Ginninderry, NSW

Biodiversity Certification Assessment Report

Final 02 – 24 November 2023
Prepared for Riverview Group Pty Ltd

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- Amy Vaughan – Principal Strategic Planner, Knight Frank Town Planning

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). 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 Assessment 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 Report, Riverview received EPBC Act Approval 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 549.9 ha area (i.e. including both ACT and NSW land) will protect and manage the areas which were identified in the Strategic Assessment as supporting significant conservation value.

In addition, 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 MNES listed pursuant to the EPBC Act. However, it is noted that 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.

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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 land[1] 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 footprint[2] for this BCAR therefore encompasses all of the land that is currently proposed for development, and on the request of the owners of Lot 61 excludes their land.

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.

[1] With reference to the biodiversity certification process, the subject land in this BCAR is equivalent to the 'biodiversity certification assessment area'.
[2] With reference to the biodiversity certification process, the development footprint in this BCAR is equivalent to the 'land proposed for biodiversity certification'.

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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 *Phalaris aquatica*) 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

<u>EPBC Act Natural Temperate Grassland of the South Eastern Highlands</u>

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 very 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

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be impacted by the proposed development. As such, while the wider subject land supports NTG-SEH 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* (EPBC Act Box-Gum Woodland). 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% of which is in low condition (i.e. 13.86 ha of 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 (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 9.2% 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

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Grass *Themeda triandra* (i.e. PCT1330 Zones 1 and 4, and PCT1093 Zone 4, total of 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 land, 48.36 ha of which supports vegetation that 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 these areas will be fenced and managed by the Ginninderry Conservation Trust (GCT). If possible, they will be incorporated into the GCC and/or be rezoned as C2 - Environmental Conservation. By doing so, the proposed development avoids impacts to:

- 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 of which meets the listing criteria for EPBC Act Box-Gum Woodland;
- 0.57 of Pink-tailed Legless Lizard habitat; and
- 3.55 ha of moderate to high quality dry forest (i.e. PCT1093)

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 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 NSW portion of the GCC protects approximately 31% (162.39 ha) of the subject land, including the vast majority of the identified significant biodiversity values. Protected values in the NSW portion of the GCC include:

- 6.73 ha of woodland vegetation (i.e. PCT1330), 0.80 ha of which meets the listing criteria for EPBC Act and BC Act Box-Gum Woodland;
- 4.30 ha of grassland vegetation (i.e. PCT3415), 3.09 ha of which meets the listing criteria for EPBC Act listed NTG-SEH;
- 33.62 ha of Pink-tailed Legless Lizard habitat.
- 151.40 ha of dry forest and riparian habitat in the Murrumbidgee River corridor, 143.29 ha of which is moderate to high quality.

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

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Impacts

Native vegetation

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

- 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).
- 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); and
- 13.86 ha of PCT1330 Zone 5 – low diversity native pasture (BC Act native vegetation, BC Act Box-Gum Woodland).

The development footprint also includes 88 mature remnant trees, all of which support at least one functional hollow or other habitat feature. It is not possible at the Biodiversity Certification stage to specify which trees, or the maximum number of trees, that will be retained or removed as part of the proposed development. However, the Ginninderry Project works towards an overall master plan, and where trees can be retained whilst achieving a sensible urban design outcome, Ginninderry endeavours to do so.

In addition to the above-described project-driven tree retention, tree removal in NSW must be approved by the local Council according to the NSW *Environmental Planning and Assessment Act 1979*. As such, Ginninderry will develop a Tree Retention Plan (TRP) for lodgement with each future Development Application (DA). The TRP will detail the location and characteristics (i.e. species, habitat values, structural integrity etc.) of each tree proposed to be retained and each proposed to be removed, providing appropriate justification where removal is necessary. The TRP will be prepared by or in consultation with a suitably qualified ecologist and arborist, and the objective of the TRP will be to facilitate the retention within the urban fabric of as many remnant trees as is practicable. It is anticipated that the Biodiversity Certification Agreement (BCA) will include a condition pertaining to the development and lodgement for Council approval of a TRP for each future DA.

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 for 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.

- 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 2 – vegetation integrity score of 42.8, proposed clearance of 0.22 ha.

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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.

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

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 considered 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 PCT1330 Zone 1 and 4, and 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.

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NSW BC Act – Biodiversity offset credit calculations

The proposed development will involve the clearance of vegetation which generates the following ecosystem credits.

- PCT1093 Zone 1 – clearance of 6.84 ha generates 201 ecosystem credits.
- PCT1093 Zone 6 – clearance of 0.91 ha generates 7 ecosystem credits.
- PCT1330 Zone 2 – clearance of 0.22 ha generates 6 ecosystem credits.

The proposed development will involve the clearance of threatened species habitat which generates the following species credits.

- 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 1.3). 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.

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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 2020a[3]) 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 land[4] 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 1.4, the 355.43 ha development footprint[5] for this BCAR therefore encompasses all of the land that is proposed for development and on the request of the owners of Lot 61 excludes their land (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.

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

[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).

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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 Map[6], and the Murrumbidgee River and Ginninderra Creek are identified on the NSW Government Biodiversity Values Map[7].

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.

1.2 Council Consultation and Public Exhibition

1.2.1 Council Consultation

Yass Valley Council ('Council') were provided with a copy of Draft 04 of this BCAR for comment on 21 April 2023, and this was followed by a copy of Draft 05 on 14 June 2023. A formal response was

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

provided by Council on 22 June 2023 (attached to this BCAR as Appendix H) stating: "*Please be advised that at this point Council has no comment to make on the draft BCAR and has no objection to the document being placed on public exhibition*".

1.2.2 Public Exhibition

In accordance with Division 2, Part 8.6 (3) of the BC Act, Draft 05 of this BCAR was publicly exhibited on the Ginninderry Website from 22 June 2023 to 24 July 2023, and submissions were invited from the public via notifications placed in The Canberra Times and Yass Tribune on 24 June 2023 and 28 June 2023. Four submissions were received. Appendix I provides a table compiling and consolidating the comments received in the submissions into thirteen (13) 'items'. A response has then been provided outlining the manner in which Riverview Projects Pty Ltd proposes to address each item as part of the proposed development. No substantial amendments to the BCAR were identified as being necessary in response to the submissions received.

1.3 Background to the Proposed Development

1.3.1 EPBC Act Strategic Assessment

In 2017, Riverview Projects and the Commonwealth Government commenced a Strategic Assessment[8] 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 Report[9] Riverview received EPBC Act Approval[10] 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."*

1.3.2 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)

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[8] 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.
[9] A T Adams Consulting (2017). *Urban Development at West Belconnen. Program Report*. Prepared for: Riverview Projects (ACT) Pty Ltd, 18 April 2017.
[10] 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.

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Exemption[11] 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.

1.3.3 Rezoning

The EPBC approval granted to the West Belconnen Project on 1 September 2017 facilitated the creation of the Ginninderry Conservation Corridor (GCC). Condition 5 of the EPBC approval required a legally binding mechanism through rezoning to secure the conservation area in perpetuity.

The Knight Frank Town Planning Proposal (February 2018, the 'planning report') for Parkwood, being the NSW portion of the Ginninderry project, identifies the GCC's function and importance of conservation management (planning report, p 67):

> *…The master plan recognises the ecological, cultural and riparian values of the Murrumbidgee River and Ginninderra Creek corridors, by confirming limits on the land for urban development through the proposed rezoning of part of the Parkwood lands to R1 General Residential and the retention of the balance for environmental purposes. The response to the Conservation Corridor, including the adjacent conservation/urban edge interface…*

Stated in the planning report, the GCC aims to achieve the following.

- Preserve the cultural and ecological values of the land.
- Accommodate a range of compatible uses.
- Deliver an open space walking track network.
- Provide a range of active and passive recreation opportunities for the Parkwood community and the broader Canberra/Yass Valley region.

Prior to rezoning, the land was zoned RU1 Primary Production, which facilities industry production rather than conservation outcomes. As part of the rezoning proposal, the GCC was proposed to be modified as an E3 Environmental Management zone boundary together with the proposed E2 Environmental Conservation zone to establish a hierarchy of protection and reflect the above desirable conservation, use, and management outcomes (planning report, p 67). To achieve the above-mentioned outcomes, the planning proposal concluded a separate Parkwood Local Environment Plan (LEP) would need to be created to ensure that the ecological and landscape values of the Murrumbidgee River and Ginninderra Creek corridors are conserved (planning report, p 129). Since the Parkwood LEP 2020 rezoning, the GCC in NSW is now protected with environmental zoning. In addition, to conserve the ecological values of the GCC, a specific conservation/urban edge interface buffer was included to add additional controls for development fronting onto the GCC (planning report, p 102).

To facilitate the urban development in the NSW portion of the site, it was understood that NSW legislation would apply in addition to the Commonwealth EPBC approval. In liaison with the Office of Heritage and Environment, the Biodiversity Certification process was identified as the most appropriate accreditation process for the NSW portion of the project. The NSW Biodiversity Certification approval being sought in this BCAR is the last environmental approval required for the

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

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NSW portion of the project to then facilitate development assessment within the proposed urban area and conservation of avoided areas that support high quality vegetation and habitat.

1.3.4 The Ginninderry Conservation Corridor

As mentioned previously, one of the conditions of the EPBC Act Approval was the establishment of the 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 values of the site (studies relevant to the subject land were collated and reviewed in Capital Ecology 2019[12]).

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 (i.e. including both ACT and NSW land) 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)[13].

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 Plan[14].

[12] 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

[13] 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.

[14] Ginninderry (2018). *Ginninderry Conservation Corridor 2018 – 2023 Management Plan*. September 2018.

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Table 2: River corridor habitat areas

River corridor habitat areas (ha.)	*ACT*	*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 extracted from A T Adams Consulting (2017). *Urban Development at West Belconnen. Program Report*. Prepared for: Riverview Projects (ACT) Pty Ltd, 18 April 2017[16].

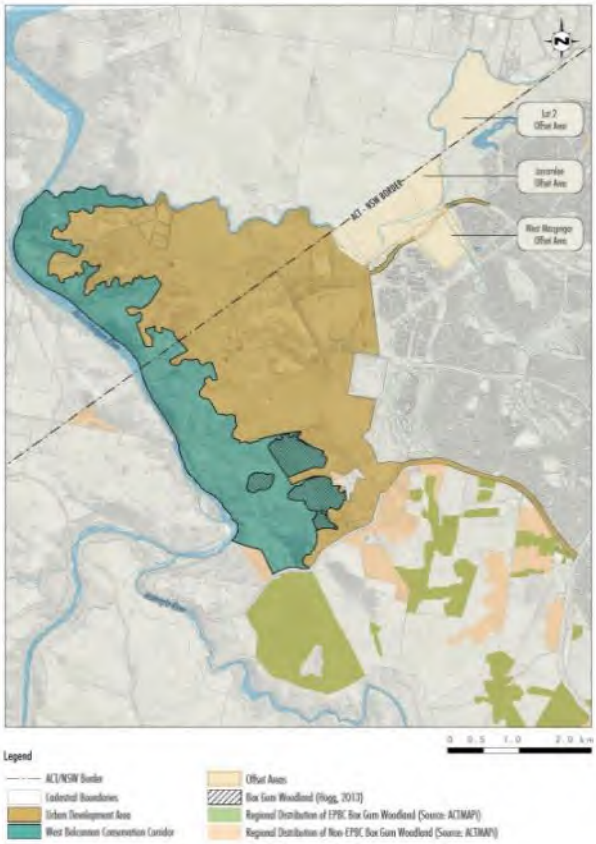

Figure 8: Yellow box red gum grassy woodland

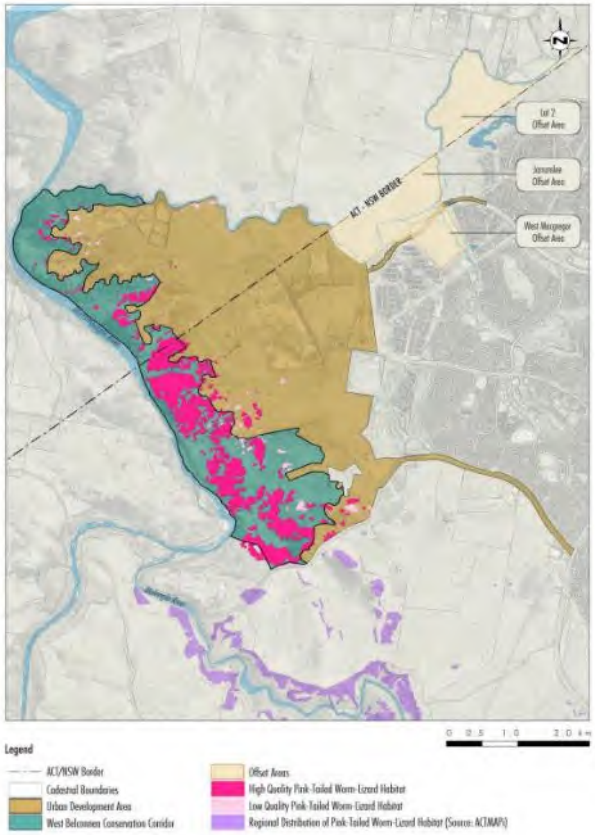

Figure 9: Pink tailed worm lizard habitat

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.

1.4 The Proposed Development

1.4.1 Ginninderry

The Ginninderry Project is a master-planned development. The Project Area included in the master plan covers 1,583.3 ha 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 in the ACT 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 in the ACT, with individual block settlements anticipated in mid-2023.

One-third (nearly 550 ha) of the Ginninderry Project is protected in perpetuity with the land dedicated to the GCC. The GCC is managed by the Ginninderry Conservation Trust (GCT) in line with the development of the urban area; establishment of the GCC 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 GCC and meeting the environmental outcomes as set out or referred to in the West Belconnen Strategic Assessment.

1.4.2 The proposed development – biodiversity certification

The proposed development seeks to subdivide the subject land to construct residential development (estimated population 30,000) and associated facilities such as shops, schools, parks, etc. In total, it is estimated that the ACT will include 6,500 dwellings and attract 16,900 residents, and NSW 5,000 dwellings and 13,000 residents.

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 four small patches of vegetation in the western portion of the subject land ('Avoided Land', total: 6.02 ha) which supports high diversity EPBC Act Box-Gum Woodland, high diversity dry sclerophyll forest, 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 these areas will be fenced and managed by the GCT. If possible, they will be incorporated into the GCC and/or be rezoned as C2 - Environmental Conservation.

Finally, the establishment of the GCC is considered to be the primary avoidance measure 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.

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1.4.3 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 in NSW are as follows (see Figure 2).

- 2028-2033 - Neighbourhood 6.
- 2040-2026 - Neighbourhood 8.
- 2046-2048 - Neighbourhood 9 & 10.

1.4.4 Occupation

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

- An estimated 5,000 dwellings and 13,000 residents across one suburb.
- Higher density residential, medium density residential, residential, and eco-living areas.
- Schooling.
- Activity centres and mixed-use areas.
- Urban open space and WSUD basins.
- Approximately 162 ha of the Ginninderry Conservation Corridor.

1.5 Commonwealth and State Assessment and Approval Processes

1.5.1 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.

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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 2013a[15]). 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: http://www.environment.gov.au/epbc/index.html.

1.5.2 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.

[15] 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.

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.

- Ecosystem credits, 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').
- Species credits, 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').

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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.

1.5.3 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).

1.6 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.

1.6.1 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.

1.6.2 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 and report review.

- 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).

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1.6.3 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: 24 November 2023

BAM Assessor Accreditation no: BAAS17089

1.6.4 Conflict of interest declaration

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

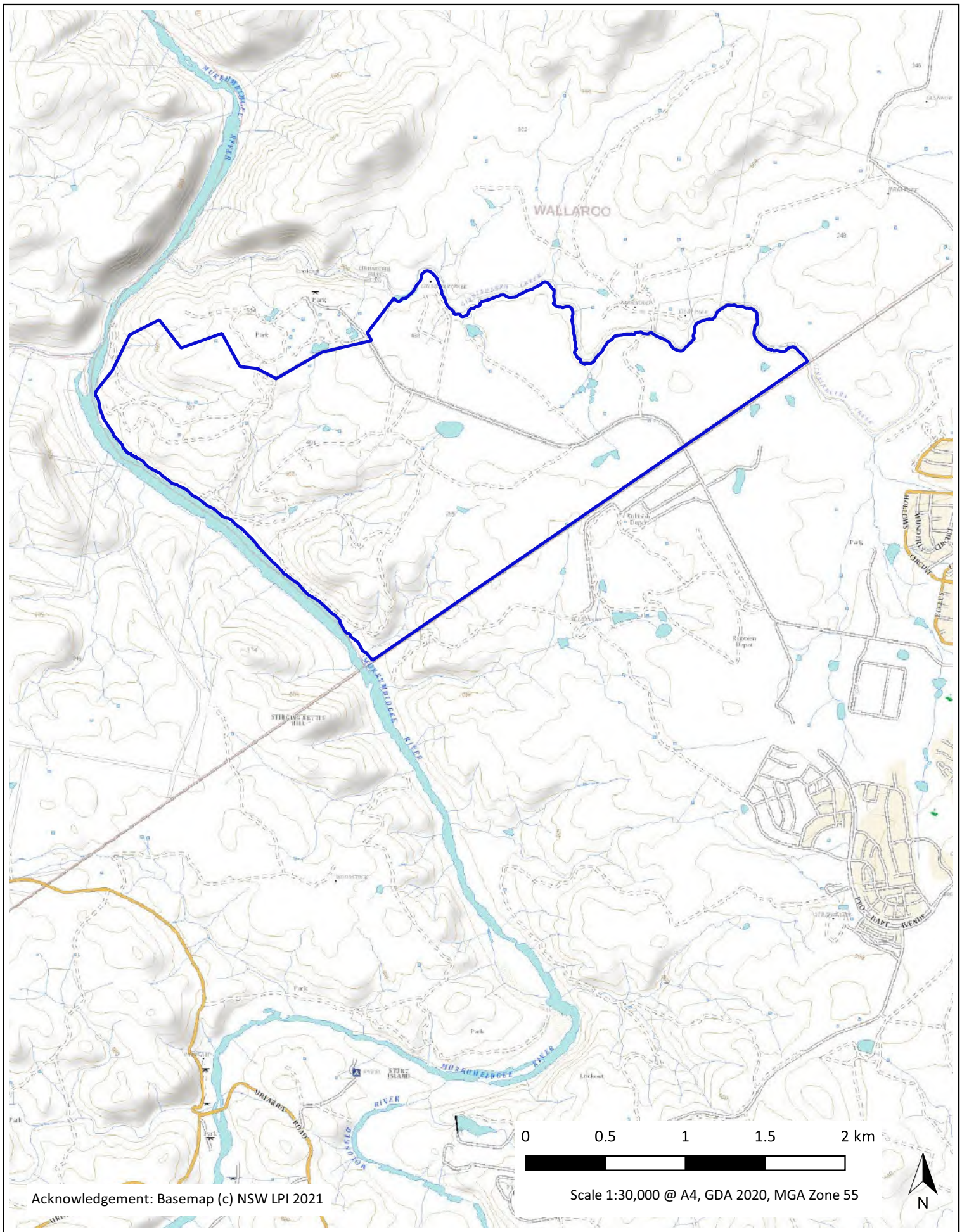
This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Name: Robert Speirs

Signature:

Date: 24 November 2023

BAM Assessor Accreditation no: BAAS17089



Acknowledgement: Basemap (c) NSW LPI 2021

Figure 1. Locality Plan

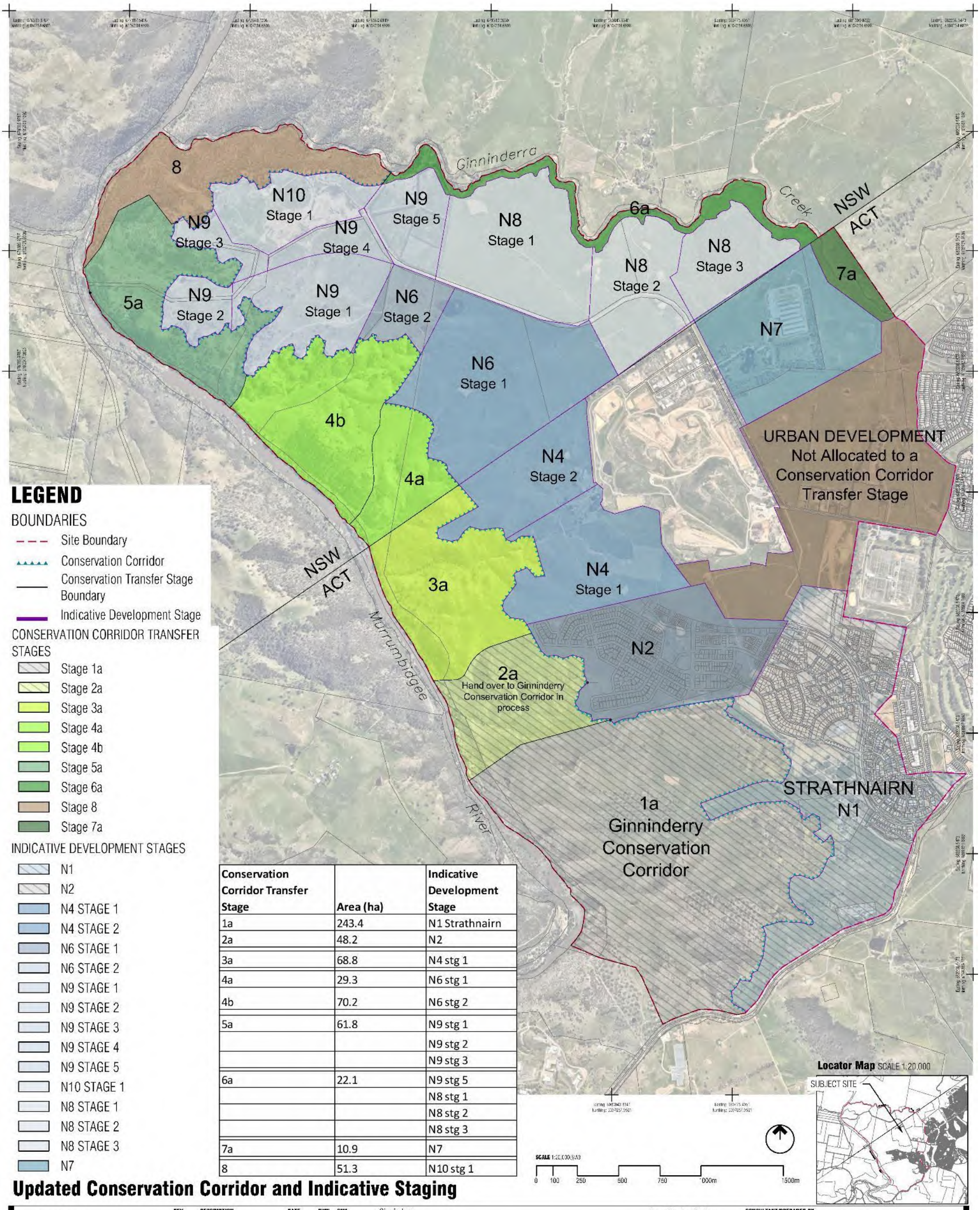
Capital Ecology Project No: 3155
Drawn by: C. Ross
Date: 12 January 2023

Legend

Subject Land

capital ecology

Figure 2. The Ginninderry Development



Conservation Corridor Transfer Stage	Area (ha)	Indicative Development Stage
1a	243.4	N1 Strathnairn
2a	48.2	N2
3a	68.8	N4 stg 1
4a	29.3	N6 stg 1
4b	70.2	N6 stg 2
5a	61.8	N9 stg 1
		N9 stg 2
		N9 stg 3
6a	22.1	N9 stg 5
		N8 stg 1
		N8 stg 2
		N8 stg 3
7a	10.9	N7
8	51.3	N10 stg 1

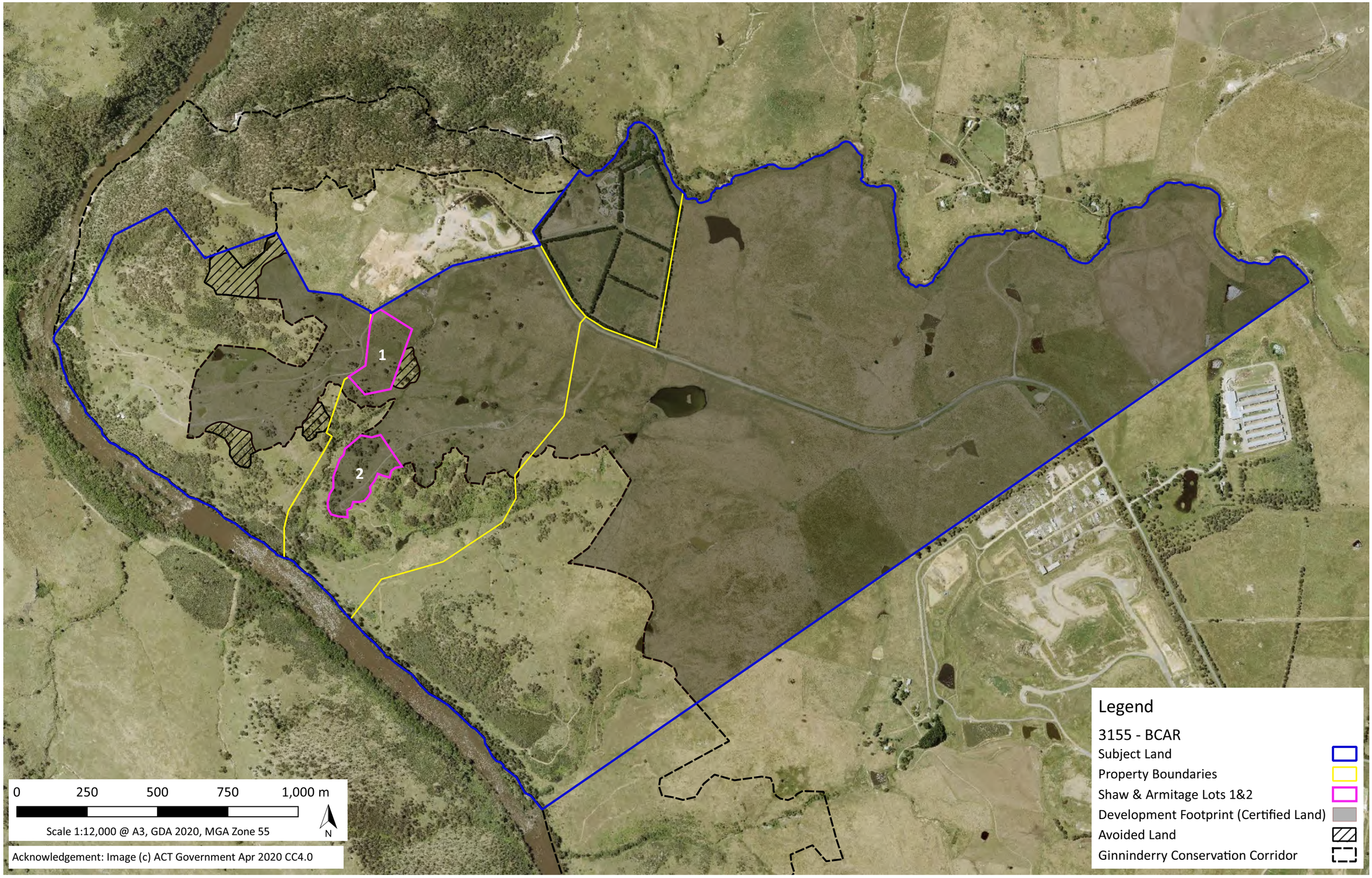


Figure 3. The Subject Land and Development Footprint on Aerial Imagery

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

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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.

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[16] stream order)	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. The subject land also contains seven 1st order tributaries running into Ginninderra Creek, and six 1st order and one 2nd 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.	Figure 4
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 *State Environmental Planning Policy No 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 have been characterised by River Oak Forest. A small patch of Natural	Figure 6

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

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Landscape Feature	Description	Figure Reference
	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[17].	
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%) of native groundstorey species remains (often referred to as derived or secondary grassland).	Figure 5

[17] http://app.actmapi.act.gov.au/actmapi/index.html?viewer=ssvcrt

Landscape Feature	Description	Figure Reference
	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[18]). 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 1,224 ha (52%). This falls into the >30–70% cover class in the BAM Calculator.	

[18] http://app.actmapi.act.gov.au/actmapi/index.html?viewer=ssvcrt

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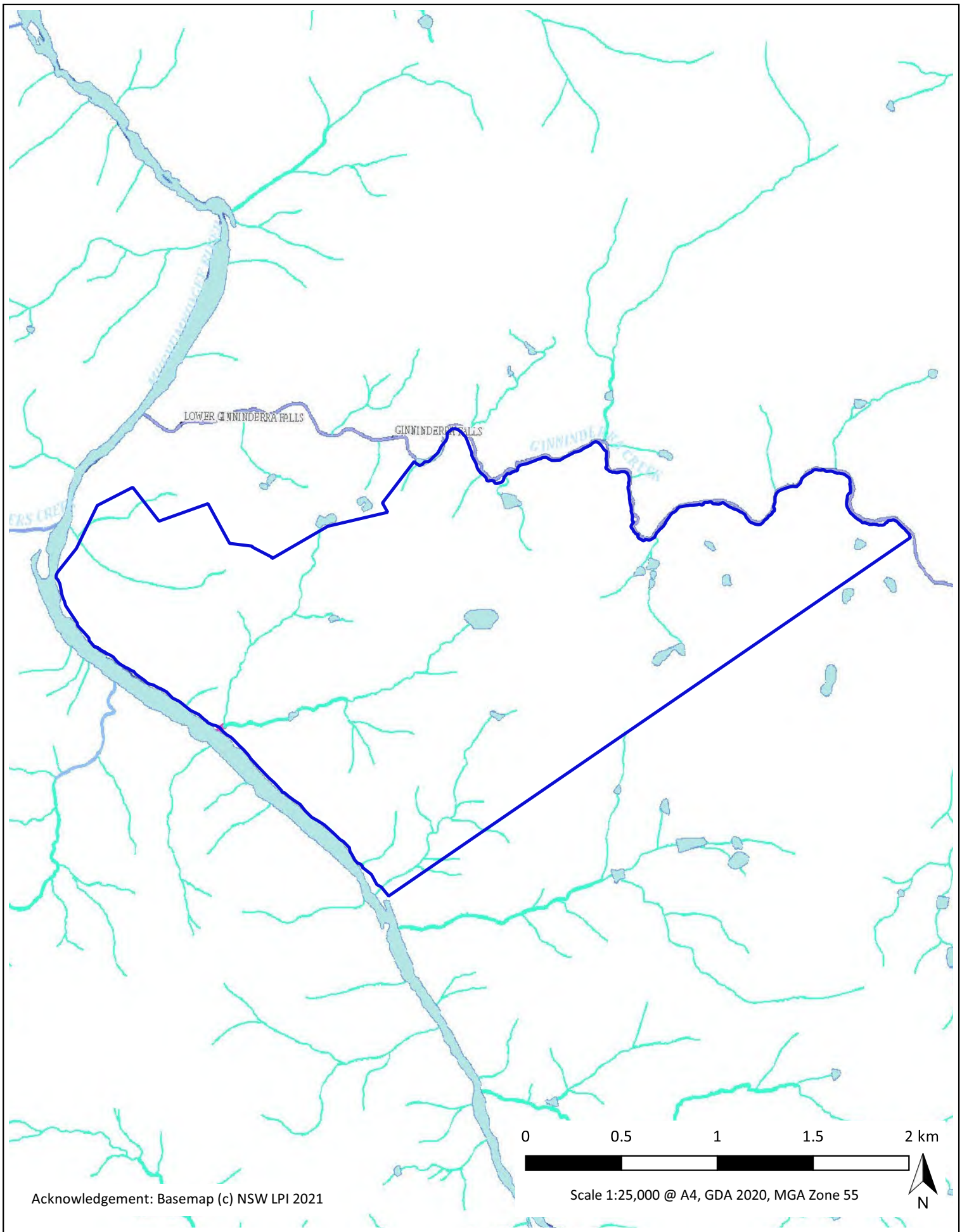

Figure 4. Hydrology

Legend

Subject Land

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Date: 12 January 2023

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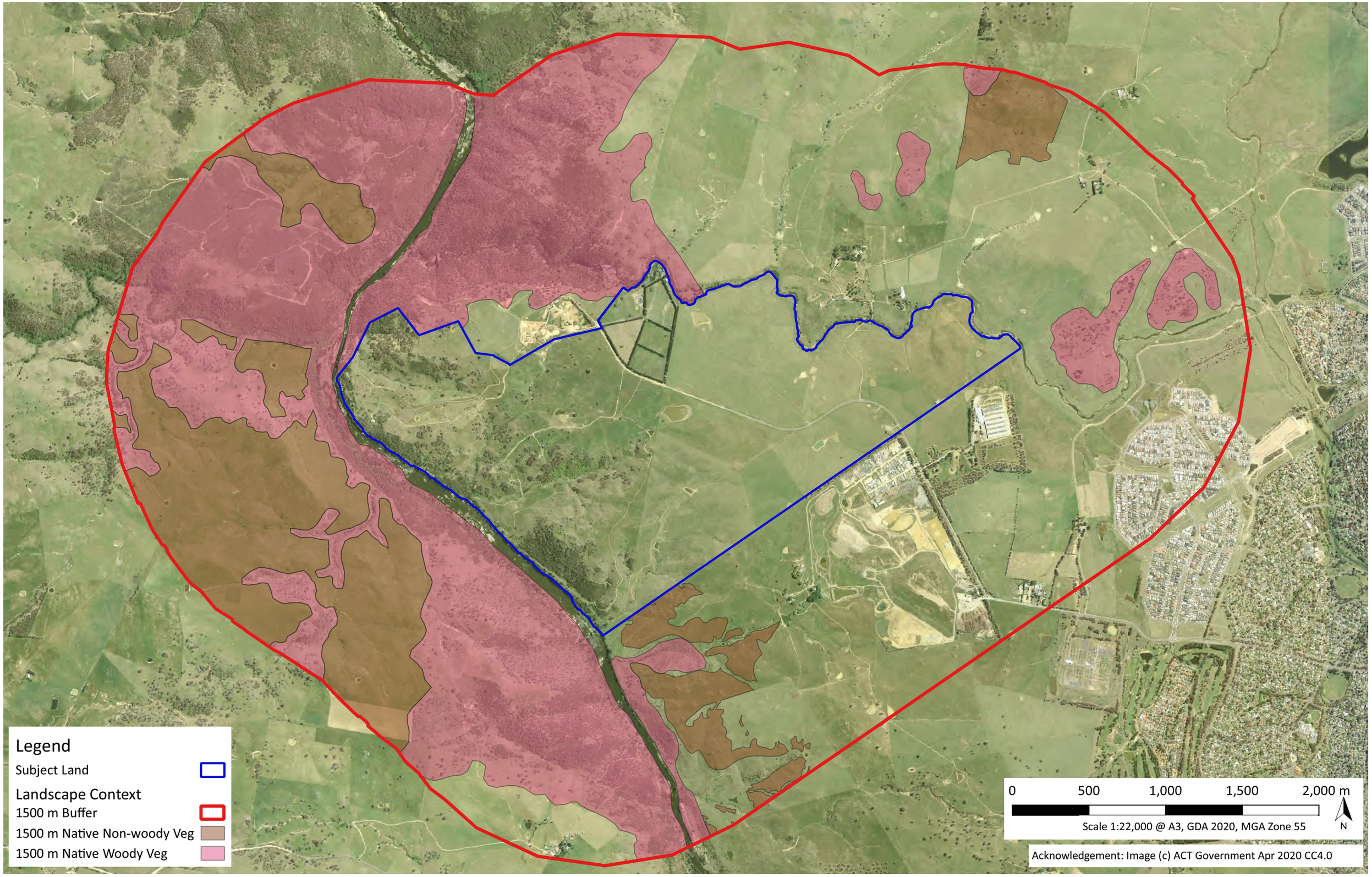

Figure 5. Site Map

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Drawn by: C. Ross
Date: 11 January 2023

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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[19,20], ACT Government[21], and previous NSW Government[22] 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.
2. Exotic vegetation is defined as any plant which is <u>not</u> native to NSW.

---

[19] 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.
[20] Commonwealth of Australia (2016). Approved conservation advice for the Natural Temperate Grassland of the South Eastern Highlands (NTG–SEH) ecological community.
[21] ACT Government (2010). *Survey guidelines for determining lowland vegetation classification and condition in the ACT*. Environment and Sustainable Development Directorate – Conservation Planning and Research.
[22] NSW Government (2014). *BioBanking Assessment Methodology 2014*. NSW Government Office of Environment and Heritage.

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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 2.2.1 to 2.2.4) were also used to assess the subject land for the presence/absence of habitat constraints and/or microhabitats for ecosystem credits species (Section 2.3.3), and species credit species (Section 2.3.4).

Table 2. Vegetation survey dates and survey effort.

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

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) https://www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm.

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.

Note: 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 area[23] 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 (2020b[24]), each BAM Plot involved:

a. one 20 x 20 m (400 m^2) plot, used to assess the composition and structure attributes;

b. one 20 x 50 m plot (1,000 m^2) plot, used to assess the function attributes; and

c. five 1 m^2 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*
>
> *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.*

[23] 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

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

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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 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', refer to Section 2.3.4). 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 survey dates and survey effort.

Task	Method	Date	Personnel	Survey effort
Targeted threatened flora searches	Random meander through likely habitat	20/10/2020 21/10/2020	5 people 4 people	40 hours 32 hours

Task	Method	Date	Personnel	Survey effort
	Opportunistic observations[25]	-	1-6 people	24 hours
Striped Legless Lizard survey	Tile grid survey	30/09/2020 10/10/2020 16/10/2020 22/10/2020 30/10/2020 07/11/2020 13/11/2020 19/11/2020 27/11/2020 04/12/2020	2 people 2 people 2 people 2 people 2 people 2 people 2 people 2 people 2 people 2 people	2 hours 2.5 hours 2.25 hours 1.5 hours 2 hours 2 hours 2 hours 1.5 hours 1.5 hours 1.5 hours
Pink Tailed Legless Lizard survey	Rock turning	19/10/2018 20/03/2019 22/03/2019	3 people 4 people 4 people	24 hours 24 hours 24 hours
Threatened bird survey	Area searches	10/10/2020 16/10/2020 20/10/2020 21/10/2020 30/10/2020	2 people 2 people 5 people 5 people 2 people	2 hours 4 hours 8 hours 4 hours 4 hours
	Opportunistic observations[26]	-	1-5 people	96 hours
Threatened bat survey	Anabat®	31/03/2021 - 11/04/2021	Four Anabat® locations (a total of 12 trap nights).	120 hours of recordings

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

Date	Temperature Min-Max	Wind @ 9am	Rain	Cloud (8th)
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
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

[25] During PCT and Zone mapping, and remnant tree habitat assessment.
[26] During PCT and Zone mapping, Remnant tree habitat assessment, and threatened flora surveys.

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Date	Temperature Min-Max	Wind @ 9am	Rain	Cloud (8th)
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 via a rock turning survey consistent with the Commonwealth guidelines. Initially mapped in 2011/12 by Osborne and Wong[27], Capital Ecology completed intensive targeted surveys between 2017 and 2019 and prepared detailed mapping of the extent and habitat condition of Pink-tailed Legless Lizard habitat in both the ACT portion[28] and NSW portion[29] 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 Mapping[30]. As this area will not be impacted by the proposed development, the assessment is not included in the current report.

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 2.3.4), 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.

[27] 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.
[28] Capital Ecology (2018a). *Ginninderry – Pink-tailed Worm-lizard survey and habitat mapping*. Capital Ecology project no. 2772.
[29] Capital Ecology (2018b). *Ginninderry – Pink-tailed Worm-lizard survey and habitat mapping of NSW land*. Capital Ecology project no. 2842.
[30] 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.

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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 2.3.4). 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 (2004[31]), these surveys involved 'area searches' (Loyn 1986[32]) 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.

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

[31] DEC (2004). *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)*. New South Wales Department of Environment and Conservation, Hurstville, NSW.
[32] 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.

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, 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 2011[33]) and the ACT Government survey guidelines (ACT Government 2015[34]).

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.

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.).

[33] 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.*
[34] ACT Government (2015). *Survey Guidelines for Striped Legless Lizard*. Conservation, Planning and Research, Environment and Sustainable Development Directorate.

- 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 (PTLL) 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 Pink-tailed Legless Lizard 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 Pink-tailed Legless Lizard habitat, Capital Ecology analysed 2018 aerial imagery in order to identify additional potential habitat (i.e. areas containing surface rock) across the subject land.

All previously mapped patches of Pink-tailed Legless Lizard habitat and identified additional patches of potential Pink-tailed Legless Lizard habitat in the subject land were inspected to assess the following.

1. 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 subject land 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 Pink-tailed Legless Lizard habitat, and any identified additional patches of potential Pink-tailed Legless Lizard habitat, were surveyed for Pink-tailed Legless Lizard 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 Pink-tailed Legless Lizard 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 Pink-tailed Legless Lizard 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 Pink-tailed Legless Lizard was classified as either an adult (≥12 cm total length), juvenile (≤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 (2013[35]) 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 (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.

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

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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.

Table 5. PCTs recorded in the subject land.

PCT	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 and Inland Scribbly Gum and an understorey of sclerophyll shrubs with a sparse groundlayer.	Occurs on the slopes and ridges in the western part of the subject land.	Not listed	61%

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PCT	PCT name	PCT description	Occurrence in subject land	TEC status Commonwealth / NSW	PCT % cleared
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.

Note: 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 area[36] 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

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

[36] 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

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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). In total, 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 remaining 20 trees will be retained and protected in the Avoided Land (refer to Figure 13).

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Table 6. PCT85 Zone 1 results summary.

	PCT85 Zone 1
Description	River Oak Forest and Woodland Wetland – Native Canopy Regeneration – Native Dominant – Mod-High Diversity Canopy of River She-oak *Allocasuarina cunninghamiana* with some regeneration. The midstorey and shrubstorey are present and is dominated by Burgan *Kunzea ericoides*. Moderate to high diversity native groundlayer dominated by Weeping Grass *Microlaena stipoides*, Kangaroo Grass *Themeda triandra*, and Wallaby Grass *Rytidosperma sp.*. 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 *Conium maculatum*, African Lovegrass *Eragrostis curvula*, St John's Wort *Hypericum perforatum*, Blackberry *Rubus fruticosus,* Paterson's Curse *Echium plantagineum*.
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	River Oak Forest and Woodland Wetland – Native Canopy – 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 *Acacia rubida,* and the exotic Blackberry and Briar Rose *Rosa rubiginosa*. Low diversity exotic groundlayer dominated by a variety of exotic grasses (e.g. African Lovegrass, Brome Grass *Bromus sp.,* Yorkshire Fog *Holcus lanatus)*. 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 *Callitris endlicheri* and Red Stringybark *Eucalyptus macrorhyncha* 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 *Schoenus apogon,* 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	Yellow Box - Blakely's Red Gum Grassy Woodland – Native Canopy – Regeneration – Native Dominant – Mod-High Diversity Canopy of Yellow Box and Blakely's Red Gum with regeneration. The midstorey and shrubstorey are present and are dominated by Long-leaf Cassinia *Cassinia longifolia* 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	Yellow Box - Blakely's Red Gum Grassy Woodland – Native Canopy – Regeneration – Native Dominant – Low Diversity 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.
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 *Anthosachne scaber*. 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 *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.
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	294.96 ha
Area – development footprint	289.03 ha.
Area – avoided land	0.00 ha.
Area – Ginninderry Conservation Corridor	5.93 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	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest – Native Canopy – Regeneration – Native Dominant – Mod-High Diversity Canopy of Red Stringybark and Inland Scribbly Gum *Eucalyptus rossii* 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 *Crataegus monogyna*, 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 *Crataegus monogyna*, Briar Rose, and Blackberry dominating this strata, where present. Moderate to high diversity native groundlayer dominated by Rough Spear-grass *Austrostipa scabra*, Red-leg Grass *Bothriochloa macra*, 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 forest Native Canopy – Regeneration – Exotic Dominant – Low Diversity Canopy of Red Stringybark and Inland Scribbly Gum with regeneration. The midstorey and shrubstorey are dominated the exotic Common Hawthorn *Crataegus monogyna*, Briar Rose, and Blackberry. The low diversity exotic groundlayer is dominated by the exotic Clover *Trifolium sp.*, 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.

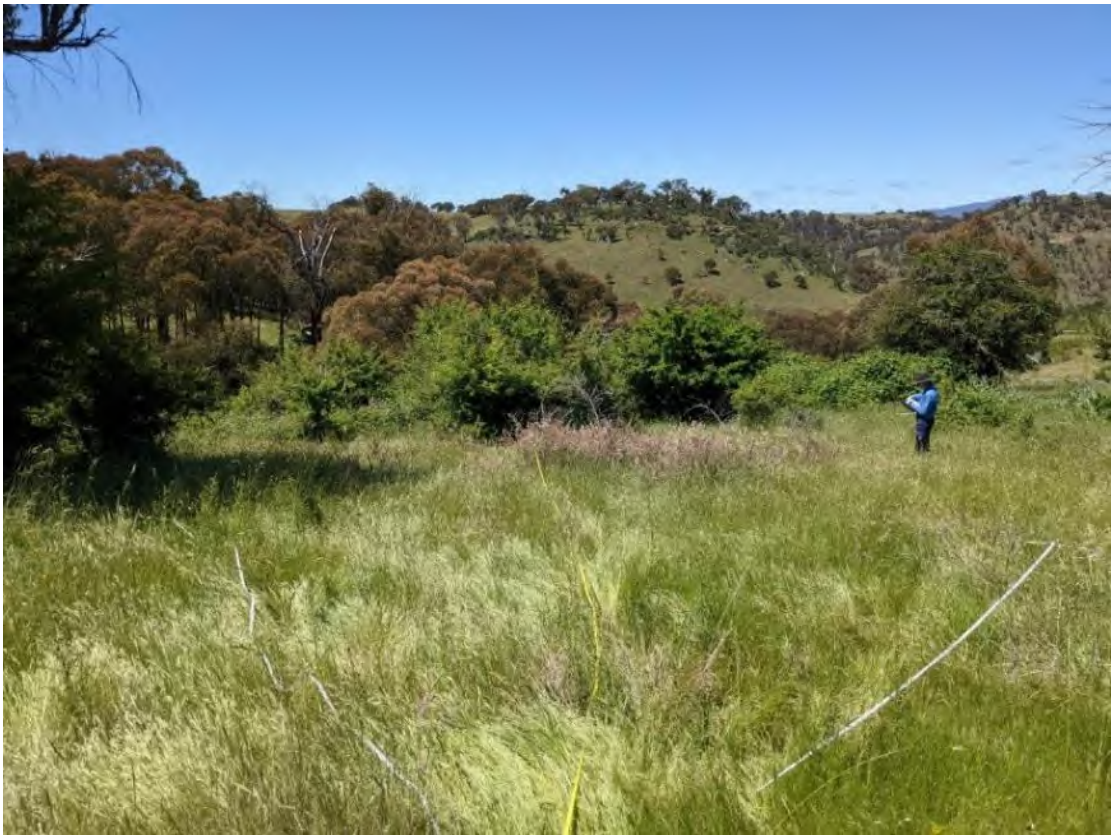

Table 17. PCT1093 Zone 8 results summary.

	PCT1093 Zone 8
Description	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest – No Canopy – 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 *Phalaris aquatica*, Clover, Wild Oats *Avena sp.*, Perennial Ryegrass *Lolium perenne*, 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 ≤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 ≥ 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	294.96 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	7	3	4	1	3
Composition condition score	13.5	22.6	0.2	62.6	30.3	19.3	3.0
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**

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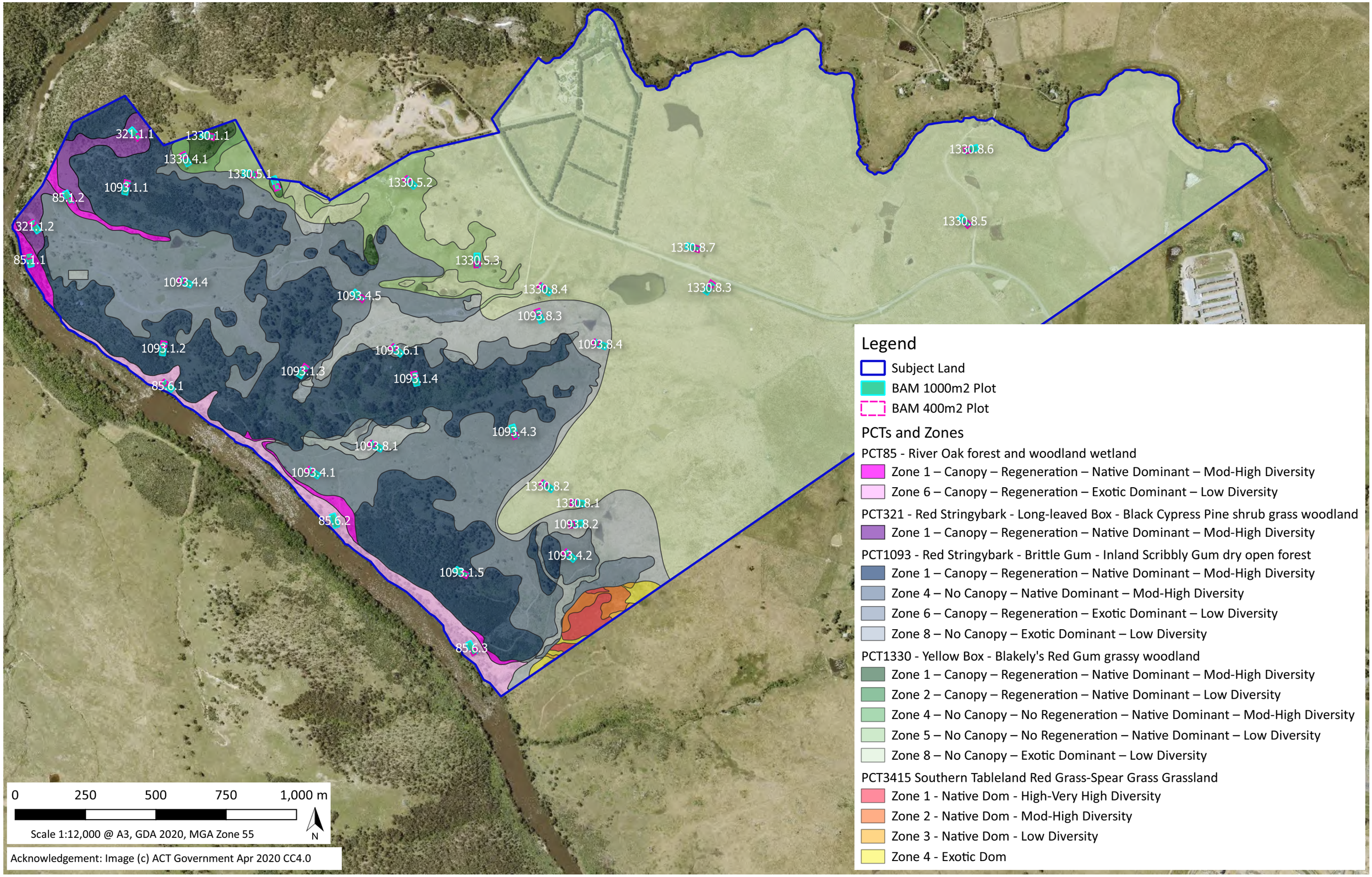

Figure 6. BAM Vegetation Mapping and Survey

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

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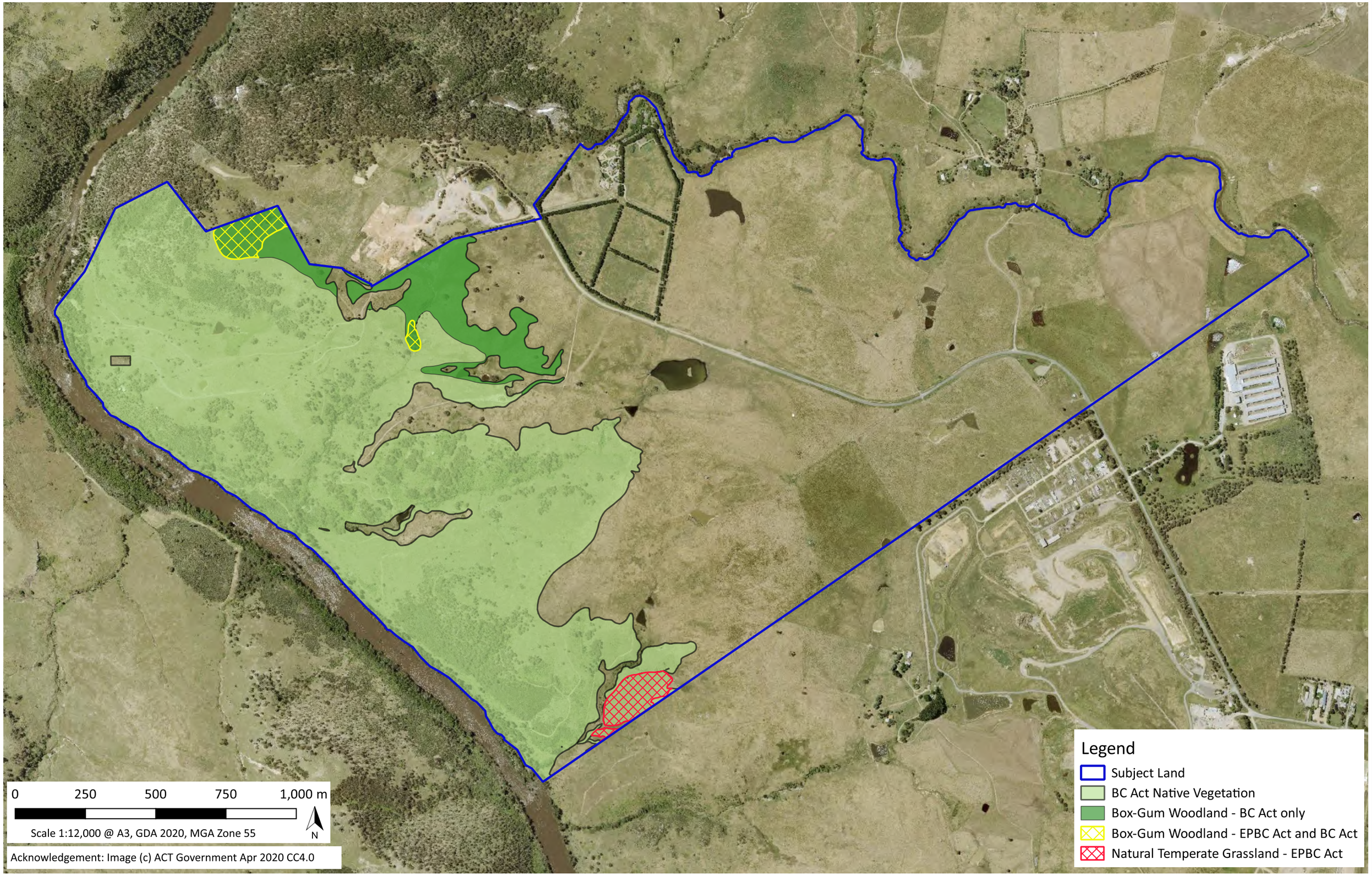

Figure 7. BC Act Native Vegetation and Threatened Ecological Communities

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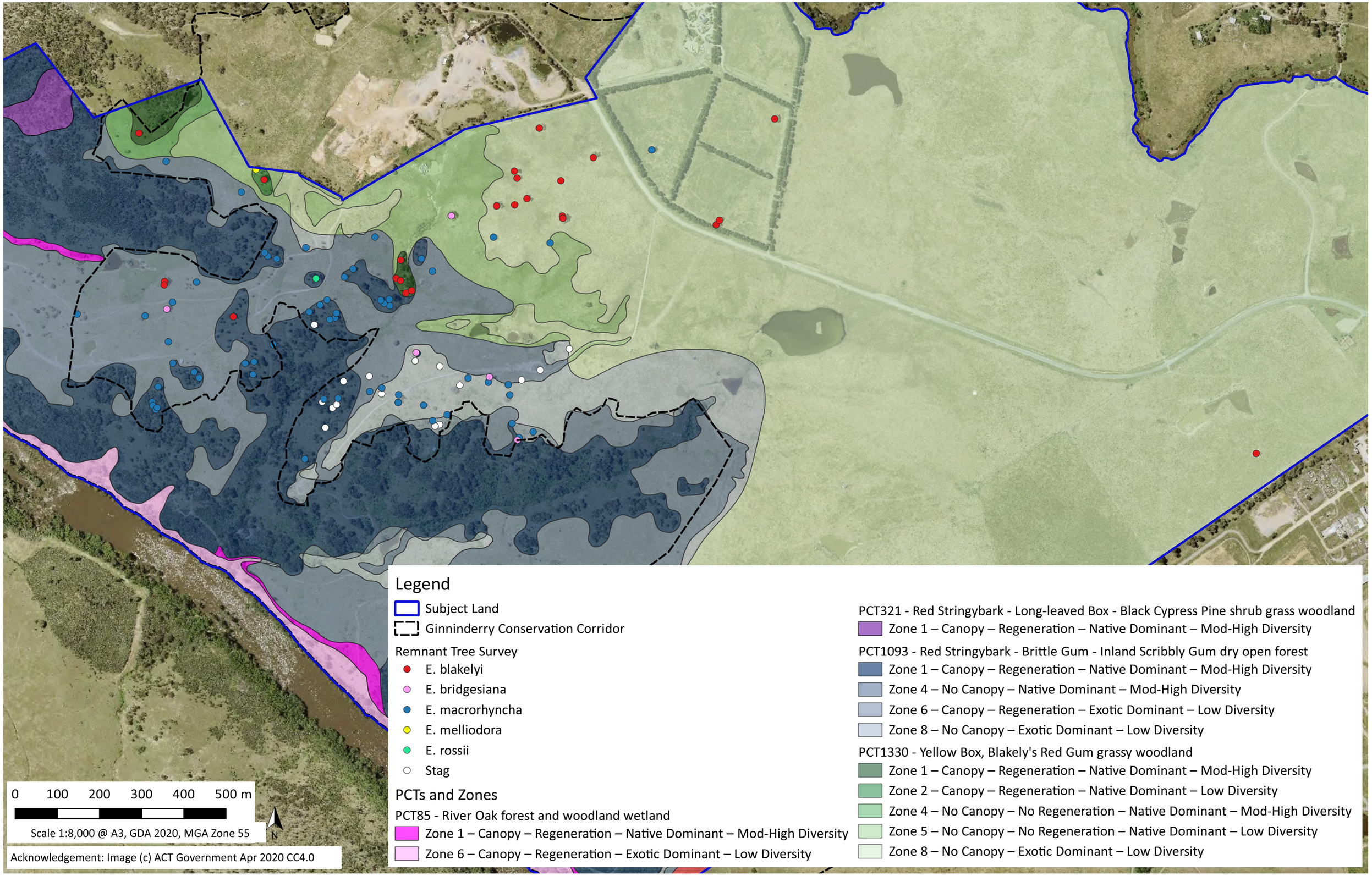

Figure 8. Remnant Tree Survey

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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 / NTG-SEH) and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act Box-Gum Woodland).

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

Description – As detailed in Commonwealth of Australia (2016a[37]), 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 m^2 (i.e. 20x20 m), if it meets either of the following scenarios.

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

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

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

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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.

PCT3415 Zones 3 and 4 do not meet the listing criteria for NTG-SEH[38]. 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 NTG-SEH 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

Description – 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.

Presence in the subject land – 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.

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 GCC or the 'Avoided Land' (see Section 3.1) and will therefore not be impacted by the proposed development.

[38] 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.

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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[39] 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**	**No**	**Yes**	**No**	**No**

[39] 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*.'

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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 2020a[40]).

> *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*

40 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.

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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.

Presence in the subject land – 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 subject land 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 only impact PCT1330 Zone 2 and Zone 5; as such, the proposed development will therefore impact 0.22 ha of moderate condition BC Act Box-Gum Woodland (PCT1330 Zone 2) and 13.86 ha of low condition BC Act Box-Gum Woodland (PCT1330 Zone 5).

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 2019[41]).

> *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*

[41] 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.

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and cover vary as a function of moisture availability, drainage and past land management. The 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.

Presence in the subject land – 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. As such, the subject land does not support vegetation which meets the criteria for this community under the BC Act.

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 2 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	
Salix 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 ecosystem credits species (Section 2.3.3), and species credit species (Section 2.3.4).

Table 21. Fauna habitat features.

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 GCC. 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 2.3.4, 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 Department of Climate Change, Energy, the Environment and Water's (DCCEEW) online EPBC Act Protected Matters Search Tool (PMST) or flagged by the BAM as ecosystem credits species (Section 2.3.3) and species credit species (Section 2.3.4).

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 DCCEEW 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.

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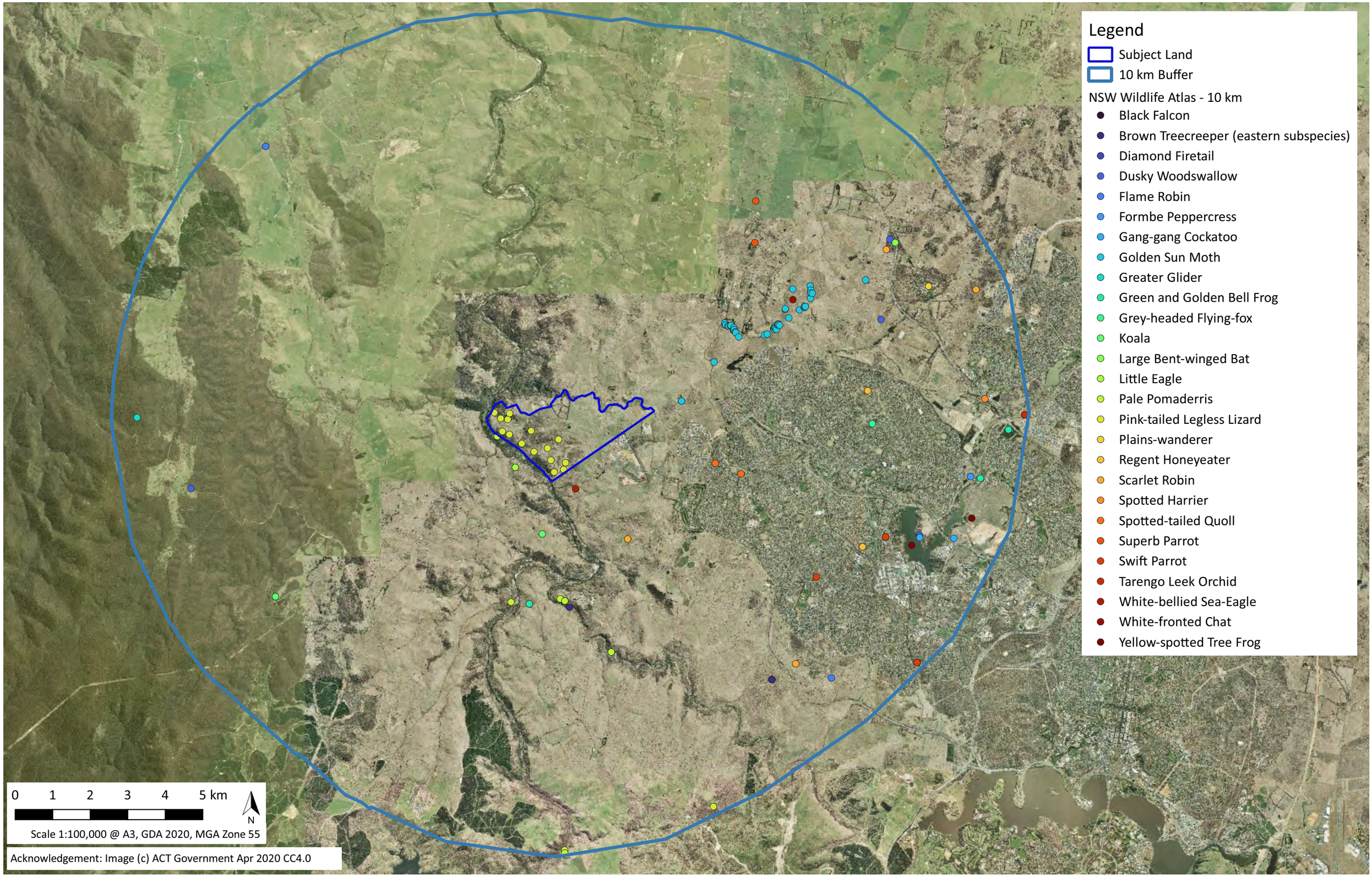

Figure 8. NSW Wildlife Atlas Threatened Species Search

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

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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 Regent Honeyeater (Foraging)	Critically Endangered	Critically Endangered	Yes – assumed	-
Artamus cyanopterus cyanopterus Dusky Woodswallow	Vulnerable	-	Yes – confirmed See Section 2.3.4	-
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	Vulnerable	Endangered	Yes – confirmed See Section 2.3.4	-
Chthonicola sagittata Speckled Warbler	Vulnerable	-	Yes – assumed	-
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	Vulnerable	Vulnerable	Yes – assumed	-
Daphoenositta chrysoptera Varied Sittella	Vulnerable	-	Yes – confirmed See Section 2.3.4	-
Dasyurus maculatus Spotted-tailed Quoll	Vulnerable	Endangered	Yes – assumed	-
Falco subniger Black Falcon	Vulnerable	-	Yes – assumed	-
Glossopsitta pusilla Little Lorikeet	Vulnerable	-	Yes – assumed	-

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
Grantiella picta 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	-	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	-
Melanodryas cucullata cucullata 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	-

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Presence	Justification for exclusion
Neophema pulchella Turquoise Parrot	Vulnerable	-	Yes – assumed	-
Ninox strenua Powerful Owl (Foraging)	Vulnerable	-	Yes – assumed	-
Petaurus australis Yellow-bellied Glider	Vulnerable	-	Yes – assumed	-
Petroica boodang Scarlet Robin	Vulnerable	-	Yes – confirmed See Section 2.3.4	-
Petroica phoenicea Flame Robin	Vulnerable	-	Yes – confirmed See Section 2.3.4	-
Polytelis swainsonii Superb Parrot (Foraging)	Vulnerable	Vulnerable	Yes – assumed	-
Pteropus poliocephalus Grey-headed Flying-fox	Vulnerable	Vulnerable	Yes – assumed	-
Scoteanax reuppellii Greater Broad-nosed Bat	Vulnerable	-	Yes – assumed	-
Stagonopleura guttata Diamond Firetail	Vulnerable	Vulnerable	Yes – confirmed See Section 2.3.4	-
Suta flagellum Little Whip Snake	Vulnerable	-	Yes – assumed	-
Varanus rosenbergi 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, geographic limitations, 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 2.3.4.

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

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Ammobium caspedioides 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 *'west of the Federal Highway'* as a geographic limitation for this species.	No – surveyed	The species was not detected in the subject land during targeted surveys. In addition, the species is not known to occur in the locality. Conclusion - the species is unlikely to occur in the subject land.
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 *'as per important habitat map'* as a breeding habitat constraint for this species.	No – habitat constraint	The subject land is not identified on the 'BAM – Important Areas viewer' map[42]. Conclusion - the subject land lacks the breeding habitat constraints required for this species.
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 *'rocky areas or within 50 m of rocky areas'* as a habitat constraint for this species and the BAM Calculator lists '*west of Dalton*' 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 2.3.4, the species was detected in the subject land during targeted surveys. Conclusion - the development footprint supports 37.64 ha of habitat for this species, of which 3.45 ha will be impacted by the proposed development.
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. The TBDC lists '*Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger'* as a breeding habitat constraint for this species.	No – surveyed	Targeted bird surveys were conducted across the wider subject land in the patches of more intact woody vegetation, and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in hollows (Figure 10). No Gang-gang Cockatoos were recorded in the subject land nesting in tree hollows. Conclusion - the species is considered unlikely to breed in the subject land.

[42] https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAreas

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Cercartetus nanus 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 – microhabitat features	Field surveys of the vegetation in the subject land did not record any banksias or bottlebrushes (Appendix B). A tree habitat assessment did not record any Ringtail Possum dreys or other evidence of this species (Appendix C). As such, the subject land lacks the primary microhabitat features required for this species. Finally, the species has not been recorded in the locality (Figure 9). Conclusion - the species is considered unlikely to occur in the subject land.
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 *Themeda triandra*, Speargrasses *Austrostipa* spp., Poa Tussocks *Poa* spp., and occasionally Wallaby Grasses *Rhytidosperma* 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 2.3.4, targeted surveys did not detect this species in the development footprint or wider subject land. Conclusion - the subject land does not support habitat for this species.
Grevillia iaspicula 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 *Eucalyptus albens* and Apple Box *E. bridgesiana.* It often occurs as a co-dominant species within the shrubby understorey of its open woodland habitat. The TBDC lists '*limestone rock substrate*' as a habitat constraint for this species.	No – habitat constraint	The subject land does not support limestone rock substrate. The absence of this habitat constraint removes this species from consideration as a species credit species. The species is not known from the locality. Conclusion - the species is considered unlikely to occur in the subject land.
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 recorded within 1 km of the subject land in 2009, and the subject land contains potential habitat particularly along the Murrumbidgee River. Targeted bird surveys were conducted across the subject land in the patches of more intact woody vegetation, and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in stick nests (Figure 10). No White-bellied Sea-eagles were recorded in the subject land. Conclusion - the species is considered unlikely to breed in the subject land.
Hieraaetus morphnoides Little Eagle (Breeding)	Vulnerable	-	This species occupies open eucalypts forest, woodland, or open woodland. Sheoak or *Acacia* 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 *'Nest trees - live (occasionally dead) large old trees within vegetation'* as a breeding habitat constraint for this species.	No – surveyed	The species has been recorded several times in the locality. Targeted bird surveys were conducted across the subject land in the patches of more intact woody vegetation, and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in stick nests (Figure 10). No Little Eagles were recorded in the subject land. Conclusion - the species is considered unlikely to breed in the subject land.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Keyacris scurra 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 *Themeda triandra*) and known food plants (particularly Asteraceae, indicator species include the daisy *Chrysocephalum apiculatum*). 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 undertaken for this species as it was not listed at the time. The species has been recorded within 10 km of the subject land, in remnant Box-Gum Woodland. 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). Conclusion - the species is assumed present across all areas of suitable habitat (i.e. PCT1330 Zones 1 and 4, and PCT1093 Zone 4).
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 *Eucalyptus globulus.* 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 Important Habitat Map'* as a breeding habitat constraint for this species.	No – habitat constraint	The subject land is not identified on the 'BAM – Important Areas viewer' map[43]. Conclusion - the subject land lacks the breeding habitat constraints required for this species.
Leucochrysum albicans var. tricolor 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 2.3.4, the species was not recorded in the subject land during targeted surveys. Conclusion - the species is considered unlikely to occur in the subject land.
Litoria booroolongensis 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 recorded in the locality. While the reach of the Murrumbidgee River which adjoins the subject land does support characteristically suitable habitat for the species (i.e. lightly impacted streams with cobble/stony banks and intact fringing vegetation), the development will not impact these areas. The remainder of the subject land either lacks appropriate microhabitat features or has been degraded to the extend that it is considered unlikely to support the species. Conclusion - the species is considered unlikely to occur in the subject land.
Lophoictinia isura 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 recorded within 10 km of the subject land (Figure 9). In addition, targeted bird surveys were conducted across the subject land in the patches of more intact woody vegetation, and remnant trees were assessed for the presence/absence of habitat features and for signs of fauna nesting in stick nests. No Square-tailed Kites were recorded in the subject land. Conclusion - the species is considered unlikely to breed in the subject land.

[43] 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	Justification for exclusion
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 contain potential breeding habitat (caves, tunnels, mines, culverts, etc.). Conclusion - the subject land lacks the breeding habitat constraints required for this species.
Myotis macropus 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[44]), where it catches aquatic insects and small fish with their large hind claws, and also catches flying insects. The TBDC lists *'hollow bearing trees within 200 m of riparian zone'*, *'bridges, caves or artificial structures within 200 m of riparian zone'*, and '*waterbodies; this include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site'* as habitat constrains for this species.	No – surveyed	The species has not been recorded in the locality and was not recorded during targeted Anabat surveys. Conclusion - the species is unlikely to occur in the subject land.
Ninox strenua 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 *'living or dead trees with hollow greater than 20 cm diameter'* as a breeding habitat constraint.	No – surveyed	A tree habitat assessment found at least 30 trees with large hollows greater than 20 cm diameter (Appendix C). As such, the subject land supports potential habitat for this species. However, the species has not been recorded in the locality, and no evidence of the species was observed during field surveys. Conclusion - the species is considered unlikely to occur in the subject land.
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 (*Bursaria spinosa subspecies lasiophylla*), and relies on a mutualistic relationship with the ant, *Anonychomyrna itinerans*.	No – habitat constraint	The species is not known from the locality. In addition, the site is below 800 m and *Bursaria spinosa* is only present in very low numbers. Conclusion - the species is considered unlikely to occur in the subject land.
Petauroides volans Southern Greater Glider	Endangered	Endangered	The Southern Greater Glider occurs in eastern Australia, in eucalypt forests and woodlands, where it has a broad distribution from around Proserpine in Queensland, south through NSW and the Australian Capital Territory into Victoria. The Southern Greater Glider is an arboreal nocturnal marsupial that feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Individuals occupy relatively small home ranges, with an average size of 1 ha to 3 ha.	No – microhabitat features	The species has been recorded around 9.5 km west of the subject land, in intact tall montane forest (Figure 9). The subject land does not support tall, montane, or moist eucalypt forest, and is isolated from areas of known habitat by cleared agricultural land. The subject land therefore lacks the primary microhabitat features required to support the species. Conclusion - the species is considered unlikely to occur in the subject land.

[44] 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.

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Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Petaurus norfolcensis 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 from the locality (Figure 9). While the subject land does support a number of mature, hollow bearing trees and areas with a relatively intact midstorey in the Murrumbidgee River corridor, these areas are not typical habitat for the species and will not be impacted by the proposed development. Conclusion - the species is considered unlikely to occur in the subject land.
Phascolarctos cinereus Koala	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 *'Presence of koala use trees - refer to the Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide for information on targeted survey requirements and mapping species polygons'* as a habitat constraint for breeding for this species.	No	The species has not been recorded recently in the locality, and 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). In addition, the ecological values of the subject land have been investigated since the early 1990s (refer to Section 1.3). No Koala or signs of Koala occupation have ever been detected. The lack of Koala observations indicates that the subject land does not support occupied Koala habitat. Conclusion - the species is considered unlikely to occur in the subject land.
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 found that the subject land contains numerous mature hollow bearing trees (Appendix C). However, the species is not known to breed in the locality and no evidence of Superb Parrot breeding was recorded during targeted surveys. Conclusion - the species is considered unlikely to occur in the subject land.
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 (*Eucalyptus mannifera*) and Red Stringybark (*E. macrorhyncha*) or *Callitris spp.* woodland.	Yes – confirmed	Pale Pomaderris has previously been recorded in the Murrumbidgee River corridor adjacent to the subject land (Figure 9). The species was recorded in a similar location during targeted threatened flora surveys conducted across the subject land during the development of this BCAR (Section 2.3.4). This area will not be impacted by the proposed development and will be protected in the Ginninderry Conservation Corridor (Figure 10). Conclusion - this species occurs in the subject land but will not be impacted by the proposed development.
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 recorded in the locality. The species was not recorded during targeted surveys for this BCAR. Conclusion - the species is unlikely to occur in the subject land.
Pteropus poliocephalus 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 *'breeding camps'* as a breeding habitat constraint for this species.	No – habitat constraint	Field surveys confirmed that the subject land does not support breeding camps. Conclusion - the subject land lacks the breeding habitat constraints required for this species.

Species	NSW (BC Act) listing status	National (EPBC Act) listing status	Habitat requirements	Presence	Justification for exclusion
Swainsona recta 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 *E. blakelyi*, Yellow Box *E. melliodora*, Candlebark Gum *E. rubida*, and Long-leaf Box *E. goniocalyx*. It grows in association with understorey dominants that include Kangaroo Grass *Themeda australis*, Poa tussocks *Poa* spp. and Speargrasses *Austrostipa* 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 recorded in the locality, and targeted threatened flora surveys through potential habitat did not detect the species (see Section 2.2.3). <u>Conclusion - the species is unlikely to occur in the subject land.</u>
Swainsona sericea Silky Swainson-pea	Vulnerable	-	This species is found in Natural Temperate Grassland and Snow Gum *Eucalyptus pauciflora* 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 *Callitris* 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 recorded in the locality, and targeted threatened flora surveys through potential habitat did not detect the species (see Section 2.2.3). <u>Conclusion - the species is unlikely to occur in the subject land.</u>
Synemon plana 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 *Rhytidosperma* 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 *Austrostipa* spp. or Kangaroo Grass *Themeda australis*. The TBDC lists '*Wallaby grass (Rytidosperma sp.), Speargrass (Austrostipa sp) or Chilean needlegrass (Nassella nessiana)'* 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, Golden Sun Moth surveys could not be completed during the 2020 or 2021 survey seasons due to the very high annual grass cover. However, based on habitat assessment across the subject land during spring 2020 and spring 2021, it was determined that Golden Sun Moth surveys are not required as the areas previously identified as potential habitat support very high biomass of exotic pasture and do not contain the habitat features required to support the species. <u>Conclusion - the habitat in the subject land is degraded to the extent that the species is unlikely to occur.</u>
Thesium australe 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	The species has not been recorded in the locality, and targeted threatened flora surveys through potential habitat did not detect the species (see Section 2.2.3). <u>Conclusion - the species is unlikely to occur in the subject land.</u>

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, Diamond Firetail *Stagonopleura guttata*, Dusky Woodswallow *Artamus cyanopterus*, Flame Robin *Petroica phoenica*, Gang-gang Cockatoo *Callocephalon fimbriatum,* and Varied Sittella *Daphoenositta chrysoptera*.

<u>Threatened birds</u>

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) and the migratory Rainbow Bee-eater *Merops ornatus* 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). No evidence of Gang-Gang Cockatoo breeding in the subject land was detected.

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.

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Striped Legless Lizard *Delma impar*

The program of tile surveys was completed in early December 2020 and no Striped Legless Lizards (were recorded in the subject land. The tiles were collected and removed from the subject land in March 2021. In light of the above, it is concluded that the subject land does not support the Striped Legless Lizard.

Pink-tailed Legless Lizard *Aprasia parapulchella*

Pink-tailed Legless Lizard 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 Pink-tailed Legless Lizard 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 Pink-tailed Legless Lizard 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 2018b[45]) 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), being PCT1330 Zones 1 and 4, and PCT1093 Zone 4 (total 78.67 ha) (Figure 11).

[45] 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.

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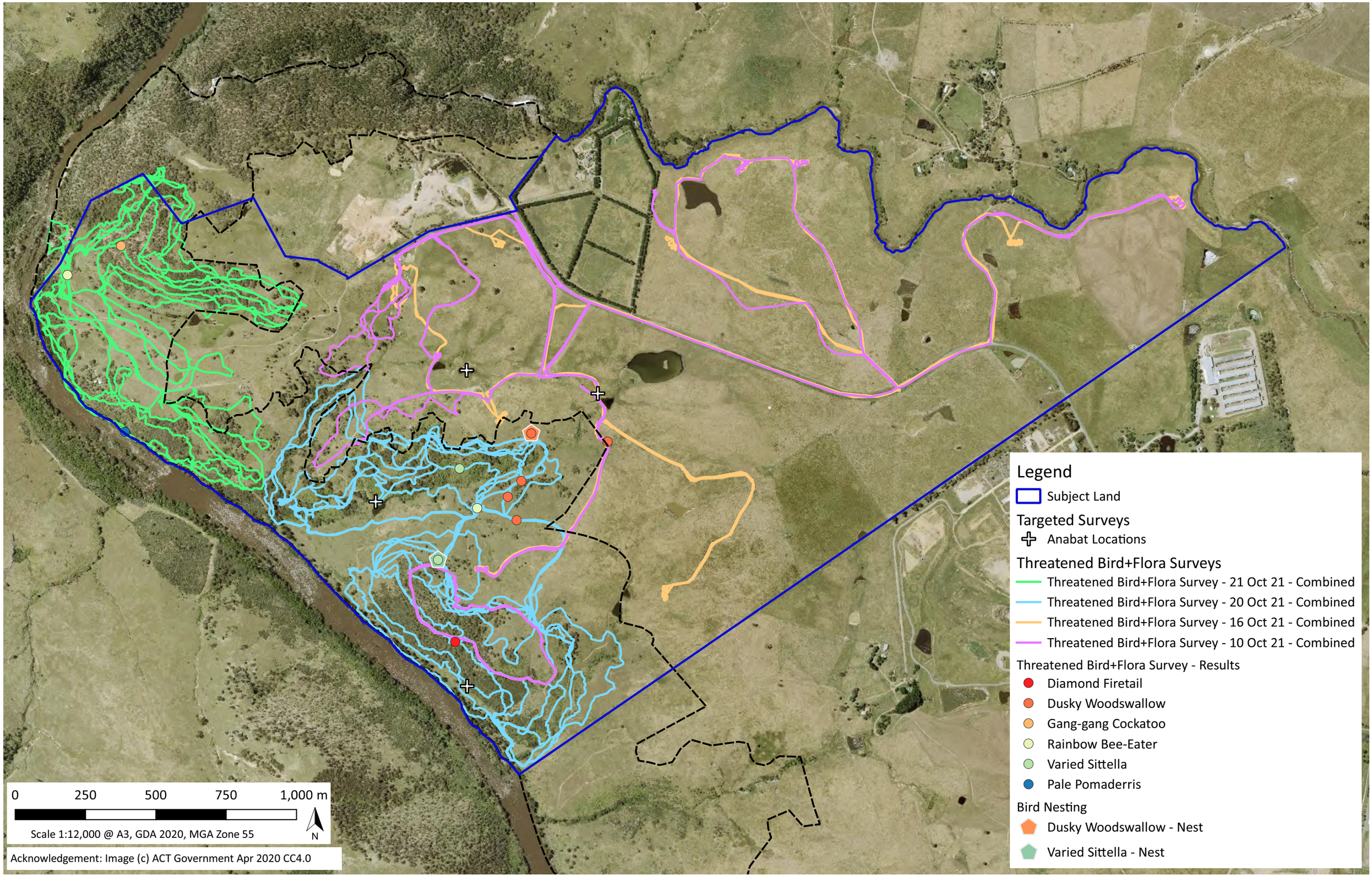

Figure 10. Threatened Bird, Bat and Flora Survey Results

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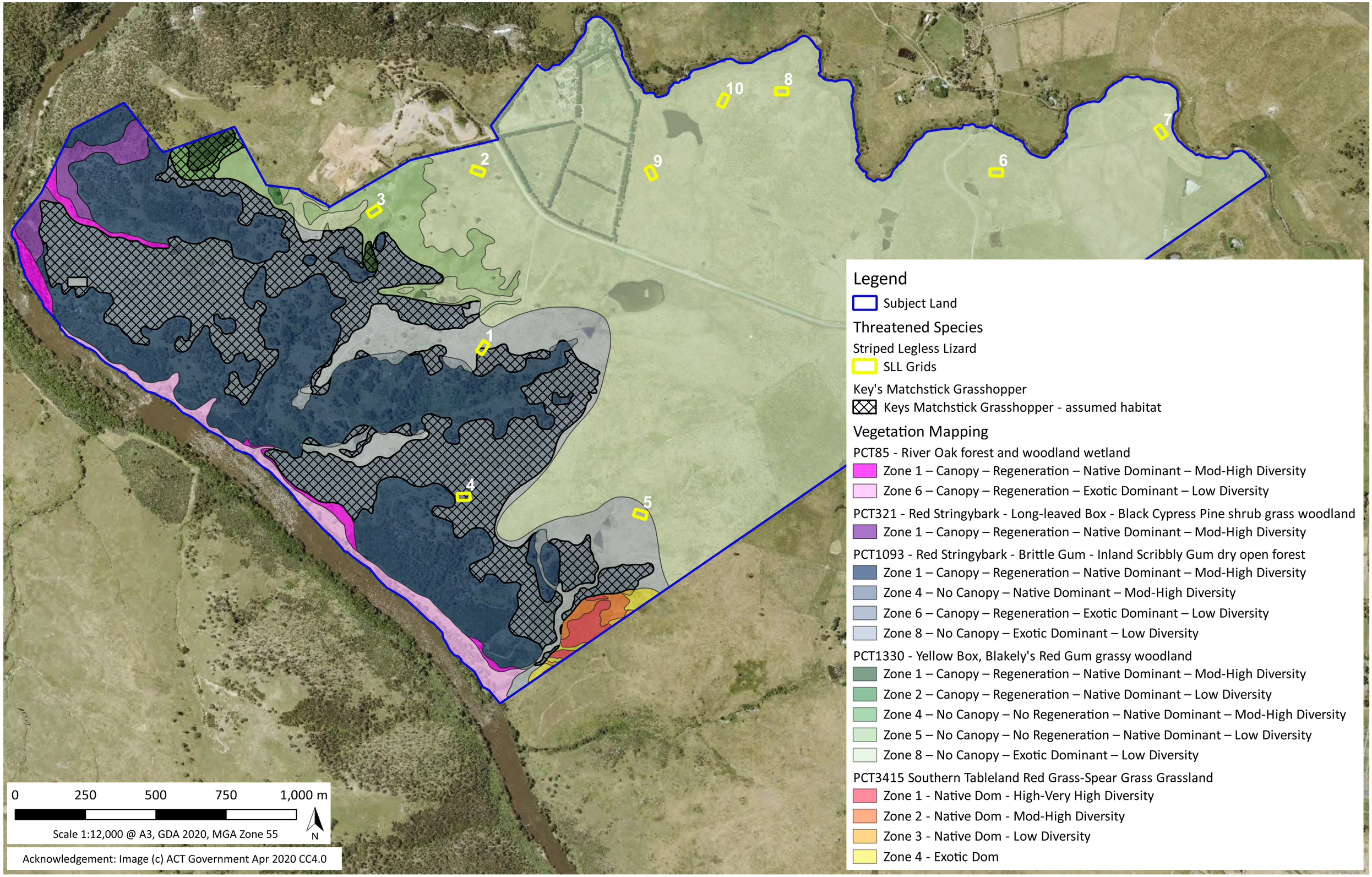

Figure 11. Striped Legless Lizard Survey Results and Assumed Key's Matchstick Grasshopper Habitat

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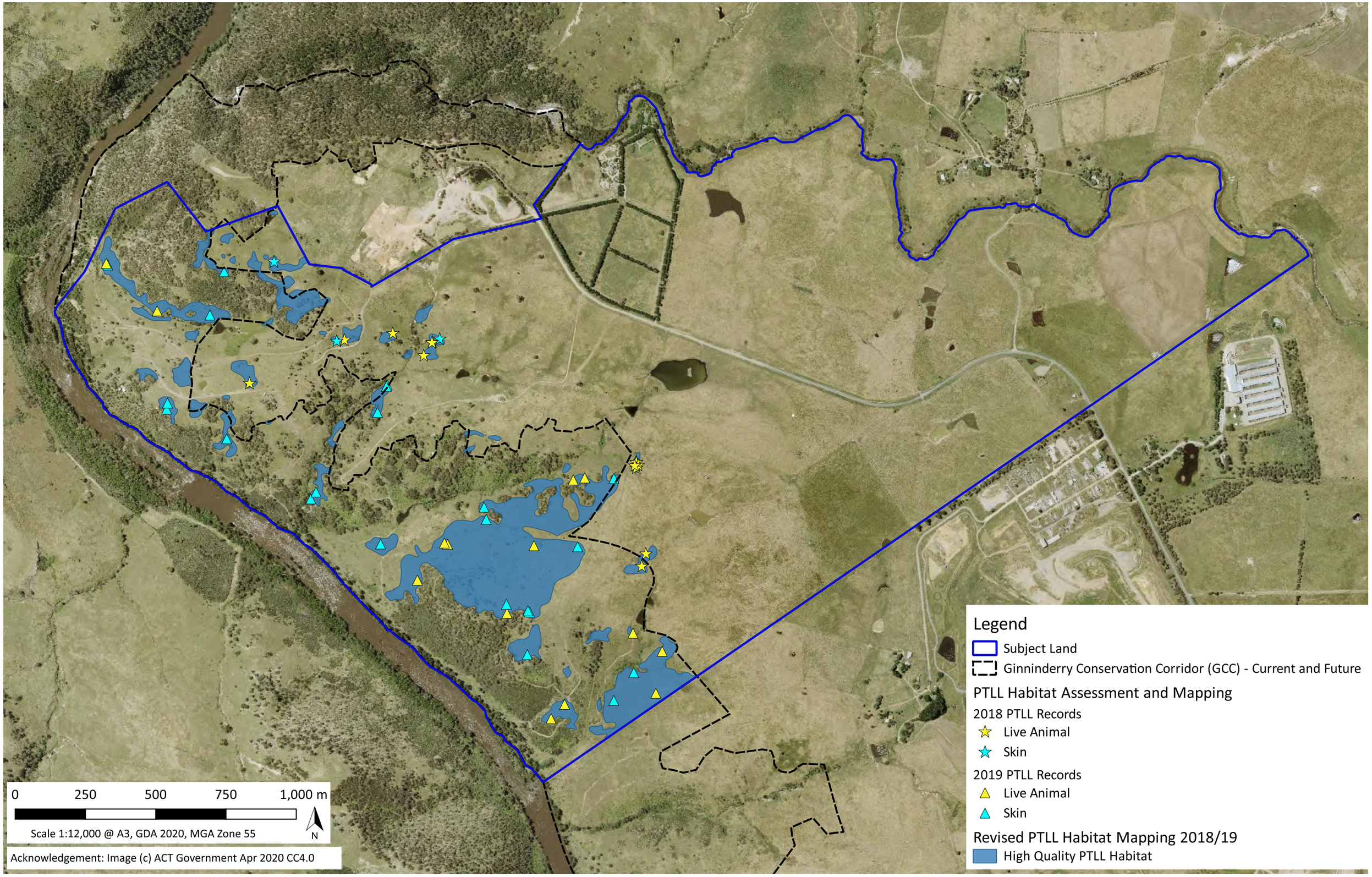

Figure 11. Pink-tailed Legless Lizard Survey Results

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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', see 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 these areas will be fenced and managed by the GCT. If possible, they will be incorporated into the GCC and/or be rezoned as C2 - Environmental Conservation. By doing so, the proposed development avoids impacts to:

- 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 of which meets the listing criteria for EPBC Act Box-Gum Woodland;
- 0.57 of Pink-tailed Legless Lizard habitat; and
- 3.55 ha of moderate to high quality dry forest (i.e. PCT1093).

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 development[46] (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 1.3). 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.

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

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3.1.1 Location

Locating the project where there are low or no biodiversity values

As mentioned in Section 1.3, 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, the NSW portion of which protects approximately 31% (162.39 ha) of the subject land, including the vast majority of the identified significant biodiversity values. As shown in Figure 13 and Figure 14, protected values in the NSW portion of the GCC include:

- 6.73 ha of woodland vegetation (i.e. PCT1330), 0.80 ha of which meets the listing criteria for EPBC Act and BC Act Box-Gum Woodland;
- 4.30 ha of grassland vegetation (i.e. PCT3415), 3.09 ha of which meets the listing criteria for EPBC Act listed NTG-SEH;
- 33.62 ha of Pink-tailed Legless Lizard habitat.
- 151.40 ha of dry forest and riparian habitat in the Murrumbidgee River corridor, 143.29 ha of which is moderate to high quality.

In addition, the NSW portion of 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).

As mentioned previously, 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 of which meets the listing criteria for EPBC Act Box-Gum Woodland;
- 0.57 of Pink-tailed Legless Lizard habitat; and
- 3.55 ha of moderate to high quality dry forest (i.e. PCT1093).

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 NSW portion of the GCC and additional proposed 'Avoided Land' protects all of the high quality condition TECs, and the vast majority higher quality vegetation and threatened species habitat in the subject land, including (refer to Figure 13 and Figure 14):

- 100% (3.22 ha) of the EPBC Act listed Box-Gum Woodland;
- 100% (3.09 ha) of the EPBC Act listed NTG-SEH;
- 81.1% (146.84 ha) of the moderate to high quality dry forest and riparian habitat;

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- 90.8% (33.62 ha) 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 1.3, 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 support[47]. 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.
- Ongoing monitoring to assess the success of restoration work and the condition of flora and fauna.

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

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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 are proposed to be protected and managed as part of the GCC and support (Figure 13 and Figure 14):

- 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 of which meets the listing criteria for EPBC Act Box-Gum Woodland;
- 0.57 of Pink-tailed Legless Lizard habitat; and
- 3.55 ha of moderate to high quality dry forest (i.e. PCT1093).

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).

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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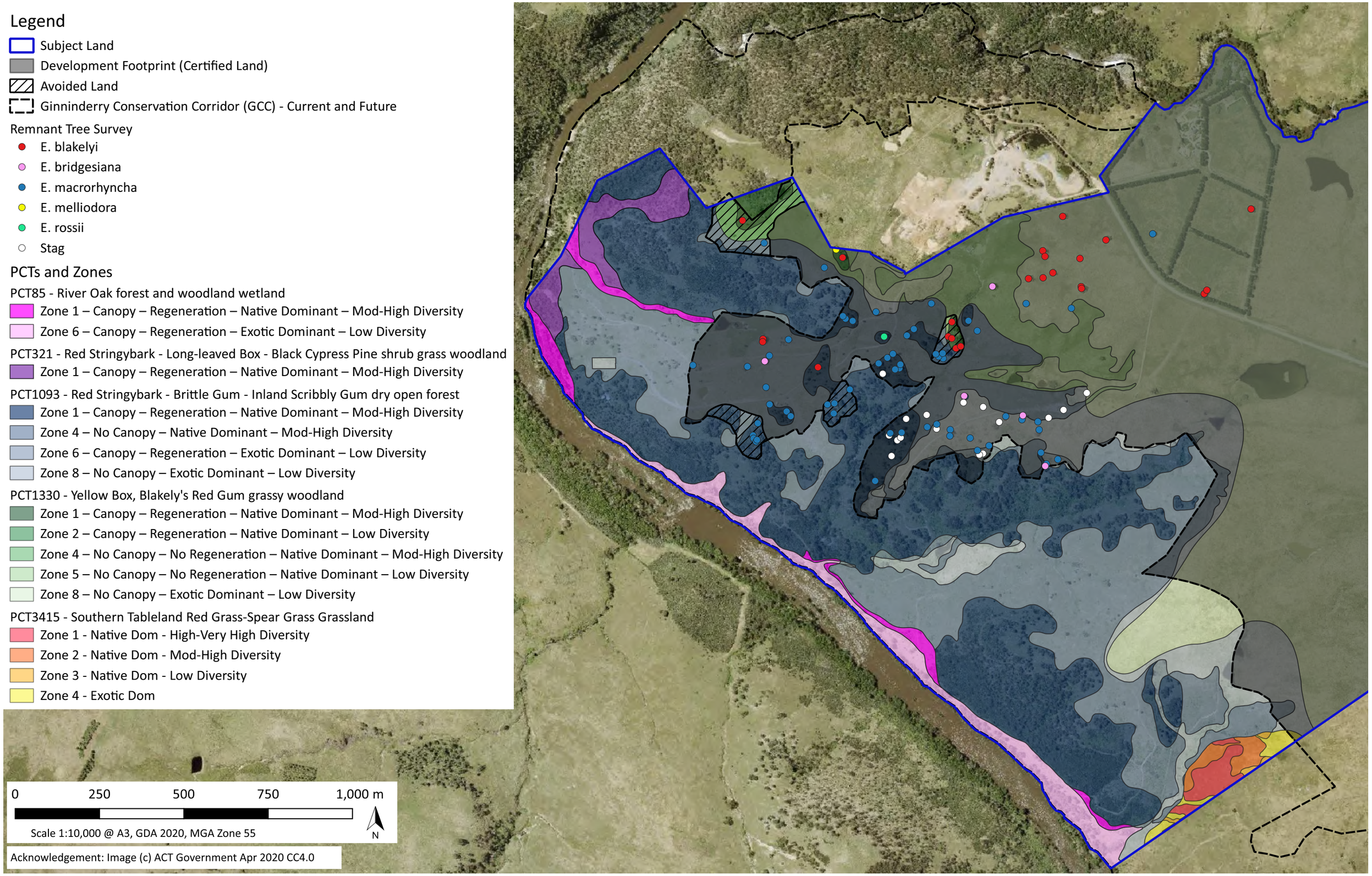

Figure 13. Avoidance, Minimisation, and Mitigation Measures - Vegetation

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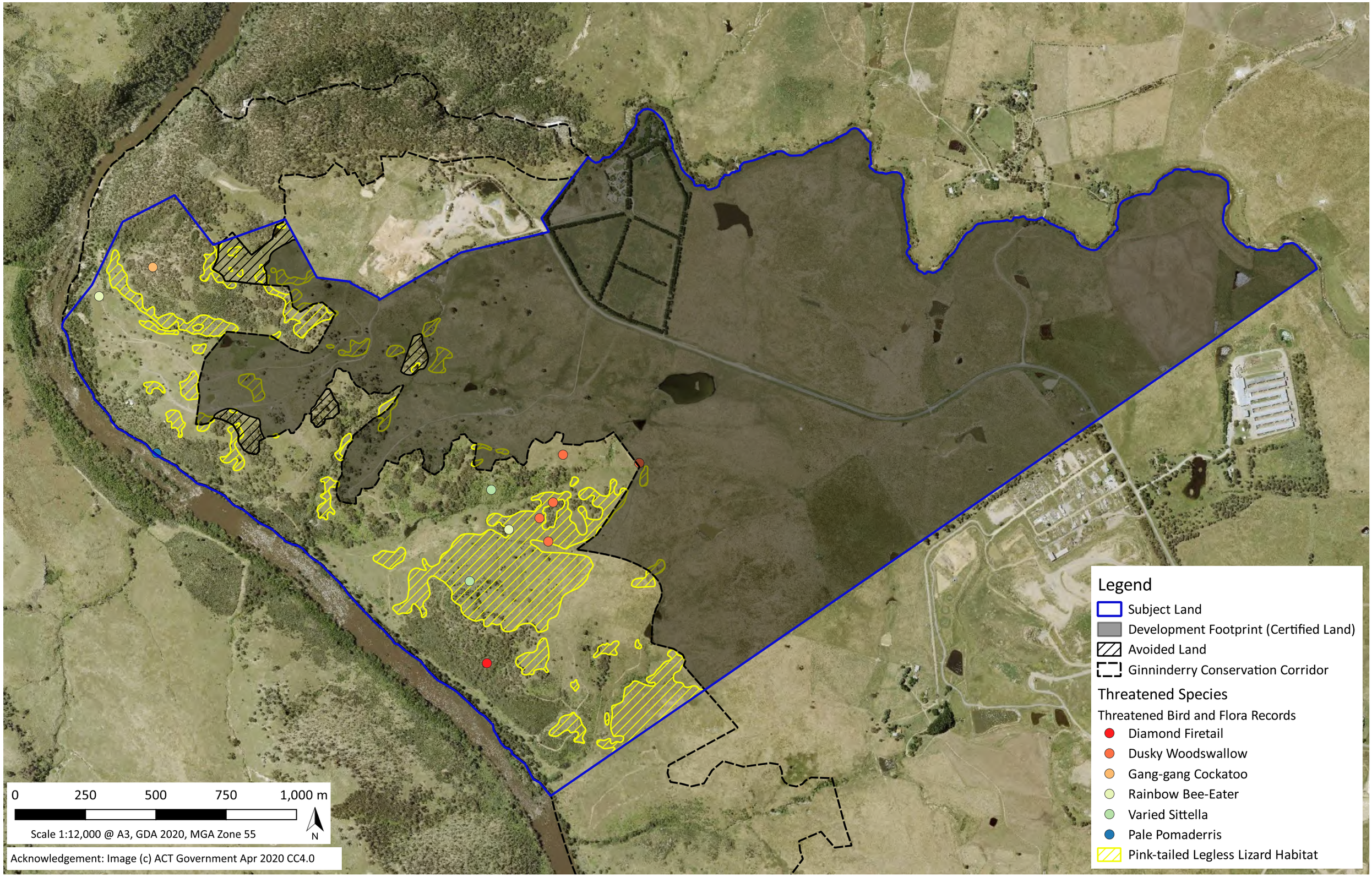

Figure 14. Avoidance, Minimisation, and Mitigation Measures - Flora and Fauna

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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:

- 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);
- 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);
- 3.45 ha of Pink-tailed Legless Lizard habitat (BC Act vulnerable, EPBC Act vulnerable); and
- 26.53 ha of assumed Key's Matchstick Grasshopper habitat (BC Act endangered, EPBC Act endangered).

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.

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- 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 1.3).

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.

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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'.

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 and Section 2.3.4, 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, a total of 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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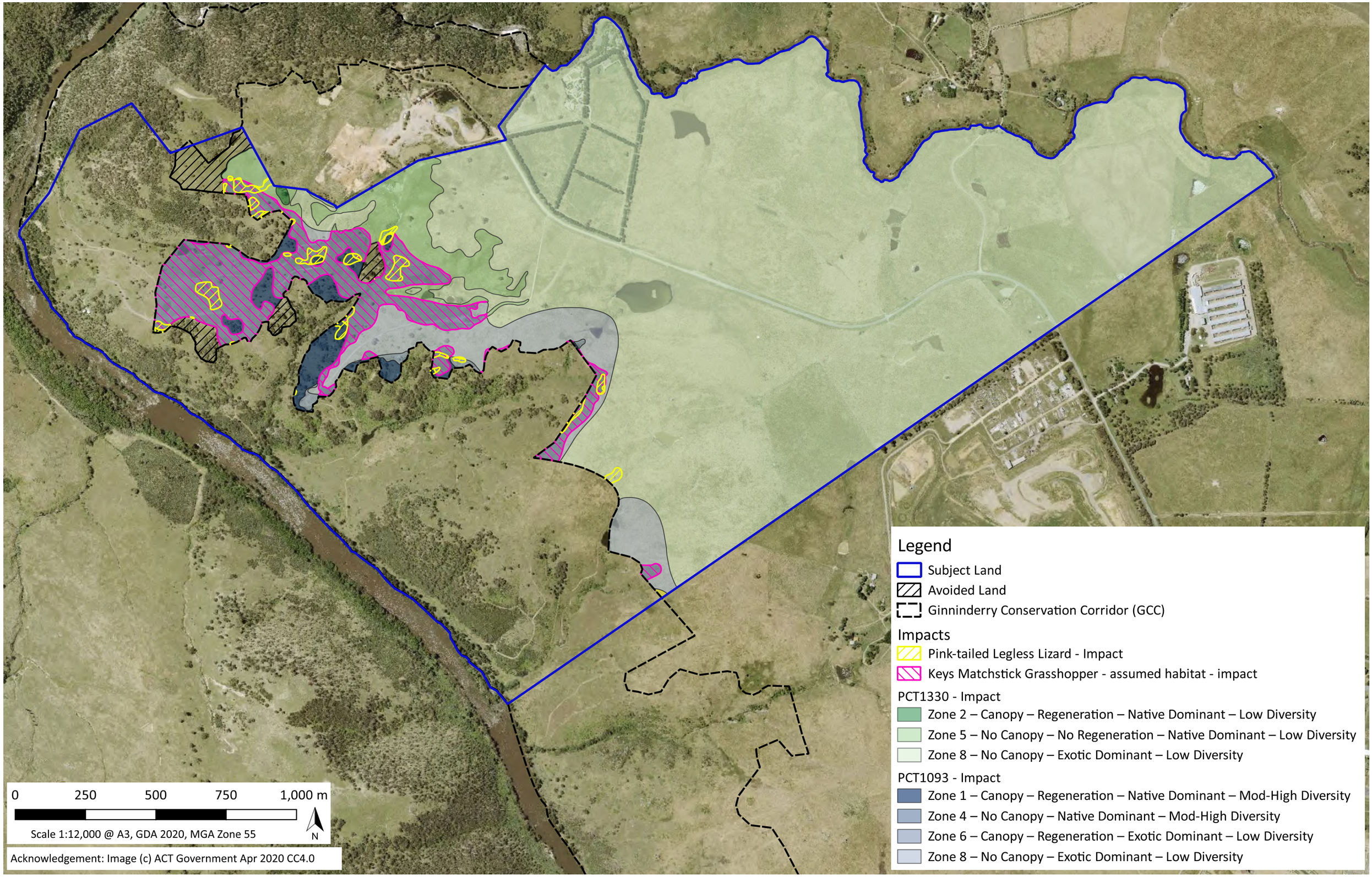

Figure 15. Residual Biodiversity Impacts of the Proposed Development

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

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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

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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 in the ACT, Strathnairn and Macnamara, will be continued through future areas of the development including those proposed in NSW. 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 re-certify 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.

<u>Remnant Tree Retention</u>

It is not possible at the Biodiversity Certification stage to specify which trees, or the maximum number of trees, that will be retained or removed as part of the proposed development. However, the Ginninderry Project works towards an overall master plan, and where trees can be retained whilst achieving a sensible urban design outcome, Ginninderry endeavours to do so.

To date, each Estate Development Plan (EDP) in the ACT portion of Ginninderry has incorporated the retention of the existing trees as a key objective to support biodiversity conservation. 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 Memorandum Of Understanding (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. 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. To date 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), and it is anticipated that similar levels of tree retention will be achieved in the NSW portion of Ginninderry.

In addition to the above-described project-driven tree retention, tree removal in NSW must be approved by the local Council, according to the NSW *Environmental Planning and Assessment Act 1979*. As such, Ginninderry will develop a Tree Retention Plan (TRP) for lodgement with each future Development Application (DA). The TRP will detail the location and characteristics (i.e. species, habitat values, structural integrity etc.) of each tree proposed to be retained and each proposed to be removed, providing appropriate justification where removal is necessary. The TRP will be

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prepared by or in consultation with a suitably qualified ecologist and arborist, and the objective of the TRP will be to facilitate the retention within the urban fabric of as many remnant trees as is practicable. It is anticipated that the Biodiversity Certification Agreement (BCA) will include a condition pertaining to the development and lodgement for Council approval of a TRP for each future DA.

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. Throughout Strathnairn (EDP 1 and EDP2) in the ACT portion of Ginninderry, a total of 1,051 additional trees, 13,855 shrubs, and 52,267 strappy plants and groundcovers were planted to supplement the original 115 remnant trees. Through these actions, Ginninderry as been able to achieve 18% tree canopy cover and 55% permeable surfaces across the currently developed urban area and is expected to achieve 26% canopy cover and 57% permeable surface for Macnamara (under construction); it is anticipated that similar levels of canopy cover and permeable surface will be achieved in the NSW portion of Ginninderry.

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. Again, it is anticipated that similar activities will occur in the NSW portion of Ginninderry.

Water Sensitive Urban Design System

A comprehensive Water Sensitive Urban Design System has been designed for the Ginninderry Development, which will be implemented in the NSW portion of Ginninderry. This system reduces the amount of stormwater that is discharged into the GCC 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, including those proposed for the NSW portion of Ginninderry, will require cat containment and dogs will be required to be on leash throughout the urban areas. These initiatives help to reduce residential impacts on native species throughout the area.

The GCT 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.

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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, the GCC 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 2019[48]) 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

[48] 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

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*[49] threatened woodland spatial data, accessed on 3 March 2021.
- NSW Government Saving Our Species (SOS) profile[50], project report[51], and Googong-Burra Region priority management information[52].
- *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 2020b[53]).
- *Conservation Assessment of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (NSW Threatened Species Scientific Committee 2020c[54]).
- NSW Government Office of Environment & Heritage White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland profile[55].
- *ACT native woodland conservation strategy and action plans* (ACT Government 2019[56]).
- *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 2006[57]).

[49] http://app.actmapi.act.gov.au/actmapi/index.html?viewer=ssvcrt
[50] https://www.environment.nsw.gov.au/savingourspeciesapp/project.aspx?ProfileID=10837
[51] https://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=988&ReportProfileID=10837
[52] https://www.environment.nsw.gov.au/savingourspeciesapp/ManagementSite.aspx?SiteID=3052
[53] NSW Threatened Species Scientific Committee (2020b), *Notice of and reason for the Final Determination.*
[54] NSW Threatened Species Scientific Committee (2020c). *Conservation Assessment of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*
[55] https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10837
[56] ACT Government (2019). *ACT native woodland conservation strategy and action plans*. Environment, Planning and Sustainable Development.
[57] 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.

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- *White box - Yellow box - Blakely's red gum grassy woodlands and derived native grasslands* (Commonwealth of Australia 2006[58]).
- *National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (DECCW 2010[59]).

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;
- 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 294.96 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 (see 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);
- 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 2); and

[58] 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.
[59] 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

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- 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 Zone 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:

- 0.80 ha is protected within the GCC; 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 0.80 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 Plan[60], 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 GCC 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 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.

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

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- ***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***

  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 2[61]. 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…

[61] 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

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…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).

- 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 0.02% of the TEC in South-Eastern NSW and 0.006% 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 42.8; 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).

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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.

98.4% (13.86 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 = 1,142 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 98.4% 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.

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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 GCC 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% (3.22 ha) of the EPBC Act listed Box-Gum Woodland;
- 100% (3.09 ha) of the EPBC Act listed NTG-SEH;
- 81.1% (146.84 ha) of the moderate to high quality dry forest and riparian habitat;
- 90.8% (33.62 ha) 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 42.8 (composition 13.5, structure 93.3, 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 22.6, structure 46.8, and function 0). As described in Section 2.2.4, 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.

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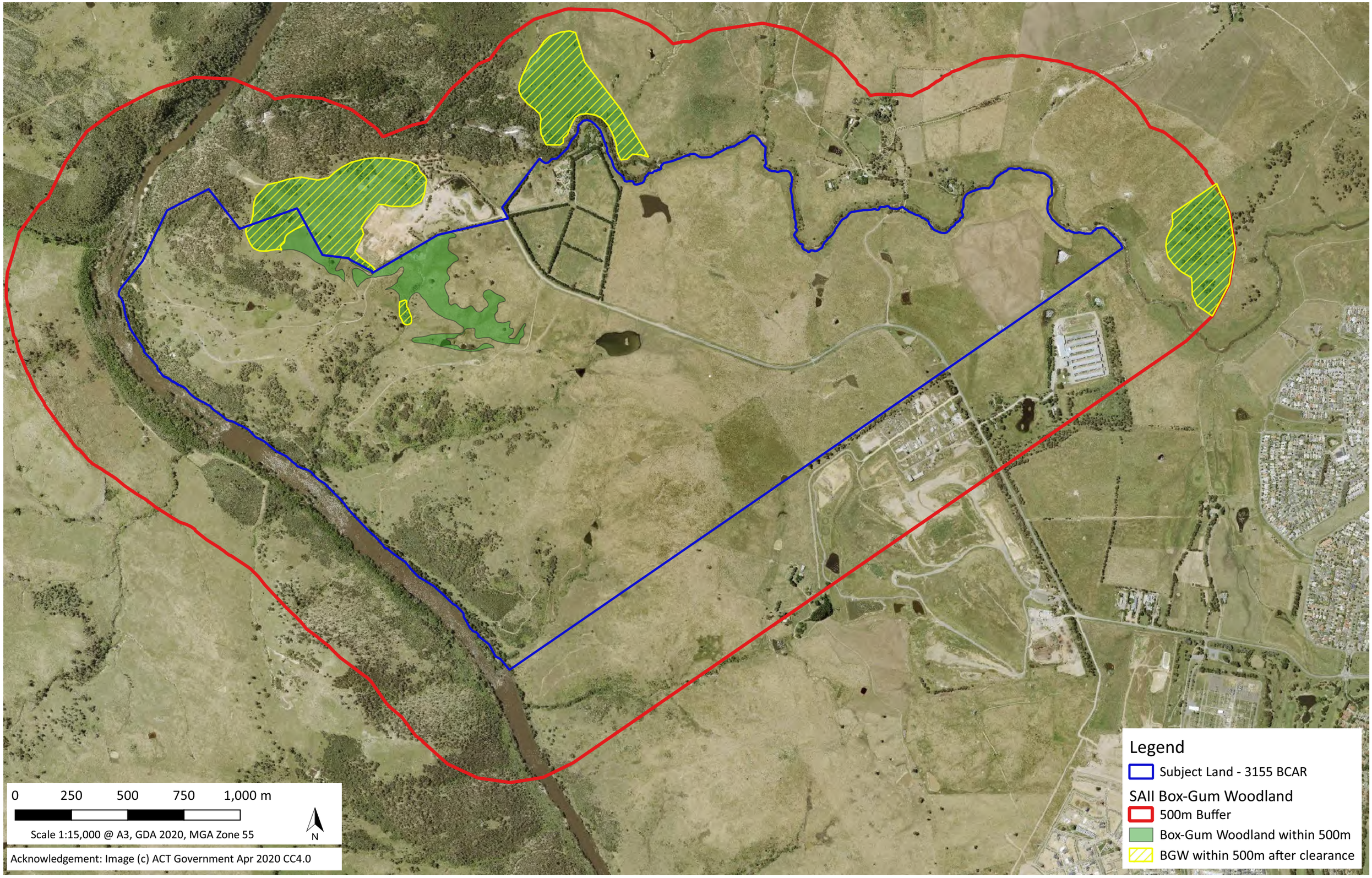

Figure 16. SAII - Box-Gum Woodland within 500m of the subject land.

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

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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.

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.

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

c. ≥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.

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Table 24. Ecosystem credit requirements.

PCT & Vegetation Zone	Vegetation Integrity Score	Proposed Clearance Area (ha)	Credits Required
PCT1093 Zone 1	67.1	6.84	201
PCT1093 Zone 4	10.4	26.53	0
PCT1093 Zone 5	17.5	0.91	7
PCT1093 Zone 8	0.7	17.96	0
		Total	**208**
PCT1330 Zone 2	42.8	0.22	6
PCT1330 Zone 5	0.7	13.86	0
PCT1330 Zone 8	0.3	289.03	0
		Total	**6**

Species credit requirements

The development footprint supports habitat for Pink-tailed Legless Lizard and assumed habitat for Key's Matchstick Grasshopper, both of which are species credit species. Accordingly, as detailed in Table 25, the proposed development does generate a species credit obligation.

Table 25. Species credit requirements.

Species	PCT & Vegetation Zone	Habitat Condition (Vegetation Integrity) Loss	Proposed Clearance Area (ha)	Credits Required
Aprasia parapulchella Pink-tailed Legless Lizard	PCT1093 Zone 1	67.1	0.63	21
	PCT1093 Zone 4	10.4	2.31	12
	PCT1093 Zone 6	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**
Keyacris scurra Key's Matchstick Grasshopper	PCT1093 Zone 4	10.4	26.53	138
			Total	**138**

Credit obligation options

As detailed by the NSW Department of Planning and Environment[62], 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.'*

[62] https://www.environment.nsw.gov.au/biodiversity/offsetsscheme.htm

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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'.
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 therefore not prevented by the Koala Habitat Protection SEPP 2021 from granting consent to a development application within the subject land</u>.

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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 reported separately 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	147.43
Retained Land not Proposed for Certification	N/A	0	0
Biodiversity Certification Assessment Area (Total area of Subject Land)		**523.84**	**201.81**

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	0.80
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	294.96	289.03	0	5.93
BC Act Box-Gum Woodland	17.35	14.08	2.47	0.80
EPBC Act Box-Gum Woodland	3.22	0	2.42	0.80
PCT3415 Zone 1	1.76	0	0	1.76

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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	3.09	0	0	3.09
Remnant trees	-	88 trees	20 trees	Not surveyed
Pink-tailed Legless Lizard	37.64	3.45	0.57	33.62
Key's Matchstick Grasshopper	78.67 (assumed)	26.53 (assumed)	N/A	N/A

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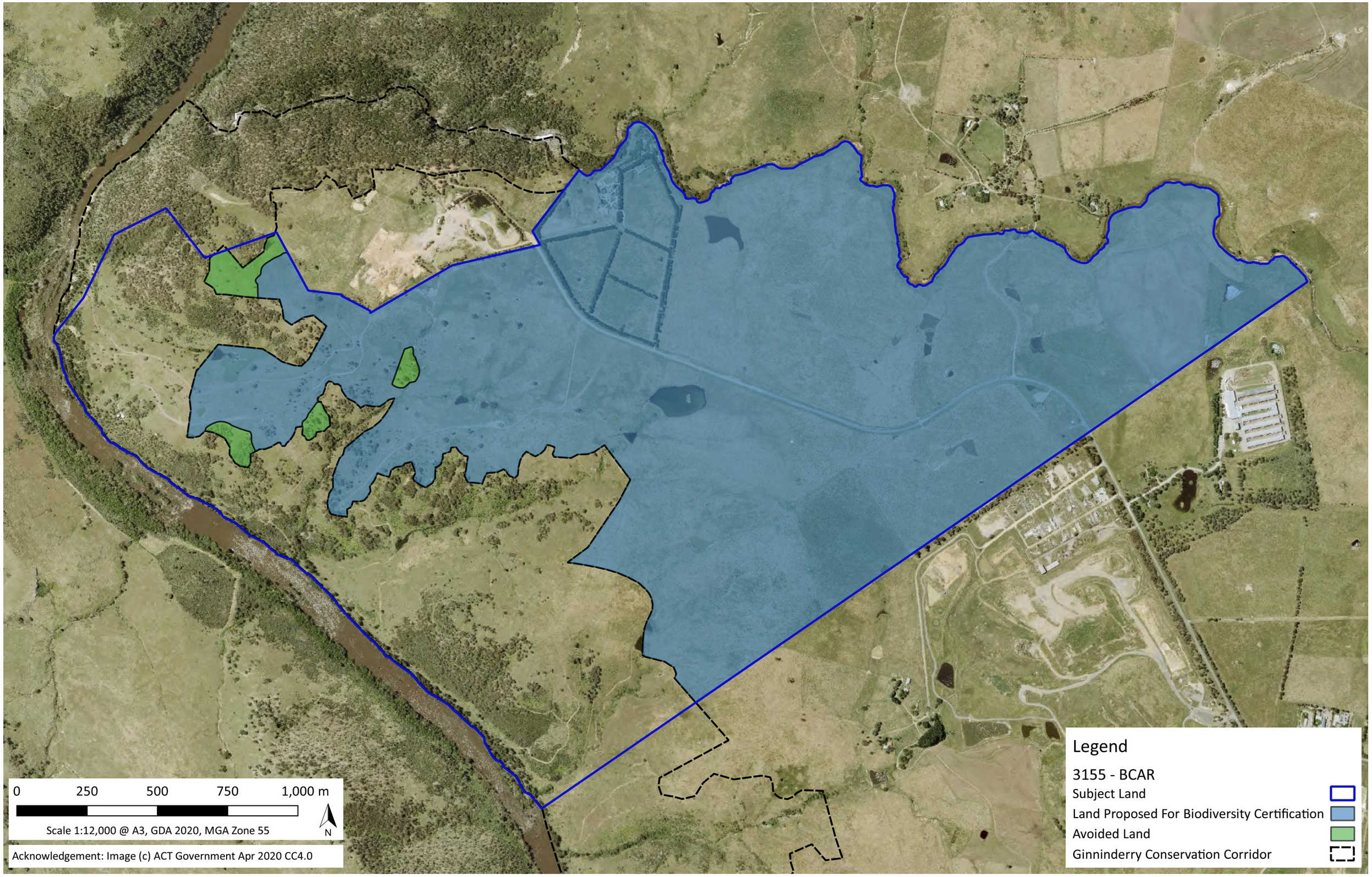

Figure 17. Biodiversity Certification Areas

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

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Appendices

Appendix A. BAM Plot/Transect Scores

PCT code	Veg. Zone	Plot No.	Composition (species richness)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
85	1	1	1	1	1	3	0	0
		2	1	1	3	6	0	0
		3	1	1	0	0	0	1
	2	1	1	0	3	1	0	0
		2	1	0	2	2	0	1
		3	2	5	8	13	1	0
321	1	1	4	3	5	10	1	0
		2	3	5	10	14	2	4
1093	1	1	1	1	3	5	0	1
		2	1	0	7	11	1	2
		3	1	1	9	13	0	1
		4	1	4	11	14	2	1
		5	0	0	5	2	0	0
	4	1	0	1	6	3	0	0
		2	0	1	11	12	1	0
		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
	8	1	0	0	2	1	0	0
		2	0	0	0	1	0	0
		3	0	0	1	3	0	0

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PCT code	Veg. Zone	Plot No.	Composition (species richness)					
			Tree	Shrub	Grass & grass like	Forb	Fern	Other
		4	1	3	11	9	1	1
1330	1	1	1	0	3	3	1	0
	2	1	0	0	9	9	1	0
	4	1	0	0	5	5	0	0
	5	1	0	0	5	5	1	0
		2	0	0	4	3	0	1
		3	0	0	0	0	0	0
	8	1	0	0	1	1	0	0
		2	0	0	0	2	0	0
		3	0	0	0	2	0	0
		4	0	0	0	1	0	0
		5	0	0	0	1	0	0
		6	0	0	1	0	0	0
		7	1	1	1	3	0	0

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PCT code	Veg. Zone	Plot No.	Structure (% cover)					
			Grass & grass like	Grass & grass like	Grass & grass like	Forb	Fern	Other
85	1	1	70	1	50	5.6	0	0
		2	25	10	46	2.5	0	0
		3	10	1	0	0	0	0.1
	2	1	15	0	20.1	1	0	0
		2	30	0	20.1	0.3	0	2
		3	30	32.3	11.4	2.4	0.5	0
321	1	1	24	0.4	11.2	4.8	0.1	0
		2	30	6.2	24.6	7.1	0.6	0.4
1093	1	1	30	30	35.2	2.4	0	0.2
		2	5	0	48.4	26.6	1	0.2
		3	30	0.1	13.4	4.4	0	0.1
		4	20	4.6	12.3	3.5	1.1	0.2
		5	0	0	64	0.6	0	0
	4	1	0	0.2	33.3	0.8	0	0
		2	0	0.1	52.5	1.3	0.1	0
		3	0	0	36	0.6	0	0
		4	0	0	40.2	0.2	0	0
		5	1	0	31.7	0.2	0	0
	6	1	0	0	5.1	0.4	0	0
	8	1	0	0	0.4	1	0	0
		2	0	0	0	1	0	0
		3	0	0	0.2	0.3	0	0
		4	30	5.2	37.3	2.9	0.2	0.1
1330	1	1	50	0	62	15.3	0.1	0

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PCT code	Veg. Zone	Plot No.	Structure (% cover)					
			Grass & grass like	Grass & grass like	Grass & grass like	Forb	Fern	Other
	2	1	0	0	54.2	5.8	0.1	0
	4	1	0	0	45.2	0.5	0	0
	5	1	0	0	62.5	1.4	0.1	0
		2	0	0	41.5	0.3	0	0.1
		3	0	0	0	0	0	0
	8	1	0	0	1	0.1	0	0
		2	0	0	0	1.1	0	0
		3	0	0	0	1.1	0	0
		4	0	0	0	0.1	0	0
		5	0	0	0	0.1	0	0
		6	0	0	0.1	0	0	0
		7	70	1	50	5.6	0	0

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PCT code	Veg. Zone	Plot No.	Function									
			Stem classes					No. of large trees	Hollow bearing trees	% Litter cover	Coarse woody debris (m)	% High threat weed cover
			Regen.	5-9	10-19	20-29	30-49					
85	1	1	0	0	0	0	0	0	0	9.2	25	0.6
		2	0	0	0	0	0	0	2	0.4	8	9
		3	0	0	0	0	0	0	0	4	138	11.3
	2	1	0	0	0	0	0	0	0	1.4	5	21.6
		2	0	0	0	0	0	0	1	0	29	7.4
		3	1	0	1	1	1	1	1	6.4	104	1.6
321	1	1	0	0	1	0	0	0	0	9	15	7
		2	1	1	1	1	1	3	1	9	29	0.9
1093	1	1	1	0	1	1	1	3	1	11	60	0.7
		2	0	1	1	0	1	1	2	0.6	2	2.4
		3	1	1	1	1	1	5	3	25.4	20	6.1
		4	0	0	1	1	1	0	2	6.6	11	0.1
		5	0	0	0	0	0	0	0	0.4	0	6.1
	4	1	0	0	0	0	0	0	0	0	0	8
		2	1	0	0	0	0	0	0	0	0	6.4
		3	0	0	0	0	0	0	0	7	0	6
		4	0	0	0	0	0	0	0	0	0	2.5
		5	0	0	0	0	0	1	3	0	1	53
	6	1	0	0	0	0	0	0	0	0.6	0	8
	8	1	0	0	0	0	0	0	0	0	0	3.6
		2	0	0	0	0	0	0	0	30	0	5
		3	0	0	0	0	0	0	0	13	0	1.1
		4	1	1	1	1	1	1	1	16	9	1

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PCT code	Veg. Zone	Plot No.	Function									
			Stem classes					No. of large trees	Hollow bearing trees	% Litter cover	Coarse woody debris (m)	% High threat weed cover
			Regen.	5-9	10-19	20-29	30-49					
1330	1	1	1	1	1	1	0	2	1	6	14	1.4
	2	1	0	0	0	0	0	0	0	10	5	0.7
	4	1	0	0	0	0	0	0	0	0	0	14.2
	5	1	0	0	0	0	0	0	0	0.8	0	0.4
		2	0	0	0	0	0	0	0	0.2	0	6.3
		3	0	0	0	0	0	0	0	0	0	0.5
	8	1	0	0	0	0	0	0	0	0	0	10
		2	0	0	0	0	0	0	0	37	0	0
		3	0	0	0	0	0	0	0	47	0	5.2
		4	0	0	0	0	0	0	0	46	0	0
		5	0	0	0	0	0	0	0	5.4	0	0.1
		6	0	0	0	0	0	0	0	4.6	0	0
		7	0	0	0	0	0	0	0	9.2	25	0.6

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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																								
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																							
Carduus pycnocephalus	Slender Thistle	0.2			3.0						0.1													0.2
Carex sp.	Sedge							0.1																
Carthamus lanatus	Saffron Thistle											1.0						0.2		5.0				
Centaurea calcitrapa	Star Thistle			1.0																				
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						
Cerastium sp.	Mouse-ears						0.1	0.1												0.1				
Chondrilla juncea	Rush Skeleton-weed				0.1												0.1		0.1			1.0		
Cirsium vulgare	Spear Thistle									0.5		0.1	0.1											
Conium maculatum	Hemlock	0.5	1.0	20.0	0.2	10.0			0.1	0.5	0.1									0.1				0.5
Conyza sp.	Fleabane	1.0	1.0		1.0		1.0	1.0	0.5	0.3	0.2	0.1	0.3	0.1		0.1	0.1							1.0
Crataegus monogyna	Common Hawthorn											5.0			5.0				20.0					
Cynodon dactylon	Couch Grass																						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				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						0.1				
Galium aparine	Goosegrass	0.5		0.1		0.5																		0.5
Galium divaricatum	Slender Bedstraw							0.1	0.1															
Galium murale	Small Bedstraw						0.1	0.1	0.1		0.1													
Gnaphalium americanum	Purple Cudweed								0.1	0.2														
Hirschfeldia incana	Buchan Weed	0.5	0.2		1.0			0.1										0.2		0.1	1.0	0.1	1.0	0.5
Holcus lanatus	Yorkshire Fog		10.0	20.0	1.0	20.0				2.0		0.2	0.2	2.0	2.0			5.0	2.0		2.0			
Hordeum sp.	Barley Grass				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	
Orobanche minor	Lesser Broomrape								0.1		0.1			0.1				0.1	0.1			0.1		
Paspalum dilatatum	Paspalum Grass																							
Petrorhagia nanteuilii	Proliferous Pink						0.1	0.1	0.1		0.2	0.2	0.2		0.1	0.1	0.2	0.1		0.1				
Phalaris aquatica	Phalaris					2.0												1.0	1.0	0.5	15.0	10.0	10.0	
Plantago lanceolata	Plantain / Lamb's Tongue	0.1			2.0		0.1	0.2			1.0	0.2			1.0			3.0	5.0	2.0	1.0	1.0	5.0	0.1
Poa sp.	Snow Grass										0.2													
Polycarpon tetraphyllum	Fourleaf Allseed						0.1	0.1																
Polygonum aviculare	Wireweed																							
Rosa rubiginosa	Briar Rose				0.5	0.1		0.5	0.1	0.1	0.1		0.1			0.1		0.1	1.0					
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					0.1																		
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			15.0	0.2		1.0					
Bothriochloa macra	Red-leg Grass										0.1			50.0		10.0	20.0							
Brachyloma daphnoides	Daphne Heath						2.0		0.1															
Bulbine bulbosa	Bulbine Lily								0.1				0.1			0.1								
Bursaria lasiophylla	Native Blackthorn												2.0											
Callitris endlicheri	Black Cypress Pine						20.0	15.0																
Carex appressa	Tall Sedge				0.1					0.2		0.1	0.1						0.1					
Carex inversa	Knob Sedge						0.1	0.1	0.1			0.1			0.1				0.1	0.1	0.2			
Cassinia longifolia	Long-leaf Cassinia						0.1		1.0															
Cassinia quinquefaria	Wild Rosemary												2.0			0.1								
Cheilanthes sieberi	Rock Fern						0.5	0.1	0.5		1.0		0.1			0.1								
Chloris truncata	Windmill Grass																							
Chrysocephalum 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																							
Eucalyptus macrorhyncha	Red Stringybark						10.0		15.0	30.0	5.0	30.0	20.0						1.0					
Eucalyptus nortonii	Bundy								5.0															
Eucalyptus rossii	Scribbly Gum								10.0															
Eucalyptus sp.	Planted Ecualypt							5.0																
Eucalyptus sp.	Planted Ecualypt							2.0																
Euchiton sp.	Cudweed						0.1	0.1	0.1	0.2	0.2	0.1	1.0	0.5	0.2	0.1	0.1							
Euphorbia drummondii	Caustic Spurge	5.0																						5.0
Galium gaudichaudii	Rough Bedstraw												0.1											
Geranium solanderi	Native Geranium	0.1	2.0			0.2	0.2	1.0	0.5	1.0	0.2	1.0	0.2		0.5				0.1		1.0		0.1	0.1
Glycine clandestina	Twining Glycine								0.1															
Gonocarpus tetragynus	Common Raspwort						0.1		0.2		0.1	0.1	0.1			0.2								

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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

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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 pycnocephalus	Slender Thistle													
Carex sp.	Sedge													
Carthamus lanatus	Saffron Thistle													
Centaurea calcitrapa	Star Thistle													
Centaurium sp.	Common Centaury	0.5		0.2			0.2							
Cerastium sp.	Mouse-ears			0.1										
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													
Eleusine tristachya	Goose Grass				5.0						0.1			
Eragrostis cilianensis	Stinkgrass					1.0								
Eragrostis curvula	African Lovegrass				10.0		5.0		10.0		1.0			
Erodium brachycarpum	Hairy-pitted Stork's-bill					0.1	0.1							
Erodium sp.	Stork's-bill		1.0											
Eschscholzia californica	California Poppy													
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			0.5									
Hypochaeris radicata	Flatweed	0.5	1.0	0.5	1.0	0.2	1.0				0.2			0.1
Juncus acutus	Spiny Rush													
Juncus bufonius	Toad Rush				0.1	2.0								
Linaria pelisserana	Pelisser's Toadflax			0.1										
Lolium perenne	Perennial Ryegrass	0.5	2.0			1.0		30.0	25.0	20.0	20.0	10.0	2.0	5.0
Lysimachia arvensis	Scarlet Pimpernel			0.1										
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	Fourleaf Allseed													
Polygonum aviculare	Wireweed											0.1		0.1
Rosa rubiginosa	Briar Rose			0.1			0.2							
Rubus fruticosus	Blackberry	0.2	0.2		0.1									
Rumex crispus	Curly Dock													
Salvia verbenaca	Wild Sage													
Sanguisorba minor	Sheep's Burnet													
Senecio sp.	Fireweed													
Setaria parviflora	Slender Pigeon Grass				5.0									
Silene gallica	Fench Catchfly			0.1										
Silybum marianum	Variegated thistle													

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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					1.0								
Carex inversa	Knob Sedge	0.1		0.1										
Cassinia longifolia	Long-leaf Cassinia	2.0												
Cassinia quinquefaria	Wild Rosemary													
Cheilanthes sieberi	Rock Fern	0.2	0.1	0.1		0.1								
Chloris truncata	Windmill Grass				5.0									
Chrysocephalum apiculatum	Common Everlasting													
Chrysocephalum semipapposum	Yellow Buttons													
Clematis microphylla	Small-leaved Clematis													
Convolvulus erubescens	Australian Bindweed						0.1							
Crassula sieberiana	Austral Stonecrop													
Cymbonotus lawsonianus	Bear’s Ears													
Cynoglossum australe	Australian Hound's-tongue													
Daucus glochidiatus	Native Carrot	0.1		0.1										
Desmodium varians	Slender Tick-trefoil	0.1												
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		0.1									
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													
Euchiton sp.	Cudweed			0.1	0.1									
Euphorbia drummondii	Caustic Spurge													
Galium gaudichaudii	Rough Bedstraw													
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												

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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

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Appendix C. Tree Survey Results

Tree number	Species Name	Common Name	DBH (cm)	Crown Dia (m)	Height (m)	Hollows S	Hollows M	Hollows L	Alive/ Dead	Notes
1	*Stag*	-	60	-	8	6	2		Dead	
2	*Stag*	-	75	-	4	4	1	1	Dead	
3	*Stag*	-	70	-	3		2		Dead	
4	*E. macrorhyncha*	Red Stringybark	95	4	5	1		1	A	
5	*E. macrorhyncha*	Red Stringybark	120	12	10	2	2		A	
6	*E. macrorhyncha*	Red Stringybark	55	3	5			1	A	
7	*E. macrorhyncha*	Red Stringybark	80	1	12	1	3	1	A	
8	*E. macrorhyncha*	Red Stringybark	105	2.5	5	4	1	1	A	
9	*E. bridgesiana*	Apple Box	125	6	8	2		1	A	
10	*E. macrorhyncha*	Red Stringybark	65	2.5	5	1	1		A	
11	*E. bridgesiana*	Apple Box	180	15	15	2	1	2	A	
12	*E. macrorhyncha*	Red Stringybark	90	5	7	2	1		A	
13	*Stag*	-	55	-	4	3			Dead	
14	*E. macrorhyncha*	Red Stringybark	85	3.5	7	4			A	
15	*Stag*	-	120	-	8	4	3	2	Dead	
16	*Stag*	-	60	-	8	5	2		Dead	
17	*E. macrorhyncha*	Red Stringybark	80	4	6	4			A	
18	*E. macrorhyncha*	Red Stringybark	70	5	6	3			A	
19	*E. macrorhyncha*	Red Stringybark	110	10	8	4	2	2	A	
20	*E. macrorhyncha*	Red Stringybark	95	6	7	2	1	1	A	
21	*E. macrorhyncha*	Red Stringybark	115	4	8	5	1	1	A	
22	*Stag*	-	85	-	4	3	1	3	Dead	
23	*Stag*	-	90	-	6	5	1		Dead	
24	*Stag*	-	95	-	8	3	1		Dead	
25	*Stag*	-	90	-	7	3	2		Dead	
26	*E. macrorhyncha*	Red Stringybark	90	6	10	2			A	
27	*E. macrorhyncha*	Red Stringybark	45	3	8	3		1	A	
28	*Stag*	-	70	-	8	3	3		Dead	
29	*Stag*	-	65	-	6	4		1	Dead	
30	*E. macrorhyncha*	Red Stringybark	150	12	9	3	2		A	
31	*Stag*	-	120	-	8	4		2	Dead	
32	*E. macrorhyncha*	Red Stringybark	80	2	5	2			A	
33	*E. macrorhyncha*	Red Stringybark	70	2	5	2	2		A	
34	*E. macrorhyncha*	Red Stringybark	40	3	4	1		1	A	
35	*E. macrorhyncha*	Red Stringybark	95	5	6	2		2	A	
36	*E. bridgesiana*	Apple Box	250	15	10	1		2	A	
37	*Stag*	-	55	-	11	4			Dead	

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Tree number	Species Name	Common Name	DBH (cm)	Crown Dia (m)	Height (m)	Hollows S	Hollows M	Hollows L	Alive/ 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	

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Tree number	Species Name	Common Name	DBH (cm)	Crown Dia (m)	Height (m)	Hollows S	Hollows M	Hollows L	Alive/ 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								

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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

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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

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Scientific Name	Common Name
Trifolium sp.	Clover
Verbascum thapsus	Common Mullein
Verbena incompta	Purpletop
Veronica anagallis-aquatica	Blue Water Speedwell
Vicia sp.	Vetch
Vulpia sp.	Rat's Tail Fescue
Native	
Acacia implexa	Hickory Wattle
Acacia mearnsii	Black Wattle
Acacia rubida	Red-stemmed Wattle
Acaena ovina	Sheep's Burr
Acrotriche serrulata	Honeypots
Ajuga australis	Austral bugle
Allocasuarina cunninghamiana	River She-oak
Allocasuarina littoralis	Black She-oak
Amyema cambagei	Sheoak Mistletoe
Anthosachne scaber	Common Wheat Grass
Aristida ramosa	Purple Wiregrass
Arthropodium minus	Small Vanilla Lily
Asperula conferta	Common Woodruff
Asplenium flabellifolium	Necklace Fern
Austrostipa bigeniculata	Tall Speargrass
Austrostipa scabra	Rough Spear-grass
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 quinquefaria	Wild Rosemary
Cheilanthes distans	Bristly cloak fern
Cheilanthes sieberi	Rock Fern
Chloris truncata	Windmill Grass
Chrysocephalum apiculatum	Common Everlasting
Chrysocephalum semipapposum	Yellow Buttons
Clematis microphylla	Small-leaved Clematis
Convolvulus erubescens	Australian Bindweed
Craspedia variabilis	Common Billy Buttons
Crassula sieberiana	Austral Stonecrop

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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

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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

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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

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Appendix E. Fauna Species Recorded

Classification	Common Name	Scientific Name	EPBC Act Status	BC Act Status
Exotic				
Aves	Common Starling	*Sturnus vulgaris*	-	-
Aves	Eurasian Coot	*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*	-	-
Mammalia	Rusa Deer	*Cerva timorensis*	-	-
Native				
Amphibia	Common Eastern Froglet	*Crinia signifera*	-	-
Amphibia	Spotted Marsh Frog	*Limnodynastes tasmaniensis*	-	-
Aves	Australasian Shoveler	*Spatula rhynchotis*	-	-
Aves	Australian (Richard's) Pipit	*Anthus novaeseelandiae*	-	-
Aves	Australian King-Parrot	*Alisterus scapularis*	-	-
Aves	Australian Magpie	*Gymnorhina tibicen*	-	-
Aves	Australian Raven	*Corvus coronoides*	-	-
Aves	Australian Reed-Warbler	*Acrocephalus australis*	-	-
Aves	Australian Wood Duck	*Chenonetta jubata*	-	-
Aves	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	-	-
Aves	Brown Falcon	*Falco berigora*	-	-
Aves	Brown Thornbill	*Acanthiza pusilla*	-	-
Aves	Common Bronzewing	*Phaps chalcoptera*	-	-
Aves	Crimson Rosella	*Platycercus elegans*	-	-
Aves	Diamond Firetail	*Stagonopleura guttata*	V	V1
Aves	Dusky Woodswallow	*Artamus cyanopterus*	-	V1
Aves	Eastern 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*	E	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*	-	-

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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	*Nyctophilus 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 darlingtoni*	-	-
Mammalia	Lesser Long-eared Bat	*Nyctophilus geoffroyi*	-	-
Mammalia	Little Forest Bat	*Vespadelus vulturnus*	-	-
Mammalia	Red-necked Wallaby	*Macropus rufogriseus*	-	-
Mammalia	Short-beaked Echidna	*Tachyglossus aculeatus*	-	-
Mammalia	South Eastern Free-tailed Bat	*Mormopterus planiceps*	-	-
Mammalia	Southern Forest Bat	*Vespadelus regulus*	-	-
Mammalia	Wallaroo	*Macropus robustus*	-	-
Mammalia	White-striped Free-tailed Bat	*Austronomus australis*	-	-
Reptilia	Boulenger's Skink	*Morethia boulengeri*	-	-
Reptilia	Cunningham's Skink	*Egernia cunninghami*	-	-

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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*	-	-

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

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Glenn Hoye
Biodiversity Monitoring Services
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Tel (02) 4947 7794
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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 1 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

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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 1	Loc 1	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 1	Loc 1	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 1	Loc 1	02/04/2021	2(2)	0	4(3)	17(15)	1(1)	4(1)	11(7)	19(16)	5(4)	0	0	1(1)	1(0)
Anabat 1	Loc 1	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 1	Loc 1	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 1	Loc 1	05/04/2021	0	0	14(13)	33(27)	2(1)	1(0)	3(3)	13(9)	5(2)	0	0	0	0
Anabat 1	Loc 1	06/04/2021	3(2)	0	8(6)	14(11)	0	1(1)	13(10)	15(10)	0	0	0	2(1)	0
Anabat 1	Loc 2	07/04/2021	3(1)	0	5(4)	9(8)	0	0	4(1)	1(0)	2(1)	0	0	1(0)	0
Anabat 1	Loc 2	08/04/2021	3(2)	0	2(1)	4(3)	0	0	7(5)	1(0)	4(4)	0	0	1(0)	0
Anabat 1	Loc 2	09/04/2021	0	0	9(8)	12(11)	0	1(0)	0	0	5(1)	0	0	2(2)	1(1)
Anabat 1	Loc 2	10/04/2021	0	0	9(6)	0	0	0	3(1)	0	2(0)	0	0	0	0
Anabat 1	Loc 2	11/04/2021	0	0	0	1(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	1(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	1(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)	1(1)
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)	1(1)
Anabat 2	Loc 3	06/04/2021	0	0	7(4)	22(20)	1(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	1(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	1(0)	4(2)	3(1)	6(6)	0	0	1(1)	0
Anabat 2	Loc 4	11/04/2021	1(1)	0	1(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 1	Loc 1	31/03/2021	0	0	0	0	0	8(8)	0	14(14)	83
Anabat 1	Loc 1	01/04/2021	0	0	0	0	0	7(7)	0	23(23)	106
Anabat 1	Loc 1	02/04/2021	0	0	0	0	0	5(4)	0	24(22)	94
Anabat 1	Loc 1	03/04/2021	0	0	0	0	0	11(11)	0	12(11)	107
Anabat 1	Loc 1	04/04/2021	0	0	0	0	0	3(3)	0	11(11)	139
Anabat 1	Loc 1	05/04/2021	0	0	0	0	0	8(6)	1(1)	16(14)	96
Anabat 1	Loc 1	06/04/2021	0	0	0	0	0	3(2)	1(0)	10(9)	70
											0
Anabat 1	Loc 2	07/04/2021	0	0	0	1(1)	0	3(2)	0	6(5)	35
Anabat 1	Loc 2	08/04/2021	0	0	0	0	0	4(3)	0	7(6)	33
Anabat 1	Loc 2	09/04/2021	0	0	0	0	0	2(2)	0	3(3)	35
Anabat 1	Loc 2	10/04/2021	0	0	0	0	0	0	0	2(2)	16
Anabat 1	Loc 2	11/04/2021	0	0	0	0	0	0	0	0	1
											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	1(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

BAM Vegetation Zones Report

Proposal Details

Assessment Id 00021371/BAAS17089/20/00021372	Assessment name Ginninderry NSW Land	BAM data last updated * 22/06/2023
Assessor Name Robert Speirs	Report Created 06/09/2023	BAM Data version * 61
Assessor Number BAAS17089	Assessment Type Biocertification	BAM Case Status Finalised
Assessment Revision 0	Date Finalised 06/09/2023	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.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	1093_1	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	1	6.84	3	

2	1093_4	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	4	26.53	4	
3	1093_6	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	6	0.91	1	
4	1093_8	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	8	17.96	3	
5	1330_2	1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	2	0.22	1	
6	1330_5	1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	5	13.86	3	
7	1330_8	1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	8	289.03	7	

BAM Predicted Species Report

Proposal Details

Assessment Id 00021371/BAAS17089/20/00021372	Proposal Name Ginninderry NSW Land	BAM data last updated * 22/06/2023
Assessor Name Robert Speirs	Report Created 06/09/2023	BAM Data version * 61
Assessor Number BAAS17089	Assessment Type Biocertification	BAM Case Status Finalised
Assessment Revision 0	BOS Threshold: Area clearing threshold	Date Finalised 06/09/2023

* 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.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Black Falcon	Falco subniger	1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Diamond Firetail	Stagonopleura guttata	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Dusky Woodswallow	Artamus cyanopterus cyanopterus	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

Flame Robin	Petroica phoenicea	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Gang-gang Cockatoo	Callocephalon fimbriatum	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Greater Broad-nosed Bat	Scoteanax rueppellii	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Grey-headed Flying-fox	Pteropus poliocephalus	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Large Bent-winged Bat	Miniopterus orianae oceanensis	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Little Eagle	Hieraaetus morphnoides	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Little Lorikeet	Glossopsitta pusilla	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

Little Whip Snake	Suta flagellum	1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Powerful Owl	Ninox strenua	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Regent Honeyeater	Anthochaera phrygia	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Rosenberg's Goanna	Varanus rosenbergi	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Scarlet Robin	Petroica boodang	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Speckled Warbler	Chthonicola sagittata	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Square-tailed Kite	Lophoictinia isura	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
Superb Parrot	Polytelis swainsonii	1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Swift Parrot	Lathamus discolor	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

Swift Parrot	Lathamus discolor	1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Turquoise Parrot	Neophema pulchella	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Varied Sittella	Daphoenositta chrysoptera	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
White-bellied Sea-Eagle	Haliaeetus leucogaster	1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
White-throated Needletail	Hirundapus caudacutus	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion
Yellow-bellied Glider	Petaurus australis	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Painted Honeyeater	Grantiella picta	1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion
		1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Painted Honeyeater	Grantiella picta	Refer to BAR

BAM Candidate Species Report

Proposal Details

Assessment Id 00021371/BAAS17089/20/00021372	Proposal Name Ginninderry NSW Land	BAM data last updated * 22/06/2023
Assessor Name Robert Speirs	Report Created 06/09/2023	BAM Data version * 61
Assessor Number BAAS17089	Assessment Type Biocertification	BAM Case Status Finalised
Assessment Revision 0	Date Finalised 06/09/2023	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.

List of Species Requiring Survey

Name	Presence	Survey Months
Ammobium craspedioides Yass Daisy	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Aprasia parapulchella Pink-tailed Legless Lizard	Yes (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?
Callocephalon fimbriatum Gang-gang Cockatoo	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Delma impar Striped Legless Lizard	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Hieraaetus morphnoides Little Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Keyacris scurra Key's Matchstick Grasshopper	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Leucochrysum albicans subsp. tricolor Hoary Sunray	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Lophoictinia isura Square-tailed Kite	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Myotis macropus Southern Myotis	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☑ Mar ☑ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?
Ninox strenua Powerful Owl	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?
Polytelis swainsonii Superb Parrot	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Pomaderris pallida Pale Pomaderris	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Prasophyllum petilum Tarengo Leek Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Swainsona recta Small Purple-pea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Swainsona sericea Silky Swainson-pea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Thesium australe Austral Toadflax	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Booroolong Frog	Litoria booroolongensis	Habitat degraded
Eastern Pygmy-possum	Cercartetus nanus	Refer to BAR
Golden Sun Moth	Synemon plana	Habitat degraded Habitat constraints
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Koala	Phascolarctos cinereus	Refer to BAR
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Purple Copper Butterfly, Bathurst Copper Butterfly	Paralucia spinifera	Refer to BAR
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Southern Greater Glider	Petauroides volans	Refer to BAR
Squirrel Glider	Petaurus norfolcensis	Refer to BAR
Swift Parrot	Lathamus discolor	Habitat constraints
Wee Jasper Grevillea	Grevillea iaspicula	Habitat constraints

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00021371/BAAS17089/20/00021372

Proposal Name
Ginninderry NSW Land

BAM data last updated *
22/06/2023

Assessor Name
Robert Speirs

Assessor Number
BAAS17089

BAM Data version *
61

Proponent Names

Report Created
06/09/2023

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Biocertification

Date Finalised
06/09/2023

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.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Grantiella picta / Painted Honeyeater

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	Not a TEC	52.2	208	0	208
1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	303.1	6	0	6

1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Southern Tableland Dry Sclerophyll Forests This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177, 3730, 3732, 3734, 3735, 3737, 3738, 3741, 3743, 3744, 3746, 3747	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	1093_1	Yes	201	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Dry Sclerophyll Forests This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177, 3730, 3732, 3734, 3735, 3737, 3738, 3741, 3743, 3744, 3746, 3747	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	1093_4	No	0	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Southern Tableland Dry Sclerophyll Forests This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177, 3730, 3732, 3734, 3735, 3737, 3738, 3741, 3743, 3744, 3746, 3747	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	1093_6	Yes	7	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Southern Tableland Dry Sclerophyll Forests This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177, 3730, 3732, 3734, 3735, 3737, 3738, 3741, 3743, 3744, 3746, 3747	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	1093_8	No	0	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box-Yellow Box-	-	1330_2	Yes	6	Murrumbateman, Bondo, Crookwell,

	Blakely's Red Gum Grassy Woodland and Derived Native Grassland This includes PCT's: 74, 75, 83, 101, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397,					Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland This includes PCT's: 74, 75, 83, 101, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1693, 1695,	-	1330_5	No	0	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland This includes PCT's: 74, 75, 83, 101, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099,	-	1330_8	No	0	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	1303, 1304, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Aprasia parapulchella / Pink-tailed Legless Lizard	**1093_1, 1093_4, 1093_8, 1330_5, 1330_8, 1093_6**	3.5	37.00
Keyacris scurra / Key's Matchstick Grasshopper	**1093_4**	26.5	138.00

Credit Retirement Options

Like-for-like credit retirement options

	Spp	IBRA subregion
Aprasia parapulchella / Pink-tailed Legless Lizard	**Aprasia parapulchella /** Pink-tailed Legless Lizard	Any in NSW

Keyacris scurra / Key's Matchstick Grasshopper	Spp	IBRA subregion
	Keyacris scurra / Key's Matchstick Grasshopper	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00021371/BAAS17089/20/00021372

Proposal Name
Ginninderry NSW Land

BAM data last updated *
22/06/2023

Assessor Name
Robert Speirs

Assessor Number
BAAS17089

BAM Data version *
61

Proponent Name(s)

Report Created
06/09/2023

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Biocertification

Date Finalised
06/09/2023

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.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Grantiella picta / Painted Honeyeater

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	Not a TEC	52.2	208	0	208.00
1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	303.1	6	0	6.00

1093-Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Southern Tableland Dry Sclerophyll Forests This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177, 3730, 3732, 3734, 3735, 3737, 3738, 3741, 3743, 3744, 3746, 3747	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	1093_1	Yes	201	Murrumbateman,Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Southern Tableland Dry Sclerophyll Forests This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177, 3730, 3732, 3734, 3735, 3737, 3738, 3741, 3743, 3744, 3746, 3747	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	1093_4	No	0	Murrumbateman,Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Dry Sclerophyll Forests This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177, 3730, 3732, 3734, 3735, 3737, 3738, 3741, 3743, 3744, 3746, 3747	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	1093_6	Yes	7	Murrumbateman,Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Southern Tableland Dry Sclerophyll Forests This includes PCT's: 299, 344, 349, 351, 352, 653, 701, 727, 728, 730, 888, 957, 1093, 1177, 3730, 3732, 3734, 3735, 3737, 3738, 3741, 3743, 3744, 3746, 3747	Southern Tableland Dry Sclerophyll Forests >=50% and <70%	1093_8	No	0	Murrumbateman,Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Variation options					
Formation	Trading group	Zone	HBT	Credits	IBRA region

	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1093_1	Yes (including artificial)	201	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1093_4	No	0	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1093_6	Yes (including artificial)	7	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1093_8	No	0	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1330-Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland This includes PCT's: 74, 75, 83, 101, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150	-	1330_2	Yes	6	Murrumbateman,Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland This includes PCT's: 74, 75, 83, 101, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150	-	1330_5	No	0	Murrumbateman,Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland This includes PCT's: 74, 75, 83, 101, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 516, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 847, 851, 921, 1099, 1303, 1304, 1324, 1329, 1330, 1332, 1383, 1606, 1608, 1611, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150	-	1330_8	No	0	Murrumbateman,Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region

	Grassy Woodlands	Tier 1	1330_2	Yes (including artificial)	6	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 1	1330_5	No	0	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 1	1330_8	No	0	IBRA Region: South Eastern Highlands, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Aprasia parapulchella / Pink-tailed Legless Lizard	**1093_1, 1093_4, 1093_8, 1330_5, 1330_8, 1093_6**	3.5	37.00
Keyacris scurra / Key's Matchstick Grasshopper	**1093_4**	26.5	138.00

Credit Retirement Options

Like-for-like options

Aprasia parapulchella/ Pink-tailed Legless Lizard	Spp		IBRA region
	Aprasia parapulchella/Pink-tailed Legless Lizard		Any in NSW
	Variation options		
	Kingdom	Any species with same or	IBRA region

		higher category of listing under Part 4 of the BC Act shown below	
	Fauna	Vulnerable	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Keyacris scurra/ Key's Matchstick Grasshopper	Spp	IBRA region	
	Keyacris scurra/Key's Matchstick Grasshopper	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Murrumbateman, Bondo, Crookwell, Inland Slopes, Monaro, Murrumbateman and Snowy Mountains. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00021371/BAAS17089/20/00021372	Ginninderry NSW Land	22/06/2023
Assessor Name	Report Created	BAM Data version *
Robert Speirs	06/09/2023	61
Assessor Number	BAM Case Status	Date Finalised
BAAS17089	Finalised	06/09/2023
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	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion												
1	1093_1	Not a TEC	67.1	67.1	6.8	PCT Cleared - 61%	High Sensitivity to Gain			1.75		201

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
											Subtotal	**208**
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands 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

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
											Subtotal	**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 parapulchella / Pink-tailed Legless Lizard (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

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**

Appendix H. Council Consultation

(02) 6226 1477
council@yass.nsw.gov.au

yass valley council

the country the people

209 Comur Street Yass
PO Box 6 YASS NSW 2582

22 June 2023

Ms Imogen Featherstone
Development Manager
Gininderry
imogen@ginninderry.com

Dear Ms Featherstone

PUBLIC EXHIBITION OF BCAR (DRAFT 5)

I refer to your request for Council's comments on the BCAR Draft 5 for the Ginninderry Urban Release Area.

Please be advised that at this point Council has no comment to make on the draft BCAR and has no objection to the document being placed on public exhibition.

If you wish to discuss the matter further, please contact me on 6226 1477 or JRogers@yass.nsw.gov.au

Yours sincerely

Julie Rogers
Director Planning and Environment

Appendix I. Public Exhibition

Item	Submission	Comment	Response
1. Edge effects & buffers from development	Friends of Grasslands (FOG)	Firstly, it is reassuring to find that four areas of the highest values, the avoided areas, have been spared from development and will not be cleared; they therefore have minimal direct impact but of course will still come under pressure from residences that will be built in close proximity and from the inhabitants of these future homes. Nevertheless, FOG commends the decision to avoid these areas.	The Ginninderry Conservation Corridor (GCC) was designed to contain and protect the majority of the significant ecological values in the Ginninderry project area (e.g. intact vegetation and important habitat for flora and fauna). The proposed retention of the four additional small patches of vegetation in the western part of the subject land (total: 6.02 ha) will contain and protect most of the other significant ecological values in the Ginninderry project area. The boundary between the GCC and the development area has been previously approved via both the EPBC Act Strategic Assessment and the rezoning. In addition to the *Ginninderry Conservation Corridor Management Plan 2018-2023*, appropriate management plans will be developed to manage the urban interface and minimise edge effects within the GCC.

	Voices of West Belconnen	Reserve lands close to development (and particularly waterways) are an asset but they can also be seriously degraded by adjacent development. Issues encountered by our members who have been involved in urban landcare activities include:
		• Littering that gets into waterways,
		• Illegal dumping of household and garden waste,
		• Badly designed and infrequently cleared Gross Pollutant Traps that allow rubbish to overflow into waterways during rainwater events,
		• Increased stormwater causing bank erosion,
		• Lowered water quality from run-off, fertilizers etc,
		• Exposure to domestic animals (not allowed in the reserve but strays will inevitably get in),
		• Introduction of weed plants (riparian areas are especially impacted as their moist, fertile soils support dense weed growth),
		• Increased risk of arson, causing bushfires
		• Recreational disturbance such as
		  ○ rock turning,
		  ○ reptile & other wildlife poaching (including freshwater traps)
		  ○ plant poaching,
		  ○ rock stealing,
		  ○ firewood collection
		  ○ bike hump building using excavators,
		  ○ illegal vehicle entry
		  ○ unauthorised tracks and erosion from desire lines.
		The best way to maintain the reserve habitat in a good quality condition is to ensure **a large buffer**, quality management plan, particularly ongoing weed management, that is well resourced, as well as an ongoing bush etiquette campaign and a contact for people to report suspicious behaviour.
			The width of the buffer between the proposed urban areas and the conservation corridor has been determined based on the type of urban development, the topography, the adjacent identified ecological values in the GCC and the bushfire management requirements which are required to occur in the urban development area.
			The urban development already has in place a series of controls that will limit impacts of the urban development on the GCC including: a fence along the entire boundary of the GCC, controlled access points, waste control provided to each development block, extensive water sensitive urban design (WSUD) approach to manage urban flows and water quality, cat containment, and extended open space maintenance for between 3-5 years beyond the standard TCCS requirements.
			These issues are however very important and need to be managed appropriately. The *Ginninderry Conservation Corridor 2018 - 2023 Management Plan* is already place and used in the current management of the dedicated corridor land. The Plan is implemented and managed by the Ginninderry Conservation Trust and its rangers and addresses all issues raised.
			In addition to this, a large buffer between the GCC and the urban development has already been established in Strathnairn and is planned for the next suburb of Macnamara. The width of the buffer determined by the factors identified above. For future stages the Ginninderry Masterplan has identified the buffers potential width which will be confirmed on future DA submissions.

	Ginninderra Falls Association	The proposed development has the potential to indirectly impact adjacent native vegetation and habitat in the Conservation Corridor.	As above.
	Ginninderra Falls Association	The circuitous boundary of the reserve will make it difficult to manage urban interface effects, such as weed introduction, feral and domestic animal incursions, and bushfire management.	As noted above, the boundary between the GCC and the development area has already been approved and aligns with the boundary between areas of degraded vegetation (i.e. in the proposed development area) and the areas which retain a canopy and/or are more intact and/or are Pink-tailed Worm-lizard habitat (i.e. in the GCC). The *Ginninderry Conservation Corridor 2018 - 2023 Management Plan* is already in place and used in the current management of the dedicated corridor land. Part of the Management Plan addresses bushfire management; however, it should be noted that the formal asset protection zone (APZ) is required to all be established within the urban development. In addition to the establishment of the APZ, the Ginninderry Conservation Trust is responsible for a bushfire management strategy within the corridor which includes grazing, cool burns, and standard ACT government fire reduction burns. .

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Item	Submission	Comment	Response
	Ginninderra Falls Association	Urbanization usually results in a proliferation of despotic birds such as miners and mynahs, which are favored by lawns and high nectar-producing garden plants. These birds will invade the adjoining conservation reserve and reduce numbers of many other bird species.	Noted. The urban development in conjunction with the Ginninderry Conservation Trust has developed a series of plant lists for use by future residents and also a list of plants to avoid using to avoid the issues identified by the GFA.
2. Incorporate avoided areas into GCC & Biodiversity Management Strategy	FOG	FOG wishes to seek a commitment that the border of the Conservation Corridor will in due course be expanded to include the three avoided areas located at development edge. The fourth area will be surrounded by residences so has to be handled differently, also being alongside one block that will be owned privately (see fig3, Lot 1). FOG looks forward to hearing of a useful biodiversity management strategy for this piece of land.	As noted in the BCAR, 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). These avoided patches will be fenced and managed by the Ginninderry Conservation Trust (GCT). If possible, they will be incorporated into the GCC and/or be rezoned as C2 - Environmental Conservation.
3. Fulfillment of EPBC Act approval conditions – Ginninderra Falls land purchase	Voices of West Belconnen	One of the EPBC approval conditions for the development was the establishment of the Ginninderry Conservation Corridor (GCC). It is our understanding that Riverview has not yet fulfilled this approval condition as key high habitat areas have not yet been acquired. The GCC must include Ginninderra Falls and all of the Ginninderry creek corridor feeding into it. Under the EPBC Act, the Riverview development cannot be permitted until it has fully established the GCC as per EPBC Act conditions, which entails acquiring the Hyles property. The deadline for this was several years ago and if it is unfulfilled, further development is in breach of development conditions. If it is not possible to acquire the property at this time, negotiations should commence with the owner and relevant government entities to see if it is possible to place a conservation covenant over the outstanding area and implement a preferential purchase agreement at agreed market value so that it can be incorporated into the reserve when the property changes hands.	As per the approval conditions, the initial stage of the GCC has been set up within the ACT and the land within NSW has been rezoned as C2 Conservation land, effectively securing this land for conservation into the future. The Ginninderry Joint Venture (GJV) has undertaken transparent dialogue with relevant NSW, ACT, and Commonwealth departments since 2013. After the conditional strategic assessment approval for the project under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was granted by the Commonwealth in 2017 (EPBC Approval), the GJV sought clarification in March 2018 from the Commonwealth that securing land for conservation in accordance with the EPBC Approval conditions was to be undertaken in a staged manner in accordance with the Program Report. The Commonwealth confirmed this position in a letter dated 13 September 2018. Both letters are publicly available on the GJV's website. It should be noted that the fulfillment of EPBC Act approval conditions is outside the scope of the NSW BCAR and therefore not relevant to the assessment of the BCAR.
	Ginninderra Falls Association	The EPBC approval conditions have not been met, since the Ginninderra Falls area (51ha, part of lot DP801234) has not been included in the conservation reserve within the specified time, by September 2019. Development cannot proceed until this non-compliance is rectified.	As above.
	Dr Chris Watson	Since 2004 when the Falls area was closed, all ACT and regional residents (plus visitors) have been denied access to these beautiful Gorges and Falls. It's about time the NSW Government lobbied to have this area reopened, managed by Aboriginal rangers, together with a Ngunnawal Cultural Centre and good facilities and pathways.	As above.
4. Offsets – Key's Matchstick Grasshopper	Voices of West Belconnen	We have concerns about the use of offsets in general as they often do not fulfill promised outcomes. However, it appears that even offsets are not proposed for the destruction of Key's matchstick grasshopper habitat (a species endemic to VIC, ACT & NSW; EPBC Act status - endangered). As it is a flightless insect, it is seriously affected by disturbance and cannot travel easily to colonise other areas. From our reading of the biodiversity assessment report, the consultants assumed that the 26ha area is Keys grasshopper habitat, but did not survey for this species. We suggest that there needs to be a survey to determine if the species is present, and if it is, an offset needs to be arranged. Key's matchstick grasshopper habitat is not necessarily pristine, high integrity native grassland. They use tall perennials primarily for shelter rather than food so native grasslands are not necessarily an indicator of suitable habitat (see the Threatened Species Scientific Report: http://www.environment.gov.au/biodiversity/threatened/species/pubs/89739-conservation-advice-05102022.pdf This is problematic for the Key's matchstick grasshopper, as usually offsetting is only required where there is a high degree of native vegetation integrity. However if known Keys matchstick grasshopper habitat is being destroyed, the very least requirement for this endangered species should be to provide an offset elsewhere, or to assist it to colonise suitable habitat elsewhere that is not susceptible to disturbance.	Key's Matchstick Grasshopper was listed as threatened after the field surveys were undertaken. It was therefore assumed to be present in the 26.53 ha of suitable habitat impacted by the development footprint, generating 138 species credits (BCAR, Appendix G). A developer that undertakes an activity that generates a credit obligation must retire the necessary credits to offset their activity. In other words, the potential impact to Key's Matchstick Grasshopper habitat is proposed to be offset, regardless of whether the species is present or not.
	Ginninderra Falls Association	The development will remove 26ha of potential Key's Matchstick Grasshopper habitat. This area should be surveyed for grasshoppers before it can be assumed that no offset is required.	As above.

Item	Submission	Comment	Response
5. Bushfire Risk and Buffer Zone	Voices of West Belconnen	We are concerned about the adequacy of the fire buffer zone. While it may comply with current regulations, the regulations do not incorporate most up-to-date information on fire behaviour. There have been many advances in understanding relating to slope, dynamic fire propagation and violent pyro-convection (bushfire 'thunderstorms'). The report "**Risk Implications of Dynamic Fire Propagation: a case study of the Ginninderry region**" (June 2017) examines the bushfire risk for the Ginninderry in the light of recent knowledge about bushfire behaviour in the wake of the 2003 bushfires. Its author, Associate Professor Jason Sharples, of UNSW Canberra is an expert on bushfire risk and combustion processes and he is a volunteer firefighter. "The current Standard for construction in bushfire prone areas (AS 3959) and the NSW RFS guidelines for planning for bushfire protection are not consistent with the current state of the science of bushfires." "bushfire management strategies, may significantly under-estimate the risk of bushfire under extreme fire danger conditions. This is particularly true when applied to regions with steep slopes like [Ginninderry]" For the Ginninderry development, this means catastrophic bushfire risks are underestimated. All future development in Ginninderry needs to incorporate most up to date knowledge or it will put lives and property at risk. There is a hierarchy in fire fighting: first lives, then property. Wildlife is the lowest priority, so it is important for the assessment report on biodiversity to look at the implications of inadequate buffers for wildlife of GCC. It is important to incorporate adequate fire buffers from the outset. If not, fire management / prevention measures and the actual fighting of catastrophic bushfires will impinge on the reserve and impact its biodiversity. This includes clearing fire breaks; regular fuel reduction activities such as mowing; clearance of undergrowth and fallen timber (removal of habitat); control burns that are focused on fuel reduction rather than biodiversity health. Some of these measures not only remove habitat but facilitate the transport of weed seed (e.g. mower hygiene). Following 2003 bushfires, fire management buffers increased in Canberra. This impacted remnant vegetation that was now deemed too close to houses. To the dismay of many landcarers who had devoted volunteer hours improving the quality of these remnants, new fuel reduction measures were put in place and vegetation and undergrowth cleared and prized habitat areas subjected to regular mowing. It is highly likely that NSW buffer zone standards will also change due to current knowledge. Regulation bushfire buffer zones will very likely be increased at Ginninderry (NSW). The only place buffer zones will be able to extend is into the bushland reserve (i.e., entailing native vegetation / habitat removal). As the knowledge is already there, this is preventable and therefore unacceptable. Adequate buffers need to be incorporated from the outset to guard against catastrophic loss, especially as climate change is set to increase both fire intensity and frequency.	Bushfire management is not Capital Ecology's area of expertise and is outside the scope of this BCAR. However, bushfire risk has been extensively examined by Ginninderry, and will be re-evaluated before lodgement of each future DA, and this will include establishing appropriate Asset Protection Zones (APZs) and other appropriate bushfire management measures. These APZs and other measures will be located / will occur inside the development footprint and will not encroach into the GCC. Whilst APZs are required to be wholly placed within the urban development areas, the Ginninderry Conservation Trust through The *Ginninderry Conservation Corridor 2018 - 2023 Management Plan*, is responsible for fire management within the corridor utilizing various techniques to reduce fuel loads whilst protecting the conservation values of the corridor. The techniques currently active within the ACT portion of the corridor will continue to be used within the NSW portion.
	Ginninderra Falls Association	The conservation reserve is at risk of damage due to efforts to stop catastrophic bushfires, resulting from its orientation and steep slopes. Current bushfire regulations do not consider the effect of dynamic bushfire propagation, or the increased likelihood of bushfires due to climate change.	As above.
	Ginninderra Falls Association	Given the substantial fire and reserve design issues already raised by experts and the community, this would also be an opportune time to reassess the boundaries to increase the area placed in the reserve, to avoid potential future catastrophic loss of life and property as well as to avoid impacts on large home range species such as Rosenberg Goanna and other biodiversity.	As above.
	Dr Chris Watson	ACT and region is very prone to fires from the Brindabella Ranges, located to the north-west. Much has been written in our local media by professional fire researchers of the increasing hazards from future 'ember showers' and 'fire'	As above.

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Item	Submission	Comment	Response
		thunderstorms for any housing that face the forests to their north and west. Folly, therefore, to contemplate housing development on headlands overlooking the Murrumbidgee Gorge in the Ginninderry development.	
6. Protection of mature trees in development area	Ginninderra Falls Association	The Report doesn't specify how many trees will be removed: a maximum at least should be specified.	It is not possible at the Biodiversity Certification stage to specify which trees, or the maximum number of trees, that will be retained or removed as part of the proposed development. However, the Ginninderry Project works towards an overall master plan, and where trees can be retained whilst achieving a sensible urban design outcome, Ginninderry endeavours to do so. To date, each Estate Development Plan (EDP) in the ACT portion of Ginninderry has incorporated the retention of the existing trees as a key objective to support biodiversity conservation. 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 Memorandum Of Understanding (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. 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. To date 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), and it is anticipated that similar levels of tree retention will be achieved in the NSW portion of Ginninderry. In addition to the above-described project-driven tree retention, tree removal in NSW must be approved by the local Council, according to the NSW *Environmental Planning and Assessment Act 1979*. As such, Ginninderry will develop a Tree Retention Plan (TRP) for lodgement with each future Development Application (DA). The TRP will detail the location and characteristics (i.e. species, habitat values, structural integrity etc.) of each tree proposed to be retained and each proposed to be removed, providing appropriate justification where removal is necessary. The TRP will be prepared by or in consultation with a suitably qualified ecologist and arborist, and the objective of the TRP will be to facilitate the retention within the urban fabric of as many remnant trees as is practicable. It is anticipated that the Biodiversity Certification Agreement (BCA) will include a condition pertaining to the development and lodgement for Council approval of a TRP for each future DA.
	FOG	Eighty eight remnant paddock trees (88) are dotted throughout most of the planned residential area. The BCAR notes that Riverview expects to retain most of these using methods it developed for Strathnairn and Macnamara suburbs. In the case of the ACT portion of the development, Riverview is required to consider mature-tree protection legislation in its actions. FOG is not aware of similar legislative requirements in NSW but is hopeful that Riverview will make decisions at a standard that protects trees right along its development footprint.	As above, the Ginninderry Project works to retain as many remnant trees as possible, and this will be guided by the development of a TRP for lodgement with each DA for approval by Council.
7. NSW cat containment	FOG	Feral animal management is a major consideration in the existing (ACT portion of) the development and Conservation Corridor. It is to be hoped that effective management will extend seamlessly across the ACT-NSW border. One such issue that will need careful planning is cat containment in the developing suburbs where ACT strategies around this are more developed than in NSW (to FOG's knowledge). FOG looks forward to hearing more detail to be announced.	As per the *Ginninderry Conservation Corridor Management Plan 2018-2023*, there is no equivalent legislation for cat containment in NSW, although Section 30 of the *Companion Animals Act 1998* enables a local authority to prohibit cats in and near the boundaries of wildlife protection areas. In other places near wildlife reserves local by-laws, or prohibition of cats as a condition of house purchase, have been used to mandate cat containment in order to protect native wildlife. The EPBC Act approval requires cat containment to be instituted in the NSW portion of the Ginninderry urban area if suitable NSW legislation comes into force. The GCT (as land manager) will work with the Ginninderry development team, the community, and Council, to achieve cat containment in the NSW portion of the urban development and thereby minimise the incursion of cats into the GCC. The GCT will also work with the relevant authorities and the community on compliance with, and effective enforcement of, cat containment.
8. Bird survey timing	Ginninderra Falls Association	The threatened bird survey was only done in October. Some birds come down to Canberra from the mountains in winter, and could be missed.	Most threatened bird species are classified as 'ecosystem credit species' as per the NSW Biodiversity Assessment Method (BAM) (Table 22), as these species can be reliably predicted to occur within a given Plant Community Type (PCT) where it is in sufficient intact condition. These species are assumed to be present even if not recorded in surveys, and therefore impacts upon these species are offset via the retirement of the applicable ecosystem credits.

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			Very few bird species with the potential to occur in the subject land are listed as 'species credit species' (Table 23), these being species for which presence cannot be reliably predicted based on the PCT and condition. Of the species credit species surveyed for, only the Powerful Owl was surveyed outside the recommended timeframe (May to August), and nocturnal surveys were not undertaken. However, the Powerful Owl is highly unlikely to nest, or occur at all, in the Ginninderry development area.
9. Rosenberg Monitor habitat requirements	Ginninderra Falls Association	Rosenberg's Monitor is listed as vulnerable in NSW, and is assumed to be present at the site. The reserve width is inadequate for the foraging range of the monitor.	The narrow sections of the GCC do represent potential habitat connectivity 'bottle necks'. However, the location of the conservation corridor boundary aligns with the boundary between areas of degraded vegetation (i.e. in the proposed development area) and areas which contain a canopy and/or are more intact and/or are Pink-tailed Worm-lizard habitat (i.e. in the GCC). As such, from a landscape connectivity perspective, the existing width of the band of more intact vegetation and habitat as it exists today is approximately the same as that which will be retained and protected in the GCC.
10. Biodiversity values of the Soil	Dr Chris Watson	I have recently been campaigning against the current method of widespread soil scalping by contractors. In the ACT, City News (8/6/23), published my letter on topsoil loss with the decimation of its biodiversity. Also, I have written to the ACT Ministers for both Planning and Environment on 23/5/23 on this very matter. The Environment Defenders Office (EDO Australia) has also been contacted and their solicitor, Justine Emerson cannot identify "any specific soil protection in ACT laws"! Has the NSW legislation any such protection? Moreover, housing and apartments occupy almost completely blocks with little remaining 'virgin soil' for trees, gardens and play areas. Thus 'heat islands' are proliferated, while families are then denied contact with wildlife too.	This BCAR assesses the significance of the impacts of the proposed development on terrestrial fauna, flora and ecological communities listed as threatened under the NSW *Biodiversity Conservation Act 2016* (BC Act). Although an interesting issue, topsoil removal is outside the scope of the BCAR.
11. Stream erosion from urban runoff	Ginninderra Falls Association	Although WSUD installations will reduce peak flows in watercourses, total volume will still be significantly above natural levels due to urbanization, which may cause erosion of streams.	The approved EPBC Act Strategic Assessment for the Ginninderry development, together with the resulting management plans, provide a formal, legally binding, and audited conservation focussed management regime for the portions of the subject land recognised as supporting significant biodiversity. These also stipulate a wide variety of management activities that are designed to protect and enhance the significant biodiversity values that these areas support. This includes 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). A Construction Environmental Management Plan (CEMP) will also be developed to guide the proposed development, and this will include sediment and erosion controls to prevent site run-off, as well as flow controls and other appropriate management.
12. Aboriginal Heritage at the Ginninderra Falls	Dr Chris Watson	The excellent report by Waters Consultancy (May 2017, 134p) identified a host of 'Aboriginal Culture Sites' at the confluence of the Ginninderra Gorge (and its two falls) with the Murrumbidgee Gorge in NSW. Proposed housing developments very close to these gorges, unfortunately. I have long been advocating with the CEOs of National Parks Association (NSW) for a co-managed 'Ngunnawal National Park' encompassing both sides of these two gorges. The Hon. David Harris MP, NSW Minister for Aboriginal Affairs must now intervene. Richie Allan, Convenor of the Traditional Owners Corporation is onside. Can a 'First Nations Panel' also be set up?	The Ginninderry Project has allowed to rehabilitate already eroded and degraded sections of creek lines identified prior to the commencement of development. In addition to this the project works with the Ginninderry Conservation Trust and the University of Canberra to monitor stream stability and water quality in areas adjacent to development. The Trust is actively involved in weed control and replanting along waterways within the corridor to improve stability and reduce erosion. The BCAR assesses the impacts of the proposed development on listed threatened biodiversity value (i.e. threatened fauna, flora, and ecological communities). As such, Aboriginal heritage is outside the scope of the BCAR. With respect to cultural heritage, all development has taken into consideration the Waters Aboriginal Cultural Values Assessment Report (May 2017). In addition to this, lands within the GCC are managed in accordance with the Waters report and the draft *Ginninderry Conservation Corridor: Heritage Management Plan* (Nov. 2021) developed by Waters, Past Traces, and the Ginninderry Conservation Trust. The Trust currently employs 3 Caring for Country rangers as part of their management team. A detailed aboriginal heritage assessment is undertaken for each DA, building on previous aboriginal heritage studies of the river corridor, in consultation with the already established Ginninderry Aboriginal Advisory Group (GAAG). GAAG provides input into the Ginninderry project to help ensure appropriate management and protection for aboriginal heritage sites. Two members sit on the Ginninderry Conservation Trust Board. Ginninderry is also engaging more widely with Aboriginal community groups to provide further input into the development as it continues.
13. Quarrying Alongside Upper	Dr Chris Watson	Quarry activity alongside upper Ginninderra Falls (Lot 61 DP801234) has been ramped up by Tharwa Sands Pty Ltd in recent decades and is obviously having appalling soil biodiversity losses as well as pollution to the adjacent water courses. Housing is proposed, tragically, right alongside! EDO Australia Senior Solicitor, Frances Bradshaw has summarised our complaints to Yass Valley Council, which commenced in 2019!	The quarry is located outside the boundary of the subject land for the BCAR, and as such is outside the scope of the BCAR. Erosion and soil management are nevertheless important to Ginninderry, and it is therefore implementing a wide variety of management activities within the development area and the GCC,

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Ginninderra Falls			notably including the implementation of CEMPs for all development activities, ecosystem restoration to stabilise soil, and best-practise sediment and erosion control.

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