

Ginninderry, NSW

Biodiversity Certification Assessment Report

Draft 05 – 20 June 2023 Prepared for Riverview Group Pty Ltd



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We acknowledge the Traditional Custodians of the land on which we work. We pay our respects to Elders past and present.

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Executive Summary

Riverview Projects Pty Ltd is currently progressing the planning and approval process for the development of the NSW portion of the Ginninderry development in Lots 1, 2, 3, 4, 5, and 7 DP771051, and Lot 62 DP801234, Wallaroo, NSW (the 'proposed development' of the 'subject land', approx. 523.84 ha) (Figure 1, Figure 2, Figure 3). Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by Riverview Projects Pty Ltd to complete the necessary biodiversity surveys and prepare this Biodiversity Certification Assessment Report (BCAR) to identify and assess the significance of the impacts that the proposed development will have on the biodiversity values of the subject land.

Background

Ginninderry is being developed as a Joint Venture between the ACT Government and Riverview Developments. Riverview Projects, acting as the project manager, is charged to develop Ginninderry for residential and community purposes. The Ginninderry development includes land both in the ACT and NSW, with development of the ACT portion well underway.

In 2017, Riverview Projects and the Commonwealth Government commenced a Strategic Assessment¹ under Part 10 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The focus of the Strategic Assessment was to assess the potential impacts from development of the Ginninderry project area on Matters of National Environmental Significance (MNES) protected under the EPBC Act. Following endorsement of the Program Report² Riverview received EPBC Act Approval³ to implement the staged development of the project. Attached to the approval are 20 conditions.

One of the conditions of approval was the establishment of the Ginninderry Conservation Corridor (GCC). This 572 ha area will protect and manage the areas which were identified in the Strategic Assessment as supporting significant conservation value.

The subject land consists of several properties under different ownership. One property owned by Shaw and Armitage has included conditions of sale such that two large blocks will be retained by the owners (Shaw and Armitage Lots 1 and 2, see Figure 3).

Scope

Although general biodiversity values are identified and considered, the primary purpose of this BCAR is to present the results of Capital Ecology's application of the NSW Biodiversity Assessment Method 2020 (BAM) to assess the significance of the impacts of the proposed development on biota listed as threatened under the NSW *Biodiversity Conservation Act 2016* (BC Act).

This BCAR also includes the assessment of the potential impact of the proposed development on Matters of National Environmental Significance (MNES) listed pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). However it is noted that

¹ Umwelt (2017). *West Belconnen Project Strategic Assessment. Strategic Assessment Report. Final.* Prepared by Umwelt (Australia) Pty Ltd on behalf of Riverview Projects Pty Ltd. Report No. 8062_R01_V8, March 2017. ² A T Adams Consulting (2017). *Urban Development at West Belconnen. Program Report.* Prepared for: Riverview Projects (ACT) Pty Ltd, 18 April 2017.

³ Australian Government (2017). Urban Development at West Belconnen (Ginninderry) – SA.024 – Final approval decision for the taking of actions in accordance with an endorsed program under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Signed K. Farrant on 1 September 2017.



the impact of the Ginninderry development on MNES (the 'proposed action') was referred on 28 September 2020 (EPBC Act Referral No. 2020/8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation). The proposed action was approved on 13 September 2021, subject to certain conditions.

The Subject Land and Development Footprint

As defined in the BAM, the subject land is "land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal". Accordingly, the subject land⁴ for this BCAR is 523.84 ha and encompasses the whole of Lots 1, 2, 3, 4, 5, and 7 DP771051, and Lot 62 DP801234, Ginninderry, NSW.

As defined in the BAM, the development footprint is "the area of land that is directly impacted by a proposed development, including access roads and areas used to store construction materials. The term development footprint is also taken to include clearing footprint, except where the reference is to a small area development or a major project development". The 355.43 ha development footprint⁵ for this BCAR therefore encompasses all of the land that is currently proposed for development.

Survey Overview

Vegetation and potential flora/fauna habitat were surveyed and mapped in accordance with the BAM. This involved the following ecological surveys performed by Capital Ecology between 27 September 2019 and 5 May 2022.

- Plant Community Type and Vegetation Zone assessment and mapping.
- BAM plots.
- A tree habitat assessment and fauna nesting survey via inspections of each tree in the subject land for signs of fauna breeding in hollows or stick nests.
- Habitat assessment for listed threatened flora and fauna.
- Threatened flora surveys via transect surveys, surveys of rocky areas, and opportunistic observations.
- Threatened bird surveys via areas searches and opportunistic observations.
- Surveys for the Pink-tailed Legless Lizard *Aprasia parapulchella* via an intensive rock turning survey consistent with the Commonwealth guidelines.
- A full program of targeted Striped Legless Lizard *Delma impar* surveys, involving 10 checks of 10 grids (50 tiles per grid) following methodology consistent with the Commonwealth guidelines.
- Anabat[®] surveys for insectivorous bat species.

⁴ With reference to the biodiversity certification process, the subject land in this BCAR is equivalent to the 'biodiversity certification assessment area' (refer to Section 3.6).

⁵ With reference to the biodiversity certification process, the development footprint in this BCAR is equivalent to the 'land proposed for biodiversity certification' (refer to Section 3.6).



Results

Native vegetation

The subject land supports five Plant Community Types (PCT).

- PCT85 River Oak forest and woodland wetland of the South Eastern Highlands Bioregion
- PCT321 Red Stringybark Long-leaved Box Black Cypress Pine shrub grass woodland on siliceous sedimentary ranges
- PCT1093 Red Stringybark Brittle Gum Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
- PCT1330 Yellow Box Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
- PCT3415 Southern Tableland Red Grass Spear Grass Grassland

Before European occupation, the subject land would have been characterised by an open grassy woodland in the eastern part of the subject land, merging with dry sclerophyll forest on the western slopes leading down to the Murrumbidgee River. The banks of the river would have been characterised by River Oak Forest. A small patch of Natural Temperate Grassland occurs in the southern corner of the subject land and extends to the south. However, the subject land has been substantially modified by its current and past land use, which has primarily been grazing (sheep and cattle). Approximately 79% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the subject land to promote the pastoral productivity of the land. The majority of the subject land (approx. 62%) has been historically pasture improved and is dominated by exotic pasture grasses (especially Phalaris) and a variety of weeds.

Most of the areas which retain the original vegetation occur along the steep slopes leading to the Murrumbidgee River corridor in the western part of the subject land. The majority of these areas also retain a native understorey with a moderate to high diversity of native grasses and forbs. The riparian vegetation along the Murrumbidgee River is generally dominated by exotic species.

The majority of the vegetation in the subject land is therefore largely characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native species or exotic grasses and weeds.

Finally, the subject land is bordered to the east and south-east by urban development, and to the north and west by the Murrumbidgee River and Ginninderra Creek.

Threatened ecological communities

EPBC Act Natural Temperate Grassland of the South Eastern Highlands

PCT3415 is identified as the potential EPBC Act listed threatened ecological community (TEC) *Natural Temperate Grassland of the South Eastern Highlands*. PCT3415 Zones 1 and 2 meet the listing criteria for NTG-SEH as they are characterised by a native groundstorey with moderate to high native forb diversity. However these areas do not occur in the development footprint and so will not be impacted by the proposed development. PCT3415 Zones 3 and 4 do not meet the listing criteria for NTG-SEH. A very small part of PCT3415 Zone 4 does occur in the development footprint and so will be impacted by the proposed development. As such, while the wider subject land supports Natural



Temperate Grassland of the South Eastern Highlands in the areas defined by PCT3415 Zones 1 and 2, the development footprint does not.

EPBC Act Box-Gum Woodland

PCT1330 is identified as the potential EPBC Act listed TEC *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. PCT1330 Zones 1 and 4 meet the criteria for the EPBC Act listed TEC, while PCT1330 Zones 2, 5 and 8 do not.

The proposed development will not impact any of the EPBC Act Box-Gum Woodland in the subject land.

BC Act Box-Gum Woodland

PCT1330 is identified as the potential BC Act listed TEC *White Box – Yellow Box – Blakely's Red Gum Woodland* (BC Act Box-Gum Woodland). PCT1330 Zones 1 and 4 support vegetation which meets the criteria for this TEC in moderate to high condition, PCT1330 Zone 2 supports vegetation which meets the criteria for this TEC in moderate condition, and PCT1330 Zone 5 support vegetation which meets the criteria for this TEC in low condition. PCT1330 Zone 8 lacks a native overstorey and has a groundstorey that is highly modified and dominated by perennial exotic grasses and herbaceous weeds. As such, PCT1330 Zone 8 does not support vegetation which meets the criteria for this TEC under the BC Act.

The proposed development will impact 14.08 ha of BC Act Box-Gum Woodland, 98.4% (13.85 ha) of which is in low condition (i.e. PCT1330 Zone 5).

Threatened species

Threatened flora

One threatened species, Pale Pomaderris *Pomaderris pallida* (EPBC Act vulnerable, BC Act vulnerable) was recorded in one location on the banks of the Murrumbidgee River. However, this area does not occur in the development footprint and so will not be impacted by the proposed development.

None of the remaining threatened flora species credit species were recorded in the subject land and none are considered likely to occur.

Threatened fauna

The historic activities which have occurred across the development footprint have substantially degraded the habitat value for native fauna. As a result, the majority of the threatened fauna species credit species identified by the BAM were considered unlikely to occur in the development footprint. However, targeted surveys did detect Pink-tailed Legless Lizard *Aprasia parapulchella* (EPBC Act vulnerable, BC Act vulnerable). A total of 29 live Pink-tailed Legless Lizards and 28 sloughed skins were recorded in the subject land during targeted surveys. The subject land was assessed as supporting 37.64 ha of Pink-tailed Legless Lizard habitat. The proposed development will impact 3.45 ha of Pink-tailed Legless Lizard habitat, which equates to an impact of 9.13% of the habitat in the subject land.

In addition, the subject land is also assumed to support habitat for the Key's Matchstick Grasshopper *Keyacris scurra* (EPBC Act endangered, BC Act endangered). No targeted surveys were undertaken for this species as it was not listed at the time. Therefore, the extent of habitat is assumed to include



all areas supporting a high diversity native groundstorey with a significant proportion of Kangaroo Grass *Themeda triandra* (i.e. PCT1330 Zones 1 and 4, and PCT1093 Zone 4, total 78.67 ha). The proposed development will impact 26.53 ha of assumed Key's Matchstick Grasshopper habitat, which equates to an impact of 33.7% of the habitat in the subject land.

Avoidance and Minimisation

The proposed development will clear 355.43 ha of vegetation, of which 48.36 ha meets the definition of BC Act native vegetation.

The proposed development includes the avoidance and retention of four small patches of vegetation in the western part of the subject land (total: 6.02 ha). It is proposed that this 6.02 ha area will be protected and managed as part of the Ginninderry Conservation Corridor. By doing so, the proposed development avoids impacts to 2.42 ha of EPBC Act Box-Gum Grassy Woodland, and 0.57 ha of Pink-tailed Legless Lizard habitat.

In addition to the above, it is important to recognise that planning for the Ginninderry development, both for development and conservation, has been a process that has progressed over more than three decades, and which has been informed by a substantial number of ecological studies. The ultimate outcome from this process was the establishment of the Ginninderry Conservation Corridor (GCC). This is considered to be the primary avoidance measure related to the proposed development as the early establishment of the GCC has ensured a formal, legally binding, and conservation focussed management regime for the areas recognised as supporting significant biodiversity values.

The establishment of the GCC protects approximately 31% (162 ha) of the subject land, including the vast majority of the identified significant biodiversity values. Protected values include:

- 0.8 ha of woodland vegetation (i.e. PCT1330), all of which meets the listing criteria for EPBC Act Box-Gum Woodland;
- 33.63 ha of Pink-tailed Legless Lizard habitat.
- 143.28 ha of high-quality dry forest and riparian habitat in the Murrumbidgee River corridor.

In addition, the GCC protects habitat for threatened flora (i.e. Pale Pomaderris *Pomaderris pallida*), and a variety of threatened birds.

Impacts

Native vegetation

The proposed development will result in the clearance of the following native vegetation.

- 0.22 ha of PCT1330 Zone 2 mature canopy, regeneration, native dominant understorey with low diversity (BC Act native vegetation, BC Act Box-Gum Woodland);
- 13.86 ha of PCT1330 Zone 5 low diversity native pasture (BC Act native vegetation, BC Act Box-Gum Woodland);
- 6.84 ha of PCT1093 Zone 1 mature canopy, regeneration, native dominant understorey with high diversity (BC Act native vegetation);
- 26.53 ha of PCT1093 Zone 4 high diversity derived native grassland (BC Act native vegetation);



• 0.91 ha of PCT1093 Zone 6 – mature canopy, regeneration, exotic dominant understorey with low diversity (BC Act native vegetation);

The development footprint also includes 88 mature remnant trees, all of which support at least one functional hollow or other habitat feature. The Ginninderry Project works toward an overall master plan, and where trees can be retained to achieve a sensible urban design outcome it endeavors to do so.

The proposed development will also result in the clearance of:

- 289.03 ha of PCT1330 Zone 8 low diversity exotic pasture.
- 17.96 ha of PCT1093 Zone 8 low diversity exotic pasture.

In total, the proposed development will result in the clearance of 48.36 of BC Act native vegetation, 14.08 ha of which meets the listing criteria BC Act Box-Gum Woodland.

The development footprint contains the following vegetation with a vegetation integrity score that requires offsetting for impacts on ecosystem credits.

- PCT1330 Zone 2 vegetation integrity score of 42.8, proposed clearance of 0.22 ha.
- PCT1093 Zone 1 vegetation integrity score of 67.1, proposed clearance of 6.84 ha.
- PCT1093 Zone 6 vegetation integrity score of 17.5, proposed clearance of 0.91 ha.

PCT1330 Zone 5 and 8, and PCT1093 Zone 4 and 8 do not have a vegetation integrity score that requires offsetting for impacts on ecosystem credits.

- PCT1330 Zone 5 vegetation integrity score of 0.7.
- PCT1330 Zone 8 vegetation integrity score of 0.3.
- PCT1093 Zone 4 vegetation integrity score of 10.4.
- PCT1093 Zone 8 vegetation integrity score of 0.7.

PCT1330 is listed as a serious and irreversible impacts (SAII) entity ('BC Act Box-Gum Woodland'). Accordingly, the proposed development could result in a SAII on a BC Act listed entity. However, as detailed in this BCAR, following substantial avoidance, minimisation, and mitigation measures, the proposed removal of 14.08 ha of BC Act Box-Gum Woodland (comprised of 0.22 ha of moderate condition BC Act Box-Gum Woodland and 13.86 ha of low condition BC Act Box-Gum Woodland) is unlikely to constitute a SAII.

The proposed development will not result in any other direct impacts on native vegetation and is unlikely to result in biodiversity impacts that are unforeseen or uncertain.



Threatened species habitat

The proposed development will result in the clearance of the following threatened species habitat.

- 3.45 ha of Pink-tailed Legless Lizard habitat (BC Act vulnerable, EPBC Act vulnerable) located in PCT1330 Zones 5 and 8, and PCT1093 Zones 1, 4, 6, and 8.
- 26.53 ha of assumed Key's Matchstick Grasshopper habitat (BC Act endangered, EPBC Act endangered) located in PCT1093 Zone 4.

The clearance of the following threatened species habitat requires offsetting for impacts on species credits.

- Pink-tailed Legless Lizard proposed impact of 3.45 ha.
- Key's Matchstick Grasshopper proposed impact of 26.53 ha.

The proposed development will not result in any other direct impacts on threatened species habitat and is unlikely to result in biodiversity impacts that are unforeseen or uncertain.

Assessment and Approval Requirements

Commonwealth EPBC Act

As mentioned previously, the impact of the Ginninderry Development on MNES was referred on 28 September 2020 (EPBC Act Referral No. 2020/8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation). The proposed action was approved on 13 September 2021, subject to certain conditions

NSW BC Act – Biodiversity offset credit calculations

The proposed development will involve the clearance of vegetation which generates the following ecosystem credits, as determined by the BAM Calculator on 31 May 2023.

- PCT1330 Zone 2 clearance of 0.22 ha generates 6 ecosystem credits.
- PCT1093 Zone 1 clearance of 6.8 ha generates 201 ecosystem credits.
- PCT1093 Zone 6 clearance of 0.91 ha generates 7 ecosystem credits.

The proposed development will involve the clearance of threatened species habitat which generates the following species credits, as determined by the BAM Calculator on 31 May 2023.

- Pink-tailed Legless Lizard clearance of 3.45 ha generates 37 species credits.
- Key's Matchstick Grasshopper clearance of 26.53 ha generates 138 species credits.



NSW Koala SEPP – Koala Habitat Protection Requirements

Regarding the application of the *State Environmental Planning Policy (Biodiversity and Conservation)* 2021 – Chapter 4 Koala Habitat protection (the 'Koala Habitat Protection SEPP 2021') for the proposed development of the subject land, the following points are noted.

- 1. The subject land is located within the Yass Valley Local Government Area (LGA), which is an LGA to which the Koala Habitat Protection SEPP 2021 applies as listed in Schedule 2.
- 2. The subject land has an area of greater than 1 hectare and there is no approved Koala Plan of Management.
- 3. The subject land support a number of the tree species listed in Schedule 3 of the Koala Habitat Protection SEPP 2021. Accordingly, the subject land supports 'potential koala habitat'.
- 4. The subject land is separated by over 7.7 km from the nearest Koala records, all of which occur in intact vegetation to the west; the intervening areas are characterised by cleared rural land and include a substantial number of significant impediments to Koala movement (e.g. cleared areas, human disturbance).
- 5. The ecological values of the subject land have been investigated since the early 1990s (refer to Section 1.2.1). No Koala or signs of Koala occupation have ever been detected.

With regard to the above and with respect to the Koala Habitat Protection SEPP, the subject land is therefore considered unlikely to support Koala habitat and as such is unlikely to constitute important or occupied Koala habitat now or in the future.

In light of the above, Council can be satisfied that the subject land is not Koala habitat, and it is therefore not prevented by the Koala Habitat Protection SEPP from granting consent to a development application within the subject land.



1 Introduction

Riverview Projects Pty Ltd is currently progressing the planning and approval process for the development of the NSW portion of the Ginninderry development in Lots 1, 2, 3, 4, 5, and 7 DP771051, and Lot 62 DP801234, Wallaroo, NSW (the 'proposed development' of the 'subject land'). Capital Ecology Pty Ltd (Capital Ecology) has been commissioned by Riverview Projects Pty Ltd to complete the necessary biodiversity surveys and prepare this Biodiversity Certification Assessment Report (BCAR) to identify and assess the significance of the impacts that the proposed development will have on the biodiversity values of the subject land.

Although general biodiversity values are identified and considered, the primary purpose of this BCAR is to present the results of Capital Ecology's application of the NSW Biodiversity Assessment Method 2020 (BAM) (NSW Government 2020a⁶) to assess the significance of the impacts of the proposed development on biota listed as threatened under the NSW *Biodiversity Conservation Act 2016* (BC Act).

1.1 The Subject Land and Development Footprint

As shown in Figure 1, Figure 2 and Figure 3, the Ginninderry development is located in West Belconnen, and occupies land to the north of Stockdill Drive and west of the suburb of Holt, extending to the Murrumbidgee River in the west and Ginninderra Creek in the north. The southern part of this area is within the Australian Capital Territory (ACT) and has been assessed via the applicable ACT process. For the purposes of this assessment, the subject land includes the land to the north of the NSW border.

As defined in the BAM, the subject land is "*land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal*". Accordingly, the subject land⁷ for this BCAR is 523.84 ha and encompasses the whole of Lots 1, 2, 3, 4, 5, and 7 DP771051, and Lot 62 DP801234, Wallaroo, NSW (Figure 1, Figure 2, and Figure 3).

As defined in the BAM, the development footprint is "the area of land that is directly impacted by a proposed development, including access roads and areas used to store construction materials. The term development footprint is also taken to include clearing footprint, except where the reference is to a small area development or a major project development". As discussed in more detail in Section 1.3, the 355.43 ha development footprint⁸ for this BCAR therefore encompasses all of the land that is proposed for development (Figure 2, Figure 3).

The subject land, as shown in Figure 1 and Figure 3, is bordered by:

- the suburb of Holt to the east;
- Stockdill Drive and rural land to the south;
- the Murrumbidgee River to the west; and
- Ginninderra Creek to the north.

⁶ NSW Government (2020a). *Biodiversity Assessment Method*. NSW Department of Planning, Industry and Environment. Published October 2020

⁷ With reference to the biodiversity certification process, the subject land in this BCAR is equivalent to the 'biodiversity certification assessment area' (refer to Section 3.6).

⁸ With reference to the biodiversity certification process, the development footprint in this BCAR is equivalent to the 'land proposed for biodiversity certification' (refer to Section 3.6).



While the subject land is located in NSW within the Yass Valley Local Government Area (LGA), it is only accessible from the ACT and is therefore subject to a joint management agreement between the ACT and NSW Governments.

The western part of the subject land is identified on the *Yass Valley Local Environmental Plan 2013* Natural Resources Biodiversity Map⁹, and the Murrumbidgee River and Ginninderra Creek are identified on the NSW Government Biodiversity Values Map¹⁰.

The topography across the eastern and southern parts of the subject land is relatively flat, ranging from approximately 550 - 570 m AHD. The topography then falls steeply down to around 420 m AHD on the banks of the Murrumbidgee River on the western boundary.

The built infrastructure in the subject land consists of an unsealed road (Parkwood Road) and smaller dirt tracks, several existing houses and sheds, and boundary and internal fences.

The subject land is bounded by the Murrumbidgee River and Ginninderra Creek on the western and northern boundaries. Several tributaries originate in the subject land and run into these larger waterways (Figure 4). The tributaries were dry at the time of survey and are only likely to convey water following substantial rain events. There are 30 small to moderately sized dams in the subject land. All of the dams held at lease some water at the time of survey. Several of these dams support modified riparian vegetation that is primarily dominated by exotic species.

Before European occupation, the subject land would have been characterised by an open grassy woodland in the eastern part of the subject land, merging with dry sclerophyll forest on the western slopes leading down to the Murrumbidgee River. The banks of the river would have been characterised by River Oak Forest. A small patch of Natural Temperate Grassland occurs in the southern corner of the subject land and extends to the south into the ACT. However, the subject land has been substantially modified by its current and past land use, which has primarily been grazing (sheep and cattle). Approximately 79% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the subject land to promote the pastoral productivity of the land. The majority of the subject land (approx. 62%) has been historically pasture improved and is dominated by exotic pasture grasses (especially Phalaris) and a variety of weeds.

Most of the areas which retain the original vegetation occur along the steep slopes leading to the Murrumbidgee River corridor in the western part of the subject land. The majority of these areas also retain a native understorey with a moderate to high diversity of native grasses and forbs. The riparian vegetation along the edge of the Murrumbidgee River is generally dominated by exotic species.

The majority of the vegetation in the subject land is therefore largely characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native species or exotic grasses and weeds.

 ⁹ Yass Valley Local Environmental Plan 2013. Natural Resources Biodiversity Map – Sheet NRB_005.
 ¹⁰ https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap



1.2 Background to the Proposed Development

1.2.1 EPBC Act Strategic Assessment

In 2017, Riverview Projects and the Commonwealth Government commenced a Strategic Assessment¹¹ under Part 10 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The focus of the Strategic Assessment was to assess the potential impacts from development of the Ginninderry project area on Matters of National Environmental Significance (MNES) protected under the EPBC Act. Following endorsement of the Program Report¹² Riverview received EPBC Act Approval¹³ to implement the staged development of the project. Attached to the approval are 20 conditions.

As detailed in the Strategic Assessment:

"The proposed urban development of Ginninderry includes the provision of 11,500 dwellings, with associated services and infrastructure (including the provision of sewer mains, an extension of Ginninderra Drive, and upgrade works to three existing arterial roads). It will extend the existing Canberra town centre of Belconnen to become the first cross border development between NSW and the ACT...The Riverview Group is aiming to create a sustainable community in the nation's capital that will be recognised with a 'six star – a world leader in sustainability' rating (Green Community Rating) under the Green Building Council of Australia's Green Star Community Pilot Rating Program... This is a pilot program aimed at enabling the long-term sustainability of urban development by assessing criteria for the planning, design, and construction phases. This final score is based on measures which include liveability, economic prosperity, environmentally responsible community design, and governance."

1.2.2 ACT Land

As the proposed development is located in the ACT it is also subject to ACT legislation. On 9 March 2018, Riverview formally lodged an application for an Environmental Impact Statement (EIS) Exemption¹⁴ under Section 211 of the *Planning and Development Act 2007* (P&D Act) for the Ginninderry Stage 2 Urban Development. The EIS Exemption, including a number of conditions, was granted by the Minister for Planning and Land Management on 24 October 2018.

1.2.3 The Ginninderry Conservation Corridor

One of the conditions of the EPBC Act Approval was the establishment of the Ginninderry Conservation Corridor (GCC). The design of Ginninderry has been under development since 2007. It has undergone multiple revisions and has been subject to a comprehensive stakeholder engagement process that has actively sought feedback from key community groups and various Commonwealth, State, and Territory agencies. This process has included extensive investigations into the ecological

 ¹¹ Umwelt (2017). West Belconnen Project Strategic Assessment. Strategic Assessment Report. Final. Prepared by Umwelt (Australia) Pty Ltd on behalf of Riverview Projects Pty Ltd. Report No. 8062_R01_V8, March 2017.
 ¹² A T Adams Consulting (2017). Urban Development at West Belconnen. Program Report. Prepared for:

Riverview Projects (ACT) Pty Ltd, 18 April 2017.

¹³ Australian Government (2017). Urban Development at West Belconnen (Ginninderry) – SA.024 – Final approval decision for the taking of actions in accordance with an endorsed program under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Signed K. Farrant on 1 September 2017.

¹⁴ Riverview Projects (ACT) Pty Ltd. *Ginninderry Stage 2 Urban Development. Application for EIS Exemption. Consideration Report.* September 2018. Ref no: 201800010



values of the site (studies relevant to the subject land were collated and reviewed in Capital Ecology 2019¹⁵).

One of the key outcomes of this process was the decision that the development would be designed around the existing ecological values of the project area. As a result, the Ginninderry development includes the creation of the GCC along the riparian corridors of the Murrumbidgee River and Ginninderra Creek (See Figures 2 and 3, and Plate 1).

The delineation of the boundary between the urban development area and the GCC was designed to protect the identified significant ecological values. As a result, the 549.9 ha GCC protects the vast majority of EPBC Act / NC Act Box-Gum Woodland, EPBC Act Natural Temperate Grassland of the South Eastern Highlands, and the majority of the higher quality flora and fauna habitat, including threatened Pink-tailed Legless Lizard *Aprasia parapulchella* habitat and the majority of the threatened woodland bird habitat and potential threatened flora habitat. These areas are summarised in the Program Report (A T Adams Consulting 2017), as detailed in Table 2 and Figures 8 and 9 (extracts included below)¹⁶.

The GCC also forms an important habitat link that facilitates movement across both the local and regional landscape, providing habitat connectivity to Mulligans Flat Woodland Sanctuary and other reserves in the north of the ACT and forming part of the 66 km long Murrumbidgee River Corridor.

The proposed development will include a wide range of measures to manage potential indirect impacts to the significant ecological values of the GCC, including a management zone running along the urban interface with the GCC, fencing along the GCC boundary, domestic cat containment, prohibition of domestic pets in the GCC, prohibition of horse riding in the GCC, mountain bike tracks will not be constructed in the GCC, provision of dog parks within the urban development area, integrated pest management, educational initiatives, and management of the GCC in accordance with the Ginninderry Conservation Corridor Management Plan¹⁷.

River corridor habitat areas (ha.)	ΑСΤ	NSW	Total
Box gum woodland retained	70.7	0	70.7
Box gum woodland within development area	0	0	0
High quality PTWL habitat retained	125.3	15.9	141.2
High quality PTWL habitat within development area	9.4	0.8	10.2
Low quality PTWL habitat retained	4.3	0.2	4.5
Low quality PTWL habitat within development area	3.6	2.6	6.2

Table 2: River corridor habitat areas

Table extracted from A T Adams Consulting (2017). *Urban Development at West Belconnen. Program Report*. Prepared for: Riverview Projects (ACT) Pty Ltd, 18 April 2017¹⁶.

¹⁵ Capital Ecology (2019). *Review of previous ecological reports regarding the NSW portion of the Ginninderry project area.* Authors: S. Reid and R. Speirs. Capital Ecology project no. 2829

¹⁶ Note that the areas shown in Table 2 and Figures 8 and 9 have been updated as a result of more recent and accurate mapping, as presented in the current report.

¹⁷ Ginninderry (2018). Ginninderry Conservation Corridor 2018 – 2023 Management Plan. September 2018.





Figure 8: Yellow box red gum grassy woodland

Figure 9: Pink tailed worm lizard habitat

Images extracted from A T Adams Consulting (2017). *Urban Development at West Belconnen. Program Report*. Prepared for: Riverview Projects (ACT) Pty Ltd, 18 April 2017.

1.3 The Proposed Development

1.3.1 Ginninderry

The Ginninderry Project is a master-planned development. The Project Area included in the master plan covers 1,583.3 hectares of land that straddles the Australian Capital Territory and New South Wales border, West Belconnen, in the newly established suburb of Strathnairn.

Holistically, the Ginninderry Project is a residential development, which in time will support local shops, schools, community facilities, and recreational experiences in the urban area and within the Ginninderry Conservation Corridor. The Ginninderry Project is a 30 - 40 year project with the first suburb of Strathnairn near completion of residential houses built. At the time of this BCAR submission estate development works have commenced for the next suburb of Ginninderry, Macnamara, with individual block settlements anticipated in mid-2023.

One-third, nearly 600ha of the Ginninderry Project is protected in perpetuity with the land dedicated to the Ginninderry Conservation Corridor. The Ginninderry Conservation Corridor is managed by the Ginninderry Conservation Trust in line with the development of the urban area; establishment of the Ginninderry Conservation Corridor is discussed further in this report.

The Ginninderry Project is subject to the West Belconnen Strategic Assessment (SA024) which sets out the Commonwealth conditions in-line with the Program Report. The urban development delivery is conditioned on the delivery of the Ginninderry Conservation Corridor and meeting the environmental outcomes as set out or referred to in the West Belconnen Strategic Assessment.



1.3.2 The proposed development – biodiversity certification

The proposed development seeks to subdivide the subject land to construct residential development (estimated population 30,000), with associated facilities such as shops, schools, parks, etc.

As mentioned previously, the 355.43 ha development footprint for this BCAR only relates to the portions of the subject land that will be directly impacted by the proposed development ('Certified Land'). It is assumed that the proposed development will clear the majority of the vegetation and habitat across the entire development footprint.

The proposed development also includes the avoidance and retention of several small patches of vegetation in the western of the subject land ('Avoided Land', total: 6.02 ha) which supports high diversity EPBC Act Box-Gum Woodland and Pink-tailed Legless Lizard habitat (Figure 3, Figure 13, and Figure 14). As detailed in Section 3.1 and Section 3.3, it is proposed that this 6.02 area will be protected and managed as part of the GCC.

Finally, the establishment of the GCC is considered to be the primary avoidance measures related to the proposed development as the early establishment of this offset site has ensured a formal, legally binding, and audited conservation focussed management regime for the portions of the subject land recognised as supporting significant biodiversity values. As such, the ecological values that these areas support are referred to throughout this BCAR when assessing the significance of the impact associated with the proposed development.

1.3.3 Anticipated timing and duration

The entire Ginninderry development is expected to be delivered over a 25-30-year timeframe. The indicative timings for each stage are as follows (see Figure 2).

- 2023-2025 Neighbourhood 2
- 2025-2027 Neighbourhood 4
- 2027-2028 Neighbourhood 5
- 2028-2033 Neighbourhood 6
- 2033-2040 Neighbourhood 7
- 2040-2026 Neighbourhood 8
- 2046-2048 Neighbourhood 9

1.3.4 Occupation

When complete, the Ginninderry Development will have a number of uses as described below.

- 11,500 dwellings (estimated population 30,000);
- four suburbs;
- four schools;
- a market centre;
- local neighbourhood centres;
- recreation, sports and community facilities;



- playgrounds;
- active travel network; and
- the Ginninderry Conservation Corridor.

1.4 Commonwealth and State Assessment and Approval Processes

1.4.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the key Commonwealth Government legislation for the protection and conservation of Australia's environment and biodiversity. The EPBC Act provides the legislative framework for the assessment and approval mechanism requiring that proposed 'actions' to be assessed in terms of their potential to impact upon 'Matters of National Environmental Significance' (MNES). MNES currently listed under the EPBC Act are:

- world heritage properties;
- national heritage places;
- wetlands of international importance (listed under the Ramsar Convention);
- threatened species and ecological communities;
- migratory species (protected under international agreements);
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- a water resource, in relation to coal seam gas development and large coal mining development.

Where a potential impact on a MNES may occur as a result of a proposed action, the significance of that impact must be assessed. Guidelines for determining whether an impact is significant are provided by the DCCEW (Commonwealth of Australia 2013a¹⁸). If it is determined that a proposed action will, or is likely to, have a significant impact on a MNES, the action must be referred to the Minister. The Department will then consider the referred action and the Minister (or their Delegate) will make a decision regarding whether the action requires assessment and approval under the EPBC Act and associated conditions and controls.

As mentioned previously, the impact of the Ginninderry Development on MNES was referred on 28 September 2020 (EPBC Act Referral No. 2020/8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation). The proposed action was approved by DCCEW on 13 September 2021, subject to certain conditions.

The following website provides further information regarding the EPBC Act referral and approval process: <u>http://www.environment.gov.au/epbc/index.html.</u>

¹⁸ Commonwealth of Australia (2013a). *Matters of National Environmental Significance - Significant Impact Guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Department of the Environment.



1.4.2 NSW Biodiversity Conservation Act 2016

The NSW *Biodiversity Conservation Act 2016* (BC Act) commenced on 25 August 2017, the purpose of which is "to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development" (BC Act Part 1, Section 1.3). The BC Act outlines the NSW framework for addressing impacts on biodiversity from development and clearing. Supported by the NSW *Biodiversity Conservation Regulation 2017* (BC Regulation), the BC Act establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme (BOS).

NSW Biodiversity Offset Scheme

The BOS creates a transparent, consistent, and scientifically based approach to biodiversity assessment and offsetting for all types of development that are likely to have a significant impact on biodiversity. The BOS aims to ensure a no-net-loss outcome for biodiversity by applying a framework which requires that impacts are first avoided and minimised, and where this cannot be fully achieved, residual impacts must be offset. The BOS also establishes Biodiversity Stewardship Agreements (BSAs), which are voluntary in-perpetuity agreements entered into by landholders, to secure and manage offset sites for biodiversity conservation. The two key elements of the BOS are as follows.

- 1. A developer, landholder etc. who undertakes an activity (i.e. development, clearing, other impact) which generates a credit obligation must retire the necessary credits to offset their activity.
- 2. A landholder who establishes a biodiversity stewardship site on their land generates credits which may be sold to developers or landholders who require those credits to offset their credit obligation.

Under the BC Act, the BOS is triggered for proposed development or clearing which:

- will involve clearance of native vegetation (including trees, understorey plants, groundcover plants, and wetland plants) or a prescribed impact (as set out in clause 6.1 of the BC Regulation) on land identified on the Biodiversity Values Map; and/or
- will exceed the native vegetation clearance threshold for the smallest minimum lot size associated with the subject land; and/or
- may significantly impact one or more BC Act listed entities (i.e. threatened species or ecological communities).

NSW Biodiversity Assessment Method

The NSW Biodiversity Assessment Method (BAM) is the assessment manual that outlines how an accredited person (i.e. a BAM Assessor) assesses impacts on biodiversity at development sites or assesses the biodiversity values of stewardship sites. The BAM is a scientific document that provides:

- a consistent (standard) method for the assessment of the biodiversity values of a proposed development site, major project site, or vegetation clearing site, or stewardship site;
- guidance on how a proponent (i.e. developer, landholder) can avoid and/or minimise potential biodiversity impacts, or assessment of the management requirements at a



proposed biodiversity stewardship site and the likely improvement in biodiversity values that are predicted to occur over time; and

• the number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' of biodiversity values for a development site, or the number and class of biodiversity credits to be generated by a proposed stewardship site.

The BAM is supported by the online BAM Calculator, into which a BAM Assessor enters the data from desktop and field investigations to determine the number and class of biodiversity credits generated:

- as an obligation for development/clearance, this obligation must be addressed by the proponent to secure approval for the development/clearance; or
- by the establishment and management of a biodiversity stewardship site, these credits being a commodity that may be sold.

The BAM determines the following two types of credits on both development/clearance sites and stewardship sites.

- <u>Ecosystem credits</u>, these are credits generated for impacts on, or conservation of:
 - threatened ecological communities; and
 - threatened species habitat for species that can be reliably predicted to occur within a given plant community type (PCT) (referred to in the BAM as 'ecosystem credit species').
- <u>Species credits</u>, these are credits generated for impacts on, or conservation of, individuals and/or the habitat of threatened species which cannot be reliably predicted to occur in a given PCT (referred to in the BAM as 'species credit species').

The BAM Assessor documents the results of the biodiversity assessment in a Biodiversity Assessment Report (BAR), of which there are the following three types.

- Biodiversity Development Assessment Report (BDAR). A BDAR is developed to assess the likely biodiversity impacts of a development or vegetation clearing proposal.
- Biodiversity Certification Assessment Report (BCAR). A BCAR is developed to assess the likely biodiversity impacts of conferring biodiversity certification over a specific area of land.
- Biodiversity Stewardship Site Assessment Report (BSSAR). A BSSAR is developed to assess the likely biodiversity conservation gain of establishing a specific area of land as a biodiversity stewardship site under a formal Biodiversity Stewardship Agreement.

1.4.3 NSW State Environmental Planning Policy (Koala Habitat Protection) 2021

The *State Environmental Planning Policy (Koala Habitat Protection) 2021* was made and commenced on 17 March 2021. This SEPP is now contained in Chapter 4 of the State Environmental Planning Policy (Biodiversity and Conservation) 2021.

The development control provisions of the Koala Habitat Protection SEPP apply to development applications relating to land within a council area listed in Schedule 2 of the Koala Habitat Protection SEPP and:



- 1. Where there is an approved Koala Plan of Management for the land
 - a. the development application must be consistent with the approved koala plan of management that applies to the land.
- 2. Where there is no approved Koala Plan of Management for the land, if the land
 - a. has an area of at least 1 hectare (including adjoining land within the same ownership)

Pursuant to the Koala Habitat Protection SEPP, the council may grant development consent if the applicant provides to the council—

- 1. information, prepared by a suitably qualified and experienced person, the council is satisfied demonstrates that the land subject of the development application
 - a. does not include any trees belonging to the koala use tree species listed in Schedule 3 for the relevant koala management area, or
 - b. is not core koala habitat, or
- 2. information the council is satisfied demonstrates that the land subject of the development application
 - a. does not include any trees with a diameter at breast height over bark of more than 10 centimetres, or
 - b. includes only horticultural or agricultural plantations.

Core koala habitat is defined as:

- 1. an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or
- 2. an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

The Koala SEPP applies in addition to any assessments required under the EPBC Act or the BC Act (i.e. BAM assessment).

1.5 Biodiversity Certification Assessment Report

As prescribed under Part 6, Division 3, Section 6.13 of the BC Act, a BCAR is -

a report prepared by an accredited person in relation to the proposed biodiversity certification of land under Part 8 that, that:

(a) assesses in accordance with the biodiversity assessment method the biodiversity values of the land proposed for biodiversity certification, and

(b) assesses in accordance with that method the impacts on biodiversity values of the actions to which the biodiversity offsets scheme applies on the land proposed for biodiversity certification,



and specifies the number and class of biodiversity credits to be retired to offset those impacts as determined in accordance with that method, and

(c) that specifies other proposed conservation measures on or in respect of other land to offset those impacts on biodiversity values and their value (in terms of biodiversity credits) determined in accordance with that method.

A BCAR prepared applying the BAM by an accredited BAM Assessor must accompany any biodiversity certification application.

The BAM provides a standard method for assessing the impacts of a development/clearance proposal. This theme should carry over to the resulting BCAR such that it is as concise as possible whilst still addressing all of the relevant elements of the BAM in order to provide a complete assessment of the proposed development/clearance. The size of the BCAR should reflect the complexity of the subject land's biodiversity values and the scale and nature of the proposed development/clearance.

1.5.1 Objectives and format

Developed to reflect the format of the BAM, this BCAR comprises the following two broad parts.

- Part 1 Biodiversity Assessment (BAM Stage 1), includes assessment of the:
 - landscape context;
 - native vegetation, threatened ecological communities (TECs), vegetation integrity; and
 - habitat suitability for threatened species.
- Part 2 Impact Assessment (BAM Stage 2), details the:
 - proposed measures to avoid, minimise and mitigate biodiversity impacts;
 - residual impacts (direct and indirect) of the proposed development; and
 - offset requirements relevant to the proposed development.

1.5.2 Technical resources and qualifications

This BCAR has been prepared by the following technical personnel:

• Robert Speirs – Director / Principal Ecologist

BAppSc (Ecology), DipPM, MEIANZ, CEnvP-E, Accredited BAM Assessor (No: BAAS17089) Robert was project manager for this assessment and completed or closely supervised all field surveys, data entry, GIS mapping, BAM credit calculations, and report preparation.

• Dr Sam Reid – Senior Ecologist

BSc (Hons), PhD, MEIANZ, Accredited BAM Assessor (No: BAAS20006) Sam undertook field surveys.

• Dr Catherine Ross – Consultant Ecologist



BSc (Hons), PhD, MEIANZ Catherine undertook field surveys, BAM credit calculations, and report preparation.

• Shannon Thompson – Field Ecologist

BSc

Shannon undertook field surveys, data entry, and GIS mapping.

All surveys for this assessment were undertaken in accordance with the following.

- Capital Ecology's (Robert Speirs Principal Investigator) Animal Research Authority (ARA) granted under the NSW *Animal Research Act 1985* by the Animal Care and Ethics Committee of the Secretary of the Department of Regional NSW (CSB 15/2046).
- Capital Ecology's NSW Scientific Licence issued by the NSW Department of Planning and Environment under Part 2 of the NSW *Biodiversity Conservation Act 2016* (SL101623).

1.5.3 Certification under clause 6.15 of the Biodiversity Conservation Act 2016

I certify that this report has been prepared based on the requirements of, and information provided under, the NSW Biodiversity Assessment Method 2020 and clause 6.15 of the NSW *Biodiversity Conservation Act 2016*.

Name: Robert Speirs

Signature:

Date: 20 June 2023

BAM Assessor Accreditation no: BAAS17089

1.5.4 Conflict of interest declaration

I declare that I have considered the circumstances and there is no actual, perceived, or potential conflict of interest.

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Name: Robert Speirs

Signature:

til gens

Date: 20 June 2023

BAM Assessor Accreditation no: BAAS17089





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		N9 stg 4	
5d	3.3	N9 stg 5	
6a	6	N8 stg 1	
6b	3.4	N8 stg 2	
бс	9.3	N8 stg 3	LEGEND
7a	10.9	N7	BOUNDARIES
8	51.3	N10 stg 1	Site Boundary

- Conservation Corridor
 - —— Conservation Stage Boundary
 - Indicative Neighborhood Stage Boundary

Updated Conservation Corridor and Indicative Staging

REV DRAFT B C

Ginninderry Mapping

 DESCRIPTION
 DATE

 DRAFT
 15.09.22

 FINAL
 20.09.22

 FINAL
 26.10.22



Notes: Copyright and property of Place Logic Pty Ltd – may be used only for the stated project and issue status, and in accordance with terms of engagement for which it was commissioned. To be read in conjunction with all relevant contracts, specifications, reports, drawings and development approval FINAL FINAL diversity of the state of

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Figure 3. The Subject Land and Development Footprint on Aerial Imagery

Capital Ecology Project No: 3155 Drawn by: C. Ross Date: 11 January 2023



Property Boundaries Shaw & Armitage Lots 1&2 Development Footprint (Certified Land) Avoided Land Ginninderry Conservation Corridor

capital ecology

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2 Part 1 – Biodiversity Assessment (BAM Stage 1)

Part 1 of this BCAR provides an assessment of the biodiversity values of the subject land as set out in Stage 1 of the BAM.

2.1 Landscape Context

As detailed in the BAM, a range of landscape features must be identified where they occur in the subject land or within the assessment area surrounding the subject land. These features may contain/support biodiversity values that are important for the site context of the subject land, or for informing the likely habitat suitability of the subject land. Table 1 outlines the landscape features and overall landscape context of relevance to the subject land.

Table	1.	Landscape	features.
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Landscape Feature	Description	Figure Reference
IBRA bioregion	The subject land occurs in the South Eastern Highlands IBRA bioregion.	-
IBRA subregion	The subject land occurs in the Murrumbateman IBRA subregion.	-
BioNet NSW landscapes (Mitchell landscapes)	The subject land contains two Mitchell Landscapes: Canberra Plains and Upper Murrumbidgee Gorge. Canberra Plains has been used as the Mitchell Landscape as it covers the majority of the subject land.	-
Rivers, streams and estuaries (Strahler ¹⁹ stream	The subject land is bounded by the Murrumbidgee River on the south- western side, and Ginninderra Creek on the northern side which joins the Murrumbidgee in the north-west of the subject land.	Figure 4
order)	The subject land also contains seven 1 st order tributaries running into Ginninderra Creek, and six 1 st order and one 2 nd order tributary running into the Murrumbidgee River (defined based on the NSW LPI Hydrology Map and as per Appendix 3 of the BAM). These tributaries were dry at the time of survey and are only likely to convey water following substantial rain events.	
	There are 30 small to moderately sized dams in the subject land. All of the dams held at least some water at the time of the survey. Several of the dams support modified riparian vegetation that is primarily dominated by exotic species. The lack of native riparian vegetation indicates that the dams are unlikely to provide habitat of significance to aquatic/riparian flora or fauna and are only likely to be of limited value to the common native water birds, reptiles, and amphibians which occur in the locality.	
Wetlands (important wetlands)	The subject land does not contain any important wetlands as listed in the Directory of Important Wetlands in Australia (DIWA) or coastal wetlands protected under <i>State Environmental Planning Policy No</i> 14.	-
Connectivity	Before European occupation, the subject land would have been characterised by an open grassy woodland in the eastern part of the subject land, merging with dry sclerophyll forest on the western slopes leading down to the Murrumbidgee River. The banks of the river would	Figure 6

¹⁹ Strahler, AN (1952). *Hypsometric (area-altitude) analysis of erosional topology*. Geological Society of America Bulletin 63 (11): 1117–1142.



Landscape Feature	Description			
	have been characterised by River Oak Forest. A small patch of Natural Temperate Grassland occurs in the southern corner of the subject land and extends to the south. However, the subject land has been substantially modified by its current and past land use, which has primarily been grazing (sheep and cattle). Approximately 79% of the original woody vegetation (canopy, midstorey, and shrubstorey) has been historically cleared across the subject land to promote the pastoral productivity of the land. The majority of the subject land (approx. 62%) has been historically pasture improved and is dominated by exotic pasture grasses (especially Phalaris) and a variety of weeds. Most of the areas which retain the original vegetation occur along the steep slopes leading to the Murrumbidgee River corridor in the western part of the subject land. The majority of these areas also retain a native understorey with a moderate to high diversity of native grasses and forbs. The riparian vegetation along the Murrumbidgee River is generally dominated by exotic species. The majority of the vegetation in the subject land is therefore largely characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native species or exotic grasses and weeds.			
	In light of the above, the vegetation along the Murrumbidgee River Corridor in the west of the subject land is likely to constitute or comprise part of an important biodiversity corridor or other notable habitat connectivity feature. This is supported by the fact that these areas are identified as 'Local Links' or 'Regional Linkage Value' on the ACT Government's ACTmapi ²⁰ .			
Areas of geological significance and soil hazard	The subject land does not contain/support any karst, caves, crevices, cliffs, or other areas/features of geological significance. There are no hazard soil features.	-		
Areas of outstanding biodiversity value	The subject land does not support or occur near any declared area of outstanding biodiversity value (AOBV).	-		
Percent native vegetation cover (buffer area)	 A 1,500 m buffer was applied to the subject land resulting in an overall buffer area of 2,354 ha. This buffer area contains both woody PCTs (i.e. woodland, dry sclerophyll forest) and non-woody PCTs (i.e. natural grassland). Accordingly, the following two categories of native vegetation were defined to identify the total are of native vegetation in the buffer. 1. Woody vegetation – The areas which have a woody PCT and retain remnant woody vegetation or woody regrowth. 2. Non-woody vegetation – The areas which either: a. have a grassland PCT and retain at least a substantial proportionate cover (i.e. > 35%) of native groundstorey species; or b. have a woody PCT from which the woody vegetation has been cleared yet at least a substantial proportionate cover (i.e. > 35%) 	Figure 5		

²⁰ <u>http://app.actmapi.act.gov.au/actmapi/index.html?viewer=ssvcrt</u>



Landscape Feature	Description	Figure Reference
	Feature 35%) of native groundstorey species remains (often referred to as derived or secondary grassland). Native vegetation cover was first identified and mapped via interpretation of the available aerial imagery (ACT Government aerial imagery and NSW LPI) and publicly available spatial datasets (ACTmapi ²¹). The presence of remnant canopy trees, cultivation patterns in paddocks, unnaturally green and/or uniform groundstorey vegetation etc., were important factors considered during aerial interpretation. Field reconnaissance was then undertaken to ground truth and refine the mapping where possible. This field reconnaissance involved driving the publicly accessible roads within the buffer area and making observations across paddocks etc. from the roadside. 1. Woody vegetation cover – 867 ha (37%) of the buffer area was determined to support native woody vegetation cover. 2. Non-woody vegetation cover – 357 ha (15%) of the buffer area was determined to support native non-woody vegetation cover. ↓ Total native vegetation cover – the total area of native vegetation cover in the buffer area is 1224 ha (52%). This falls into the >30–70% cover class	
	DRAFT	

²¹ <u>http://app.actmapi.act.gov.au/actmapi/index.html?viewer=ssvcrt</u>





Capital Ecology Project No: 2155 Drawn by: C. Ross Date: 11 January 2023



2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

2.2.1 Native vegetation extent

As per the BC Act, native vegetation is defined according to Part 5A of the *Local Land Services Act 2013* (LLS Act), which states –

(1) For the purposes of this Part, native vegetation means any of the following types of plants native to New South Wales:

- (a) trees (including any sapling or shrub or any scrub),
- (b) understorey plants,
- (c) groundcover (being any type of herbaceous vegetation),
- (d) plants occurring in a wetland.

(2) A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.

As per this definition, planted vegetation which comprises plant species native to NSW, regardless of whether or not the species are indigenous to the specific region and/or PCT of the subject land, is classified as native vegetation.

The Commonwealth Government^{22,23}, ACT Government²⁴, and previous NSW Government²⁵ assessment guidelines for the temperate grassland and woodland PCTs of the NSW/ACT Southern Tablelands region each declare vegetation as native dominant if 50% or more of the perennial groundlayer is comprised of native species. However, no such threshold is defined by the BAM, and advice from the Department of Planning and Environment – Biodiversity Conservation Division (DPE-BCD) has been that the criteria for use in determining native vs. exotic dominance must be more stringent than the previously applied 50/50 rule. It is understood that this is due to the potential for seasonal variation and/or assessor disparity to substantially alter the BAM mapping result. For example, a patch of vegetation that is classified as 55% native in one season may be classified as 45% native in another.

With regard to the above, for the purposes of this BCAR (and the supporting BAM assessment):

1. 'Native vegetation' is defined as any plant, naturally occurring or planted, which is native to NSW.

 ²² Commonwealth of Australia (2006). *Policy Statement 3.5: White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands*. Commonwealth Department of Environment and Heritage.
 ²³ Commonwealth of Australia (2016). Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community.

 ²⁴ ACT Government (2010). Survey guidelines for determining lowland vegetation classification and condition in the ACT. Environment and Sustainable Development Directorate – Conservation Planning and Research.
 ²⁵ NSW Government (2014). BioBanking Assessment Methodology 2014. NSW Government Office of Environment and Heritage.



- 2. Exotic vegetation is defined as any plant which is <u>not</u> native to NSW.
- 3. A polygon of vegetation is 'native vegetation' if:
 - a. species native to NSW are present in the canopy or mid-storey; and/or
 - b. for derived grassland vegetation (i.e. no canopy or mid-storey present), 15% or greater of the groundstorey vegetation is composed of native species.

2.2.2 Vegetation survey and mapping methods

The vegetation throughout the subject land was surveyed and mapped in accordance with the BAM. Vegetation survey dates and survey effort are detailed in Table 2. The methodology involved the following.

- Mapping of the on-ground boundaries of the Plant Community Types (PCTs).
- Stratification of each PCT into vegetation zones reflecting the broad condition state of vegetation.
- The completion of a series of surveys to measure the composition, structure, and function attributes of the vegetation.

These steps are described in more detail below. The full BAM and supplementary resources are available online via the DPE website https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/accredited-assessors/biodiversity-assessment-method-2020.

It is important to note that the information and data collected during vegetation survey and mapping (Section 2.2.2.1 to 2.2.2.4) were also used to assess the subject land for the presence/absence of habitat constraints and/or microhabitats for EPBC Act only listed species (Section 2.3.3), ecosystem credits species (Section 2.3.4), and species credit species (Section 2.3.5).

Task	Method	Date	Personnel	Survey effort
PCT and Vegetation Zone	Random meander	03/05/2021	1 person	9 hours
mapping		07/06/2021	1 person	8 hours
Vegetation assessment	BAM plot	16/11/2021	4 people	32 hours
		17/11/2021	2 people	16 hours
		15/12/2021	2 people	16 hours
		01/01/2022	1 person	1 hour
Remnant tree habitat	Tree survey	17/11/2020	1 person	8 hours
assessment		17/11/2021	1 person	8 hours

Table 2. Vegetation survey dates and survey effort.

Plant Community Type (PCT) mapping

The on-ground boundaries of each of the Plant Community Types (PCTs) present in the subject land were mapped by marking boundaries directly onto high resolution orthorectified aerial photograph field maps. The PCTs and their characteristics are provided in the NSW Vegetation Information System (VIS) <u>https://www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm</u>.


The PCTs were identified, and their boundaries defined, based on the:

- presence, species, growth form and density of remnant canopy trees and/or stags or stumps of these;
- presence and species of midstorey shrubs and trees;
- floristic composition of the groundstorey; and
- the landscape position and other geographical features (elevation, aspect, soils, apparent hydrology).

Vegetation zone definition and mapping

The mapped PCTs were further divided into vegetation zones based on the structure, floristic composition, and overall condition ('condition state') of the vegetation. The vegetation zones were mapped in the field and then digitised using GIS which provided accurate calculations of the total area of each vegetation zone in the subject land.

<u>Note:</u> for consistency, these zones were classified as per the zones defined in the woody PCT mapping conducted in the ACT portion of the Ginninderry project area²⁶ and many of Capital Ecology's other BAM mapping projects in the region.

Survey Plots/Transects

A series of a BAM plots (i.e. vegetation assessment survey plot/transect sets) were completed to adequately sample each vegetation zone. As illustrated in NSW Government (2020b²⁷), each BAM Plot involved:

- a. one 20 x 20 m (400 m²) plot, used to assess the composition and structure attributes;
- b. one 20 x 50 m plot (1,000 m²) plot, used to assess the function attributes; and
- c. five 1 m² sub-plots, used to assess average little cover (and other optional groundcover components) for the plot.

BAM plot locations were spread throughout the entire subject land and all BAM plot locations were selected randomly within the vegetation zone by marking on a map and walking to the location. The number of BAM plots completed in each vegetation zone of the subject land was determined as per the minimum required plot numbers specified in Table 3 of the BAM. As shown in Figure 6, a total of 35 plots were completed across the 12 vegetation zones present in the subject land.

As stated in Section 4.1.2 of the BAM:

Any part of the subject land that does not contain native vegetation does not need to be assessed under this chapter, **unless** the land is:

a. proposed for restoration as part of a biodiversity stewardship site (see Stage 3), or

²⁶ Capital Ecology (2022). *The Extent and Condition of Woody Vegetation Communities in the Ginninderry Conservation Corridor, ACT*. Final 01 – August 2022. Prepared for the Ginninderry Conservation Trust. Authors: C. Ross and R. Speirs. Project no. 2985

²⁷ NSW Government (2020b). *Biodiversity Assessment Method 2020 Operational Manual – Stage 1*. NSW Department of Planning, Industry and Environment. Published December 2020.



b. assessed as habitat for threatened species according to Chapter 5.

All parts of the subject land that do not contain native vegetation must be clearly shown on the Site Map. Justification as to why these areas do not support **any** native vegetation must be provided in the BAR.

While several of the vegetation zones are not classified as BC Act 'native vegetation' (refer to Section 2.2.1, Figure 7), they still support a very small native component (Appendix A and Appendix B). As such, as per the BAM, all vegetation zones were assessed in this BCAR. In addition, surveying all zones ensured that the vegetation composition (including an accurate determination of BC Act native vegetation presence/absence) and potential threatened species habitat were accurately assessed across all of the vegetation condition types present in the development footprint and subject land.

It is important to note that all vegetation zones present in the development footprint, regardless of whether or not they are classified as BC Act native vegetation and/or threatened species habitat, are used to determine the impact of the proposed development (refer to Section 2.2.4.4 and Section 3.2).

Remnant tree survey

All of the mature remnant trees (i.e. >20 cm DBH) present in the subject land were assessed. During the tree assessment, all mature remnant trees were identified to species level and assessed for their value to native fauna. Particular attention was given to observations on the presence of stick nests, hollows, or fauna nesting in hollows. The location of each tree was recorded via hand-held GPS. Data collected for each tree are detailed in Appendix C and included:

- tree number;
- tree species;
- diameter at breast height DBH (cm);
- approximate height (m); and
- presence and characteristics of any hollows and other habitat values such as nests, mistletoe etc.

The data collected during this process is also used to determine the number of hollow bearing trees in each vegetation zone.

2.2.3 BAM targeted survey methods

A number of threatened flora and fauna species were identified by the BAM as potentially occurring in the subject land (referred to as 'species credit species', see Section 2.3.5). Some of these species were excluded from further consideration based on factors such as habitat constraints, degraded habitat, geographical limitations, or the absence of required microhabitat features (refer to Table 23). Survey dates and survey effort for the remaining species credit species considered to have the potential to occur in the subject land are detailed in Table 3.

When combined with vegetation survey and mapping (Table 2), the survey effort for this BCAR totalled 273-person hours. Weather conditions for all survey dates are detailed in Table 4.



Table	3. Flora	and fauna	survev	dates	and	survev	effort.
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Task	Method	Date	Personnel	Survey effort
Targeted	Random meander	20/10/2020	5 people	40 hours
threatened flora	through likely habitat	21/10/2020	4 people	32 hours
searches				
	Opportunistic observations ²⁸	-	1-6 people	24 hours
Striped Legless	Tile grid survey	30/09/2020	2 people	2 hours
Lizard survey		10/10/2020	2 people	2.5 hours
		16/10/2020	2 people	2.25 hours
		22/10/2020	2 people	1.5 hours
		30/10/2020	2 people	2 hours
		07/11/2020	2 people	2 hours
		13/11/2020	2 people	2 hours
		19/11/2020	2 people	1.5 hours
		27/11/2020	2 people	1.5 hours
		04/12/2020	2 people	1.5 hours
Pink Tailed Legless	Rock turning	19/10/2018	3 people	24 hours
Lizard survey		20/03/2019	4 people	24 hours
		22/03/2019	4 people	24 hours
Threatened bird	Area searches	10/10/2020	2 people	2 hours
survey		16/10/2020	2 people	4 hours
		20/10/2020	5 people	8 hours
		21/10/2020	5 people	4 hours
		30/10/2020	2 people	4 hours
	Opportunistic observations ²⁹	-	1-5 people	96 hours
Threatened bat	Anabat®	31/03/2021	Four Anabat [®] locations	120 hours of
survey		-	(a total of 12 trap	recordings
		11/04/2021	nights).	

Table 4. Survey weather conditions (Canberra Airport, ACT).

Date	Temperature Min-Max	Wind @ 9am	Rain	Cloud (8 th)
19/10/2018	5.5 – 27.8°C	-	0 mm	0
20/03/2019	12.2 – 28.8°C	-	0 mm	0
22/03/2019	16.7 – 22.5°C	-	0 mm	4
30/09/2020	5.2 – 17.1°C	11 km/h NW	0 mm	8
10/10/2020	6.5 – 19.0°C	19 km/h NNW	0 mm	0
16/10/2020	13.5 – 21.5°C	15 km/h N	0.2 mm	8
20/10/2020	9.7 – 21.0°C	6 km/h E	0 mm	8
21/10/2020	9.7 – 23.3°C	6 km/h SE	0 mm	6
22/10/2020	8.7 – 24.4°C	6 km/h ESE	0 mm	0
30/10/2020	6.7 – 20.9°C	11 km/h SE	12.0 mm	8
07/11/2020	6.8 – 20.2°C	15 km/h SSE	0.2 mm	7
13/11/2020	12.8 – 23.9°C	9 km/h NWN	4.2 mm	8

²⁸ During PCT and Zone mapping, and remnant tree habitat assessment.

²⁹ During PCT and Zone mapping, Remnant tree habitat assessment, and threatened flora surveys.



Date	Temperature Min-Max	Wind @ 9am	Rain	Cloud (8 th)
17/11/2020	5.5 – 24.0°C	2 km/h NNW	0 mm	0
19/11/2020	9.2 – 28.6°C	9 km/h S	0 mm	0
27/11/2020	13.3 – 31.4°C	4 km/h NW	0 mm	0
04/12/2020	6.0 – 28.8°C	7 km/h NNW	0 mm	0
31/03/2020	4.4 – 23.4°C	9 km/h SSE	0 mm	0
01/04/2021	5.0 – 25.0°C	Calm	0 mm	0
02/04/2021	7.4 – 27.1°C	7 km/h ESE	0 mm	0
03/04/2021	5.9 – 28.3°C	7 km/h E	0 mm	0
04/04/2021	5.8 – 28.1°C	Calm	0 mm	0
05/04/2021	8.1 – 25.6°C	11 km/h ESE	0 mm	0
06/04/2021	10.7 – 25.3°C	7 km/h SSW	0 mm	7
07/04/2021	9.7 – 24.1°C	2 km/h SE	0 mm	8
08/04/2021	10.4 – 25.0°C	7 km/h SSE	0 mm	2
09/04/2021	10.5 – 23.6°C	17 km/h NW	0 mm	5
10/04/2021	6.0 – 15.8°C	28 km/h WNW	0 mm	7
11/04/2021	3.6 – 14.6°C	28 km/h W	0.2 mm	0
03/05/2021	2.5 – 22.3°C	4 km/h NW	0 mm	0
07/06/2021	0.2 – 14.5°C	4 km/h N	0 mm	8
16/11/2021	2.4 – 17.5°C	37 km/h NNW	0 mm	0
17/11/2021	7.3 – 20.7°C	6 km/h WSW	0.6 mm	8
15/12/2021	10.2 – 30.2°C	Calm	0 mm	2
02/02/2022	18.4 – 21.7°C	Calm	0 mm	2

Relevant previous field surveys

- Surveys for the Pink-tailed Legless Lizard Aprasia parapulchella via a rock turning survey consistent with the Commonwealth guidelines. Initially mapped in 2011/12 by Osborne and Wong³⁰, Capital Ecology completed intensive targeted surveys between 2017 and 2019 and prepared detailed mapping of the extent and habitat condition of PTLL habitat in both the ACT portion³¹ and NSW portion³² of the Ginninderry project area.
- A small portion of grassland along the southern boundary of the subject land was mapped and assessed as part of Capital Ecology's 2020 Natural Temperate Grassland Mapping³³. As this area will not be impacted by the proposed development, the assessment is not included in the current report.

³⁰ Osborne and David Wong (2013). *The extent of habitat for the vulnerable Pink-tailed Worm Lizard (Aprasia parapulchella) in the West Belconnen – Ginninderra Creek investigation area - confirmatory distribution surveys and mapping.* Institute for Applied Ecology University of Canberra. 10 May 2013.

³¹ Capital Ecology (2018a). *Ginninderry – Pink-tailed Worm-lizard survey and habitat mapping*. Capital Ecology project no. 2772.

³² Capital Ecology (2018b). *Ginninderry – Pink-tailed Worm-lizard survey and habitat mapping of NSW land*. Capital Ecology project no. 2842.

³³ Capital Ecology (2020). The Extent and Condition of Natural Temperate Grassland of the South Eastern Highlands in the Ginninderry Project Area. Final 02 – July 2020. Prepared for The Riverview Group Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 2916.



Threatened flora survey

Based on the location and the ecological communities present, the subject land was assessed as having the potential to support EPBC Act and/or BC Act listed threatened flora species. Some threatened flora species are identified by the BAM as a species credit species (refer to Section 2.3.5), which is a species for which presence/absence and habitat value cannot be reliably predicted by location, vegetation type, and vegetation condition. Accordingly, targeted surveys are required to determine the species credit value of the subject land for these species.

Therefore, a targeted threatened flora transect survey was conducted across the portions of the subject land identified as potentially supporting threatened flora species, these being the vegetation zones with a native dominant groundstorey (Figure 10). The transect survey involved four or five ecologists walking multiple transects across the identified areas (totalling 72 hours of effective survey effort), targeting threatened flora species. If detected, significant species identified were recorded via a GPS waypoint and, if a population, the population boundary was delineated via GPS.

Threatened flora surveys were timed to coincide with the flowering period for the significant flora species with the potential to occur in the subject land.

A thorough inventory of the flora species occurring at a site on the NSW Southern Tablelands cannot be compiled from a small number of surveys undertaken at any particular time. For example, many groundstorey flora species, notably the orchids, lilies, and peas, are only readily identifiable during their short and seasonally variable flowering period. As such, an inventory of all species identified in the subject land was commenced during the preliminary field inspection (19 October 2018) and supplemented across all of the subsequent surveys undertaken until the final field survey (2 February 2022). This inventory is presented in Appendix B (flora). Maintaining an inventory in this manner ensures that the maximum possible diversity of species is recorded, and if present, any significant species are flagged. If detected, all significant species identified are recorded via a GPS waypoint and, if possible, the population size is counted or estimated.

Threatened bird survey

Based on the location and the ecological communities present, the subject land was assessed as having the potential to support EPBC Act and/or BC Act listed threatened bird species. Some threatened bird species are identified by the BAM as a species credit species (refer to Section 2.3.5). Accordingly, targeted surveys are required to determine the species credit value of the subject land for these species. Therefore, three targeted threatened bird surveys were conducted across the portions of the subject land identified as potentially supporting threatened bird habitat, these being areas with a moderate to high canopy cover or dense cover of exotic shrubs (Figure 10). As described in Section 5 of DEC (2004³⁴), these surveys involved 'area searches' (Loyn 1986³⁵) to identify and record the terrestrial birds occurring in the subject land (totalling 22 hours of effective survey effort). If detected, significant species identified were recorded via a GPS waypoint and notes were taken on any nesting/breeding activity.

³⁴ DEC (2004). *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)*. New South Wales Department of Environment and Conservation, Hurstville, NSW.

³⁵ Loyn, R.H. (1986). '*Birds in fragmented forests in Gippsland, Victoria*'. In Keast, A., Recher, H.F., Ford, H. and Saunders, D. (eds.). In Birds of Eucalypt Forests and Woodlands; Ecology, Conservation Management, RAOU; and Surrey Beatty and Sons.



Threatened bird surveys were timed to coincide with the nesting period for the significant bird species with the potential to occur in the subject land.

A thorough inventory of the bird species occurring at a site on the NSW Southern Tablelands cannot be compiled from a small number of surveys undertaken at any particular time. As such, an inventory of all species identified in the subject land was commenced during the preliminary field inspection (19 October 2018) and supplemented across all of the subsequent surveys undertaken until the final field survey (2 February 2022). This inventory is presented in Appendix E (fauna). Maintaining an inventory in this manner ensures that the maximum possible diversity of species is recorded, and if present, any significant species are flagged. If detected, all significant species identified are recorded via a GPS waypoint and, if possible, the population size is counted or estimated.

Fauna nesting survey

As mentioned in Section 2.2.2.4, all of the mature remnant trees (i.e. >20 cm DBH) present in the subject land were assessed for fauna habitat features (Figure 8). At that time, these trees were also inspected for signs of fauna nesting in hollows and/or on large stick nests (e.g. individuals in hollows, scratch/chew marks, birds flying off nests, birds 'on station'), totalling 16 hours of effective survey effort. Particular attention was given to any signs of species credit species breeding in the subject land. Surveys were timed to coincide with the nesting period for the significant bird species with the potential to occur in the subject land.

Striped Legless Lizard survey

At the time field surveys were conducted for this BCAR, the NSW Government had not developed survey guidelines for the Striped Legless Lizard. As such, a program of roof tile surveys was undertaken in accordance with both the Commonwealth Government survey guidelines (Commonwealth of Australia 2011³⁶) and the ACT Government survey guidelines (ACT Government 2015³⁷).

As per the ACT Government survey guidelines, tiles were placed in grids of 50 (10 rows of 5) with 5 m spacing. The guidelines state that sites with greater than 30 ha of potential habitat require 10 grids for the survey program. As the subject land contains greater than 30 ha of potential habitat, 10 grids were established. Therefore, 500 tiles were placed for the survey. The location of each grid was chosen to spatially separate the grids as much as practicable to obtain an adequate coverage of the subject land whilst still ensuring grids were placed in locations with appropriate Striped Legless Lizard habitat characteristics. Where possible, grids were therefore placed in open grassland with a well-defined grass tussock structure. The location of each corner of the grid was marked with a GPS (accurate +/- 3m) and each tile was assigned a unique number (refer to Figure 11).

Following a two week 'settling in' period, each tile was checked once per week for 10 weeks. Surveys commenced on 30 September 2020 and were completed on 4 December 2020. All tiles were checked between 0730 hrs and 1130 hrs, with the exact timing of each check chosen to reflect the weather conditions. In this regard, checks were timed to occur when the tiles were warm to the touch, but not hot. Start time, finish time, and weather conditions were recorded for each check.

 ³⁶ Commonwealth of Australia (2011). Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the vulnerable striped legless lizard, Delma impar – EPBC Act policy statement 3.28.
 ³⁷ ACT Government (2015). Survey Guidelines for Striped Legless Lizard. Conservation, Planning and Research, Environment and Sustainable Development Directorate.



Any captured Striped Legless Lizard had the following data recorded.

- Location (tile number).
- Snout-to-vent (SVL) length (mm).
- Total length (mm).
- Tail condition (Full/Regrowth).
- Other relevant biometrics (markings, colour, age, etc.).
- A macro photograph of the dorsal head scales. This photo was taken as the dorsal head scales of Striped Legless Lizard are unique to each individual and can therefore be used to determine the number of unique captures across the 10-week survey period.

Once processed, captured Striped Legless Lizards are released beside the tile of capture, allowing them to move back beneath the tile or to a tussock adjacent to the tile. All other vertebrate fauna found under the tiles were visually identified to species level.

Pink-tailed Legless Lizard survey

The targeted surveys occurred on Friday 19 October 2018 (a sunny day with minimum temperature of 5.5 °C and maximum of 27.8 °C4), Wednesday 20 March 2019 (a sunny day with minimum temperature of 12.2 °C and maximum of 28.8 °C), and Friday 22 March 2019 (a partly cloudy day with minimum temperature of 16.7 °C and maximum of 22.5 °C). As search success appears to be greatest following rain, the surveys were timed to occur following light to moderate rain received across the west Belconnen locality during the week preceding each survey. These conditions were considered appropriate for PTWL survey. Approximately 80 person-hours were spent during the survey (three to four ecologists for approximately 24 hours).

Prior to the on-ground inspection of the previously mapped PTLL habitat, Capital Ecology analysed 2018 aerial imagery in order to identify additional potential habitat (i.e. areas containing surface rock) across the study area.

All previously mapped patches of PTLL habitat and identified additional patches of potential PTWL habitat in the study area were inspected to assess the following.

- The habitat quality using the classification/categorisation detailed by Osborne and Wong (2013), under 'Habitat Classification' in that report. Using the same habitat classification/categorisation ensures that any differences in the mapping are due to on-ground habitat change or mapping corrections, rather than differences in classification etc.
- 2. The current extent of the patch. Any observed differences were mapped in the field directly onto high resolution field maps.

The remainder of the study area was also inspected during the field survey to ensure that all patches of rocky habitat were identified and included in the above described habitat assessment.

Each previously mapped patch of PTLL habitat, and any identified additional patches of potential PTLL habitat, were surveyed for PTLL individuals or sloughed skins. The survey intensity and method were consistent with that used by Osborne and Wong (2013) and involved the following.

• Searches for PTLL by carefully turning rocks over and then placing them back into position.



• Turning a minimum of 500 rocks per patch (considered adequate for confirming occurrence at large sites based on averages for detection presented in Jones 19995), or until a PTWL individual or sloughed skin was found and thus presence in the patch confirmed. Where it was not possible to turn 500 rocks because of a shortage of surface rock, all possible rocks were turned.

When discovered, each PTLL was classified as either an adult (\geq 12 cm total length), juvenile (\leq 12 cm total length), or soughed skin, and the position recorded via a handheld GPS.

The above survey methodology is consistent with the Commonwealth Survey Guidelines.

Golden Sun Moth survey

Several populations of Golden Sun Moth *Synemon plana* (EPBC Act and BC Act vulnerable) are known in the locality, notably adjacent to Ginninderra Creek in Jarramlee-West MacGregor Grasslands Nature Reserve, immediately to the north-east of the subject land. However, there are no known records of the species within the subject land.

A previous study by Alison Rowell (2013³⁸) identified several parts of the subject land and neighbouring ACT land as potentially suitable habitat for Golden Sun Moth. The areas adjacent to Ginninderra Creek in the north-east of the subject land were found to support disturbance tolerant Wallaby Grasses such as *Rytidosperma racemosa*, and were therefore classified as very low quality potential habitat. However, no GSM were observed during targeted surveys across these areas, despite the species being recorded in nearby habitat outside the subject land.

Based on the thorough habitat assessments completed by Capital Ecology across the subject land during spring 2020 and spring 2021, it was determined that the areas previously identified as potential habitat now support very high biomass of exotic perennial and annual pasture grasses and do not have the habitat features required to support the species. Accordingly, the BAM does not require targeted surveys for Golden Sun Moth in the subject land.

2.2.4 Vegetation survey and mapping results

Plant Community Type (PCT) mapping

Before European occupation, the subject land would have been characterised by an open grassy woodland PCT (i.e. PCT1330) in the eastern part of the subject land, merging with dry sclerophyll forest (i.e. PCT1093 and PCT321) on the western slopes leading down to the Murrumbidgee River. The banks of the river would have been characterised by River Oak Forest (i.e. PCT85). A small patch of Natural Temperate Grassland (i.e. PCT3415) occurs in the southern corner of the subject land and extends to the south into the ACT (Figure 6, Table 5).

The boundaries between the PCTs were determined with particular reference to:

- remnant canopy trees and/or stags or stumps;
- elevation, aspect, soils; and
- current and historic aerial imagery.

The subject land has been substantially modified by its current and past land use, which has primarily been grazing (sheep and cattle). Approximately 79% of the original woody vegetation

³⁸ Alison Rowell (2013). West Belconnen Golden Sun Moth surveys, October to December 2012.



(canopy, midstorey, and shrubstorey) has been historically cleared across the subject land to promote the pastoral productivity of the land. The majority of the subject land (approx. 62%) has been historically pasture improved and is dominated by exotic pasture grasses (especially Phalaris) and a variety of weeds.

Most of the areas which retain the original vegetation occur along the steep slopes leading to the Murrumbidgee River corridor in the western part of the subject land. The majority of these areas also retain a native understorey with a moderate to high diversity of native grasses and forbs. The riparian vegetation along the Murrumbidgee River is generally dominated by exotic species.

The majority of the vegetation in the subject land is therefore largely characterised by an absent or low-density canopy of mature remnant eucalypts, an absent midstorey and shrubstorey, and a low diversity groundstorey dominated by disturbance tolerant native species or exotic grasses and weeds.

РСТ	PCT name	PCT description	Occurrence in subject land	TEC status Commonwealth / NSW	PCT % cleared
85	River Oak forest and woodland wetland of the South Eastern Highlands Bioregion	This community occurs along major watercourses. Tall or very tall open forest of woodland of River Oak, often with other tree species such as Ribbon Gum, Blakely's Red Gum or Yellow Box. Sparse shrub layer of River Bottlebrush, Silver Wattle, and Bracken.	Occurs along the Murrumbidgee River Corridor	Not listed	73%
321	Red Stringybark – Long-leaved Box – Black Cypress Pine shrub grass woodland on siliceous sedimentary ranges in the upper NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	This community occurs on shallow, loamy sand soils. Mid-high woodland or open forest dominated by Red Stringybark, Long-leaved Box, usually with Black Cypress Pine. The midstorey and groundstorey are often sparse with rocks or leaf litter.	Occurs in the northwestern part of the subject land, on the steep slopes leading down to the river corridor.	Not listed	35%
1093	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	This community occurs on ridges and slopes between 550 m and 1150 m on the Southern and Central Tablelands. In its climax form this community would have been characterised by a low open forest or woodland with a canopy dominated by Red Stringybark, Brittle Gum	Occurs on the slopes and ridges in the western part of the subject land.	Not listed	61%

Table 5. PCTs recorded in the subject land.



РСТ	PCT name	PCT description	Occurrence in subject land	TEC status Commonwealth / NSW	PCT % cleared
		and Inland Scribbly Gum and an understorey of sclerophyll shrubs with a sparse groundlayer.			
1330	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	This community occurs on soils of moderate to high fertility and generally moderate depth, on undulating terrain between 500 m and 900 m on the tablelands. In its climax form this community would have been characterised by an open canopy dominated by Yellow Box and Blakely's Red Gum, sparse or absent mid and shrubstorey, together with a defined grassy groundcover supporting a high diversity of native forbs.	Occurs on the flat areas in the north and east of the subject land.	Critically Endangered (Commonwealth and NSW) when occurring in a condition consistent with the listing criteria of the TEC.	94%
3415	Southern Tableland Red Grass-Spear Grass Grassland	A tall to very tall dense grassland comprised of grasses, forbs and some twiners, occurring on the undulating valley floors from Goulburn to Bredbo.	A small area occurs in the south-western part of the subject land and extends to the south.	Critically Endangered (Commonwealth only) when occurring in a condition consistent with the listing criteria of the TEC.	95%

Vegetation zones

As detailed in Table 6 to Table 17, the PCTs identified in Table 5 were determined to comprise the following discernible vegetation zones.

<u>Note:</u> for consistency, these zones were classified as per the zones defined in the woody PCT mapping conducted in the ACT portion of the Ginninderry project area³⁹ and many of Capital Ecology's other BAM mapping projects in the region.

PCT85 – River Oak forest and woodland wetland of the South Eastern Highlands Bioregion

- Zone 1 Canopy Regeneration Native Dominant Mod-High Diversity
- Zone 6 Canopy Regeneration Exotic Dominant Low Diversity

³⁹ Capital Ecology (2022). *The Extent and Condition of Woody Vegetation Communities in the Ginninderry Conservation Corridor, ACT*. Final 01 – August 2022. Prepared for the Ginninderry Conservation Trust. Authors: C. Ross and R. Speirs. Project no. 2985



PCT321 – Red Stringybark – Long-leaved Box – Black Cypress Pine shrub grass woodland on siliceous sedimentary ranges in the upper NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion

• Zone 1 – Canopy – Regeneration – Native Dominant – Mod-High Diversity

PCT1093 – Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

- Zone 1 Canopy Regeneration Native Dominant Mod-High Diversity
- Zone 4 Scattered Canopy Native Dominant Mod-High Diversity
- Zone 6 Canopy Regeneration Exotic Dominant Low Diversity
- Zone 8 No Canopy Exotic Dominant Low Diversity

PCT1330 – Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

- Zone 1 Canopy Regeneration Native Dominant Mod-High Diversity
- Zone 2 Canopy Regeneration Native Dominant Low Diversity
- Zone 4 Scattered Canopy No Regeneration Native Dominant Mod-High Diversity
- Zone 5 Scattered Canopy No Regeneration Native Dominant Low Diversity
- Zone 8 No Canopy Exotic Dominant Low Diversity

PCT3415 – Southern Tableland Red Grass-Spear Grass Grassland

- Zone 1 Native Dominant High-Very High Diversity
- Zone 2 Native Dominant Mod-High Diversity
- Zone 3 Native Dominant Low Diversity
- Zone 4 Exotic Dominant Low Diversity

All zones except PCT1093 Zone 8, PCT1330 Zone 8, and PCT3415 Zone 4 meet the definition of BC Act 'native vegetation'.

PCT1093 Zone 8, PCT1330 Zone 8, and PCT3415 Zone 4 do not meet the definition of BC Act 'native vegetation' as they have a groundstorey clearly dominated by exotic grasses and forbs (i.e. > 65% perennial exotic) and do not contain a cover of native trees and/or shrubs. However, as these zones still support a very small native component (Appendix A and Appendix B) they must be assessed to determine the impact of the proposed development.

As such, all zones are assessed to determine a vegetation integrity score and the impact associated with the proposed development.



Remnant Trees

The subject land (excluding the GCC) supports 108 mature remnant trees which contain at least one functional hollow or other habitat features (Figure 8, Appendix C). 38 trees in the subject land support large hollows greater than 20 cm.

The proposed development area (Certified Land) includes 88 of the remnant trees. The Ginninderry Project works toward an overall master plan, and where trees can be retained to achieve a sensible urban design outcome it endeavors to do so. The remaining 20 trees will be retained and protected in the Avoided areas (refer to Figure 13). Furthermore, the vast majority of the remnant trees in the subject land are already protected and managed within the GCC (refer to Figure 13).

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Table 6. PCT85 Zone 1 results summary.

	PCT85 Zone 1
Description	<u>River Oak Forest and Woodland Wetland – Native Canopy</u> <u>Regeneration – Native Dominant – Mod-High Diversity</u>
	Canopy of River She-oak <i>Allocasuarina cunninghamiana</i> with some regeneration. The midstorey and shrubstorey are present and is dominated by Burgan <i>Kunzea ericoides</i> . Moderate to high diversity native groundlayer dominated by Weeping Grass <i>Microlaena stipoides</i> , Kangaroo Grass <i>Themeda triandra</i> , and Wallaby Grass <i>Rytidosperma sp.</i> . A high number of exotic species scattered throughout the zone.
Area – subject land	3.77 ha.
Area – development footprint	0.00 ha.
Area – avoided land	0.00 ha.
Area – Ginninderry Conservation Corridor	3.77 ha.
BAM plots assessed	2.
Overstorey Species	River She-oak.
Overstorey Cover	25% - 70%.
Overstorey Regeneration	Yes.
Perennial Groundlayer	64-85% native, with 4-7 native non-grass understorey species.
Significant Weeds	Hemlock <i>Conium maculatum</i> , African Lovegrass <i>Eragrostis curvula</i> , St John's Wort <i>Hypericum perforatum</i> , Blackberry <i>Rubus fruticosus,</i> Paterson's Curse <i>Echium plantagineum</i> .
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	Yes.





Table 7. PCT85 Zone 6 results summary.

	PCT85 Zone 6
Description	<u>River Oak Forest and Woodland Wetland – Native Canopy –</u> Regeneration – Exotic Dominant – Low Diversity
	Canopy of River She-oak with regeneration. The midstorey and shrubstorey present and is dominated by Burgan, Red-stemmed Wattle <i>Acacia rubida</i> , and the exotic Blackberry and Briar Rose <i>Rosa</i> <i>rubiginosa</i> . Low diversity exotic groundlayer dominated by a variety of exotic grasses (e.g. African Lovegrass, Brome Grass <i>Bromus sp.</i> , Yorkshire Fog <i>Holcus lanatus</i>). This zone contains a high cover and diversity of weeds such as Hemlock, St John's Wort, Blackberry, and other common weeds.
Area – subject land	8.37 ha.
Area – development footprint	0.00 ha.
Area – avoided land	0.00 ha.
Area – Ginninderry Conservation Corridor	8.37 ha.
BAM plots assessed	3.
Overstorey Species	River She-oak.
Overstorey Cover	10 - 30%.
Overstorey Regeneration	Yes.
Perennial Groundlayer	0.1-28% native, with 1-3 native non-grass understorey species.
Significant Weeds	Box Elder Acer negundo, Briar Rose, Hemlock, African Lovegrass, St John's Wort, Blackberry, Paterson's Curse.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	Yes.





Table 8. PCT321 Zone 1 results summary.

	PCT321 Zone 1
Description	Red Stringybark - Long-leaved Box - Black Cypress Pine shrub/grass woodland – Native Canopy – Regeneration – Native Dominant – Mod- High Diversity Canopy of Black Cypress Pine <i>Callitris endlicheri</i> and Red Stringybark <i>Eucalyptus macrorhyncha</i> with regeneration. The midstorey and shrubstorey are present and is dominated by Burgan and Red-stemmed Wattle. Sparsely covered high diversity native groundlayer dominated by Common Bog-sedge <i>Schoenus apogon</i> , Weeping Grass, Kangaroo Grass, and Wallaby Grass with a high diversity of native forbs. This zone contains a diversity of common weeds.
Area – subject land	4.94 ha.
Area – development footprint	0.00 ha.
Area – avoided land.	0.00 ha.
Area – Ginninderry Conservation Corridor	4.94 ha.
BAM plots assessed	2.
Overstorey Species	Co-dominant = Black Cypress Pine and Red Stringybark. Associate = River She-oak.
Overstorey Cover	25% - 30%.
Overstorey Regeneration	Yes.
Perennial Groundlayer	61-70% native, with 14-19 native non-grass understorey species.
Significant Weeds	Briar Rose, St John's Wort, Blackberry, Paterson's Curse.
EPBC Act and/or BC Act listed TEC	No.
BC Act Native Vegetation	Yes.





Table 9. PCT1330 Zone 1 results summary.

	PCT1330 Zone 1		
Description	<u>Yellow Box - Blakely's Red Gum Grassy Woodland – Native Canopy –</u> <u>Regeneration – Native Dominant – Mod-High Diversity</u> Canopy of Yellow Box and Blakely's Red Gum with regeneration. The midstorey and shrubstorey are present and are dominated by Long-leaf Cassinia <i>Cassinia longifolia</i> and Burgan. Moderate to high diversity native groundlayer dominated by Rough Spear-grass and Weeping Grass. This zone contains a low cover but moderate to high diversity of common weeds.		
Area – subject land	1.78 ha.		
Area – development footprint	0.00 ha.		
Area – avoided land	0.98 ha.		
Area – Ginninderry Conservation Corridor	0.80 ha.		
BAM plots assessed	1.		
Overstorey Species	Co-dominant = Yellow Box and Blakely's Red Gum.		
Overstorey Cover	30%		
Overstorey Regeneration	Yes.		
Perennial Groundlayer	82% native, with 14 native non-grass understorey species.		
Significant Weeds	St John's Wort, Paterson's Curse.		
EPBC Act and/or BC Act listed TEC	Yes (EPBC Act and BC Act)		
BC Act Native Vegetation	Yes.		





Table 10. PCT1330 Zone 2 results summary.

	PCT1330 Zone 2	
Description	<u>Yellow Box - Blakely's Red Gum Grassy Woodland – Native Canopy –</u> <u>Regeneration – Native Dominant – Low Diversity</u> Canopy of Blakely's Red Gum with regeneration. The midstorey and shrubstorey are absent. Low native groundlayer dominated by Rough Spear-grass, Wallaby Grass, Weeping Grass, and Native Geranium <i>Geranium solanderi</i> . This zone has been historically disturbed and contains a low diversity of native forbs. This zone contains a low cover but moderate to high diversity of common weeds.	
Area – subject land	0.22 ha.	
Area – development footprint	0.22 ha.	
Area – avoided land	0.00 ha.	
Area – Ginninderry Conservation Corridor	0.00 ha	
BAM plots assessed	1.	
Overstorey Species	Dominant = Blakely's Red Gum.	
Overstorey Cover	50%.	
Overstorey Regeneration	Yes.	
Perennial Groundlayer	78% native, with 4 native non-grass understorey species.	
Significant Weeds	Blackberry.	
EPBC Act and/or BC Act listed TEC	Yes (BC Act only).	
BC Act Native Vegetation	Yes.	





Table 11. PCT1330 Zone 4 results summary.

	PCT1330 Zone 4		
Description	Yellow Box - Blakely's Red Gum Grassy Woodland – Scattered Canopy – No Regeneration – Native Dominant – Mod-High Diversity		
	Derived grassland that is predominantly cleared of remnant canopy, however, contains a few isolated Blakely's Red Gum paddock trees. There is no regeneration of the overstorey. The midstorey and shrubstorey are entirely absent. Moderate to high diversity native groundlayer dominated by Red-leg Grass, Wallaby Grass and Kangaroo Grass, and Common Wheat Grass <i>Anthosachne scaber</i> . This zone contains a low to moderate cover and diversity of common exotic perennial and annual grasses, and weeds.		
Area – subject land	1.44 ha		
Area – development footprint	0.00 ha		
Area – avoided land	1.44 ha		
Area – Ginninderry Conservation Corridor	0.00 ha		
BAM plots assessed	1.		
Overstorey Species	Scattered Blakely's Red Gum.		
Overstorey Cover	0-50%.		
Overstorey Regeneration	No.		
Perennial Groundlayer	72% native, with 10 native non-grass understorey species.		
Significant Weeds	Briar Rose, Paterson's Curse.		
EPBC Act and/or BC Act listed TEC	Yes (EPBC Act and BC Act)		
BC Act Native Vegetation	Yes.		





Table 12. PCT1330 Zone 5 results summary.

	PCT1330 Zone 5		
Description	Yellow Box - Blakely's Red Gum Grassy Woodland – Scattered Canopy – No Regeneration – Native Dominant – Low Diversity		
	Overstorey largely cleared, with scattered remnant paddock trees. Midstorey and shrubstorey are entirely absent. Low diversity native groundlayer marginally dominated by native grasses and sedges, Clustered Wallaby-grass <i>Rytidosperma</i> racemosum, Weeping Grass <i>Microlaena stipoides</i> , and Common Bog-sedge <i>Schoenus apogon</i> , with exotic grasses and weeds such as Barley Grass <i>Hordeum sp.</i> , Clover Wild Oats, and Brome Grass.		
Area – subject land	13.91 ha.		
Area – development footprint	13.86 ha.		
Area – avoided land	0.05 ha.		
Area – Ginninderry Conservation Corridor	0.00 ha.		
BAM plots assessed	3.		
Overstorey Species	Scattered Yellow Box and Blakely's Red Gum.		
Overstorey Cover	<5%		
Overstorey Regeneration	No.		
Perennial Groundlayer	46-62% native, with 4-6 native non-grass understorey species.		
Significant Weeds	Briar Rose, African Lovegrass, St John's Wort, Blackberry, Paterson's Curse.		
EPBC Act and/or BC Act listed TEC	Yes (BC Act only)		
BC Act Native Vegetation	Yes.		





Table 13. PCT1330 Zone 8 results summary.

	PCT1330 Zone 8		
Description	Yellow Box - Blakely's Red Gum Grassy Woodland – No Canopy – No Regeneration – Exotic Dominant – Low Diversity Overstorey largely cleared, with scattered remnant paddock trees. Midstorey and shrubstorey are entirely absent. This zone has been cultivated and pasture improved and now supports a low diversity exotic groundlayer dominated by exotic perennial and annual grasses and weeds (e.g. Phalaris, Clover, Wild Oats., Perennial Ryegrass, and other common agricultural species).		
Area – subject land	294.95 ha		
Area – development footprint	289.03 ha.		
Area – avoided land	0.00 ha.		
Area – Ginninderry Conservation Corridor	5.92 ha		
BAM plots assessed	7.		
Overstorey Species	Scattered Yellow Box, and Blakely's Red Gum.		
Overstorey Cover	<5%		
Overstorey Regeneration	No.		
Perennial Groundlayer	0-1.8% native, with 0-2 native non-grass understorey species.		
Significant Weeds	African Lovegrass, St John's Wort, Blackberry, Paterson's Curse.		
EPBC Act and/or BC Act listed TEC	No.		
BC Act Native Vegetation	No.		





Table 14. PCT1093 Zone 1 results summary.

	PCT1093 Zone 1		
Description	<u>Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest –</u> <u>Native Canopy – Regeneration – Native Dominant – Mod-High Diversity</u> Canopy of Red Stringybark and Inland Scribbly Gum <i>Eucalyptus rossii</i> with regeneration. The midstorey and shrubstorey are present in portions of this zone and absent in others. Where present, the midstorey and shrubstorey are dominated by Burgan and Red- stemmed Wattle. Moderate to high diversity native groundlayer dominated by Weeping Grass, and Wallaby Grass. This zone contains a low cover but moderate to high diversity of common weeds.		
Area – subject land	86.81 ha.		
Area – development footprint	6.84 ha.		
Area – avoided land	2.52 ha.		
Area – Ginninderry Conservation Corridor	77.45 ha.		
BAM plots assessed	5.		
Overstorey Species	Dominant = Red Stringybark. Sub-dominant = Inland Scribbly Gum. Associate = Long-leaved Box.		
Overstorey Cover	5% - 30%.		
Overstorey Regeneration	Yes.		
Perennial Groundlayer	86-89% native, with 7-25 native non-grass understorey species.		
Significant Weeds	Common Hawthorn <i>Crataegus monogyna</i> , Briar Rose, Hemlock, African Lovegrass, St John's Wort, Blackberry, Paterson's Curse.		
EPBC Act and/or BC Act listed TEC	No.		
BC Act Native Vegetation	Yes.		





Table 15. PCT1093 Zone 4 results summary.

	PCT1093 Zone 4	
Description	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest – Scattered Canopy – Native Dominant – Mod-High Diversity Derived grassland that is predominantly cleared of remnant canopy, but contains patches of isolated paddock trees of Red Stringybark and Inland Scribbly Gum. There is no regeneration of the overstorey. The midstorey and shrubstorey are largely absent, with the exotic Common Hawthorn <i>Crataegus monogyna</i> , Briar Rose, and Blackberry dominating this strata, where present. Moderate to high diversity native groundlayer dominated by Rough Spear-grass <i>Austrostipa scabra</i> , Red- leg Grass <i>Bothriochloa macra</i> , Hairy Panic Panicum effusum, Snowgrass Poa sieberiana, Wallaby Grass and Kangaroo Grass. This zone contains a low to moderate cover and diversity of common exotic perennial and annual grasses, and weeds.	
Area – subject land	75.45 ha.	
Area – development footprint	26.53 ha.	
Area – avoided land	1.03 ha.	
Area – Ginninderry Conservation Corridor	47.89 ha.	
BAM plots assessed	5.	
Overstorey Species	Scattered Red Stringybark and Inland Scribbly Gum.	
Overstorey Cover	0-5%	
Overstorey Regeneration	No.	
Perennial Groundlayer	53-89% native, with 2-14 native non-grass understorey species.	
Significant Weeds	Common Hawthorn, Briar Rose, Hemlock, African Lovegrass, St John's Wort, Blackberry, Paterson's Curse.	
EPBC Act and/or BC Act listed TEC	No.	
BC Act Native Vegetation	Yes.	





Table 16. PCT1093 Zone 6 results summary.

	PCT1093 Zone 6		
Description	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forestNative Canopy - Regeneration - Exotic Dominant - Low DiversityCanopy of Red Stringybark and Inland Scribbly Gum with regeneration.The midstorey and shrubstorey are dominated the exotic CommonHawthorn Crataegus monogyna, Briar Rose, and Blackberry. The lowdiversity exotic groundlayer is dominated by the exotic Clover Trifoliumsp., and Wallaby Grass, with a mix of common exotic annual grasses.This zone contains a high cover and diversity of common weeds.		
Area – subject land	1.78 ha.		
Area – development footprint	0.91 ha.		
Area – avoided land	0.00 ha.		
Area – Ginninderry Conservation Corridor	0.87 ha		
BAM plots assessed	1.		
Overstorey Species	Dominant = Red Stringybark		
Overstorey Cover	0%		
Overstorey Regeneration	No.		
Perennial Groundlayer	50% native, with 2 native non-grass understorey species.		
Significant Weeds	Common Hawthorn, Briar Rose, St John's Wort, Blackberry, Paterson's Curse.		
EPBC Act and/or BC Act listed TEC	No.		
BC Act Native Vegetation	Yes.		





Table 17. PCT1093 Zone 8 results summary.

	PCT1093 Zone 8		
Description	<u>Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest – No Canopy – Exotic Dominant – Low Diversity</u>		
	Overstorey largely cleared, with scattered remnant paddock trees. Midstorey and shrubstorey are entirely absent. This zone has been cultivated and pasture improved and now supports a low diversity exotic groundlayer dominated by exotic perennial and annual grasses and weeds (e.g. Phalaris <i>Phalaris aquatica</i> , Clover, Wild Oats <i>Avena sp</i> Perennial Ryegrass <i>Lolium perenne</i> , and other common agricultural species).		
Area – subject land	26.07 ha.		
Area – development footprint	17.96 ha.		
Area – avoided land	0.00 ha		
Area – Ginninderry Conservation Corridor	8.11 ha.		
BAM plots assessed	4.		
Overstorey Species	Scattered Red Stringybark and Inland Scribbly Gum.		
Overstorey Cover	0-5%		
Overstorey Regeneration	No.		
Perennial Groundlayer	1.5-9% native, with 1-3 native non-grass understorey species.		
Significant Weeds	Common Hawthorn, Hemlock, African Lovegrass, St John's Wort, Blackberry, Paterson's Curse.		
EPBC Act and/or BC Act listed TEC	No		
BC Act Native Vegetation	No.		





Patch size

As defined in the BAM, patch size is -

an area of native vegetation that:

a) occurs on the development site or biodiversity stewardship site, and

b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or \leq 30m for non-woody ecosystems).

Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site.

With respect to the above, all of the vegetation in the subject land meets the definition of 'native vegetation' as per the BAM apart from PCT1330 Zone 8, PCT3415 Zone 4 and PCT1093 Zone 8; the patch size for these zones is therefore 0 ha. For the remaining vegetation zones, the native vegetation outside of the subject land extends to the north, south, and west for > 100 ha; the patch size for these vegetation zones therefore falls into the \geq 100 ha class as defined by the BAM.

Vegetation integrity scores

As stated in Section 1.1, the 'development footprint' only relates to the portions of the 'subject land' which will be impacted by the proposed development (refer to Figure 3). Zones which support any amount of 'native vegetation', regardless of how small, and which occur in the development footprint are used to determine vegetation integrity scores and the impacts associated with the proposed development (refer to Figure 7). Zones which do not support *any* native vegetation do not require further assessment in the BAM except where:

- (a) they are proposed for restoration as part of a biodiversity stewardship site; or
- (b) they are assessed as habitat for threatened species.

As detailed in Table 6 to Table 17 and shown in Figure 6, the following zones do not occur in the development footprint and so will not be impacted by the proposed development:

- PCT85 Zones 1 and 6;
- PCT321 Zone 1;
- PCT1330 Zones 1 and 4; and
- PCT3415 Zones 1, 2 and 3.

PCT1330 Zone 2, 5 and 8, PCT1093 Zone 1, 4, 6, and 8, and PCT3415 Zone 4 do occur in the development footprint. While PCT1330 Zone 1, 2, 4 and 5 and PCT1093 Zone 1, 4, and 6 are classified as BC Act 'native vegetation', PCT1330 Zone 8, PCT1093 Zone 8, and PCT3415 Zone 4 are not as they have a groundstorey clearly dominated by exotic grasses and forbs (i.e. > 65% perennial exotic) and do not contain a cover of native trees and/or shrubs. However, both PCT1330 Zone 8 and PCT1093 Zone 8 do support a very small native component (Appendix A and Appendix B) and so must be assessed as per the BAM.

Table 18 therefore presents the results of the BAM plot assessments and details the composition, structure, function, and resulting vegetation integrity score for all vegetation zones that will be impacted by the proposed development.



Table 18. Vegetation integrity scores.

	PCT1330		PCT1093				
	Zone 2	Zone 5	Zone 8	Zone 1	Zone 4	Zone 6	Zone 8
Native Canopy	Yes	No	No	Yes	No	Yes	No
Groundstorey	Exotic	Native	Exotic	Native	Native	Exotic	Exotic
Native Diversity	Low	Low	Low	High	High	Low	Low
Patch size	>100 ha	> 100 ha	0 ha	> 100 ha	>100 ha	> 100 ha	0 ha
Area in the subject land	0.22 ha	13.91 ha	294.95 ha	86.81 ha	75.45 ha	1.78 ha	26.07 ha
Area impacted by the proposed development (Certified Land)	0.22 ha	13.86 ha	289.03 ha	6.84 ha	26.53 ha	0.91 ha	17.96 ha
BAM plots assessed in the subject land	1	3		3	4	1	3
Composition condition score	13.5	22.6	0.2	62.6	30.3	19.3	3
Structure condition score	93.3	46.8	0	76.1	28.8	28.7	0.2
Function condition score	62.5	0	7.3	63.5	1.3	9.7	0.6
Current vegetation integrity score	42.8	0.7	0.3	67.1	10.4	17.5	0.7



Figure 6. BAM Vegetation Mapping and Survey

Capital Ecology Project No: 3155 Drawn by: C. Ross Date: 11 January 2023





Figure 7. BC Act Native Vegetation and Threatened Ecological Communities

Capital Ecology Project No: 3155 Drawn by: C. Ross Date: 11 January 2023





Figure 8. Remnant Tree Survey

Capital Ecology Project No: 3155 Drawn by: C. Ross Date: 11 January 2023





2.2.5 Threatened Ecological Communities

Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

Two EPBC Act critically endangered listed threatened ecological communities have the potential to occur in the locality, both listed as critically endangered under the EPBC Act: Natural Temperate Grassland of the South Eastern Highlands (Natural Temperate Grassland) and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland).

Natural Temperate Grassland of the South Eastern Highlands – listed as critically endangered pursuant to the EPBC Act

<u>Description</u> – As detailed in Commonwealth of Australia (2016a⁴⁰), the Natural Temperate Grassland threatened ecological community is characterised by grassy vegetation dominated by moderately tall (25–50cm) to tall (50–100cm), dense to open tussock grasses in the genera *Austrodanthonia* (note: now *Rytidosperma*), *Austrostipa*, *Bothriochloa*, *Poa* and *Themeda*. Up to 70% of all plant species may be forbs. The community may be treeless or contain up to 10% cover of trees, shrubs or sedges.

The Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community (Commonwealth of Australia 2016a) provides the key diagnostic characteristics and condition thresholds for determining whether a patch is the listed community. A patch is the listed community, assessed via a standard sampling plot of 400 m² (i.e. 20x20 m), if it meets either of the following scenarios.

<u>Scenario A</u> – The patch is characterised by at least 50 % foliage cover of the ground of either Themeda triandra, Poa labillardierei, or Carex bichenoviana.

<u>Scenario B</u> – When the cover of the grassland is not evidently dominated by the species highlighted under Scenario A:

1. The percentage cover of native vascular plants (including annual and perennial species) in the patch is greater than the percentage cover of perennial exotic species.

And

- 2. When assessed during favourable sampling times (i.e. spring-summer), the patch has:
 - At least 8 non-grass native species

OR

• At least 2 indicator species

OR

• A floristic value score (FVS) of at least 5.

<u>Presence in the subject land</u> – Confirmed – The entire portion of the subject land mapped as PCT3415 would have once supported the climax community of this TEC.

PCT3415 Zones 1 and 2 meet the listing criteria for NTG-SEH in high and moderate condition respectively. PCT3415 Zones 1 and 2 do not occur in the development footprint and so will not be impacted by the proposed development.

⁴⁰ Commonwealth of Australia (2016a). *Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community.*



PCT3415 Zones 3 and 4 do not meet the listing criteria for NTG-SEH⁴¹. A small patch of PCT3415 Zone 4 occurs in the development footprint and so will be impacted by the proposed development.

As such, while the wider subject land supports Natural Temperate Grassland of the South Eastern Highlands in the areas defined by PCT3415 Zones 1 and 2, the development footprint does not.

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland – listed as critically endangered pursuant to the EPBC Act

<u>Description</u> – The White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs (where shrub cover comprises less than 30% cover), and a dominance or prior dominance of White Box and/or Yellow Box and/or Blakely's Red Gum trees. This TEC occurs along the western slopes and tablelands of the Great Dividing Range from southern Queensland through New South Wales and the Australian Capital Territory to Victoria.

<u>Presence in the subject land</u> – Confirmed – The entire portion of the subject land mapped as PCT1330 would have once supported the climax community of this TEC.

Assessments of structure and floristic composition were undertaken in each of the five condition categories (Vegetation Zones) of PCT1330 present in the subject land. The purpose of these assessments was to determine whether the patches of each Vegetation Zone support characteristics sufficient to meet the listing criteria for the EPBC Act listed TEC. The assessment process follows that provided in the Commonwealth EPBC Act Policy Statement 3.5 – White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands (Commonwealth of Australia 2006). The results of this assessment are provided in Table 19. As detailed in Table 19, the areas mapped as PCT1330 Zones 1 and 4 meet the criteria for the EPBC Act listed TEC, while PCT1330 Zones 2, 5 and 8 do not meet the listing criteria.

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Conclusion

The subject land supports EPBC Act Box Gum Woodland in the areas defined by PCT1330 Zones 1 and 4. The entire area of Zones 1 and 4 are included in the Ginninderry Conservation Area or the 'Avoided Land' (see Section 3.1) and will therefore not be impacted by the proposed development.

⁴¹ Capital Ecology (2020). *The Extent and Condition of Natural Temperate Grassland of the South Eastern Highlands in the Ginninderry Project Area*. Final 02 – July 2020. Prepared for The Riverview Group Pty Ltd. Authors: S. Reid, S. Thompson, and R. Speirs. Project no. 2916.

Table 19. Assessment against the listing criteria for the EPBC listed TEC – White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

	Criterion	Assessment results					
		PCT1330 Zone 1	PCT1330 Zone 2	PCT1330 Zone 4	PCT1330 Zone 5	PCT1330 Zone 8	
1	Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?	Yes Yellow Box and Red Gum are co-dominant throughout this zone.	Yes Yellow Box and Red Gum are co-dominant throughout this zone.	Yes Yellow Box and Red Gum are expected to have been historically dominant or co- dominant throughout this zone.	Yes Yellow Box and Red Gum are expected to have been historically dominant or co- dominant throughout this zone.	Yes Yellow Box and Red Gum are expected to have been historically dominant or co-dominant throughout this zone.	
2	Does the patch have a predominantly native understorey?	Yes The understorey was recorded as 82% native species cover.	Yes The understorey was recorded as 78% native species cover.	Yes The understorey was recorded as 73% native species cover.	Yes The understorey was recorded as ranging from 46% to 62% native species cover, with an average of 52%.	No The understorey was recorded as ranging from 0.1% to 1.9% native species cover, with an average of 0.8%.	
3	Is the patch 0.1 ha (1000 m ²) or greater in size with 12 or more native understorey species present (excluding grasses)? There must be at least one important species.	Yes The patch is greater than 0.1 ha in size and 17 native non-grass understorey species were recorded across the single plot.	No While the patch is greater than 0.1 ha in size, only 4 native non-grass understorey species were recorded across the single plot.	Yes The patch is greater than 0.1 ha in size and 13 native non-grass understorey species were recorded across the single plot.	No While the patches are greater than 0.1 ha in size, only an average 6 (range of 4-9) native non-grass understorey species were recorded across three plots.	N/A Refer Criterion 2 results.	
	Or Is the patch 2 ha or greater in size with an average of 20 or more mature trees per hectare, or is there natural regeneration ⁴² of the dominant overstorey eucalypts?	Yes The patch supports mature trees and natural regeneration of the overstorey.	No The patch supports mature trees and natural regeneration of the overstorey, but is less than 2 ha in size.	No PCT1330 Zone 4 does not support mature trees or regeneration of the overstorey.	No PCT1330 Zone 5 does not support mature trees or regeneration of the overstorey.	N/A Refer Criterion 2 results.	
	Does the patch meet the criteria for the listed TEC?	Yes	Νο	Yes	Νο	No	



⁴² Defined in Commonwealth of Australia (2006) as 'natural regeneration of the dominant overstorey eucalypts when there are mature trees [circumference of at least 125 cm at 130 cm above the ground] plus regenerating trees of at least 15 cm circumference at 130 cm above the ground.'



Biodiversity Conservation Act 2016 (NSW)

Two BC Act listed ecological communities have the potential to occur in the subject land: *White Box* – *Yellow Box* – *Blakely's Red Gum Woodland* (BC Act Box-Gum Woodland) and *Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion*.

BC Act Box-Gum Woodland

This community, listed as critically endangered in NSW, is described below, together with an assessment of its presence and condition in the subject land.

The below description is extracted from the NSW *Final Determination: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020, gazetted 17 July 2020a⁴³).

4.2. White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is characterised by widely-spaced trees with canopies not touching and projected foliage cover generally less than 30% (Prober et al. 2017) ... Understorey shrubs are typically sparse or absent (Prober et al. 2017). The groundcover is dominated by perennial tussock grasses interspersed with a diverse range of forb species with the families Asteraceae and Fabaceae, and the orders Liliales and Asparagales well represented (Prober et al. 2017).

4.3. White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is characteristically dominated by one or more of the species Eucalyptus albens (White Box), E. melliodora (Yellow Box) and E. blakelyi (Blakely's Red Gum) ...A number of understorey species are typically found throughout almost the entire range of the community, with the exception of the extreme north of its distribution and areas where they have been excluded by grazing.

4.10. The distribution of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland spans a range in elevation from approximately 170 m ASL on the western slopes of the Great Dividing Range to approximately 1200 m on the Northern Tablelands of NSW (Beadle 1981), although occurrences on the ranges are typically at lower elevations (Prober et al. 2017). The topography on which the community occurs ranges from flat in the west of its range to hilly and undulating in the east (Prober and Thiele 2004).

4.12. ...For the purpose of establishing the risk of ecosystem/community collapse due to ongoing decline in distribution, it is not possible on the basis of available data, to specify thresholds in either tree cover or species diversity which are indicative of loss of function because: i) no single threshold is appropriate for the range of circumstances and pathways leading to different states of degradation (and hence the potential for recovery); ii) the point at which an ecological community has ceased to function in its original form is inherently uncertain, and the scientific basis upon which symptoms such as loss of tree cover and diversity can be related to ecological function is not established in this case; and iii) recovery may be dependent on active remediation, therefore thresholds can not be determined in absolute terms because they depend on social (collective will) and economic (cost of remediation) factors.

3.1.4. The condition of remnants ranges from relatively good to highly degraded, such as paddock remnants with weedy understories and only a few hardy natives left. Some remnants of

⁴³ NSW Threatened Species Scientific Committee (2020a). Final Determination: White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Gazetted 17 July 2020.



the community may consist of only an intact overstorey or an intact understorey but may still have high conservation value due to the flora and fauna they support.

The final determination does not provide specific listing criteria against which to assess a patch of vegetation. However, as described in the final determination, the definition for the BC Act Box-Gum Woodland TEC is extremely broad. In effect, any land for which the climax community is Box-Gum Woodland that has not been cultivated, become a stock camp, or otherwise been entirely modified, is likely to meet the minimum definition of the BC Act listed TEC.

<u>Presence in the subject land</u> – Confirmed – The entire portion of the subject land mapped as PCT1330 would have once supported the climax community of this TEC. PCT1330 Zone 1 is characterised by a native overstorey with a moderate to high diversity native understorey, PCT1330 Zone 2 by a native overstorey with a low diversity native understorey, PCT1330 Zone 4 by no overstorey with a moderate to high diversity native understorey, PCT1330 Zone 5 by no overstorey with a low diversity native understorey, and PCT1330 Zone 8 by no overstorey with a low diversity exotic understorey.

PCT1330 Zones 1 and 4 support vegetation which meets the criteria for this TEC in moderate to high condition, PCT1330 Zone 2 supports vegetation which meets the criteria for this TEC in moderate condition, and PCT1330 Zone 5 supports vegetation which meets the criteria for this TEC in low condition. This condition classification is reflected in the respective vegetation integrity score for each zone (Table 18).

PCT1330 Zone 8 lacks a native overstorey and has a groundstorey that is highly modified and dominated by perennial exotic grasses and herbaceous weeds. As such, PCT1330 Zone 8 does not support vegetation which meets the criteria for this TEC under the BC Act.

The portions of the development footprint that support BC Act Box-Gum Woodland are defined by the extent of PCT1330 Zone 1, Zone 2, Zone 4, and Zone 5. The proposed development will therefore impact 0.22 ha of moderate condition BC Act Box-Gum Woodland and 13.86 ha of low condition BC Act Box-Gum Woodland.

BC Act Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion

The Monaro Tableland Cool Temperate Grassy Woodland (CTGW) in the South East Highlands Bioregion community, listed as critically endangered in NSW, is described below, together with an assessment of its presence and condition within the subject land.

The below description is extracted from the NSW *Final Determination for the TSC Act critically endangered listed ecological community Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion* (NSW Threatened Species Scientific Committee 2019⁴⁴).

Monaro Tableland Cool Temperate Grassy Woodland ranges in structure from woodland to low open woodland. It is characterised by a sparse to very sparse tree stratum dominated by Eucalyptus pauciflora either in monospecific stands or with any of Acacia melanoxylon, E. rubida subsp. rubida, E. stellulata or E. viminalis as codominants. A number of other tree species have been recorded within the community, although very infrequently and always as canopy subdominants. These include E. bridgesiana, E.dives, E. blakelyi and E. melliodora. Tree height and cover vary as a function of moisture availability, drainage and past land management. The

⁴⁴ NSW Threatened Species Scientific Committee (2019). *Final Determination: Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion*. Department of Planning, Industry and Environment, Sydney. Gazetted 28 June 2019.



tree stratum becomes shorter and sparser with declining moisture availability or increasing levels of soil waterlogging... Trees may be absent as a consequence of tree removal under pastoral management and grazing by domestic stock. A continuous herbaceous ground stratum is usually present, although this is highly variable in composition and cover as a function of grazing pressure from wild herbivores (native and exotic) and domestic stock. Ground cover species include Themeda triandra, Poa sieberiana, Elymus scaber, Hydrocotyle laxiflora, Scleranthus biflorus, Oxalis perennans, Plantago varia, Euchiton japonicus, Poa labillardieri, Hypericum gramineum, Desmodium varians, Geranium solanderi, Acaena echinata, Gonocarpus tetragynus, Microlaena stipoides, Dichondra repens, Solenogyne gunnii, Asperula conferta, Asperula scoparia, Rumex brownii, Rytidosperma laeve, Rytidosperma pilosum, Chrysocephalum apiculatum and Chrysocephalum semipapposum. The Community may develop a shrub or bracken layer as a consequence of the opening up of the ground stratum following excessive grazing by rabbits and sheep. This may include species such as Pimelea pauciflora, Acacia dealbata, Acacia melanoxylon, Acacia rubida subsp. rubida, Cassinia longifolia and Pteridium esculentum (Costin 1954).

As stated in Part 4 of the Final Determination, the occurrence or historical occurrence of Snow Gum *Eucalyptus pauciflora* is the primary characteristic for determining the presence of the community. The final determination provides a Monaro & Werriwa CTGW Assessment Spreadsheet Tool to be used in conjunction with an Advisory Layer indicating potential extent. Presence of Snow Gum, characteristic species, non-characteristic species, stumps, and the proximity to nearest Snow Gum, are entered into the assessment tool to determine the likelihood of occurrence of the community. Part 1 of the Final Determination provides a list of an assemblage of species characteristic of the Monaro Tableland CTGW.

<u>Presence in the subject land</u> – Absent – The dominant tree species in the subject land are not characteristic of the dominant or co-dominant species of the BC Act Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion TEC. <u>As such, the subject land</u> <u>does not support vegetation which meets the criteria for this community under the BC Act</u>.

Conclusion

The development footprint supports the BC Act listed ecological community *White Box Yellow Box Blakely's Red Gum Woodland* in the areas mapped as PCT1330 Zone 1, Zone 3, Zone 4, and Zone 5. No part of the development footprint or wider subject land supports the BC Act listed ecological community *Monaro Tableland Cool Temperate Grassy Woodland in the South East Highlands Bioregion.*

2.2.6 High threat weeds

Table 20 lists the high threat weeds that occur in the subject land.

Table 20. High threat weeds.

Species Name	Common Name	Status
Trees		
Acer negundo	Box Elder	
Pinus radiata	Radiata Pine	
<i>Salix</i> sp.	Willow	WoNS, LM/AP
Shrubs		
Crataegus monogyna	Common Hawthorn	-



Species Name	Common Name	Status	
Lonicera japonica	Honeysuckle		
Lycium ferocissimum	African Boxthorn	WoNS, AP	
Rosa rubiginosa	Briar Rose	-	
Rubus fruticosus aggregate	Blackberry	WoNS, LM/AP	
Forb			
Acetosella vulgaris	Sheep's Sorrel	-	
Carthamus lanatus	Saffron Thistle	-	
Cyperus eragrostis	Tall Flat-sedge	-	
Echium plantagineum	Paterson's Curse	-	
Hypericum perforatum	St John's Wort	LM	
Romulea rosea	Onion Grass		
Xanthium spinosum	Bathurst Burr		
Grass			
Ehrharta erecta	Panic Veldtgrass		
Eragrostis curvula	African Lovegrass	AP	
Nassella neesiana	Chilean Needlegrass		
Nassella trichotoma	Serrated Tussock	WoNS, C	
Paspalum dilatatum	Paspalum	-	

Table key. Commonwealth Weed of National Significance = **WoNS**. Regional Priority Weed in the South East Local Land Services region under the NSW *Biosecurity Act 2015*: **P** = Prevention; **E** = Eradication; **C** = Containment; **AP** = Asset Protection; **LM** = Species subject to Local Management programs.

2.3 Habitat Suitability for Threatened Species

2.3.1 Fauna habitat

The habitat features in the subject land were identified during the field surveys and assessed regarding their potential value to native fauna species, both threatened and common. The fauna habitat features of the subject land are described in Table 21. It is important to note that the information presented in Table 21 is also used to assess the presence/absence of habitat constraints and/or microhabitats for EPBC Act only listed species (Section 2.3.3), ecosystem credits species (Section 2.3.4), and species credit species (Section 2.3.5).

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Habitat Feature	Description	Relevant Native Fauna Species/Assemblages
Remnant eucalypts	Historic clearing has removed approximately 79% of the native overstorey across the subject land. The majority of the remaining intact vegetation is protected within the Ginninderry Conservation Corridor. The subject land (excluding the GCC) supports 108 remnant trees, all of which contain at least one functional hollow or other habitat feature (Figure 8, Appendix C).	All remnant trees are likely to provide foraging resources for a variety of birds and marsupials when in flower, including threatened species. The hollow bearing remnant trees are likely to provide a nesting resource for birds, bats, and marsupials.


Habitat Feature	Description	Relevant Native Fauna Species/Assemblages
Other native vegetation (i.e. native shrubs, grasses, and forbs)	While the vegetation in the GCC is largely intact, the midstorey and shrubstorey are almost entirely absent throughout the remainder of the subject land. Approximately 18% of the subject land supports native dominant grassy vegetation in the form of derived grassland. The value of these areas to native fauna, particularly threatened species, depends largely on the degree of modification.	The intact vegetation in the GCC provides high value habitat for a range of threatened and rare woodland birds. The grasses and forbs are likely to provide a foraging resource to a variety of native birds, reptiles, and herbivorous mammals, such as the Eastern Grey Kangaroo. Open areas are likely to provide a hunting resource for raptors and other predatory birds.
Exotic pasture	Approximately 61% the subject land supports a highly modified pasture dominated by exotic grasses and forbs (i.e. PCT1330 Zone 8 and PCT1093 Zone 8).	The exotic dominant pasture would provide a foraging resource of limited value for common birds, reptiles, and herbivores. Open areas are likely to provide a hunting resource for raptors and other predatory birds.
Surface rocks and rocky outcrops	Loose surface rock and embedded rocky outcrops are scattered across a substantial portion of the subject land.	The loose surface rock is likely to provide refuge and foraging habitat for common herpetofauna and invertebrates. In addition, as detailed in Section 2.3.5.2, the areas that contain loose surface rock support habitat for the threatened Pink- tailed Legless Lizard
Creeks, streams, dams	The subject land in bounded to the west and north by the Murrumbidgee River and Ginninderra Creek. Several tributaries originate in the subject land and join these larger waterways. The tributaries were dry at the time of survey and is only likely to convey water following substantial rain events. There are 30 small to moderately sized dams in the subject land. All of the dams held moderate amount water at the time of survey. Several of the dams support modified riparian vegetation that is primarily dominated by exotic species.	The Murrumbidgee River and Ginninderra Creek are likely to support habitat for a range of aquatic/riparian flora and fauna. These areas are protected within the GCC. The lack of reliable water flows and native riparian vegetation indicates that the tributaries and drainage line are unlikely to provide habitat of potential value to aquatic/riparian flora or fauna. The small to moderately sized farm dams are only likely to be of limited value to the common native herbivores, water birds, reptiles, and amphibians that occur in the locality.

2.3.2 Threatened Biodiversity Data

Definitions of conservation significance

The conservation significance of a species, population or community is determined by its current listing pursuant to Commonwealth and/or State legislation and associated policy, more specifically:

• National – Listed as threatened (critically endangered, endangered, vulnerable, or conservation dependent) pursuant to the EPBC Act; and



• State (NSW) – Listed as threatened (critically endangered, endangered, or vulnerable) pursuant to the BC Act.

Species listed as 'migratory' under the EPBC Act are also considered where relevant.

Database and literature review

Information regarding the suitability of the habitat in the subject land for threatened species was obtained from the Threatened Biodiversity Data Collection (TBDC), BioNet (e.g. the profile of a threatened species), the BAM Calculator, listing determinations, and/or recovery plans prepared for the species by the Commonwealth Government and NSW Government. This information is used to assess the presence/absence of habitat constraints and/or microhabitats for species identified by the DCCEW's online EPBC Act Protected Matters Search Tool (PMST) (Section 2.3.3) or flagged by the BAM as ecosystem credits species (Section 2.3.4) and species credit species (Section 2.3.5).

A database search and literature review were completed to inform likelihood of occurrence assessments and provide useful background information for this assessment. This review included obtaining:

- a list of threatened species (flora and fauna), threatened populations and threatened ecological communities (TECs) listed pursuant to the EPBC Act with the potential to occur in the subject land obtained using the Department of the Environment's online EPBC Act Protected Matters Search Tool (PMST) on 9 July 2019 and updated on 6 May 2022; and
- ecological point data from the NSW Wildlife Atlas (BioNet), downloaded on 11 September 2019 and updated on 21 January 2022, providing a list of threatened species which have previously been recorded in the broad locality of the subject land (i.e. within 10 km) (refer to Figure 9).

Literature referred to during the conduct of the surveys for this study and/or during the preparation of this BCAR is listed under References.



Figure 8. NSW Wildlife Atlas Threatened Species Search

Capital Ecology Project No: 3155 Drawn by: C. Ross Date: 11 January 2023

Legend Subject Land 10 km Buffer NSW Wildlife Atlas - 10 km Black Falcon Brown Treecreeper (eastern subspecies) Diamond Firetail Dusky Woodswallow Flame Robin \bigcirc Formbe Peppercress \bigcirc Gang-gang Cockatoo \bigcirc Golden Sun Moth \bigcirc Greater Glider \bigcirc Green and Golden Bell Frog \bigcirc Grey-headed Flying-fox \bigcirc Koala \bigcirc Large Bent-winged Bat \bigcirc \bigcirc Little Eagle Pale Pomaderris \bigcirc Pink-tailed Legless Lizard \bigcirc **Plains-wanderer** 0 **Regent Honeyeater** \bigcirc Scarlet Robin 0 **Spotted Harrier** 0 Spotted-tailed Quoll • Superb Parrot Swift Parrot Tarengo Leek Orchid

- White-bellied Sea-Eagle
- White-fronted Chat
- Yellow-spotted Tree Frog





2.3.3 Habitat suitability for ecosystem credit species

Threatened species classified as ecosystem credit species and identified by the BAM as potentially occurring in the subject land are listed in Table 22. The value of the habitat in the subject land for ecosystem credit species is determined based on the type and condition (i.e. vegetation integrity) of the vegetation present together with the landscape context (refer to Section 2.1). The likelihood of these species occurring in the subject land is determined based the presence/absence of specific habitat constraints, geographic limitations, and vagrancy. Information regarding habitat constraints, geographic limitations, and vagrancy were obtained from the TBDC, BioNet (e.g. the profile of a threatened species), and through the BAM Calculator.

Table 22. Predicted ecosystem credit species identified by the BAM as potentially occurring in the subject land.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
Anthochaera phrygia	Critically Endangered	Critically Endangered	Yes – assumed	-
(Foraging)				
Artamus cyanopterus	Vulnerable	IJKA	Yes – confirmed	-
Dusky Woodswallow			See Section 1.2	
Callocephalon fimbriatum	Vulnerable	Endangered	Yes – confirmed	-
Gang-gang Cockatoo (Foraging)			See Section 1.2	
Chthonicola sagittata Speckled Warbler	Vulnerable	-	Yes – assumed	-
Climacteris picumnus victoriae	Vulnerable	-	Yes – assumed	-
Brown Treecreeper (eastern subspecies)				
Daphoenositta chrysoptera	Vulnerable	-	Yes – confirmed	-
Varied Sittella			See Section 1.2	
Dasyurus maculatus	Vulnerable	Endangered	Yes – assumed	-
Spotted-tailed Quoll				



Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
<i>Falco subniger</i> Black Falcon	Vulnerable	-	Yes – assumed	-
<i>Glossopsitta pusilla</i> Little Lorikeet	Vulnerable	-	Yes – assumed	-
<i>Grantiella picta</i> Painted Honeyeater	Vulnerable	Vulnerable	No – habitat constraint	 The BAM Calculator and TBDC lists the following habitat constraint: Mistletoes present at a density of greater than five mistletoes per hectare. A small number of mistletoes were recorded in the subject land (far less than five per hectare). As such, the absence of this habitat constraint removes this species as an ecosystem credit species.
Haliaeetus leucogaster White-bellied Sea-Eagle (Foraging)	Vulnerable	DR	Yes – assumed	-
Hieraaetus morphnoides Little Eagle (Foraging)	Vulnerable		Yes – assumed	-
Hirundapus caudacutus White-throated Needletail	-	Vulnerable	Yes – assumed	-
Lathamus discolor Swift Parrot (Foraging)	Endangered	Critically Endangered	Yes – assumed	-
Lophoictinia isura Square-tailed Kite (Foraging)	Vulnerable	-	Yes – assumed	-



Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
<i>Melanodryas cucullata cucullata</i> Hooded Robin (south-eastern form)	Vulnerable	-	Yes – assumed	-
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	Vulnerable	-	Yes – assumed	-
Miniopterus orianae oceanensis Large Bent-winged Bat (Foraging)	Vulnerable	-	Yes – assumed	-
Neophema pulchella Turquoise Parrot	Vulnerable		Yes – assumed	-
Ninox strenua Powerful Owl (Foraging)	Vulnerable	UKA	Yes – assumed	-
Petroica boodang Scarlet Robin	Vulnerable	-	Yes – confirmed See Section 1.2	-
<i>Petroica phoenicea</i> Flame Robin	Vulnerable	-	Yes – confirmed See Section 1.2	-
Polytelis swainsonii Superb Parrot (Foraging)	Vulnerable	Vulnerable	Yes – assumed	-
Pteropus poliocephalus Grey-headed Flying-fox	Vulnerable	Vulnerable	Yes – assumed	-
<i>Scoteanax reuppellii</i> Greater Broad-nosed Bat	Vulnerable	-	Yes – assumed	-
<i>Stagonopleura guttata</i> Diamond Firetail	Vulnerable		Yes – confirmed See Section 1.2	-



Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
<i>Suta flagellum</i> Little Whip Snake	Vulnerable	-	Yes – assumed	-
<i>Varanus rosenbergi</i> Rosenberg's Goanna	Vulnerable	-	Yes – assumed	-

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2.3.4 Habitat suitability for species credit species

Candidate species credit species

Threatened species classified as species credit species and identified by the BAM as potentially occurring in the subject land are listed in Table 23. The value of the habitat in the subject land for species credit species is determined based on the type and condition (i.e. vegetation integrity) of the vegetation present together with the landscape context (refer to Section 2.1). The likelihood of these species occurring in the subject land is determined based the presence/absence of specific habitat constraints, microhabitat requirements, geographic limitations, vagrancy, species records (BioNet and ecological reports), and/or the results of targeted surveys. Information regarding habitat constraints, microhabitat requirements, and vagrancy were obtained from the TBDC, BioNet (e.g. the profile of a threatened species), and through the BAM Calculator. A summary of the findings from each targeted survey is given in Section 2.3.5.2.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	
<i>Ammobium caspedioides</i> Yass Daisy	Vulnerable	Vulnerable	The Yass Daisy is a perennial herb that bears large yellow flowerheads, with each flowerhead supported by a 30-60 cm stem. It is found from Crookwell (north of Goulburn) to near Wagga Wagga, with most populations occurring in the Yass District. The Yass Daisy occurs in dry forest, Box-Gum Woodland and secondary derived grassland of these communities. It tolerates light grazing and areas that are irregularly mown or slashed. Flowering occurs from October to November. The BAM Calculator lists <i>'west of the Federal</i> <i>Highway'</i> as a geographic limitation for this species.	No – surveyed	The species was not detect addition, the species is not <u>Conclusion - the species is</u>
Anthochaera phrygia Regent Honeyeater (Breeding)	Critically Endangered	Critically Endangered	This species inhabits dry open forest and woodland (particularly Box- Ironbark woodland and riparian forests of River Sheoak) that have significantly large numbers of mature trees, high canopy cover, and abundance of mistletoes. The species breeds in Box-Ironbark and other temperate woodlands, and in riparian gallery forest dominated by River Sheoak. The species usually nests in tall mature eucalypts, Sheoaks, or mistletoe haustoria. There are only three known key breeding regions: north-east Victoria (Chiltern-Albury) and NSW (Capertee Valley and the Bundarra-Barraba region). The TBDC lists <i>'as per mapped areas'</i> as a breeding habitat constraint for this species.	No – habitat constraint	The subject land is not iden the 'BAM – Important Area <u>Conclusion - the subject lan</u> <u>species.</u>
Aprasia parapulchella Pink-tailed Legless Lizard	Vulnerable	Vulnerable	This species inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks. The TBDC lists <i>'rocky areas or within 50 m of rocky</i> <i>areas'</i> as a habitat constraint for this species and the BAM Calculator lists <i>'west of Dalton'</i> as a geographic limitation. Some of the main threats to this species listed in the TBDC are habitat loss through bush-rock removal and vegetation clearing for agricultural purposes (e.g. pasture improvement including slashing, ploughing, and sowing of non-native species), overgrazing by domestic stock, and invasion of habitat by weeds.	Yes – surveyed	As detailed in Section 2.3.5 targeted surveys. <u>Conclusion - the developm</u> <u>species, of which 3.45 ha v</u>

Table 23. Candidate species credit species identified by the BAM as potentially occurring in the subject land.



Justification for exclusion

ted in the subject land during targeted surveys. In t known to occur in the locality. <u>unlikely to occur in the subject land.</u>

ntified as an 'important area' for Regent Honeyeater on as' map⁴⁵.

and lacks the breeding habitat constraints required for this

5.2, the species was detected in the subject land during

hent footprint supports 37.64 ha of habitat for this will be impacted by the proposed development.

⁴⁵ https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM ImportantAreas

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	Vulnerable	Endangered	In spring and summer, this species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Gang-Gang Cockatoos favour old growth forest and woodland for nesting and roosting. Nests are located in hollows of eucalypts that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts. The TBDC lists ' <i>Eucalypt tree species with hollows greater than 9 cm diameter'</i> as a breeding habitat constraint for this species.	No – surveyed	Targeted bird surveys were of more intact woody vege presence/absence of habita (Figure 10). No Gang-gang (of nesting in tree hollows w <u>Conclusion - the species is o</u>
Calyptorhynchus lathami Glossy Black-cockatoo	Vulnerable	Vulnerable	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. The species feeds almost exclusively on the seeds of several species of she- oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May.	No – surveyed	Targeted bird surveys were of more intact woody veget presence/absence of habita (Figure 10). No Glossy Black sign nesting in tree hollows <u>Conclusion - the species is c</u>
<i>Cercartetus nanus</i> Eastern Pygmy-possum	Vulnerable	-	This species is found in a broad range of habitats, but in most areas woodlands and heath appear to be preferred. It feeds primarily on nectar and pollen collected from banksias, eucalypts, and bottlebrushes, but also feeds on insects throughout the year. The species shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum dreys, or thickets of vegetation, (e.g. grass-tree skirts). Tree hollows are favoured for breeding. The TBDC lists 'declining shrub diversity in forests and woodlands due to overgrazing by stock and rabbits', 'predation from cats, dogs and foxes', and 'loss of nest sites due to removal of firewood' as some of the key threats to the species.	No - surveyed	Field surveys of the vegetat bottlebrushes (Appendix B) Possum dreys or other evid land lacks the primary micr species has not been record <u>Conclusion - the species is o</u>
Delma impar Striped Legless Lizard	Vulnerable	Vulnerable	Striped Legless Lizard is mainly found in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. It is also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is characterised by perennial, tussock-forming grasses such as Kangaroo Grass <i>Themeda</i> <i>triandra</i> , Speargrasses <i>Austrostipa</i> spp., Poa Tussocks <i>Poa</i> spp., and occasionally Wallaby Grasses <i>Rhytidosperma</i> spp The species can sometimes be found in modified grasslands with a significant content of exotic grasses, and in grasslands with significant amounts of surface rocks (used for shelter). Some of the main threats to this species listed in the TBDC are habitat loss through vegetation clearing for agricultural purposes (e.g. pasture improvement including slashing, ploughing, and sowing of non- native species), habitat degradation through invasion by weeds or escaped pasture species, and overgrazing by domestic stock.	No – surveyed	As described in Section 2.3. development footprint or v <u>Conclusion - the subject lar</u>
<i>Grevillia iaspicula</i> Wee Jasper Grevillia	Critically Endangered	Endangered	The Wee Jasper Grevillea is only found in the Wee Jasper area and on the shores of Lake Burrinjuck. This species grows on rocky limestone outcrops and around sink holes and cave entrances. The species occurs in open woodland dominated by White Box <i>Eucalyptus albens</i> and Apple Box <i>E. bridgesiana</i> . It often occurs as a co-dominant species within the shrubby understorey of its open woodland habitat. The TBDC lists ' <i>limestone rock substrate</i> ' as a habitat constraint for this species.	No – habitat constraint	The subject land does not s habitat constraint removes species. The species is not l <u>Conclusion - the species is c</u>



conducted across the wider subject land in the patches tation, and remnant trees were assessed for the at features and for signs of fauna nesting in hollows Cockatoos were recorded in the subject land and no sign vas detected.

considered unlikely to breed in the subject land.

conducted across the wider subject land in the patches tation, and remnant trees were assessed for the at features and for signs of fauna nesting in hollows k-cockatoos were recorded in the subject land and no was detected.

considered unlikely to breed in the subject land.

tion in the subject land did not record any banksias or). A tree habitat assessment did not record any Ringtail dence of this species (Appendix C). As such, the subject rohabitat features required for this species. Finally, the rded in the locality (Figure 9).

considered unlikely to occur in the subject land.

3.5.2, targeted surveys did not detect this species in the wider subject land.

nd does not support habitat for this species.

support limestone rock substrate. The absence of this s this species from consideration as a species credit known from the locality.

considered unlikely to occur in the subject land.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	Vulnerable	-	Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. The TBDC lists 'living or dead mature trees in suitable vegetation within 1km of a river, lake, large dam, creek, wetland, or coastline' as a breeding habitat constraint.	No - surveyed	The species has been recor subject land contains pote Targeted bird surveys were more intact woody vegetat presence/absence of habit (Figure 10). No White-belli <u>Conclusion - the species is</u>
<i>Hieraaetus morphnoides</i> Little Eagle (Breeding)	Vulnerable	-	This species occupies open eucalypts forest, woodland, or open woodland. Sheoak or <i>Acacia</i> woodlands and riparian woodlands of interior NSW are also used. The species nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. The TBDC <i>'Nest trees - live</i> <i>(occasionally dead) large old trees within vegetation'</i> as a breeding habitat constraint for this species.	No – surveyed	The species has been reconverse conducted across the vegetation, and remnant to features and for signs of favere recorded in the subject <u>Conclusion - the species is</u>
<i>Keyacris scurra</i> Key's Matchstick Grasshopper	Endangered	Endangered	Key's Matchstick Grasshopper is usually found in native grasslands, but it has also been recorded in other vegetation associations containing a native grass understory (especially Kangaroo Grass <i>Themeda triandra</i>) and known food plants (particularly Asteraceae, indicator species include the daisy <i>Chrysocephalum apiculatum</i>). Although it does not appear to feed on Kangaroo Grass, it may be important for providing protection from predators. More recently, however, opportunistic sightings of Key's Matchstick Grasshopper have been reported in a wide range of vegetation types in south-east NSW including wet sclerophyll forest, montane low forest, dry woodlands, heathland and montane grasslands. In some reported locations there is an absence of Kangaroo Grass and very few or no Asteraceae. Where the understory is favourable for the species, habitat under scattered trees could be suitable. Being flightless, this species does not disperse large distances (< 10 m).	Yes - assumed	No surveys were undertake species has been recorded Woodland. For the purpose species across all suitable h undisturbed native unders PCT1330 Zones 1 and 4, an <u>Conclusion - the species is</u> <u>PCT1330 Zones 1 and 4, an</u>
Lathamus discolor Swift Parrot (Breeding)	Endangered	Critically Endangered	This species breeds in Tasmania from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum <i>Eucalyptus globulus.</i> The species migrates between February and October to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. On the mainland, they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. In NSW, the species mostly occurs on the coast and south west slopes. The TBDC lists 'as per mapped areas' as a breeding habitat constraint for this species.	No – habitat constraint	The subject land is not ider – Important Areas' map ⁴⁶ . <u>Conclusion - the subject lan</u> <u>species.</u>
<i>Leucochrysum albicans var. tricolor</i> Hoary Sunray	-	Endangered	This species occurs in a wide variety of grassland, woodland, and forest habitats, generally on relatively heavy soils. It can occur in modified habitats such as semi-urban areas and roadsides. It is highly dependent on the presence of bare ground for germination, and in some areas disturbance is required for successful establishment.	No – surveyed	As detailed in Section 2.3.5 during targeted surveys. <u>Conclusion - the species is</u>



rded within 1 km of the subject land in 2009, and the ential habitat particularly along the Murrumbidgee River. e conducted across the subject land in the patches of tion, and remnant trees were assessed for the tat features and for signs of fauna nesting in stick nests ied Sea-eagles were recorded in the subject land. <u>considered unlikely to breed in the subject land.</u>

rded several times in the locality. Targeted bird surveys e subject land in the patches of more intact woody rees were assessed for the presence/absence of habitat auna nesting in stick nests (Figure 10). No Little Eagles ect land.

considered unlikely to breed in the subject land.

ten for this species as it was not listed at the time. The d within 10km of the subject land, in remnant Box-Gum ses of this assessment, we have assumed presence of this habitat in the subject land (areas supporting a relatively storey with *Themeda* and *Asteraceae* species present), i.e. and PCT1093 Zone 4.

assumed present across all areas of suitable habitat i.e. nd PCT1093 Zone 4.

ntified as an 'important area' for Swift Parrot on the 'BAM

nd lacks the breeding habitat constraints required for this

5.2, the species was not recorded in the subject land

considered unlikely to occur in the subject land.

⁴⁶ <u>https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas</u>

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	
<i>Litoria booroolongensis</i> Booroolong Frog	Endangered	Endangered	This species lives along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble (stony) banks and other rock structures within stream margins and shelter under rocks or amongst vegetation near the ground on the stream edge. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing connected or isolated pools. The TBDC lists erosion / sedimentation impacting stream channels, cobble banks, native streamside vegetation, and stream margins as the primary threat to the species.	No – microhabitat features, habitat degraded.	The species has not been r Murrumbidgee River which suitable habitat for the spe banks and intact fringing ve <u>Conclusion - the species is</u>
<i>Lophoictinia isura</i> Square-tailed Kite (Breeding)	Vulnerable	-	This species is found in a variety of timbered habitats including dry woodlands and open forests. It shows a particular preference for timbered watercourses. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. The TBDC lists 'nest trees' as a breeding habitat constraint. The TBDC general notes state 'it will be difficult to identify a Kite nest (there are lots of comparable sized stick nests built by other species), especially given Kites have large territories and other stick nesters will undoubtedly also be nesting where Kites might be recorded. Kites will need be in attendance to confirm breeding sites.'	No – surveyed	The species has not been re addition, targeted bird sum patches of more intact woo presence/absence of habit No Square-tailed Kites wer <u>Conclusion - the species is</u>
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	Vulnerable	-	Caves are the primary roosting habitat, but the species also use derelict mines, storm-water tunnels, buildings, and other man-made structures. The species forms discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. Breeding or roosting colonies can number from 100 to 150,000 individuals. The TBDC list the following breeding habitat constraint, 'Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave", observation type code "E nest-roost", with numbers of individuals >500.'	No – habitat constraint	The subject land does not o culverts, etc.). <u>Conclusion - the subject lan</u> <u>species.</u>
<i>Myotis macropus</i> Southern Myotis	Vulnerable	-	The Southern Myotis occurs from the north-west of Australia, across the top- end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. The species roosts close to water in caves, hollow-bearing trees, man-made structures (bridges, culverts etc) and in dense foliage. Colonies occur close to water bodies, ranging from rainforest streams to large lakes and reservoirs. The species is dependent on waterways (i.e. medium to large permanent creeks, rivers, lakes, or other waterways with pools/stretches 3 m wide or greater ⁴⁷), where it catches aquatic insects and small fish with their large hind claws, and also catches flying insects. The TBDC lists <i>'hollow bearing trees within 200 m of riparian</i> <i>zone'</i> , <i>'bridges, caves or artificial structures within 200 m of riparian zone'</i> , and <i>'waterbodies; this include rivers, creeks, billabongs, lagoons, dams and</i> <i>other waterbodies on or within 200m of the site'</i> as habitat constrains for this species.	No – surveyed	The species has not been re targeted Anabat surveys. <u>Conclusion - the species is</u>



recorded in the locality. While the reach of the adjoins the subject land does support characteristically ecies (i.e. lightly impacted streams with cobble/stony regetation), the development will not impact these areas. considered unlikely to occur in the subject land.

recorded within 10 km of the subject land (Figure 9). In veys were conducted across the subject land in the ody vegetation, and remnant trees were assessed for the tat features and for signs of fauna nesting in stick nests. re recorded in the subject land.

considered unlikely to breed in the subject land.

contain potential breeding habitat (caves, tunnels, mines,

nd lacks the breeding habitat constraints required for this

recorded in the locality, and was not recorded during

unlikely to occur in the subject land.

⁴⁷ Anderson. J., Law. B., and Tidemann (2005). Stream use by the Large-footed Myotis Myotis Macropus in relation to environmental variables in Northern New South Wales. Australian Mammalogy 28:15-26.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	
<i>Ninox strenua</i> Powerful Owl (Breeding)	Vulnerable	-	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The species requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him. The TBDC lists <i>'living or dead trees with hollow greater than 20 cm diameter'</i> as a breeding habitat constraint.	No – surveyed	A tree habitat assessment f cm diameter (Appendix C). this species. However, the evidence of the species was <u>Conclusion - the species is c</u>
Paralucia sinifera Purple Copper Butterfly	Endangered	Vulnerable	This species is only known from a few locations in the Central Tablelands of NSW and Namadgi National Park, ACT. Its habitat is restricted to elevations above 850 metres. The purple copper butterfly feeds exclusively on a form of blackthorn (<i>Bursaria spinosa subspecies lasiophylla</i>), and relies on a mutualistic relationship with the ant, <i>Anonychomyrna itinerans</i> .	No – habitat constraint	The species is not known fr <i>Bursaria spinosa</i> is only pre <u>Conclusion - the species is c</u>
<i>Petauroides volans</i> Greater Glider	Endangered	Endangered	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, and is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species.	No – microhabitat features	The species has been recommontane forest (Figure 9). moist eucalypt forest, and in agricultural land. The subje required to support the species is of Conclusion - the species is of
<i>Petaurus norfolcensis</i> Squirrel Glider	Vulnerable	-	West of the Great Diving Range, this species inhabits mature or old growth Box, Box-Ironbark woodlands, and River Red Gum forest. It prefers mixed species stands with a shrub or Acacia midstorey. The species requires abundant tree hollows for refuge and nest sites and generally relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely connected (i.e. no more than 50 m apart). The TBDC lists 'Loss of hollow-bearing trees' and 'Loss of understorey food resources' as some of the key threats to this species.	No – microhabitat features	This species is not known fr support a number of matur midstorey in the Murrumbi for the species and will not <u>Conclusion - the species is c</u>
Phascolarctos cinereus Koala (Breeding)	Endangered	Endangered	This species inhabits eucalypt woodlands and forests, feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species. Home range size varies with quality of habitat, ranging from less than 2 hectares to several hundred hectares in size. The TBDC lists 'areas identified via survey as important habitat' as a habitat constraint for breeding for this species. 'Important habitat' is defined in TBDC by the density of Koalas and quality of habitat as determined by on-site survey.	No - habitat constraint	The species has not been re contains areas of potential detected during the survey Koala observations indicate 'important habitat' for bree <u>Conclusion - the species is c</u>
Polytelis swainsonii Superb Parrot (Breeding)	Vulnerable	Vulnerable	This species inhabits Box-Gum Woodland, Box-Cypress-pine Woodland, Boree Woodlands, and River Red Gum Forest. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used for nesting are Blakely's Red Gum, Yellow Box, Apple Box, and Red Box. The species breeds in hollow branches of tall eucalypt trees within 10 kilometres of feeding areas. The TBDC lists ''living or dead E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta with hollows greater than 5cm diameter; greater than 4m above ground or trees with a DBH of greater than 30cm' as a breeding habitat constraint.	No – surveyed	A tree habitat assessment f hollow bearing trees (Appe the locality, and no evidence targeted surveys. <u>Conclusion - the species is c</u>



found at least 30 trees with large hollows greater than 20 . As such, the subject land supports potential habitat for species has not been recorded in the locality, and no as observed during targeted surveys.

considered unlikely to occur in the subject land.

rom the locality. In addition, the site is below 850 m and esent in very low numbers.

considered unlikely to occur in the subject land.

rded around 9.5 km west of the subject land, in intact tall The subject land does not support tall, montane, or is isolated from areas of known habitat by cleared ect land therefore lacks the primary microhabitat features recies.

considered unlikely to occur in the subject land.

from the locality (Figure 9). While the subject land does are, hollow bearing trees and areas with a relatively intact bidgee River corridor, these areas are not typical habitat t be impacted by the proposed development. considered unlikely to occur in the subject land.

recorded recently in the locality. While the subject land I habitat, no Koalas or signs of Koala presence were ys conducted for this BCAR (see Section 1.2). The lack of es that the subject land could not be classified as reding.

considered unlikely to breed in the subject land.

found that the subject land contains numerous mature endix C). However, the species is not known to breed in ce of Superb Parrot breeding was recorded during

considered unlikely to occur in the subject land.

	Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	
	Pomaderris pallida Pale Pomaderris	Vulnerable	Vulnerable	Pale Pomaderris has been recorded from near Kydra Trig (north-west of Nimmitabel), Tinderry Nature Reserve, the Queanbeyan River (near Queanbeyan), the Shoalhaven River (between Bungonia and Warri), the Murrumbidgee River west of the ACT and the Byadbo area in Kosciuszko National Park. It is also found along the Murrumbidgee River in the ACT and has been recently recorded in eastern Victoria. This species usually grows in shrub communities surrounded by Brittle Gum (<i>Eucalyptus mannifera</i>) and Red Stringybark (<i>E. macrorhyncha</i>) or <i>Callitris</i> <i>spp.</i> woodland.	Yes – confirmed.	Pale Pomaderris has previo adjacent to the subject lan location during targeted th during the development of impacted by the proposed Conservation Corridor (Fig <u>Conclusion - this species of</u> proposed development.
р Т С (1	Prasophyllum petilum Tarengo Leek Orchid	Endangered	Endangered	The Tarengo Leek Orchid occurs on relatively fertile soils in grassy woodland or natural grassland. The species is intolerant of grazing and this is considered to be the key reason it has been found only within cemeteries and Travelling Stock Routes, land from which grazing has been restricted.	No – surveyed	This species has not been r during targeted surveys for <u>Conclusion - the species is</u>
	<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Breeding)	Vulnerable	Vulnerable	Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Site fidelity to camps is high; some camps have been used for over a century. The TBDC lists <i>'breeding camps'</i> as a breeding habitat constraint for this species.	No – habitat constraint	Field surveys confirmed the breeding camps. <u>Conclusion - the subject lan</u> <u>species.</u>
	<i>Swainsona recta</i> Small Purple-pea	Endangered	Endangered	Before European settlement Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum <i>E. blakelyi</i> , Yellow Box <i>E. melliodora</i> , Candlebark Gum <i>E. rubida</i> , and Long-leaf Box <i>E. goniocalyx</i> . It grows in association with understorey dominants that include Kangaroo Grass <i>Themeda australis</i> , Poa tussocks <i>Poa</i> spp. and Speargrasses <i>Austrostipa</i> spp Some of the main threats to this species listed in the TBDC are: 1) grazing and trampling by cattle, sheep and goats; and 2) loss, degradation and fragmentation of habitat and/or populations for residential developments, agricultural developments, and by weed invasion (including exotic grasses mostly, as well as bridal creeper and St John's wort).	No – surveyed	The species has not been r surveys through potential <u>Conclusion - the species is</u>
	<i>Swainsona sericea</i> Silky Swainson-pea	Vulnerable	-	This species is found in Natural Temperate Grassland and Snow Gum <i>Eucalyptus pauciflora</i> Woodland on the Monaro, and in Box-Gum Woodland in the Southern Tablelands and South West Slopes. It is sometimes found in association with Cypress-pines <i>Callitris</i> spp Some of the main threats to this species listed in the TBDC are loss and degradation of habitat and/or populations for: 1) residential developments; 2) invasion of weeds; 3) intensification of grazing regimes; and 4) agricultural developments.	No – surveyed	The species has not been r surveys through potential <u>Conclusion - the species is</u>



ously been recorded in the Murrumbidgee River corridor ad (Figure 9). The species was recorded in a similar hreatened flora surveys conducted across the subject land f this BCAR (Section 2.3.4.2). This area will not be development and will be protected in the Ginninderry gure 10).

ccurs in the subject land but will not be impacted by the

recorded in the locality. The species was not recorded or this BCAR.

unlikely to occur in the subject land.

hat the subject land and wider study area do not support

nd lacks the breeding habitat constraints required for this

recorded in the locality, and targeted threatened flora habitat did not detect the species (see Section 1.2). s unlikely to occur in the subject land.

recorded in the locality, and targeted threatened flora habitat did not detect the species (see Section 1.2). unlikely to occur in the subject land.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	
<i>Synemon plana</i> Golden Sun Moth	Vulnerable	Vulnerable	The species occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which the groundlayer is dominated by Wallaby grasses <i>Rhytidosperma</i> spp Grasslands dominated by Wallaby grasses are typically low and open and the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several Wallaby grass species, which are typically associated with other grasses particularly Speargrasses <i>Austrostipa</i> spp. or Kangaroo Grass <i>Themeda australis</i> . The TBDC lists ' <i>Wallaby grass</i> (<i>Rytidosperma sp.</i>), Speargrass (Austrostipa sp) or Chilean needlegrass (<i>Nassella nessiana</i>)' as a habitat constraint. Some of the main threats to this species listed in the TBDC are loss and degradation of habitat by urban, residential, infrastructure, and agricultural development, modifications to agricultural practices (e.g. fertiliser application, ploughing, and inappropriate grazing), overgrazing by domestic stock, and invasive grasses.	No – habitat degraded	As detailed in Section 2.3.4 during the 2020 or 2021 su However, based on habitat and spring 2021, it was det as the areas previously ider exotic pasture and do not o species. <u>Conclusion - the habitat in</u> <u>species is unlikely to occur.</u>
<i>Thesium australe</i> Austral Toadflax	Vulnerable	Vulnerable	This species is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern tablelands. It occurs in grassland and grassy woodland. Austral Toadflax is a root parasite that takes water and some nutrients from other plants, especially Kangaroo Grass. It is therefore often found in association with Kangaroo Grass. Some of the main threats to this species listed in the TBDC are loss and degradation of habitat and/or populations by: 1) residential, infrastructure, and agricultural developments; 2) intensification of grazing regimes; and 3) invasion of weeds.	No – surveyed, habitat degraded	The species has not been re surveys through potential h <u>Conclusion - the species is r</u>



4.2, Golden Sun Moth surveys could not be completed urvey seasons due to the very high annual grass cover. t assessment across the subject land during spring 2020 termined that Golden Sun Moth surveys are not required entified as potential habitat support very high biomass of contain the habitat features required to support the

the subject land is degraded to the extent that the

recorded in the locality, and targeted threatened flora habitat did not detect the species (see Section 1.2). unlikely to occur in the subject land.



BAM targeted survey results

As described in Table 23, targeted surveys were completed to confirm the occurrence and/or habitat potential for the species credit species identified as having the potential to occur in the subject land.

Threatened flora

As detailed in Table 23, several of the threatened flora species credit species flagged by the BAM are considered to have a moderate or greater likelihood of occurring in the subject land, particularly in the areas supporting vegetation in higher condition.

Therefore, an extensive program of threatened flora surveys was conducted via targeted searches and opportunistic observations across the less disturbed vegetation zones (Figure 10). A total of 238 flora species were recorded during the surveys, comprising 143 native species and 95 exotic species (Appendix D). As expected, the GCC supports a far higher diversity and cover of native species in comparison to the Ginninderry Development Area.

One threatened species, Pale Pomaderris *Pomaderris pallida* (EPBC Act vulnerable and BC Act vulnerable), was recorded during the targeted surveys on the banks of the Murrumbidgee River (Figure 10).

None of the other threatened flora species credit species considered to have the potential to occur were recorded in the subject land, and given the high degree of targeted survey effort, none are considered likely to occur.

Threatened fauna

A total of 92 native fauna species were recorded during field surveys, comprising 62 bird species, 8 reptile species, 2 amphibian species, and 20 mammal species (Appendix E). As described below, this included several threatened species, including Pink-tailed Legless Lizard *Aprasia parapulchella*, Diamond Firetail *Stagonopleura guttata*, Dusky Woodswallow *Artamus cyanopterus*, Flame Robin *Petroica phoenica*, Gang-gang Cockatoo *Callocephalon fimbriatum*, and Varied Sittella *Daphoenositta chrysoptera*.

Threatened birds

A total of 67 bird species were recorded within the subject land across all surveys, comprising 62 native species and 5 exotic species (Appendix E). The completed bird surveys are shown in Figure 10. Five threatened species (Diamond Firetail, Dusky Woodswallow, Flame Robin, Gang-gang Cockatoo, and Varied Sittella, all listed as BC Act Vulnerable) and the migratory Rainbow Bee-eater were recorded in the subject land via targeted surveys and opportunistic observations. Surveys recorded a pair of Varied Sittellas and Dusky Woodswallows constructing a nest. No threatened species were observed within the development footprint.

Apart from the migratory species (which are only likely to visit the subject land and surrounds on a transitory basis) all of the above species are assumed to be present as ecosystem credit species (Table 22).

None of the other threatened candidate species credit species identified in Table 23 were, or have previously been, recorded nesting/breeding in the subject land. In light of the above, all of the threatened bird species credit species flagged by the BAM are considered unlikely to breed in the subject land.



Striped Legless Lizard Delma impar

The program of tile surveys was completed in early December 2020 and no Striped Legless Lizards *Delma impar* (EPBC Act and BC Act vulnerable) were recorded in the subject land. The tiles were collected and removed from the subject land in March 2021. <u>In light of the above, it is concluded that the subject land does not support the Striped Legless Lizard.</u>

Pink-tailed Legless Lizard Aprasia parapulchella

Pink-tailed Legless Lizard (PTLL) habitat has been mapped at fine scale over the entire Ginninderry Project Area. Initially mapped in 2011/12 by Osborne and Wong, Capital Ecology completed intensive targeted surveys between 2017 and 2019 and prepared detailed mapping of the extent and habitat condition of PTLL habitat in both the ACT portion and NSW portion of the Ginninderry project area. During these surveys, a total of 27 live animals and 27 skins were recorded in the subject land. Of these, 15 animals and 4 skins were found within the Development Footprint (Figure 12). In total, 37.64 ha of PTLL habitat occurs in the subject land, most of which is within the GCC (Figure 12).

Threatened bats

A total of 120 hours of Anabat[®] recordings were collected over a total of 12 trap nights and four locations (Figure 10). The data were provided to Glenn Hoye of Biodiversity Monitoring Services for analysis, the results of which are detailed in the report provided as Appendix F. As detailed in the report, insectivorous bats were recorded at each survey location. A total of 1,417 passes were analysed and calls from the following threatened species were detected:

- Eastern False Pipistrelle Falsistrellus tasmaniensis (BC Act vulnerable) (few confident calls);
- Corben's Long-eared Bat *Nyctophilus corbeni* (EPBC Act and BC Act vulnerable) (few probable calls); and
- Large Bent-winged Bat *Miniopterus orianae oceanensis* (BC Act vulnerable) (many confident calls).

The Eastern False Pipistrelle and Corben's Long-eared Bat are identified in the BAM Calculator and the BAM Survey Guide (NSW Government 2018b⁴⁸) as ecosystem credit species (foraging). The Large Bent-winged Bat are identified as ecosystem credit species (foraging) and species credit species (breeding habitat only), however the subject land does not support nor occur within 2 km of potential roosting and/or breeding habitat for this species (caves, tunnels, mines or other structures known or suspected to be used by the species). Based on these results, development within the subject land would not result in impacts that would generate species credits for any threatened bat species, and further targeted surveys are unwarranted.

Key's Matchstick Grasshopper Keyacris scurra

No surveys were undertaken for this species as it was not listed at the time. For the purposes of this assessment, we have assumed presence of this species across all suitable habitat in the subject land (areas supporting a relatively undisturbed native understorey with *Themeda* and *Asteraceae* species present), i.e. PCT1330 Zones 1 and 4, and PCT1093 Zone 4 (total 78.67 ha).

⁴⁸ NSW Government (2018b). 'Species credit' threatened bats and their habitats. NSW survey guide for the Biodiversity Assessment Method. NSW Office of Environment and Heritage. September 2018.



Figure 10. Threatened Bird, Bat and Flora Survey Results

Capital Ecology Project No: 3155 Drawn by: C. Ross Date: 11 January 2023





Figure 11. Striped Legless Lizard Survey Results

Capital Ecology Project No: 3155 Drawn by: C. Ross Date: 11 January 2023 Legend Subject Land Striped Legless Lizard SLL Grids





Figure 11. Pink-tailed Legless Lizard Survey Results

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3 Part 2 – Impact Assessment (BAM Stage 2)

Part 2 of this BCAR provides an assessment of the impacts of the proposed development as set out in Stage 2 of the BAM.

3.1 Avoidance and Minimisation of Impacts on Biodiversity Values

In accordance with the BAM, a proponent is required to demonstrate that all reasonable and practicable measures have been employed to avoid and minimise the impacts of a project on biodiversity values. Accordingly, this section outlines the avoidance and minimisation measures that have been incorporated into the project design of the proposed development.

As mentioned in Section 1.3, the proposed development will clear 355.43 ha ('Certified Land', Figure 3). The proposed development includes the full retention of four patches of vegetation in the western part of the development footprint ('Avoided Land', totalling 6.02 ha) (Figure 3, Figure 13, and Figure 14). It is proposed that this 6.02 ha area will be protected and managed as part of the Ginninderry Conservation Corridor (GCC). By doing so, the proposed development avoids impacts to substantial areas of EPBC Act Box-Gum Woodland, Dry Sclerophyll Forest, and Pink-tailed Legless Lizard habitat.

While it is assumed that the proposed development will clear the majority of the vegetation within the Certified Land, the final urban design will include a number of measures to avoid and minimise impacts to remnant trees, as well as increasing the sustainability and habitat value of the development⁴⁹ (e.g. restoration of native vegetation around remnant trees in urban parks, landscaping with native species, use of water sensitive urban design, relocation of fallen timber and rock, see Section 3.3.2).

In addition to the above, it is important to recognise that planning for the Ginninderry development, both for development and conservation, has been a process that has progressed over more than two decades, and which has been informed by a substantial number of ecological studies (refer to Section 1.2). The ultimate outcome from this process was the establishment of the GCC. This is considered to be one of the primary avoidance measures related to the proposed development as the early establishment of this offset site has ensured a formal, legally binding, and audited conservation focussed management regime for the portions of the subject land recognised as supporting significant biodiversity values. This approach was presented in the EPBC Act referral (EPBC Ref: 220-8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation, and approved by the Minister's delegate on 13 September 2021) following its agreement as the most appropriate approach during the 18 June 2020 pre-referral meeting and other communication with the Department.

3.1.1 Location

Locating the project where there are low or no biodiversity values

As mentioned in Section 1.2, the ecological values of the subject land have been investigated since the late 1990s. One of the key outcomes of this work was the decision that any future development would be designed around the existing ecological values of the land. This led to the establishment of the GCC, which protects approximately 31% (162 ha) of the subject land, including the vast majority

⁴⁹ https://ginninderry.com/wp-content/uploads/2021/08/Ginninderry-Project-Vision-Progress-Report-2019-FINAL.pdf



of the identified significant biodiversity values. As shown in Figure 13 and Figure 14, protected values include:

- 4.33 ha of grassland vegetation (i.e. PCT3415), 3.05 ha of which meets the listing criteria for EPBC Act listed NTG-SEH;
- 6.73 ha of woodland vegetation (i.e. PCT1330), 0.8 ha of which meets the listing criteria for EPBC Act and BC Act Box-Gum Woodland; and
- 33.63 ha of Pink-tailed Legless Lizard habitat.

In addition, the GCC protects habitat for threatened flora (i.e. Pale Pomaderris) birds (i.e. Dusky Woodswallow, Gang-gang Cockatoo, Varied Sitella, Diamond Firetail, and the migratory Rainbow Bee-eater).

An additional 6.02 ha of native vegetation will be retained in the proposed development as 'Avoided Land'. This includes:

- 2.47 ha of woodland vegetation (i.e. PCT1330), all of which meets the listing criteria for BC Act Box-Gum Woodland and 2.42 ha meets the listing criteria for EPBC Act Box-Gum Woodland; and
- 0.56 ha of Pink-tailed Legless Lizard habitat.

In contrast, approximately 86% of the climax vegetation across the development footprint has been historically cleared and is now entirely dominated by exotic grasses and weeds (i.e. 17.96 ha of PCT1093 Zone 8 and 289.03 ha of PCT1330 Zone 8).

When considered together, the vast majority of the land to be impacted by the proposed development is located in areas that support very low or no biodiversity values.

Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition

As mentioned previously, the GCC and additional proposed 'Avoided Land' protects the vast majority of higher quality vegetation and threatened species habitat in the subject land, including (refer to Figure 13 and Figure 14):

- 100% of the EPBC Act listed Box-Gum Woodland;
- 100% of the EPBC Act listed NTG-SEH;
- 90.83% of the Pink-tailed Legless Lizard habitat; and
- the vast majority of the threatened woodland bird habitat.

In contrast, approximately 86% of the climax vegetation across the development footprint has been historically cleared and is now entirely dominated by exotic grasses and weeds (i.e. 17.96 ha of PCT1093 Zone 8 and 289.03 ha of PCT1330 Zone 8).

When considered together, the proposed development has therefore been located in areas where the native vegetation and threatened species habitat is in the poorest condition.



3.1.2 Design

Making provision for the demarcation, ecological restoration, rehabilitation, and/or ongoing maintenance of retained native vegetation and habitat

As mentioned in Section 1.2, the GCC is established as a requirement of the EPBC Act Strategic Assessment for the Ginninderry development. This agreement provides a formal, legally binding, and audited conservation focussed management regime for the portions of the subject land recognised as supporting significant biodiversity. The agreement also stipulates a wide variety of management activities that are designed to protect and enhance the significant biodiversity values that these areas support⁵⁰. In summary, these management activities include the following.

- Ecological restoration and biodiversity management (i.e. soil stabilisation, pest and weed control, natural vegetation regeneration, planting vegetation, creation of fauna habitat, flora and fauna reintroduction);
- Weed management;
- Pest animal management;
- Fire management;
- Controlled grazing (kangaroos or livestock);
- Managing urban interface effects (i.e. soil erosion, introduction of weeds, domestic animals, pollution in runoff, noise and light disturbance, road strikes, invasion by urban adapted fauna, human impacts from access and activities);
- Sensitive location and design of infrastructure;
- Protection of aquatic ecosystems (i.e. ecosystem restoration to stabilise soil, best-practise sediment and erosion control, riparian restoration, development of a sustainable fisheries plan, monitoring water quality);
- Conservation connectivity;
- Collaboration with ACT and NSW Government agencies and adjacent landholders; and
- Ongoing monitoring to assess the success of restoration work and the condition of flora and fauna.

Furthermore, the proposed development includes an additional 6.02 ha of 'Avoided Land', consisting of four small patches in the western part of the development area. These areas support 2.22 ha of EPBC Act Box-Gum Woodland, and 0.56 ha of Pink-tailed Legless Lizard habitat, and are proposed to be protected and managed as part of the GCC (Figure 13 and Figure 14).

Finally, the final urban design will include a number of measures to avoid and minimise the impacts to remnant trees, as well as increasing the sustainability and habitat value of the development (e.g. restoration of native vegetation around remnant trees in urban parks, landscaping with native species, use of water sensitive urban design, relocation of fallen timber and rock, see Section 3.3.2).

⁵⁰ Ginninderry (2018). *Ginninderry Conservation Corridor 2018-2023 Management Plan*. Prepared by TRC Tourism Ltd for Riverview Projects (ACT) Pty Ltd.



When considered together, the proposed development therefore includes provision for the demarcation, ecological restoration, rehabilitation, and ongoing maintenance of the retained native vegetation and habitat across the subject land.

Locating ancillary facilities in areas: where there are no biodiversity values; where the native vegetation or threatened species habitat is in the poorest condition; and that avoid habitat for species and vegetation in high threat status categories

Given that the Ginninderry development is located immediately adjacent to existing urban and industrial development, many of the biodiversity impacts associated with a new development will be reduced (i.e. impacts related to services, roads, bushfire protection, flood planning, etc.). In addition, all ancillary facility associated with the construction and operation of the proposed development will be located to avoid the majority of the significant biodiversity values that will be retained by the proposed development.

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Legend

Sub	iect	Lan

Development Footprint (Certified Land)

Avoided Land

Ginninderry Conservation Corridor (GCC) - Current and Future

Remnant Tree Survey

- E. blakelyi
- E. bridgesiana
- E. macrorhyncha
- E. melliodora
- E. rossii
- Stag

PCTs and Zones

PCT85 - River Oak forest and woodland wetland

- Zone 1 Canopy Regeneration Native Dominant Mod-High Diversity
- Zone 6 Canopy Regeneration Exotic Dominant Low Diversity
- PCT321 Red Stringybark Long-leaved Box Black Cypress Pine shrub grass woodland
- Zone 1 Canopy Regeneration Native Dominant Mod-High Diversity
- PCT1093 Red Stringybark Brittle Gum Inland Scribbly Gum dry open forest
- Zone 1 Canopy Regeneration Native Dominant Mod-High Diversity
- Zone 4 No Canopy Native Dominant Mod-High Diversity
- Zone 6 Canopy Regeneration Exotic Dominant Low Diversity
- Zone 8 No Canopy Exotic Dominant Low Diversity
- PCT1330 Yellow Box, Blakely's Red Gum grassy woodland
- Zone 1 Canopy Regeneration Native Dominant Mod-High Diversity
- Zone 2 Canopy Regeneration Native Dominant Low Diversity
- Zone 4 No Canopy No Regeneration Native Dominant Mod-High Diversity
- Zone 5 No Canopy No Regeneration Native Dominant Low Diversity
- Zone 8 No Canopy Exotic Dominant Low Diversity
- PCT3415 Southern Tableland Red Grass-Spear Grass Grassland
- Zone 1 Native Dom High-Very High Diversity
- Zone 2 Native Dom Mod-High Diversity
- Zone 3 Native Dom Low Diversity
- Zone 4 Exotic Dom



Figure 13. Avoidance, Minimisation, and Mitigation Measures - Vegetation

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Figure 14. Avoidance, Minimisation, and Mitigation Measures - Flora and Fauna

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Legend



Subject Land

Development Footprint (Certified Land)

Avoided Land

Ginninderry Conservation Corridor

Threatened Species

Threatened Bird and Flora Records

- Diamond Firetail
- Dusky Woodswallow
- Gang-gang Cockatoo
- O Rainbow Bee-Eater
- Varied Sittella
- Pale Pomaderris
- Pink-tailed Legless Lizard Habitat





3.2 Residual Biodiversity Impacts of the Proposed Development

3.2.1 Direct impacts on native vegetation and habitat

As shown in Figure 15, the proposed development will result in the clearance of:

- 0.22 of PCT1330 Zone 2 mature canopy, regeneration, native dominant, low diversity (BC Act native vegetation, BC Act Box-Gum Woodland);
- 13.86 ha of PCT1330 Zone 5 derived grassland, native dominant, low diversity (BC Act native vegetation, BC Act Box-Gum Woodland);
- 6.84 ha of PCT1093 Zone 1 mature canopy, regeneration, native dominant, high diversity (BC Act native vegetation);
- 26.53 ha of PCT1093 Zone 4 derived grassland native dominant, high diversity (BC Act native vegetation);
- 0.91 ha of PCT1093 Zone 6 mature canopy, exotic dominant, low diversity (BC Act native vegetation);
- 3.45 ha of Pink-tailed Legless Lizard habitat (BC Act vulnerable, EPBC Act vulnerable);
- 26.53 ha of assumed Key's Matchstick Grasshopper habitat (BC Act endangered); and

The development footprint also includes 88 mature remnant trees, all of which support at least one functional hollow or other habitat feature. The Ginninderry Project works toward an overall master plan, and where trees can be retained to achieve a sensible urban design outcome it endeavors to do so.

In total, the proposed development will result in the clearance of 48.36 ha of BC Act native vegetation, 14.08 ha of which meets the listing criteria BC Act Box-Gum Woodland, 3.45 ha of which supports Pink-tailed Legless Lizard habitat, and 26.53 ha of which supports assumed Key's Matchstick Grasshopper habitat. The proposed development will not result in any other direct impacts on native vegetation or habitat.

As shown in Figure 15, the proposed development will also result in the clearance of:

- 17.96 ha of PCT1093 Zone 8 low diversity exotic pasture.
- 289.03 ha of PCT1330 Zone 8 low diversity exotic pasture.

These areas are clearly dominated by exotic grasses and forbs, do not meet the definition of BC Act native vegetation, and are not identified as habitat for threatened species.

3.2.2 Indirect impacts on native vegetation and habitat

The proposed development has the potential to indirectly impact retained or adjacent native vegetation and habitat. Potential indirect impacts are listed below.

- Increased sedimentation of receiving waterways (i.e. Ginninderra Creek and Murrumbidgee River) during construction.
- Increased noise, vibration, and dust during construction.
- Weed introduction and/or spread during construction and occupation.



- Incidental damage or removal of retained native vegetation and habitat during construction and occupation.
- Increase in pest animal populations as a result of increased human activity during occupation.

The above potential indirect impacts could occur during the construction and/or occupation of the subject land and are likely to reduce the extent and/or condition of the surrounding native vegetation and habitat. This may occur in the short-term during the construction phase of the proposed development and in the long-term during the occupation phase of the proposed development. By impacting native vegetation and habitat, indirect impacts also have the potential to impact the following threatened species and ecological communities.

- EPBC Act Box-Gum Woodland, BC Act Box-Gum Woodland, Pink-tailed Legless Lizard habitat and threatened woodland bird habitat.
- The threatened species listed in Table 22.
- The retained vegetation and threatened species protected in the GCC (refer to Section 1.2).

However, the proposed development reduces the likelihood of indirect impacts by enacting the following principles detailed in Section 3.1 to avoid and minimise impacts to native vegetation and habitat.

- Locating the project where there are low or no biodiversity values.
- Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition.
- Making provision for the demarcation, ecological restoration, rehabilitation, and/or ongoing maintenance of retained native vegetation and habitat.
- Locating ancillary facilities in areas: where there are no biodiversity values; where the native vegetation or threatened species habitat is in the poorest condition; and that avoid habitat for species and vegetation in high threat status categories.

In addition, potential indirect impacts will be minimised and mitigated during construction by the measures outlined in Section 3.3 and during occupation by the measures outlined in Section 3.1 and Section 3.3. These measures:

- control potential sedimentation of receiving waterways during construction and operation;
- control noise, vibration, and dust spill during construction;
- control weed introduction and/or spread during construction and occupation;
- control incidental damage of retained native vegetation and habitat during construction and occupation; and
- control pest animal populations as a result of increased human activity during occupation.

In combination, the above measures are considered sufficient to reduce the risk of indirect impacts to an acceptably low level. As such, the proposed development is unlikely to result in any indirect impacts on native vegetation or habitat.



3.2.3 Prescribed biodiversity impacts

As described in the BAM, some types of projects may have impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. For many of these impacts the biodiversity values may be difficult to quantify, replace or offset, making avoiding and minimising impacts critical. Clause 6.1 of the BC Regulation identifies the following as impacts that are 'prescribed biodiversity impacts' that must be assessed using the BOS.

(a) impacts of development on the habitat of threatened species or ecological communities associated with:

(i) karst, caves, crevices, cliffs and other geological features of significance;

(ii) rocks;

(iii) human made structures;

(iv) non-native vegetation;

(b) impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range;

(c) impacts of development on movement of threatened species that maintains their life cycle;

(d) impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining);

(e) impacts of wind turbine strikes on protected animals; and

(f) impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

A potential 'prescribed biodiversity impact' due to the proposed development was identified during the development of this BCAR. As described in the following section, this potential impact was not determined to be a 'prescribed biodiversity impact' due to the fact that it did not impact threatened species habitat or threatened ecological communities in addition to that described in Section 3.2.1 and Section 3.2.2.

Notwithstanding this, the avoidance and minimisation measures detailed in Section 3.1 and the mitigation measures detailed in Section 3.3 will reduce the impact of the proposed development on the below potential 'prescribed biodiversity impact'.

3.2.3.1 Rocks

As detailed in Section 2.3 and shown on Figure 12, the development footprint contains patches of loose surface rock, the removal of which is identified as a potential prescribed biodiversity impact. As detailed in Section 2.2.3.5 and 2.3.5.2, a rock turning survey was performed across the development footprint and wider subject land in order to determine the value of the loose surface rock to threatened fauna (particularly with respect to Pink-tailed Legless Lizard, the species credit species associated with loose surface rock).

As described in Section 2.3.4.2, 29 live Pink-tailed Legless Lizards and 28 sloughed skins were recorded in the subject land. As shown in Figure 12, the subject land is therefore estimated to



support 37.64 ha of Pink-tailed Legless Lizard habitat, of which 3.45 ha occurs within the development footprint.

No other threatened species associated with loose surface rock was recorded in the subject land.

It is therefore unlikely that the removal of rocks in the development footprint will have an additional prescribed biodiversity impact on any threatened species or ecological community.

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Figure 15. Residual Biodiversity Impacts of the Proposed Development

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3.3 Mitigation of Residual Impacts on Biodiversity Values

The following mitigation techniques will be implemented to address the residual impacts on biodiversity values during and after the construction phase of the proposed development. In combination, these mitigation measures are considered sufficient to reduce the risk of residual impacts to an acceptably low level.

3.3.1 Construction

A Construction Environmental Management Plan (CEMP) will be developed to guide the proposed development from before construction commences and until construction is completed. At a minimum the CEMP will include:

- appropriate definition of clearing boundaries;
- protective fencing around sensitive values;
- buffer zones around sensitive values;
- clearing procedures;
- weed management procedures;
- sediment and erosion controls to prevent site run-off;
- noise, vibration, and dust control;
- flow controls;
- pollution and waste management;
- water treatment standards before release; and
- monitoring, reporting, and compliance requirements.

All trees to be retained will be protected and managed in accordance with the CEMP.

Trees to be cleared will be removed in accordance with the CEMP. At a minimum this will include pre-clearance surveys, clearing outside of the breeding season of most of the locally occurring native fauna (i.e. August to December), and fauna rescue procedures.

Where appropriate, any large logs and/or tree sections will be recovered for the purpose of fauna habitat enhancement in the adjacent GCC.

Best practice sediment and erosion control, such as the use of sediment traps, sediment interception ponds, silt fences and haybale fences, will be implemented as required during construction to minimise the flow of water and associated material into the surrounding areas and water sources.

The key potential risk to the biodiversity values of the development footprint and adjoining areas during construction of the proposed development is the facilitated spread of the high threat weeds



currently occurring in the locality and/or the introduction of new weeds. Therefore, at a minimum, the following weed management measures will be implemented during construction.

- Appropriate vehicle hygiene will be maintained. Vehicles and machinery entering the development footprint will be clean of weed seed or propagules.
- Only sterile materials such as hessian/jute or rice straw will be used for soil stabilisation or similar purposes.
- High threat weeds will be prevented from establishing on newly created road verges, landscaped areas, and other open space

3.3.2 Occupation

Ginninderry's urban design philosophies through the first two suburbs, Strathnairn and Macnamara will be continued through future areas of the development. These philosophies are guided by Ginninderry's Project Vision and certification by the Green Building Council of Australia (GBCA) as a 6 star rated development under their Green Star Communities program. Ginninderry is required to recertify with the GBCA every 5 years.

Ginninderry's masterplan is guided by a Landscape and Open Space System that allows connectivity and integration between the Ginninderry Conservation Corridor and the urban landscape. A number of innovations/best-practise initiatives are discussed below.

Existing Tree Retention

Each Estate Development Plan has been informed by the retention of the existing trees as a key target to support biodiversity. This includes the retention of poor quality and dead trees with habitat hollows. The retention of trees is supported by a long-term research project and MOU between the Australian National University, Transport Canberra and City Services, Environment, Planning and Sustainable Development Directorate and the Suburban Land Agency to assess a number of landscaping treatments around these existing trees to support new growth and habitat over the lifetime of the trees and beyond. Through this project, Ginninderry has retained over 80% of all remnant trees across Strathnairn (EDP 1 and EDP2) and 86% of trees within Macnamara (EDP 1) (compared to 37.3% of remnant trees being retained after urban development throughout the rest of Canberra). Three treatments are being trialled for urban parks containing remnant trees, with the objective of testing whether greenspace can be managed to mitigate impact of urban development on biodiversity; motivate community engagement; reduce maintenance cost; and increase property values.

Increasing Tree Canopy and Supportive Plantings

Ginninderry is committed to reducing the impact of Urban Heat Island Effect through a number of measures including an increase of tree canopy throughout the urban area. A total of 1,051 additional trees, 13,855 shrubs and 52,267 strappy plants and groundcovers were planted throughout Strathnairn (EDP 1 and EDP2) – to supplement the original 115 remnant trees. Ginninderry was able to achieve 18% tree canopy cover and 55% permeable surfaces across the urban area and is expected to achieve 26% canopy cover and 57% permeable surface for Macnamara (under construction). Ginninderry also undertakes the front soft landscaping for all single residential blocks that meet the Ginninderry Housing Design Guidelines. This allows us to educate residents and provide early landscaping on block to reduce sediment and erosion impacts, increase native and edible plantings and reduce weed species impacts.



Water Sensitive Urban Design System

A comprehensive Water Sensitive Urban Design System has been designed for the Ginninderry Development. This system reduces the amount of stormwater that is discharged into the Ginninderry Conservation Corridor and ultimately the Murrumbidgee River to pre-development levels. Water is collected through a series of large pond and wetland systems not only to help improve water quality but to store water on site for reuse in irrigation of open space areas within the estate. This is key to the overall health and wellbeing of the living infrastructure networks throughout the urban area. Water tanks have also been required on block for re-use within homes through toilets, laundries and irrigation. Passive street tree watering, rain gardens, swales, angled road systems and the use of strata cells and permeable paving have been included through the street network designs. High efficiency sediment ponds and early plantings around settling ponds have also been trialled to ensure best practice water management throughout civil construction. These design and engineering features are also supported through a long-term research project with the University of Canberra to not only observe the water quality and impacts of rain events, but ensure the environment is protected during the construction of the suburb.

Other Innovations

All suburbs within Ginninderry will require cat containment and dogs are required to be on leash throughout the urban areas. These initiatives help to reduce residential impacts on native species throughout the area.

The Ginninderry Conservation Trust and Ginninderry development team have an extensive community and visitor education and events program which aims to increase awareness, understanding and ultimate custodianship of the shared open space and conservation areas.

Ginninderry has also undertaken extended maintenance arrangements to allow for greater landscape growth and establishment prior to handing areas over to Transport Canberra and City Services.

3.3.3 Adaptive management for uncertain impacts

As per the BAM, an adaptive management strategy is required for impacts on biodiversity values that are infrequent or difficult to measure prior to commencement of the proposed development. Such impacts are referred to as uncertain biodiversity impacts. If uncertain biodiversity impacts are identified, the proponent must develop an adaptive management strategy.

The proposed development is unlikely to result in biodiversity impacts that are unforeseen or uncertain, especially given that:

- the subject land does not support karst, caves, crevices, cliffs and other geological features of significance;
- the proposed development does not include underground mining;
- the proposed development does not include wind turbines;
- the proposed development is unlikely to substantively increase the incidence of vehicle strikes; and
- the minimisation and mitigation detailed in Section 3.1 and 3.3 are considered sufficient to reduce the risk of indirect impacts to an acceptably low level.



As such, an adaptive management strategy is not required for the proposed development. Notwithstanding this, as detailed in Section 3.1.2.1, the Ginninderry Conservation Corridor Management Plan includes adaptive management strategies. As such, the adaptive management approach outlined in the Management Plan will act to address any potential unforeseen biodiversity impacts on the significant vegetation and habitat retained within the GCC (including the Avoided Land).

3.4 Serious and irreversible impacts

The guidance to assist a decisionmaker to determine a serious and irreversible impact (NSW Government 2019⁵¹) provides a list of threatened species and ecological communities which are likely to be the subject of serious and irreversible impacts (SAII). The potential for a project to impact these SAII entities must be assessed in the BCAR.

The subject land does not contain habitat of potential significance to any flora or fauna species listed as an SAII entity. However, the subject land does support the following biodiversity value which is listed as a SAII entity.

• PCT1330 – Yellow Box – Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion ('BC Act Box-Gum Woodland').

The proposed development will result in the removal of a total of 14.08 ha of BC Act Box-Gum Woodland (comprised of 0.22 ha of moderate condition BC Act Box-Gum Woodland [i.e. PCT1330 Zone 2] and 13.86 ha of low condition BC Act Box-Gum Woodland derived grassland [i.e.PCT1330 Zone 5]).

The DPE-BCD have advised that a decision has been made not to develop entity specific thresholds for SAII. Instead, decisions will be made on a case-by-case basis. Accordingly, the below additional information is provided to support the decision maker to determine if the proposed removal of 14.08 ha of BC Act Box-Gum Woodland constitute an SAII.

However, as detailed in the following sections, the substantial avoidance, minimisation, and mitigation measures incorporated into the proposed development reduce the likelihood of a SAII on BC Act Box-Gum Woodland.

3.4.1 Box-Gum Woodland

The following information is presented according to the requirements outlined in Section 9.1 of the BAM and has been informed by the following databases and documents.

- ACT Government's ACTmapi *Significant Species, Vegetation Communities & Registered Trees*⁵² threatened woodland spatial data, accessed on 3 March 2021.
- NSW Government Saving Our Species (SOS) profile⁵³, project report⁵⁴, and Googong-Burra Region priority management information⁵⁵.

⁵¹ NSW Government (2019). *Guidance to assist a decision-maker to determine a serious and irreversible impact*. State of New South Wales and Office of Environment and Heritage

⁵² <u>http://app.actmapi.act.gov.au/actmapi/index.html?viewer=ssvcrt</u>

⁵³ <u>https://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10837</u>

⁵⁴ <u>https://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=</u> <u>988&ReportProfileID=10837</u>

⁵⁵ <u>https://www.environment.nsw.gov.au/savingourspeciesapp/ManagementSite.aspx?SiteID=3052</u>



- Final Determination: White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Gazetted 17 July 2020 (NSW Threatened Species Scientific Committee 2020a).
- *Notice of and reason for the Final Determination* (NSW Threatened Species Scientific Committee 2020b⁵⁶).
- Conservation Assessment of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (NSW Threatened Species Scientific Committee 2020c⁵⁷).
- NSW Government Office of Environment & Heritage White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland profile⁵⁸.
- ACT native woodland conservation strategy and action plans (ACT Government 2019⁵⁹).
- White Box Yellow Box Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands listing advice and conservation advice (Department of the Environment and Heritage 2006⁶⁰).
- White box Yellow box Blakely's red gum grassy woodlands and derived native grasslands (Commonwealth of Australia 2006⁶¹).
- National Recovery Plan for White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DECCW 2010⁶²).

3.4.1.1 Box-Gum Woodland – SAII additional information

• the action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII

The proposed development enacts the principles detailed in Section 3.1 to avoid and minimise impacts to Box-Gum Woodland. Potential indirect impacts, including indirect impacts to Box-Gum Woodland, will be minimised and mitigated by the measures outlined in Section 3.3.

In total, the subject land supports 17.35 ha of BC Act Box-Gum Woodland (Figure 7), composed of:

• 1.78 ha of high condition BC Act Box-Gum Woodland (i.e. PCT1330 Zone 1), with a vegetation integrity of 64.5;

 ⁵⁶ NSW Threatened Species Scientific Committee (2020b), Notice of and reason for the Final Determination.
 ⁵⁷ NSW Threatened Species Scientific Committee (2020c). Conservation Assessment of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

⁵⁸ <u>https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10837</u>

⁵⁹ ACT Government (2019). *ACT native woodland conservation strategy and action plans*. Environment, Planning and Sustainable Development.

⁶⁰ Department of the Environment and Heritage (2006). *White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands listing advice and conservation advice*. Nationally threatened species and ecological communities guidelines. EPBC Act policy statement.

⁶¹ Commonwealth of Australia (2006). *White box - Yellow box - Blakely's red gum grassy woodlands and derived native grasslands.* EPBC Act Policy Statements, Nationally threatened species and ecological communities.

⁶² DECCW (2010). National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Department of Environment, Climate Change and Water NSW, Sydney



- 0.22 ha of moderate condition BC Act Box-Gum Woodland (i.e. PCT1330 Zone 2), with a vegetation integrity of 42.8;
- 1.44 ha of high condition BC Act Box-Gum Woodland derived grassland (i.e. PCT1330 Zone 4), with a vegetation integrity of 2.2;
- 13.91 ha of low condition BC Act Box-Gum Woodland derived grassland (i.e. PCT1330 Zone 5), with a vegetation integrity of 0.7.

The subject land also supports an additional 294.95 ha of PCT1330 (i.e. PCT1330 Zone 8) that has been disturbed to the extent that it no longer meets the listing criteria for BC Act Box-Gum Woodland.

With reference to the 303.11 ha of PCT1330 that occurs in the development footprint (Figure 15):

- 95% of the impact is located in areas that support vegetation disturbed to the extent that it no longer meets the listing criteria for BC Act Box-Gum Woodland (i.e. 289.03 ha of PCT1330 Zone 8);
- 4.6% of the impact is located in areas that support vegetation that meets the listing criteria for BC Act Box-Gum Woodland in its lowest possible condition state (i.e. 13.86 ha of PCT1330 Zone 5); and
- 0.4% of the impact is located in areas that support vegetation that meets the listing criteria for BC Act Box-Gum Woodland in moderate condition (i.e. 0.22 ha of PCT1330 Zone 1).
- 0% of the impact is located in areas that support vegetation that meets the listing criteria for BC Act Box-Gum Woodland in its highest condition (i.e. PCT1330 Zones 1 and 4).

When considered together, the proposed development has almost entirely been located in the portions of the subject land that support highly degraded and low condition vegetation.

Of the remaining areas of BC Act Box-Gum Woodland in the subject land,

- 0.8 ha is protected within the Ginninderry Conservation Corridor, and
- 2.47 ha will be protected within the proposed 'Avoided Land' (see Figure 13).

These areas include all of the vegetation that meets the listing criteria for BC Act Box-Gum Woodland in its highest condition (i.e. PCT1330 Zones 1 and 4).

The proposed development will therefore impact:

- 0% (0 ha) of the EPBC Act Box-Gum Woodland in the subject land;
- 100% (0.22 ha) of the moderate condition BC Act Box-Gum Woodland in the subject land; and
- 0.36% (0.05 ha) of the low condition BC Act Box-Gum Woodland in the subject land.

The 0.8 ha of BC Act Box-Gum Woodland in the GCC, including most of the higher quality Box-Gum Woodland in the subject land, will be protected and managed in accordance with the GCC


Management Plan⁶³, which includes the management actions summarised in Section 3.1.2. In addition, the plan also stipulates the development and implementation of a science-based Box-Gum Woodland Management Plan with the following goals:

- Protective measures and ecosystem restoration activities including enhancement of plant diversity;
- maintenance and enhancement of connectivity between Box-Gum Woodland habitat areas;
- ongoing monitoring programs to assess the condition of remediation measures;
- location of initial Corridor infrastructure to avoid or manage impacts on Box-Gum Woodland in accordance with EPBC Act approval conditions; and
- community and visitor education on Box-Gum Woodland and recreation requirements for its protection.

Finally, the proposed development will protect an additional 6.02 ha of vegetation that occurs in the western part of the subject land. This area supports 2.47 ha of BC Act Box-Gum Woodland, 0.19 ha of Pink-tailed Legless Lizard habitat, and 2.42 ha of assumed Key's Matchstick Grasshopper habitat, and is proposed to be protected and managed as part of the GCC (Figure 13 and Figure 14).

When all of the above is considered together, the proposed development has therefore been designed to avoid and minimise impacts to BC Act Box-Gum Woodland while simultaneously ensuring the protection and management of all of the higher condition vegetation.

- The current status of the TEC including:
 - a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW and estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal).
 - b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC regulation) indicated by:
 - *i.* change in community structure
 - ii. change in species composition
 - *iii.* disruption of ecological processes
 - iv. invasion and establishment of exotic species
 - v. degradation of habitat, and
 - vi. fragmentation of habitat

⁶³ Ginninderry (2018). Ginninderry Conservation Corridor 2018-2023 Management Plan. Prepared by TRC Tourism Ltd for Riverview Projects (ACT) Pty Ltd.



- c. evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the
 - i. Extent of occurrence
 - ii. Area of occupancy, and
 - *iii.* Number of threat-defined locations
- d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland is listed under the NSW BC Act as a Critically Endangered Ecological Community. It is considered to be an SAII entity based on Principles 1 and 2⁶⁴. As stated in the Final Determination (NSW Threatened Species Scientific Committee 2020b) –

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland has undergone a very large reduction in geographic distribution. The Community has been extensively cleared throughout its range and remnants typically are small, isolated, highly fragmented, occur in predominantly cleared landscapes and exhibit highly modified understoreys (TSSC 2006). Based on a compilation of available maps depicting the current extent of the community, TSSC (2006) estimated that less than 5% of the original distribution remained, however the extent to which remaining examples continue to support characteristic biota, their interactions and function is unknown...

...White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is subject to a number of threatening processes that have caused severe declines in biotic processes and interactions throughout its range and are likely to cause continuing decline in the future.

• Is the TEC 'Unknown' or 'Data deficient' for Principles 1 to 4?

The TEC is not data deficient.

- in relation to the impacts from the proposal on the TEC at risk of an SAII:
 - a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:
 - i. in hectares, and
 - ii. as a percentage of the current geographic extent of the TEC in NSW

Data and information should include direct impacts (i.e. from clearing) and indirect impacts where partial loss of the TEC is likely as a result of the proposal.

The current geographic extent of the TEC in NSW varies widely between estimates. The following information was taken from Table 2a of the *Conservation Assessment of White Box-Yellow Box-Blakely's Red Gum Grass Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020c).

⁶⁴ <u>https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development</u>



- Former (pre-1750) extent in NSW = 3,717,366 ha.
- Current extent in NSW = 250,729 ha (93% cleared).
- Former extent (pre-1750) in South-Eastern NSW = 1,012,052 ha.
- Current extent in South-Eastern NSW = 59,468 ha (94% cleared).

The proposed development will impact 14.08 ha of BC Act Box-Gum Woodland. This impact represents <u>0.02%</u> of the TEC in South-Eastern NSW and <u>0.006%</u> of the total extent in NSW.

However, it is also important to note that the impact to 14.08 ha of BC Act Box-Gum Woodland is comprised of:

0.22 ha of moderate condition BC Act Box-Gum Woodland (i.e. PCT1330 Zone 2), with a vegetation integrity of 41.1; and

13.86 ha of low condition BC Act Box-Gum Woodland (i.e. PCT1330 Zone 5), with a vegetation integrity of 0.7.

With respect to the above, 98.4% of the impact to BC Act Box-Gum Woodland is therefore directed towards vegetation that meets the listing criteria for BC Act Box-Gum Woodland in its lowest possible condition state (i.e. PCT1330 Zone 5).

- b. The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:
 - i. Estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500m of the development footprint or equivalent area for other types of proposals

The proposed development is surrounded by:

- residential development to the south and east;
- intact riparian vegetation and dry sclerophyll forest to the north;
- cleared agricultural land to the west and north east.

As shown in Figure 16, a 500 m buffer around the development footprint contains approximately 60.97 ha of BC Act Box-Gum Woodland.

98% (13.85 ha) of the BC Act Box-Gum Woodland in the development footprint only meets the listing criteria for this TEC in its lowest possible condition state (i.e. PCT1330 Zone 5, vegetation integrity of 0.7). The areas to be cleared therefore largely consist of patches of low-quality vegetation that lack a native overstorey, midstorey, and shrubstorey.

The proposed development is therefore unlikely to significantly reduce the size or result in an increase in isolation of the remaining patches of BC Act Box-Gum Woodland.

- *ii.* Describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:
 - Distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and



The average minimum distance between all patches of BC Act Box-Gum Woodland within 500 m of the development footprint (including vegetation within the development footprint, refer to Figure 16) is:

- if the remnant is retained = 1142 m; and
- if the remnant is removed as proposed = 806 m.

The proposed development would therefore result in an average decrease of 366 m (30%) for the minimum distance between all patches of BC Act Box-Gum Woodland within 500 m of the development footprint. However, it is important to note that 98% of the impact to BC Act Box-Gum Woodland occurs in PCT1330 Zone 5, which is a low-diversity vegetation zone that does not support an overstorey, midstorey, or shrubstorey. The removal of such degraded BC Act Box-Gum Woodland is therefore considered unlikely to further isolate retained and adjacent areas of the TEC.

• Estimated maximum dispersal distance for native flora species characteristic of the TEC, and

The vegetation across the development footprint is highly disturbed as approximately 86% of the overstorey has been cleared and the midstorey and shrubstorey are almost entirely absent. The proposed development is therefore largely located in an area that largely supports low-quality vegetation and flora habitat. In addition, the proposed development will not significantly reduce the size or result in an increase in isolation of the remaining patches of the TEC.

In contrast, the Ginninderry Conservation Corridor protects the vast majority of higher quality vegetation and threatened species habitat in the subject land, including (refer to Figure 13 and Figure 14):

- 100% of the EPBC Act listed Box-Gum Woodland;
- 100% of the EPBC Act listed NTG-SEH;
- 91.4% of the Pink-tailed Legless Lizard habitat; and
- the vast majority of the threatened woodland bird habitat

As a result, the proposed development is considered unlikely to impact the dispersal of any flora species characteristic of the TEC.

• Other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development

The average area to perimeter ratio for all patches of BC Act Box-Gum Woodland within 500 m of the development footprint (including vegetation within the development footprint, refer to Figure 16) is:

- if the remnant is retained = 67.85; and
- if the remnant is removed as proposed = 62.65.

The proposed development would therefore result in an average decrease of 5.2 (7.6%) for the average area to perimeter ratio for all patches of BC Act Box-Gum Woodland within 500 m of the development footprint.



iii. Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zones(s). Include the relevant composition, structure and function condition scores for each vegetation zone.

The proposed development will directly impact (i.e. remove) of a total of 14.08 ha of BC Act listed Box-Gum Woodland, comprised of the following vegetation condition zones.

- <u>PCT1330 Zone 2 (0.22 ha).</u> Vegetation Integrity Score of 41.1 (composition 11.9, structure 93.8, and function 62.5). As described in Table 10, this zone is characterised as 'Canopy of Blakely's Red Gum with regeneration. The midstorey and shrubstorey are absent. Low native groundlayer dominated by Rough Spear-grass, Wallaby Grass, Weeping Grass, and Native Geranium Geranium solanderi. This zone has been historically disturbed and contains a low diversity of native forbs. This zone contains a low cover but moderate to high diversity of common weeds.'
- <u>PCT1330 Zone 5 (13.86 ha).</u> Vegetation Integrity Score of 0.7 (composition 20.1, structure 50.7, and function 0). As described in Section 1.1.3, this zone is characterised as 'Overstorey largely cleared, with scattered remnant paddock trees. Midstorey and shrubstorey are entirely absent. Low diversity native groundlayer marginally dominated by native grasses and sedges, Clustered Wallaby-grass Rytidosperma racemosum, Weeping Grass Microlaena stipoides, and Common Bog-sedge Schoenus apogon, with exotic grasses and weeds such as Barley Grass Hordeum sp., Clover Wild Oats, and Brome Grass.'

As discussed previously, all of the impact to BC Act Box-Gum Woodland therefore occurs in vegetation that has been substantially degraded by historic and current agricultural activities and only meets the definition of the TEC in a highly modified form.



Figure 16. SAII - Box-Gum Woodland within 500m of the subject land.

Capital Ecology Project No: 3155 Drawn by: C. Ross Date: 11 January 2023



Legend

- Subject Land 3155 BCAR
- SAII Box-Gum Woodland
- 500m Buffer
 - Box-Gum Woodland within 500m
 - BGW within 500m after clearance

capital ecology



3.5 Legislative Requirements

3.5.1 Commonwealth EPBC Act – Referral

As mentioned in Section 1, the impact of the Ginninderry Development on MNES was referred on 28 September 2020 (EPBC Act Referral No. 2020/8801, determined to be a controlled action on 20 November 2020 to be assessed by preliminary documentation). The proposed action was approved on 13 September 2021, subject to certain conditions.

3.5.2 NSW BC Act – Biodiversity Offset Requirements

The BAM Calculator is the tool for quantifying the offset requirements for a project, the output being expressed as ecosystem credits and species credits. The results of the BAM credit calculations completed for the proposed development are provided below and detailed in Appendix G.

3.5.2.1 Biodiversity risk weighting

The biodiversity risk weighting is a tool used in the BOS to mitigate the risk in offsetting the loss of vegetation, threatened entities and/or their habitat. The biodiversity risk weighting does this by increasing the quantum of credits required at an impact site. The biodiversity risk weighting is derived from two components:

- sensitivity to loss based on threat status under legislation or evidence-based information that suggests the entity is at an increased risk of loss; and
- sensitivity to potential gain based on life history characteristics and ecological information for a species.

The development footprint contains vegetation with a vegetation integrity score that requires offsetting for impacts on ecosystem credits. The development footprint also contains threatened species habitat that requires offsetting for impacts on species credits. The biodiversity risk weighting for the identified ecosystem credits and species credits are shown below.

- PCT1093 Biodiversity risk rating of 1.75.
- PCT1334 Biodiversity risk rating of 2.5.
- Aprasia parapulchella Pink-tailed Legless Lizard Biodiversity risk rating of 2.
- Keyacris scurra Key's Matchstick Grasshopper Biodiversity risk rating of 2.

3.5.2.2 Ecosystem credit requirements

The results of the BAM ecosystem credit calculations completed for the proposed development are provided in Table 24. As shown in Table 24, a subset of the assessed vegetation zones in the proposed biodiversity certification area have a vegetation integrity score sufficient for their clearance to result in generation of ecosystem credits, as outlined in Section 9.2.1 of the BAM, these being vegetation zones that have a vegetation integrity score of:

a. ≥15, where the PCT is representative of an EEC or a CEEC

b. \geq 17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community



 $c. \ge 20$, where the PCT does not represent a TEC and is not associated with threatened species habitat.

Accordingly, the proposed development does generate an ecosystem credit obligation, as determined by the BAM Calculator on 31 May 2023.

Table 24. Ecosystem credit requirements.

PCT & Vegetation Zone	Vegetation Integrity Score	Proposed Clearance Area (ha)	Credits Required
PCT1093 Zone 1	67.2	6.8	201
PCT1093 Zone 4	10.4	26.53	0
PCT1093 Zone 5	17.5	0.91	7
PCT1093 Zone 8	0.7	18	0
		Total	208
PCT1330 Zone 2	42.8	0.22	6
PCT1330 Zone 5	0.7	13.9	0
PCT1330 Zone 8	0.3	289	0
		Total	6

3.5.2.3 Species credit requirements

The development footprint supports habitat of potential significance to the Golden Sun Moth, which is species credit species. Accordingly, as detailed in Table 25, the proposed development does generate a species credit obligation, as determined by the BAM Calculator on 31 May 2023.

Table 25. Species credit requirements.

Species	PCT & Vegetation Zone	Habitat Condition (Vegetation Integrity) Loss	Proposed Clearance Area (ha)	Credits Required
Aprasia	PCT1093 Zone 1	67.1	0.63	21
parapulchella	PCT1093 Zone 4	10.4	2.3	12
Pink-tailed Legless Lizard	PCT1093 Zone 5	17.5	0.04	1
	PCT1093 Zone 8	0.7	0.03	1
	PCT1330 Zone 5	0.7	0.25	1
	PCT1330 Zone 8	0.3	0.19	1
			Total	37
<i>Keyacris scurra</i> Key's Matchstick Grasshopper	PCT1093 Zone 4	10.4	26.53	138
	1		Total	138



3.5.2.4 Credit obligation options

As detailed by the NSW Department of Planning and Environment⁶⁵, the proponent can address the estimated offset obligation outlined in the following two ways (options).

- 1. The proponent can '*identify and purchase the required 'like for like' credits in the market and then retire those credits via OEH BOAMS* [Biodiversity Offsets and Agreement Management System]. *For example, credits could be located by using the OEH registers or by retaining a broker to locate credits for them.*'
- 2. The proponent can 'use the Offsets Payment Calculator to determine the cost of its credit obligation, and transfer this amount to the Biodiversity Conservation Fund via OEH BOAMS. The Biodiversity Conservation Trust is then responsible for identifying and securing the credit obligation.'

When the proponent has completed these steps for all credits that the proponent is required to retire, they can proceed with their activity in accordance with their approval. The consent authority is responsible for ensuring compliance with credit obligations, and any other conditions of the consent or approval.

If the proponent chooses Option 2 to meet the credit obligations, the amount which must be paid into the Biodiversity Conservation Fund is determined at the time the proponent applies for an invoice from the Biodiversity Conservation Trust. A risk premium is included in that calculation to account for fact that the risks and costs involved in securing the offset have effectively been transferred to the Biodiversity Conservation Trust. The benefits associated with Option 2 include a more streamlined process and no ongoing obligations once the required amount has been paid to the Biodiversity Conservation Fund.

If the proponent chooses Option 1 to meet the credit obligations, the cost per credit purchased from the market is likely to be lower than that to pay into the Biodiversity Conservation Fund, and as such, the total monetary cost of the offset obligation is likely to be lower than Option 2. However, the disadvantages associated with Option 1 include a more complicated process and potential delays associated with sourcing credits from the BOS credit market.

3.5.3 NSW Koala SEPP – Koala Habitat Protection Requirements

Regarding the application of the *State Environmental Planning Policy (Biodiversity and Conservation)* 2021 – Chapter 4 Koala Habitat protection (the 'Koala Habitat Protection SEPP 2021') for the proposed development of the subject land, the following points are noted.

- 1. The subject land is located within the Yass Valley Local Government Area (LGA), which is an LGA to which the Koala Habitat Protection SEPP 2021 applies as listed in Schedule 2.
- 2. The subject land has an area of greater than 1 hectare and there is no approved Koala Plan of Management.
- 3. The subject land support a number of the tree species listed in Schedule 3 of the Koala Habitat Protection SEPP 2021. Accordingly, the subject land supports 'potential koala habitat'.

⁶⁵ https://www.environment.nsw.gov.au/biodiversity/offsetsscheme.htm



- 4. The subject land is separated by over 7.7 km from the nearest Koala records, all of which occur in intact vegetation to the west; the intervening areas are characterised by cleared rural land and include a substantial number of significant impediments to Koala movement (e.g. large cleared areas, human disturbance).
- 5. The ecological values of the subject land have been investigated since the early 1990s (refer to Section 1.2.1). No Koala or signs of Koala occupation have ever been detected.

With regard to the above and with respect to the Koala Habitat Protection SEPP, the subject land is therefore considered unlikely to support Koala habitat and as such is unlikely to constitute important or occupied Koala habitat now or in the future.

In light of the above, <u>Council can be satisfied that the subject land is not Koala habitat, and it is</u> therefore not prevented by the Koala Habitat Protection SEPP 2021 from granting consent to a <u>development application within the subject land</u>.

DRAFT



3.6 Information Requirements for the Biodiversity Certification Agreement

The information in Table 26, Table 27, and Figure 17 is required by DPE-BCD in order to inform the Biodiversity Certification Agreement that will be sent to the NSW Minister for Planning for approval.

While the establishment of the GCC is considered to be one of the primary avoidance measures related to the proposed development, feedback from DPE-BCD indicates that the GCC cannot be officially included as 'Avoided Land'. This is because the early establishment and protection of this area means that it can no longer be considered as 'developable land' and thus can no longer be technically considered as 'Avoided Land' in the current BCAR. As such, the GCC and the values it supports are not included in Table 26, Table 27, and Figure 17.

Table 26. Biodiversity Certification Areas.

General Area	Land Zoning	Area (ha)	Native Vegetation (ha)
Land Proposed for Certification (Certified Land/Development Footprint)	R1 – General Residential	355.43	48.36
Avoided Land	R1 – General Residential	6.02	6.02
Ginninderry Conservation Corridor	C2 – Environmental Conservation	162.39	147.39
Retained Land not Proposed for Certification	N/A	0	0
Biodiversity Certification Assessment Area (Total area of Subject Land)	DAFT	523.84	201.76

Table 27. Biodiversity Values within each Biodiversity Certification Area.

Biodiversity Value	Biodiversity Certification Assessment Area (ha)	Land Proposed for Certification (ha)	Avoided Land (ha)	Ginninderry Conservation Corridor (ha)
PCT85 Zone 1	3.77	0	0	3.77
PCT85 Zone 6	8.37	0	0	8.37
PCT321 Zone 1	4.94	0	0	4.94
PCT1093 Zone 1	86.81	6.84	2.52	77.45
PCT1093 Zone 4	75.45	26.53	1.03	47.89
PCT1093 Zone 6	1.78	0.91	0	0.87
PCT1093 Zone 8	26.07	17.96	0	8.11
PCT1330 Zone 1	1.78	0	0.98	0.8
PCT1330 Zone 2	0.22	0.22	0	0
PCT1330 Zone 4	1.44	0	1.44	0
PCT1330 Zone 5	13.91	13.86	0.05	0
PCT1330 Zone 8	294.95	289.03	0	5.92
BC Act Box-Gum Woodland	17.35	14.08	2.47	0.8
EPBC Act Box-Gum Woodland	3.22	0	2.42	0.8
PCT3415 Zone 1	1.72	0	0	1.72



Biodiversity Value	Biodiversity Certification Assessment Area (ha)	Land Proposed for Certification (ha)	Avoided Land (ha)	Ginninderry Conservation Corridor (ha)
PCT3415 Zone 2	1.33	0	0	1.33
PCT3415 Zone 3	0.25	0	0	0.25
PCT3415 Zone 4	1.03	0.07	0	0.96
EPBC Act Natural Temperate Grassland	3.05	0	0	3.05
Remnant trees	-	88 trees	20 trees	Not surveyed
Pink-tailed Legless Lizard	37.64	3.45	0.56	33.63
Key's Matchstick Grasshopper	78.67	26.53	3.45	48.69

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Figure 17. Biodiversity Certification Areas

Capital Ecology Project No: 3155 Drawn by: C. Ross Date: 11 January 2023 capital ecology



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Appendices

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Appendix A. BAM Plot/Transect Scores

DCT code	Vez Zeze	Diet Ne	Composition (species	s richness)				
PCT code	veg. zone	PIOL NO.	Composition (speci Tree 1 1 1 1 1 1 2 4 3 3 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0	Shrub	Grass & grass like	Forb	Fern	Other
		1	1	1	1	3	0	0
	1	2	1	1	3	6	0	0
OE		3	1	1	0	0	0	1
60		1	1	0	3	1	0	0
	2	2	1	0	2	2	0	1
		3	2	5	8	13	1	0
221	1	1	4	3	5	10	1	0
521	L	2	3	5	10	14	2	4
		1	1	1	3	5	0	1
		2	1	0	7	11	1	2
	1 3	3	1	1	9	13	0	1
		4	1	4	11	14	2	1
		5	0	0	5	2	0	0
		1	0	1	6	3	0	0
1002		2	0	1	11	12	1	0
1095	4	3	0	0	8	4	0	0
		4	0	0	4	2	0	0
		5	1	0	5	2	0	0
	6	1	0	0	2	3	0	0
		1	0	0	2	1	0	0
	8	2	0	0	0	1	0	0
		3	0	0	1	3	0	0



DCT code	Veg Zene	Plot No.	Composition (species	s richness)				
PCT code	veg. zone	PIOL NO.	Tree	Shrub	Grass & grass like	Forb	Fern	Other
		4	1	3	11	9	1	1
	1	1	1	0	3	3	1	0
	2	1 0		0	9	9	1	0
	4 1 0	0	0	5	5	0	0	
		1	0	0	5	5	1	0
	5	2	0	0	4	3	0	1
		3	0	0	0	0	0	0
1330		1	0	0	1	1	0	0
		2	0	0	0	2	0	0
		3	0	0	0	2	0	0
	8	4	0	0	0	1	0	0
		5	0	0	0	1	0	0
		6	0	0	1	0	0	0
			1	1	1	3	0	0



DCT codo	Vog Zono	Diat No.	Structure (% cover)					
PCTCOUE	veg. zone	PIOL NO.	Grass & grass like	Grass & grass like	Grass & grass like	Forb	Fern	Other
		1	70.0	1.0	50.0	5.6	0.0	0.0
	1	2	25.0	10.0	46.0	2.5	0.0	0.0
OE		3	10.0	1.0	0.0	0.0	0.0	0.1
65		1	15.0	0.0	20.1	1.0	0.0	0.0
	2	2	30.0	0.0	20.1	0.3	0.0	2.0
		3	30.0	32.3	11.4	2.4	0.5	0.0
271	1	1	24.0	0.4	11.2	4.8	0.1	0.0
521	Ţ	2	30.0	6.2	24.6	7.1	0.6	0.4
		1	30.0	30.0	35.2	2.4	0.0	0.2
		2	5.0 0.0 48.4		48.4	26.6	1.0	0.2
	1	3	30.0	0.1	13.4	4.4	0.0	0.1
		4	20.0	4.6	12.3	3.5	1.1	0.2
		5	0.0	0.0	64.0	0.6	0.0	0.0
		1	0.0	0.2	33.3	0.8	0.0	0.0
		2	0.0	0.1	52.5	1.3	0.1	0.0
1093	4	3	0.0	0.0	36.0	0.6	0.0	0.0
		4	0.0	0.0	40.2	0.2	0.0	0.0
		5	1.0	0.0	31.7	0.2	0.0	0.0
	6	1	0.0	0.0	5.1	0.4	0.0	0.0
		1	0.0	0.0	0.4	1.0	0.0	0.0
	Q	2	0.0	0.0	0.0	1.0	0.0	0.0
	o	3	0.0	0.0	0.2	0.3	0.0	0.0
		4	30.0	5.2	5.2 37.3		0.2	0.1
1330	1	1	50.0	0.0	62.0	15.3	0.1	0.0



DCT and a	Ver Zene	Plot No.	Structure (% cover)					
PCT code	veg. zone	PIOL NO.	Grass & grass like	Grass & grass like	Grass & grass like	Forb	Fern	Other
	2	1	0.0	0.0	54.2	5.8	0.1	0.0
	4	1	0.0	0.0	45.2	0.5	0.0	0.0
		1	0.0	0.0	62.5	1.4	0.1	0.0
	5	2	0.0	0.0	41.5	0.3	0.0	0.1
		3	0.0	0.0	0.0	0.0	0.0	0.0
		1 0.0		0.0	1.0	0.1	0.0	0.0
		2	0.0	0.0	0.0	1.1	0.0	0.0
		3	0.0	0.0	0.0	1.1	0.0	0.0
	8 4 5 6	0.0	0.0	0.0	0.1	0.0	0.0	
		5	0.0	0.0	0.0	0.1	0.0	0.0
		6	0.0	0.0	0.1	0.0	0.0	0.0
		7	70.0	1.0	50.0	5.6	0.0	0.0



			Function							Function											
PCT code	Veg. Zone	Plot No.	Stem clas	ses				No. of large	Hollow bearing	% Litter	Coarse woody	% High threat									
			Regen.	5-9	10-19	20-29	30-49	trees	trees	cover	debris (m)	weed cover									
		1	0	0	9.2	25.0	0	0	0	0	0	0									
	1	2	0	2	0.4	8.0	0	0	0	0	0	0									
QE		3	0	0	4.0	138.0	0	0	0	0	0	0									
60		1	0	0	1.4	5.0	0	0	0	0	0	0									
	2	2	0	1	0.0	29.0	0	0	0	0	0	0									
		3	1	1	6.4	104.0	0	1	1	1	0	1									
221	1	1	0	0	9.0	15.0	0	1	0	0	0	0									
521		2	3	1	9.0	29.0	1	1	1	1	1	1									
		1	3	1	11.0	60.0	0	1	1	1	2	1									
		2	1	2	0.6	2.0	1	1	0	1	1	0									
	1	3	5	3	25.4	20.0	1	1	1	1	5	1									
		4	0	2	6.6	11.0	0	1	1	1	0	0									
		5	0	0	0.4	0.0	0	0	0	0	0	0									
		1	0	0	0.0	0.0	0	0	0	0	0	0									
		2	0	0	0.0	0.0	0	0	0	0	0	1									
1093	4	3	0	0	7.0	0.0	0	0	0	0	0	0									
		4	0	0	0.0	0.0	0	0	0	0	0	0									
		5	1	3	0.0	1.0	0	0	0	0	0	0									
	6	1	0	0	0.6	0.0	0	0	0	0	0	0									
		1	0	0	0.0	0.0	0	0	0	0	0	0									
	0	2	0	0	30.0	0.0	0	0	0	0	0	0									
	0	3	0	0	13.0	0.0	0	0	0	0	0	0									
			1	1	16.0	9.0	1	1	1	1	0	1									



		_	Function										
PCT code	Veg. Zone	Plot No.	Stem clas	ses				No. of large	Hollow bearing	% Litter	Coarse woody	% High threat	
			Regen.	5-9	10-19	20-29	30-49	trees	trees	cover	debris (m)	weed cover	
	1	1	2	1	6.0	14.0	1	1	1	0	0	1	
	2	1	0	0	10.0	5.0	0	0	0	0	0	0	
	4	1	0	0	0.0	0.0	0	0	0	0	0	0	
		1	0	0	0.8	0.0	0	0	0 0		0	0	
	5	2	0	0	0.2	0.0	0	0 0		0	0	0	
		3	0	0	0.0	0.0	0	0	0	0 0 0		0	
1330		1	0	0	0.0	0.0	0	0	0	0	0	0	
		2	0	0	37.0	0.0	0	0	0	0	0	0	
		3	0	0	47.0	0.0	0	0	0	0	0	0	
	8	4	0	0	46.0	0.0	0	0	0	0	0	0	
		5	0	0	5.4	0.0	0	0	0	0	0	0	
		6	0	0	4.6	0.0	0	0	0	0	0	0	
		7	0	0	9.2	25.0	0	0	0	0	0	0	

Appendix B. Flora Species Recorded by Plot and Percent Cover or Presence

Scientific Name	Common Name	85.1.1	85.1.2	85.1.3	85.6.1	85.6.2	85.6.3	321.1.1	321.1.2	1093.1.1	1093.1.2	1093.1.3	1093.1.4	1093.1.5	1093.4.1	1093.4.2	1093.4.3	1093.4.4	1093.4.5	1093.6.1	1093.8.1	1093.8.2	1093.8.3	1093.8.4
Exotic	1																							
Acer negundo	Box Elder			1.0																				
Acetosella vulgaris	Sheep's Sorrel				0.1		0.5	1.0	0.2	0.4	0.1			0.1					1.0		2.0			
Aira sp.	Hair-grass						1.0	0.5	0.2	2.0	0.1	2.0	0.5	0.1	1.0	2.0	2.0	0.1						
Arctotheca calendula	Cape Weed																							
Avena sp.	Wild Oats		2.0	1.0	5.0	2.0				0.2	0.5			15.0	25.0	1.0	2.0	20.0	5.0	40.0	35.0	60.0	50.0	
Briza maxima	Greater Quaking-grass																							
Briza minor	Lesser Quaking-grass				0.1		0.1	0.5	0.1	0.2	0.1	0.1		0.1										
Bromus sp.	Brome Grass	10.0	15.0	25.0	10.0	20.0		1.0		20.0	1.0	5.0	1.0	5.0	5.0	5.0		10.0	5.0		20.0	10.0	5.0	10.0
Capsella bursa-pastoris	Shepherd's Purse			ļ																				
Carduus pycnocephalus	Slender Thistle	0.2			3.0						0.1													0.2
Carex sp.	Sedge							0.1																
Carthamus Ianatus	Saffron I histle			1.0								1.0						0.2		5.0				
Centaurea calcitrapa	Star Thistle		1.0	1.0	1.0		0.5	1.0	0.5	1.0	0.2		0.2	2.0	0.5			0.1						
Centaurium sp.	Common Centaury		1.0	0.2	1.0		0.5	1.0	0.5	1.0	0.2		0.2	2.0	0.5			0.1		0.1				
Cerustium sp.	Rush Skoloton wood				0.1		0.1	0.1									0.1		0.1	0.1		1.0		
Cirsium vulgare	Snear Thistle				0.1					0.5		0.1	0.1				0.1		0.1			1.0		
Conjum maculatum	Hemlock	0.5	10	20.0	0.2	10.0			0.1	0.5	0.1	0.1	0.1							0.1				0.5
	Fleabane	1.0	1.0	20.0	1.0	10.0	1.0	1.0	0.5	0.3	0.2	0.1	0.3	0.1		0.1	0.1			0.1				1.0
Crataeaus monoavna	Common Hawthorn	1.0	1.0		1.0		1.0	1.0	0.5	0.5	0.2	5.0	0.5	0.1	5.0	0.1	0.1		20.0					1.0
Cynodon dactylon	Couch Grass			1								0.0			0.0				2010				0.1	
Cyperus eragrostis	Tall Flat-sedge		3.0	0.1		0.1	0.1											0.1		0.5			0.1	
Dactylis glomerata	Cock's Foot	1.0		1		2.0									3.0						2.0			1.0
Echium plantagineum	Paterson's Curse	0.1	0.2			0.2												0.2	0.1			0.2	0.1	0.1
Ehrharta erecta	Panic Veldtgrass			10.0		5.0																		
Eleusine tristachya	Goose Grass																						5.0	
Eragrostis cilianensis	Stinkgrass				5.0													1.0						
Eragrostis curvula	African Lovegrass		5.0		20.0	0.2								0.5		5.0	1.0	2.0			0.5		0.5	
Erodium brachycarpum	Hairy-pitted Stork's-bill																		0.1					
Erodium sp.	Stork's-bill		0.1		5.0			0.1						0.2										
Eschscholzia californica	California Poppy			0.1																				
Foeniculum vulgare	Fennel					0.5								0.5						0.1				0.5
Galium aparine	Goosegrass	0.5		0.1		0.5			0.1															0.5
Galium alvaricatum	Siender Bedstraw						0.1	0.1	0.1		0.1													
Gallum murale	Small Bedstraw						0.1	0.1	0.1	0.2	0.1													
Hirschfeldia incana	Buchan Weed	0.5	0.2		1.0			0.1	0.1	0.2								0.2		0.1	1.0	0.1	1.0	0.5
Holcus lanatus	Yorkshire Fog	0.5	10.0	20.0	1.0	20.0		0.1		2.0		0.2	0.2	2.0	2.0			5.0	2.0	0.1	2.0	0.1	1.0	0.5
Hordeum sp.	Barley Grass		10.0	20.0	2.0	20.0				2.0		0.2	0.2	2.0	2.0			5.0	2.0	2.0	2.0		1.0	
Hypericum perforatum	St John's Wort	0.1			1.0		1.0	0.5	0.5		2.0			0.5	1.0	0.3	5.0		1.0	2.0	0.1	5.0	0.5	0.1
Hypochaeris glabra	Smooth Cats-ear	0.1					0.2	1.0	0.1		0.2		0.1			0.1	1.0	0.1						0.1
Hypochaeris radicata	Flatweed	0.1		0.1	1.0		0.1	1.0			0.1	0.2	0.2	1.0	1.0	0.2	1.0	1.0	1.0					0.1
Juncus acutus	Spiny Rush																	0.1						
Juncus bufonius	Toad Rush																							
Linaria pelisserana	Pelisser's Toadflax							0.1			0.1	0.1					0.1							
Lolium perenne	Perennial Ryegrass	2.0		5.0	5.0	15.0					0.1							1.0		5.0		5.0	3.0	2.0
Lysimachia arvensis	Scarlet Pimpernel	0.1					0.1	0.1												0.1				0.1
Modiola caroliniana	Red-flowered Mallow		0.1		0.2	0.1					0.1							0.2	0.1	5.0	1.0	1.0		
Onopordum acanthium	Scotch Thistle		0.2		5.0			0.2	0.2			0.1								0.1		0.5	3.0	-
Urobanche minor	Lesser Broomrape								0.1		0.1			0.1				0.1	0.1			0.1		
Paspalum dilatatum	Paspalum Grass						0.1	0.1	0.1		0.2	0.2	0.2		0.1	0.1	0.2	0.1		0.1				
Petrornagia nanteulli	Proliferous Pink Dealaria					2.0	0.1	0.1	0.1		0.2	0.2	0.2		0.1	0.1	0.2	0.1	1.0	0.1	15.0	10.0	10.0	
Plantago lanceolata	Plantain / Lamb's Tonguo	0.1			2.0	2.0	0.1	0.2			1.0	0.2			1.0			3.0	5.0	2.0	15.0	10.0	10.0	0.1
Pog sp	Snow Grass	0.1			2.0		0.1	0.2			0.2	0.2			1.0			5.0	5.0	2.0	1.0	1.0	5.0	0.1
Polycarpon tetranhyllum	Fourleaf Allseed						0.1	0.1			0.2													
Polyaonum aviculare	Wireweed						0.1	0.1																
Rosa rubiginosa	Briar Rose				0.5	0.1		0.5	0.1	0.1	0.1		0.1			0.1		0.1	1.0	1				
Rubus fruticosus	Blackberry	0.5	1.0	0.2		2.0		5.0	0.1	0.2	0.2	0.1		5.0	2.0	1.0			30.0	0.5	1.0			0.5
Rumex crispus	Curly Dock	-		1	ĺ	0.1						1	İ	1		1				1				
Salvia verbenaca	Wild Sage																			1.0			0.1	
Sanguisorba minor	Sheep's Burnet	0.1												0.1										0.1
Senecio sp.	Fireweed	0.1					0.1																	0.1

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Scientific Name	Common Name	85.1.1	85.1.2	85.1.3	85.6.1	85.6.2	85.6.3	321.1.1	321.1.2	1093.1.1	1093.1.2	1093.1.3	1093.1.4	1093.1.5	1093.4.1	1093.4.2	1093.4.3	1093.4.4	1093.4.5	1093.6.1	1093.8.1	1093.8.2	1093.8.3	1093.8.4
Setaria parviflora	Slender Pigeon Grass																							
Silene gallica	Fench Catchfly																							
Silybum marianum	Variegated thistle					1.0																		
Solanum nigrum	Black Nightshade	1.0		0.1	0.1	0.1			0.1	0.2		0.2	0.1											1.0
Sonchus sp.	Milk/Sow Thistle												0.2											
Sporobolus africanus	Parramatta Grass																							
Stellaria media	Chickweed	0.2										0.2												0.2
Tolpis barbata	Yellow Hawkweed						0.1		0.1		0.1					0.1	0.1							
Trifolium sp.	Clover	0.5	5.0		5.0		2.0	3.0	1.0	0.2	5.0	0.1	1.0	5.0		0.5	20.0	20.0	20.0	30.0	10.0	5.0	5.0	0.5
Verbascum thapsus	Common Mullein		0.2	0.1	2.0			0.2	0.1		0.1	0.1	0.1	0.5		0.2				1.0		0.1	0.1	
Verbena incompta	Purpletop	0.1			0.1			0.1	0.1	0.3	0.1			0.1						1.0				0.1
Vicia sp.	Vetch	1.0																						1.0
Vulpia sp.	Rat's Tail Fescue		2.0	15.0		15.0	2.0	1.0	5.0	15.0		2.0	1.0		10.0	10.0	30.0				10.0		5.0	
Native						-								-										
Acacia rubida	Red-stemmed Wattle								0.1															
Acaena ovina	Sheep's Burr		0.1					0.1			0.1	0.1			0.1									
Ajuga australis	Austral bugle											0.2	0.2											
Allocasuarina cunninghamiana	River She-oak	70.0	25.0	10.0		30.0		2.0																70.0
Allocasuarina littoralis	Black She-oak				15.0																			
Amyema cambagei	Sheoak Mistletoe			0.1		2.0																		
Anthosachne scabra	Common Wheat Grass		1.0								1.0	1.0	0.2	5.0	1.0	2.0			0.5					
Aristida ramosa	Purple Wiregrass												0.2											
Asperula conferta	Common Woodruff																							
Asplenium flabellifolium	Necklace Fern								0.1				1.0											
Austrostipa bigeniculata	Tall Speargrass											1.0	0.2										0.2	
Austrostipa scabra	Rough Spear-grass						2.0						2.0	50.0		15.0	0.2		1.0					
Bothriochloa macra	Red-leg Grass						2.0		0.1		0.1			50.0		10.0	20.0							
Brachyloma daphnoides	Daphne Heath						2.0		0.1				0.4	-		0.1								
Buibine buibosd	Buibine Lily								0.1				0.1	-		0.1								
Bursaria lasiophylia	Native Blackthorn						20.0	15.0	_				2.0	-										
					0.1		20.0	15.0		0.2		0.1	0.1						0.1					
Carex inversa	Knob Sodgo				0.1		0.1	0.1	0.1	0.2		0.1	0.1	-	0.1				0.1	0.1	0.2			
Cassinia lonaifolia	Long-leaf Cassinia						0.1	0.1	1.0			0.1			0.1				0.1	0.1	0.2			
Cassinia auinquefaria	Wild Rosemary						0.1		1.0				2.0			0.1								
Cheilanthes sieberi	Rock Fern						0.5	0.1	0.5		1.0		0.1			0.1								
Chloris truncata	Windmill Grass							0.12	0.0		2.0		0.2			0.1								
Chrvsocephalum apiculatum	Common Everlasting															0.1								
Chrysocephalum semipapposum	Yellow Buttons									0.2	25.0								0.1					
Clematis microphylla	Small-leaved Clematis								0.1	0.2	0.1	0.1	0.2											
Convolvulus erubescens	Australian Bindweed										0.1													
Crassula sieberiana	Austral Stonecrop							0.1			0.1													
Cymbonotus lawsonianus	Bear's Ears												0.1											
Cynoglossum australe	Australian Hound's-tongue		0.1				0.1	0.1				0.1												
Daucus glochidiatus	Native Carrot		0.1				0.1		0.2		0.1	0.1	0.1			0.1	0.1							
Desmodium varians	Slender Tick-trefoil								0.1															
Dichelachne sp.	Plumegrass										0.2		0.1	1.0		0.2								
Dichondra repens	Kidney Weed		0.1				1.0											0.1		0.1				
Dodonaea viscosa	Hopbush												0.1											
Drosera peltata	Pale Sundew																							
Dysphania pumilio	Small Crumbweed																							
Enneapogon nigricans	Nineawn grass															2.0								
Epilobium billardierianum	Glabrous Willow Herb																							
Eragrostis brownii	Brown's Lovegrass																							
Eucalyptus blakelyi	Blakely's Red Gum						10.0		45.0	20.0		20.0	20.0						1.0					
Eucalyptus macrorhyncha	Red Stringybark			-			10.0		15.0	30.0	5.0	30.0	20.0						1.0					
Eucalyptus nortonii	Bundy Soribbly Cum								5.0															
Eucolyptus rossii	Dianted Equalunt							5.0	10.0															
Eucolyptus sp.	Planted Ecualypt							5.0																
Euclippius sp.							0.1	2.0	0.1	0.2	0.2	0.1	1.0	0.5	0.2	0.1	0.1							
Eucharbia drummandii		5.0					0.1	0.1	0.1	0.2	0.2	0.1	1.0	0.5	0.2	0.1	0.1							5.0
Galium agudichgudii	Rough Redstraw	5.0	-	-		-							0.1											5.0
Geranium solanderi	Native Geranium	0.1	20			0.2	0.2	1.0	05	10	0.2	10	0.1		0.5				0.1		1.0		0.1	0.1
Glycine clandestina	Twining Glycine	0.1	2.0	+		0.2	0.2	1.0	0.1	1.0	0.2	1.0	0.2		0.5				0.1		1.0		0.1	0.1
Gonocarpus tetraavnus	Common Rasnwort				<u> </u>		0.1		0.1		0.1	0.1	0.1			0.2								
pao teti agginas		1	1	1	1	1	1 0.1		0.2	1	0.1	0.1	0.1	1	1	0.2	1	1	1	1	1	I		

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Scientific Name	Common Name	85.1.1	85.1.2	85.1.3	85.6.1	85.6.2	85.6.3	321.1.1	321.1.2	1093.1.1	1093.1.2	1093.1.3	1093.1.4	1093.1.5	1093.4.1	1093.4.2	1093.4.3	1093.4.4	1093.4.5	1093.6.1	1093.8.1	1093.8.2	1093.8.3	1093.8.4
Grevillea sp.	Planted Grevillea							0.2																
Haloragis heterophylla	Varible Raspwort																							
Hardenbergia violacea	Native Sarsaparilla								0.1															
Hibbertia obtusifolia	Hoary Guinea Flower						0.1	0.1				0.1												
Hydrocotyle laxiflora	Stinking Pennywort						0.2	2.0	5.0	0.5		2.0	1.0			0.1								
Hypericum gramineum	Native St John's Wort													0.1										
Isoetopsis graminifolia	Grass cushions																							
Juncus australis	Austral Rush					0.1												0.1						
Juncus filicaulis	Pinrush																							
Kunzea ericoides	Burgan	1.0	10.0	1.0			30.0	0.1	2.0	30.0														1.0
Lepidosperma laterale	Variable Swordsedge												0.2											
Lomandra filiformis subsp. filiformis	Wattle Mat-rush								0.1			0.1				0.2								
Lomandra filiformis subsp. coriacea	Wattle Mat-rush								0.1							0.1	0.1							
Lomandra longifolia	Spiny-head Mat-rush								0.1				0.3											
Luzula densiflora	Woodrush							0.1	0.2		0.1	0.1				1.0								
Lythrum hyssopifolia	Hyssop Loosestrife																							
Melichrus urceolatus	Urn Heath						0.1																	
Microlaena stipoides	Weeping Grass	50.0			10.0	20.0	1.0	5.0	2.0	30.0	25.0	5.0	5.0	5.0		5.0	2.0	10.0			0.2			50.0
Microtis unifolia	Common Onion Orchid										0.1					0.1								
Oxalis perennans	Woody-Root Oxalis	0.5			1.0	0.1	0.1	1.0	0.2		0.1	0.2					0.2	0.1		0.2		1.0	0.1	0.5
Panicum effusum	Hairy Panic						0.2										10.0							
Poa sieberiana	Snowgrass						0.1		1.0			1.0	2.0		10.0	2.0	0.2							
Pomaderris angustifolia	Pomaderris								3.0															
Rubus parvifolius	Native Raspberry												0.5		0.2									
Rumex brownii	Rumex brownii		0.1						0.1				0.1							0.1			0.1	
Rytidosperma racemosum	Rytidosperma racemosum				10.0						20.0							30.0	30.0	5.0				
Rytidosperma sp.	Rytidosperma sp.		5.0				5.0	5.0	10.0	5.0	2.0	5.0	2.0	3.0	2.0	15.0	3.0							
Schoenus apogon	Schoenus apogon						1.0		1.0						0.2			0.1						
Senecio hispidulus	Senecio hispidulus								0.1			0.1	0.2											
Senecio quadridentatus	Senecio quadridentatus						0.1	0.2	0.2	0.5		0.1	0.1											
Solenogyne dominii	Solenogyne dominii								0.1															
Stackhousia monogyna	Stackhousia monogyna								0.1															
Stuartina muelleri	Stuartina muelleri						0.1																	
Themeda triandra	Themeda triandra		40.0				2.0	1.0	10.0						20.0		0.5							
Tricoryne elatior	Tricoryne elatior															0.1								
Triptilodiscus pygmaeus	Triptilodiscus pygmaeus						0.1	0.1			0.5					0.1								
Vittadinia muelleri	Vittadinia muelleri								0.1							0.1								
Wahlenbergia communis	Wahlenbergia communis						0.1	0.1	0.1		0.1	0.2	0.1			0.1	0.2							
Wahlenbergia stricta	Wahlenbergia stricta											0.1	0.1			0.1								
Wurmbea dioica	Wurmbea dioica						0.1																	
	Number of Species	28	28	20	31	25	48	50	60	28	48	44	48	26	23	40	25	28	25	26	17	15	22	28
	Number of Native Species	6	11	3	5	6	29	23	38	11	22	25	33	7	10	25	12	6	8	5	3	1	4	6
	No. Native Non-grass Species	4	7	2	2	4	21	16	31	8	15	19	24	2	6	17	5	4	4	4	2	1	3	4
	Number of Exotic Species	22	17	17	26	19	19	27	22	17	26	19	15	19	13	15	13	22	17	21	14	14	18	22
	% Native Ground Cover	85.67	64.24	0.17	26.41	28.46	69.76	61.22	89.10	87.10	88.19	86.47	86.36	83.57	79.86	89.09	56.13	53.30	50.32	9.29	3.89	3.33	1.47	85.67



Scientific Name	Common Name	1330.1.1	1330.2.1	1330.4.1	1330.5.1	1330.5.2	1330.5.3	1330.8.1	1330.8.2	1330.8.3	1330.8.4	1330.8.5	1330.8.6	1330.8.7
Acer negundo	Box Elder													
Acetosella vulgaris	Sheep's Sorrel	0.2	0.2	0.1	0.1	0.1	0.1	0.5			0.2			
Aira sp.	Hair-grass	0.2		1.0	0.1	0.1								
Arctotheca calendula	Cape Weed		0.1											
Avena sp.	Wild Oats	0.1	1.0	1.0	0.1	0.5	5.0	25.0	35.0	20.0	30.0	20.0	10.0	10.0
Briza maxima	Greater Quaking-grass			0.1										
Briza minor	Lesser Quaking-grass	0.2		0.5		0.2								
Bromus sp.	Brome Grass	1.0	5.0	5.0	2.0	1.0	2.0	5.0	2.0	10.0	10.0	10.0	3.0	1.0
Capsella bursa-pastoris	Shepherd's Purse		0.1											
Carduus pychocephalus	Slender I histle													
Carthamus lanatus	Sedge													
Centaurea calcitrana	Star Thistle													
Centaurium sp		0.5		0.2			0.2							
Cerastium sp.	Mouse-ears	0.5		0.1			0.2							
Chondrilla juncea	Rush Skeleton-weed	0.1												
Cirsium vulgare	Spear Thistle													
Conium maculatum	Hemlock													
Conyza sp.	Fleabane	0.5		0.1	0.5		0.1							
Crataegus monogyna	Common Hawthorn													
Cynodon dactylon	Couch Grass									5.0				
Cyperus eragrostis	Tall Flat-sedge	0.1	1.0		2.0	0.1					1.0			
Dactylis glomerata	Cock's Foot									5.0	1.0			
Echium plantagineum	Paterson's Curse		0.1		0.1	0.1					0.2			0.1
Ehrharta erecta	Panic Veldtgrass				5.0						0.1			
Eleusine tristachya	Goose Grass				5.0	1.0					0.1			
Eragrostis curuula	Sullikgrass				10.0	1.0	5.0		10.0		1.0			
Eradium brachvarnum	Hairy-nitted Stork's-hill				10.0	0.1	0.1		10.0		1.0			
Frodium sp	Stork's-bill		1.0			0.1	0.1							
Eschscholzia californica	California Poppy		1.0			_								
Foeniculum vulgare	Fennel													
Galium aparine	Goosegrass													
Galium divaricatum	Slender Bedstraw	0.1												
Galium murale	Small Bedstraw	0.1		0.1										
Gnaphalium americanum	Purple Cudweed		0.2	0.1										
Hirschfeldia incana	Buchan Weed		0.1						1.0		0.1	0.1	0.1	
Holcus lanatus	Yorkshire Fog	1.0	5.0	0.1	5.0	20.0	20.0				1.0			
Hordeum sp.	Barley Grass		1.0					1.0	2.0					
Hypericum perforatum	St John's Wort	0.5		0.5	2.0	0.2	1.0				2.0		0.1	
Hypochaeris glabra	Smooth Cats-ear	0.5	1.0	0.5	0.5		1.0							0.1
Hypochaeris radicata	Flatweed	0.5	1.0	0.5	1.0	0.2	1.0				0.2			0.1
	Spiny Rush				0.1	2.0								
Lingria pelisserana	Pelisser's Toadflax			0.1	0.1	2.0								
	Perennial Ryegrass	0.5	2.0	0.1		1.0		30.0	25.0	20.0	20.0	10.0	2.0	5.0
Lysimachia arvensis	Scarlet Pimpernel			0.1		2.0				2010	2010	2010		
Modiola caroliniana	Red-flowered Mallow	0.1						0.2	1.0	1.0	0.2	1.0		0.1
Onopordum acanthium	Scotch Thistle	0.5	1.0						0.1					
Orobanche minor	Lesser Broomrape													
Paspalum dilatatum	Paspalum Grass										1.0			
Petrorhagia nanteuilii	Proliferous Pink	0.2		0.2	0.1									
Phalaris aquatica	Phalaris							30.0	20.0	30.0	20.0	30.0	70.0	80.0
Plantago lanceolata	Plantain / Lamb's Tongue	1.0				5.0	1.0	0.2		1.0	0.1			
Poa sp.	Snow Grass													
Polycarpon tetraphyllum	Fourleat Allseed													0.1
Polygonum aviculare	wireweed			0.1			0.2					0.1		0.1
Rubus fruticosus	Plackborn	0.2	0.2	0.1	0.1		0.2							
Rumov crispus		0.2	0.2		0.1									
Salvia verhenaca	Wild Sage												<u> </u>	
Sanauisorba minor	Sheep's Burnet							<u> </u>			<u> </u>		<u> </u>	
Senecio sp.	Fireweed													
Setaria parviflora	Slender Pigeon Grass				5.0									
Silene gallica	Fench Catchfly			0.1										1
Silybum marianum	Variegated thistle													



Scientific Name	Common Name	1330.1.1	1330.2.1	1330.4.1	1330.5.1	1330.5.2	1330.5.3	1330.8.1	1330.8.2	1330.8.3	1330.8.4	1330.8.5	1330.8.6	1330.8.7
Solanum nigrum	Black Nightshade	0.1	0.2											
Sonchus sp.	Milk/Sow Thistle									0.1				
Sporobolus africanus	Parramatta Grass				15.0									
Stellaria media	Chickweed													
Tolpis barbata	Yellow Hawkweed	0.1		0.1										
Trifolium sp.	Clover	2.0	10.0	20.0	5.0	10.0	20.0	5.0	5.0	10.0	10.0	20.0	5.0	1.0
Verbascum thapsus	Common Mullein	0.2					0.1						0.1	
Verbena incompta	Purpletop										0.1			
Vicia sp.	Vetch													
Vulpia sp.	Rat's Tail Fescue	2.0	2.0	10.0	0.1			2.0						
Acacia rubida	Red-stemmed Wattle													
Acaena ovina	Sheep's Burr	0.1					0.1							
Ajuga australis	Austral bugle													
Allocasuarina cunninghamiana	River She-oak													
Allocasuarina littoralis	Black She-oak													
Amyema cambagei	Sheoak Mistletoe													
Anthosachne scabra	Common Wheat Grass	1.0		5.0			0.5		1.0					
Aristida ramosa	Purple Wiregrass	1.0		1.0										
Asperula conferta	Common Woodruff	0.1												
Asplenium flabellifolium	Necklace Fern													
Austrostipa bigeniculata	Tall Speargrass													0.1
Austrostipa scabra	Rough Spear-grass	4.0	2.0		5.0	0.5	1.0							
Bothriochloa macra	Red-leg Grass			5.0	30.0									
Brachyloma daphnoides	Daphne Heath													
Bulbine bulbosa	Bulbine Lily													
Bursaria lasiophylla	Native Blackthorn													
Callitris endlicheri	Black Cypress Pine													
Carex appressa	Tall Sedge			0.1		1.0	_					1		
Carex Inversa	Knob Sedge	0.1		0.1										
	Long-leaf Cassinia	2.0												
Cassinia quinquefaria	Wild Rosemary		0.4	0.4		0.1								
Cheria trunceta	KOCK Fern	0.2	0.1	0.1	5.0	0.1								
Chioris truncata	Common Evoracting				- 5.0									
Chrysocephalum apicalatam	Vollow Puttons													
Clamatic microphylla	Small-Joaved Clematic													
Convolvulus erubescens							0.1							
Crassula sieheriana	Austral Stonecron						0.1							
Cymbonotus lawsonianus	Bear's Fars													
Cynoolossum australe	Australian Hound's-tongue													
Daucus alochidiatus	Native Carrot	0.1		0.1										
Desmodium varians	Slender Tick-trefoil	0.1		0.2										
Dichelachne sp.	Plumegrass													
Dichondra repens	Kidney Weed	0.2												
Dodonaea viscosa	Hopbush													
Drosera peltata	Pale Sundew	0.1		0.1		0.1								
Dysphania pumilio	Small Crumbweed		0.2	1	0.1						1			
Enneapogon nigricans	Nineawn grass													
Epilobium billardierianum	Glabrous Willow Herb						0.1							
Eragrostis brownii	Brown's Lovegrass				0.2									
Eucalyptus blakelyi	Blakely's Red Gum	30.0	50.0											
Eucalyptus macrorhyncha	Red Stringybark													
Eucalyptus nortonii	Bundy													
Eucalyptus rossii	Scribbly Gum													
Eucalyptus sp.	Planted Ecualypt													
Eucalyptus sp.	Planted Ecualypt				ļ		ļ							
Euchiton sp.	Cudweed			0.1	0.1									
Euphorbia drummondii	Caustic Spurge													
Galium gaudichaudii	Rough Bedstraw										1			
Geranium solanderi	Native Geranium	1.0	15.0							0.1				
Glycine clandestina	Twining Glycine													
Gonocarpus tetragynus	Common Raspwort													
Grevillea sp.	Planted Grevillea													
Haloragis heterophylla	Varible Raspwort	0.1		5.0	0.1	1.0								
Hardenbergia violacea	Native Sarsaparilla													
Hibbertia obtusifolia	Hoary Guinea Flower	0.2												



Scientific Name	Common Name	1330.1.1	1330.2.1	1330.4.1	1330.5.1	1330.5.2	1330.5.3	1330.8.1	1330.8.2	1330.8.3	1330.8.4	1330.8.5	1330.8.6	1330.8.7
Hydrocotyle laxiflora	Stinking Pennywort	1.0		0.1										
Hypericum gramineum	Native St John's Wort													
Isoetopsis graminifolia	Grass cushions					0.1								
Juncus australis	Austral Rush					1.0								
Juncus filicaulis	Pinrush	0.1		0.1										
Kunzea ericoides	Burgan	3.0												
Lepidosperma laterale	Variable Swordsedge													
Lomandra filiformis subsp. filiformis	Wattle Mat-rush													
Lomandra filiformis subsp. coriacea	Wattle Mat-rush													
Lomandra longifolia	Spiny-head Mat-rush													
Luzula densiflora	Woodrush													
Lythrum hyssopifolia	Hyssop Loosestrife		0.1			0.1								
Melichrus urceolatus	Urn Heath													
Microlaena stipoides	Weeping Grass	20.0	40.0	3.0			10.0							
Microtis unifolia	Common Onion Orchid													
Oxalis perennans	Woody-Root Oxalis				0.1	0.1	0.1				1.0		0.1	
Panicum effusum	Hairy Panic	1.0			5.0									
Poa sieberiana	Snowgrass	0.1												
Pomaderris angustifolia	Pomaderris													
Rubus parvifolius	Native Raspberry													
Rumex brownii	Rumex brownii			0.1					0.1	1.0	0.1	0.1		
Rytidosperma racemosum	Rytidosperma racemosum					20.0	30.0							
Rytidosperma sp.	Rytidosperma sp.	5.0	20.0	15.0										
Schoenus apogon	Schoenus apogon	3.0		5.0		40.0								
Senecio hispidulus	Senecio hispidulus													
Senecio quadridentatus	Senecio quadridentatus													
Solenogyne dominii	Solenogyne dominii													
Stackhousia monogyna	Stackhousia monogyna													
Stuartina muelleri	Stuartina muelleri													
Themeda triandra	Themeda triandra	2.0		20.0										
Tricoryne elatior	Tricoryne elatior	0.2		0.1										
Triptilodiscus pygmaeus	Triptilodiscus pygmaeus			0.1										
Vittadinia muelleri	Vittadinia muelleri													
Wahlenbergia communis	Wahlenbergia communis			0.1	0.1									
Wahlenbergia stricta	Wahlenbergia stricta													
Wurmbea dioica	Wurmbea dioica													
	Number of Species	52	27	41	30	27	22	10	12	12	21	9	9	10
	Number of Native Species	26	8	19	10	11	8	0	2	2	2	1	1	1
	No. Native Non-grass Species	17	4	13	5	9	4	0	1	2	2	1	1	0
	Number of Exotic Species	26	19	22	20	16	14	10	10	10	19	8	8	9
	% Native Ground Cover	82.15	77.87	72.85	47.06	61.66	46.30	0.00	1.74	1.50	1.85	0.16	0.13	0.12





Appendix C. Tree Survey Results

Creasian Norma	Common Nomo	DBH	Crown Dia	Height	H	lollov	vs	Alive/	Nietes
Species Name	Common Name	(cm)	(m)	(m)	S	М	L	Dead	Notes
Stag	-	60	-	8	6	2		Dead	
Stag	-	75	-	4	4	1	1	Dead	
Stag	-	70	-	3		2		Dead	
E. macrorhyncha	Red Stringybark	95	4	5	1		1	A	
E. macrorhyncha	Red Stringybark	120	12	10	2	2		A	
E. macrorhyncha	Red Stringybark	55	3	5			1	A	
E. macrorhyncha	Red Stringybark	80	1	12	1	3	1	A	
E. macrorhyncha	Red Stringybark	105	2.5	5	4	1	1	A	
E. bridgesiana	Apple Box	125	6	8	2		1	A	
E. macrorhyncha	Red Stringybark	65	2.5	5	1	1		A	
E. bridgesiana	Apple Box	180	15	15	2	1	2	A	
E. macrorhyncha	Red Stringybark	90	5	7	2	1		A	
Stag	-	55		4	3			Dead	
E. macrorhyncha	Red Stringybark	85	3.5	7	4			A	
Stag	-	120		8	4	3	2	Dead	
Stag	-	60		8	5	2		Dead	
E. macrorhyncha	Red Stringybark	80	4	6	4			A	
E. macrorhyncha	Red Stringybark	70	5	6	3			A	
E. macrorhyncha	Red Stringybark	110	10	8	4	2	2	A	
E. macrorhyncha	Red Stringybark	95	6	7	2	1	1	A	
E. macrorhyncha	Red Stringybark	115	4	8	5	1	1	A	
Stag	-	85	-	4	3	1	3	Dead	
Stag	-	90	-	6	5	1		Dead	
Stag	-	95	-	8	3	1		Dead	
Stag	-	90	-	7	3	2		Dead	
E. macrorhyncha	Red Stringybark	90	6	10	2			A	
E. macrorhyncha	Red Stringybark	45	3	8	3		1	A	
Stag	-	70	-	8	3	3		Dead	
Stag	-	65	-	6	4		1	Dead	
E. macrorhyncha	Red Stringybark	150	12	9	3	2		A	
Stag	-	120	-	8	4		2	Dead	
E. macrorhyncha	Red Stringybark	80	2	5	2			A	
E. macrorhyncha	Red Stringybark	70	2	5	2	2		A	
E. macrorhyncha	Red Stringybark	40	3	4	1		1	A	
E. macrorhyncha	Red Stringybark	95	5	6	2		2	Α	
E. bridgesiana	Apple Box	250	15	10	1		2	Α	
Stag	-	55	-	11	4			Dead	
	Species NameStagStagE. macrorhynchaE. macrorhynchaE. macrorhynchaE. macrorhynchaE. macrorhynchaE. macrorhynchaE. macrorhynchaE. bridgesianaE. macrorhynchaE. bridgesianaE. macrorhynchaStagE. macrorhynchaStagE. macrorhynchaStagE. macrorhynchaStagE. macrorhynchaE. macrorhynchaE. macrorhynchaE. macrorhynchaE. macrorhynchaE. macrorhynchaStagStagStagStagStagStagStagStagStagStagStagStagStagStagStagStagStagE. macrorhynchaE. macrorhynchaStagE. macrorhynchaE. bridgesianaStagStag	Species NameCommon NameStag-Stag-E. macrorhynchaRed StringybarkE. bridgesianaApple BoxE. macrorhynchaRed StringybarkE. bridgesianaApple BoxE. macrorhynchaRed StringybarkStag-E. macrorhynchaRed StringybarkStag-E. macrorhynchaRed StringybarkStag-E. macrorhynchaRed StringybarkE. macrorhynchaRed StringybarkStag-E. macrorhynchaRed StringybarkStag-E. macrorhynchaRed StringybarkStag-E. macrorhynchaRed StringybarkStag-E. macrorhyncha	Species NameCommon NameDBH (cm)Stag-60Stag-75Stag-70E. macrorhynchaRed Stringybark95E. macrorhynchaRed Stringybark120E. macrorhynchaRed Stringybark55E. macrorhynchaRed Stringybark80E. macrorhynchaRed Stringybark105E. macrorhynchaRed Stringybark105E. macrorhynchaRed Stringybark65E. macrorhynchaRed Stringybark65E. macrorhynchaRed Stringybark90Stag-55E. macrorhynchaRed Stringybark90Stag-55E. macrorhynchaRed Stringybark80E. macrorhynchaRed Stringybark80E. macrorhynchaRed Stringybark80E. macrorhynchaRed Stringybark70E. macrorhynchaRed Stringybark110E. macrorhynchaRed Stringybark110E. macrorhynchaRed Stringybark95E. macrorhynchaRed Stringybark90Stag-90Stag-90Stag-65E. macrorhynchaRed Stringybark45Stag-65E. macrorhynchaRed Stringybark90E. macrorhynchaRed Stringybark90E. macrorhynchaRed Stringybark45Stag-65E. macrorhynchaRed	Species NameCommon NameDBHCrown DiaStag-60-Stag-75-Stag-70-E. macrorhynchaRed Stringybark954E. macrorhynchaRed Stringybark12012E. macrorhynchaRed Stringybark553E. macrorhynchaRed Stringybark801E. macrorhynchaRed Stringybark1052.5E. bridgesianaApple Box1256E. macrorhynchaRed Stringybark652.5E. bridgesianaApple Box18015E. macrorhynchaRed Stringybark905Stag-55-E. macrorhynchaRed Stringybark853.5Stag-120-Stag-120-Stag-60-E. macrorhynchaRed Stringybark804E. macrorhynchaRed Stringybark11010E. macrorhynchaRed Stringybark956E. macrorhynchaRed Stringybark95-Stag-90Stag-90Stag-90Stag-90Stag-90Stag-65E. macrorhynchaRed Stringybark906E. macrorhynchaRed S	Species Name Common Name DBH Crown Dia Height (cm) Cown Dia Stag - 60 - 8 Stag - 75 - 4 Stag - 70 - 3 E. macrorhyncha Red Stringybark 95 4 5 E. macrorhyncha Red Stringybark 120 12 10 E. macrorhyncha Red Stringybark 55 3 5 E. macrorhyncha Red Stringybark 105 2.5 5 E. bridgesiana Apple Box 125 6 8 E. macrorhyncha Red Stringybark 90 5 7 Stag - 55 - 4 E. macrorhyncha Red Stringybark 90 5 7 Stag - 120 - 8 E. macrorhyncha Red Stringybark 80 4 6 E. macrorhyncha Red Stringybark 110 10	Species Name Common Name DBH Crown Dia Height H Stag - 60 - 8 6 Stag - 75 - 4 4 Stag - 70 - 3 - E. macrorhyncha Red Stringybark 95 4 5 1 E. macrorhyncha Red Stringybark 120 12 10 2 E. macrorhyncha Red Stringybark 80 1 12 1 E. macrorhyncha Red Stringybark 105 2.5 5 4 E. bridgesiana Apple Box 180 15 15 2 E. macrorhyncha Red Stringybark 85 3.5 7 4 3 E. macrorhyncha Red Stringybark 80 15 15 2 E. macrorhyncha Red Stringybark 85 3.5 7 4 3 E. macrorhyncha Red Stringybark 80 4	Species Name Common Name DBH Crown Dia Height Hullow Stag - 60 - 8 6 2 Stag - 75 - 4 4 1 Stag - 70 - 3 2 E. macrorhyncha Red Stringybark 95 4 5 1 E. macrorhyncha Red Stringybark 120 12 10 2 2 E. macrorhyncha Red Stringybark 55 3 5 - 4 1 E. macrorhyncha Red Stringybark 105 2.5 5 1 1 E. bridgesiana Apple Box 125 6 8 2 1 E. macrorhyncha Red Stringybark 90 5 7 2 1 E. macrorhyncha Red Stringybark 85 3.5 7 4 3 Stag - 60 - 8 5 2 </td <td>Species Name Common Name DBH Crown Dia Height Holows Stag - 60 - 8 6 2 Stag - 70 - 8 6 2 E. macronhyncha Red Stringybark 95 4 5 1 1 E. macronhyncha Red Stringybark 120 12 10 2 2 E. macronhyncha Red Stringybark 55 3 5 1 1 E. macronhyncha Red Stringybark 105 2.5 5 4 1 1 E. macronhyncha Red Stringybark 105 2.5 5 1 1 E. bridgesiana Apple Box 125 6 8 2 1 2 E. macronhyncha Red Stringybark 90 5 7 2 1 2 E. macronhyncha Red Stringybark 85 3.5 7 4 3 2 Stag<td>Species Name Common Name DBH Crown Dia Height Hollows Alive/ Stag - 60 - 8 6 2 Dead Stag - 75 - 4 4 1 1 Dead Stag - 775 - 4 4 1 1 Dead E. macrorhyncha Red Stringybark 95 4 5 1 1 A E. macrorhyncha Red Stringybark 120 12 10 2 2 A E. macrorhyncha Red Stringybark 105 2.5 5 4 1 1 A E. macrorhyncha Red Stringybark 105 1.5 2 1 A E. bridgesiana Apple Box 180 15 15 2 1 A E. macrorhyncha Red Stringybark 90 5 7 2 1 A E. macrorhyncha Red Stringyba</td></td>	Species Name Common Name DBH Crown Dia Height Holows Stag - 60 - 8 6 2 Stag - 70 - 8 6 2 E. macronhyncha Red Stringybark 95 4 5 1 1 E. macronhyncha Red Stringybark 120 12 10 2 2 E. macronhyncha Red Stringybark 55 3 5 1 1 E. macronhyncha Red Stringybark 105 2.5 5 4 1 1 E. macronhyncha Red Stringybark 105 2.5 5 1 1 E. bridgesiana Apple Box 125 6 8 2 1 2 E. macronhyncha Red Stringybark 90 5 7 2 1 2 E. macronhyncha Red Stringybark 85 3.5 7 4 3 2 Stag <td>Species Name Common Name DBH Crown Dia Height Hollows Alive/ Stag - 60 - 8 6 2 Dead Stag - 75 - 4 4 1 1 Dead Stag - 775 - 4 4 1 1 Dead E. macrorhyncha Red Stringybark 95 4 5 1 1 A E. macrorhyncha Red Stringybark 120 12 10 2 2 A E. macrorhyncha Red Stringybark 105 2.5 5 4 1 1 A E. macrorhyncha Red Stringybark 105 1.5 2 1 A E. bridgesiana Apple Box 180 15 15 2 1 A E. macrorhyncha Red Stringybark 90 5 7 2 1 A E. macrorhyncha Red Stringyba</td>	Species Name Common Name DBH Crown Dia Height Hollows Alive/ Stag - 60 - 8 6 2 Dead Stag - 75 - 4 4 1 1 Dead Stag - 775 - 4 4 1 1 Dead E. macrorhyncha Red Stringybark 95 4 5 1 1 A E. macrorhyncha Red Stringybark 120 12 10 2 2 A E. macrorhyncha Red Stringybark 105 2.5 5 4 1 1 A E. macrorhyncha Red Stringybark 105 1.5 2 1 A E. bridgesiana Apple Box 180 15 15 2 1 A E. macrorhyncha Red Stringybark 90 5 7 2 1 A E. macrorhyncha Red Stringyba



Treesewalter	Cupacing Name	Common Name	DBH	Crown Dia	Height	F	Iollow	/S	Alive/	Nietes
Tree number	Species Name	Common Name	(cm)	(m)	(m)	S	м	L	Dead	NOTES
38	Stag	-	60	-	5	1	2	2	Dead	
39	E. macrorhyncha	Red Stringybark	65	4	7	1			A	
40	E. macrorhyncha	Red Stringybark	70	5	8	1	1		A	
41	E. macrorhyncha	Red Stringybark	140	15	15	3	1		A	
42	E. macrorhyncha	Red Stringybark	120	5	10	2	2		A	
43	E. macrorhyncha	Red Stringybark	80	5	8	1	1	2	A	
44	E. macrorhyncha	Red Stringybark	120	4	7	1		1	A	
45	E. macrorhyncha	Red Stringybark	100	5	8	3	2	1	A	
46	Stag	-	90	-	6	4	2		Dead	
47	E. macrorhyncha	Red Stringybark	120	8	10	4	4		A	
48	E. macrorhyncha	Red Stringybark	130	5	12	1		3	A	
49	E. macrorhyncha	Red Stringybark	135	8	6	2		1	A	
50	E. macrorhyncha	Red Stringybark	100	5	6	1			A	
51	E. macrorhyncha	Red Stringybark	55	4	7	2			A	
52	E. macrorhyncha	Red Stringybark	80	3.5	7	1	2		A	
53	E. blakelyi	Red Stringybark	65		7	1			A	Burnt - Main stem dead with lots of fissures
54	E. macrorhyncha	Red Stringybark	75		9	2	1	1	A	
55	E. melliodora	Yellow Box	45		6				A	Tree fallen - Branching from fallen trunk
56	E. blakelyi	Red Stringybark	105		13		3		A	Pardalote - A clearly used hollow in tree - Surrounding regen
57	E. macrorhyncha	Red Stringybark	55,40		5	3	1		A	
58	E. macrorhyncha	Red Stringybark	95		7				A	
59	E. rossii	Scribbly Gum	100		12			5	A	
60	E. macrorhyncha	Red Stringybark	100		7	1		1	A	
61	E. macrorhyncha	Red Stringybark	90		5			1	A	
62	E. macrorhyncha	Red Stringybark	100		7		1		A	
63	E. blakelyi	Red Stringybark	75		12		2		A	
64	E. macrorhyncha	Red Stringybark	85		7	2			A	
65	E. blakelyi	Red Stringybark	95		16			2	A	
66	E. blakelyi	Red Stringybark	40		9				A	
67	E. macrorhyncha	Red Stringybark	180		5	3		1	A	
68	E. macrorhyncha	Red Stringybark	110		10	2		1	A	
69	E. bridgesiana	Apple Box	205		12	1		3	A	
70	E. macrorhyncha	Red Stringybark	50		5				A	
71	E. macrorhyncha	Red Stringybark	40		6				A	
72	E. macrorhyncha	Red Stringybark	80		4	3		1	A	
73	E. macrorhyncha	Red Stringybark	135		10	1		1	A	
74	E. macrorhyncha	Red Stringybark	100		12	1		1	A	
75	E. macrorhyncha	Red Stringybark	105		12	2	1		A	
76	E. macrorhyncha	Red Stringybark	95		12	1	1		A	



T	Current and Names	0 N	DBH	Crown Dia	Height	H	lollov	vs	Alive/	Neter
Tree number	Species Name	Common Name	(cm)	(m)	(m)	S	М	L	Dead	NOTES
77	E. macrorhyncha	Red Stringybark	80		5			1	Dead	Stag
78	E. macrorhyncha	Red Stringybark	115		12	4			A	
79	E. macrorhyncha	Red Stringybark	70		11	1	1	2	Dead	
80	E. macrorhyncha	Red Stringybark	70		13				A	
81	E. macrorhyncha	Red Stringybark	85		15	1	2		A	
82	E. macrorhyncha	Red Stringybark	105		8			2	A	Large hollow with evidence of nesting
83	E. macrorhyncha	Red Stringybark	95		8				A	
84	E. blakelyi	Blakely's Red Gum								
85	E. blakelyi	Blakely's Red Gum								
86	E. blakelyi	Blakely's Red Gum								
87	E. blakelyi	Blakely's Red Gum								
88	E. blakelyi	Blakely's Red Gum								
89	E. blakelyi	Blakely's Red Gum								
90	E. blakelyi	Blakely's Red Gum								
91	E. blakelyi	Blakely's Red Gum								
92	E. blakelyi	Blakely's Red Gum								
93	E. macrorhyncha	Red Stringybark								
94	E. blakelyi	Blakely's Red Gum								
95	E. blakelyi	Blakely's Red Gum								
96	E. blakelyi	Blakely's Red Gum		_		_				
97	E. blakelyi	Blakely's Red Gum								
98	E. macrorhyncha	Red Stringybark								
99	E. blakelyi	Blakely's Red Gum								
100	E. blakelyi	Blakely's Red Gum								
101	E. blakelyi	Blakely's Red Gum								
102	E. blakelyi	Blakely's Red Gum								
103	E. blakelyi	Blakely's Red Gum								
104	E. blakelyi	Blakely's Red Gum								
105	E. bridgesiana	Apple Box								
106	E. macrorhyncha	Red Stringybark								
107	E. macrorhyncha	Red Stringybark								
108	E. macrorhyncha	Red Stringybark								



Appendix D. Flora Species Inventory

Scientific Name	Common Name
Exotic	
Acer negundo	Box Elder
Acetosella vulgaris	Sheep's Sorrel
Aira sp.	Hair-grass
Arctotheca calendula	Cape Weed
Avena sp.	Wild Oats
Briza maxima	Greater Quaking-grass
Briza minor	Lesser Quaking-grass
Bromus sp.	Brome Grass
Capsella bursa-pastoris	Shepherd's Purse
Carduus pycnocephalus	Slender Thistle
Carex sp.	Sedge
Carthamus lanatus	Saffron Thistle
Centaurea calcitrapa	Star Thistle
Centaurium sp.	Common Centaury
Cerastium sp.	Mouse-ears
Chondrilla juncea	Rush Skeleton-weed
Cirsium vulgare	Spear Thistle
Conium maculatum	Hemlock
Conyza sp.	Fleabane
Cotoneaster sp.	Grey Cotoneaster
Crataegus monogyna	Common Hawthorn
Cynodon dactylon	Couch Grass
Cyperus eragrostis	Tall Flat-sedge
Dactylis glomerata	Cock's Foot
Echium plantagineum	Paterson's Curse
Echium vulgare	Viper's Bugloss
Ehrharta erecta	Panic Veldtgrass
Eleusine tristachya	Goose Grass
Eragrostis cilianensis	Stinkgrass
Eragrostis curvula	African Lovegrass
Erodium botrys	Long Stocksbill
Erodium brachycarpum	Hairy-pitted Stork's-bill
Erodium cicutarium	Common Stork's-bill
Erodium sp.	Stork's-bill
Eschscholzia californica	California Poppy
Euphorbia peplus	Petty Spurge
Foeniculum vulgare	Fennel
Galium aparine	Goosegrass
Galium divaricatum	Slender Bedstraw
Galium murale	Small Bedstraw
Gnaphalium americanum	Purple Cudweed
Hirschfeldia incana	Buchan Weed
Holcus lanatus	Yorkshire Fog



Scientific Name	Common Name
Hordeum sp.	Barley Grass
Hypericum perforatum	St John's Wort
Hypochaeris glabra	Smooth Cats-ear
Hypochaeris radicata	Flatweed
Juncus acutus	Spiny Rush
Juncus bufonius	Toad Rush
Lactuca serriola	Prickly Lettuce
Linaria arvensis	Corn Toadflax
Linaria pelisserana	Pelisser's Toadflax
Lolium perenne	Perennial Ryegrass
Lysimachia arvensis	Scarlet Pimpernel
Malva sp.	Mallow / Marshmallow Weed
Modiola caroliniana	Red-flowered Mallow
Myosotis discolor	Changing Forget-me-not
Nassella trichotoma	Serrated Tussock
Onopordum acanthium	Scotch Thistle
Orobanche minor	Lesser Broomrape
Papaver somniferum	Opium Poppy
Parentucellia latifolia	Red Bartsia
Paronychia brasiliana	Brazilian Whitlow
Paspalum dilatatum	Paspalum Grass
Petrorhagia nanteuilii	Proliferous Pink
Phalaris aquatica	Phalaris
Plantago lanceolata	Plantain / Lamb's Tongue
Poa bulbosa	Bulbous Bluegrass
Poa sp.	Snow Grass
Polycarpon tetraphyllum	Fourleaf Allseed
Polygonum aviculare	Wireweed
Prunus sp.	Plum
Rosa rubiginosa	Briar Rose
Rubus fruticosus	Blackberry
Rumex crispus	Curly Dock
Salix sp.	Willow
Salvia verbenaca	Wild Sage
Sanguisorba minor	Sheep's Burnet
Senecio sp.	Fireweed
Setaria parviflora	Slender Pigeon Grass
Silene gallica	Fench Catchfly
Silybum marianum	Variegated thistle
Solanum nigrum	Black Nightshade
Sonchus sp.	Milk/Sow Thistle
Spergularia rubra	Red Sandspurry
Sporobolus africanus	Parramatta Grass
Stellaria media	Chickweed
Taraxacum officinale	Common Dandelion
Tolpis barbata	Yellow Hawkweed



Trifolium sp.CloverVerbascum thapsusCommon MulleinVerbena incomptaPurpletopVeronica anagallis-aquaticaBlue Water SpeedwellVicia sp.VetchVulpia sp.Rat's Tail FescueNativeAcacia implexaHickory WattleAcacia rubidaRed-stemmed WattleAcacia rubidaSheep's BurrAcratic serrulataHoneypotsAjuga australisAustral bugleAllocasuarina cunninghamianaRiver She-oakAlmyema cambageiSheeoakArthropodium minusSmall Vanilla LilyArsperia ConfertaCommon WoodruffAspenium flabellifoliumNecklace FernAustrostipa bigeniculataTall SpeargrassAustrostipa bigeniculataRoly Spear-grassBossiaea buxifoliaMatted Bossiaea
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Bossiaea buxifolia Matted Bossiaea
Bothriochloa macra Red-leg Grass
Brachychiton populneus Kurrajong
Brachyloma daphnoides Daphne Heath
Bulbine bulbosa Bulbine Lily
Bulbine glauca Rock Lily
Bursaria lasiophylla Native Blackthorn
Caladenia fuscata Dusky Fingers
Callitris endlicheri Black Cypress Pine
Calotis lappulacea Yellow burr-daisy
Carex appressa Tall Sedge
Carex inversa Knob Sedge
Cassinia longifolia Long-leaf Cassinia
Cassinia auinauefaria Wild Rosemary
Cheilanthes distans Bristly cloak fern
Cheilanthes sieberi Rock Fern
Chloris truncata Windmill Grass
Chrysocephalum aniculatum Common Everlasting
Chrysocephalum seminapposum Yellow Buttons
Clematis microphylla Small-leaved Clematis
Convolvulus erubescens Australian Bindweed
Craspedia variabilis Common Rilly Buttons
Crassula sieberiana Austral Stonecron



Scientific Name	Common Name			
Cryptandra amara	Bitter Cryptandra			
Cymbonotus lawsonianus	Bear's Ears			
Cymbopogon refractus	Barbed Wire Grass			
Cynoglossum australe	Australian Hound's-tongue			
Cynoglossum suaveolens	Sweet Hounds-tongue			
Daucus glochidiatus	Native Carrot			
Desmodium varians	Slender Tick-trefoil			
Dianella revoluta	Blue Flax-Lily			
Dichelachne sp.	Plumegrass			
Dichondra repens	Kidney Weed			
Dichopogon fimbriatus	Nodding Chocolate Lily			
Dodonaea viscosa	Hopbush			
Drosera peltata	Pale Sundew			
Dysphania pumilio	Small Crumbweed			
Einadia nutans	Climbing Saltbush			
Eleocharis acuta	Common Spikerush			
Enneapogon nigricans	Nineawn grass			
Epilobium billardierianum	Glabrous Willow Herb			
Eragrostis brownii	Brown's Lovegrass			
Erodium crinitum	Native Crowfoot			
Eucalyptus blakelyi	Blakely's Red Gum			
Eucalyptus bridgesiana	Apple Box			
Eucalyptus dives	Broad-leaved Peppermint			
Eucalyptus goniocalyx	Long-leaved Bundy			
Eucalyptus macrorhyncha	Red Stringybark			
Eucalyptus mannifera	Brittle Gum			
Eucalyptus melliodora	Yellow Box			
Eucalyptus nortonii	Bundy			
Eucalyptus pauciflora	Snow Gum			
Eucalyptus rossii	Scribbly Gum			
Euchiton sp.	Cudweed			
Euphorbia drummondii	Caustic Spurge			
Galium gaudichaudii	Rough Bedstraw			
Geranium solanderi	Native Geranium			
Glossodia major	Waxlip Orchid			
Glycine clandestina	Twining Glycine			
Gonocarpus tetragynus	Common Raspwort			
Grevillea ramosissima subsp. ramosissima	Fan Grevillea			
Grevillea sp.	Planted Grevillea			
Haloragis heterophylla	Varible Raspwort			
Hardenbergia violacea	Native Sarsaparilla			
Hibbertia obtusifolia	Hoary Guinea Flower			
Hibbertia riparia	Erect Guinea-flower			
Hovea heterophylla	Common Hovea			
Hydrocotyle laxiflora	Stinking Pennywort			
Hypericum gramineum	Native St John's Wort			


Scientific Name	Common Name				
Indigofera adesmiifolia	Tick Indigo				
Indigofera australis	Australian Indigo				
Isoetopsis graminifolia	Grass cushions				
Juncus australis	Austral Rush				
Juncus filicaulis	Pinrush				
Kunzea ericoides	Burgan				
Lepidosperma laterale	Variable Swordsedge				
Linum marginale	Native Flax				
Lomandra filiformis subsp. coriacea	Wattle Mat-rush				
Lomandra filiformis subsp. filiformis	Wattle Mat-rush				
Lomandra longifolia	Spiny-head Mat-rush				
Luzula densiflora	Woodrush				
Lythrum hyssopifolia	Hyssop Loosestrife				
Melichrus urceolatus	Urn Heath				
Microlaena stipoides	Weeping Grass				
Microseris lanceolata	Yam Daisy				
Microtis unifolia	Common Onion Orchid				
Oxalis perennans	Woody-Root Oxalis				
Panicum effusum	Hairy Panic				
Pelargonium sp.	Native Stork's Bill				
Plantago varia	Variable Plantain				
Pleurosorus rutifolius	Blanket Fern				
Poa labillardieri	River Tussock-grass				
Poa sieberiana	Snowgrass				
Pomaderris angustifolia	Pomaderris				
Pomaderris betulina	Birch Pomaderris				
Pomaderris eriocephala	Woolly-headed Pomaderris				
Pomaderris sp.	Small- leaved Pomaderris (CHECK)				
Pteridium esculentum	Bracken Fern				
Ranunculus sp.	Buttercup				
Rubus parvifolius	Native Raspberry				
Rumex brownii	Swamp Dock				
Rytidosperma carphoides	Short Wallaby Grass				
Rytidosperma laeve	Smooth Wallaby-Grass				
Rytidosperma racemosum	Clustered Wallaby-grass				
Rytidosperma sp.	Wallaby Grass				
Schoenus apogon	Common Bog-sedge				
Senecio diaschides	Mountain Groundsel				
Senecio hispidulus	Hill Fireweed				
Senecio quadridentatus	Cotton Fireweed				
Sigesbeckia australiensis	Daisy				
Solanum cinereum	Narrawa Burr				
Solenogyne dominii	Smooth Solengyne				
Sorghum leiocladum	wild sorghum				
Stackhousia monogyna	Creamy Candles				
Stellaria pungens	Prickly Starwort				



Scientific Name	Common Name
Stellaria sp.	Starwort
Stuartina muelleri	Spoon Cudweed
Themeda triandra	Kangaroo Grass
Tricoryne elatior	Yellow Rush-lily
Triptilodiscus pygmaeus	Common Sunray
Viola betonicifolia	Showy Violet
Vittadinia cuneata	Fuzzweed
Vittadinia muelleri	Narrow-leaved New Holland Daisy
Wahlenbergia communis	Native Bluebell
Wahlenbergia stricta	Tall Bluebell
Westringia eremicola	Slender Westringia
Wurmbea dioica	Early Nancy
Number of Species	238
Number of Native Species	143
Number of Exotic Species	95



Classification	Common Name	Scientific Name	EPBC Act	BC Act
			Status	Status
Exotic				
Aves		Sturnus vulgaris	-	-
Aves		Fulica atra	-	-
Aves	Eurasian Skylark	Alauda arvensis	-	-
Aves	European Goldfinch	Carduelis carduelis	-	-
Aves	House Sparrow	Passer domesticus	-	-
Mammalia	House Mouse	Mus musculus	-	-
Mammalia	Red Fox	Vulpes vulpes	-	-
Nammalia	Rusa Deer	Cerva timorensis	-	-
Amphihia	Common Factorn Fraglat	Crinia cianifora		
Amphibia	Common Eastern Froglet		-	-
Amphibia	Australasian Shavalar	Enniodynastes tasmaniensis	-	-
Aves	Australian (Disbard's) Disit	Anthus nousessalandias	-	-
Aves	Australian (Richard S) Pipit	Alistorus scapularis	-	-
Aves	Australian Magnia	Alisterus scupularis	-	-
Aves	Australian Magple	Gymnornina Libicen	-	-
Aves	Australian Rood Warbler	Acrosophalus australis	-	-
Aves	Australian Wood Duck	Chanonatta juhata	-	-
Aves	Australian Wood Duck		-	-
Aves	Brown Falcon			
Ανές	Brown Thornhill	Acanthiza pusilla		
	Common Bronzewing	Phans chalcontera		
Aves	Crimson Rosella	Platycercus elegans		
Aves	Diamond Firetail	Stagononleura auttata		V1
Aves	Dusky Woodswallow	Artamus cvanonterus		V1
Aves	Fastern Rosella	Platycercus eximius	-	-
Aves	Eastern Yellow Robin	Eopsaltria australis	-	-
Aves	Fan-tailed Cuckoo	Cacomantis flabelliformis	-	-
Aves	Flame Robin	Petroica phoenica	-	V1
Aves	Galah	Eolophus roseicapilla	-	-
Aves	Gang-gang Cockatoo	Callocephalon fimbriatum	-	V1
Aves	Golden whistler	Pachycephala pectoralis	-	-
Aves	Grey Fantail	Rhipidura albiscapa	-	-
Aves	Grey Teal	Anas gracilis	-	-
Aves	Laughing Kookaburra	Dacelo novaeguineae	-	-
Aves	Little Corella	Cacatua sanguinea	-	-
Aves	Magpie-lark	Grallina cyanoleuca	-	-
Aves	Masked Lapwing	Vanellus miles	-	-
Aves	Mistletoebird	Dicaeum hirundinaceum	-	-
Aves	Nankeen Kestrel	Falco cenchroides	-	-
Aves	New Holland Honeyeater	Phylidonyris novaehollandiae	-	-
Aves	Noisy Friarbird	Philemon corniculatus	-	-
Aves	Noisy Miner	Manorina melanocephala		-
Aves	Olive-backed Oriole	Oriolus sagittatus	-	-
Aves	Pacific Black Duck	Anas superciliosa	-	-
Aves	Pied Currawong	Strepera graculina	-	-

Appendix E. Fauna Species Recorded



Classification	Common Name	Scientific Name	EPBC Act Status	BC Act Status
Aves	Purple Swamphen	Porphyrio porphyrio	-	-
Aves	Rainbow Bee-eater	Merops ornatus	Migratory	-
Aves	Red Wattlebird	Anthochaera carunculata	-	-
Aves	Red-browed Finch	Neochmia temporalis	-	-
Aves	Red-rumped Parrot	Psephotus haematonotus	-	-
Aves	Rufous Whistler	Pachycephala rufiventris	-	-
Aves	Silvereye	Zosterops lateralis	-	-
Aves	Striated Pardalote	Pardalotus striatus	-	-
Aves	Striated Thornbill	Acanthiza lineata	-	-
Aves	Stubble Quail	Coturnis pectoralis	-	-
Aves	Sulphur-crested Cockatoo	Cacatua galerita	-	-
Aves	Superb Fairy-wren	Malurus cyaneus	-	-
Aves	Varied Sittella	Daphoenositta chrysoptera	-	V1
Aves	Wedge-tail Eagle	Aquila audax	-	-
Aves	Welcome Swallow	Hirundo neoxena	-	-
Aves	Western Gerygone	Gerygone fusca	-	-
Aves	White-bellied Sea Eagle	Haliaeetus leucogaster	-	-
Aves	White-browed Scrubwren	Sericornis frontalis	-	-
Aves	White-faced Heron	Egretta novaehollandiae	-	-
Aves	White-necked Heron	Ardea pacifica	-	-
Aves	White-throated Gerygone	Gerygone albogularis	-	-
Aves	White-throated Treecreeper	Cormobates leucophaea	-	-
Aves	White-winged Chough	Corcorax melanorhamphos	-	-
Aves	Willy Wagtail	Rhipidura leucophrys	-	-
Aves	Yellow-faced Honeyeater	Lichenostomus chrysops	-	-
Aves	Yellow-rumped Thornbill	Acanthiza chrysorrhoa	-	-
Aves	Yellow-tailed Black-cockatoo	Calyptorhynchus funereus	-	-
Mammalia	Common Wombat	Vombatus ursinus	-	-
Mammalia	Chocolate Wattled bat	Chalinolobus morio	-	-
Mammalia	Corben's Long-eared Bat	Nyctophilus corbeni	V	V1
Mammalia	Eastern False Pipistrelle	Falsistrellus tasmaniensis	-	V1
Mammalia	Eastern Free-tailed Bat	Mormopterus ridei	-	-
Mammalia	Eastern Grey Kangaroo	Macropus giganteus	-	-
Mammalia	Gould's Long-eared Bat	Nvctophilus gouldii	-	-
Mammalia	Gould's Wattled Bat	Chalinolobus gouldii	-	-
Mammalia	Inland Broad-nosed Bat	Scotorepens balstoni	-	-
Mammalia	Inland Free-tailed Bat	Mormopterus petersi	-	-
Mammalia	Large Bent-winged Bat	Miniopterus orianae oceanensis	-	V1
Mammalia	Large Forest Bat	Vespadelus darlinatoni	-	-
Mammalia	Lesser Long-eared Bat	Nyctophilus geoffroyi	-	-
Mammalia	Little Forest Bat	Vespadelus vulturnus	-	-
Mammalia	Red-necked Wallaby	Macropus rufoariseus	-	-
Mammalia	Short-beaked Echidna	Tachyalossus aculeatus	-	-
Mammalia	South Eastern Free-tailed Bat	Mormopterus planiceps	-	-
Mammalia	Southern Forest Bat	Vespadelus reaulus	-	-
Mammalia	Wallaroo	Macropus robustus	-	-
Mammalia	White-striped Free-tailed Bat	Austronomus australis	-	-
Reptilia	Boulenger's Skink	Morethia boulengeri	-	-
Reptilia	Cunningham's Skink	Egernia cunninahami	-	-



Classification	Common Name	Scientific Name	EPBC Act Status	BC Act Status
Reptilia	Delicate Skink	Lampropholis delicata	-	-
Reptilia	Eastern Brown Snake	Pseudonaja textilis	-	-
Reptilia	Eastern Long-necked Turtle	Chelodina longicollis	-	-
Reptilia	Jacky Dragon	Amphibolurus muricatus	-	-
Reptilia	Olive Legless lizard	Delma inornata	-	-
Reptilia	Red-bellied Black Snake	Pseudechis porphyriacus	-	-



Appendix F. Biodiversity Monitoring Services (Glenn Hoyle) Anabat analysis

Glenn Hoye Biodiversity Monitoring Services PO Box 271 BELMONT NSW 2280 Tel (02) 4947 7794 Email: glenn@flybynightbatsurveys.com.au

Shannon Thompson Field Ecologist **Capital Ecology Pty Ltd** PO Box 854 GUNGAHLIN ACT 2912 Mobile: 0423 075 528

16th June 2021



Hi Shannon,

Following are the results for the files you sent for the BAM Stage I sites at Ginninderry, NSW. Calls from the following threatened species were detected: Eastern False Pipistrelle (few confident calls), Large Bent-winged Bat (many confident calls) and Corben's Long-eared Bat (few probable calls).

Best wishes

Glenn Hoye



I 67 McKanes Falls Road South Bowenfels, NSW 2790 E: <u>andrew.lothian@biodiversitymonitoring.com.au</u> M: 0421 841 726

Unit	Site	Date	A.au	C.dw	C.go	C.mo	F.ta	Mi.or	Mo.pe	Mo.pl	Mo.ri	My.ma	N.co	N.ge	N.go
Anabat I	Loc I	31/03/2021	0	0	10(9)	21(19)	0	4(3)	7(4)	8(5)	5(3)	0	0	3(2)	3(2)
Anabat I	Loc I	01/04/2021	1(1)	0	10(9)	11(11)	0	9(7)	8(5)	32(28)	2(2)	0	0	3(3)	0
Anabat I	Loc I	02/04/2021	2(2)	0	4(3)	17(15)	1(1)	4(1)	11(7)	19(16)	5(4)	0	0	1(1)	l (0)
Anabat I	Loc I	03/04/2021	3(3)	0	12(11)	13(11)	0	1(1)	13(10)	37(35)	2(1)	0	0	3(3)	0
Anabat I	Loc I	04/04/2021	1(1)	0	10(9)	33(29)	0	0	12(8)	61(52)	3(3)	0	0	1(1)	4(4)
Anabat I	Loc I	05/04/2021	0	0	14(13)	33(27)	2(1)	I (0)	3(3)	13(9)	5(2)	0	0	0	0
Anabat I	Loc I	06/04/2021	3(2)	0	8(6)	14(11)	0	1(1)	13(10)	15(10)	0	0	0	2(1)	0
Anabat I	Loc 2	07/04/2021	3(1)	0	5(4)	9(8)	0	0	4(1)	l (0)	2(1)	0	0	I (0)	0
Anabat I	Loc 2	08/04/2021	3(2)	0	2(1)	4(3)	0	0	7(5)	l (0)	4(4)	0	0	I (0)	0
Anabat I	Loc 2	09/04/2021	0	0	9(8)	12(11)	0	l (0)	0	0	5(1)	0	0	2(2)	l(l)
Anabat I	Loc 2	10/04/2021	0	0	9(6)	0	0	0	3(1)	0	2(0)	0	0	0	0
Anabat I	Loc 2	/04/202	0	0	0	l (0)	0	0	0	0	0	0	0	0	0
Anabat 2	Loc 3	31/03/2021	1(1)	0	6(5)	8(8)	0	1(1)	4(2)	4(3)	2(2)	0	0	5(2)	0
Anabat 2	Loc 3	01/04/2021	1(1)	0	8(8)	8(6)	0	2(2)	7(6)	1(1)	4(3)	0	0	0	2(2)
Anabat 2	Loc 3	02/04/2021	I (0)	0	7(6)	13(12)	1(1)	2(2)	4(4)	5(4)	1(1)	0	0	3(2)	2(2)
Anabat 2	Loc 3	03/04/2021	0	0	2(1)	9(9)	0	l (0)	5(4)	5(4)	4(4)	0	1(1)	2(2)	0
Anabat 2	Loc 3	04/04/2021	0	0	4(4)	14(12)	0	0	14(11)	2(2)	5(2)	0	0	5(4)	l(l)
Anabat 2	Loc 3	05/04/2021	0	0	13(13)	15(13)	2(2)	3(3)	12(9)	4(2)	9(5)	0	1(1)	5(3)	l(l)
Anabat 2	Loc 3	06/04/2021	0	0	7(4)	22(20)	I (0)	2(1)	27(18)	3(2)	5(4)	0	0	6(4)	0
Anabat 2	Loc 4	07/04/2021	1(1)	0	7(7)	8(8)	0	2(2)	11(10)	0	6(6)	0	0	I (0)	1(1)
Anabat 2	Loc 4	08/04/2021	4(2)	0	9(7)	8(7)	0	3(3)	7(5)	1(1)	2(1)	0	0	0	1(1)
Anabat 2	Loc 4	09/04/2021	0	0	27(24)	39(38)	0	3(3)	4(3)	2(0)	9(4)	0	0	1(1)	1(1)



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Anabat 2	Loc 4	10/04/2021	1(1)	0	31(23)	9(9)	0	l (0)	4(2)	3(1)	6(6)	0	0	1(1)	0
Anabat 2	Loc 4	11/04/2021	1(1)	0	l (0)	2(1)	0	0	1(1)	0	0	0	0	1(1)	0

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Unit	Site	Date	R.meg	Sa.fla	Scote.rue	Scoto.bal	Scoto.ori	V.dar	V.reg	V.vul	Total Passes
Anabat I	Loc I	31/03/2021	0	0	0	0	0	8(8)	0	14(14)	83
Anabat I	Loc I	01/04/2021	0	0	0	0	0	7(7)	0	23(23)	106
Anabat I	Loc I	02/04/2021	0	0	0	0	0	5(4)	0	24(22)	94
Anabat I	Loc I	03/04/2021	0	0	0	0	0	11(11)	0	12(11)	107
Anabat I	Loc I	04/04/2021	0	0	0	0	0	3(3)	0	11(11)	139
Anabat I	Loc I	05/04/2021	0	0	0	0	0	8(6)	1(1)	16(14)	96
Anabat I	Loc I	06/04/2021	0	0	0	0	0	3(2)	l (0)	10(9)	70
											0
Anabat I	Loc 2	07/04/2021	0	0	0	1(1)	0	3(2)	0	6(5)	35
Anabat I	Loc 2	08/04/2021	0	0	0	0	0	4(3)	0	7(6)	33
Anabat I	Loc 2	09/04/2021	0	0	0	0	0	2(2)	0	3(3)	35
Anabat I	Loc 2	10/04/2021	0	0	0	0	0	0	0	2(2)	16
Anabat I	Loc 2	11/04/2021	0	0	0	0	0	0	0	0	I
											0
Anabat 2	Loc 3	31/03/2021	0	0	0	0	0	0	0	2(2)	33
Anabat 2	Loc 3	01/04/2021	0	0	0	0	0	0	0	7(6)	40
Anabat 2	Loc 3	02/04/2021	0	0	0	0	0	0	0	6(4)	45
Anabat 2	Loc 3	03/04/2021	0	0	0	0	0	1(1)	0	2(0)	32
Anabat 2	Loc 3	04/04/2021	0	0	0	0	0	1(1)	0	l (0)	47
Anabat 2	Loc 3	05/04/2021	0	0	0	1(1)	0	1(1)	0	3(3)	70
Anabat 2	Loc 3	06/04/2021	0	0	0	0	0	3(1)	0	2(1)	78
											0
Anabat 2	Loc 4	07/04/2021	0	0	0	0	0	4(4)	1(1)	7(7)	49
Anabat 2	Loc 4	08/04/2021	0	0	0	0	0	4(2)	0	5(5)	44
Anabat 2	Loc 4	09/04/2021	0	0	0	0	0	0	0	10(7)	96



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Anabat 2	Loc 4	10/04/2021	0	0	0	0	0	0	0	6(6)	62
Anabat 2	Loc 4	11/04/2021	0	0	0	0	0	0	0	0	6

The number of echolocation calls identified to a high level of confidence to a species are marked in brackets. Species codes explained below, those in bold are listed as threatened.

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Species code	Scientific name	Common name	NSW status	C'th status
A.au		White-striped Free-tailed Bat	-	-
C.dw	Chalinolobus dwyeri	Large-eared pied Bat	V	V
C.go	Chalinolobus gouldii	Gould's Wattled Bat	-	-
C.mo	Chalinolobus morio	Chocolate Wattled bat	-	-
F.ta	Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-
Mi.au	Miniopterus australis	Little Bent-winged Bat	V	-
Mi.or	Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-
Mo.nor	Mormopterus norfolkensis	Eastern Coastal Free-tailed Bat	V	-
Mo.pet	Mormopterus petersi	Inland Free-tailed Bat (sp.3)	-	-
Mo.pla	Mormopterus planiceps	South Eastern Free-tailed Bat (sp.4)	-	-
Mo.rid	Mormopterus ridei	Eastern Free-tailed Bat (sp.2)	-	-
My.ma	Myotis macropus	Southern Myotis	V	-
Ny. spp.	Nyctophilus spp.	Long-eared Bat species (unidentifiable to species)	-	-
N.co	Nyctophilus corbeni	Corben's Long-eared Bat	V	v
N.ge	Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-
N.go	Nyctophilus gouldii	Gould's Long-eared Bat	-	-
R.meg	Rhinolophus megaphyllus	Eastern Horseshoe Bat	-	-
Sa.fl	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-
Scote.ru	Scoteanax rueppellii	Greater Broad-nosed Bat	V	-
Scoto.ba	Scotorepens balstoni	Inland Broad-nosed Bat	-	-
Scoto.gr	Scotorepens greyii	Little Broad-nosed Bat	-	-
Scoto.or	Scotorepens orion	Eastern Broad-nosed Bat	-	-
V.dar	Vespadelus darlingtoni	Large Forest Bat	-	-
V.reg	Vespadelus regulus	Southern Forest Bat	-	-
V.vul	Vespadelus vulturnus	Little Forest Bat	-	-





Appendix G. BAM Credit Summary Report



Proposal Details

r oposar Betans		
Assessment Id	Proposal Name	BAM data last updated *
00021371/BAAS17089/20/00021372	Ginninderry NSW Land	14/04/2023
Assessor Name	Report Created	BAM Data version *
Robert Speirs	31/05/2023	58
Assessor Number	BAM Case Status	Date Finalised
BAAS17089	Open	To be finalised
Assessment Revision	Assessment Type	
0	Biocertification	BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetatio n zone name	TEC name	Current Vegetatio n integrity score	Change in Vegetatio n integrity (loss / gain)	Are a (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversit y risk weighting	Potenti al SAII	Ecosyste m credits
Red St	tringybark ·	Brittle Gum - In	and Scribb	ly Gum dry	open	forest of the t	ablelands, Sou	th Eastern Highl	ands Bioregior	ı		
1	1093_1	Not a TEC	67.1	67.1	6.8	PCT Cleared - 61%	High Sensitivity to Gain			1.75		201

Assessment Id



BAM Credit Summary Report

2	1093_4	Not a TEC	10.4	10.4	26.5	PCT Cleared - 61%	High Sensitivity to Gain			1.75		0
3	1093_6	Not a TEC	17.5	17.5	0.91	PCT Cleared - 61%	High Sensitivity to Gain			1.75		7
4	1093_8	Not a TEC	0.7	0.7	18	PCT Cleared - 61%	High Sensitivity to Gain			1.75		0
											Subtot al	208
Yellov	v Box - Bla	kely's Red Gum gr	assy woodland	d on the	table	lands, South E	astern Highlaı	nds Bioregion				
5	1330_2	White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland	42.8	42.8	0.22	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		6
6	1330_5	White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland	0.7	0.7	13.9	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		0



BAM Credit Summary Report

7	7 1330_8	White Box- Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland	0.3	0.3	289	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		0
											Subtot al	6
											Total	214

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Aprasia parapu	lchella / Pink-tail	ed Legless Lizai	rd (Fauna)						
1093_1	67.1	67.1	0.63	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	21
1093_4	10.4	10.4	2.3	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	12

Assessment Id



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1093_8	0.7	0.7	0.03	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	1
1330_5	0.7	0.7	0.25	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	1
1330_8	0.3	0.3	0.19	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	1
1093_6	17.5	17.5	0.04	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	1
								Subtotal	37
Keyacris scurra	/ Key's Matchstick	Grasshopper (Fauna)						
1093_4	10.4	10.4	26.5	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Endangered	Not Listed	False	138
								Subtotal	138