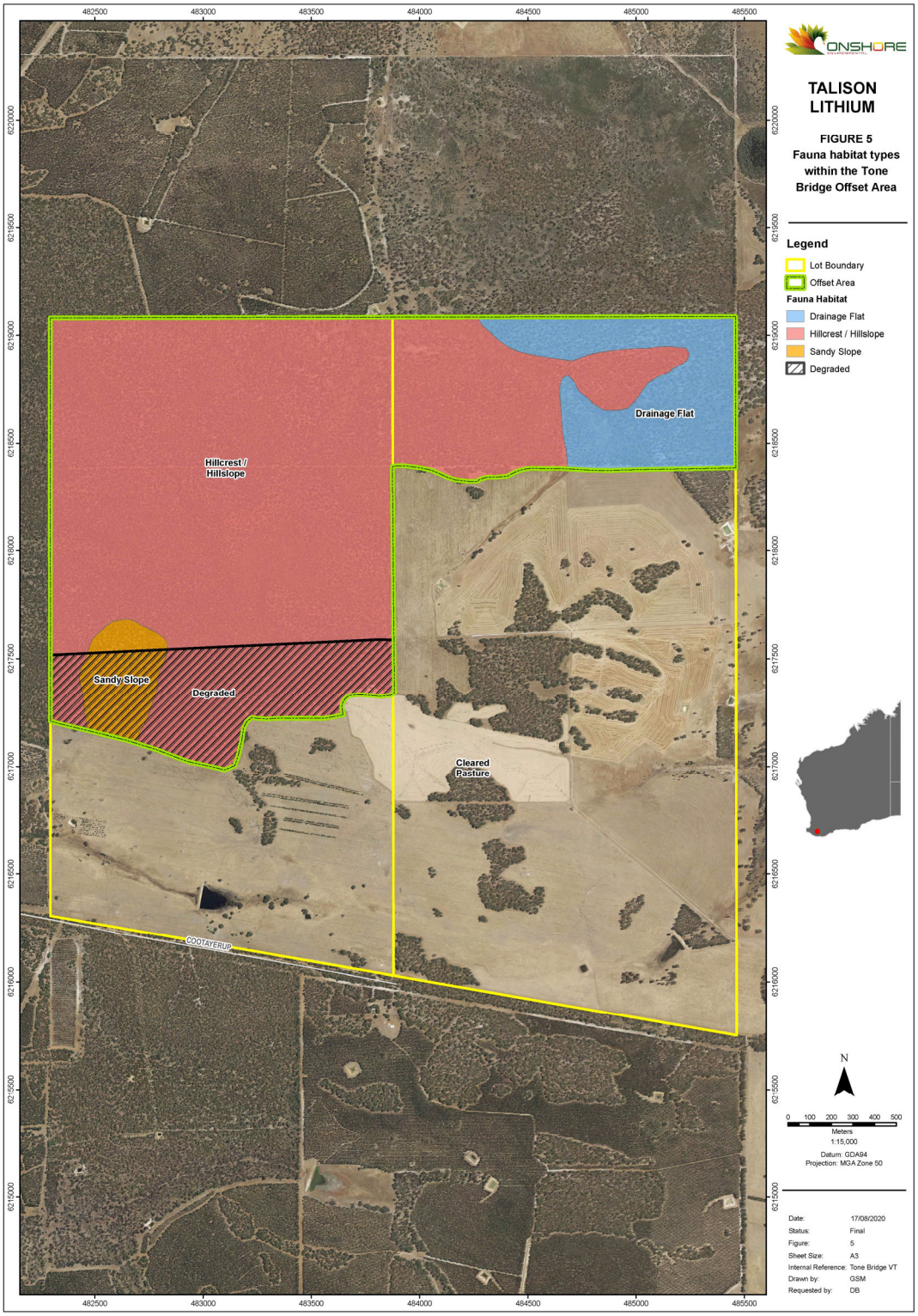

Figure 5: Fauna habitat types within the Tone Bridge Offset Area.

2.4 Presence of Protected Matters within the Offset Area

2.4.1 Black Cockatoos

Habitats within the Tone Bridge Offset Area were assessed for the use by, and suitability for, Black Cockatoos. There were sightings of, and evidence of foraging, by Forest Red-tailed Cockatoos within the Tone Bridge Offset Area. All habitats within the Tone Bridge Offset Area were deemed to be suitable foraging, roosting, and potential breeding habitat for the three (3) species of Black Cockatoos (Figure 5).

To assess the potential for future nesting trees within the study area, suitable tree species (i.e. *Corymbia/Eucalyptus* species) that had a diameter at breast height of equal to or greater than 50 centimetres (**cm**), or 30 cm for *Eucalyptus wandoo,* were counted within defined areas at the three (3) habitat types. Trees with a diameter at breast height of over 50cm were relatively common at the Tone Bridge Offset Area with an estimated density of 124 trees per ha on hillcrests/hillslopes, 109 trees per ha on sandy slopes, and 74 trees per ha on drainage flats. None of the trees in the Tone Bridge Offset Area were recorded as having evidence of nesting, however the large area with suitable tree species of a suitable age means that it is likely that breeding trees are present, or have the potential to develop in the future (Onshore Environmental 2020, Appendix 1).

2.4.2 Chuditch

The Chuditch was assessed during a desktop assessment as likely to occur within the Tone Bridge Offset Area based on the presence of suitable habitat and previous records in the area (Onshore Environmental 2020). The Chuditch inhabits Jarrah forest, in moist densely vegetated and steeply sloping forest, and drier open, gently sloping forest particularly in riparian vegetation (Orrell and Morris 1994). Chuditch may utilise all three habitats at the Tone Bridge Offset Area for foraging or dispersing.

2.4.3 Other Significant Fauna

Although not listed as a Protected Matter, the South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*, listed as Conservation Dependent under the BC Act) was recorded within the Tone Bridge Offset Area. Western Brush Wallaby, Numbat and Muir's Cockatoo are other species of significance that have the potential to utilise habitats within the Tone Bridge Offset Area.

3.0 ENVIRONMENTAL MANAGEMENT MEASURES

3.1 Management Objectives

Key threats to Black Cockatoos include the loss of suitable habitat for breeding, night roosting and foraging. Therefore, the objective of the Plan is to protect and maintain the habitat condition at the Tone Bridge Offset Area by undertaking prescribed burning to reduce the likelihood of catastrophic wildfire impacting on habitat. Management actions are discussed further in Section 3.2.

The Plan will be implemented for a period of 20 years and reviewed every five (5) years so that operational targets and budgets can be revised and customised to management priorities over the forward period. Monitoring and reporting will continue until the condition requirements are achieved. The successful completion of the condition requirements within the timeframes are subject to natural conditions and unexpected events, and the risks identified in Section 4.

As part of the process for formalising the Tone Bridge lot as an environmental offset, the land title will be transferred to DBCA. After the completion of the Plan, providing the conditions of approval in relation to the site are met, the Tone Bridge Offset Area will be managed by DBCA as Crown Reserve (Conservation Reserve). The transfer of the land rights from a private owner to the DBCA and reservation as agreed by DBCA ensures that the habitat within the site will be formally protected in perpetuity.

3.2 Management Actions for Existing Habitat

The DBCA will use the DBCA DAS or an approved PFP as the planning and control mechanisms for management operations at the Tone Bridge Offset Area. The DAS is an online portal used to assess, approve and manage proposed activities (other than prescribed fire) on CALM Act lands where vegetation, the environment or values that the DBCA is responsible will be altered and/or disturbed. All proposals are managed in accordance with departmental objectives, associated management plans, and land use categories with an objective to remove and/or minimise disturbance impacts to As Low As is Reasonably Practicable (ALARP). Similarly, the PFP is a detailed planning document for prescribed burns to identify the value within and adjoining the burn area, fuel types, fuel quantities, appropriate weather and fuel moisture conditions for the required burn purpose and intensity. Any operations undertaken at the Tone Bridge Offset Area will be planned and managed in accordance with these documents and processes.

Management actions that will be implemented to protect and maintain the existing habitat for Protected Matters with particular focus on Black Cockatoos within the Tone Bridge Offset Area are described below. A summary of these actions, the associated performance indicators and timing of the actions are presented in Table 3.

Table 3: Management actions to be implemented to protect existing habitat within the Tone Bridge Offset Area.

Management Objectives	Threats	Management Actions	Performance Indicator	Timing	Responsibility
Protect, maintain and manage existing habitat for Protected Matters including the Black Cockatoo at the Tone Bridge Offset Area to deliver improvements in habitat. Protect and maintain existing suitable foraging habitat and hollows within the Tone Bridge Offset Area, to deliver improvements in habitat. Protect and maintain suitable habitat that will provide suitable future nesting sites for Black Cockatoos, to deliver improvements in habitat.	Fire	Maintenance of fire breaks and tracks within the property. Fire management for the site will be integrated with management of other reserves in the Warren region by DBCA.	Compliance with DBCA Fire Management strategy.	Ongoing	DBCA
	Dieback	Those undertaking monitoring/management activities will have regard to: • Policy Statement 3: Management of Phytophthora and disease caused by it (Department of Parks and Wildlife [DPaW] (2015); and • Phytophthora Dieback Management Manual (DBCA 2017). Dieback management by DBCA at the Tone Bridge Offset Area will be integrated with wider management currently being implemented at other reserves in the Warren region by DBCA.	Compliance with DBCA Dieback Management Procedures.	Ongoing	DBCA/Talison

3.2.1 Fire Management

Management at the Tone Bridge Offset Area will use and respond to fire in a manner that mitigates the risk of adverse impacts of bushfire. Fire management will have consideration for Black Cockatoos and other protected species, specifically the impact of significant bushfire events impacting on potential tree hollows, as well as the availability of food for Black Cockatoos in the local area (foraging value).

Fire management for the Tone Bridge Offset Area will be integrated with management of other nearby conservation reserves within the Warren region, which is likely to involve a number of controlled burns over the life of this Plan. Appropriate fire regimes will contribute to avoiding the catastrophic outcomes associated with large scale bushfire events.

3.2.2 Dieback Management

There key objective for the Tone Bridge Offset Area is to reduce the risk for introduction or spread of *Phytophthora* Dieback to the site. When undertaking the proposed management activities, Talison and DBCA will have regard to:

- Policy Statement 3: Management of *Phytophthora* and disease caused by it (Department of Parks and Wildlife [DPaW] (2015); and
- *Phytophthora* Dieback Management Manual (DBCA 2017).

Dieback management at the Tone Bridge Offset Area by DBCA will be integrated with wider management currently being implemented within other Warren conservation reserves and undertaken as required in the DAS or PFP approval documents.

4.0 RISK ASSESSMENT

A risk assessment was undertaken for the Tone Bridge Offset Area to consider the risks associated with achieving the objectives of the Plan (Table 4). The risks are identified and characterised as low, medium, high or severe, as derived from the likelihood (highly likely, likely, possible, unlikely, rare) and consequence (minor, moderate, high, major and critical) risk matrix based on the Department of Environment Guidelines for Developing Environmental Management Plans (DoE 2014).

The risk analysis assesses the risk of not achieving the management objectives. It may be necessary to re-evaluate and modify the risk analysis and contingency measures throughout the period of the Plan, particularly if any unforeseen risks or issues emerge during the implementation of the Plan.

Table 4: Risk management for the Tone Bridge Offset Area.

Risk	Likelihood	Consequence	Inherent Risk	Trigger	Contingency Measures
Objectives: • protect and improve the quality of existing habitat and trees at the Tone Bridge Offset Area that will provide nesting sites for Black Cockatoos in the future; and • protect existing suitable hollows within the Tone Bridge Offset Area.					
Uncontrolled fires occur within the Tone Bridge Offset Area	Possible	High	Medium	Unplanned fire occurring within Tone Bridge Offset Area.	DBCA undertake fire management practices within the Tone Bridge Offset Area and incorporate with nearby reserves.
Damage to vegetation from vandalism e.g. 4wd vehicles, off-road motorbikes etc.	Possible	Minor	Low	Evidence of damage to vegetation from unauthorised entry.	DBCA will identify access points and introduce signage, or other site management as required.
Human induced Dieback spread and/or disease is significantly affecting vegetation within the Tone Bridge Offset Area	Possible	Moderate	Medium	Unexplained senescence of dieback susceptible species.	DBCA to determine requirement for additional dieback control measures.

5.0 MONITORING PROGRAM

Talison will be responsible for implementing a qualitative monitoring program at the Tone Bridge Offset Area to document evidence that required management actions are being implemented as required by the management plan, aimed at protecting and maintaining habitat for Protected Matters in particular the Black Cockatoo.

Monitoring of the management actions will be undertaken by a suitably qualified professional in Spring 2022, and then at six (6) year intervals for the lifetime of the plan (20 years), i.e. Spring 2028, Spring 2034 and Spring 2040.

The results of the annual monitoring will be included in Talison's Annual Environmental Offset Report as described in Section 6.0.

5.1 Qualitative Monitoring

The Tone Bridge Offset Area will be evaluated against the management actions and performance indicators with respect to:

- Fire management; and
- *Phytophthora* Dieback management.

Monitoring results will be reported in the Annual Environmental Offset Report as described in Section 6.

6.0 REPORTING AND REVIEW

6.1 Reporting

Compliance reporting frequency and timing for the Tone Bridge Offset Area will be submitted annually from 2021 in accordance with Condition 14 EPBC 2018/8206 compliance reporting requirements. Talison will submit a compliance report annually by the 14 December to DAWE.

The annual compliance reports prepared by Talison and submitted to DAWE will include:

- a review of management actions and performance indicators for activities undertaken in the previous 12 months under the Plan; and
- a summary of compliance against the Plan.

Talison will notify the DAWE of any incident at the site, non-compliance with the conditions, or non-compliance with the commitments or performance indicators made in the Plan. The notification will be given in writing as soon as practicable, and no later than two (2) business days after the incident or non-compliance. The notification will include the following information:

- any condition which is or may be in breach;
- the location (including coordinates), date and time of the incident and/or non-compliance; and
- a short description of the incident and/or non-compliance.

6.2 Adaptive Management

The management approach for the Tone Bridge Offset Area will be adaptive through ongoing review and reporting measures, to ensure that it achieves the identified purpose, environmental objectives of the Plan and ultimately meets requirements of the EPBC condition.

The Plan will be formally reviewed five (5) yearly by a suitably qualified and experienced person. In addition to the scheduled review, the Plan will be reviewed if:

- new information is learned from monitoring, or monitoring indicates that performance indicators are not being achieved;
- new information becomes available about Protected Matters (e.g. a change in conservation status of a species); or
- new requirements need to be included as a consequence of approvals being issued or modified.

Where an adaptive management response is required to respond to any issues identified in the implementation of management measures and monitoring, Talison will in consultation with DBCA, identify and implement the management response in order to more effectively meet the environmental objectives of the Plan.

The following potential adaptive management actions have been developed to respond in the event that performance indicators show that the condition of the Tone Bridge Offset Area is declining, or if there is an incident involving Protected Matters at the site:

- investigate cause;

- Talison and DBCA in consultation will review and revise the Plan and management measures as required; and
- Talison and DBCA in consultation will implement additional contingency measures identified as part of the risk assessment.

7.0 ROLES AND RESPONSIBILITIES

Talison is responsible for:

- purchasing and transferring ownership of the Tone Bridge Offset Area to the State of WA for management and future reservation as a conservation reserve;
- undertaking or providing agreed funds to the DBCA towards the management of the Tone Bridge Offset Area to achieve the required standards and approval conditions;
- engaging a suitably qualified professional to undertake monitoring where required after DBCA take ownership and management responsibility for the Tone Bridge Offset Area; and
- report compliance against the Plan.

The DBCA is responsible for:

- incorporating the management of the Tone Bridge Offset Area with other Warren conservation reserves;
- facilitate future reservation as a conservation reserve; and
- Facilitate access by Talison, or their agents, to the Tone Bridge Offset Area to undertake necessary actions detailed in this Plan, or other relevant activities.

8.0 GLOSSARY

Black Cockatoo habitat includes foraging, breeding, potential breeding and roosting habitat for Black Cockatoos, as defined in the *EPBC Act Referral Guidelines for three species of Western Australian black cockatoos: Carnaby's Black Cockatoo (Calyptorhynchus latirostris), (Endangered) Baudin's Black Cockatoo (Calyptorhynchus baudinii) (Vulnerable) and Forest Red-tailed Black Cockatoo (Calyptorhynchus banksii naso) (Vulnerable)* (October 2012).

Black Cockatoo/s means the EPBC Act listed Carnaby's Black Cockatoo *(Calyptorhynchus latirostris),* Baudin's Black Cockatoo *(Calyptorhynchusbaudinii)* and Forest Red-tailed Black Cockatoo *(Calyptorhynchus banksii naso).*

Business day means a day that is not a Saturday, a Sunday or a public holiday in the state or territory of the action.

Clearing means the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of vegetation (but not including weeds)

Commencement of the action means the first instance of any specified activity associated with the action including clearance of vegetation and construction of any infrastructure. Commencement does not include minor physical disturbance necessary to:

- undertake pre-clearance surveys or monitoring programs;
- install signage and or temporary fencing to prevent unapproved use of the project area;
- protect environmental and property assets from fire, weeds and feral animals, including
    - construction of fencing, and maintenance of existing surface access tracks;
- install temporary site facilities for persons undertaking pre-commencement activities so long as these are located where they have no impact on the Protected Matters.

DBCA is the Western Australian Department of Biodiversity, Conservation and Attractions or any future entity that retains that agency's roles and responsibilities.

Department means the Australian Government agency responsible for administering the EPBC Act. Previously the Department of Environment and Energy and now (since February 2020) the Department of Agriculture, Water and the Environment.

EPBC Act means the Environment Protection and Biodiversity Conservation Act 1999.

Habitat quality means the capacity of the land to provide ecosystem services for Protected Matters.

Incident means any event which has the potential to, or does, impact on one or more protected matter(s}.

Known nesting hollow means any tree bearing a hollow in use or showing historical evidence of use by Black Cockatoos for breeding, as verified by a suitably qualified field ecologist, including any hollow identified during the investigation required by Condition 2.

Ministerial Statement 1111 means the Statement that a proposal may be implemented for Greenbushes Lithium Mine Expansion Statement No. 1111 as signed by the WA Minister for Environment on 19 August 2019 or as subsequently amended/replaced.

Offset Area is the area as defined in the table in Condition 4 and in Condition 5. These areas are also identified in the Maps at Attachment B as follows:

- the areas within the yellow outline in Map 1
- the areas within the yellow outline that are hatched in orange and green in Map 2
- the area within the yellow outline that is hatched in green in Map 3
- the area within the yellow outline that is not shaded in green in Map 4.

Plan(s) means any of the documents required to be prepared, approved by the Minister, and/or implemented by the approval holder and published on the website in accordance with these conditions (includes action management plans and/or strategies).

Project Area is the area Greenbushes Mine Expansion area also referred to as the Mine Development Area (MDE).

Protected Matter/s means a matter protected under a controlling provision in Part 3 of the EPBC Act for which this approval has effect including, but not limited to, Carnaby's Black Cockatoo *(Calyptorhynchus latirostris),* Baudin's Black Cockatoo *(Calyptorhynchus baudinii),* Forest Red-tailed Black Cockatoo *(Calyptorhynchus banksia naso), Chuditch (Dasyurus geoffroii)* and Western Ringtail Possum *(Pseudocheirus occidentalis).*

Suitable nesting hollow means any tree bearing a hollow capable of being used by the Black Cockatoos for breeding, as identified by a suitably qualified person.

Suitably qualified field person means a person who has professional qualifications, training, skills and/or experience related to the nominated subject matter and can give authoritative independent assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods and/or literature.

Suitably qualified field ecologist means a person who has professional qualifications and at least 3 years of work experience designing and implementing surveys for Black Cockatoo Habitat, and can give an authoritative assessment and advice on the presence of suitable nesting hollows using relevant protocols, standards, methods and/or literature.

Website means a set of related web pages located under a single domain name attributed to the approval holder and available to the public.

9.0 REFERENCES

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APPENDIX 1

GREENBUSHES OFFSET AREA FLORA, VEGETATION AND VERTEBRATE FAUNA SURVEY

ONSHORE ENVIRONMENTAL

Flora, Vegetation and Vertebrate Fauna Survey
Lots 12372 & 12416 Cootayerup Road, Tone Bridge

Prepared for Talison Lithium
24 January 2020

Document Status						
Rev No.	Authors	Reviewer/s	Date	Approved for Issue		
				Name	Distributed To	Date
1	D.Brearley, M.Brown	D.Brearley	13/01/20	D.Brearley	C.Griffin	24/01/20

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EXECUTIVE SUMMARY

Talison Lithium Pty Ltd (Talison) commissioned Onshore Environmental Consultants Pty Ltd (Onshore Environmental) to undertake a reconnaissance flora and vegetation survey, and a Level 1 vertebrate fauna survey covering 416.86 hectares (ha) of remnant native vegetation occurring on two proposed offset lots at Cootayerup Road, Tone Bridge, herein referred to as the study area. An additional 550.59 ha has been cleared for dryland agriculture. The study area occurs on privately owned land approximately 58 km southeast of Boyup Brook in the southwest region of Western Australia.

The reconnaissance flora and vegetation survey and Level 1 fauna assessment was completed by a Principal Botanist and Principal Zoologist working over five days between the 12th and the 21st of December 2019.

None of the plant taxa recorded from the study area were gazetted as Threatened Flora pursuant to the *Biodiversity Conservation Act 2016* (BC Act), or listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). One taxon, *Caustis* sp. Boyanup (G.S. McCutcheon 1706), was listed as a Priority 3 flora species by the Department of Biodiversity Conservation and Attractions (DBCA), and one other taxon, *Hypocalymma asperum,* was considered to represent a 60 km range extension from the current known distribution.

A total of three vegetation associations were described and mapped from the study area. None of the vegetation associations were aligned with federal or state listed Threatened Ecological Communities (TECs) or state listed Priority Ecological Communities (PECs). However, the *Eucalyptus wandoo* Woodland association was determined to be poorly represented and poorly reserved at the state, bioregional and local levels.

Vegetation condition was predominantly rated as *very good* (87% of the study area) with wider disturbances including historical logging and establishment of linear fire breaks. Vegetation condition fringing farmland within Lot 12372 was rated as a combination of *good* (8% of the study area), *degraded* (1% of the study area) and *completely degraded* (4% of the study area). This block had previously been fenced and subjected to historical grazing by sheep which had impacted on understorey vegetation structure.

Two vertebrate fauna species listed as Scheduled species under the BC Act and/or listed as Threatened fauna under the EPBC Act, were recorded from the study area:

- Forest Red-tailed Black-Cockatoo *(Calyptorhynchus banksii naso)* - listed as Vulnerable under the EPBC Act and Schedule 3 under the BC Act; and
- South-western Brush-tailed Phascogale *(Phascogale tapoatafa wambenger)* - listed as Schedule 6 under the BC Act.

One Priority fauna species, as recognised by the DBCA, was recorded from the study area:

- Western Brush Wallaby (*Notamacropus irma*) - DBCA Priority 4.

An additional five fauna species of conservation significance were assessed as likely to occur in the study area based on habitat preference and previous recordings of the species from surrounding areas.

One introduced species, the European Rabbit (*Ortyctolagus cuniculus*), was identified as using the area through secondary means.

Three main fauna habitat types were described and mapped from the study area; 'hillslope/hillcrest', 'drainage flats' and 'sandy slopes'. Additional areas of the study area were mapped as 'cleared pasture', noting the southeastern sector of the 'hillslope/hillcrest' and 'sandy slope' habitats were degraded due to grazing by domestic stock.

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1.0 INTRODUCTION

1.1 Background

Talison owns and operates a lithium mine near the town of Greenbushes in the south west of Western Australia. The Greenbushes operation represents the world's largest known lithium reserve and has been producing lithium for 25 years, contributing to Australia's position as one of the two top global producers of lithium. Talison is proposing to undertake an expansion at the Greenbushes Mine, aimed at increasing supply of lithium to the market. The proposed expansion will require 350 hectares (ha) of native vegetation to be cleared outside existing approval areas.

In 2018, Talison referred its proposal to expand operations to the Department of Energy and Environment (DoEE) for assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The referral was made on the basis that the expansion would require the clearing of 350 ha of native vegetation known to contain habitat for listed threatened species, namely:

- Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* (Vulnerable);
- Baudin's Cockatoo *Calyptorhynchus baudinii* (Vulnerable); and
- Carnaby's Cockatoo *Calyptorhynchus latirostris* (Endangered).

1.2 EPBC Environmental Offsets Policy

DoEE has advised Talison that the *EPBC Environmental Offsets Policy* (DSEWPAC 2012a) would apply to the proposed clearing of native vegetation, to compensate for residual impacts to the three threatened black cockatoo species (collectively referred to by DoEE as forest black cockatoos - FBC). In response, Talison has been working to identify measures that, in combination, would constitute an acceptable and cost-effective package of environmental offsets that would satisfy the requirements of the EPBC Policy, as per the policy's acceptance criteria.

The *EPBC Offsets Assessment Guide* (DSEWPAC 2012b) has been used to characterise and quantify the residual impacts that require offsetting under the EPBC Policy. The Policy requires that a minimum of 90% of the offset package go towards directly offsetting residual impacts to the attribute of the protected matter that will be affected ('direct offsets'), with the remainder having the option of including offsets that are less directed towards the specific nature of the impact ('indirect offsets').

Efforts by Talison to identify suitable environmental offsets has included regular liaison with the WA Department of Biodiversity Conservation and Attractions (DBCA). DBCA has a land acquisition program for adding to its conservation estate suitable areas of environmental value that meet its selection criteria. The criteria includes the area being contiguous with existing estate or sufficiently large in its own right relative to the environmental values that the site contains.

Potential synergies may arise in circumstances where DBCA's acquisition program and EPBC offset requirements coincide. Talison and DBCA have identified two securable lots that potentially satisfy both DBCA's criteria and those of the *EPBC Environmental Offsets Policy* (Figure 1):

- Lot 12416 on Plan 206989 Cootayerup Road, Tone Bridge; and
- Lot 12372 on Plan 206989 Cootayerup Road, Tone Bridge.

TALISON LITHIUM

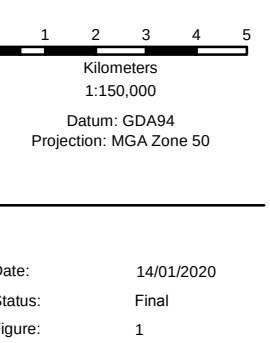
Tone Bridge Offset Site
Lot 12416 on Plan 206989 and Lot 12372 on Plan 206989
Location

Legend

Tone Bridge Study Area

Lot 12416 & Lot 12372

FIGURE 1



N

0 1 2 3 4 5
Kilometers
1:150,000

Datum: GDA94
Projection: MGA Zone 50

Date:	14/01/2020
Status:	Final
Figure:	1
Sheet Size:	A3
Internal Reference:	Tone Bridge Loc
Drawn by:	GSM
Requested by:	DB

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

1.3 Scope of Works

To support environmental approvals for the proposed expansion, Onshore Environmental Consultants Pty Ltd (Onshore Environmental) was commissioned by Talison to undertake a reconnaissance flora and vegetation survey and Level 1 vertebrate fauna assessment of native vegetation present on two proposed lots at Cootayerup Road Tone Bridge, herein referred to as 'the study area'.

The objectives of the survey were to:

- describe and map vegetation associations and fauna habitats, and assess their likelihood to support flora and fauna species of conservation significance;
- determine the significance of vegetation associations; and
- undertake targeted searches for flora and fauna species of conservation significance.

1.4 Biogeographic Regions

The Interim Biogeographic Regionalisation for Australia (IBRA) describes a system of 89 'biogeographic regions' (bioregions) and 419 subregions covering the entire Australian continent (IBRA7). Bioregions are defined on the basis of climate, geology, landforms, vegetation and fauna. The study area is situated in the Jarrah Forest bioregion (Thackway and Cresswell 1995). The Jarrah Forest bioregion is divided into two subregions; the Northern Jarrah Forest (JF1) and the Southern Jarrah Forest (JF2). The study area is located within the Southern Jarrah Forest subregion.

The Southern Jarrah Forest is described as; "Duricrusted plateau of Yilgarn Craton characterised by Jarrah-Marri forest on laterite gravels and in the eastern part, by Wandoo - Marri woodlands on clayey soils. Eluvial and alluvial deposits support *Agonis* shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands (Hearn, Williams, Comer and Beecham 2002)."

1.5 Land Use

The southern portion of the study area fronting Cootayerup Road has been historically cleared for dryland agriculture, and supports a mixture of cropping and annual winter growing pastures. Small isolated native remnants comprise parkland cleared Jarrah *(Eucalyptus marginata)* and Marri *(Corymbia calophylla)* trees within this zone.

A large consolidated block of remnant native vegetation remains across the entire northern sector of the study area. Historical grazing by domestic stock has occurred along the intersection with cleared farmland in southern parts of Lot 12372, with evidence of historical logging throughout.

Regionally, nature conservation is a significant land use and includes the Perup Forest and the Lake Muir/Unicup complex of Nature Reserves. The Tone Perup Nature Reserve occurs less than 8 km west of the study area.

1.6 Geology and Soils

The regional geology has been described by Wilde and Walker (1984), Muhling and Brakel (1985), Myers (1990a, 1990b) and De Silva (2000). The study area occurs sits within the Archaean Yilgarn Craton which is characterised by crystalline rocks, predominantly granite and gneiss, which are often deeply weathered. Sediments typically overlie these basement rocks, and extensive laterisation is evident. The laterite varies from massive and cemented structure with either a pisolitic or vesicular texture, to loose uncemented pisolites. Typical soil profiles across the study area comprise sandy or gravelly topsoil, duricrust and mottled clays over bedrock. This sequence may also include layers of pallid zone clay and partially weathered rock or saprolite.

1.7 Flora and Vegetation

Vegetation of the Tonebridge-Frankland area has been broadly mapped by Smith (1972) and Beard (1979), with a combined vegetation systems map (1:1,000,000 scale) produced by Beard (1981).

The study area occurs in the Jingalup System within the Menzies Sub-district of the Darling Botanical District, in the South-West Botanical Province (Beard 1981). The Menzies Sub-district (southern jarrah forest) covers a total area of 26,572 km^2, of which 18,715 km^2 (70%) originally supported jarrah and jarrah-marri forest (Beard 1990). It is estimated that approximately 61% of the total area has been cleared since European settlement, mainly in the valleys which are free of laterite, leaving the forest intact on laterised higher plateau levels.

The Jingalup System is described as a combination of jarrah-marri-wandoo woodland occurring on summit ironstone gravels. Brown mallet *(Eucalyptus astringens)* may occur with jarrah on breakaways, while jarrah, marri and wandoo associate with jam *(Acacia acuminata),* sheoak *(Allocasuarina huegeliana)* and scattered understorey species. Flooded gum *(Eucalyptus rudis)* is the dominant tree species encountered along drainage line with *Melaleuca* (paperbark) species.

The Menzies Sub-district is characterised by Jarrah stands on laterite within some Marri and Wandoo woodlands. Valley soils are often richer and Blackbutt (*Eucalyptus patens)* is more dominant in these areas. Flooded Gum (*Eucalyptus rudis)* is common along stream banks and Bullich (*Eucalyptus megacarpa)* is also present in some areas. Within the study area vegetation is dominated by Jarrah *(Eucalyptus marginata)* and Marri *(Corymbia calophylla)* forest over the tall shrubs bull banksia *(Banksia grandis)* and snotty gobble *(Persoonia longifolia).* The lower understorey strata contains a range of plant genera including *Hakea, Acacia, Xanthorrhoea, Adenanthos, Hovea, Leucopogon, Macrozamia, Leucopogon, Bossiaea, Daviesia, Grevillea, Patersonia, Styphelia* and *Kennedia.*

2.0 METHODOLOGY

2.1 Legislation and Guidance Statements

The reconnaissance flora and vegetation survey was carried out in a manner that was compliant with Environmental Protection Authority (EPA) requirements for the environmental surveying and reporting of flora and vegetation in Western Australia:

- Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a); and
- Environmental Factor Guideline: Flora and Vegetation (EPA 2016b).

The Level 1 vertebrate fauna survey was carried out in a manner that was compliant with EPA requirements for the environmental surveying and reporting of vertebrate fauna in Western Australia:

- Statement of Environmental Principles, Factors and Objectives (EPA 2018);
- Environmental Factor Guideline Terrestrial Fauna (EPA 2016a);
- Technical Guidance Sampling Methods for Terrestrial Vertebrate Fauna (EPA 2016b);
- Technical Guidance Terrestrial Fauna Surveys (EPA 2016c);
- Department of the Environment, Water, Heritage and the Arts (DEWHA) (2010a) Survey Guidelines for Australia's Threatened Bats;
- DEWHA (2010b) Survey Guidelines for Australia's Threatened Birds;
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) (2011a) Survey Guidelines for Australia's Threatened Mammals;
- DSEWPC (2011b) Survey Guidelines for Australia's Threatened Reptiles; and
- DEWHA (2010c) Survey Guidelines for Australia's Threatened Frogs.

2.2 Flora and Vegetation Field Survey Methodology

2.2.1 Timing and Personnel

The flora and vegetation survey was completed by Principal Botanists Dr Darren Brearley working over a three day field trip on the 12th to the 14th December 2019.

2.2.2 Sampling of Study Sites

The field survey involved systematic sampling to record relevé vegetation descriptions and note changes in vegetation structure and composition. The following environmental parameters were recorded at relevé sampling points:

- Landform;
- Aspect;
- Soil colour and soil type;
- Rock type;
- Slope (angle);
- Vegetation condition;
- Disturbance (caused by fire, clearing, grazing etc);
- Age since fire;
- Broad floristic formation;
- Vegetation association description; and

- Height and percentage ground cover provided by individual plant taxa.

Other parameters recorded for each study site were:

- Relevé site number and date of assessment;
- Names of the botanists undertaking the assessment;
- Location description and waypoint - GPS coordinate (GDA94) using a handheld GPS; and
- Photograph number.

2.2.3 Vegetation Association and Condition Mapping

The vegetation mapping utilised high-resolution aerial photography of the study area at a scale of 1:17,500, with definition of vegetation polygons based on shading patterns. Ground-truthing of the study area was completed during the survey with vegetation descriptions made within selected vegetation polygons to confirm dominant structural layers and associated plant taxa.

The location of relevé sites assessed during the survey was overlayed on the aerial photography, and associated flora and vegetation data used to provide vegetation association descriptions for individual polygons defined. Description of vegetation structure follows the height, life form and density classes of Muir (1977) (see Appendix 1). This is largely a structural classification suitable for broader scale mapping, but taking all ecologically significant strata into account. Vegetation condition for each of the study sites was determined using a recognised rating scale (based on Keighery 1994, see Appendix 2).

2.2.4 Targeted Searches for Significant Flora

Targeted searches for flora species of conservation significance were completed within the study area. Ground truthing provided an opportunity to record opportunistic locations for Threatened and Priority listed flora and undertake closer examination of specific landforms where conservation significant flora would be expected to occur.

2.2.5 Field Survey Constraints

The EPA Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2016a) list seven potential limitations that field surveys may encounter. These limitations are addressed in Table 1.

Table 1 Relevance of limitations, as identified by EPA (2016a), to the flora and vegetation survey.

Constraint	Relevance
Availability of contextual information at a regional and local scale	While no previous surveys have been completed within the study area, a recent survey was undertaken less than 5 km south of the study area (Onshore Environmental 2019). These survey provides an excellent local database.
Proportion of flora recorded and/or collected, any identification issues	Given that it was a reconnaissance level flora and vegetation survey being undertaken, no formal quadrats were assessed and flora observations were based on grid transects of the entire study area. The seasonal conditions at the time of survey were rated as fair, noting that a number of the annual and ephemeral taxa may not have been present.

Constraint	Relevance
Survey timing, rainfall, season of survey	The field survey was completed in early December 2019, which is marginally outside the spring seasonal window recommended by EPA (2016). Annual rainfall for 2019 (393mm) was below the long term average for Kojonup (530mm). Three below average rainfall months were experienced prior to the field survey, and seasonal conditions were rated as 'fair'.
Disturbance that may have affected the results of the survey such as fire, flood or clearing	There were no disturbances recorded within the study area that influenced survey outcomes. Disturbances within the study area were restricted to historical logging and grazing by sheep in southern parts of vegetated remnants. Disturbances did not impact on the ability to complete the field survey.
Was the appropriate area fully surveyed (effort and extent)	A Principal Botanist spent three field days covering the entire study area, with numerous relevé sites assessed within the study area. This represented an extensive survey effort.
Access restrictions within the survey area	The study area was accessed by vehicle and on foot, noting that vegetation mapping was facilitated by high-resolution aerial photography. Access did not pose any restrictions to undertaking the field survey.
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed	The Principal Botanist working on the survey (Dr Darren Brearley) has more than 20 years' experience working in the southwest region, and has completed a number of previous surveys within the Boyup Brook area.

2.3 Fauna Field Survey Methodology

2.3.1 Timing and Personnel

The vertebrate fauna survey was completed by a Principal Zoologist from Onshore Environmental, Mr Michael Brown, working over three-days on the 12th, 16th and 18th of December 2019.

2.3.2 Surveying of the Study Area

The entire study area was ground truthed and assessed to document habitat characteristics including evaluation of the presence of habitats suitable to support conservation significant fauna. The survey recorded any observations of fauna species made via primary or secondary evidence. In addition, low intensity sampling was undertaken involving bird census and active foraging, and the use of motion cameras. Targeted searches (as detailed below) were also undertaken for conservation significant fauna species identified during the database review.

The following parameters were recorded for all conservation significant fauna:

- co-ordinate locations;
- description of habitat in which the species was located; and
- photograph of the species, evidence of species and/or habitat.

<u>Camera Trap Surveying</u>

Baited camera traps were deployed throughout the study area between the 12th and 16th December 2019 to identify species of fauna likely to be utilising the area. Five sites were assessed within the study area using non-rewarding bait.

Active Foraging

Active foraging, involving raking litter and turning over rocks, was completed throughout the study area. Records were captured for any conservation significant species sighted during foraging.

Bird Surveying

Opportunistic records of conservation significant bird sightings throughout the day were recorded during the field survey.

Opportunistic Recordings

During the survey work non-systematic opportunistic observations were recorded. These recordings focused primarily on conservation significant fauna and included the recording of secondary evidence such as tracks, scats, diggings, and feeding signs.

2.3.3 Targeted Surveys for Conservation Significant Species

Tree Hollow searches and Tree Density Assessments

Tree hollows were actively searched for during transect walks within the study area. If a tree hollow was encountered, it was assessed for its suitability to provide habitat for conservation significant species (namely, phascogales and black cockatoos) and other species. Those hollows deemed appropriate (i.e. sufficient size) were assessed further (as per below). To determine approximate densities of potential future habitat trees (trees >50 cm diameter) tree counts were conducted in defined areas (i.e. 50 x 50 m quadrats). Tree numbers within these areas were then extrapolated to a per hectare density for different habitats within the study area.

Black Cockatoo searches

Habitats used by black cockatoos have been placed into three categories by DSEWPaC (2012c), these being:

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

Breeding habitat for black cockatoos was assessed by the identification of all suitable breeding trees that had a diameter at breast height (DBH) of equal to or greater than 50 cm. Target tree species included marri and jarrah and any other *Corymbia* and *Eucalyptus* species of a suitable size that were present. The location of each tree identified (with appropriate DBH) was recorded along with details on the number and size of hollows present (if any).

Trees were examined to identify hollows using binoculars and evidence of actual use by black cockatoos (e.g. chewing around hollow entrance, scarring and scratch marks on trunks and branches). Any suitable hollows observed were further investigated using a drone to categorise the hollows, based on the size of the hollow entrance, and its suitability for black cockatoos to use (i.e. greater than 10 cm in diameter) and to nest in (i.e. deep enough).

Any evidence of foraging (e.g. chewed fruits around the base of trees) was recorded, and the type of foraging was also detailed. Potential foraging habitat was documented notwithstanding of the presence of foraging evidence.

Any evidence of roosting (e.g. branch clippings, droppings or moulted feathers) within trees was recorded.

Drey searches

Dreys were actively searched for in areas of suitable habitat to provide evidence of the presence of Western Ringtail Possums. Each active drey encountered was photographed (where possible) and a GPS point recorded.

2.3.4 Fauna Habitat Mapping

Assessments were undertaken throughout the study area to document habitat characteristics and map the fauna habitat types. The fauna habitat mapping utilised high-resolution aerial photography of the study area at a scale of 1:15,000. Ground-truthing of the study area was completed during the survey with habitat characteristics recorded at each habitat assessment site, and the habitat type selected for each polygon. Vegetation association mapping was utilised to further aid in characterising the habitat map accuracy across the full extent of the study area.

2.3.5 Species Identification and Nomenclature

Vertebrate fauna species were identified at the time of observation in the field by the Principal Zoologist. All species were able to be fully identified with no specimens needed to be taken for further examination. Nomenclature and conservation significance rankings used in this report are in accordance with the current listing of WA fauna recognised by the DBCA, as listed on NatureMap.

2.3.6 Field Survey Constraints

The EPA Technical Guidance (EPA 2016c) list potential limitations that field surveys may encounter. Limitations associated with the Level 1 vertebrate fauna survey, are addressed in Table 2. There were no survey-specific limitations for this survey.

Table 2 Relevance of limitations, as identified by EPA (2016c), to the vertebrate fauna survey.

Constraint	Relevance
Competency/experience of the consultant carrying out the survey	The Senior Zoologist working on the survey have in excess of 12 years' experience in the south-west and has completed previous fauna surveys for Talison.
Scope (faunal groups sampled and were some sampling methods not able to be employed because of constraints)	The study area was assessed, and all allocated tasks detailed in the scope of works were achieved during the survey, with foraging, bird census, motion cameras, nocturnal searches and targeted searches undertaken.
Proportion of fauna identified, recorded and/or collected	All fauna species were identified and recorded in the field when observed or via camera footage.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	There has been no previous fauna survey work completed within the study area. However, there is information available for the adjacent national park.
Proportion of the task achieved and further work which might be needed	The Level 1 vertebrate fauna survey was aimed at mapping fauna habitats within the study area and assessing their suitability to support fauna species of conservation significance, as well as targeting fauna species of conservation significance. All allocated tasks detailed in the scope of works were achieved during the survey.

Constraint	Relevance
Timing/weather/season/cycle	The survey was completed in December 2019. Annual rainfall for 2019 (393mm) was below the long term average for Kojonup (530mm). Three below average rainfall months were experienced prior to the field survey, and seasonal conditions were rated as 'fair'.
Disturbances which affected results of survey	There were no disturbances recorded within the study area that influenced survey outcomes.
Intensity	A Senior Zoologist working over a 3-day period traversed and sampled suitable habitat within the study area, and assessed habitats during the field survey, representing an adequate survey intensity for a Level 1 survey.
Completeness	All allocated tasks detailed in the scope of works were adequately completed during the Level 1 survey.
Resources	All resources required to complete the Level 1 survey were available.
Remoteness and/or access problems	There were no access restrictions experienced during the survey with the study area accessible by vehicle and on foot; noting that fauna habitat mapping was facilitated by high-resolution aerial photography.
Availability of contextual information on the region	There has been no previous fauna survey work completed within the study area. However, there is information available for the adjacent national park.

2.4 Assessment of Conservation Significance

The conservation significance of flora, fauna and ecological communities are classified at a Commonwealth, State and Local level on the basis of various Acts and Agreements, including:

International Level:

- IUCN: The IUCN 'Red List' lists species at risk under nine categories (status codes) (Appendix 3); and
- International Conventions: Migratory taxa listed under the Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA), and Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

Commonwealth Level:

- EPBC Act: The DoEE lists Threatened flora, fauna and ecological communities, which are determined by the Threatened Species Scientific Committee according to criteria set out in the Act. The Act lists flora that are considered to be of conservation significance under one of six categories (Appendix 4).

State Level:

- BC Act: At a State level, native flora and fauna species are protected under the BC Act – Wildlife Conservation Notice. A number of species are assigned an additional level of conservation significance based on a limited number of known populations and the perceived threats to these locations (Appendix 5); and
- DBCA Priority list: DBCA produces a list of Priority flora and fauna species and ecological communities that have not been assigned statutory protection under the BC Act. Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added under Priorities 1, 2 or 3.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been removed from the threatened species list for other taxonomic reasons, are placed in Priority 4. These species require regular monitoring (see Appendix 6). The list of PECs identifies those that need further investigation before nomination for TEC status at a State level.

Local Level:

- Species may be considered of local conservation significance because of their patterns of distribution and abundance. Although not formally protected by legislation, such species are acknowledged to be in decline as a result of threatening processes, primarily habitat loss through land clearing.

3.0 RESULTS

3.1 Desktop Assessment

3.1.1 Literature Review

The literature review for the surrounding area resulted in one previous flora and fauna survey completed within a 5 km radius of the study area in October 2018 (Onshore Environmental 2018). No other local survey results were publicly available. The closest additional survey data was contained within a management plan for Perup (Department of Environmental and Conservation 2012), which includes two National Parks and 17 Nature Reserves from the region. Relevant information from both studies is summarised below.

Vegetation Survey and Level 1 Vertebrate Fauna Survey - Terrace Road, Tone Bridge (Onshore Environmental 2018, 2019)

A privately held parcel of land at Tone Bridge supporting 559 hectares of remnant native vegetation was surveyed in October 2018 (Onshore Environmental 2018, 2019). A total of eleven vegetation types from five broad landforms were described and mapped. Native vegetation with highest conservation value occurred as two consolidated blocks at the northern and southern sectors of the study area, where it formed linkages with native vegetation on adjacent lots. Broad scale vegetation mapping confirmed that remnant native vegetation present within portion of the site was poorly represented and poorly reserved at a state, regional and local level.

The study area supported four fauna habitats; hillslopes/hillcrests, Wandoo hillslopes, heath hillslopes and minor drainage lines. There was no evidence of foraging or roosting by black cockatoos observed from the study area, however the majority of habitats were deemed to be suitable for foraging. Birds and feathers of Red-tail Black Cockatoos were observed during the field survey. The majority of habitats within the study areas were considered to be unsuitable for Western Ringtail Possums (WRP), and no evidence was recorded during the field survey. The South-western Brush-tailed Phascogale was recorded from camera traps established on the hillslope habitat during the field survey. The occurrence of this taxon was linked to the occurrence of tree hollows for nesting on the hillslope habitat. The Western Brush Wallaby was recorded as a single individual during daytime searches within the Jarrah/Marri hillslope habitat. The Chuditch was recorded on a camera trap as a single individual from a rocky hillslope within the study area.

Perup Management Plan

The habitat of the area was described broadly as Jarrah Forest, with granite outcrops, wetlands and riparian zones. There region also contains important habitat features comprising the Muir-Byenup Ramsar wetland system.

A total of 15 currently listed fauna of conservation significance are known from, or considered likely to occur in, the area:

Mammals:

- Chuditch (*Dasyurus geoffroii*) – listed as Vulnerable under the EPBC Act and Schedule 3 under the WC Act;
- Numbat (*Myrmecobius fasciatus*) – listed as Endangered;
- South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) – listed as Schedule 6 under the WC Act;

- Southwestern Brown Bandicoot (*Isoodon fusciventer*) – listed as Priority 4;
- Western Ringtail Possum (*Pseudocheirus occidentalis*) – listed as Critically Endangered under the EPBC Act and Schedule 1 under the WC Act;
- Woylie (*Bettongia penicillata*) – listed as Endangered under the EPBC Act and Schedule 1 under the WC Act;
- Western Brush Wallaby (*Notamacropus irma*) – listed as Priority 4;
- Quokka (*Setonix brachyurus*) – listed as Vulnerable under the EPBC Act and Schedule 3 under the WC Act;
- Water-rat (*Hydromys chrysogaster*) – listed as Priority 4; and
- Western False Pipistrelle (*Falsistrellus mackenziei*) – listed as Priority 4.

Birds:

- Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*) – listed as Priority 3;
- Peregrine Falcon (*Falco peregrinus*) – listed as Schedule 7 under the WC Act;
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) – listed as Vulnerable under the EPBC Act and Schedule 3 under the WC Act;
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – listed as Endangered under the EPBC Act and Schedule 2 under the WC Act; and
- Baudin's Cockatoo (*Calyptorhynchus baudinii*) – listed as Endangered under the EPBC Act and Schedule 2 under the WC Act.

3.1.2 Flora and Vegetation Database Searches

Threatened Flora listed under the EPBC Act

A search of the EPBC Act Protected Matters database was undertaken within a 40 km radius around the central point of the study area (DoEE 2018). The search identified six records of 'Vulnerable' plant taxa potentially occurring regionally: *Adenanthos pungens* subsp. *pungens, Caladenia christineae, Caladenia harringtoniae, Diuris drummondii, Diuris micrantha* and *Drakaea micrantha*; and a further five records of 'Endangered' plant taxa: *Adenanthos pungens* subsp. *effusus, Banksia oligantha, Caladenia dorrienii, Darwinia oxylepis* and *Grevillea acropogon*.

There were two TECs listed from the Federal search occurring within the search radius:

- Eucalypt Woodlands of the Western Australian Wheatbelt; and
- Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia.

Threatened Flora listed under the BC Act

A search of NatureMap identified eight Threatened Flora as having previously being recorded within a 50 km radius of the study area (Table 3). Two of the eight Threatened Flora were determined to possibly occur within the study area on the basis on habitat and distance to known records; *Bossiaea* sp. Frankland (EM Sandiford EMS 896) and *Gastrolobium lehmannii.*

Priority Flora recognised by the DBCA

The NatureMap search (DBCA 2020) identified 34 Priority flora taxa as potentially occurring within a 50 km radius of the study area (Table 3). It was determined that 15 of these taxa were considered *possible* to occur within the study area (Table 3).

Table 3 Conservation significant flora taxa previously recorded within a 50 km radius of the study area (DBCA 2020), and the likelihood of these taxa occurring within the study area.

Taxon	Cons Code	Habitat Preference	Likelihood in the study area
Acacia parkerae	3	Brown loam, clay or clay loam (normally not lateritic) in association with Wandoo.	Possible
Banksia porrecta	4	White or grey sand, sandy loam.	Possible
Banksia subpinnatifida subsp. *subpinnatifida*	2	Gravelly loam.	Possible
Bossiaea sp. Frankland (EM Sandiford EMS 896)	T	Yellow-brown sandy loam. Flats, previously logged or grazed areas.	Possible
Caladenia caesarea subsp. *transiens*	1	Sand, loam.	Possible
Caladenia christineae	T	Margins of winter-wet flats, swamps, & freshwater lakes.	Unlikely
Caladenia dorrienii	T	Clayey loam. Moist sites adjacent to rivers and seasonal creeks.	Unlikely
Caladenia erythrochila	2	Grey sand over laterite. Well-drained lateritic soils under scattered jarrah.	Possible
Caladenia harringtoniae	T	Sandy loam. Winter-wet flats, margins of lakes, creeklines, granite outcrops.	Unlikely
Caladenia integra	4	Clayey loam. Granite outcrops, rocky slopes.	Unlikely
Calytrix pulchella	3	Grey or white sand over laterite. Ridges, flats.	Possible
Chamaescilla gibsonii	3	Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.	Unlikely
Cryptandra arbutiflora var. *pygmaea*	3	Shallow clay. Around granite outcrops.	Unlikely
Diuris drummondii	T	Low-lying depressions, swamps.	Unlikely
Diuris micrantha	T	Brown loamy clay. Winter-wet swamps, in shallow water.	Unlikely
Eryngium sp. Ferox (GJ Keighery 16034)	3	Floodplain. Brown sand loam.	Possible
Gastrolobium lehmannii	T	Red clay, laterite. Low hilltop of breakaway.	Possible
Grevillea acropogon	T	Shallow soil, ironstone. Margins of seasonally inundated areas.	Unlikely
Kunzea micrantha subsp. *hirtiflora*	3	In temporary marshes, often partly submerged.	Unlikely
Lasiopetalum cardiophyllum	4	Lateritic gravelly soils, sandy clay. Flats, hillslopes.	Possible
Logania sylvicola	2	Low rise. Grey sand over laterite.	Possible
Melaleuca ordinifolia	2	Sandy loam or clay, flats depressions.	Unlikely

Taxon	Cons Code	Habitat Preference	Likelihood in the study area
Ornduffia submersa	4	Winter wetlands, submerged.	Unlikely
Phyllangium palustre	2	Winter-wet claypans, low-lying seasonal wetlands.	Unlikely
Senecio gilbertii	1	Peaty sand. Swamps, slopes.	Unlikely
Schoenus capillifolius	3	Brown mud. Claypans.	Unlikely
Schoenus loliaceus	2	Sandy soils. Winter-wet depressions.	Unlikely
Schoenus natans	4	Winter-wet depressions.	Unlikely
Schoenus sp. Jindong (RD Rotce 2485)	1	Red loamy soils. Stream banks.	Unlikely
Stylidium lepidum	3	Gravelly sand or loam, clay. Winter-wet depressions.	Unlikely
Stylidium rhipidium	3	Sandy soils. Wet creek flats, swamps, granite outcrops.	Unlikely
Stylidium roseonanum	3	Swamps.	Unlikely
Stylidium squamellosum	2	Brown to red-brown clay loam. Winter-wet habitats and depressions, open woodland, shrubland.	Unlikely
Synaphea decumbens	3	Sand over laterite.	Likely
Synaphea hians	3	Sandy soils. Rises.	Possible
Synaphea otiostigma	3	Clayey laterite, gravelly loam, sand.	Possible
Synaphea preissii	3	Sand, gravelly loam.	Possible
Tetratheca exasperata	3	White-grey sand, sandy loam with gravel, orange-brown gravelly loam.	Possible
Thysanotus unicupensis	3	Brown loamy sand, low lying.	Unlikely
Trithuria australis	4	Edge of wetland, grey clay.	Unlikely
Wurmbea sp. Cranbrook (AR Annels 3819)	3	Valley floor.	Possible
Xanthosia eichleri	4	Grey sand over granite, sandy loam. Granite outcrops, jarrah/marri woodland.	Possible

3.1.3 Fauna Database Searches

Threatened Fauna listed under the EPBC Act

A search of the EPBC Act Protected Matters database was undertaken for a 20 km buffer around the study area (DoEE 2019). The database search listed 13 Threatened fauna species, or species habitat, that may occur in the study area:

Mammals:
- Chuditch (*Dasyurus geoffroii*) – listed as Vulnerable;
- Numbat (*Myrmecobius fasciatus*) – listed as Endangered;
- Western Ringtail Possum (*Pseudocheirus occidentalis*) – listed as Critically Endangered;
- Red-tailed Phascogale (*Phascogale calura*) – listed as Vulnerable;
- Woylie (*Bettongia penicillata*) – listed as Endangered; and
- Quokka (*Setonix brachyurus*) – listed as Vulnerable.

Birds:
- Malleefowl (*Leipoa ocellata*) – listed as Vulnerable;
- Australasian Bittern (*Botaurus poiciloptilus*) – listed as Endangered;
- Eastern Curlew (*Numenius madagascariensis*) – listed as Critically Endangered;
- Curlew Sandpiper (*Calidris ferruginea*) – listed as Critically Endangered;
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) – listed as Vulnerable;
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – listed as Endangered; and
- Baudin's Cockatoo (*Calyptorhynchus baudinii*) – listed as Endangered.

The database search also identified nine Migratory bird species, or species habitat, that may occur in the study area:
- Osprey (*Pandion haliaetus*);
- Eastern Curlew (*Numenius madagascariensis*);
- Common Sandpiper (*Actitis hypoleucos*);
- Pectoral Sandpiper (*Calidris melanotos*);
- Sharp-tailed Sandpiper (*Calidris acuminata*);
- Curlew Sandpiper (*Calidris ferruginea*);
- Common Greenshank (*Tringa nebularia*);
- Fork-tailed Swift (*Apus pacificus*); and
- Grey Wagtail (*Motacilla cinerea*).

Threatened Fauna listed under the BC Act

The DBCA NatureMap search (DBCA 2019) identified 16 species listed as Scheduled species under the WC Act from around the study area:

Mammals:
- Chuditch (*Dasyurus geoffroii*) – listed as Schedule 3;
- South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) – listed as Schedule 6;
- Bilby (*Macrotis lagotis*) – listed as Vulnerable;
- Numbat (*Myrmecobius fasciatus*) – listed as Schedule 2;
- Western Ringtail Possum (*Pseudocheirus occidentalis*) – listed as Schedule 1;
- Woylie (*Bettongia penicillata ogilbyi*) – listed as Schedule 1; and
- Quokka (*Setonix brachyurus*) – listed as Schedule 3.

Birds:

- Glossy Ibis (*Plegadis falcinellus*) – listed as Schedule 5;
- Osprey (*Pandion haliaetus*) – listed as Schedule 5;
- Common Sandpiper (*Actitis hypoleucos*) – listed as Schedule 5;
- Peregrine Falcon (*Falco peregrinus*) – listed as Schedule 7;
- Fork-tailed Swift (*Apus pacificus*) – listed as Schedule 5;
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) – listed as Schedule 3;
- Muir's Corella (*Cacatua pastinator* subsp. *pastinator*) – Schedule 6
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) – listed as Schedule 2; and
- Baudin's Cockatoo (*Calyptorhynchus baudinii*) – listed as Schedule 2.

Priority Fauna recognised by the DBCA

The DBCA Threatened Fauna database search (DBCA 2019a) and NatureMap search (DPaW 2019) identified six Priority fauna species as potentially occurring around the study area:

Mammals:

- Southwestern Brown Bandicoot (*Isoodon fusciventer*) – listed as Priority 4;
- Western Brush Wallaby (*Notamacropus irma*) – listed as Priority 4;
- Tammar Wallaby (*Notamaxropus eugenii*) – listed as Priority 4;
- Water-rat (*Hydromys chrysogaster*) – listed as Priority 4; and
- Western False Pipistrelle (*Falsistrellus mackenziei*) – listed as Priority 4.

Birds:

- Hooded Plover (*Thinornis rubricollis*) – listed as Priority 5;
- Blue-billed Duck (*Oxyura australis*) – listed as Priority 4; and
- Masked Owl (southwest) (*Tyto novaehollandiae novaehollandiae*) – listed as Priority 3.

A total of 33 conservation significant species were identified during the desktop assessment, comprising 12 mammals, and 21 bird species. Based on the known distributions and habitat preferences of the species and comparison with the habitats identified and mapped within the study area, three species were recorded. Five species were determined as being "likely" to occur within the study area (Table 4). Four species were determined as "possible" to occur in the study area (Table 4). The remaining species identified as "unlikely" to occur (Table 4).

Table 4 Conservation significant fauna species identified during the desktop assessment.

Common Name	Scientific Name	Cons. Code				Habitat Preference	Suitable Habitat Present	Likelihood in the Study Area
		EPBC Act	WC Act	IUCN	DBCA			
Mammals								
Chuditch	*Dasyurus geoffroii*	VU	S3	NT		Jarrah forest, in moist, densely vegetated, steeply sloping forest and drier, open, gently sloping forest particularly in riparian vegetation (Orell & Morris 1994).	Yes	Likely
Red-tailed Phascogale	*Phascogale calura*	VU	S3	NT		Preferred habitat consists of *Allocasuarina* woodlands with hollow-containiung *Eucalyptus* and *Gastrolobium spp.* (Kitchener 1981; Maxwell et al. 1996)	Yes (limited areas only)	Unlikely[1]
South-western Brush-tailed Phascogale	*Phascogale tapoatafa wambenger*		S6	NT		Dry sclerophyll forests and open woodlands that contain hollow-bearing trees with a sparse ground cover (Woinarski *et al.* 2014).	Yes	Recorded
Numbat	*Myrmecobius fasciatus*	EN	S2	EN		Eucalypts forests and woodland, notably wandoo and jarrah woodland (Van Dyck & Strahan 2008).	Yes	Likely
Bilby	*Mavrotis lagotis*	VU	S3	NT		Were known to occur in a variety of habitats, however they are currently associated with mulga shrublands and spinifex grassland.	No	Unlikley
Southwestern Brown Bandicoot	*Isoodon fusciventer*				P4	Jarrah forest and swamp habitats, preferring dense vegetation around wetland fringes and heathland (Cooper 1998, Woinarski *et al*. 2014).	No	Unlikely

[1] Due to no known recent recordings of this species from the local area.

Common Name	Scientific Name	Cons. Code				Habitat Preference	Suitable Habitat Present	Likelihood in the Study Area
		EPBC Act	WC Act	IUCN	DBCA			
Western Ringtail Possum	*Pseudocheirus occidentalis*	CE	S1	CE		Coastal *Agonis flexuosa* forest or eucalypt woodland or forest with a mid-story of *Agonis flexuosa* (DPaW 2017, Jones *et al.* 1994). Additionally, inland forest areas that have been unlogged and unburnt for long periods (Wayne *et al.* 2006).	No	Unlikely
Woylie	*Bettongia penicillata ogilbyi*	EN	S1	CE		Woodlands and adjacent heaths with a dense understory of shrubs (Woinarski *et al*. 2014).	Yes (limited areas only)	Possible
Western Brush Wallaby	*Notamacropus irma*				P4	Inhabits a wide-range of habitats including low *Banksia* woodlands, Jarrah/Marri woodlands and moist *Melaleuca* lowlands, favours open, grassy areas (Wann & Bell 1997, Woinarski *et al.* 2014).	Yes	Recorded
Tammar Wallaby	*Notamaxropus eugenii*				P4	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 (Maxwell et al. 1996)	Yes	Unlikely
Quokka	*Setonix brachyurus*	VU	S3	VU		Habitat varies but prefer *Acacia* and *Melaleuca* thickets. Associated with *Taxandria linearifolia* in Jarrah Forest (de Tores 2008).	No	Unlikely
Water-rat	*Hydromys chrysogaster*				P4	Permanent bodies of fresh or brackish water, subalpine streams to lakes and farm dams (Van Dyck & Strahan 2008).	No	Unlikely
Western False Pipistrelle	*Falsistrellus mackenziei*			NT	P4	Tall forests and woodlands in higher rainfall parts of the south-west, particularly Karri forests but also Tuart and Jarrah forests (Woinarski *et al.* 2014).	Yes (limited areas only)	Possible

Common Name	Scientific Name	Cons. Code				Habitat Preference	Suitable Habitat Present	Likelihood in the Study Area
		EPBC Act	WC Act	IUCN	DBCA			
Birds								
Blue-billed Duck	*Oxyura australis*			NT	P4	Mainly deep freshwater swamps and lakes, occasionally salt lakes and estuaries freshened by flood waters (Johnstone & Storr 1998).	No	Unlikely
Malleefowl	*Leipoa ocellata*	VU	S3	VU		Semi-arid shrublands and low woodlands dominated by mallee eucalypts and/or acacias (Benshemesh 2007).	No	Unlikely
Glossy Ibis	*Plegadis falcinellus*	MG	S5			Freshwater wetlands, irrigated areas, margins of dams, floodplains, brackish and saline wetlands, tidal mudflats, pastures, lawns and public gardens (Johnstone *et al.* 2013).	No	Unlikely
Australasian Bittern	*Botaurus poiciloptilus*	EN	S2	EN		Tall dense Typha and sedges in freshwater swamps (Johnstone & Storr 1998).	No	Unlikely
Osprey	*Pandion haliaetus*	MG	S5			Sheltered seas around islands, tidal creeks, estuaries and saltwork ponds, and large river pools (Johnstone *et al*. 2013).	No	Unlikely
Eastern Curlew	*Numenius madagascariensis*	CE, MG	S3	EN		Tidal mudflats, also reef flats, sandy beaches (Johnstone & Storr 1998).	No	Unlikely
Hooded Plover	*Thinornis rubricollis*				P5	Along beaches and on the banks of inland salt lakes (Baker-Gabb, D.J. & M.A. Weston. 2001).	No	Unlikely
Common Greenshank	*Tringa nebularia*	MG	S5			Occurs in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity (Birdlife International 2009).	No	Unlikley
Common Sandpiper	*Actitis hypoleucos*	MG	S5			Edge of sheltered waters, salt or fresh, estuaries, river pools, claypans, drying swamps (Johnstone & Storr 1998).	No	Unlikely

Common Name	Scientific Name	Cons. Code				Habitat Preference	Suitable Habitat Present	Likelihood in the Study Area
		EPBC Act	WC Act	IUCN	DBCA			
Pectoral Sandpiper	*Calidris melanotos*	MG	S5			Fresh waterbodies including swamps, lagoons and river pools (Johnstone & Storr 1998).	No	Unlikely
Sharp-tailed Sandpiper	*Calidris acuminata*	MG	S5			Coastal and inland areas saline and fresh or brackish wetlands (Geering *et al*. 2007).	No	Unlikely
Curlew Sandpiper	*Calidris ferruginea*	CE, MG	S3	NT		Intertidal mudflats in sheltered coastal areas (Geering *et al.* 2007).	No	Unlikely
Masked Owl	*Tyto novaehollandiae*				P3	Forested areas and occasionally dry woodland areas (Johnstone & Storr 1998).	Yes	Possible
Fork-tailed Swift	*Apus pacificus*	MG	S5			Entirely aerial species (Johnstone & Storr 1998).	N/A	Possible
Peregrine Falcon	*Falco peregrinus*		S7			Coastal cliffs, rivers and ranges, wooded watercourses and lakes (Johnstone & Storr 1998).	No	Unlikely
Forest Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	VU	S3			Eucalypt forests, areas of seeding Marri, Jarrah, Blackbutt, Karri and Sheoak (Johnstone & Storr 1998).	Yes	Recorded
Carnaby's Cockatoo	*Calyptorhynchus latirostris*	EN	S2	EN		Eucalypt woodlands and forests and adjacent area of Proteaceous scrubs and heaths (Johnstone & Storr 1998).	Yes	Likely
Baudin's Cockatoo	*Calyptorhynchus baudinii*	EN	S2	EN		Eucalypt forest, areas of Marri, Karri and Wandoo (Johnstone & Storr, 1998, Johnstone & Kirkby 2008).	Yes	Likely
Muir's Corella	*Cacatua pastinator* subsp. *pastinator*		S6			Habitat used by Muir's Corella comprises large love or dead eucalypts, particularly Marri, Jarrah and Flooded Gum (Department of Environment and Conservation 2008).	Yes	Likely
Grey Wagtail	*Motacilla cinerea*	MG	S5			Various habitats with open waterbodies (Johnstone & Storr 2004).	No	Unlikely

3.2 Vegetation Associations

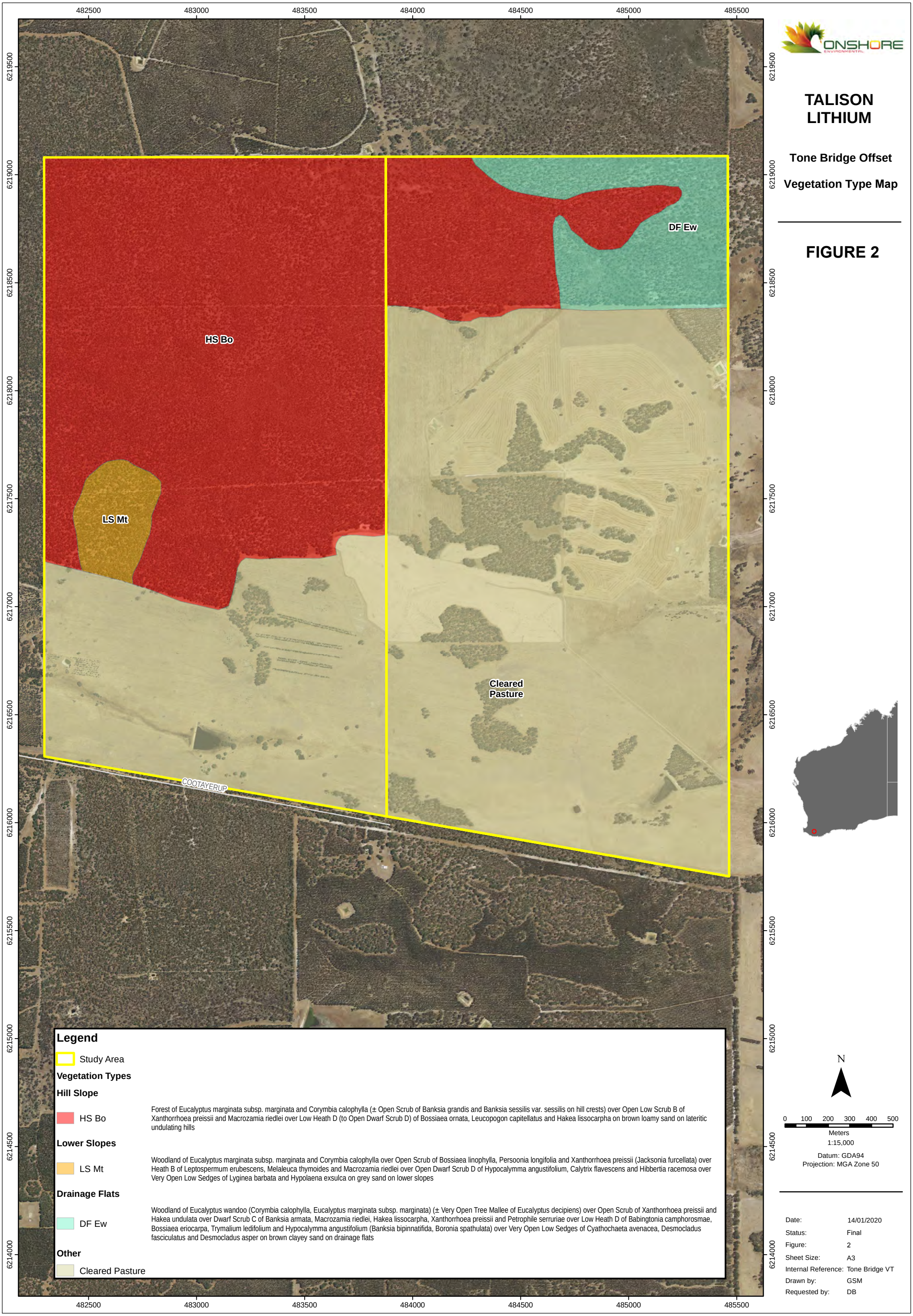
A total of three vegetation types were described and mapped from the study area occurring on lateritic undulating hills, lower sandy slopes, and drainage flats (Figure 2, Table 5). Remnant native vegetation covered 416.86 ha of the study area, with the remainder (550.59 ha) supporting cleared agricultural land with small isolated parkland cleared native remnants. Native vegetation occurred as a consolidated block across the northern sector of the study area, where it formed linkages with native vegetation on adjacent lots to the north and west.

Excluding cleared agricultural areas, remnant native vegetation within the study area was predominantly rated as *very good* (363.6 ha or 87%) with historical logging and linear fire breaks being the most obvious disturbances (Figure 3). Historical grazing by domestic stock (sheep) had reduced vegetation condition to a combination of *good* (32.2 ha or 7.7%), *degraded* (4.9 ha or 1%) and *completely degraded* (16.1 ha or 4%) along the intersection with cleared farmland in the southern vegetated part of Lot 12372 (Figure 3).

Table 5 Vegetation types mapped within the study area.

Code	Broad Florstic Formation and Vegetation Type	Area (% study area)
HS Bo	Forest of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* (± Open Scrub of *Banksia grandis* and *Banksia sessilis* var. *sessilis* on hill crests) over Open Low Scrub B of *Xanthorrhoea preissii* and *Macrozamia riedlei* over Low Heath D (to Open Dwarf Scrub D) of *Bossiaea ornata, Leucopogon capitellatus* and *Hakea lissocarpha* on brown loamy sand on lateritic undulating hills	348.49 ha (83.6%)
		
LS Mt	Woodland of *Eucalyptus marginata* subsp. *marginata* and *Corymbia calophylla* over Open Scrub of *Bossiaea linophylla, Persoonia longifolia* and *Xanthorrhoea preissii (Jacksonia furcellata)* over Heath B of *Leptospermum erubescens, Melaleuca thymoides* and *Macrozamia riedlei* over Open Dwarf Scrub D of *Hypocalymma angustifolium, Calytrix flavescens* and *Hibbertia racemosa* over Very Open Low Sedges of *Lyginea barbata* and *Hypolaena exsulca* on grey sand on lower slopes	16.82 ha (4.0%)

Code	Broad Florstic Formation and Vegetation Type	Area (% study area)
		
DF Ew	Woodland of *Eucalyptus wandoo (Corymbia calophylla, Eucalyptus marginata* subsp. *marginata)* (± Very Open Tree Mallee of *Eucalyptus decipiens*) over Open Scrub of *Xanthorrhoea preissii* and *Hakea undulata* over Dwarf Scrub C of *Banksia armata, Macrozamia riedlei, Hakea lissocarpha, Xanthorrhoea preissii* and *Petrophile serruriae* over Low Heath D of *Babingtonia camphorosmae, Bossiaea eriocarpa, Trymalium ledifolium* and *Hypocalymma angustifolium (Banksia bipinnatifida, Boronia spathulata)* over Very Open Low Sedges of *Cyathochaeta avenacea, Desmocladus fasciculatus* and *Desmocladus asper* on brown clayey sand on drainage flats	51.55 ha (12.4%)
		



ONSHORE ENVIRONMENTAL

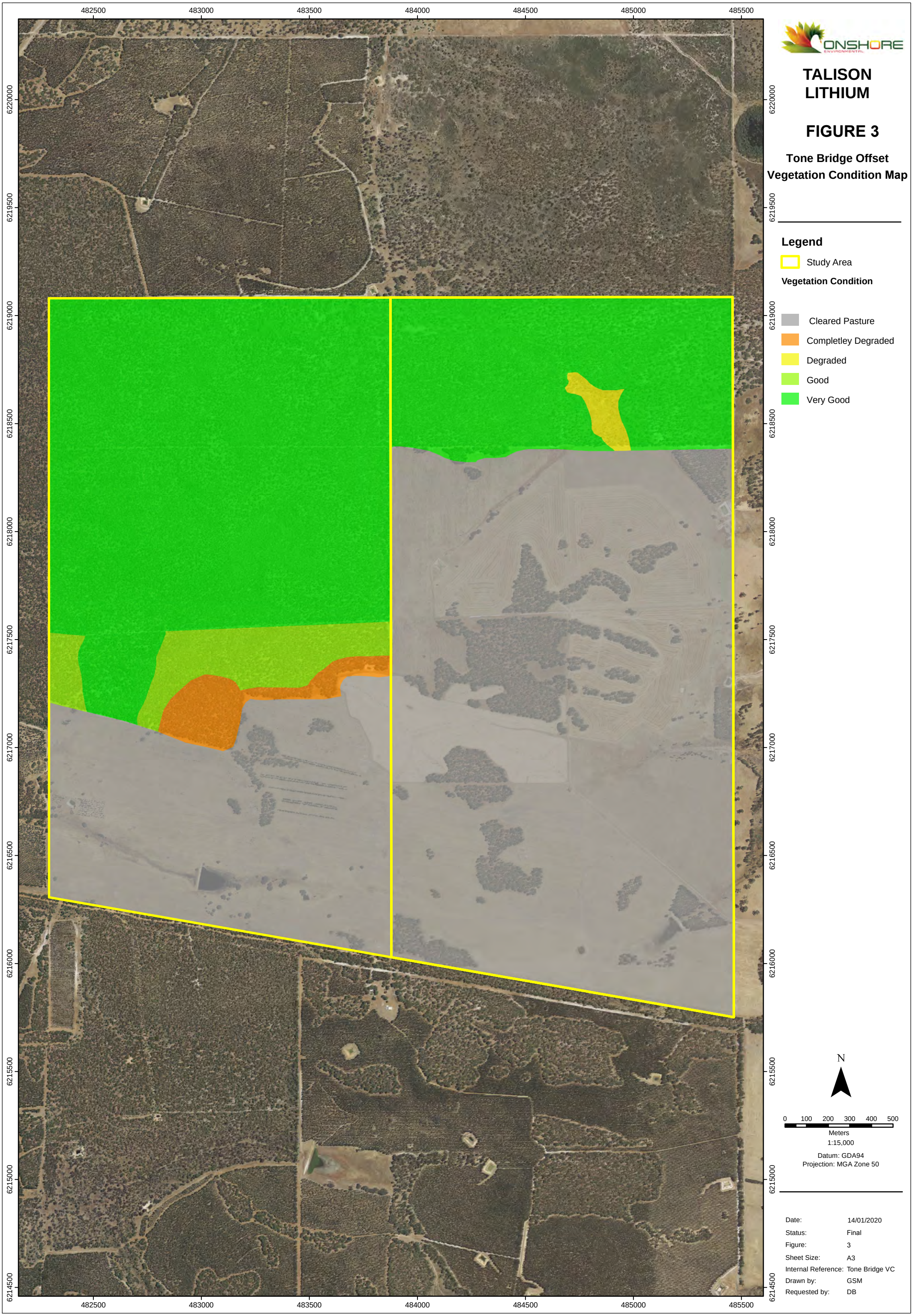
TALISON LITHIUM

Tone Bridge Offset

Vegetation Type Map

FIGURE 2

Date:	14/01/2020
Status:	Final
Figure:	2
Sheet Size:	A3
Internal Reference:	Tone Bridge VT
Drawn by:	GSM
Requested by:	DB



ONSHORE ENVIRONMENTAL

TALISON LITHIUM

FIGURE 3

Tone Bridge Offset
Vegetation Condition Map

Legend

- Study Area

Vegetation Condition

- Cleared Pasture
- Completley Degraded
- Degraded
- Good
- Very Good

N

0 100 200 300 400 500
Meters
1:15,000

Datum: GDA94
Projection: MGA Zone 50

Date:	14/01/2020
Status:	Final
Figure:	3
Sheet Size:	A3
Internal Reference:	Tone Bridge VC
Drawn by:	GSM
Requested by:	DB

3.3 Vegetation Representation and Reservation

3.3.1 Beard (1981) Vegetation Associations

The study area occurs in the Menzies Sub-district of the Darling Botanical District, in the South-West Botanical Province (Beard 1981). The Menzies Sub-district (southern jarrah forest) covers a total area of 26,572 km^2, of which 18,715 km^2 (70 percent) originally supported jarrah and jarrah-marri forest (Beard 1981).

The study area lies within the Jingalup Vegetation System as recognised by Beard (1981, see Figure 4). Within this system, there are three vegetation associations that intersect the study area:

- Vegetation Association 3 - Medium Forest; Jarrah-Marri;
- Vegetation Association 4 - Medium woodland; marri & wandoo; and\
- Vegetation Association 27 - Low woodland; paperbark (Melaleuca sp.).

When determining representation and reservation of these three vegetation associations (Table 6), Vegetation Association 4 was determined to be poorly represented at all levels, statewide, bioregional (IBRA and IBRA sub-region), and local government authority, with less than 30% of the Pre-European extent remaining.

Vegetation Association 4 was also determined to be poorly reserved, with less than 15% of the current extent protected for conservation within the Southern Jarrah Forest sub-region and within the Shire of Boyup Brook (Table 6).

3.3.2 Mattiske and Havel (1998) Vegetation Complexes

The representation of vegetation complexes within the reserve system has been published as part of the Regional Forest Agreement process and updated as part of the latest Forest Management Plan. At the complex level, there were four vegetation complexes (as described and mapped by Mattiske and Havel 1998, see Figure 5) represented within the study area:

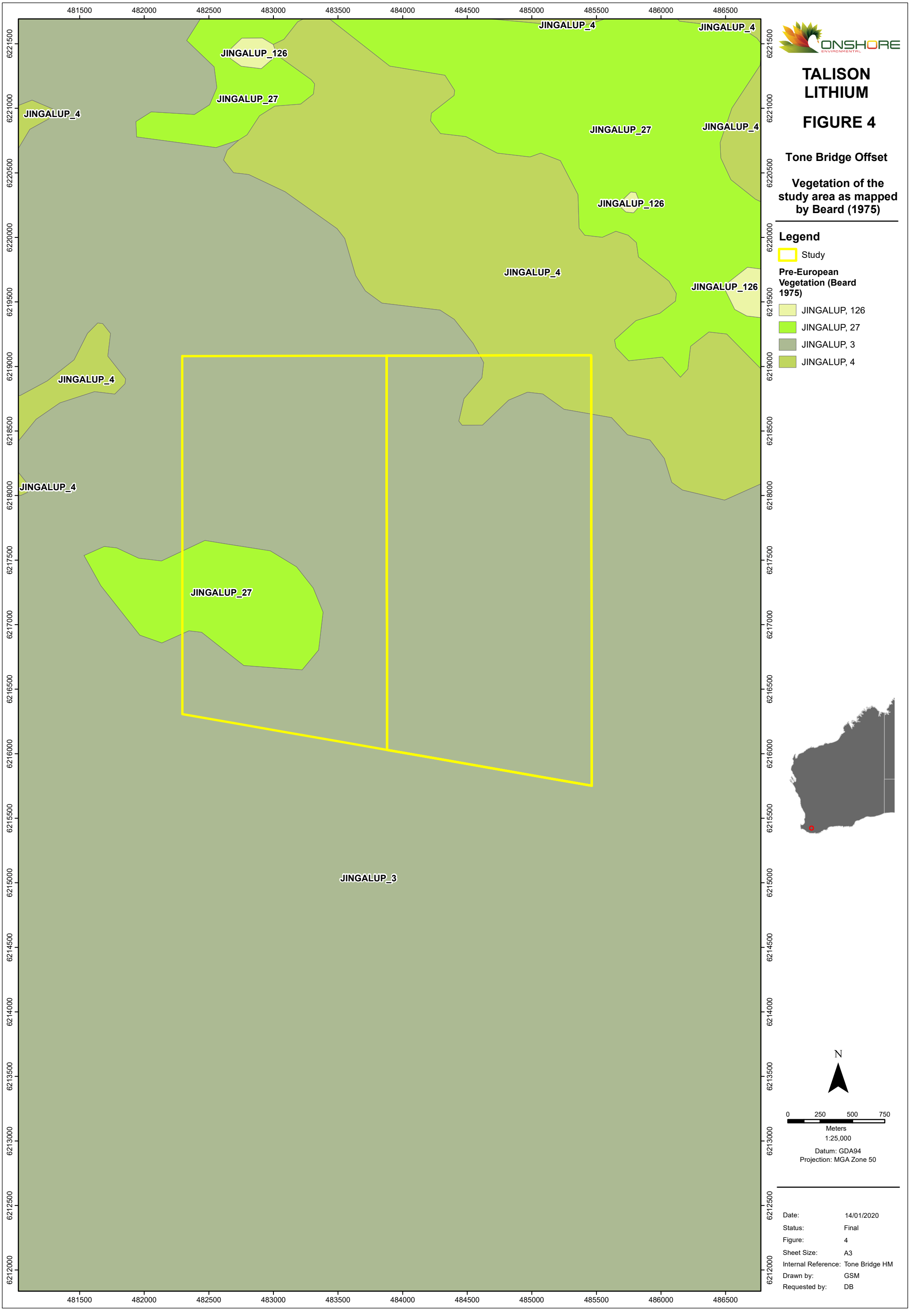
- Frankland Hills 1 (FH1) - Woodland to low open forest of *Eucalyptus marginata* subsp. *marginata* with some *Corymbia calophylla* on uplands in subhumid and semiarid zones;
- Frankland Hills 2 (FH2) - Woodland of *Eucalyptus wandoo-Corymbia calophylla* with some *Eucalyptus marginata* subsp. *marginata* on slopes of low undulating hills in subhumid and semiarid zones;
- Frankland Hills 3 (FH3) - Woodland of *Eucalyptus wandoo-Corymbia calophylla* on the slopes and woodland of *Eucalyptus rudis-Eucalyptus occidentalis* and *Eucalyptus decipiens* on the valley floors in subhumid and semiarid zones; and
- Gordon Flats 1 (GD1) - Mixture of low woodland of *Melaleuca cuticularis* woodland of *Eucalyptus rudis-Eucalyptus occidentalis* and woodland of *Eucalyptus wandoo-Eucalyptus decipiens* on broad flats with some *Banksia littoralis* in the semiarid zone.

These four vegetation complexes currently have between 39 and 50 percent of the pre-European extent remaining within the South West Forest Region, and between 6.3 and 31.9 percent of the current extent protected for conservation. A review of vegetation complexes occurring within sub-region ‘m’ (southeastern dissections and depressions - Tone, Gordon and Muir) by Havel and Mattiske (2002) found one of the four vegetation complexes occurring within the study areas was determined to be

poorly reserved; Gordon Flats 1 (GD1). This complex is aligned with Beard Vegetation Association 4.

Table 6 Pre-European extent of vegetation represented on the basis of identified datasets.

Vegetation System / Association	Pre-European Extent (ha)	Extent Remaining (ha)	% Extent of Pre-European	% Current Extent Protected (IUCN I - IV) for Conservation (proportion of Current Extent)
Beard Vegetation Association				
3 - Medium forest; jarrah-marri	2,661,404.62	1,806,035.91	67.86	26.87
4 - Medium woodland; marri & wandoo	1,054,279.89	287,300.55	27.25	15.83
27 - Low woodland; paperbark	130,385.33	92,770.71	71.15	74.85
Vegetation System				
Jingalup System 3.3	50,124.95	17,700.08	35.31	11.59
Jingalup System 4.1	167,087.44	36,959.21	22.12	4.90
Jingalup System 27.3	8,559.42	5,011.31	58.55	18.58
Jarrah Forest (JAF)				
Beard Vegetation Association 3	2,390,591.54	1,606,736.77	67.21	23.97
Beard Vegetation Association 4	1,022,712.70	280,312.43	27.41	15.91
Beard Vegetation Association 27	49,877.73	37,033.38	74.25	66.98
Jarrah Forest (JAF)				
Jingalup System 3	49,350.82	17,531.57	35.52	11.70
Jingalup System 4	166,658.80	36,904.81	22.14	4.90
Jingalup System 27	8,505.58	5,003.40	58.82	18.61
Southern Jarrah Forest JAF02				
Beard Vegetation Association 3	1,482,491.85	883,557.83	59.60	31.03
Beard Vegetation Association 4	408,511.89	82,508.11	20.20	5.95
Beard Vegetation Association 27	49,877.73	37,033.38	74.25	66.98
Southern Jarrah Forest JAF02				
Jingalup System 3.3	49,351	17,532	35.52	11.70
Jingalup System 4.1	166,659	36,905	22.14	4.90
Jingalup System 27.3	8,506	5,003	58.82	18.61
Shire of Boyup Brook				
Beard Vegetation Association 3	154,522	86,677	56.09	44.34
Beard Vegetation Association 4	49,869	14,214	28.50	8.49
Beard Vegetation Association 27	4,125	2,487	60.28	32.17
Shire of Boyup Brook				
Jingalup System 3.3	8,492	4,170	49.11	2.54
Jingalup System 4.1	4,358	2,161	49.58	0.00
Jingalup System 27.3	3,386	2,016	59.54	19.14
Mattiske Vegetation Complex**				
Frankland Hills 1 (FH1)	15,476.50	7,725.02	49.91	17.50
Frankland Hills 2 (FH2)	47,878.62	18,736.16	39.13	17.02
Frankland Hills 3 (FH3)	10,285.98	5,172.55	50.29	31.90
Gordon Flats 1 (GD1)	8,394.99	3,764.73	44.84	6.32



TALISON LITHIUM

FIGURE 5

Tone Bridge Offset

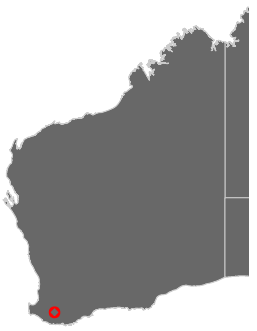
Vegetation of the study area as mapped by Mattiske and Havel (1998)

Legend

- Study Area

Mattiske and Havel (1998) Vegetation Mapping

- FH1 , Frankland Hills
- FH2 , Frankland Hills
- FH3 , Frankland Hills
- FH4 , Frankland Hills
- GD1 , Gordon Flats
- GD2 , Gordon Flats
- GD4 , Gordon Flats



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Status:	Final
Figure:	5
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Drawn by:	GSM
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3.4 Significant Flora

The flora survey was undertaken in early December 2019 and following a relatively dry winter and spring period. Many of the annual and ephemeral taxa were unlikely to be present this late in the year and hence, were not likely to be recorded during the field survey. It is also noted that many of the conservation significant flora recorded during the database searches occur on seasonal wetlands and other riparian habitats that were absent within the study area.

Two significant flora were recorded during the December 2019 field survey including the Priority 3 flora taxon *Caustis* sp. sp. Boyanup (G.S. McCutcheon 1706) (Plate 1), and the range extension taxon *Hypocalymma asperum* (Plate 2). Both of these taxa were recorded together at the northern extent of the sandy slopes vegetation type (Figure 6).

Caustis sp. sp. Boyanup (G.S. McCutcheon 1706) has previously been recorded sparsely over a relatively wide distribution spanning Busselton, Pingelly, Albany and Walpole, with the nearest local collection from north of Kojonup.

Hypocalymma asperum has a mainly coastal distribution extending west from Israelite Bay to Tenterden, approximately 60 km east of the study area. The collection made from within the study area represents the most westerly known population for *Hypocalymma asperum.*

Plate 1 *Caustis* sp. sp. Boyanup (G.S. McCutcheon 1706) (Priority 3)

Plate 2 ***Hypocalymma asperum*** **(range extension)**

TALISON LITHIUM

FIGURE 6

Tone Bridge Offset Site

Significant Flora and Fauna Locations

FRBC
WBW
C.b
H.a
SWBTP
COOTAYERUP

Legend

- Study Area

Significant Flora and Fauna Locations

Significant Flora

- Caustis sp. Boyanup (G.S. McCutcheon 1706) (C.b) - Priority 3
- Hypocalymma asperum (H.a) - Range Extension

Significant Fauna

- Forest Red-tailed Black-Cockatoo (FRBC)
- South-western Brush-tailed Phascogale (SWBTP)
- Western Brush Wallaby (WBW)

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Meters
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Datum: GDA94
Projection: MGA Zone 50

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Drawn by:	GSM
Requested by:	DB

3.5 Level 1 Fauna Survey

3.5.1 Vertebrate Fauna Species

Threatened Fauna listed under the WC Act and EPBC Act

Two vertebrate fauna species listed as Scheduled species under the WC Act and/or listed as Threatened fauna under the EPBC Act were recorded from the study area (Figure 6):

- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) – listed as Vulnerable under the EPBC Act and Schedule 3 under the WC Act; and
- South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) – listed as Schedule 6 under the WC Act.

Priority Fauna recognised by the DBCA

One Priority fauna species, as recognised by the DBCA, was recorded from the study area; Western Brush Wallaby (*Notamacropus irma*) - DBCA Priority 4 (Figure 6).

Introduced Fauna Species

One introduced fauna species (feral animals) were observed within the study area during the survey:

- European Rabbit (**Oryctolagus cuniculus*);

The European Rabbit was identified by fresh diggings and latrines in the study area.

The Laughing Kookaburra (*Dacelo novaeguineae*) was also recorded during the survey. This species was previously referred to as introduced species but is now considered naturalised in the area.

A full list of fauna species recorded is provided in Appendix 7.

3.5.2 Fauna Habitat

Habitat Types

Three main fauna habitats types were identified and mapped within the study area during the field survey: Hillslope/Hillcrest, Drainage Flat and Sandy Slope (Figure 7; Table 7).

The majority of the study area was mapped as 'Hillslopes/Hillcrests' with Jarrah (*Eucalyptus marginata*), and Marri (*Corymbia calophylla*) forest and an open shrub mid-storey with *Banksia* species (*Banksia sessilis* and *Banksia grandis*).

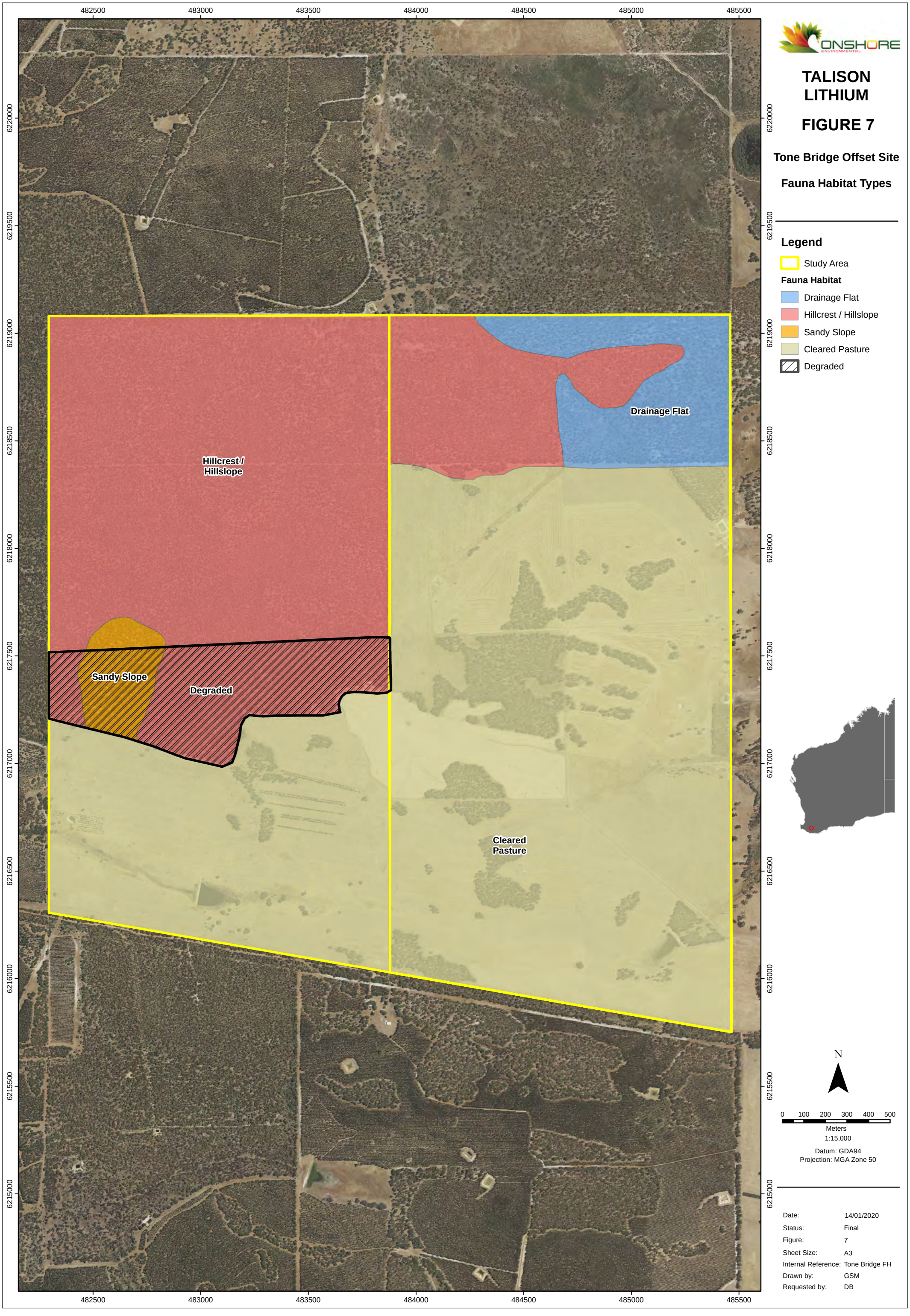
The 'Drainage Flat' habitat occurred through the north-eastern part of the study area and supported trees of Wandoo (*Eucalyptus wandoo*), Marri and Jarrah with an open understorey of shrubs and sedges. This habitat provides good potential for hollows to form due to the presence of Wandoo, Marri and Jarrah.

A small area of 'Sandy Slope' habitat was identified on the western side of the study area. This area provided potential hollows from the Marri and Jarrah trees, as well as softer sandy soils favoured by some burrowing species of fauna.

Additional areas of the study area were mapped as 'Cleared Pasture' and one portion of the 'Hillslope/Hillcrest' and 'Sandy Slope area' was mapped as being degraded habitat due to lack of understorey vegetation due to historical disturbance (Figure 7).

Table 7 Fauna habitat mapped within the study area.

Habitat Type	Description
Hillcrest/Hillslopes	Forest of *Eucalyptus marginata* and *Corymbia calophylla* over open scrub. Soils of brown loamy sand on laterite make this habitat moderately suitable for burrowing fauna species.
Drainage Flat	Woodland of *Eucalyptus wandoo, Eucalyptus marginata* and *Corymbia calophylla* over open scrub, low heath and sedges.
Sandy Slope	Woodland of *Eucalyptus marginata* and *Corymbia calophylla* over open shrubs, heath and sedges. This habitat has sandy soils suitable for burrowing and digging fauna species.
Cleared Pasture	Areas of cleared annual pasture on farmland or cleared areas.



3.5.3 Fauna Habitats and Species of Significance

Assessment of Habitat Trees

To assess the potential for habitat trees within the study area, suitable tree species (i.e. *Corymbia/Eucalyptus* species) that had a diameter at breast height (DBH) of equal to or greater than 50 cm, or 30 cm for *Eucalyptus wandoo,* were counted within defined areas (i.e. 50 x 50 m quadrats) throughout the study area. Trees with a DBH of over 50 cm were relatively common within the 'Hillcrest/Hillslope' habitat with an estimated average density of 124 trees per ha. The estimated average density within the 'Sandy Slope' habitat was 109 trees per ha, and the 'Drainage Flat' habitat had an estimated density of 74 trees per ha.

None of the trees observed within the study area showed signs of being used by black cockatoo species.

Black Cockatoos

Habitats within the study area were assessed for the use by, and suitability for, black cockatoos. There were sightings of, and evidence of foraging, by Forest Red-tailed Cockatoos within the study area (Figure 7). The majority of habitats within the study area were deemed to be suitable foraging, roosting, and potential breeding habitat for the cockatoos, with the exception of areas of cleared annual pasture (Figure 7).

Muir's Cockatoo

Muir's Cockatoo has the potential to use the majority of habitat within the study area. They are known for foraging in open grasslands as well as eucalypt forests and woodland. The 'Hillcrest/Hillslopes', 'Drainage Flat' and 'Sandy Slope' habitats all have the potential to provide breeding habitat for the Muir's Cockatoo, as they nest in tree hollows of large *Eucalyptus* trees.

South-western Brush-tailed Phascogale

The South-western Brush-tailed Phascogale was assessed during the desktop searches as likely to occur within the study area, and was subsequently recorded during the field survey. This species is known to inhabit dry sclerophyll forests and open woodlands that contain hollow-bearing trees with a sparse ground cover (Woinarski *et al.* 2014). South-western Brush-tailed Phascogales rely on tree hollows for nesting, with the hollows observed within the study area assessed as providing habitat for usage by phascogales. Individuals may utilise the 'Hillslope/Hillcrest', 'Drainage Flat' and 'Sandy Slope' habitat types (Figure 7). During the survey, camera traps recorded the South-western Brush-tailed Phascogales in areas of 'Hillslope/Hillcrest habitat' (Figure 7).

Chuditch

The Chuditch was assessed during the desktop assessment as likely to occur within the study area. The Chuditch inhabits Jarrah forest, in moist, densely vegetated, steeply sloping forest and drier, open, gently sloping forest particularly in riparian vegetation (Orell and Morris 1994). Within the study area this species may utilise the 'Hillslope/Hillcrest', 'Sandy Slope' and 'Drainage Flats' habitats for foraging or dispersing.

Western Brush Wallaby

Western Brush Wallaby's like to utilise areas of open forest or woodland. They favour areas that are seasonally wet flats with low grasses and open scrubby thickets. One

sighting of the Western Brush Wallaby was made within the 'Hillslope/Hillcrest' habitat (Figure 7), noting that they are likely to utilise all the habitat types recorded within the study area, with a preference for areas of the 'Drainage Flats' habitat.

Numbat

Previously known to inhabit a wide range of habitats, Numbats are now known to occur predominantly in habitats with *Eucalyptus* species (Van Dyck, et al 2013). They utilise hollow logs and branches for shelter and target termites for food. There is potential for Numbats to utilise the three main habitats within the study area.

4.0 SUMMARY

Talison propose to increase the current (approved) area of the Greenbushes Lithium Operations from 1,591 hectares to 1,989 hectares, representing a 398 hectare (or 25%) increase to the current approved extent of the mine. The proposed expansion will require 350 hectares of native vegetation to be cleared outside existing approval areas. This vegetation is known to contain habitat for three listed threatened species of forest black cockatoos.

As part of a larger package to compensate for residual impacts to the three forest black cockatoos, Talison has identified a privately held parcel of land at Tone Bridge supporting remnant native vegetation. In December 2019, Onshore Environmental completed a reconnaissance flora and vegetation survey and Level 1 vertebrate assessment of remnant vegetation across two adjoining lots at the site.

Remnant native vegetation covering a total of 416.86 ha was described and mapped as three vegetation types including Jarrah-Marri Forest on lateritic undulating hills, *Leptospermum erubescens-Melaleuca thymoides-Macrozamia riedlei* Heath in grey sand on lower slopes, and *Eucalyptus wandoo* Woodland on drainage flats.

Vegetation condition was predominantly rated as *very good* (87% of the study area) with wider disturbances including historical logging and establishment of linear fire breaks. Vegetation condition fringing farmland within Lot 12372 was rated as a combination of *good* (8% of the study area), *degraded* (1% of the study area) and *completely degraded* (4% of the study area). This block had previously been fenced and subjected to historical grazing by sheep which had impacted on understorey vegetation structure.

Broad scale vegetation mapping confirms that remnant native vegetation supporting *Eucalyptus wandoo* Woodland in the northeast sector of the study area is poorly represented and poorly reserved at a state, regional and local level.

Two vertebrate fauna species listed as Scheduled species under the WC Act and/or listed as Threatened fauna under the EPBC Act were recorded from the study area:

- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) – listed as Vulnerable under the EPBC Act and Schedule 3 under the WC Act; and
- South-western Brush-tailed Phascogale (*Phascogale tapoatafa wambenger*) – listed as Schedule 6 under the WC Act.

One Priority fauna species, as recognised by the Department of Biodiversity Conservation and Attractions (DBCA), was recorded from the study area:

- Western Brush Wallaby (*Notamacropus irma*) - DBCA Priority 4.

An additional five species of conservation significance were assessed as likely to occur in the study area based on habitat preference and previous recordings of the species from surrounding areas.

One introduced species, the European Rabbit (*Ortyctolagus cuniculus*), was recorded in the study area. The presence of this species was identified through latrines and diggings within the survey area.

Three main fauna habitat types were described and mapped from the study area, with most of the study area consisting of Hillslope/Hillcrest habitat type, along with Drainage Flats and Sandy Slope. Additional areas of the study area were mapped as

Cleared Pasture and areas of Hillslope/Hillcrest and Sandy Slope were degraded due to grazing.

Habitats within the study area were assessed for their suitability for roosting, foraging and breeding by black cockatoos. All three of the main habitats were considered to offer these characteristics, with Forest Red-tailed Cockatoos recorded foraging in the Hillslope/Hillcrest habitat and evidence of foraging in the Sandy Slope habitat was also observed. None of the trees in the study area were recorded as having evidence of nesting, however the large area with suitable tree species of a suitable age means that it is likely that breeding trees are present, or have the potential to develop in the future.

5.0 STUDY TEAM

The reconnaissance flora and vegetation survey and Level 1 vertebrate fauna assessment was planned, coordinated and executed by the following personnel:

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PO Box 227
YALLINGUP WA 6282
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Project Staff

Dr Darren Brearley	PhD	Project Manager and Principal Botanist
Mr Michael Brown	BSc	Principal Zoologist
Dr Jerome Bull	PhD	Principal Botanist and Taxonomist
Mr Todd Griffin	BSc	GIS and Mapping Specialist

Licences

The field survey was conducted under the authorisation of the following licences issued by DBCA:

- Darren Brearley, Onshore Environmental Consultants 'Flora Taking (Biological Assessment) Licence' - Licence No. FB62000103

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APPENDIX 1

Vegetation Classifications following Muir (1997)

LIFE FORM / HEIGHT	Canopy Cover			
CLASS	**DENSE**	**MID DENSE**	**SPARSE**	**VERY SPARSE**
	70 % - 100%	**30% - 70%**	**10% - 30%**	**2% - 10%**
Trees > 30 m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland
Trees 15 – 30 m	Dense Forest	Forest	Woodland	Open Woodland
Trees 5 – 15 m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A
Trees < 5 m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B
Mallee tree form	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Mallee shrub form	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs > 2 m	Dense Thicket	Thicket	Scrub	Open Scrub
Shrubs 1.5 – 2 m	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A
Shrubs 1 - 1.5 m	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B
Shrubs 0.5 – 1 m	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C
Shrubs 0 - 0.5 m	Dense Low Heath D	Low Heath D	Dwarf Scrub D	Open Dwarf Scrub D
Mat plants	Dense Mat Plants	Mat Plants	Open Mat Plants	Very Open Mat Plants
Hummock grass	Dense Hummock Grass	Mid-Dense Hummock Grass	Hummock Grass	Open Hummock Grass
Bunch grass > 0.5 m	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass
Bunch grass < 0.5 m	Dense Low Grass	Low Grass	Open Low Grass	Very Open Low Grass
Herbaceous spp.	Dense Herbs	Herbs	Open Herbs	Very Open Herbs
Sedges > 0.5 m	Dense Tall Sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges
Sedges < 0.5 m	Dense Low Sedges	Low Sedges	Open Low Sedges	Very Open Low Sedges
Ferns	Dense Ferns	Ferns	Open Ferns	Very Open Ferns
Mosses, liverworts	Dense Mosses	Mosses	Open Mosses	Very Open Mosses

APPENDIX 2

Vegetation condition scale
(as developed by Keighery 1994)

Condition	Scale	Description
Pristine	1	Pristine or nearly so, no obvious signs of disturbance.
Excellent	2	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good	3	Vegetation structure altered; obvious signs of disturbance.
Good	4	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
Degraded	5	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching Very Good condition without intensive management.
Completely Degraded	6	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

APPENDIX 3

Status codes for species listed on the IUCN 'Red List'

Category	Description
Extinct (EX)	A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Extinct in the Wild (EW)	A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
Critically Endangered (CR)	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	A taxon is Near Threatened when it 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)	A taxon is Least Concern when it 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)	A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.
Not Evaluated (NE)	A taxon is Not Evaluated when it has not yet been evaluated against the criteria.

APPENDIX 4

Conservation categories for species listed under the EPBC Act

Category	Description
Extinct	A species is extinct if there is no reasonable doubt that the last member of the species has died.
Extinct in the Wild	A species is categorised as extinct in the wild if it is only known to survive in cultivations, in captivity, or as a naturalised population well outside its past range; or if it has not been recorded in its known/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	The species is facing an extremely high risk of extinction in the wild and in the immediate future.
Endangered	The species is likely to become extinct unless the circumstances and factors threatening its abundance, survival, or evolutionary development cease to operate; or its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction.
Vulnerable	Within the next 25 years, the species is likely to become endangered unless the circumstances and factors threatening its abundance, survival or evolutionary development cease to operate.
Conservation Dependent	The species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

APPENDIX 5

Conservation categories for species listed under the BC Act

Fauna Species - Wildlife Conservation (Specially Protected Fauna) Notice 2017

Category	Description
Schedule 1	Fauna that is rare or is likely to become extinct as critically endangered fauna.
Schedule 2	Fauna that is rare or is likely to become extinct as endangered fauna.
Schedule 3	Fauna that is rare or is likely to become extinct as vulnerable fauna.
Schedule 4	Fauna presumed to be extinct.
Schedule 5	Migratory birds protected under an international agreement.
Schedule 6	Fauna that is of special conservation need as conservation dependent fauna.
Schedule 7	Other specially protected fauna.

APPENDIX 6

Conservation codes for Western Australian species

Threatened Species

Published as Specially Protected under the *Wildlife Conservation Act 1950*, and listed under Schedules 1 to 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice* for Threatened Fauna and *Wildlife Conservation (Rare Flora) Notice* for Threatened Flora (which may also be referred to as Declared Rare Flora).

Threatened fauna is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the *Wildlife Conservation Act*.

Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the *Wildlife Conservation Act*.

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.

Priority One: 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 Two: 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 Three: 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 Four: 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 7

List of all fauna species recorded within the study area

Common Name	Species Name	Observation Type	Status
Mammals			
Western Grey Kangaroo	*Macropus fuliginosus*	Day Sighting, Scats, Camera	
South-western Brush-tailed Phascogale	*Phascogale tapoatafa wambenger*	Camera	S6 (WC Act)
Western Brush Wallaby	*Notamacropus irma*	Day Sighting	Priority 4 (DBCA)
European Rabbit	**Oryctolagus cuniculus*	Latrine	Introduced
Birds			
Emu	*Dromaius novaehollandiae*	Scats, track	
Wedge-tailed Eagle	*Aquila audax*	Day Sighting	
Brown Goshawk	*Accipiter fasciatus*	Day Sighting	
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	Call	
Southern Boobook	*Ninox novaeseelandiae*	Day Sighting	
Laughing Kookaburra	*Dacelo novaeguineae*	Day Sighting	Naturalised
Forest Red-tailed Black Cockatoo	*Calyptorhynchus banksii naso*	Day Sighting, Foraging evidence	VU (EPBC Act) S3 (WC Act)
Australian Ringneck	*Platycercus zonarius*	Day Sighting	
Elegant Parrot	*Neophema elegans*	Day Sighting	
Red-winged Fairywren	*Malurus elegans*	Day Sighting	
Splendid Fairywren	*Malurus splendens*	Day Sighting	
Brown Honeyeater	*Lichmera indistincta*	Day Sighting	
White-cheeked Honeyeater	*Phylidonyris niger*	Day Sighting	
New Holland Honeyeater	*Phylidonyris novaehollandiae*	Day Sighting	
Red Wattlebird	*Anthochaera carunculata*	Day Sighting	
White-browed Scrubwren	*Sericornis frontalis*	Day Sighting	
Weebill	*Smicrornis brevirostris*	Day Sighting	
Western Gerygone	*Gerygone fusca*	Day Sighting	
Western Thornbill	*Acanthiza inornata*	Day Sighting	
Broad-tailed Thornbill	*Acanthiza apicalis*	Day Sighting	
Australian Magpie	*Cracticus tibicen*	Day Sighting	
Black-faced Cuckoo Shrike	*Coracina novaehollandiae*	Day Sighting	
Western Golden Whistler	*Pachycephala occidentalis*	Day Sighting	
Grey-shrike Thrush	*Colluricincla harmonica*	Calling	
Willie Wagtail	*Rhipidura leucophrys*	Day Sighting	
Grey Fantail	*Rhipidura leucophrys*	Day Sighting	
Australian Raven	*Corvus coronoides*	Day Sighting	
Hooded Robin	*Melanodryas cucullata*	Day Sighting	
White-breasted Robin	*Eopsaltria georgiana*	Day Sighting	
Scarlet Robin	*Petroica boodang*	Day Sighting	
Red-capped Robin	*Petroica goodenovii*	Calling	
Silvereye	*Zosterops lateralis*	Day Sighting	
Mistletoe Bird	*Dicaeum hirundinaceum*	Day Sighting	
Reptiles			
South-western Crevice-skink	*Egernia napoleonis*	Day Sighting	
Shrubland Morethia Skink	*Morethia obscura*	Day Sighting	
Common Dwarf Skink	*Menetia greyii*	Day Sighting	
Shingle Back	*Tiliqua rugosa*	Day Sighting	
Heath Monitor	*Varanus rosenbergi*	Day Sighting	

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