170 Lancefield Road and 45 Gellies Road, Sunbury: Expert Evidence Report

Prepared for the Hume Planning Scheme Amendment C208 Planning Panel (Lancefield Road Precinct Structure Plan).

This report has been requested by AAP Corporation Pty Ltd on behalf of Wincity Pty Ltd and, accordingly, is subject to legal professional privilege

10 August 2017

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- APP Corporation: Julie Katz, Robyn Lukstin
- Department of Environment, Land, Water and Planning for access to the Victorian Biodiversity Atlas and Native Vegetation Information Tools
- Department of the Environment and Energy for access to the Protected Matters Search Tool of the Australian Government

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1. Name and Address

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2. Qualifications and Experience

2.1 Qualifications and Training

- Bachelor of Science (Hons), Deakin University
- Bachelor of Applied Science, Deakin University
- Diploma Natural Resource Management, Swinburne University

2.2 Professional Affiliations and Memberships

- Australian Institute of Alpine Studies
- Environment Institute of Australia and New Zealand
- Victorian Planning and Environmental Law Association

2.3 Professional Experience

I am the Director of Consulting Services at Biosis Pty Ltd, a leading ecology and cultural heritage consulting firm with offices in Melbourne, Ballarat, Wangaratta and interstate. I have worked extensively in a wide range of environments throughout south-eastern Australia, conducting numerous flora and fauna surveys, preparing rehabilitation and revegetation plans and providing general ecological advice to Commonwealth, State and Local Government, private companies and land managers. I have particular experience in flora and fauna management, habitat hectares assessments and environmental impact studies especially within alpine and sub-alpine environments.

From 2008 to 2013, I worked closely with the Growth Areas Authority (GAA) (now the Victorian Planning Authority) and the Victorian Government Department of Sustainability and Environment (DSE) (now the Department of Environment, Land, Water and Planning (DELWP)) on the mapping of vegetation and fauna habitat across approximately 20,000 ha in the Melbourne region. I was also involved in the Sub-regional Survey for the Golden Sun Moth and in revising the Southern Brown Bandicoot Sub-regional Species Strategy (SRSS) for the GAA and DSE respectively.

Since 2013, I have worked on a range of major projects across Victoria including large scale regional infrastructure development as well as biodiversity assessments to inform large residential sub-divisions and government projects.

Further details about my qualifications and experience can be found in Appendix **Error! Reference source not found.**.

3. Area of Expertise to Make this Report

3.1 General Expertise

I have worked extensively across eastern Australia for more than 10 years, conducting flora and fauna surveys and providing specialist advice on ecological management in a wide range of environments. Most of this work has been based in Victoria and much of it has been in Melbourne's peri-urban fringe.

3.2 Site-specific Expertise

I have been involved, directly and indirectly, with investigations into the proposed development at 170 Lancefield Road and 43 Gellies Road since 2011.

Biosis undertook a preliminary flora and fauna assessment in 2003 and subsequent investigations in 2006 (Growling Grass Frog target survey), 2007 (updated flora and fauna assessment). I had no direct involvement in these initial assessments. From 2011 to 2013, Biosis undertook a final flora and fauna assessment according to the requirements of the Biodiversity Precinct Structure Planning Kit. I was project manager during this time and oversaw all aspects of the investigation. See Section 7.3 for the full list of past reports.

I first visited the Site on the 1st April 2014 along with the Growth Areas Authority ('GAA', now Victorian Planning Authority) and Hume City Council ('Council'). Subsequent visits and assessments were undertaken on the 14th April 2014 with the Department of Environment and Primary Industries (now DELWP), Council and the GAA; and 6th August 2015 with Melbourne Water. Based on the information gained through site visits and Biosis reports, I have provided input to multiple meetings with other consultants and advice to Wincity between 2014 and 2017. I therefore have extensive expertise in the ecological values of the area for the proposed development.

4. Other Contributors to this Report and their Expertise

I, Aaron Harvey, have researched and written this expert evidence report with the assistance of colleagues from Biosis Pty Ltd (formerly Biosis Research). I have been involved in investigations into the ecological values of the land parcels at 170 Lancefield Road and 45 Gellies Road, Sunbury, since 2011. Whilst I have been responsible for collating the information and providing ecological advice on the proposed development, all on-site ecology projects have been led by my colleagues. I have therefore relied on input from current colleagues and written reports produced by current and former colleagues in preparing this expert evidence report.

I have relied on the work of the following current and former colleagues at Biosis:

- Current:
  - Daniel Gilmore (Senior Zoologist)
  - Stephen Mueck (Senior Consultant Botanist)
  - Katrina Sofo (Consultant Zoologist)
  - Shana Nerenberg (Field Botanist)
  - Sonika Kumar (GIS Operator)
- Former:
  - Timothy Wills
  - Chris Bloink
  - Kylie Payze
  - Thea Shell.

5. Scope of this Report

I have been requested by Julie Katz, Senior Consultant with APP Corporation Pty Ltd acting on behalf of Wincity Pty Ltd, to provide expert ecological evidence in relation to the Hume Planning Scheme Amendment C208. The request relates only to Wincity land at 170 Lancefield Road and 45 Gellies Road, Sunbury (referred to hereafter as 'the Site'), with all three parcels at these addresses subject to Amendment C208 (Figure 1, page 10 of this report). APP have prepared a submission on behalf of Wincity to the Hume Planning Scheme Amendment C208 requesting several changes to Amendment C208 (February 2017).

In conjunction with this submission, APP on behalf of Wincity have submitted a Section 96a Planning Permit Application for the Proposed Staged Subdivision of Land at 170 Lancefield Road, Sunbury (11/06/2015, Application No. P18855).

My instructions were to provide expert evidence in relation to the following:

- Any ecological (flora, fauna and native vegetation) issues on the Site.
- Any ecological issues as they relate to the proposed changes to the Urban Growth Zone boundary on the Site (and resultant changes to Rural Conservation Zone boundary) as proposed in the Wincity submission to Amendment C208.
- Review the submissions to Amendment C208 where they relate to the above two points.

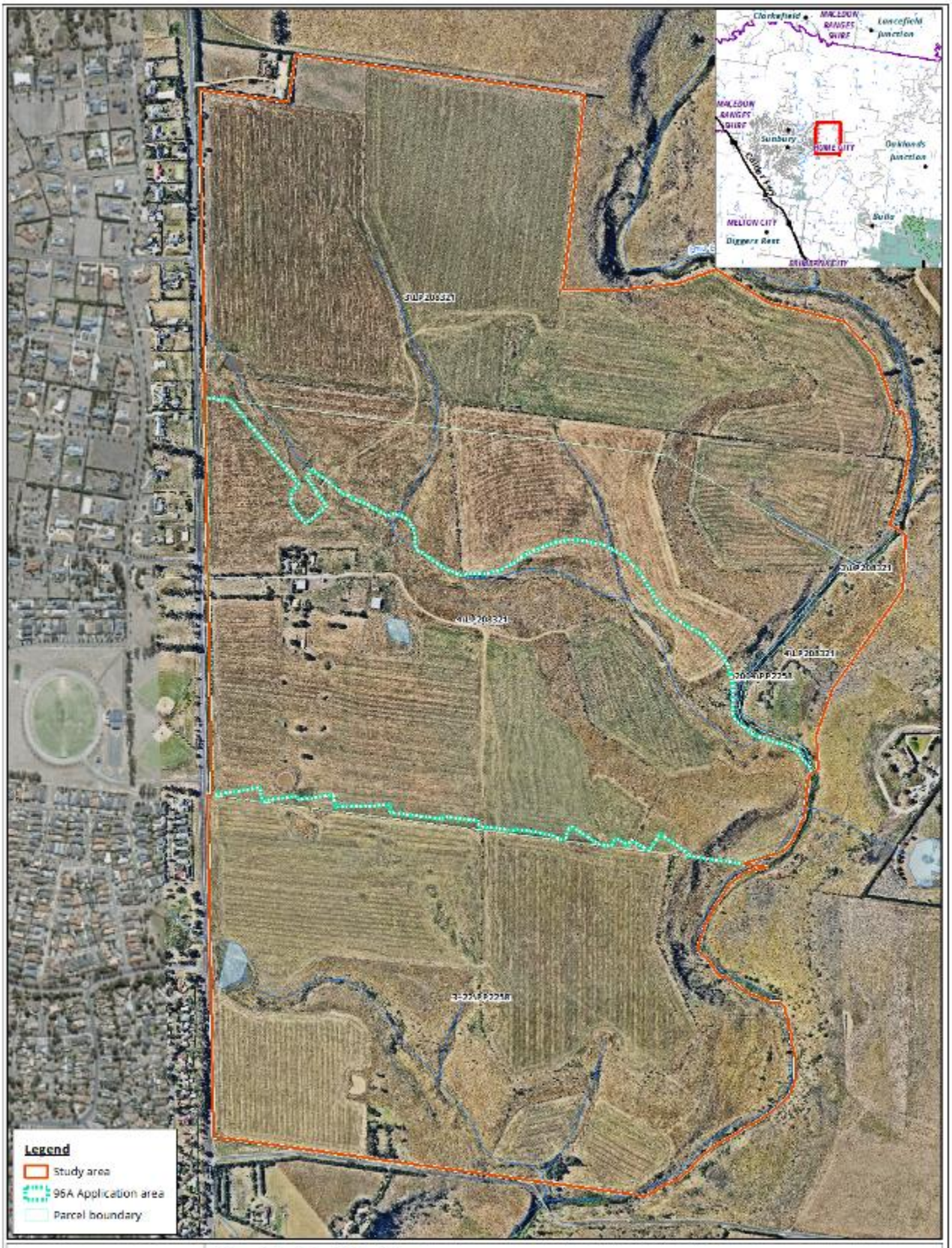

Figure 1 Location of the study area

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0 80 160 240 320 400 N
Metres
Scale 1:7,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

6. Facts and Assumptions

6.1 Site characteristics

The Site consists of three parcels of land bounded by the Melbourne-Lancefield Road, Gellies Road, and Emu Creek, Sunbury, totalling 277.99 hectares (Figure 1). The area is the site of the proposed Kingfisher Estate. The land is privately owned and wholly within the area of the Melbourne Strategic Assessment. Part of the land has been designated a Conservation Area under the Biodiversity Conservation Strategy ('BCS', see Figure 4).

The topography of the area is flat to gently undulating, with gentle to steep slopes extending down to Emu Creek and associated drainage lines. All minor drainage lines are ephemeral, occurring as shallow rocky depressions that become more deeply incised and develop steep escarpments as they approach Emu Creek. The site lies within the Victorian Volcanic Plain bioregion and the Maribyrnong River catchment.

Much of the Site has been cropped and subject to grazing by domestic stock. The native vegetation within the Site is largely restricted to the steeper slopes and escarpments leading down to Emu Creek. The patches of native vegetation are typically dominated by native grasses such as spear-grass *Austrostipa* spp. and wallaby-grass *Rytidosperma* spp. with a scattered cover of indigenous herbs. Steeper rocky areas also support an open cover of shrubs and small trees such as Lightwood *Acacia implexa*, Tree Violet *Melicytus dentatus* and Sweet Bursaria *Bursaria spinosa*. Outside of these patches of native vegetation, the Site is sown to cereal crops or introduced pasture dominated by introduced Rye Grass *Lolium* spp., Clover *Trifolium* spp., Cocksfoot *Dactylis glomerata* and Toowoomba Canary-grass *Phalaris aquatic*.

The Site is currently zoned Urban Growth Zone (UGZ) and Rural Conservation Zone – Schedule 1 (RCZ1). The area along Emu Creek and associated drainage lines is subject to an Environmental Significance Overlay (Schedule 1 and Schedule 10) under the City of Hume planning scheme. These zonings will change with the proposed Amendment C208.

6.2 Section 96A: Application for staged subdivision

Wincity has applied for a planning permit for a staged residential subdivision at 170 Lancefield Road. The proposed development consists of 461residential lots and provision for a town centre, school and open space. The proposed subdivision covers 72.05 hectares of which 54% is considered Net Developable Area and 13% is arterial roads and community facilities. Of the 72.05 hectares, 33% will remain as Rural Conservation Zone or drainage areas. Biosis assessed the ecological values present on the Site (2003-2013, Section 7.3) and provided background biodiversity reports to the subdivision application. The ecological values identified included the location of native vegetation, flora and fauna habitat, and habitat for threatened species. Paragraphs 3.2 (first paragraph on page 5) of the submission summarises the ecological values of the Site with details provided in Section 8.1 of this report. Section 8.1.4 identifies potential impacts to ecological values of the subdivision and mitigation measures for these impacts. Section 8.1.5 outlines the mitigation of potential downstream impacts during design and construction. Section 8.1.6 identifies obligations under the Melbourne Strategic Assessment (MSA) and Biodiversity Conservation Strategy (BSC). Draft planning permit conditions have been issued under the existing planning scheme but do not reflect all proposed changes to the planning scheme that would be introduced under Amendment C208.

6.3 Lancefield Road PSP: Proposed changes to Urban Growth Zone – Schedule 10

Wincity suggest changes to the boundary of the Urban Growth Zone – Schedule 10 (UGZ10) in their submission to Amendment C208 (Paragraphs 3.1 to 3.4 of the submission, paragraphs 2 to 5 on page 5). The suggested changes result from investigations of the Site's topography, servicing and ecological features and aim to align the boundary of UGZ10 more closely to the topography and ecological features of the Site. Figure 2 of this report shows the proposed changes to the UGZ10 boundary on the Site. The changes result in a swap of land between the UGZ10 and Rural Conservation Zone (RCZ) such that 14.36 hectares would become RCZ and 15.85 hectares would become UGZ10. Section 8.2 details the ecological implications of this change.

6.4 Lancefield Road PSP: Request to update Plan 8 of Lancefield Road PSP incorporated document

Plan 8 of the Lancefield Road Precinct Structure Plan incorporated document ('the PSP') shows 2011 timestamped native vegetation mapping that is now out of date. The timestamped data was updated in August 2016 based on site inspection and field mapped native vegetation mapping provided by Biosis and accepted by DELWP and now appears on DELWP's NVIM system. Wincity request that Plan 8 of the PSP be updated to reflect the changes to the timestamped data (Paragraph 3.1 of page 4 the submission). The updated timestamped data is shown in Figure 3 of this report. I note that Figure 7 of the PSP also displays the old timestamping data and likewise should be updated. Section 8.3 describes the need to update the timestamped data.

6.5 Lancefield Road PSP: Proposed changes to Wetlands 12-20 of PSP

Wincity have proposed a range of changes to proposed constructed wetlands on the Site. While it is outside my expertise to comment on water treatment infrastructure, in Section 8.1.5, I make comments on minimising environmental impacts in the design and construction of such wetlands including minimising site disturbance and downstream impacts during construction of Water Sensitive Urban Design treatments (Paragraph 5.11 of the submission). These comments are given in the context of the adjoining Growling Grass Frog habitat which is designated as Conservation Area 21 under the Biodiversity Conservation Strategy approved under the Melbourne Strategic Assessment. Figure 4 of this report shows the location of this habitat. Section 8.4 details these measures.

6.6 Lancefield Road PSP: Outstanding matters raised by Wincity submission

The remaining matters in the Wincity submission are beyond my area of expertise.

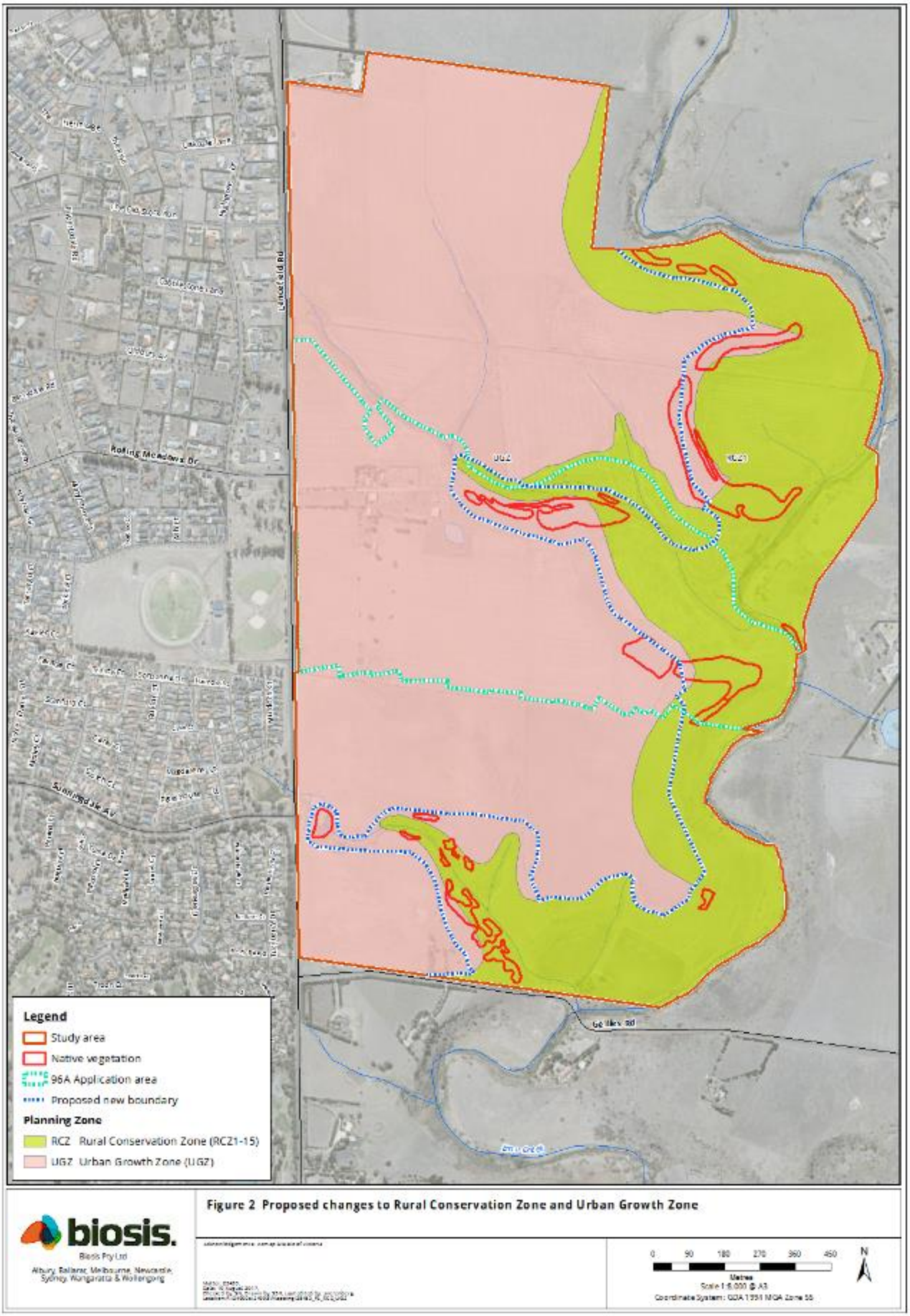

Figure 2 Proposed changes to Rural Conservation Zone and Urban Growth Zone

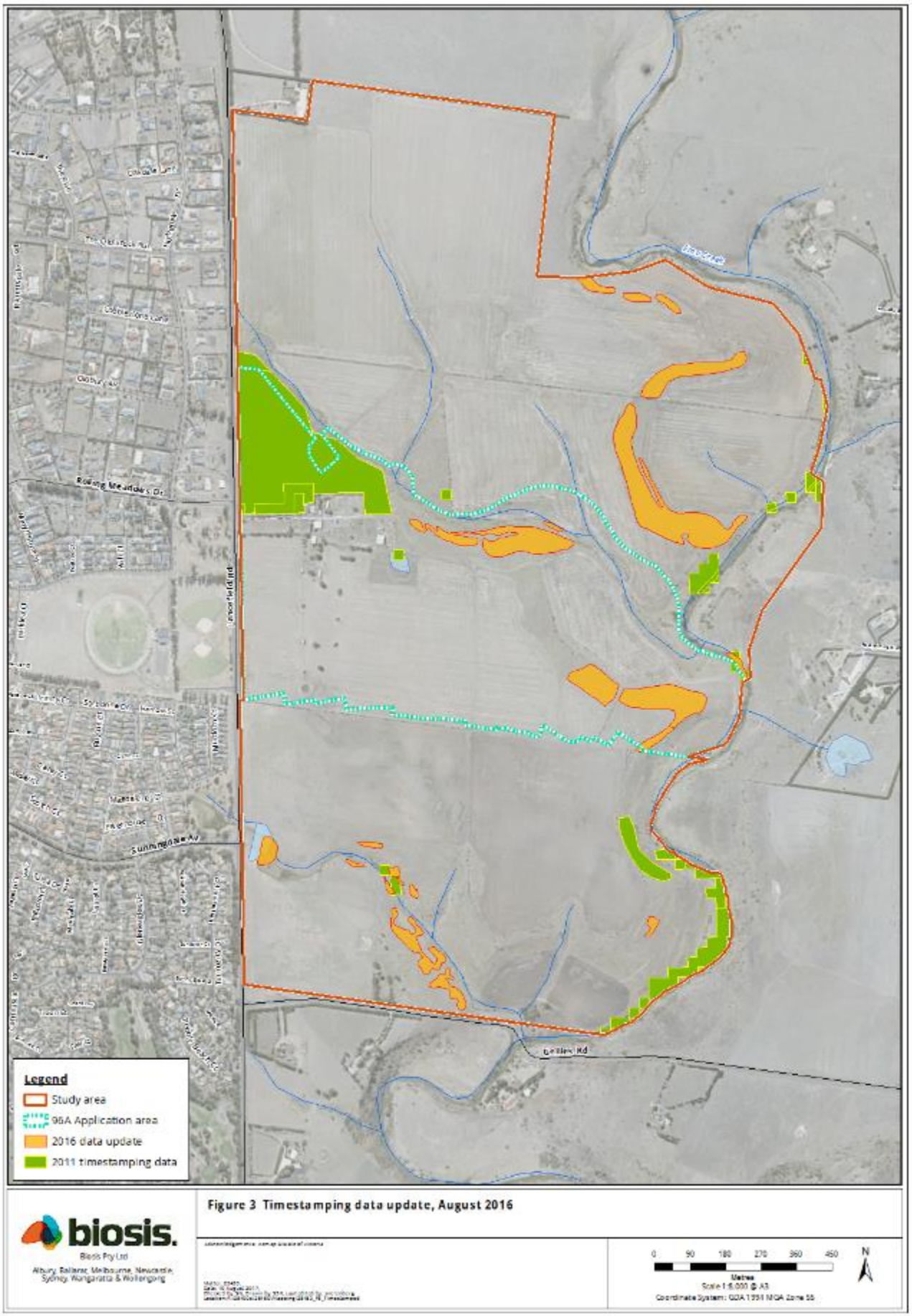

Figure 3 Timestamping data update, August 2016

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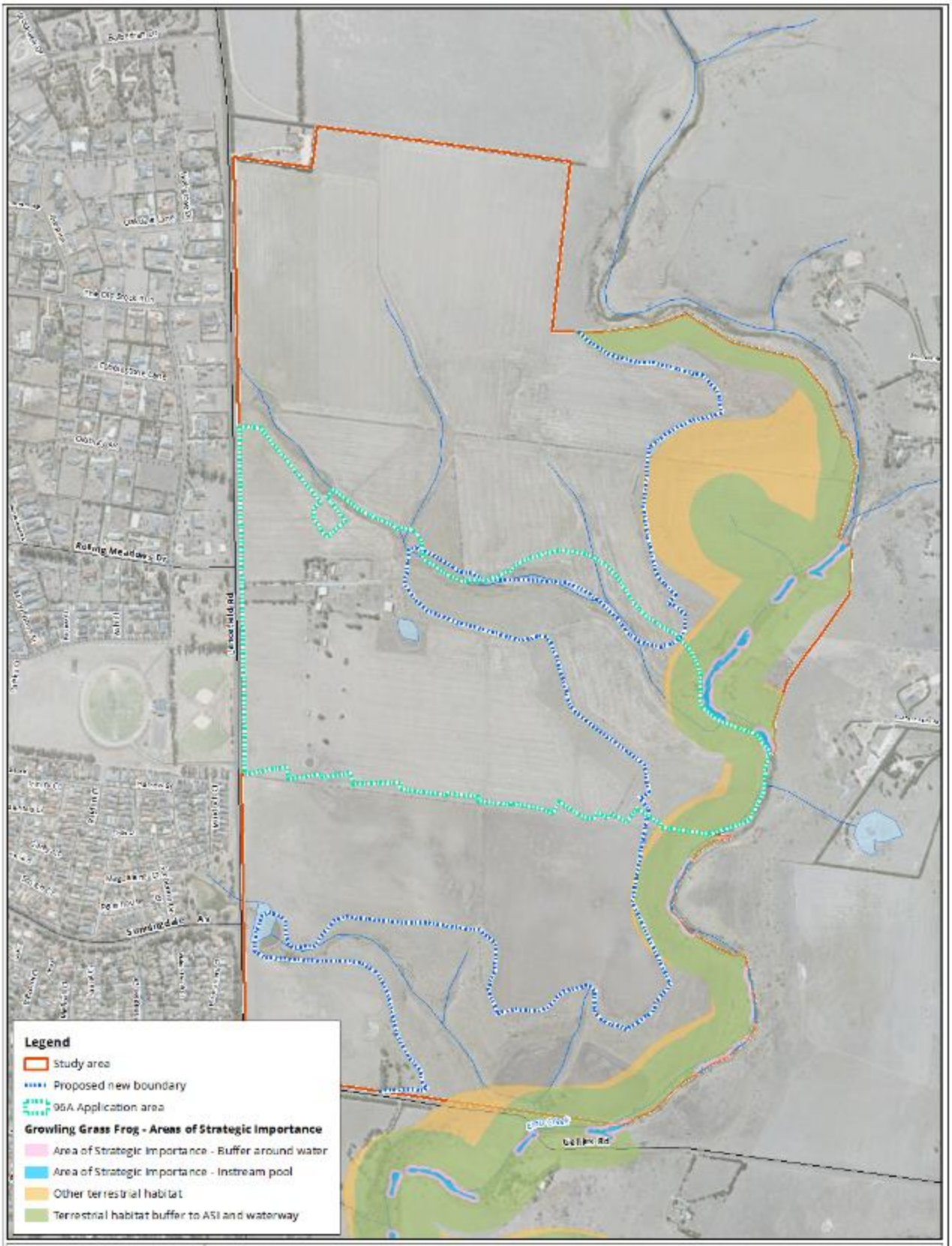

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Figure 4 Growling Grass Frog - Areas of Strategic Importance within the study area

7. Documents and Materials Considered

The following is a list of the documents and materials that I have been instructed to consider or otherwise used in preparing this report.

7.1 Legislation and Subordinate Instruments

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Cth).
- *Environment Protection Act 1970* (Vic).
- *Flora and Fauna Guarantee Act 1988* (FFG Act) (Vic).
- Hume Planning Scheme 2017 (Vic).

7.2 Government Publications

- Commonwealth of Australia 2009. *Significant impact guidelines for the vulnerable Growling Grass Frog* (Litoria raniformis). Nationally threatened species and ecological communities EPBC Act policy statement 3.14, Department of the Environment, Water, Heritage & the Arts, Australian Government, Canberra.
- DELWP 2015. *Guidance note: Implementing the Biodiversity Conservation Strategy for Melbourne's Growth Corridors. Working document – February 2015. Melbourne Strategic Assessment.* State of Victoria, Melbourne.
- DELWP 2017. *Growling Grass Frog Habitat Design Standards. Melbourne Strategic Assessment.* State of Victoria, Melbourne.
- DELWP 2017. *Growling Grass Frog Masterplan for Melbourne's Growth Corridors. Melbourne Strategic Assessment.* State of Victoria, Melbourne.
- DEPI 2013. *Sub-regional Species Strategy for The Growling Grass Frog.* State of Victoria, Melbourne.
- DEPI 2013b. *Biodiversity Conservation Strategy for Melbourne's Growth Corridors.* Victorian Government Department of Environment and Primary Industries, Melbourne (June 2013).
- DEPI 2013c. *Permitted Clearing of Native Vegetation - Biodiversity Assessment Guidelines*. Victorian Government Department of Environment and Primary Industries, Melbourne.
- DoE 2013. *Matters of National Environmental Significance: Significant Impact Guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999*. Australian Government Department of the Environment, Canberra.
- DSE 2004. *Native Vegetation: Sustaining a living landscape. Vegetation Quality Assessment Manual – Guidelines for applying the Habitat hectares scoring method.* Version 1.3. Victorian Government Department of Sustainability & Environment, Melbourne.
- DSE 2010. *Biodiversity Precinct Structure Planning Kit.* Victorian Government Department of Sustainability & Environment, Melbourne.
- EPA 2004. *Guidelines for Environmental Management. Doing it right on subdivisions. Temporary environmental protection measures for subdivision construction sites.* Publication 960, Environment Protection Agency, Melbourne.

- EPA, 1991. *Construction Techniques for Sediment Pollution Control*. Publication 275, Environment Protection Authority Victoria, Melbourne.
- EPA, 1996. *Environmental Guidelines for Major Construction Sites*. Publication 480, Environment Protection Authority Victoria, Melbourne.
- Melbourne Water (undated). *Guidance note for the Development Industry on the interim use of the draft Constructed Wetlands Design Manual.* Melbourne Water, Melbourne.

7.3 Past Reports

- Biosis Research 2003. Preliminary flora and fauna assessment of a property bounded by Melbourne-Lancefield Road and Emu Creek, Sunbury East, Victoria. Authors: Wills, T., and Gilmore, D. Prepared for Austcorp group Limited, Melbourne.
- Biosis Research 2006. Targeted survey for the Growling Grass Frog at Emu Creek, Sunbury, Victoria. Author: Daniel Gilmore .Prepared for AustCorp Group Limited, Melbourne.
- Biosis Research 2007. Flora and fauna assessment of a property bounded by Melbourne-Lancefield Road and Emu Creek, Sunbury East, Victoria. Authors: Gilmore, D., Wills, T., Mueck, S., and Bloink, C. Prepared for Austcorp Group Limited, Melbourne.
- Biosis Research 2011. Submission to Growth Corridor Plan Submissions, Growth Areas Authority. Biosis Research, Melbourne. Project no. 13541.
- Biosis Research 2012. Biodiversity Assessment Report: Kingfisher Estate, Sunbury. Report for Wincity Development Pty Ltd. Authors: Payze, K. & Shell, T. Biosis Research, Melbourne. Project no. 12050.
- Biosis 2013. Biodiversity Assessment Report: Kingfisher Estate, 170 Lancefield Road & 43 Gellies Road, Sunbury. Report for Wincity Development. Authors: Sofo, K, Mueck, S. & Payze, K. Biosis Pty Ltd, Melbourne. Project no. 17027.

7.4 Databases

- DSE 2010. Victorian Biodiversity Atlas 'VBA_FAUNA25, FAUNA100 & FAUNARestricted, FLORA25, FLORA100 & FLORARestricted' August 2010 © The State of Victoria. Victorian Government Department of Sustainability & Environment, Melbourne.
- DoE 2015. Protected Matters Search Tool (PMST) for matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Australian Government Department of Sustainability, Environment, Water, Population and Communities, Canberra.
- Viridans 2014. Victorian Flora Information System. Viridans Biological Databases, Melbourne.

7.5 Other Materials

- Planning Application No. P18855 to Hume City Council by Wincity Pty Ltd and draft permit conditions.
- Submission 69 to Amendment C208, Ben Nam for DELWP.
- Submission 54 to Amendment C208, Kevin Walsh for Hume City Council.
- Submission 74 to Amendment C208, Michael Prior for Melbourne Water.
- VPA response to Wincity submission.

8. Summary of Expert Opinion

8.1 Section 96A: Application for staged subdivision

8.1.1 Flora and Fauna

Field assessment and mapping was undertaken in accordance with the Biodiversity Precinct Structure Planning Kit (DSE 2010).

8.1.1.1 Flora Species Recorded in the Site

Our flora surveys recorded 77 indigenous flora species and 105 introduced species within the Site. No flora species of national significance or state significance were recorded. Appendix 2 provides a list of all recorded flora species.

8.1.1.2 Significant ecological communities

Three Ecological Vegetation Classes (EVCs) were identified: Heavier soils – Plains Grassland, Stream Bank Shrubland and Escarpment Shrubland. The three EVCs identified have a DELWP bioregional conservation status of endangered within the Victorian Volcanic Plain Bioregion. Areas of Plains Grassland also typically correspond to the community Natural Temperate Grassland of the Victorian Volcanic Plain ('NTGVVP') which is listed as critically endangered under the EPBC Act. The community was not considered in detail during the assessment because conservation of NTGVVP is considered in the BCS.

8.1.1.3 Fauna Species Recorded in the Site

We recorded a total of 95 fauna species within the Site across the four Biosis assessments (Appendix 3; Biosis Research 2003; 2006; 2007; Biosis 2013). Eighty-two fauna species were indigenous: 54 birds, 15 mammals, four reptiles, seven amphibians and two fish (Appendix 3). Thirteen fauna species were introduced: nine birds, three mammals and one fish (Appendix 3). Appendix **Error! Reference source not found.** provides a list of all recorded fauna species. One species of national significance Growling Grass Frog *Litoria raniformis* was recorded (Biosis Research 2006) and one state significant species Common Bent-wing Bat (eastern spp.) *Miniopterus schreibersii oceanensis* was recorded (Biosis 2013).

8.1.1.4 Common Bent-wing Bat (eastern spp.) *Miniopterus schreibersii oceanensis* (DSE Advisory List – vulnerable; FFG Act – listed)

Anabat ultrasonic detectors (Titley Scientific, Australia) were used at two locations within the Site over eight nights to survey for microbats (Biosis 2013). Common Bent-wing Bat (eastern spp.) *Miniopterus schreibersii oceanensis,* was recorded along with 11 other bat species (Appendix 3; Biosis 2013).

8.1.1.5 Fauna Habitat Recorded in the Site

Seven fauna habitat types occur within the Site and are summaries below: grassland, rocky shrubland, remnant trees, planted vegetation, crop/pasture, rockwalls/rockpiles and wetlands/watercourses.

Crops/pasture: Most of the Site is crop/pasture, which, due to its highly disturbed and modified nature, contains few resources for fauna and as a consequence, species diversity is generally poor.

Grassland: There are a number of smaller patches of grassland within the agricultural matrix but the quality of grassland habitat varies depending on past land management practices. Grassland provides habitat for a number of terrestrial fauna species, particularly birds, reptiles and invertebrates. Grassland also provides potential habitat for the EPBC Act listed Golden Sun Moth *Synemon plana.* Targeted surveys for this species were not required under the BCS.

Rocky shrubland: Scattered remnants of rocky shrubland occur along the basalt escarpments of Emu Creek and the steep gullies. In many areas, the remnant shrubland is low quality due to weed invasion (especially Boxthorn and Serrated Tussock), grazing, and removal of the indigenous vegetation. The rocky substrate provides shelter for Cunningham's Skink *Egernia cunninghami* and Little Whip Snake *Suta flagellum,* while shrubs provide foraging and nesting habitat for a range of small woodland birds, including Superb Fairy-wren *Malurus cyaneus*, Yellow-rumped Thornbill *Acanthiza chrysorrhoa*, and New-Holland Honeyeater *Phylidonyris novaehollandiae*.

Rockwalls/piles: Rock walls and piles are generally constructed of loose basalt rocks of various sizes, presumably collected from the surrounding landscape. Rock walls provide long narrow linear habitats that are most likely to be used as protective cover by small, ground-dwelling species, particularly frogs, lizards and snakes.

Remnant trees: Remnant trees have been almost entirely removed from the Site, however, a single remnant Manna Gum is located adjacent to Emu Creek and a single standing dead tree is also present within the Site. Both these trees have small hollows, which could be utilised by hollow-dependant fauna.

Planted vegetation: Planted vegetation consists of exotic and non-indigenous trees and shrubs that have been planted around buildings, along fence lines, as wind breaks in paddocks and as scattered paddock trees to provide shelter for stock. Planted trees and shrubs provide some resources for native fauna in the form of foraging, nesting and roosting habitat; however, this habitat is unlikely to support any threatened species.

Wetlands/watercourses: Emu Creek and its associated aquatic and semi-aquatic habitat has the highest value for fauna of any habitat within the Site. The variety of microenvironments within the creek (rocky riffles, deeper pools) provides habitat for native fish including Mountain Galaxias *Galaxias olidus* and possibly Southern Pygmy Perch *Nannoperca australis* (Biosis Research 2007). Platypus *Ornithorhynchus anatinus* has been recorded within the creek on a number of occasions and is likely to be resident in low numbers (Biosis Research 2007). Fast-flowing rocky sections provide high quality breeding habitat for the locally significant Lesueur's Frog *Litoria lesueuri*. The deeper pools supporting abundant fringing and submerged aquatic vegetation supports an important breeding population of the nationally significant Growling Grass Frog *Litoria raniformis* (Biosis Research 2006). Tall reed beds also provide potential habitat for the state significant Lewin's Rail *Lewinia pectoralis* and Baillon's Crake *Porzana pusilla*.

Drainage lines and farm dams upstream of Emu Creek are of low habitat value as a result of little to no aquatic or fringing vegetation and degradation by stock. All dams within the Site provide habitat for a variety of common waterbirds, such as Pacific Black Duck *Anas superciliosa* and Cheastnut Teal *Anas castanea*, and frogs such as Common Froglet *Crinia signifera* and Spotted Marsh Frog *Limnodynastes tasmaniensis*. Steep drainage lines with a high amount of rock provide movement corridors for some fauna, such as Black Wallaby *Wallabia bicolour*, through the otherwise cropped landscape. Insectivorous bats also utilise these steep, low vegetation gullies as 'flyways' while foraging for insects.

8.1.2 Matters of National Environmental Significance

Matters of National Environmental Significance ('MNES') under the EPBC Act are defined in the Significant Impact Guidelines 1.1 (DoE 2013). The MNES include: listed threatened species and communities, listed migratory species, and Ramsar wetlands of international importance. MNES known or predicted to occur within the search area (defined as a 5 km buffer around the Site) are identified by the Protected Matters Search Tool (PMST) of the Australian Government Department of the Environment (DoE 2015). In addition, Biosis searched databases of flora and fauna records to identify any nationally or state significant species that have occurred in the search area (DSE 2010, Viridans 2014).

8.1.2.1 Significant Flora Species Predicted to Occur in the Site

The Protected Matters Search Tool (PMST; DoE 2015) predicted the occurrence of, or suitable habitat for, seven nationally significant flora species within 5 km of the Site (Appendix 2). Database records were retrieved

for an additional two nationally significant flora species and 10 state significant flora species within 5 km of the Site (Appendix 2).

8.1.2.2 Targeted Surveys for Significant Flora Species Predicted to Occur in the Site

Target surveys for flora species of national and state significance predicted to occur within 5 km of the Site were undertaken over 16 days and three seasons (Biosis 2013). The species surveyed for were: Spiny Rice-flower, Black Roly-poly, Brittle Greenhood, Native Peppercress, Austral Toad-flax, Button Wrinklewort, Clover Glycine, Curly Sedge, Large-headed Fireweed, Matted Flax-lily, Pale-flower Crane's-bill, River Swamp Wallaby-grass, Small Golden Moths, Swamp Everlasting, Swamp Fireweed, Austral Crane's-bill, Austral Tobacco, Basalt Podolepis, Fragrant Saltbush, Pale Swamp Everlasting, Plump Swamp Wallaby-grass, Slender Tick-trefoil, Small Milkwort, Small Scurf-pea, Tough Scurf-pea, Basalt Peppercress, Rye Beetle-grass, and Veined Spear-grass.

No flora species of national significance or state significance were recorded during targeted surveys. Based on the results of the targeted surveys, it is unlikely that these species occur within the Site.

8.1.2.3 Fauna Species Predicted to Occur in the Site

The PMST (DoE 2015) predicted the occurrence of, or suitable habitat for, 17 nationally significant fauna species within 5 km of the Site (Appendix 2). Database records were retrieved for an additional 21 state significant fauna species within 5 km of the Site (Appendix 2). For each species, the likelihood of occurrence within the Site is given in Appendix 3, ranked as: negligible, low, medium, high or recorded. Rankings are based on the types of habitat available, database records and expert opinion. Twenty-eight species were given a negligible or low likelihood of occurring in the Site and are not considered further. One was recorded in the Site: Growling Grass Frog *Litoria raniformis* and is considered further in Section 8.1.2.7 and under the provisions in the BCS, Section 8.1.6. Nine species that were given a medium or high likelihood of occurrence but were not recorded are given further consideration here:

- Two of the nine species were listed migratory species: Eastern Great Egret and Latham's Snipe. While some of these species would be expected to use the Site on occasions, it does not provide important habitat for an ecologically significant proportion of any of these species (Biosis 2013).
- Two of the nine species are already addressed under the provisions of the BCS and so were not considered further: Striped Legless Lizard and Golden Sun Moth.
- Black-eared Cuckoo and Spotted Harrier are considered "near threatened" on the DSE advisory list, which is not a threat category under relevant legislation and as such are not considered significant.
- Australasian Bittern may be provided with some habitat at densely vegetated dams and sections of Emu Creek with slow flowing water but have not been recorded in the Site. Since the proposed development does not propose to remove wetland habitat and may increase wetland habitat by providing constructed wetlands, the species was not considered further.
- Black Falcon primarily occurs in arid and semi-arid zones in the north, north-west and west of Victoria, though can be forced into more coastal areas by droughts and subsequent food shortages. While the Site may be occasionally visited by this species, the Site does not provide important habitat for an ecologically significant proportion of any of these species
- Yarra Pygmy Perch was recorded by Biosis in a connecting waterbody, Deep Creek and suitable habitat exists within Emu Creek so it is considered to have a medium likelihood of occurring in Emu Creek. Protection of the aquatic environment is addressed in Section 8.1.5.

8.1.2.4 Significant Ecological Communities Predicted to Occur in the Site

The PMST (DoE 2015) predicted the occurrence of five listed threatened ecological communities within 5 km of the Site. One listed ecological community occurs on the Site: *Natural Temperate Grassland of the Victorian Volcanic Plain* ('NTGVVP'). Approvals for clearing of NTGVVP are already addressed under the BCS so are not considered further.

8.1.2.5 Migratory Species Predicted to Occur in the Site

Nineteen migratory species were predicted to occur within 5 km of the Site. While some of these species would be expected to use the Site on occasions, and some of them may do so regularly, it does not provide important habitat for an ecologically significant proportion of any of these species (Biosis 2013).

8.1.2.6 Wetlands of international importance (Ramsar sites) associated with the Site

There are no Ramsar sites associated with the Site. The Site does not drain directly into a Ramsar site and any development is not likely to result in a significant impact (Biosis 2013).

8.1.2.7 Growling Grass Frog *Litoria raniformis* (EPBC Act – vulnerable; DSE Advisory List – endangered; FFG Act – listed)

Targeted surveys for Growling Grass Frog *Litoria raniformis* were undertaken in Emu Creek (Biosis Research 2006) and dams and drainage lines on Wincity land (Biosis 2013). Targeted surveys were undertaken to comply with the requirements of the EPBC Act policy statement 3.14 (Commonwealth of Australia 2009). A reference site in the region (Jacana Wetlands, Broadmeadows) was visited on the same nights as the targeted surveys in order to confirm the suitability of the nights for survey. A breeding population of the species was identified in Emu Creek (Biosis Research 2006). The species was not recorded in any of the farm dams or drainage lines (Biosis 2013).

8.1.3 Native Vegetation

Native vegetation was mapped according to standard methods provided by DSE (2004). Figure 5 shows the location of native vegetation remnant patches within the Site.

8.1.3.1 Ecological Vegetation Classes (EVCs)

The standard methods determine the Ecological Vegetation Class (EVC) and vegetation quality score for each patch. A patch is defined by DSE (2007) as an area where at least 25% of the total understorey plant cover is native (excluding bare ground), or a group of at least three trees where the canopy cover is at least 20%.

The EVCs identified as present at the Site were:

- Heavier soils – Plains Grassland (EVC 132-61, bioregional conservation status: Endangered).
- Stream Bank Shrubland (EVC 851, bioregional conservation status: Endangered).
- Escarpment Shrubland (EVC 895, bioregional conservation status: Endangered).

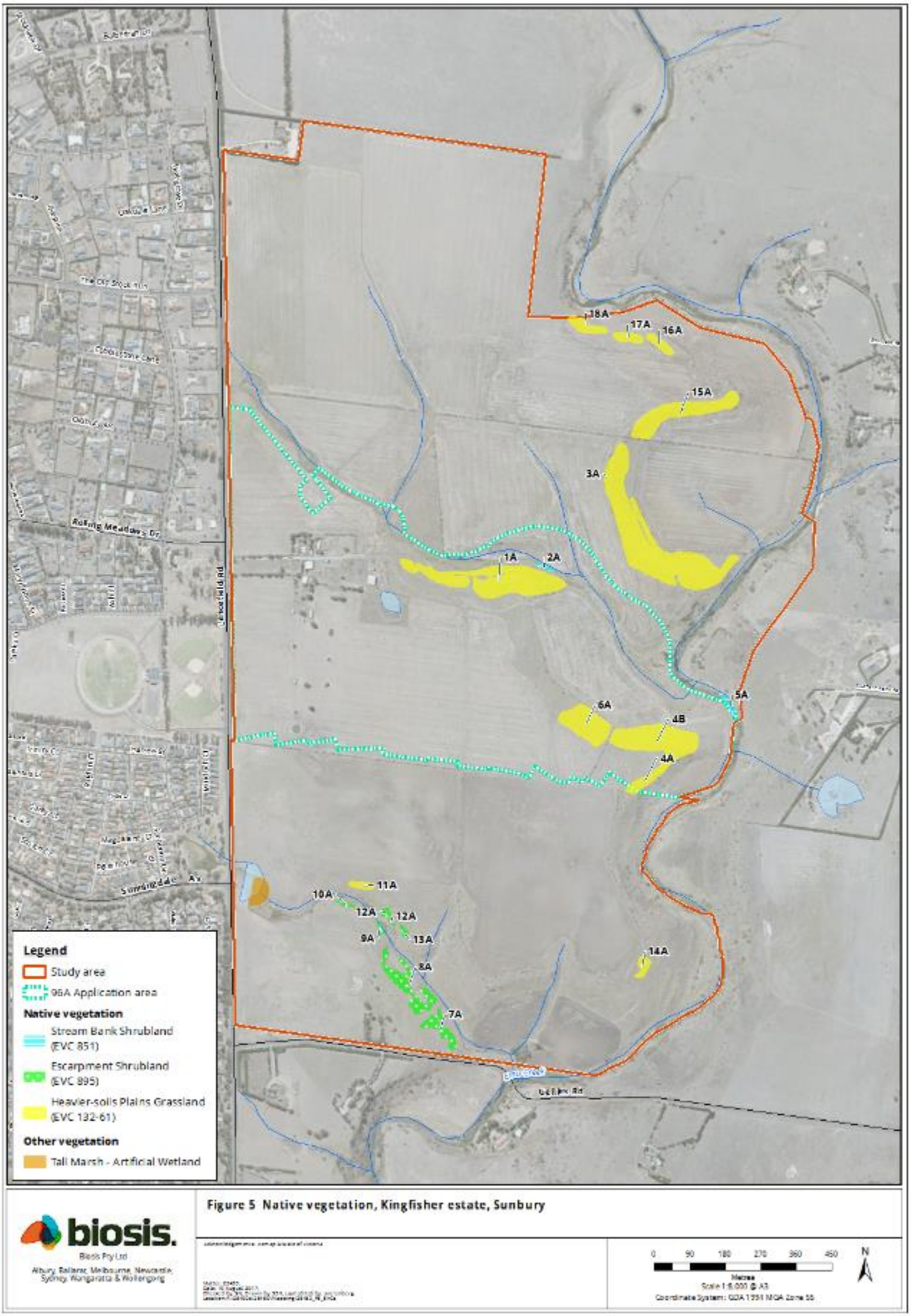
8.1.3.2 Habitat Hectare Assessment

Each patch of vegetation mapped was assigned a Habitat Zone (HZ). For each HZ, a habitat hectare assessment was conducted and habitat score calculated. All patches were of low to moderate quality (Habitat Scores between 10.05/100and 45.52/100, Table 1). The total amount of native vegetation mapped was 9.95 hectares comprising a total of 3.07 Habitat hectares (Table 1).

Table 1: Vegetation quality assessment scores for each habitat zone within the Site.

Habitat Zone			1A	2A	3A	4A	4B	5A	6A	7A	8A	9A	10A	11A	12A	13A	14A	15A	16A	17A	18A	Total
Bioregion			VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	
EVC Name / #			HS-PG 132-61	SBS 851	HS-PG 132-61	HS-PG 132-61	HS-PG 132-61	SBS 851	HS-PG 132-61	ES 895	ES 895	ES 895	ES 895	HS-PG 132-61	ES 895	ES 895	HS-PG 132-61	HS-PG 132-61	HS-PG 132-61	HS-PG 132-61	HS-PG 132-61	
		Max Score	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**	
Site Condition	Large Old Trees	10	N/A	N/A	N/A	N/A	N/A	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Canopy Cover	5	N/A	N/A	N/A	N/A	N/A	5	N/A	0	0	3	0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	
	Lack of Weeds	15	4	4	4	4	0	7	0	0	0	0	4	0	0	0	0	0	4	0	0	
	Understorey	25	15	10	15	15	15	5	15	5	10	10	10	15	5	5	15	15	20	20	20	
	Recruitment	10	3	0	0	0	3	0	0	0	0	3	0	3	0	0	0	0	3	0	0	
	Organic Matter	5	4	3	5	5	2	3	4	2	2	4	4	4	2	2	2	4	5	4	4	
	Logs	5	N/A	0	N/A	N/A	N/A	0	N/A	0	0	0	0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	
	Total Site Score		26	17	24	24	20	30	19	7	12	20	18	22	7	7	17	19	24	32	24	
	EVC standardiser (x 75/55)		1.36	1.25	1.36	1.36	1.36	1	1.36	1.15	1.15	1.15	1.15	1.36	1.15	1.15	1.36	1.36	1.36	1.36	1.36	
	Adjusted Site Score		35.36	21.25	32.64	32.64	27.2	30	25.84	8.05	13.8	23	20.7	29.92	8.05	8.05	23.12	25.84	32.64	43.52	32.64	
Landscape Value	Patch Size	10	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Neighbourhood	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Distance to Core	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Total Landscape Score		2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
HABITAT SCORE		**100**	37.36	23.25	35.64	34.64	29.2	32	27.84	10.05	15.8	25	22.7	31.92	10.05	10.05	25.12	27.84	34.64	45.52	34.64	10.05
Habitat points = #/100		**1**	**0.37**	**0.23**	**0.36**	**0.35**	**0.29**	**0.32**	**0.28**	**0.1**	**0.16**	**0.25**	**0.23**	**0.32**	**0.1**	**0.1**	**0.25**	**0.28**	**0.35**	**0.46**	**0.35**	
Habitat Zone area (ha)			1.61	0.5	3	0.18	1.25	0.1	0.73	0.29	0.61	0.03	0.04	0.07	0.07	0.05	0.09	0.91	0.12	0.18	0.12	9.95
Habitat Hectares (Hha)			**0.6**	**0.12**	**1.07**	**0.06**	**0.37**	**0.03**	**0.2**	**0.03**	**0.1**	**0.01**	**0.01**	**0.02**	**0.01**	**0.01**	**0.02**	**0.25**	**0.04**	**0.08**	**0.04**	**3.07**

Legend: VVP = Victorian Volcanic Plain, HS-PG =-Heavier Soils Plains Grassland, SBS = Stream Bank Shrubland, ES = Escarpment Shrubland, N/A = Not Applicable



biosis
Biosis Pty Ltd
Albury, Ballarat, Melbourne, Newcastle, Sydney, Wangaratta & Wollongong

Figure 5 Native vegetation, Kingfisher estate, Sunbury

8.1.4 Potential Impacts from proposed subdivision and residential development

The proposed development will have a localised direct impact through the removal of the ecological values within the Site and potential indirect impacts to waterways downstream of the development. Direct site impacts (removal of native vegetation, removal of habitat for threatened species) will be offset via Habitat Compensation Obligation payments under the BCS. Indirect impacts to waterways can be mitigated or avoided through the design and management of the development and associated works.

8.1.4.1 Direct Impacts

The primary source of direct impacts to flora and fauna would occur as a result of vegetation and habitat removal required by the proposed construction footprint. These include the following:

- Permanent removal of up to 3.80 ha hectares of native vegetation comprised of HZ 1A, 2A, 4A, 4B and 6A.
- Disturbance to soil.
- The permanent removal of some native species habitats (e.g. grassland).
- Mortality of native flora and fauna during vegetation clearing and ground disturbance.
- Permanent or temporary accidental loss of or damage to retained vegetation or habitat during the construction phase.
- Runoff or accidental spillage of chemicals/contaminants utilised during and post-construction.

8.1.4.2 Indirect Impacts

Indirect impacts of development typically involve the modification and degradation of adjacent vegetation and habitat not removed by the development footprint. They include the following potential impacts:

- Alteration to drainage hydrology of the Site primarily through an increase in runoff from impervious surfaces.
- Alteration to drainage hydrology and a subsequent alteration in downstream riparian and instream habitat in Emu Creek, primarily through increases in erosion and sedimentation in tributaries, and bed and bank erosion.
- Deterioration in runoff water quality from the Site (particularly increased sediments/suspended solids, toxicants and litter) and a subsequent downstream alteration to the water quality and habitat value (via siltation) for significant fauna (Growling Grass Frog *Litoria raniformis*).
- Changes to wildlife behaviour and mortality.
    - Construction of roads/housing is likely to impede the movement of native fauna and result in increased mortality due to vehicle traffic.
- Increased invasion by weeds and garden escapes and rubbish dumping into adjoining reserves.
- Degradation of habitat values in the local area due to incremental loss of remnant vegetation and fragmentation of habitat and reduced opportunities for ecological restoration.

8.1.4.3 Steps for Mitigation of Potential Impacts

There may be opportunities to reduce (mitigate) potential impacts through alterations to the design or management of the proposed development. The primary mitigation measures for direct impacts is to minimise the removal of native vegetation. In addition, particular attention should be paid to the downstream aquatic environments and associated Growling Grass Frog habitat to mitigate indirect impacts.

Step 1: Avoid

It is unlikely that loss of native vegetation can be completely avoided if this project is to proceed; however, Wincity has suggested changes to the boundary of the UGZ10 and RCZ, which incorporate greater amounts of native vegetation within the RCZ. Section 8.2 details these changes.

Step 2: Minimise

The construction footprint of the proposed development is based on the extent of all works, including batters, trenching and any incidental clearing for temporary access tracks and storage of materials, plant and equipment. Where practical, the development should be designed to avoid and minimise the loss and damage to native vegetation and to avoid downstream impacts at all stages, including the construction phase. Details on requirements to minimise construction and downstream impacts are provided in Section 8.1.5. Section 8.2 details changes to the UGZ10 boundary which would reduce the amount of native vegetation included within the UGZ10.

Step 3: Offset

The Site is within the MSA so that offsets for native vegetation clearing and clearing of habitat for threatened species are dealt with in the BCS. Offset requirements are outlined below in Section 8.1.6.

8.1.5 Mitigation of Potential Downstream Impacts during design and construction

Design and construction of wetlands – BCS requirements

In March 2017, DELWP released the *Growling Grass Frog Masterplan for Melbourne's Growth Corridors*, which updates the original *Sub-regional Species Strategy for the Growling Grass Frog* approved under the EPBC Act. In addition to this, the DELWP released the *Growling Grass Frog Habitat Design Standards* (March 2017). The Masterplan and associated Design Standards apply to Conservation Area 21 – Jacksons Creek and Emu Creek.

The Masterplan states "*The standards apply to the creation of dedicated Growling Grass Frog wetlands and adjacent terrestrial habitat within conservation areas established under the Biodiversity Conservation Strategy for Melbourne's Growth Corridors. They do not apply to stormwater wetlands or other types of waterbodies such as lakes built for amenity purposes*." (DELWP 2017, page 5). The Design Standards provide specifications for, among other things: wetland size, shape, water depths, hydroperiod, wetland lining and substrate, thermal properties and aquatic vegetation. All wetland designs within and adjoining Conservation Area 21 should be assessed to ensure they comply with the Masterplan and Design Standards.

Design and construction of wetlands – Melbourne Water requirements

Melbourne Water has issued the *Guidance note for the Development Industry on the interim use of the draft Constructed Wetlands Design Manual.* This document states that "All wetlands within new PSPs and DSSs are to be designed in accordance with the draft Constructed Wetlands Design Manual."

Construction Site Environmental Management Plan

A Construction Site Environmental Management Plan ('CSEMP') is required as specified in the draft planning permit conditions. The CSEMP should follow the requirements outlined in the draft planning permit and follow the following mitigation measures:

Pre-construction:

- Design and planning for construction of the proposed 96A subdivision should pay particular attention to protecting downstream water quality.

- All areas of retained native vegetation should be designated for protection during construction.
- Design all drainage lines and drainage line crossings to minimise disturbance to instream habitat. Use Water Sensitive Urban Design (WSUD) principles to minimise road runoff input to drainage lines and to minimise erosion/siltation.
- Prepare a comprehensive Site Revegetation Plan for wetland areas that are reformed to construct wetlands and retarding basins.
- Signage, induction and careful supervision of contractors should be implemented.

Construction:

- Retained vegetation should be fenced and treated as no-go zones. Establish and fence off the construction zone using silt fences adjacent to drainage lines to ensure that areas outside the construction zone are not impacted.
- Sub-surface rock or piles of rock disturbed during construction should be stock piled for potential use in habitat enhancement works.
- Best practice sediment control measures should be adopted to ensure the protection of aquatic habitats. Construction works need to be managed to minimise land disturbance, soil erosion and the discharge of sediments and other pollutants to surface waters. Effective management practices that are consistent with guidance from the Environmental Protection Authority, including those provided in *Environmental Guidelines for Major Construction Sites* (EPA 1996) as amended and *Construction Techniques for Sediment Pollution Control* (EPA 1991) should be implemented. The *Guidelines for Environmental Management* (EPA 2004) also provide useful guidance on temporary environmental protection measures applicable to construction sites.
- All temporary sediment/pollution retention measures should be designed to withstand significant rainfall events. In addition they must be maintained and regularly inspected to ensure adequate performance.
- Ensure equipment storage, and stockpiles of waste materials are located on stable surfaces away from areas of remnant vegetation and drainage lines.
- Monitor the construction site periodically especially during periods of high use and after significant rainfall events.
- Consider closing the construction site after significant rainfall events, if the surface is saturated and the potential for erosion is high.
- All noxious and woody environmental weeds arising from the proposed works should be controlled. Rock or soil materials should not be introduced from outside the Site or from areas within the Site that are infested with weeds.

Post-construction:

- Carry out revegetation works around wetlands using site indigenous species as a first option. Any battered slopes should be stabilised using locally indigenous species appropriate for the relevant EVC. It is recommended that any battered slopes are regularly monitored and managed for a minimum of five years to ensure the successful establishment of revegetation and control of any erosion that may occur.
- Control all noxious and woody environmental weeds arising from the proposed works.

8.1.5.1 Landscape masterplan

The landscape masterplan for the Kingfisher estate provides a list of species for street trees, shrubs and ground cover plantings. I note that none of the species recommended as street trees are indigenous to the bioregion, being introduced trees (North American Maples) or Eucalypt species found in other states (e.g.

Salmon Gum from Western Australia). The master plan should be updated to provide indigenous street trees in most areas. Planting of indigenous trees would be more sympathetic to the surrounding conservation and landscape values and the natural heritage of Victoria's volcanic plain.

Ground cover plantings and shrubs are given as a colour palette in the landscape masterplan. These plantings instead should in many instances try to replicate native grassland in species composition and structure of garden beds and other ground cover plantings. This is especially important in areas that interface with conservation areas and which were originally Plains Grassland.

The wetland planting palette provides some suggestions of indigenous species for wetland plantings. Wetland plantings should also follow the guidelines described in the above sections regarding the design and construction of wetlands.

Hume City Council already has a detailed Landscape guidelines document (September 2005) available on their website and which lists a large number of indigenous species in the planting guides. I recommend that this be referred to and priority given to indigenous species over native or introduced species.

8.1.6 The Biodiversity Conservation Strategy (BCS)

The BCS is the overarching strategy for the protection of biodiversity in Melbourne's growth corridors. The Site is within Melbourne's north-western growth corridor so the BCS applies. Of particular relevance to the Site is the provision of Conservation Areas under the BCS and the payment of Habitat Compensation Obligation fees.

8.1.6.1 Implementing the BCS

To assist in implementing the BCS, the DELWP has produced the 2015 document titled: *Guidance note: Implementing the Biodiversity Conservation Stratgey for Melbourne's Growth Corridors. Working document – February 2015* (DELWP 2015). Key sections for the proposed development are:

- Adjustments to conservation area boundaries (Chapter 2 of DEWLP 2015).
- Conservation Area Concept Plan (Chapter 3 of DEWLP 2015).
- Conservation Interface Plan (Chapter 3 of DEWLP 2015).

Adjustments to conservation area boundaries

Adjustments to conservation area boundaries need to be approved by DEWLP. The Guidance note provides the decision tree for assessing applications to adjust conservation area boundaries (Diagram 1 and Figure 1, DELWP 2015). These processes should be considered when addressing the proposed changes to the UGZ10 boundary (Section 8.2 below).

Conservation Area Concept Plan

Conservation Area Concept Plans (CACPs) will be prepared for each Conservation Area within the BCS. "*The purpose of CACPs is to set out the conservation objectives of each conservation area and show the locations of areas suitable for land-uses compatible with conservation, such as passive recreation and water management. CACPs comprise: 1. A map setting out the land-uses/constraints for the conservation area. 2. Notes specifying any conservation requirements relating to the plan.*" (DELWP 2015, page 19). The requirement for a CACPs should be considered at the PSP stage.

Amendment C208 introduces the requirement for CACPs into the Hume Planning Scheme. DEWLP's submission to Amendment C208 raises several inconsistencies within the mapping for the CACPs. These should be addressed prior to finalising the PSP. Figure 7 of the PSP should be updated to reflect the current timestamping of native vegetation within this area.

Conservation Interface Plan

Conservation Interface Plans will be prepared for each conservation area within the BCS. "*Conservation Interface Plans are plans showing the layout of the interface area that must be established around conservation areas in accordance with the requirements of the BCS. The plan will describe the land uses within 30m of the conservation area.*" (DELWP 2015, page 19).

Figure 7 of the PSP shows a red dotted line described as "conservation interface zone (30m)" around Conservation Area 21 on Emu Creek. No explanation of this mapped zone is given within the PSP document so I am assuming that this is the area that to be covered by the Conservation Interface Plan. I suggest that the PSP document needs to re-name this to "BCS Conservation Interface Plan zone (30m)" and clearly explain what documentation needs to be provided to satisfy the requirements of the Conservation Interface Plans and reference the Guidance note (DELWP 2015). R44 in the PSP notes a 20 metre buffer is a requirement, which is inconsistent with the requirement for a CIP and only mentions Conservation Areas 18, 19 & 20 and not Conservation Area 21. Wincity in their submission highlight that no explanation of the "conservation interface zone (30m)" is given in the PSP and suggest it should be removed. Because it is part of the BCS, the 30 m zone needs to be retained but this should be made clearer in the PSP.

8.1.6.2 Requirements for Habitat Compensation Obligations

Under the BCS, biodiversity offsets are managed by way of a Habitat Compensation Obligation ('HCO') fee. HCO fees are calculated on a parcel-by-parcel basis using previously mapped and modelled biodiversity spatial information in accordance with the MSA (DEPI 2013b). An estimate of the HCO fees can be generated by the DELWP NVIM system. The HCO estimate for the 96A application area (Parcel Number 4\LP208321) is summarised is Table 1 below and attached in Appendix 4. Wincity would need to enter into a staging agreement with the MSA to pay the HCO fees, prior to approval being granted. The requirement to pay the HCO fee is included in the amended UGZ10 ordinance, section **4.13 Permit Note: Operation of Commonwealth Environmental Laws**.

Table 1 MSA habitat compensation obligations for 170 Lancefield Road

Habitat Compensation Obligation:	Unit price (per ha)	Obligation	Estimate subtotal
Native vegetation	$104,582.50	4.741 ha	$495,825.63
Spiny Rice-flower	$8,730.70	4.741 ha	$41,392.25
Golden Sun Moth	$8,705.40	32.140 ha	$279,791.56
Growling Grass Frog	$8,281.90	53.663	$444,431.60
Total			$1,261,441.04
Conservation Area:	**Number:**	**Area**	**Type**
	21	18.085 ha	Growling Grass Frog

8.2 Lancefield Road PSP: Proposed changes to Urban Growth Zone – Schedule 10

Figure 2 of this report shows the proposed changes to the UGZ10 boundary on Wincity land. The changes result in a swap of land between the UGZ10 and RCZ. The changes would result in the following:

- 14.36 ha would be rezoned to RCZ.
- 15.85 ha would be rezoned UGZ10.
- Native vegetation zoned RCZ would increase from 4.62 ha to 8.43 ha.
- Native vegetation zoned UGZ10 would decrease from 5.15 ha to 1.35 ha.
- 0.17 ha of Growling Grass Frog "Terrestrial habitat buffer to ASI and waterway" to be rezoned UGZ10.
- 0.33 ha of Growling Grass Frog "Other terrestrial habitat" to be rezoned UGZ10.

It is my opinion that the proposed changes to the UGZ10 boundary would result in more native vegetation being retained within the RCZ. Changes to Growling Grass Frog habitat occur in the Terrestrial buffer and Other terrestrial habitat mapped by the MSA (DELWP 2017). Based on the Guidance note, it is likely that the proposed adjustment will be considered 'slight' or 'minor' because of the small area of the habitat involved and because additional terrestrial habitat is being added to the RCZ (see Figure 4 of this report). The decision needs to be referred to DELWP for approval (DELWP 2015).

Were the changes to be implemented, mapping in the PSP and planning scheme would need to be updated to reflect this change as well as the Incorporated Plan Overlay Schedules 3 and 4 (IPO3 and IPO4 , Paragraph 9.1 of the submission).

8.3 Lancefield Road PSP: Request to update Plan 8 of Lancefield Road PSP incorporated document

Wincity request that Plan 8 of the PSP be updated to reflect changes to the timestamped native vegetation mapping data (Paragraph 3.1 of page 4 the submission). Plan 8 and Figure 7 of the PSP shows 2011 timestamped native vegetation mapping that is now out of date. The timestamped data was updated in August 2016 based on site inspection and field mapped native vegetation mapping provided by Biosis. Thus the updated timestamping more accurately reflects the location and extent of native vegetation with the Site. The updated timestamped data is compared with the old timestamping data in Figure 3 of this report.

Plan 8 of the PSP determines which native vegetation is retained and which is to be removed. The vegetation removal plan is incorporated into the planning scheme via an amendment to the schedule to Clause 52.17 which states that the vegetation shown as "to be removed" on Plan 8, does not need a permit to remove/lop/destroy native vegetation. Thus is it essential that Plan 8 accurately reflect which vegetation does and does not need a permit to be removed.

The proposed amended schedule to Clause 52.17 contains an error in the last paragraph in 1.0 Scheduled area (as noted by the DELWP submission). This needs to be amended as a matter of urgency to prevent unwanted clearing of native vegetation.

8.4 Lancefield Road PSP: Proposed changes to Wetlands 12-20 of PSP

Wincity have proposed a range of changes to proposed constructed wetlands on the Site. Wetlands should be designed and constructed according to the recommendations listed in Section 8.1.5 of this report. If wetland construction can be done in such a way as to minimise soil disturbance and excavation and still meet the Melbourne Water and BCS requirements, I would be supportive of such efforts. Given the proximity to a

known breeding population of Growling Grass Frog, at all stages the protection of water quality and retention and improvement of Growling Grass Frog habitat should be considered.

8.5 Summary of response to submissions

Table 2, below, details the submissions and items relevant to ecological values on Wincity land that were considered while preparing this report. Unless listed in Table 2, Items within these submissions were either beyond my area of expertise or minor edits that do not need further comment.

Table 2 Summary of Biosis response to submissions

Paragraph/Item	Summary of submission	Witness response
APP for Wincity		
3.1 (page 4)	*Plan 8 - Native Vegetation Removal and Retention (p. 30) of the PSP partly utilizes the old time stamping mapping which has subsequently been updated by DELWP upon the submission of information from Biosis....Plan 8 should be amended....*	Concur. See Section 8.3 and Figure 3 of this report. I note that Figure 7 of the PSP also needs to be updated.
3.2 (paragraph 1, page 5)	*The majority of the site has been cropped and the condition of vegetation ... fauna habitat within the site which indicated that Emu Creek is of high conservation value for Growling Grass Frog and a range of other species (e.g. Lesuer's Frog, Platypus, etc.).*	Concur. See Section 8.1 of this report.
3.1 to 3.5 (paragraphs 2-5, page 5)	*Wincity has submitted to the VPA and DELWP that some areas currently zoned RCZ should be UGZ and conversely some areas of UGZ should be RCZ.*	Concur. See Section 8.2 of this report.
4.10	*What is the purpose / specific requirement for the 30m 'conservation interface zone' as referred to on Figure 7?*	I assume this is the area covered by the Conservation Interface Plan stipulated in BCS Guidance note (DELWP 2015). See Section 8.1.6 of this report.
5.11	*A key advantage of reducing the wetland footprint will be the ability to:* *a) Integrate WSUD elements around existing vegetation to be retained;* *b) Break the slope;* *c) Reduce the overall earthworks required to contrast a typical "Constructed Wetland" and associated carbon footprint;* *d) Reduce the area footprint of the treatment devices;*	I give in-principle support to efforts to minimise excavation and earthworks where this reduces potential negative impacts to water quality and instream habitat. I support retaining as much native vegetation as possible. Section 8.1.5 provides further advice on mitigation potential downstream impacts. I cannot comment further on comparisons of particular WSUD treatments.

	e) Reduce the excavation in rock and overall cost; *f) Respond to the natural topography of the subject land.*	
9.1	*The boundary of the Incorporated Plan Overlay Schedules 3 and 4 will need to be altered in accordance with any boundary alterations between the RCZ and UGZ.*	Concur.
Ben Nam for DELWP (Lancefield Road Precinct Structure Plan only)		
1	*DELWP's preference is for only one conservation area layer to be shown and for 'drainage/waterway in conservation area' to be changed to 'drainage/waterway' with a lighter hatching to clearly show it existing within the conservation area.* [Plan 3]	I am generally supportive of maps relating to conservation areas being refined with the aim of increasing interpretability, including Plan 3 highlighted by DELWP. • Maps should be mindful of differing visual abilities including the range of colour blindness. Even with full colour vision, most maps are difficult to interpret. • BCS reserves should be depicted with one solid colour called "BCS Conservation Area" and labelled with each CA number (18-21). The current designation of "conservation area" and "drainage/waterway in conservation area" in hashed lines misrepresent the reserves i.e. the drainage/waterway *is* the conservation area and *must be* protected under the existing Commonwealth approval. • The category called "regionally significant landscape values" should be hashed not solid – these areas are yet to be finalised compared to the conservation areas, which have existing Commonwealth approval and must be protected. • There should be a clear distinction between conservation land and recreation areas. E.g. All public open space should have the same colour and not be dull green.
4	*Reference to conservation areas 18,19 or 20 to be changed to Conservation Area 21;*	Concur. I make the general comment that the different BCS reserves within the PSP boundary are not well articulated in

		the PSP document. Conservation Area 21 includes all mapped Growling Grass Frog habitat and is known as "GGF Corridors – North-Western Growth Corridor". Conservation Area 19 and part of 18 is for "Nature conservation". Conservation Area 20 and part of 18 is for "Open space" (DEPI 2013b). E.g. Figure 4 of the PSP is almost unreadable due to trying to depict conservation areas boundaries, topography and shared paths on one small diagram with surrounding areas faded out and causing further confusion. Without clearer depiction of these areas, there is a risk that these reserves are overlooked with a potential resulting failure to satisfy the Commonwealth approval.
8	*The PSP does not currently show a Conservation Area Interface Plan. This are critical for ensuring urban development maintains consistency with the 2013 Commonwealth Approval for Urban Development under the EPBC Act. The Guidance Note: Implementing the Biodiversity Conservation Strategy for Melbourne's Growth Corridors IDELWP 2015) outlines the requirements for these plans. The PSP must include a Conservation Area Interface Plan consistent with the requirements of the Guidance Note. DELWP looks forward to providing guidance and advice as these plans are developed.*	Concur. The BCS needs to be implemented in full to satisfy Commonwealth approval under the EPBC Act. See Section 8.1.6 for more information on the BCS.
11	*Plan 8 to address the following:* 1. *The wording in the legend should refer to 'scattered trees' instead of 'existing trees';* 2. *The scattered tree points don't represent DELWP's final scattered tree layer. DELWP to provide VPA with final scattered tree layer.* 3. *The plan does not show any native vegetation or scattered trees within conservation areas. All native vegetation and scattered trees within the conservation area*	I respond to DELWPs dot points as follows: 1. Incorrect: this should be labelled "Native vegetation". The patches labelled "existing trees to be retained" is Plains Grassland on Wincity land and so does not support trees. See Figure 5 of this report. 2. No scattered trees are depicted and should be updated, if available. 3. Depicting native vegetation within reserves does not seem necessary as clearing within these areas would not

	to be shown as to be retained. 4. *The extent of native vegetation shown outside of conservation areas is missing a number of patches.*	be consistent with the BCS. 4. Again, native vegetation should be updated to the most recent data.
13	1. *DELWP requests the legend in the CACP's identify the number of each conservation area.* 2. *Scattered trees displayed do not reflect DELWP's final scattered tree layer for the precinct. DELWP to provide VPA with up to date layer.* 3. *DELWP has recently finalised its Areas of Strategic Importance (ASI) mapping for GGF (as part of masterplanning process} and requests thee be included in the CACP's.* 4. *In a number of areas, native vegetation identified in the time stamping data layer is not shown in the CACP's.* 5. *DELWP requests shared paths be realigned in these areas to avoid native vegetation.*	I respond to DELWPs dot points as follows: 1. Concur as per response to Item 4. 2. Concur as per response to point 2, Item 11. 3. Concur. See Figure 4 of this report for ASI for Wincity land. 4. Concur. See Section 8.3 of this report. 5. Concur. Removal of native vegetation should be avoided.
16	*As a first principle utilities should be placed outside conservation areas however where there is no alternative, disturbance to existing waterway values, native vegetation and habitat for matters for national environmental significance must be avoided.*	Concur. Removal of native vegetation should be avoided.
17	*Utilities must be placed outside conservation areas in the first instance.*	Concur. Removal of native vegetation should be avoided.
18	*Avoid impact to native vegetation and habitat for matters of national environmental significance within conservation areas.*	Concur. Removal of native vegetation should be avoided.
19	*The wording* [for] *the planning permit exemption* [for Schedule to Clause 52.17] *to be replaced.*	Concur. Current wording allows all native vegetation within the PSP to be removed.
Kevin Walsh for Hume City Council		

11. Biodiversity	It would assist in reading the CACPs if the legend indicated which areas are CA 18, 19, 20 and 21.	Concur as per response to Item 4 of DELWP submission above.
	Clarification is required as to whether habitat compensation offsets are required for shared paths within BCS areas if the area contains an existing track or is already clear of native vegetation.	This is a matter for the DELWP MSA team.
	A statement about the payment of all habitat compensation obligations should be in the PSP (e.g. Growling Grass Frog and Golden Sun Moth). It is unclear how an applicant will be made aware of their need to pay offsets or habitat compensation obligations.	The requirement to pay the HCO fee is included in the amended UGZ10 ordinance, section 4.13 Permit Note: Operation of Commonwealth Environmental Laws.
Michael Prior for Melbourne Water		
Appendix 1 – Part A		
7	*There is no mention of the need for development to be sensitive to the need to protect significant tributaries. Wording of the PSP should include significant tributaries.* Reword to: *"... to protect the sensitive geomorphological values of the creeks themselves and their significant tributaries."*	Concur. Changes to water quality and instream habitat of tributaries to Growling Grass Frog conservation areas can potentially impact Growling Grass Frog habitat.
8	*Wording of the PSP should include significant tributaries.* Reword to: *"...including the key landscape features of the Jacksons Creek and Emu Creek corridors and their significant tributaries."*	Concur. Changes to water quality and instream habitat of tributaries to Growling Grass Frog conservation areas can potentially impact Growling Grass Frog habitat.
9	*Wording of the PSP should include significant tributaries.* Reword to: *"...protecting the natural landscape qualities of the Jacksons and Emu Creek corridor and their tributaries, and providing a usable network of open space adjacent to the creeks and above the break of slope."*	Concur. Changes to water quality and instream habitat of tributaries to Growling Grass Frog conservation areas can potentially impact Growling Grass Frog habitat.
11	*The design and construction of any crossing of the Jacksons Creek must be consistent with the 'Design and construction standards for Growling*	Concur. Changes to water quality and instream habitat of conservation areas can potentially impact Growling Grass Frog habitat and must abide by BCS

	Grass Frog passage structures' (DELWP 2016) to the satisfaction of (Melbourne Water) and the Department of Environment, Land, Water and Planning.	documents.
22	*Melbourne Water is concerned about vegetation removal in existing waterway corridors. Suggested modification to G70 second point: "Retain existing vegetation within waterway corridors"*	Concur. Removal of native vegetation should be avoided.
Appendix 1 – Part B		
Page 10 (Item # not provided)	Reword O11 to: *"...high landscape values of the precinct, protecting the natural landscape qualities of Jacksons and Emu Creek and their tributaries..."*	Concur. Changes to water quality and instream habitat of tributaries to Growling Grass Frog conservation areas can potentially impact Growling Grass Frog habitat.
Page 11	Reword O11 to: "*Create a range of off-street pedestrian and cycle links that promote the use of existing utility easements and waterways as green transport links where significant waterway environmental values are not impacted.*"	Concur. Such infrastructure is inappropriate where it has potential to negatively impact Growling Grass Frog habitat.
Page 31	*This Guideline* [G49] *should be a Requirement as plan*[t]*ing non-indigenous species within areas abutting waterways has the potential to exacerbate future weed threat and maintenance investment required from Melbourne Water.*	Concur. See Section 8.1.5.1 *Landscape masterplan* of this report for further comments.

8.6 Conclusion

- A total of 9.95 hectares of native vegetation was mapped on Wincity land comprising 19 habitat zones and 3.07 Habitat hectares.
- No significant flora species were recorded on the Site.
- One significant fauna species was recorded breeding on the Site: Growling Grass Frog *Litoria raniformis* was recorded in Emu Creek.
- The Biodiversity Conservation Strategy ('BCS') addresses offsets for direct impacts to native vegetation and fauna habitat in the form of Habitat Conservation Obligation fees.
- The BSC addresses conservation of Growling Grass Frog in the provision of Conservation Area 21 on Emu Creek.
- Proposed constructed wetlands need to comply with Melbourne Water and BCS requirements.
- Mitigation of indirect impacts needs to be undertaken by designing and implementing a Construction Site Environmental Management Plan (CSEMP).
- Proposed changes to the boundary between UGZ10 and RCZ zones would result in an increase in native vegetation in the RCZ from 4.62 ha to 8.43 ha. In my opinion, the change is warranted given the increased protection to native vegetation and the minor nature of changes to Conservation Area 21.
- Typographical errors, inconsistencies in mapping, errors in requirements, and updates to mapping need to be fixed as outlined here and in the Wincity, DELWP, Melbourne Water and Hume submissions.

9. Limitations and Qualifications

9.1.1 Provisional Opinions

In relation to the proposed development, I have not provided any provisional opinions that have not been fully researched. However, it should be noted that at the time of my assessment, the exact footprint of the development had not been approved and all calculations of native vegetation loss were based on digitising the proposed footprint from .pdf files of the plans provided as part of the 96A application. Should exact calculations of the area of native vegetation to be removed become warranted, I would need the approved development footprint provided as a georeferenced shapefile or drawing file. NVIM output provides an estimate of HCO fees only and the exact fees payable would be determine at the time a staging agreement was entered into with DELWP.

9.1.2 Questions

In relation to the proposed development, I have no questions that fall outside my area of expertise.

9.1.3 Inaccuracies

To the best of my knowledge, this report is complete and accurate.

10. Declaration

I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

Aaron Harvey.

10 August 2017

Appendices

Appendix 1: Curriculum Vitae

Curriculum Vitae

Aaron Harvey

Position:

Director – Consulting Services & Senior Botanist
Melbourne Resource Group
Victoria

Professional Affiliations and Memberships:

Australian Institute of Alpine Studies

Environment Institute of Australia and New Zealand

Victorian Planning and Environmental Law Association

Qualifications and Training:

Bachelor of Science (Hons), Deakin University

Bachelor of Applied Science, Deakin University

Diploma Natural Resource Management, Swinburne University

Professional Experience:

Aaron has worked extensively in a wide range of environments throughout south-eastern Australia conducting numerous flora and fauna surveys, preparing rehabilitation and revegetation plans and providing general ecological advice to Commonwealth, state and local government, private companies and land managers in south-eastern Australia. He has particular experience in flora and fauna management, habitat hectares assessments and environmental impact studies.

Over the last four years Aaron has worked closely with the Growth Areas Authority (GAA) on the mapping of vegetation and fauna habitat across approximately 20,000 ha in the Melbourne region and he was also involved in the Sub-regional Survey for the Golden Sun Moth for the GAA.

Aaron has worked extensively in alpine and sub-alpine environments, conducting numerous flora and fauna surveys and providing advice on ecological management.

Employment Profile:

2011 - Present	Director – Consulting Services, Biosis Pty Ltd
2008 - 2011	Manager Melbourne Resource Group, Biosis Pty Ltd
2005 - 2008	Senior Consultant, Biosis Pty Ltd
2002 - 2005	Ecologist & Director, Harvey and Associates Pty Ltd & Synecology Pty Ltd

Curriculum Vitae Aaron Harvey

biosis.

Fields of Competence:

- Ecology
- Vegetation survey and classification
- Vegetation management
- Rare species management
- Rehabilitation and revegetation planning and management
- Weed control
- Land use planning
- Conservation value assessment
- Project management

Appendix 2: Flora

Notes to tables:

EPBC Act: CR - Critically Endangered EN - Endangered VU - Vulnerable	**DSE 2005:** e - endangered v - vulnerable r - rare
PMST – Protected Matters Search Tool	**FFG Act:** L - listed as threatened under FFG Act P - protected under the FFG Act (public land only)
# - Native species outside natural range	**Noxious weed status:** SP State prohibited species RP Regionally prohibited species RC Regionally controlled species RR Regionally restricted species

A2.1 Flora species recorded from the Site

Table A2.1. Flora species (77 native and 105 introduced) recorded from the Site (Biosis 2013).

Status	Scientific name	Common name
Rare or threatened Indigenous species		
Rare	*Nicotiana suaveolens*	Austral Tobacco
Indigenous species		
	Acacia implexa	Lightwood
	Acacia melanoxylon	Blackwood
P	*Acacia pycnantha*	Golden Wattle
	Acaena agnipila/ovina complex	Hairy/Australian Sheep's Burr
	Acaena echinata	Sheep's Burr
	Allocasuarina sp.	Sheoak
	Aristida ramosa	Cane Wire-grass
	Asperula conferta	Common Woodruff
	Asperula scoparia subsp. *scoparia*	Prickly Woodruff
	Asplenium flabellifolium	Necklace Fern
	Atriplex semibaccata	Berry Saltbush
	Austrostipa bigeniculata	Kneed Spear-grass
	Austrostipa gibbosa	Spurred Spear-grass
	Austrostipa mollis	Supple Spear-grass
	Austrostipa nodosa	Knotty Spear-grass
	Austrostipa scabra subsp. *falcata*	Rough Spear-grass
	Austrostipa setacea	Corkscrew Spear-grass
	Azolla filiculoides	Pacific Azolla
	Bothriochloa macra	Red-leg Grass
	Bulbine bulbosa	Bulbine Lily
	Bursaria spinosa subsp. *spinosa*	Sweet Bursaria
	Callistemon sieberi	River Bottlebrush
	Carex appressa	Tall Sedge
	Carex inversa	Knob Sedge
	Carex tereticaulis	Poong'ort
P	*Cheilanthes sieberi* subsp. *sieberi*	Narrow Rock-fern
	Clematis microphylla s.s.	Small-leaved Clematis
	Convolvulus angustissimus	Blushing Bindweed

Status	Scientific name	Common name
	Correa glabra var. *glabra*	Rock Correa
	Crassula colorata	Dense Crassula
	Crassula decumbens var. *decumbens*	Spreading Crassula
	Crassula helmsii	Swamp Crassula
	Crassula sieberiana s.s.	Sieber Crassula
	Cymbopogon refractus	Barbed-wire Grass
	Cynoglossum suaveolens	Sweet Hound's-tongue
	Dichanthium sericeum subsp. *sericeum*	Silky Blue-grass
	Dichondra repens	Kidney-weed
	Dodonaea viscosa subsp. *cuneata*	Wedge-leaf Hop-bush
	Einadia nutans	Nodding Saltbush
	Eleocharis acuta	Common Spike-sedge
	Enchylaena tomentosa var. *tomentosa*	Ruby Saltbush
	Enneapogon nigricans	Dark Bottle-washers
	Epilobium billardierianum	Variable Willow-herb
	Epilobium hirtigerum	Hairy Willow-herb
	Erodium crinitum	Blue Heron's-bill
	Eucalyptus viminalis subsp. *viminalis*	Manna Gum
P	*Euchiton involucratus* s.s.	Star Cudweed
P	*Euchiton sphaericus*	Annual Cudweed
	Euphorbia drummondii	Flat Spurge
	Exocarpos strictus	Pale-fruit Ballart
	Ficinia nodosa	Knobby Club-sedge
	Galium australe s.l.	Tangled Bedstraw
	Galium migrans spp. agg.	Wandering Bedstraw
	Geranium homeanum	Rainforest Crane's-bill
	Geranium retrorsum s.s.	Grassland Crane's-bill
	Geranium spp.	Crane's Bill
	Haloragis heterophylla	Varied Raspwort
P	*Helichrysum luteoalbum*	Jersey Cudweed
	Isolepis cernua var. *cernua*	Nodding Club-sedge
	Juncus flavidus	Gold Rush
	Juncus sarophorus	Broom Rush

Status	Scientific name	Common name
	Juncus sp.	Rush
	Lachnagrostis filiformis s.s.	Common Blown-grass
	Leptospermum lanigerum	Woolly Tea-tree
	Lobelia anceps	Angled Lobelia
	Lomandra filiformis	Wattle Mat-rush
	Lythrum hyssopifolia	Small Loosestrife
	Melicytus dentatus s.s.	Tree Violet
	Mentha sp.	Mint
	Microlaena stipoides var. stipoides	Weeping Grass
	Myriophyllum verrucosum	Red Water-milfoil
	Oxalis perennans	Grassland Wood-sorrel
	Parietaria debilis s.s.	Shade Pellitory
	Pelargonium australe	Austral Stork's-bill
P	*Pellaea falcata* s.s.	Sickle Fern
	Phragmites australis	Common Reed
	Plantago varia	Variable Plantain
P	*Pleurosorus rutifolius* s.s.	Blanket Fern
	Poa labillardierei	Common Tussock-grass
	Polyscias sambucifolia	Elderberry Panax
	Rubus parvifolius	Small-leaf Bramble
	Rumex brownii	Slender Dock
	Rytidosperma auriculatum	Lobed Wallaby-grass
	Rytidosperma caespitosum	Common Wallaby-grass
	Rytidosperma duttonianum	Brown-back Wallaby-grass
	Rytidosperma fulvum	Copper-awned Wallaby-grass
	Rytidosperma racemosum var. *racemosum*	Slender Wallaby-grass
	Rytidosperma setaceum var. *setaceum*	Bristly Wallaby-grass
	Rytidosperma sp.	Wallaby Grass
	Samolus repens var. *repens*	Creeping Brookweed
	Schoenoplectus tabernaemontani	River Club-sedge
	Schoenus apogon	Common Bog-sedge
	Selliera radicans	Shiny Swamp-mat
P	*Senecio quadridentatus*	Cotton Fireweed

Status	Scientific name	Common name
	Themeda triandra	Kangaroo Grass
	Triglochin procera s.s.	Common Water-ribbons
	Triglochin striata	Streaked Arrowgrass
	Typha domingensis	Narrow-leaf Cumbungi
	Urtica incisa	Scrub Nettle
	Veronica gracilis	Slender Speedwell
	Vittadinia gracilis	Woolly New Holland Daisy
	Wahlenbergia gracilis	Sprawling Bluebell
	Wahlenbergia luteola	Bronze Bluebell
	Introduced species:	
	Acetosella vulgaris	Sheep Sorrel
	Aira cupaniana	Quicksilver Grass
	Anthoxanthum odoratum	Sweet Vernal-grass
	Aphanes arvensis	Parsley Piert
	Arctotheca calendula	Cape Weed
	Aster subulatus	Aster-weed
	Avena barbata	Bearded Oat
	Avena fatua	Wild Oat
	Brachypodium distachyon	False Brome
	Bromus alopecuros	Mediterranean Brome
	Bromus catharticus	Prairie Grass
	Bromus diandrus	Great Brome
	Bromus hordeaceus subsp. *hordeaceus*	Soft Brome
	Capsella bursa-pastoris	Shepherd's Purse
RC	*Carduus tenuiflorus*	Winged Slender-thistle
	Carex divisa	Divided Sedge
RC	*Carthamus lanatus*	Saffron Thistle
	Cerastium glomeratum s.s.	Sticky Mouse-ear Chickweed
	Chenopodium album	Fat Hen
	Chenopodium murale	Sowbane
RC	*Cirsium vulgare*	Spear Thistle
RC	*Conium maculatum*	Hemlock
	Conyza bonariensis	Flaxleaf Fleabane

Status	Scientific name	Common name
	Cotula coronopifolia	Water Buttons
RC	*Cynara cardunculus* subsp. *flavescens*	Artichoke Thistle
	Cynodon dactylon var. *dactylon*	Couch
	Cynosurus echinatus	Rough Dog's-tail
	Cyperus eragrostis	Drain Flat-sedge
	Dactylis glomerata	Cocksfoot
RC	*Datura stramonium*	Common Thorn-apple
RC	*Echium plantagineum*	Paterson's Curse
	Ehrharta erecta var. *erecta*	Panic Veldt-grass
	Ehrharta longiflora	Annual Veldt-grass
	Eleusine tristachya	American Crows-foot Grass
	Erodium botrys	Big Heron's-bill
	Erodium cicutarium	Common Heron's-bill
	Erodium moschatum	Musky Heron's-bill
RC	*Foeniculum vulgare*	Fennel
	Fraxinus angustifolia	Desert Ash
	Fumaria sp.	Fumitory
	Galenia pubescens var. *pubescens*	Galenia
	Galium aparine	Cleavers
	Gaudinia fragilis	Fragile Oat
RC	*Genista monspessulana*	Montpellier Broom
	Geranium dissectum	Cut-leaf Crane's-bill
	Helminthotheca echioides	Ox-tongue
	Hirschfeldia incana	Buchan Weed
	Holcus lanatus	Yorkshire Fog
	Hordeum leporinum	Barley-grass
	Hypochaeris glabra	Smooth Cat's-ear
	Hypochaeris radicata	Flatweed
RC	*Juncus acutus* subsp. *acutus*	Spiny Rush
	Juncus articulatus subsp. *articulatus*	Jointed Rush
	Lactuca serriola	Prickly Lettuce
	Lepidium africanum	Common Peppercress
RC	*Lepidium draba*	Hoary Cress

Status	Scientific name	Common name
	Lolium rigidum	Wimmera Rye-grass
RC	*Lycium ferocissimum*	African Box-thorn
	Lysimachia arvensis	Pimpernel
	Malva nicaeensis	Mallow of Nice
RC	*Marrubium vulgare*	Horehound
	Medicago polymorpha	Burr Medic
	Modiola caroliniana	Red-flower Mallow
RR	*Nassella neesiana*	Chilean Needle-grass
RC	*Nassella trichotoma*	Serrated Tussock
RR	*Oxalis pes-caprae*	Soursob
	Oxalis spp. (naturalised)	Wood Sorrel
	Paronychia brasiliana	Whitlow Wort
	Paspalum dilatatum	Paspalum
	Paspalum distichum	Water Couch
	Pentameris airoides subsp. *airoides*	False Hair-grass
	Petrorhagia dubia	Velvety Pink
	Petrorhagia nanteuilii	Childling Pink
	Phalaris aquatica	Toowoomba Canary-grass
	Phalaris minor	Lesser Canary-grass
	Pinus radiata	Radiata Pine
	Plantago coronopus	Buck's-horn Plantain
	Plantago lanceolata	Ribwort
	Poa annua	Annual Meadow-grass
	Poa bulbosa	Bulbous Meadow-grass
	Poa pratensis	Kentucky Blue-grass
	Polycarpon tetraphyllum	Four-leaved Allseed
	Polygonum aviculare s.s.	Hogweed
	Polypogon monspeliensis	Annual Beard-grass
	Ranunculus muricatus	Sharp Buttercup
RR	*Reseda lutea*	Cut-leaf Mignonette
	Romulea minutiflora	Small-flower Onion-grass
	Romulea rosea	Onion Grass
RC	*Rosa rubiginosa*	Sweet Briar

Status	Scientific name	Common name
RC	*Rubus fruticosus* spp. agg.	Blackberry
	Rumex conglomeratus	Clustered Dock
	Rumex crispus	Curled Dock
	Rumex spp. (naturalised)	Dock (naturalised)
RR	*Salix cinerea*	Grey Sallow
	Salix matsudana 'Tortuosa'	Tortured Willow
RR	*Salix* spp.	Willow
	Salvia verbenaca	Wild Sage
	Schinus molle	Pepper Tree
RC	*Scolymus hispanicus*	Golden Thistle
	Sherardia arvensis	Field Madder
	Silybum marianum	Variegated Thistle
	Solanum linnaeanum	Apple of Sodom
	Solanum nigrum s.s.	Black Nightshade
	Sonchus asper s.s.	Rough Sow-thistle
	Sonchus oleraceus	Common Sow-thistle
	Stellaria media	Chickweed
	Taraxacum officinale spp. agg.	Garden Dandelion
	Trifolium angustifolium var. *angustifolium*	Narrow-leaf Clover
	Trifolium dubium	Suckling Clover
	Trifolium glomeratum	Cluster Clover
	Trifolium repens var. *repens*	White Clover
	Trifolium subterraneum	Subterranean Clover
RC	*Ulex europaeus*	Gorse
	Urtica urens	Small Nettle
RR	*Verbascum thapsus* subsp. *thapsus*	Great Mullein
	Verbascum virgatum	Twiggy Mullein
	Vicia sativa	Common Vetch
	Vulpia bromoides	Squirrel-tail Fescue

A2.2 Significant flora species

The following table includes a list of the significant flora species that have potential to occur within the Site. The list of species is sourced from the Victorian Flora Information System and the Protected Matters Search Tool (DoE accessed on 11.09.2013).

Table A2.2. Significant flora species recorded / predicted to occur within 5 km of the Site.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Carex tasmanica	Curly Sedge	VU	v	L		PMST	Seasonally wet areas, such as around drainage lines and freshwater swamps, on fertile, clay soils derived from basalt.	Low	Remote from known distribution of this species.
Comesperma polygaloides	Small Milkwort		v	L	1983		Grasslands on the western basalt plains; less commonly in grassy woodlands between Bendigo and the Wimmera.	Low	Palatable species that is unlikely to have persisted in the face of past land use.
Cullen tenax	Tough Scurf-pea		e	L	2013		Lowland grasslands, including pastures and occasionally in otherwise disturbed grassy areas.	Low	Persists in rocky grasslands and escarpments.
Dianella amoena	Matted Flax-lily	EN	e	L		PMST	Lowland grassland and grassy woodland, on well-drained to seasonally waterlogged fertile sandy loam soils to heavy cracking clays.	Low	Mainly a grassy woodland species. No local records.
Dianella sp. aff. *longifolia*	Arching Flax-		v		2007		The habitat requirements of this	Low	Persists in rocky

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
(Benambra)	lily						species are poorly known.		grasslands and escarpments.
Dianella tarda	Late-flower Flax-lily		v		2005		Heavy soils in grassy woodland environments dominated by River Red-gum and Yellow Box.	Low	Not typical habitat.
Diuris basaltica	Small Golden Moths	EN	v	L	1904		Plains Grassland dominated by tussock-forming perennial grasses (including Kangaroo Grass); often with embedded surface basalt.	Low	Prolonged disturbance of the Site by grazing domestic stock. No recent local records.
Eucalyptus leucoxylon subsp. *connata*	Melbourne Yellow-gum		v		2013		Well-drained slopes in a restricted area around Melbourne and Geelong.	Low	Tree species which would have been observed on site during surveys.
Geranium sp. 3	Pale-flower Crane's-bill		r		2013		Grasslands and dry woodlands.	High	Species recorded from similar habitat in the local area.
Glycine latrobeana	Clover Glycine	VU	v	L		PMST	Grasslands and grassy woodlands, particularly those dominated by *Themeda triandra*.	Low	Prolonged disturbance of the Site by grazing domestic stock. No recent local records.
Lepidium hyssopifolium	Basalt Peppercress	EN	e	L	1977		Basalt plains grassland and woodland communities.	Low	Prolonged disturbance of the

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
									Site by grazing domestic stock. No recent local records.
Nicotiana suaveolens	Austral Tobacco		r		2002		Areas of sandy or gravelly soil, typically associated with streams, gullies and other drainage lines; also grasslands and escarpment shrublands.	Medium	Species observed on local rocky escarpments.
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	CR	e	L	1984	PMST	Primarily grasslands featuring a moderate diversity of other native species and inter-tussock spaces, although also recorded in grassland dominated by introduced perennial grasses.	Low	On the margin of the known distribution of this species. Rocky slopes supporting native grassland vegetation not known habitat.
Prasophyllum frenchii	Maroon Leek-orchid	EN	e	L		PMST	Grassland and grassy woodland environments on sandy or black clay loam soils that are generally damp but well drained.	Low	Prolonged disturbance of the Site by grazing domestic stock. No recent or local records.
Pterostylis truncata	Brittle Greenhood		e	L	1500		Grassland and grassy woodland habitats, largely to the west of Melbourne.	Low	Prolonged disturbance of the Site by grazing

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
									domestic stock. No recent or local records.
Rhagodia parabolica	Fragrant Saltbush		r		2011		Plains and escarpment grassland, shrubland and woodland.	Low	Perennial shrub which would have been observed during targeted surveys.
Rutidosis leptorhynchoides	Button Wrinklewort	EN	e	L		PMST	Higher quality Plains Grassland and Grassy Woodland in Western Victoria, particularly those with fertile soil and light timber cover.	Low	Perennial species that would have been observed during targeted surveys.
Senecio macrocarpus	Large-headed Fireweed	VU	e	L	2001	PMST	Grassland, shrubland and woodland habitats on heavy soils subject to waterlogging and/or drought conditions in summer.	Low	Perennial species that would have been observed during targeted surveys
Tripogon loliiformis	Rye Beetle-grass		r		1987		Dry sites in association with escarpments and rocky outcrops.	Low	Cryptic grass of rocky grassland and escarpments.

Appendix 3: Fauna

Notes to tables:

EPBC Act: EX - Extinct CR - Critically Endangered EN - Endangered VU - Vulnerable CD - Conservation dependent PMST – Protected Matters Search Tool	**DSE 2013:** ex - extinct cr - critically endangered en - endangered vu - vulnerable nt - near threatened dd - data deficient rx - regionally extinct
* - introduced species ** - pest species listed under the CaLP Act	**FFG Act:** L - listed as threatened under FFG Act N - nominated for listing as threatened I - determined ineligible for listing

Fauna species in these tables are listed in alphabetical order within their taxonomic group.

A3.1 Fauna Species Recorded in the Site

Table A3.1. Fauna species recorded from the Site, 2007-2013 (Biosis 2013).

Status	Scientific name	Common name	Type of record	Survey method
	Mammals			
	Chalinolobus gouldii	Gould's Wattled Bat	Indirect Observation	Acoustic Detector Survey
	Chalinolobus morio	Chocolate Wattled Bat	Indirect Observation	Acoustic Detector Survey
	Macropus giganteus	Eastern Grey Kangaroo	Direct Observation	General Fauna
L	*Miniopterus schreibersii oceanensis*	Common Bent-wing Bat (eastern ssp.)	Indirect Observation	Acoustic Detector Survey
	Mormopterus sp. 2	Southern Freetail Bat (short penis)	Indirect Observation	Acoustic Detector Survey
	Mormopterus sp. 4	Southern Freetail Bat (long penis)	Indirect Observation	Acoustic Detector Survey
nt	*Myotis macropus*	Southern Myotis	Indirect Observation	Acoustic Detector Survey
	Nyctophilus spp	Long-eared Bats	Indirect Observation	Acoustic Detector Survey
	Ornithorhynchus anatinus	Platypus	Direct Observation	Aquatic Survey
	Scotorepens balstoni	Inland Broad-nosed Bat	Indirect Observation	Acoustic Detector Survey
	Tadarida australis	White-striped Freetail Bat	Indirect Observation	Acoustic Detector Survey
	Vespadelus darlingtoni	Large Forest Bat	Indirect Observation	Acoustic Detector Survey
	Vespadelus regulus	Southern Forest Bat	Indirect Observation	Acoustic Detector Survey
	Vespadelus vulturnus	Little Forest Bat	Indirect Observation	Acoustic Detector Survey
	Wallabia bicolor	Black Wallaby	Direct Observation	General Fauna
	Birds			
	Acanthagenys rufogularis	Spiny-cheeked Honeyeater	Direct Observation	General Fauna
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Direct	General Fauna, Bird

Status	Scientific name	Common name	Type of record	Survey method
			Observation	Survey
	Acanthiza nana	Yellow Thornbill	Direct Observation	General Fauna
	Acanthiza pusilla	Brown Thornbill	Direct Observation	Bird Survey
	Acrocephalus stentoreus	Clamorous Reed Warbler	Direct Observation	General Fauna, Bird Survey
	Anas castanea	Chestnut Teal	Direct Observation	General Fauna, Bird Survey
	Anas gracilis	Grey Teal	Direct Observation	General Fauna
	Anas superciliosa	Pacific Black Duck	Direct Observation	General Fauna, Bird Survey
	Anthochaera carunculata	Red Wattlebird	Direct Observation	General Fauna, Bird Survey
	Anthus novaeseelandiae	Australasian Pipit	Direct Observation	General Fauna, Bird Survey
	Aquila audax	Wedge-tailed Eagle	Direct Observation	General Fauna
	Cacatua galerita	Sulphur-crested Cockatoo	Direct Observation	General Fauna, Bird Survey
	Cacatua tenuirostris	Long-billed Corella	Direct Observation	General Fauna
	Cacomantis flabelliformis	Fan-tailed Cuckoo	Direct Observation	General Fauna
	Chenonetta jubata	Australian Wood Duck	Direct Observation	General Fauna
	Chrysococcyx basalis	Horsfield's Bronze-Cuckoo	Direct Observation	General Fauna
	Cincloramphus cruralis	Brown Songlark	Direct Observation	General Fauna, Bird Survey
	Cisticola exilis	Golden-headed Cisticola	Direct Observation	General Fauna, Bird Survey
	Colluricincla harmonica	Grey Shrike-thrush	Direct Observation	General Fauna, Bird Survey
	Corvus coronoides	Australian Raven	Direct Observation	General Fauna
	Corvus mellori	Little Raven	Direct	General Fauna, Bird

Status	Scientific name	Common name	Type of record	Survey method
			Observation	Survey
	Coturnix pectoralis	Stubble Quail	Direct Observation	General Fauna
	Cuculus pallidus	Pallid Cuckoo	Direct Observation	General Fauna
	Egretta novaehollandiae	White-faced Heron	Direct Observation	General Fauna
	Elanus axillaris	Black-shouldered Kite	Direct Observation	General Fauna, Bird Survey
	Eolophus roseicapilla	Galah	Direct Observation	General Fauna, Bird Survey
	Falco berigora	Brown Falcon	Direct Observation	General Fauna, Bird Survey
	Falco cenchroides	Nankeen Kestrel	Direct Observation	General Fauna, Bird Survey
	Fulica atra	Eurasian Coot	Direct Observation	General Fauna
	Gallinula tenebrosa	Dusky Moorhen	Direct Observation	General Fauna
	Grallina cyanoleuca	Magpie-lark	Direct Observation	General Fauna, Bird Survey
	Gymnorhina tibicen	Australian Magpie	Direct Observation	General Fauna, Bird Survey
	Haliastur sphenurus	Whistling Kite	Direct Observation	General Fauna
	Hieraaetus morphnoides	Little Eagle	Direct Observation	General Fauna
	Hirundo neoxena	Welcome Swallow	Direct Observation	General Fauna, Bird Survey
	Lichenostomus penicillatus	White-plumed Honeyeater	Direct Observation	General Fauna, Bird Survey
	Malurus cyaneus	Superb Fairy-wren	Direct Observation	General Fauna, Bird Survey
	Megalurus gramineus	Little Grassbird	Direct Observation	General Fauna
	Microcarbo melanoleucos	Little Pied Cormorant	Direct Observation	General Fauna
	Neochmia temporalis	Red-browed Finch	Direct	Bird Survey

Status	Scientific name	Common name	Type of record	Survey method
			Observation	
	Ocyphaps lophotes	Crested Pigeon	Direct Observation	General Fauna
	Pachycephala pectoralis	Golden Whistler	Direct Observation	General Fauna
	Petroica phoenicea	Flame Robin	Direct Observation	General Fauna
	Phalacrocorax carbo	Great Cormorant	Direct Observation	General Fauna
	Phylidonyris novaehollandiae	New Holland Honeyeater	Direct Observation	General Fauna, Bird Survey
	Porphyrio porphyrio	Purple Swamphen	Direct Observation	General Fauna, Amphibian Survey
	Porzana tabuensis	Spotless Crake	Direct Observation	General Fauna
	Psephotus haematonotus	Red-rumped Parrot	Direct Observation	General Fauna, Bird Survey
	Rhipidura albiscarpa	Grey Fantail	Direct Observation	General Fauna
	Rhipidura leucophrys	Willie Wagtail	Direct Observation	General Fauna, Bird Survey
	Sericornis frontalis	White-browed Scrubwren	Direct Observation	General Fauna
	Trichoglossus haematodus	Rainbow Lorikeet	Direct Observation	General Fauna, Bird Survey
	Vanellus miles	Masked Lapwing	Direct Observation	General Fauna, Amphibian Survey
	Zosterops lateralis	Silvereye	Direct Observation	General Fauna
	Reptiles			
	Egernia cunninghami	Cunningham's Skink	Direct Observation	General Fauna
	Eulamprus tympanum tympanum	Southern Water Skink	Direct Observation	General Fauna
	Suta flagellum	Little Whip Snake	Direct Observation	General Fauna
	Tiliqua scincoides	Common Blue-tongued Lizard	Direct Observation	General Fauna

Status	Scientific name	Common name	Type of record	Survey method
	Frogs			
	Crinia signifera	Common Froglet	Direct Observation	Amphibian Survey
	Limnodynastes dumerilii	Southern Bullfrog	Direct Observation	Amphibian Survey / General Fauna
	Limnodynastes peronii	Striped Marsh Frog	Direct Observation	Amphibian Survey
	Limnodynastes tasmaniensis	Spotted Marsh Frog	Direct Observation	Amphibian Survey / General Fauna
	Litoria lesueuri	Lesueur's Frog	Direct Observation	Amphibian Survey
Vu, en, L	*Litoria raniformis*	Growling Grass Frog	Direct Observation	Amphibian Survey
	Litoria verreauxii verreauxii	Whistling Tree Frog	Direct Observation	Amphibian Survey
	Fishes			
	Anguilla australis	Short-finned Eel	Direct Observation	Aquatic Survey
	Galaxias olidus	Mountain Galaxias	Direct Observation	Aquatic Survey

Table A2.2. Introduced fauna species recorded from the Site (Biosis 2013).

Status	Scientific name	Common name	Type of record	Survey method
	Mammals			
*	*Lepus europeaus*	European Hare	Direct Observation	General Fauna
*	*Mus musculus*	House Mouse	Direct Observation	General Fauna
*	*Oryctolagus cuniculus*	European Rabbit	Direct Observation	General Fauna
*	*Vulpes vulpes*	Red Fox	Direct Observation	General Fauna
	Birds			
*	*Acridotheres tristis*	Common Myna	Direct Observation	General Fauna
*	*Alauda arvensis*	European Skylark	Direct Observation	General Fauna
*	*Carduelis carduelis*	European Goldfinch	Direct Observation	General Fauna
*	*Carduelis chloris*	European Greenfinch	Direct Observation	General Fauna
*	*Columba livia*	Rock Dove	Direct Observation	General Fauna
*	*Passer domesticus*	House Sparrow	Direct Observation	General Fauna
*	*Streptopelia chinensis*	Spotted Turtle-Dove	Direct Observation	General Fauna
*	*Sturnus vulgaris*	Common Starling	Direct Observation	General Fauna
*	*Turdus merula*	Common Blackbird	Direct Observation	General Fauna
	Fishes			
*	*Tinca tinca*	Tench	Direct Observation	Aquatic Survey

A3.2 Significant Fauna Species

The following table includes a list of the significant fauna species that have potential to occur within the Site. The list of species is sourced from the Victorian Biodiversity Atlas and the Protected Matters Search Tool (DoE; accessed on 11.09.2013).

Table A2.3. Significant fauna species recorded, or predicted to occur, within 5 km of the Site.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Mammals									
Dasyurus maculatus maculatus	Spot-tailed Quoll	EN	en	L	PMST		Uses a wide range of habitats but prefer undisturbed mature wet forests. Spot-tailed Quoll have large home ranges and rely on hollows, logs, rock outcrops or caves for den sites, and areas with a large amount of prey.	Negligible	Suitable habitat not present on site.
Dasyurus viverrinus	Eastern Quoll		rx	L	1846		The Eastern Quoll is a medium-sized carnivorous marsupial that once occupied a broad range of forest, woodland and grassland habitats in Victoria.	Negligible	The species is now restricted to Tasmania and is considered to be extinct from mainland Australia.
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat		Vu	L	-	Current survey	Use a broad variety of habitats from open woodlands and open grasslands though typically found in well timbered valleys where it feeds above the tree canopy. Generally roosts in caves, but will also utilise	Recorded	Recorded on site during current assessment. Likely to use the creek corridor for foraging.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
							man-made structures such as road culverts, old mines, stormwater channels and occasionally buildings.		
Phascogale tapoatafa tapoatafa	Brush-tailed Phascogale		vu	L	1845		Occurs in dry foothill forest which is open with sparse ground cover. Favours areas dominated by box, ironbark and stringybark eucalypts.	Negligible	Suitable habitat not present on site.
Pseudomys novaehollandiae	New Holland Mouse	VU	vu	L	PMST		Inhabits a variety of habitats along the coast of south-eastern Australia, including coastal heath, heathy woodland and coastal scrub habitat.	Negligible	Suitable habitat not present on site.
Pteropus poliocephalus	Grey-headed Flying-fox	VU	vu	L	PMST		Uses a wide range of habitats from lowland rainforest in East Gippsland and coastal stringybark forests to agricultural land and suburban gardens, with permanently established colonies in Melbourne, Geelong and Mallacoota.	Low	Sufficient suitable habitat (mature flowering/ fruiting trees) not present.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Sminthopsis crassicaudata	Fat-tailed Dunnart		nt		1913		Inhabits sparse grasslands and open shrubland habitats, usually where there is a significant component of bare ground. Requires suitable refuge sites such as surface rocks or logs to construct nests of grass or other dried plant material.	Low	Grassland is too dense in its current state, insufficient surface rocks to support the species.
Sminthopsis murina murina	Common Dunnart		vu		1990		Found in heathland areas, open forests and woodlands that have structurally complex microhabitats. Common Dunnart prefer dry sclerophyll forest and mallee heath with high rock and crevice density.	Negligible	Suitable habitat not present on site.
Birds									
Anas rhynchotis	Australasian Shoveler		vu		1977		Prefers large, permanent lakes and swamps with deep water and abundant aquatic vegetation. Less commonly recorded in small or shallow waters, such as billabongs, sewage ponds, freshwater rivers and densely vegetated farm dams.	Low	Some potential for the species to occur within Emu Creek, however, dams are not large or vegetated enough to support the species.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Anthochaera phrygia	Regent Honeyeater	EN	cr	L	PMST		Inhabits dry woodlands and forests dominated by box and ironbark eucalypts. Distribution currently restricted to the Chiltern Box-Ironbark National Park in northern Victoria following severe range contraction and population decline.	Negligible	Suitable habitat not present on site.
Ardea modesta	Eastern Great Egret		vu	L	1980/PMST		Usually found in terrestrial wetland, estuarine and wet grassland habitats particularly permanent well-vegetated waterbodies but also use freshwater meadows, channels, flooded crops and larger dams.	High	Sufficient good quality habitat in Emu Creek and vegetated dams and drainage lines.
Botaurus poiciloptilus	Australasian Bittern	EN	en	L	PMST		Occurs in wetlands with tall, dense vegetation where it forages in shallow water at the edges of pools or waterways. Prefers permanent freshwater habitats, particularly when dominated by sedges, rushes and reeds.	Medium	Densely vegetated dams and sections of Emu Creek with slow flowing water provide potential habitat.
Calidris ferruginea	Curlew Sandpiper		en		1977		Curlew Sandpipers occur in intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and	Low	Suitable habitat not present on site.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
							lagoons near the coast.		
Ceyx azureus	Azure Kingfisher		nt		1987		Azure Kingfishers are found in association with well vegetated freshwater wetlands and slow-flowing creeks and rivers.	Low	Some potential for the species to occur along Emu Creek, however wooded areas are limited in their extent and isolation to support the species.
Chalcites osculans	Black-eared Cuckoo		nt		2005		Typically occupies open vegetation communities such as open eucalypt woodlands and shrublands in lower rainfall areas. In Victoria, mainly found north of the Great Dividing Range and in Western Victoria.	Medium	Shrubland along Emu Creek and in drainage lines have the capacity to support this species which has been recorded in recent years.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Chthonicola sagittata	Speckled Warbler		vu	L	1990		Inhabits dry woodlands with tussock-grass ground cover. Favours areas with rocky gullies and ridges. Forages on the ground within sparse shrubs, logs and tussocks.	Negligible	Suitable habitat not present on site.
Circus assimilis	Spotted Harrier		nt		2004		Most common over the Murray Valley with occasional visits to coastal Victoria. Inhabits open and wooded country of inland and sub-inland Australia, where they hunt over flat or undulating country with low vegetation cover.	Medium	Suitable foraging habitat occurs for the species across the Site.
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern ssp.)		nt		1988		Generally inhabits open eucalypt forests, woodlands and mallee, often where there are stands of dead trees.	Negligible	Suitable habitat not present on site.
Falco subniger	Black Falcon		vu		1977		Primarily occurs in arid and semi-arid zones in the north, north-west and west of Victoria, though can be forced into more coastal areas by droughts and subsequent food shortages. Occurs in woodlands, open country and around terrestrial wetland areas.	Medium	Suitable foraging habitat occurs for the species across the Site in open undulating grassland and shrubland alongside Emu Creek.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Gallinago hardwickii	Latham's Snipe		nt		1979/PMST		A migrant to Australia from July to April occurring in a wide variety of permanent and ephemeral wetlands. Prefers open freshwater wetlands with nearby cover, but also recorded on the edges of creeks and rivers, river-pools and floodplains.	Medium	Sufficient good quality habitat is present on site, including the fringes of Emu Creek and the vegetated fringes of dams.
Haliaeetus leucogaster	White-bellied Sea-Eagle		vu	L	PMST		Occurs in marine habitats and terrestrial wetlands along or near coastal areas in Eastern Victoria, particularly around large open wetlands such as deep freshwater swamps, lakes, reservoirs and billabongs and occasionally ephemeral wetlands filled by floodwater.	Negligible	Suitable habitat not present on site.
Hirundapus caudacutus	White-throated Needletail		vu		1990/PMST		An almost exclusively aerial species within Australia, occurring over most types of habitat, particularly wooded areas. Less often seen over open farm paddocks but has been recorded in vineyards flying between the rows of trees.	Low	May fly over the Site on irregular occasions.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Lathamus discolor	Swift Parrot	EN	en	L	2011/PMST		Migrates to south-east mainland Australia during the winter months where it prefers dry, open eucalypt forests and woodlands, especially box-ironbark forest in north-central Victoria. Has also been recorded in urban parks, gardens, street trees and golf courses with flowering ornamental trees and shrubs.	Low	Preferred feeding trees not present on site.
Leipoa ocellata	Malleefowl	VU	en	L	PMST		Malleefowl occur mainly in semi-arid mallee habitats; in Victoria this type of habitat is largely restricted to the north-west area of the State.	Negligible	Suitable habitat not present on site.
Melithreptus gularis	Black-chinned Honeyeater		nt		1990		Occurs in dry eucalypt woodlands and forests and wooded areas along watercourses. Often found in areas with no understory and on western slopes of box ironbark forests.	Low	Sufficient suitable (woodland) habitat not present.
Rostratula australis	Australian Painted Snipe	EN	cr	L	PMST		Generally found in shallow, terrestrial freshwater wetlands with rank, emergent tussocks of grass, sedges and rushes. Australian Painted Snipe can occur in well vegetated lakes, swamps,	Low	A limited few vegetated wetland areas may provide marginal habitat, but overall the

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
							inundated pasture, saltmarsh and dams.		Site does not represent optimal habitat for this species.
Stagonopleura guttata	Diamond Firetail		nt	L	2005		Occurs mostly in the lowlands and foothills in the north of Victoria. It has specific habitat requirements, which include grassy woodlands with tree cover for refuge and an undisturbed ground layer with grasses.	Low	Sufficient suitable habitat (grassy woodland) not present.
Sternula nereis	Fairy Tern	VU	en	L	PMST		Fairy Terns inhabit coastal environments including intertidal mudflats, sand flats and beaches. Nests above high-water mark on sandy shell-grit beaches.	Negligible	Suitable habitat not present on site.
Stictonetta naevosa	Freckled Duck		en	L	2009		Freckled Ducks are usually found on densely vegetated freshwater wetlands. During dry conditions the birds move from ephemeral wetlands to large areas of permanent open water such as lakes and reservoirs.	Low	Emu Creek provides limited habitat for this species.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Tringa nebularia	Common Greenshank		vu		1977		Occupies a wide variety of ephemeral and permanent inland and sheltered coastal wetlands, preferring extensive mudflats.	Low	Wetlands within the Site unlikely to provide sufficient habitat.
Reptiles									
Aprasia parapulchella	Pink-tailed Worm-Lizard	VU	en	L	PMST		Isolated population near Bendigo. Favours areas with native grasses and partially buried rocks, sheltering beneath rock and in ant tunnels.	Negligible	Suitable habitat not present on site.
Delma impar	Striped Legless Lizard	VU	en	L	PMST		Inhabits native and modified grasslands, where sufficient cover is available to provide protection from predators. Often associated with soils of cracking clays with embedded and surface rocks. Also recorded from grassy woodlands.	Medium	Although not recorded within 5km, the rocky shrubland and grassland areas provide potential habitat.
Tympanocryptis pinguicolla	Grassland Earless Dragon	EN	cr	L	1990/PMST		Typically occurs in native temperate grasslands and prefers sites with little or no grazing. Last confirmed sighting in Victoria was at Little River in 1967, despite recent surveys for the species throughout its former range within the state.	Low	Species likely to be regionally extinct.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Amphibians									
Litoria raniformis	Growling Grass Frog	VU	en	L	2006/PMST		Occupies a variety of permanent and semi-permanent waterbodies generally containing abundant submerged and emergent vegetation.	Recorded	Species recorded during previous assessment (Biosis Research 2006). Emu Creek identified as important breeding location for the species (DEPI 2013).
Pseudophryne bibronii	Brown Toadlet		en	L	1990		Occurs in a variety of damp and occasionally inundated habitats at lower elevations, including watercourses and gullies in forest and woodland habitat; roadside ditches and table drains; wetlands; permanent ponds; heaths and grasslands. Requires abundant damp leaf litter for shelter.	Low	Limited habitat of moist leaf litter present but limited in its extent.
Fishes									

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Galaxiella pusilla	Dwarf Galaxias	VU	en	L	PMST		Occurs in relatively shallow still or slow flowing waterbodies including streams, wetlands and drains. In many instances suitable wetlands are ephemeral and partially dry out over summer. Typically requires abundant marginal and aquatic vegetation.	Negligible	No records within catchment or adjoining catchments.
Nannoperca obscura	Yarra Pygmy Perch	VU	vu	L	2005		A freshwater, non-migratory fish preferring heavily vegetated, slow flowing or still aquatic habitats. Also known to occur in small semi-permanent habitats.	Medium	Recorded by Biosis in connecting waterbody, Deep Creek. Suitable habitat exists within Emu Creek.
Prototroctes maraena	Australian Grayling	VU	vu	L	1982		Australian Grayling is a diadromous species and spends most of its life in freshwater within rivers and large creeks. Juveniles inhabit estuaries and coastal seas, whilst adults occur in freshwater habitats, typically rivers and streams with cool, clear waters and gravel substrates.	Low	Species recorded from within the same drainage system, however substantial habitat loss has occurred since previous records.
Invertebrates									

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Site	Rationale for likelihood ranking
		EPBC	DSE	FFG					
Synemon plana	Golden Sun Moth	CR	cr	L	PMST		This diurnal moth inhabits grasslands and grassy woodlands. Once thought to be a specialised species inhabiting grasslands dominated by Wallaby-grasses, it is now recognised that this species can occur in exotic grasslands dominated by Chilean Needle Grass *Nassella neesiana*.	High	Potential habitat within both native and exotic grassland present on site. Recent records (Biosis *unpublished data*) from the Sunbury area.

A3.3 Migratory Species (EPBC Act Listed)

Table A3.3. Migratory fauna species recorded or predicted to occur within 5 km of the Site.

Scientific Name	Common Name	Most recent record
Leipoa ocellata	Malleefowl	PMST
Tringa nebularia	Common Greenshank	1977
Calidris ferruginea	Curlew Sandpiper	1977
Calidris ruficollis	Red-necked Stint	1977
Calidris acuminata	Sharp-tailed Sandpiper	1977
Gallinago hardwickii	Latham's Snipe	1979
Rostratula australis	Australian Painted Snipe	PMST
Ardea modesta	Eastern Great Egret	1980
Haliaeetus leucogaster	White-bellied Sea-Eagle	PMST
Pandion cristatus	Eastern Osprey	PMST
Merops ornatus	Rainbow Bee-eater	1990
Hirundapus caudacutus	White-throated Needletail	1990
Apus pacificus	Fork-tailed Swift	2007
Rhipidura rufifrons	Rufous Fantail	1999
Myiagra cyanoleuca	Satin Flycatcher	PMST
Monarcha melanopsis	Black-faced Monarch	PMST
Acrocephalus stentoreus	Clamorous Reed Warbler	2005
Anthochaera phrygia	Regent Honeyeater	PMST
Bubulcus ibis	Cattle Egret	1981

Appendix 4: NVIM Habitat Obligation Estimate

Estimate of obligations under the Biodiversity Conservation Strategy

Date of estimate: 24 July 2017

Time of estimate: 13:13

Summary of parcel obligations

Total fee estimate: $1,261,441.04

This Total fee estimate and the following summary of obligations are provided as estimates for indicative purposes only. The obligations stated may be incomplete. The fees are calculated as at the date of this document, and are subject to change. Please refer to the disclaimer on the final page of this document for further information.

Number of parcels included in this estimate: 1

Habitat compensation obligations

Habitat type	Obligation	Unit price	Estimated subtotal
Native vegetation	4.741 ha	$104,582.50	$495,825.63
Spiny Rice-flower	4.741 ha	$8,730.70	$41,392.25
Golden Sun Moth	32.140 ha	$8,705.40	$279,791.56
Growling Grass Frog	53.663 ha	$8,281.90	$444,431.60

All prices are inclusive of GST

Conservation areas

Conservation area number	Conservation area type	Area
21	Growling Grass Frog	18.085 ha

Salvage and Translocation

Your parcel(s) may contain areas affected by Salvage and Translocation, please refer to DELWP for further information about your parcel.

Next steps

The Biodiversity Conservation Strategy and a number of approvals under section 146B of the Environment Protection and Biodiversity Conservation Act 1999 (Cth) form part of the Melbourne Strategic Assessment (MSA) program.

For information about how to meet habitat compensation obligations, or how conservation areas are treated under the program, either refer to the Melbourne Strategic Assessment website (http://www.depi.vic.gov.au/msa) or contact msa.habitatcompensation@delwp.vic.gov.au.

Estimate of obligations under the Biodiversity Conservation Strategy

Parcel details

Standard Parcel Identifier (SPI)	4\LP208321
Address	Unknown

Parcel fee estimate: $1,261,441.04

This Parcel fee estimate and the following summary of obligations are provided as estimates for indicative purposes only. The obligations stated may be incomplete. The fees are calculated as at the date of this document, and are subject to change. Please refer to the disclaimer on the final page of this document for further information.

Habitat compensation obligations

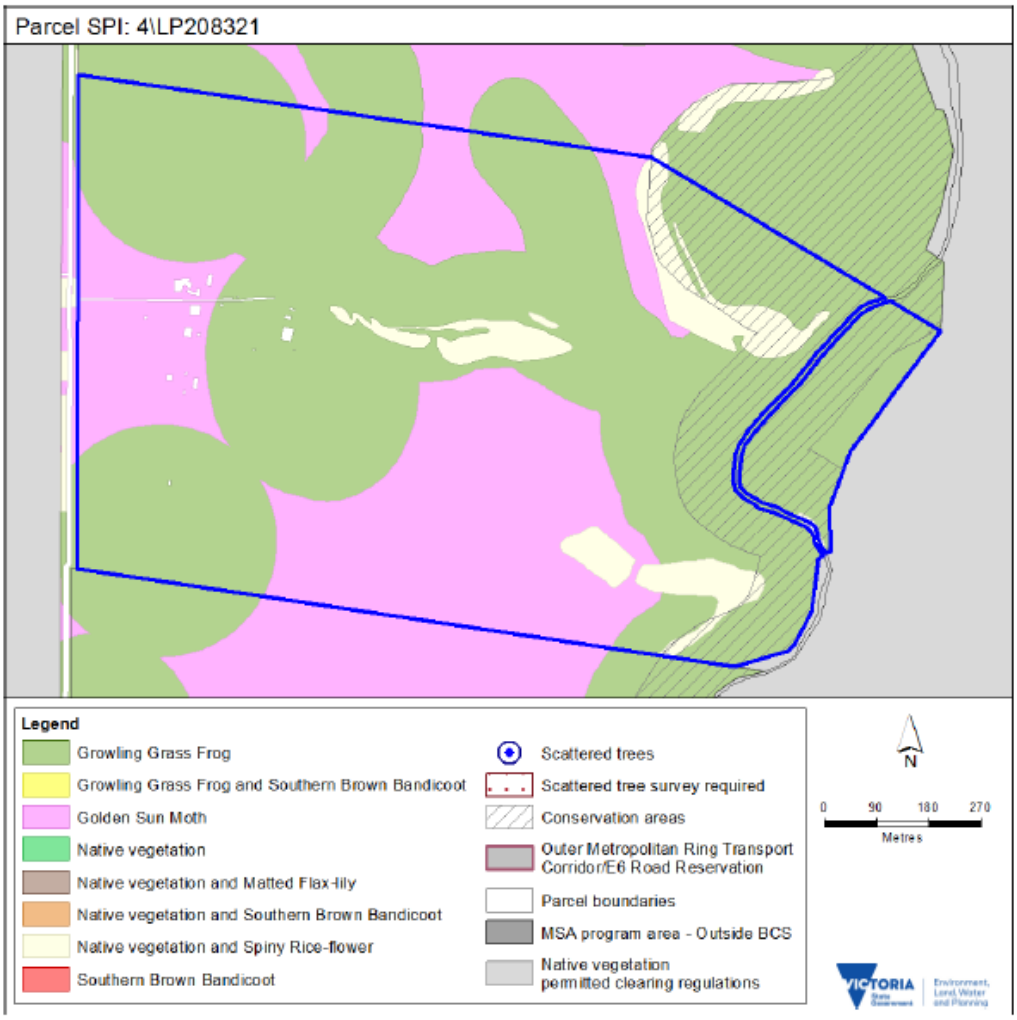
Habitat type	Obligation	Unit price	Estimated subtotal
Native vegetation	4.741 ha	$104,582.50	$495,825.63
Spiny Rice-flower	4.741 ha	$8,730.70	$41,392.25
Golden Sun Moth	32.140 ha	$8,705.40	$279,791.56
Growling Grass Frog	53.663 ha	$8,281.90	$444,431.60

All prices are inclusive of GST

Conservation areas

Conservation area number	Conservation area type	Habitat type	Area
21	Growling Grass Frog	Not applicable	18.085 ha

Estimate of obligations under the Biodiversity Conservation Strategy



Estimate of obligations under the Biodiversity Conservation Strategy

For more information, telephone the DELWP Customer Service Centre on 136 186.

Disclaimer

Any fee estimate or estimate of habitat compensation obligations on which the fee estimate is based is provided for indicative purposes only. No claim or representation is made as to the final obligations in respect of a parcel of land. An estimate is not an invoice. Information concerning the fee estimate and habitat compensation obligations should not be relied on for any purpose other than to provide an indicative estimate of the fees and habitat compensation obligations that might apply to a parcel of land at the time of the issue of the information only. Parcel boundaries, fees and habitat compensation obligations shown may be subject to change. The estimate of fees and extent of habitat compensation obligations for a parcel of land produced by NVIM may be incomplete in some cases (for example, scattered tree obligations may not be displayed and may require a survey to be determined, and habitat compensation obligations may already have been met). Please refer to the terms and conditions of use (available at http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/native-vegetation-information-management/terms-and-conditions-of-use) for the terms and conditions governing your use of the Native Vegetation Information Management system.

http://www.delwp.vic.gov.au

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