



**Preliminary Ecological and
Bushfire Risk Assessments
for 12 Potential Growth Areas
within the City of Greater Bendigo**

PART A: SUMMARY REPORT

February 2022

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City of Greater Bendigo: Preliminary Native Vegetation and Bushfire Risk Assessment for 12 Future Growth Areas

February 2022

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PE project number: BEN 3205
PE file location: R:\Bendigo Greater\Bendigo Council 12
Growth Areas_Ecology and
Bushfire_2021\Report

Version	Date	Authors	Reviewer	Version notes
0.0	23/12/21	Michelle Savona, Julian Drummond, Noemie Seck,	Daniel Miller (Practical Ecology Pty Ltd)	Pre-draft internal review
0.1	23/12/21	Daniel Casullo, Nathaniel Knight and Liza James	Andrew Cockerall (City of Greater Bendigo)	Draft for City of Greater Bendigo Review
1.0	24/02/2022		N/A	Final for City of Greater Bendigo

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Contents

1.	INTRODUCTION	5
1.1	Project Scope	5
1.2	Proposed CoGB Growth Areas Assessed	7
1.3	Report Structure	7
2.	LEGISLATIVE AND REGULATORY FRAMEWORK	9
2.1	Legislation	9
2.1.1.1	<i>Environment Protection & Biodiversity Conservation Act 1999</i>	9
2.2	Policy, Guidelines and Criteria	26
2.2.1	Commonwealth	26
2.2.2	State	27
2.2.3	Local	29
3.	PROJECT METHODOLOGY	31
3.1	Desktop Review	31
3.1.1	Ecological Values	31
3.1.2	Bushfire Risk	32
3.2	Ground-truthing	33
3.2.1	Ecological Values Assessment	33
3.2.2	Bushfire Risk Assessment	37
3.2.3	Ground-truthing Limitations	38
3.3	Post Ground-Truthing Analysis	40
3.3.1	Ecological Scoring System	40
3.3.2	Bushfire Risk Determination	43
4.	SUMMARY OF RESULTS	48
4.1	Ecological values	48
4.1.1	Native Vegetation: Types and Classification	48
4.1.2	Native Vegetation: Quality	52
4.1.3	Significant ecological communities likely to occur within Growth Areas	53
4.1.4	Significant flora and fauna species likely to occur within Growth Areas	56
4.1.5	Ecological Scoring System Results	58
4.1.6	Native Vegetation Impact Analysis: EnSym Scenario Tests	58
4.2	Bushfire Risk Assessment	63
4.2.1	Huntly East	63
4.2.2	Allies Road, Myers Flat	63
4.2.3	Calder Highway, Kangaroo Flat	64
4.2.4	Heathcote Township	64
4.2.5	Mclvor Highway, Junortoun.	64
4.2.6	Lockwood Road, Kangaroo Flat	64
4.2.7	Sparrowhawk Road, Maiden Gully	65
4.2.8	Olympic Parade, Maiden Gully	65
4.2.9	Ravenswood Run	65
4.2.10	Simpsons Road, Eaglehawk	65
4.2.11	Strathfieldsaye South East	66
4.2.12	Watson Street, White Hills	66
5.	OPPORTUNITIES, CONSTRAINTS AND RECOMMENDATIONS	67
5.1	Ecological Values	67
5.2	Bushfire Risk	72
5.3	Summary	82
	REFERENCES	89

TABLES

Table 1.	Summary of Growth Areas included in Assessment	7
Table 2.	Planning Scheme Zones within each proposed Growth Area	22
Table 3.	Planning Scheme Overlays within each proposed Growth Area	24
Table 4.	Determining the Assessment pathway	28
Table 5.	Databases and resources reviewed for ecological values assessment	31
Table 6.	Databases and resources reviewed for ecological values assessment	32
Table 7.	City of Greater Bendigo Ecological Scoring System, NV = Native Vegetation	42
Table 8.	Summary of native vegetation documented within each proposed Growth Area	49
Table 9.	Summary of percentage cover native vegetation patches and scattered trees	50
Table 10.	Average modelled native vegetation condition score for each Growth Area	52
Table 11.	FFG Act and EPBC Act communities expected to occur in Growth Areas	53
Table 12.	EPBC Act listed community likely to occur on site	55
Table 13.	FFG Act and EPBC Act listed species	57
Table 14.	Total score and ranking for each Growth Area based on CoGB Ecological Scoring System	58
Table 15.	Summary of Clause 52.17 offset requirements based on “worst-case scenario”	59
Table 16.	Species Unit triggers within Growth Areas	60
Table 17.	Policy and legislative implications of ecological findings	69
Table 18.	Summary of the bushfire recommendations for the 12 Growth Areas	74
Table 19.	Opportunities, Constraints and Recommendations Summary	83

FIGURES

Figure 1.	Risk management process as per ISO 31000:2018	43
Figure 2.	Proportion of proposed Growth Areas occupied by mapped Native Vegetation Patches	51

MAPS

Map 1.	Overview Map 12 Growth Areas	8
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1. INTRODUCTION

Practical Ecology was commissioned by the City of Greater Bendigo (CoGB) to provide ecological and bushfire consultancy services in relation to the Managed Growth (Settlement) Strategy. The Managed Growth (Settlement) Strategy will support expected population growth across the CoGB over the next 30+ years.

To plan for this future growth and expansion of the urban footprint within the CoGB municipality, early planning regarding environmental and bushfire risks is critical. The Managed Growth (Settlement) Strategy not only considers policy and statutory controls related to managing bushfire risk made following the 2009 Bushfire Royal Commission, but also the rich diversity of flora and fauna present across the CoGB. Achieving a balance between the necessary expansion of development in the CoGB, and the need to consider bushfire safety while simultaneously managing ecological values, is critical to avoid and minimise impacts to biodiversity while ensuring the safety of developments.

In order to understand where future growth can occur to a level that meets State Government planning policy in relation to bushfire risk, while considering the ecological values of these areas, this Ecological and Bushfire Risk Assessment focuses on the 12 potential Growth Areas as identified by the CoGB. The findings of this Assessment will subsequently inform the contents of the Managed Growth (Settlement) Strategy by highlighting areas that present higher-level ecological values and/or bushfire risks, which would rule these areas out from further consideration, or identify areas for further investigation as a Growth Area.

1.1 Project Scope

The overall purpose of this Ecological and Bushfire Risk Assessment is to:

- determine the ecological values and bushfire risks within each of the 12 Growth Areas under investigation
- provide recommendations regarding proposed development in these areas, and
- provide an indication of policy and legislative implications of future development within these areas.

Note that as outlined in Section 1.3 below, this overall Assessment is presented as two separate reports: Part A and Part B. The information presented across these two reports in relation to the overall Assessment undertaken is based on the following scope of works:

- a desktop review of information relevant to both bushfire risk and ecology prior to ground-truthing, inclusive of:
 - for ecological values: reviewing GIS or mapping data to identify native vegetation extent, mapped Ecological Vegetation Classes (EVCs), threatened flora and fauna records, or other relevant information; reviewing aerial photography to determine the likely extent of native vegetation and habitat; and reviewing ecological databases

- for bushfire risk: determining the likely vegetation types, fuel loads and slopes present within each Growth Area from available desktop information; identifying potential mechanisms to achieve Bushfire Attack Level (BAL) 12.5 ratings for proposed infrastructure to meet the requirements of relevant bushfire related policy; and reviewing State Planning Policy at Clause 13.02–1S in particular, and determining the implication of this Clause within each of the 12 Growth Areas
- preliminary mapping of each Growth Area with available desktop based information to initiate the process of site based ground–truthing
- ground–truthing of information collated during the desktop review to refine data, which focussed on:
 - for ecological values: verifying EVCs and the location of Patches of Native Vegetation and Scattered Trees as per the *Guidelines for the Removal, Destruction or Lopping of Native Vegetation* (DELWP 2017); reviewing habitat conditions to determine the likelihood of State and Commonwealth listed species and/or communities occurring; and consideration of ecological scoring system requirements, later refined during reporting
 - for bushfire risk: confirming vegetation types and fuel load levels based on *Australian Standards 3959– 2018: Construction of Buildings in Bushfire Prone Areas* (AS3959–2018); confirming slopes; undertaking strategic fuel load assessments as per the *Overall Fuel Hazard Assessment Guide* (Hines *et al.* 2010); and identifying the feasibility of implementing mechanisms to reduce bushfire risk
- reporting and mapping to:
 - outline the methods implemented and present the findings of the desktop review process and results of ground–truthing
 - provide an overview of the policy and legislation that that forms the basis for decisions and approvals as they relate to ecological values and bushfire risk at Commonwealth and State levels
 - identify opportunities and constraints associated with potential future development within each of the 12 Growth Areas
 - provide recommendations to balance future development with ecological values and bushfire risk, and highlight the suitability of each Growth Area for future development.

Further details on the methods implemented as part of this Ecological and Bushfire Risk Assessment to meet the above Project Scope are outlined in Section 3.

1.2 Proposed CoGB Growth Areas Assessed

As noted above, 12 potential Growth Areas formed the focus of this Ecological and Bushfire Risk Assessment. Further detail on each of these Growth Areas is provided in Table 1 below. Map 1 provides an overview of the location of each Growth Area within the Bendigo municipality and their relative size.

Table 1. Summary of Growth Areas included in Assessment

Growth Area Name	Size (hectares)
Huntly East	593
Allies Road, Myers Flat	672
Calder Highway, Kangaroo Flat	59
Heathcote Township	1079
Mclvor Highway, Junortoun	298
Lockwood Road, Kangaroo Flat	78
Sparrowhawk Road, Maiden Gully	45
Olympic Parade, Maiden Gully	957
Ravenswood Run	2483
Simpsons Road, Eaglehawk	238
Strathfieldsaye South East	644
Watsons Street, White Hills	207

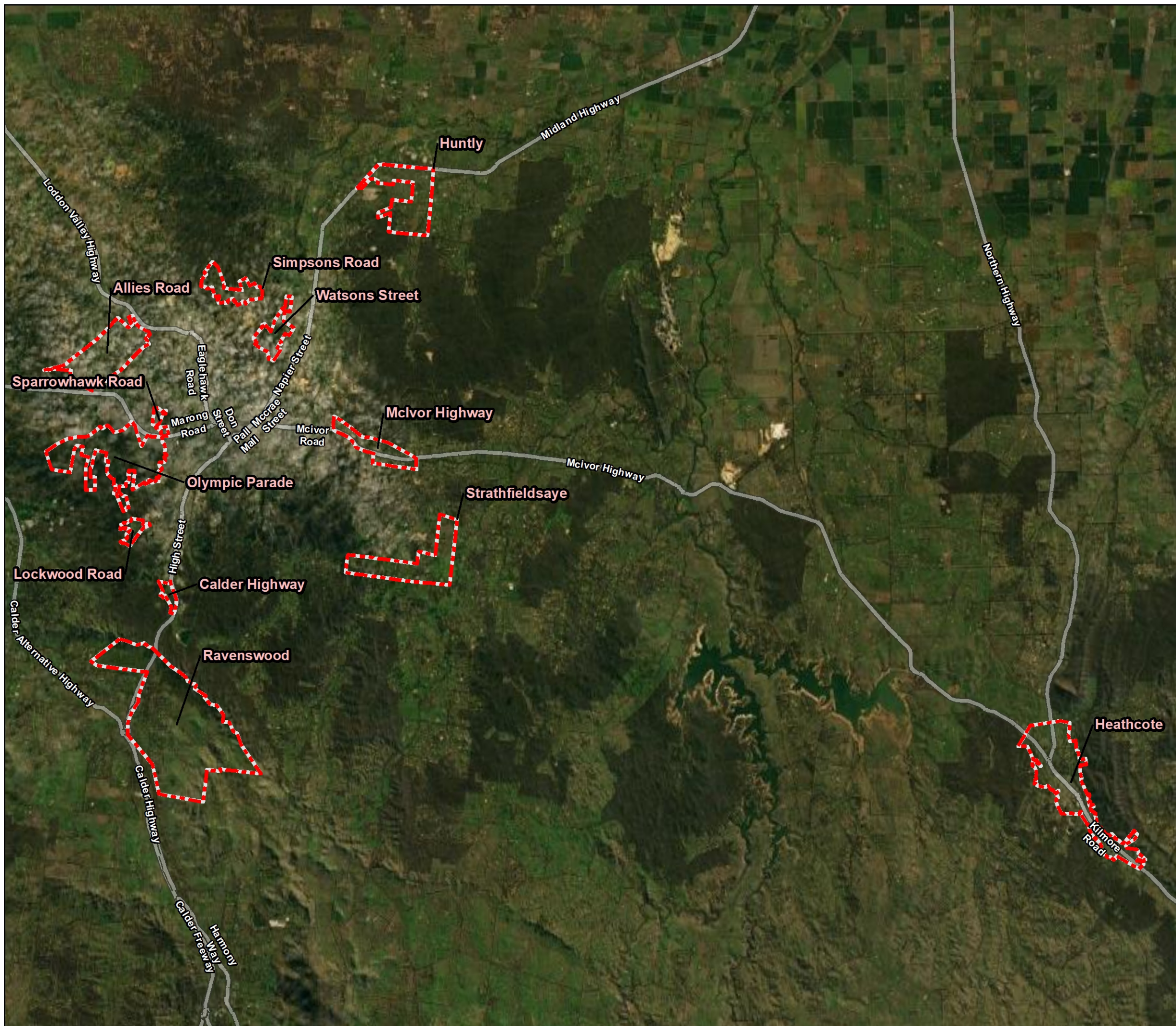
1.3 Report Structure

As noted above, this Ecological and Bushfire Risk Assessment for the 12 potential Growth Areas listed in Table 1 and shown on Map 1 is presented in two parts. These being:

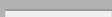
- **Part A: Summary Report** (this report), which introduces the project and the policy and legislative context that applies to the Growth Areas and underpins the methods of assessment; outlines the methods implemented to capture data information for each Growth Area; summarises the results presented in Part B; and subsequently provides an indication of the opportunities and constraints associated with future development within the 12 Growth Areas and associated recommendations
- **Part B: Ecological Values and Bushfire Risk Analysis**, which presents the findings from the desktop review and ground-truthing that was completed within each of the 12 Growth Areas; provides Growth Area specific recommendations; highlights State level offsets for native vegetation removal in a worst-case scenario approach to future development and provides maps to support this information.

This two-part structure aims to provide the CoGB with detailed results and findings for each Growth Area as part of Part B, but provide a higher-level overview of these results as part of Part A, along with the relevant policy and legislation that applies and the potential for each Growth Area to be subject to future development based on identified opportunities and constraints. Part A culminates in the provision of an assessment of the suitability of each proposed Growth Area in relation to each other.

Map 1. Growth Area Boundaries
Bendigo



Legend

-  Growth Area Boundaries
-  Major Roads

Details

Mapping by: Ali Nia
Date: 22/12/2021
Version: 1
Aerial photography from Esri World Imagery.
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0 2,500 5,000 7,500 m

Scale 1:170,000 (Page size A3)

Disclaimer

Practical Ecology bears no responsibility for the accuracy and completeness of this information and any decisions or actions taken on the basis of the map. While information appears accurate at publication, nature and circumstances are constantly changing.

2. LEGISLATIVE AND REGULATORY FRAMEWORK

A number of legislative, policy and guidance documents are relevant to this study, and have underpinned the approach taken to documenting the ecological values and bushfire risk across the 12 Growth Areas assessed. The contents and implications of these documents are also highly relevant to proposed future development of the 12 Growth Areas being considered, and thus have influenced the recommendations presented in subsequent section of this report.

2.1 Legislation

The following section addresses Commonwealth and State legislation with direct relevance to the contents of this study.

2.1.1.1 *Environment Protection & Biodiversity Conservation Act 1999*

The *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the Act as Matters of National Environmental Significance (MNES). There are nine MNES to which this Act applies, these are:

- world heritage sites
- national heritage places
- wetlands of international importance (often called 'Ramsar' wetlands)
- nationally threatened species and ecological communities
- migratory species
- Commonwealth marine areas
- nuclear actions
- the Great Barrier Reef Marine Park
- a water resource, in relation to coal seam gas development and large coal mining development.

Of these nine MNES to which the EPBC Act applies, two are deemed most relevant to this study the Growth Areas being considered: (1) nationally threatened species and ecological communities and (2) and migratory species. The EPBC Act aims to protect these particular MNES by providing for:

- identification and listing of species and ecological communities as threatened
- development of conservation advice and recovery plans for listed species and ecological communities
- development of a register of critical habitat
- recognition of key threatening processes
- where appropriate, reducing the impacts of these processes through threat abatement plans.

While it is noted that ‘Ramsar’ wetlands were identified through completion of the EPBC Act Protected Matters Search Tool (PMST), managed by the Commonwealth Department of the Environment and Energy (DOEE 2019), given the distance of these wetlands from the Growth Areas (>50km at minimum) they are less likely to be affected by future development in the proposed Growth Areas.

Relevance to this study

Overall, if future development with any of the Growth Area is likely to have a significant impact on such MNES, the action or proposal to develop within these areas must be referred to the Department of Agriculture, Water and the Environment (DAWE). This ‘referral’ is then released to the public for comment. A ‘*significant impact is defined under the EPBC Act as an impact that is important, notable, or of consequence, having regard to its context or intensity*’ (DoE 2013b).

Under the EPBC Act, actions that are likely to have a significant impact upon MNES require approval from the Environment Minister to undertake those actions. Where a significant impact is likely, offsets will usually be required to compensate for the residual adverse impacts of an action on the environment. This is guided by the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (DSEWPC 2012).

The contents of this study – including the subsequent sections of Part A, along with Part B – aim to highlight the likelihood of occurrence of MNES within each Growth Area, particularly as it directly relates to nationally threatened species and ecological communities and migratory species. The opportunities, constraints and recommendations as they relate to the potential presence of MNES within the Growth Areas is further explored in Section 5 below.

2.1.1.2 *Environment Effects Act 1978*

Under Victoria’s *Environmental Effects Act 1978* (EE Act), projects that could have a ‘significant effect’ on Victoria’s environment can potentially require an Environmental Effects Statement (EES). This Act applies to works ‘reasonably considered to have or be capable of having a significant effect on the environment’. The Minister for Planning and Environment is the responsible person for assessing whether this Act applies.

Before commencing any works to which this Act applies, a proponent firstly must undertake a self-assessment to determine if the proposal meets the criteria to trigger an EES. If the trigger is met, then the proponent must initiate an EES and submit it to the Minister, for the Minister’s assessment, of the environmental effects of the works.

The criteria for the types of potential effects on the environment that might be of significance with regard to ecology include:

- clearing of 10 ha or more of native vegetation (that is of an endangered Ecological Vegetation Community (EVC) or of very high conservation significance)
- impacts to matters listed under the *Flora and Fauna Guarantee Act 1988*, including:
 - potential loss of a significant area of a listed ecological community, or

- potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats, or
- potential loss of critical habitat, or
- potential significant effects on habitat values of a wetland supporting migratory bird species
- potential extensive or major effects on land stability, acid sulphate soils or highly erodible soils over the short or long term
- potential extensive or major effects on beneficial uses of waterbodies over the long-term due to changes in water quality, stream flows or regional groundwater levels.

The above are based on referral criteria in the *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978* (DSE 2006).

Relevance to this study

There is potential that varying scenarios as they relate to the proposed Growth Areas could potentially trigger the need for a referral under the EE Act. These scenarios as they relate to ecology include but are not limited to:

- the removal of 10 ha or more of an endangered EVC
- impacts to matters listed under the FFG Act, including listed communities and species
- potential significant effects on habitat values of a wetland supporting migratory bird species.

Given the levels of native vegetation present within the Growth Areas and likely presence of FFG listed communities and species, the EE Act and its implications are likely to require further consideration with regard to the proposed Growth Areas in due course.

Note here that It is understood that DELWP has recently advised the CoGB in relation to a project within the Maiden Gully area that a planning scheme amendment to implement a Precinct Structure Plan (PSP), which may be the case with the Growth Areas, would trigger an EE Act referral (more than 10ha of veg clearance and FFG species). However, additional legal advice has indicated that a Planning Scheme amendment would not require an EE Act referral, as the referral is triggered by “works” taking place, and the PSP amendment was introducing a planning document into the planning scheme (Andrew Cockerall Pers. Comm. 10/01/2022).

Regardless, addressing environmental impacts will still be a key matter that needs to be addressed as part of any amendment within the Growth Areas, it would not be however under EE Act. Where future subdivisions trigger the need for a referral under the EE Act, for the reasons listed above (e.g. removal of 10 ha or more of an endangered EVC) then it is at the subdivision stage that an EES may be required by the Minister for Planning and Environment.

The contents of this study – including the subsequent sections of Part A, along with Part B – aim to highlight the ecological values within the 12 Growth Areas – including endangered EVCs and FFG Act listed communities and/or species – that could trigger the need for a referral under the EES Act if present. As above, this may not necessarily be at the stage of Planning Scheme amendments to establish and further develop within the proposed Growth Areas, but may be required where large land holdings contain higher level ecological values that may trigger the need for a referral and subsequently an EES.

The opportunities, constraints and recommendations as they relate to these potential triggers within the Growth Areas is further explored in Section 5 below.

2.1.1.3 *Flora and Fauna Guarantee Act 1988*

The FFG Act was established to provide a legal framework for enabling and promoting the conservation of all Victoria's native flora and fauna, and to enable management of potentially threatening processes. One of the main features of the FFG Act is the listing process, whereby native species and communities of flora and fauna, and the processes that threaten native flora and fauna are listed in the schedules of the FFG Act. This assists in identifying those species and communities that require management to survive and identifies the processes that require management to minimise the threat to native flora and fauna species and communities within Victoria.

Projects that may impact FFG Act listed species or their habitat within areas that intersect public land may require approval to remove threatened species protected under this Act. A permit from the Department Environment, Land Water and Planning (DELWP) is also required to 'take' (to kill, injure, disturb or collect) listed flora species that are members of protected taxa from public land may also be required.

Relevance to this study

These contents of this study – including the subsequent sections of Part A, along with Part B – aims to highlight the known or potential presence FFG Act matters. This includes FFG Act listed:

- communities, given that development of areas of Crown land that contain these communities would likely require a permit from DELWP
- threatened fauna, which may require a permit for removal of their habitat, and
- threatened flora and other protected flora, which would require a permit from DELWP if individuals are 'taken'

The opportunities, constraints and recommendations as they relate to these ecological values within the Growth Areas further explored in Section 5 below.

2.1.1.4 Flora and Fauna Guarantee Amendment Act 2019

The FFG Act has been amended to provide a modern and strengthened framework for the protection of Victoria's biodiversity. The *Flora and Fauna Guarantee Amendment Act 2019* (the Amendment Act) came into effect on June 1, 2020. The Amendment Act:

- introduces principles to guide the implementation of the FFG Act, including consideration of the rights and interests of Traditional Owners and the impacts of climate change
- requires consideration of biodiversity across government to ensure decisions and policies are made with proper consideration of the potential impacts on biodiversity
- clarifies existing powers to determine critical habitat and improves their protection by encouraging cooperative management
- gives effect to a consistent national approach to assessing and listing threatened species using the Common Assessment Method (CAM), which will reduce duplication of effort between jurisdictions and facilitate the monitoring and reporting of species' conservation status
- modernises the FFG Act's enforcement framework including stronger penalties.

The Amended Act requires ministers and public authorities to consider the FFG Act when performing functions that might impact biodiversity when exercising their functions (set out in new section 4B). The Act requires that in performing any of their functions that may reasonably be expected to impact on biodiversity, including a function under any Act, ministers and public authorities must consider the Act's objectives, so far as is consistent with the proper exercising of their functions.

Additional matters are also specified to be considered to clarify the objectives, including the Biodiversity Strategy, relevant action statements, management plans or critical habitat determinations. The types of potential impacts on biodiversity that should be considered are also specified, these include:

- long- and short-term impacts
- detrimental and beneficial impacts
- direct and indirect impacts
- cumulative impacts
- potentially threatening processes.

The Act establishes tools to provide guidance to public authorities in considering biodiversity, these include:

- **ministerial guidelines** to clarify the duty and support public authorities with further information

- **public authority management agreements** made with the Secretary to DELWP, which can provide certainty that biodiversity impacts are being sufficiently considered and being managed and can streamline approval requirements.

Relevance to this study

As a public authority, the Amendment Act will likely need to be considered by the CoGB when performing functions in relation to the proposed Growth Areas that might impact ecological values. As highlighted above, potential impacts to FFG Act listed ecological values must therefore be considered, inclusive of long- and short-term impacts associated with development within the proposed Growth Areas, and potentially threatening processes. These contents of this study – including the subsequent sections of Part A, along with Part B – highlight the known or potential presence of FFG Act matters that will need to be considered.

2.1.1.5 Wildlife Act 1975

The *Wildlife Act 1975* provides for the protection and conservation of native wildlife (fauna) within Victoria. It also provides the basis for the majority of wildlife permit/licensing requirements within the state. Under the Act a person must not hunt, take or destroy endangered, notable or protected wildlife; this includes all native vertebrate animals, all kinds of deer, non-indigenous quail, pheasants, and partridges, and all terrestrial invertebrate animals listed under the Flora and Fauna Guarantee Act 1988.

Relevance to this study

As outlined in subsequent sections of Part A, along with Part B, fauna habitat is present across each of the Growth Areas and includes that which may support significant fauna species.

The handling, salvage or movement of fauna as part of future works within the Growth Areas, including the need for relocation of fauna species from the Growth Areas, will require authorisation from DELWP under this Act by any professionals undertaking such tasks.

2.1.1.6 Planning and Environment Act 1987

The *Planning and Environment Act 1987* establishes the framework for planning the use, development and protection of land in Victoria in the present and long-term interests of all Victorians. This includes providing the structure for and administering the implementation of Planning Schemes in each municipality through the Victoria Planning Provisions (VPPs). Planning Schemes are legal instruments outlining provisions for land use, development and protection. They are constructed and sourced from the VPPs.

Note here that the commentary within this study with regard to the CoGB Planning Scheme is based on current ordinance that applies to each of the Growth Areas. It is expected however that future development within these areas, if to progress, would be via a planning scheme amendment to facilitate higher density residential, industrial and/or commercial development within these areas.

Ministerial Direction No. 11 Strategic Assessment of Amendments aims to ensure a comprehensive strategic evaluation process of a planning scheme amendment and the outcomes it produces. In preparing an amendment, a planning authority must evaluate and include in the explanatory report, a discussion about how the amendment addresses a number of strategic considerations including how the amendment addresses environmental, social and economic issues.

A full assessment against the strategic considerations should be made for amendments that include:

- major changes in policy
- introduction or extension of a zone or overlay that would produce a different or new land use or development outcome
- major changes to the ordinance or mapping that involve a large number of lots.

2.1.1.7 State Planning Policy Framework

Clause 12 Environmental and Landscape Values

Clause 12 of the planning scheme recognises that planning:

- should help to protect the health of ecological systems and the biodiversity they support (including ecosystems, habitats, species and genetic diversity) and conserve areas with identified environmental and landscape values
- must implement environmental principles for ecologically sustainable development that have been established by international and national agreements
- should protect sites and features of nature conservation, biodiversity, geological or landscape value.

Clauses of particular relevance to this study include:

- Clause 12.01 – 1S Protection of biodiversity
- Clause 12.01 – 2S Native vegetation management.

The objectives of these clauses will need to be considered as part of future planning of the proposed Growth Areas as they relate to avoiding and minimising impacts to biodiversity in particular.

Clause 13 Environmental Risks

Clause 13 recognises that planning should adopt a best practice environmental management and risk management approach which aims to avoid or minimise environmental degradation and hazards. This includes consideration of:

- climate change
- floodplains
- soil degradation
- erosion and landslip
- noise and air
- air quality
- bushfire.

2.1.1.8 Clause 13.02–1S Bushfire Planning

This Clause is specifically relevant to this study and future development within the proposed Growth Areas, particularly in relation to directing population growth and development to low risk locations. The primary objective of this Clause is to strengthen the resilience of settlements and communities to bushfire through risk-based planning that prioritises the protection of human life. This is achieved through assessing applications against multiple strategies, one of these include the 'Use and development control in a Bushfire Prone Area' and states that the following uses need to consider bushfire risk at the planning level:

- subdivisions of more than 10 lots
- accommodation
- childcare centre
- education centre
- emergency services facility
- hospital
- indoor recreation facility
- major sports and recreation facility
- place of assembly
- any application for development that will result in people congregating in large numbers.

When assessing a planning permit application for the above uses and development it is necessary to:

- Consider the risk of bushfire to people, property and community infrastructure
- Require the implementation of appropriate bushfire protection measure to address the identified bushfire risk
- Ensure new development can implement bushfire protection measure without unacceptable biodiversity impacts

As the Managed Growth (Settlement) Strategy is predominantly about establishing residential areas and associated facilities, the majority of the developments stemming from this strategy will need to address the provisions of 13.01–1S. The other strategies within this Clause include:

- protection of human life
- bushfire hazard identification and assessment
- settlement planning
- areas of biodiversity conservation value
- policy guidelines
- policy documents.

The ways in which each of the strategies in Clause 13.01–1S have been addressed by this current study, and are expected to also be through future planning as outlined below.

Relevance to this study

The protection of human life forms the basis of this study as it has related to bushfire risk, by providing recommendations that aim to outline the kinds of development which can safely and responsibly proceed within the proposed Growth Areas being considered

The requirements under ‘bushfire hazard identification and assessment’ can and have also been addressed through the assessment approach completed as part of this study. ‘Areas of biodiversity conservation value’ have and are being considered by the ecological assessment also completed as part of this study. This overall study addressing bushfire risk and ecology is expected to influence subsequent strategic documents associated with the Growth Areas from this point forward, such that to an extent the requirements of ‘policy guidelines and documents’ of Clause 13.02–1S is also addressed to a degree by this study.

‘Settlement planning’ is designed to promote higher resilience in new and existing settlements through planning and the prioritisation of the protection of human life. Addressing this strategy at this current point as part of this study is therefore essential to ensure that the types of development being proposed within each Growth Area are appropriate for the risk present. The key points to address with regard to settlement planning are as follows:

- directing population growth and development to low-risk locations, being those locations assessed as having a radiant heat flux of less than 12.5 kilowatts/square metre under AS 3959–2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia 2018)
- ensuring the availability of, and safe access to, areas assessed as a BAL-LOW rating under AS 3959–2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia 2018) where human life can be better protected from the effects of bushfire
- ensuring the bushfire risk to existing and future residents, property and community infrastructure will not increase as a result of future land use and development
- achieving no net increase in risk to existing and future residents, property and community infrastructure, through the implementation of bushfire protection measures and where possible reducing bushfire risk overall

- assessing and addressing the bushfire hazard posed to the settlement and the likely bushfire behaviour it will produce at a landscape, settlement, local, neighbourhood and site scale, including the potential for neighbourhood-scale destruction
- assessing alternative low risk locations for settlement growth on a regional, municipal, settlement, local and neighbourhood basis
- not approving any strategic planning document, local planning policy, or planning scheme amendment that will result in the introduction or intensification of development in an area that has, or will on completion have, more than a BAL-12.5 rating under AS 3959-2018 Construction of Buildings in Bushfire-prone Areas (Standards Australia 2018).

The above have largely formed the basis for recommendations presented as part of this study related to bushfire risk. This includes ensuring that all developments within each Growth Area can achieve BAL-12.5 through ensuring there are setbacks guaranteed through managed road reserves and/or managed setbacks, but this is only a small part of it. Recommending that an area is developed into higher density residential or similar means ensuring that access in and out is readily available, and that there is a broader connection to other residential areas which can therefore be considered BAL-LOW. Although, this can also be attained through developing larger areas which become BAL-LOW as a result. The provision of development within land adjacent to existing settlement also has the potential to reduce the overall risk through associated reduction in fuel loads and upgrade of road network.

However, the risk to adjacent areas also has to be considered since, even though denser residential development normally results in a managed terrain which will not support a fire, a higher population means more people need to be evacuated, which can cause associated resources to become stretched. If the risk to an existing residential area is already considered high, then adding another development to an area with similar risk levels increases the hazard to both areas, which may be considered unacceptable. Developing at lowered densities or different uses, and/or directing the population away from currently strained areas in the case of an emergency, could be used to reduce this hazard.

An area where the risk is too high to support higher density populations does not mean no development can occur. Lower-density residential properties, urban/rural interfaces such as smaller farming properties, industrial developments. The provision of development within land adjacent to existing settlement also has the potential to reduce the overall risk through associated reduction in fuel loads and upgrade of road network. Such development provides a reason to provide the required infrastructure, meaning that some fuel management will occur, and there will be a lower population which can be quickly evacuated without increasing the strain on adjacent areas. Some areas will still be too high-risk to recommend certain types of development, and recommendations made in this study have identified these accordingly. These areas can still provide for growth, though must be appropriate for the present risk and therefore may mean that high-density residential developments are not suitable.

These points are further explored in subsequent sections of this Part A report, and form the basis for assessing the planning requirements of each of the Growth Areas and providing recommendations for future use and management of these areas. This follows the assessment of the risk and potential hazards for each Growth Area detailed in Part B of this study, which is also summarised in Section 4.2 below.

2.1.1.9 Clause 22.01 – Urban/Forest Interface Policy

The areas in and around Bendigo have ecological significance, provide environmental and economic benefits, and make an important contribution to the municipality's unique character. Mechanisms are needed to address the urban-forest interface principally by way of a 'buffer zone' and building setbacks. The Urban/Forest Interface Policy sets minimum standards to be applied to residential development that abuts both public and privately owned forest. Higher standards may be required depending on the circumstances. In relation to public land as a matter of principle all buffers are to be provided on privately owned land.

This policy provides a number of recommendations for proposed development within private and public forest:

For public forest and proposed new development areas, consider applying a Design and Development Overlay to public forest – proposed new development areas, which at a minimum addresses:

- *The protection of areas that have a Strategic Biodiversity Score of 0.41 and above;*
- *The subdivision design in consultation with the adjoining public land manager;*
- *The development of biolinks to link critical vegetation;*
- *The provision of building envelopes;*
- *The placement of all utility services under ground in common trenches;*
- *The preparation of a fire management plan, which includes issues such access for emergency vehicles and fire hazard reduction; and*
- *Higher density lots in areas that have been previously disturbed and undisturbed areas left as public open space, where appropriate.*

For private forest (areas of very high, high and medium conservation significance vegetation) and proposed new development areas:

- *Discourage new residential areas that abut private forest unless it can be demonstrated that an appropriate management regime can be introduced that will produce a positive environmental outcome for the private forest.*
- *Consider applying a Design and Development Overlay to private forest – proposed new development areas, which at a minimum addresses:*
 - *The protection of areas that have a Strategic Biodiversity Score of 0.41 and above;*
 - *The development of biolinks to link critical vegetation;*
 - *The provision of building envelopes;*

- *The placement of all utility services under ground in common trenches;*
- *The preparation of a fire management plan, which includes issues such access for emergency vehicles and fire hazard reduction; and*
- *Higher density lots in areas that have been previously disturbed and undisturbed areas left as public open space or covenanted private forest, where appropriate.*

Relevance to this study

All of the Growth Areas assessed as part of this study include private and/or public vegetation within their confines and/or abutting their boundaries. While this study provides a summary of the ecological values and bushfire risk present within and surrounding the proposed Growth Areas, these preliminary findings will need to be considered as part of ongoing planning if these areas are to be developed in the future. Planning will need to ensure the provisions of Clause 22.01 are addressed through the application of a Design and Development Overlay aims to balancing the often conflicting issues associated with ecological value and bushfire risk.

2.1.1.10 Clause 52.16 and Clause 52.17

Clause 52.16 of the planning scheme applies to land where a Native Vegetation Precinct Plan applies, and has objectives:

- to provide for the protection, management and removal of native vegetation through the use of a native vegetation precinct plan incorporated into this scheme
- to ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation. This is achieved by applying the following three step approach in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*:
 1. avoid the removal, destruction or lopping of native vegetation
 2. minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided
 3. provide an offset to compensate for the biodiversity impact if a permit is granted to remove, destroy or lop native vegetation.
- to manage the removal, destruction or lopping of native vegetation to minimise land and water degradation.

Clause 52.16 requires a planning permit to remove, destroy or lop native vegetation unless the native vegetation removal is in accordance with an NVPP or is exempted under Clause 52.16–8. Clause 52.17 of the planning scheme does not apply to land where an NVPP applies. If the purpose of the proposed removal of native vegetation is not in accordance with the purpose of the NVPP, a planning permit to remove native vegetation is required under Clause 52.16 of the relevant Planning Scheme.

For sites not covered by an NVPP, a planning permit is required for the removal of native vegetation under Clause 52.17 unless exemptions apply.

Relevance to this study

There are three NVPPs referred to within the Schedule to Clause 52.16 of the CoGB Planning Scheme that are already in place:

- Huntly Township Plan Native Vegetation Precinct Plan, September 2010
- Jackass Flat Vegetation Precinct Plan, September 2009
- Native Vegetation Precinct Plan for land at 244 Edwards Road, Maiden Gully, June 2014,

Part of the Huntly Township Plan Native Vegetation Precinct Plan dated September 2010 covers a portion of the proposed Huntly East Growth Area, to the north of the train line. This NVPP nominates vegetation to be removed and native vegetation to be retained. If vegetation proposed to be retained in the NVPP is subsequently proposed for removal as a result of future growth, the provisions of the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017c) will need to be applied.

For other Growth Areas, where native vegetation is proposed to be removed, the provisions of Clause 52.17 and the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017c) will apply. Further information on the Guidelines for the removal, destruction and lopping of native vegetation (DELWP 2017c) are provided in Section 2.2.2.1.

2.1.1.11 Zoning and Overlays

There are several zones and overlays that cover the 12 Growth Areas. A summary of the zones and overlays as they apply to each of these Growth Areas is provided in Table 2 and Table 3 below.

A planning permit is likely to be required under most of the current zones and overlay that apply to each Growth Area as presented in Table 2 and Table 3 below. This may be to subdivide land; remove, destroy or lop native vegetation; or to develop in an area that has been determined to have a higher bushfire risk and is covered by a Bushfire Management Overlay (BMO).

While a full overview of the planning permit triggers and requirements is not provided in detail as part of this study, the various objectives of these zones and overlay of the CoGB planning Scheme – as they relate to avoiding and minimising impacts on ecological values, and the protection of life and property as it relates to bushfire in particular – have been considered in the recommendations made in subsequent sections of this report.

Note again that these tables above are based on current zoning and overlays that apply to each Growth Area. As noted in Section 2.1.1.6, future development within the proposed Growth Areas is most likely to be facilitated by planning scheme amendments to facilitate higher density residential, industrial and/or commercial development within these areas and the applicable zoning and overlays are likely to be changed through such an amendment.

Table 2. Planning Scheme Zones within each proposed Growth Area

Zone	Code	Huntly East	Allies Road, Myers Flat	Calder Highway, Kangaroo Flat	Heathcote Township	Mclvor Highway, Junortoun	Lockwood Road, Kangaroo Flat	Sparrowhawk Road, Maiden Gully	Olympic Parade, Maiden Gully	Ravenswood Run	Simpsons Road, Eaglehawk	Strathfieldsaye South East	Watsons Street, White Hills
General Residential Zone	GRZ	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓
Commercial 1 Zone	C1Z				✓								
Commercial 2 Zone	C2Z				✓								
Commonwealth Land – Not Zoned	CA					✓							
Farming Zone	FZ	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓
Industrial 1 Zone	INZ1						✓						
Industrial 3 Zone	IN3Z				✓	✓		✓					✓
Low Density Residential Zone	LDRZ		✓	✓	✓	✓							✓
Low Density Residential Zone – Schedule 1	LDRZ1		✓						✓				
Mixed Use Zone – Schedule 1	MUZ1				✓								
Public Conservation and Resource Zone	PCRZ		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Public Use Zone – Schedule 1	PUZ1			✓		✓			✓		✓		✓
Public Use Zone – Schedule 2	PUZ2				✓	✓							
Public Use Zone – Schedule 3	PUZ3				✓								
Public Use Zone – Schedule 4	PUZ4	✓	✓			✓				✓			
Public Use Zone – Schedule 5	PUZ5				✓								
Public Use Zone – Schedule 7	PUZ7		✓		✓								
Road Zone Category 1	RDZ1	✓		✓	✓	✓	✓	✓	✓	✓		✓	
Road Zone Category 2	RDZ2		✓			✓			✓		✓	✓	✓
Rural Conservation Zone	RCZ				✓	✓				✓		✓	

Preliminary Ecological and Bushfire Risk Assessment for 12 Potential Growth Areas

Zone	Code	Huntly East	Allies Road, Myers Flat	Calder Highway, Kangaroo Flat	Heathcote Township	McIvor Highway, Junortoun	Lockwood Road, Kangaroo Flat	Sparrowhawk Road, Maiden Gully	Olympic Parade, Maiden Gully	Ravenswood Run	Simpsons Road, Eaglehawk	Strathfieldsaye South East	Watsons Street, White Hills
Public Park and Recreation Zone	PPRZ					✓	✓		✓				✓
Rural Living Zone	RLZ	✓			✓							✓	
Special Use Zone – Schedule 1	SUZ1					✓							
Special Use Zone – Schedule 5	SUZ5					✓							
Urban Floodway Zone	UFZ				✓								
Urban Growth Zone	UGZ	✓											

Table 3. Planning Scheme Overlays within each proposed Growth Area

Overlay	Code	Huntly East	Allies Road, Myers Flat	Calder Highway, Kangaroo Flat	Heathcote Township	McIvor Highway, Junortoun	Lockwood Road, Kangaroo Flat	Sparrowhawk Road, Maiden Gully	Olympic Parade, Maiden Gully	Ravenswood Run	Simpsons Road, Eaglehawk	Strathfieldsaye South East	Watsons Street, White Hills
Airport Environs Overlay – Schedule 2	AEO2					✓							
Bushfire Management Overlay	BMO		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Design and Development Overlay – Schedule 1	DDO1					✓							
Design and Development Overlay – Schedule 3	DDO3									✓			
Design and Development Overlay – Schedule 6	DDO6												✓
Design and Development Overlay – Schedule 10	DDO10							✓	✓		✓		
Development Plan Overlay – Schedule 4	DPO4				✓	✓			✓			✓	✓
Development Plan Overlay – Schedule 21	DDO21												✓
Development Plan Overlay – Schedule 26	DPO26											✓	
Environmental Significance Overlay – Schedule 1	ESO1	✓		✓	✓	✓	✓		✓	✓		✓	
Environmental Significance Overlay – Schedule 2	ESO2		✓					✓	✓	✓	✓		
Environmental Significance Overlay – Schedule 3	ESO3				✓								
Erosion Management Overlay	EMO									✓			
Heritage Overlay – Numerous Schedules	HO				✓				✓	✓		✓	

Preliminary Ecological and Bushfire Risk Assessment for 12 Potential Growth Areas

Overlay	Code	Huntly East	Allies Road, Myers Flat	Calder Highway, Kangaroo Flat	Heathcote Township	Mclvor Highway, Junortoun	Lockwood Road, Kangaroo Flat	Sparrowhawk Road, Maiden Gully	Olympic Parade, Maiden Gully	Ravenswood Run	Simpsons Road, Eaglehawk	Strathfieldsaye South East	Watsons Street, White Hills
Land Subject to Inundation – Schedule 1	LSIO1		✓		✓							✓	
Land Subject to Inundation – Schedule 2	LSIO2		✓		✓	✓						✓	
Neighbourhood Character Overlay – Schedule 1	NCO1				✓								
Public Acquisition Overlay – Schedule 2	PAO2									✓			
Public Acquisition Overlay – Schedule 5	PAO5											✓	
Restructure Overlay – Schedule 2	RO2									✓			
Significant Landscape Overlay – Schedule 1	SLO1				✓								✓
Salinity Management Overlay	SMO									✓		✓	
Vegetation Protection Overlay – Schedule 1	VPO1											✓	
Vegetation Protection Overlay – Schedule 2	VPO2		✓			✓		✓	✓	✓	✓	✓	✓
Vegetation Protection Overlay – Schedule 3	VPO3				✓				✓				

2.1.1.12 *Catchment and Land Protection Act 1994*

The *Catchment and Land Protection Act 1994* (CaLP Act) intends to manage land degradation including detrimental environmental or economic impacts of declared noxious weeds and pest animals.

Under section 20 of the CaLP Act, all landowners, including the Crown, public authorities and licensees of Crown lands, must, in relation to their land, take all reasonable steps to:

- avoid causing or contributing to land degradation which causes or may cause damage to land of another landowner
- eradicate regionally prohibited weeds
- prevent the growth and spread of regionally controlled weeds on their land
- prevent the spread of, and as far as possible, eradicate established pest animals.

There are also provisions within the Act to prevent the spread of declared noxious weeds, through regulating the purchase, sale, possession for the purposes of sale, display, propagation or transport of these species into or within Victoria. Furthermore, under the Act it is prohibited to bring into Victoria, keep, sell or release declared pest animals without an authority (permit).

Future planning within the Growth Areas will need to consider the potential for development to provide the potential for declared noxious weeds to spread into areas of development into native vegetation to be retained. At a minimum, provisions should be put in place to ensure that all landowners are educated about their obligations under this Act.

2.2 Policy, Guidelines and Criteria

The following section addresses Commonwealth, State and local policy, guidelines and criteria that can have a direct influence of future development within the Growth Areas.

The contents of some of these documents have been considered as part of preparation of this study, in particular the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017c) and State related State level policy documents relevant to the removal of native vegetation. Other documents listed will likely require ongoing consideration should proposed development proceed within any of the Growth Areas.

2.2.1 Commonwealth

Various policy documents, guidelines and criteria that govern the assessment, management and offsetting of MNES listed under the *EPBC Act* are relevant to potential impacts associated with future development in the Growth Areas.

These relate to MNES that are known to occur within the Growth Areas being considered, or are expected to occur, as summarised in Section 4.1 below and in Part B of this study. Key documents include but are not limited to:

- *Draft survey guidelines for Australia's threatened orchids* (DoE 2013a)
- *Survey Guidelines for Australia's threatened birds* (DEWHA 2010a)
- *Survey Guidelines for Australia's threatened frogs* (DEWHA 2010b)
- *Survey guidelines for Australia's threatened fish* (DEWHA 2011)
- *Survey guidelines for Australia's threatened mammals* (DSEWPC 2011)
- *Survey guidelines for Australia's threatened reptiles* (DSEWPC 2004)
- *Matters of National Significance. Significant Impact Guidelines 1.1* (DEWHA 2009)
- *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (DSEWPC 2012).

2.2.2 State

Various State level policy documents, guidelines and criteria also govern the assessment, management and offsetting of ecological values and need to be considered as part of future planning within the Growth Areas. As noted above, a number of these were considered as part of development of this study in terms of assessing ecological values, but each will require further consideration for Growth Areas where development potential is to be further explored by the CoGB. Key documents include but are not limited to:

- *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017c)
- *Vegetation Quality Assessment Manual–Guidelines for Applying the Habitat Hectares Scoring Method* (DSE 2004)
- *Characteristics of Threatened Communities – Flora and Fauna Guarantee Act 1988* (FFG SAC undated)
- *Applicant's guide – Applications to remove, destroy or lop native vegetation* (DELWP 2018a)
- *Assessor's handbook – Applications to remove, destroy or lop native vegetation* (DELWP 2017a)
- *Exemptions from requiring a planning permit to remove native vegetation – Guidance* (DELWP 2017b)
- Various FFG Act Action Statements.

2.2.2.1 Guidelines for the removal, destruction and lopping of native vegetation

In Victoria, a permit is required to remove, destroy or lop native vegetation. These regulations are known as the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017c). Responsibilities for the clearance of native vegetation are referenced under the Planning and Environment Act and are generally enacted under the municipal planning scheme via Clause 52.17 of the Victoria Planning Provisions (VPP). The Guidelines are also embedded in Clause 52.16.

The Guidelines provide instructions on how impacts on Victoria's biodiversity are assessed under Clause 52.16, and under Clause 52.17, when an application to remove native vegetation is lodged. The Guidelines are an incorporated document in all Victorian planning schemes and have been designed to manage the risk to Victoria's biodiversity associated with the removal of native vegetation. This risk is determined via an assessment of the location category and the extent of the native vegetation to be removed.

The location category is determined by assessing the likelihood that the removal of defined areas of native vegetation may impact the persistence of a rare or threatened species. Location category has been determined for all of Victoria. Extent is determined by the amount of the native vegetation that is proposed to be removed. Together, these two elements are used to determine the assessment pathway for assessing a permit application to remove native vegetation.

The assessment pathway determines the process to be followed for the assessment of planning permit applications and dictates the types of offsets that are required to be implemented for the vegetation removal. Table 4 presents the assessment pathways for native vegetation and Scattered Trees (which are assessed by area (hectares) rather than by the number of trees).

The assessment pathway for an application to remove native vegetation reflects its potential impact on biodiversity. The three assessment pathways are:

- **Basic** – limited impacts on biodiversity.
- **Intermediate** – could impact on large trees, endangered EVCs, and sensitive wetlands and coastal areas.
- **Detailed** – could impact on large trees, endangered EVCs, sensitive wetlands and coastal areas, and could significantly impact on habitat for rare or threatened species.

The assessment pathway determines the information that accompanies an application and the decision guidelines that are considered in determining the outcome of an application.

Table 4. Determining the Assessment pathway

Extent of native vegetation	Location category		
	Location 1	Location 2	Location 3
Less than 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
Less than 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
0.5 hectares or more	Detailed	Detailed	Detailed

Source: Table 3, *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017c)

Relevance to this study

The *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017c) and associated documents, including the *Vegetation Quality Assessment Manual–Guidelines for Applying the Habitat Hectares Scoring Method* (DSE 2004) have underpinned the ecological assessment completed as part of this study. This in particular relates to the way in which native vegetation has been assessed and documented as part of this study (see Section 3 below), noting that there are limitations to the method implemented during ground-truthing in particular (refer to Section 3.2.3.1).

As noted in Section 1.3 above, Part B of this study highlights State level offsets for native vegetation removal in line with the provisions of the Guidelines (DELWP 2017c). These have been summarised in Section 4.1.6 below and have based on a “worst-case scenario” approach to future development within these areas that would see all native vegetation documented as part of this study within the 12 Growth Areas removed. The exclusion of some vegetated sites within growth areas in line with bushfire requirements would however lessen the biodiversity impacts on the Growth Area.

As detailed in the subsequent sections of this report, along with Part B of this study, such removal of native vegetation within the Growth Areas will lead to significant State level offsets. This includes both “general habitat units” and “species units” of habitat for specific species where DELWP mapped habitat associated with the native vegetation to be removed goes beyond a specific threshold.

Recommendations as they relate to the avoid and minimise principles of the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017c) are further explored in Section 5 below. This is also the case for State level offsets associated with clearing of native vegetation, based on the results of vegetation removal scenario tests completed for each Growth Area, the details of which are provided in Part B of this study.

2.2.3 Local

2.2.3.1 City of Greater Bendigo Municipal Fire Management Plan

This Municipal Fire Management Plan was first prepared in 2012 in line with Part 6 of the Emergency Management Manual of Victoria and the State Committee’s guidelines for integrated Fire Management Planning. The Municipal Fire Management Plan identifies the risk and vulnerabilities to be managed across the municipal footprint. The plan aims to reduce the likelihood and consequence of fire hazards within local communities through treatment management strategies. These were designed to increase safety whilst decreasing the risks to communities and physical, environmental, economic and social assets along with building community resilience.

2.2.3.2 North Central Catchment Management Authority Strategies and Plans

The 12 Growth Areas sit within the area management by the North Central Catchment Management Authority (CMA). The North Central CMA has responsibility for the co-ordination and management of floodplains; stormwater runoff and pollution; rural drainage (including regional drainage schemes);

water quality and nutrient management; water supply catchment protection; wetlands; restoration of degraded waterways; and Crown frontages and heritage rivers outside of national parks.

The North Central CMA have developed a Regional Catchment Strategy (RCS) for 2021–27, and Native Vegetation Plan (2005) to help achieve their management responsibilities.

Under Clause 52.16 of the planning scheme the decision guidelines include any relevant approved Regional Vegetation Plan. The North Central Vegetation Management Plan (2005) is the approved Regional Vegetation Plan for the 12 Growth Area, which sets out a coordinated and strategic approach to managing the region's native vegetation, and is to be used in conjunction with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017c).

2.2.3.3 North Central Biolinks: Principles and Approaches

The Victorian Department of Planning and Community Development, the CoGB and the Shire of Campaspe (SoC) undertook a study to identify potential locations for linear reserves or biolinks within the two municipalities. The resulting report – North Central Biolinks (CoGB and SoC 2009) – identifies regional biolinks within the Greater Bendigo/Campaspe region. These biolinks will provide important connections between State and National Parks, remnant vegetation on private land and along waterways and roadsides.

The biolink concept relates to maintenance and enhancement of habitat corridors for flora and fauna to prevent population isolation and support natural dispersal across the landscape (CoGB and SoC 2009). While the plan does not specifically apply to areas within the 12 Growth Areas, it provides for greater connectivity of species to their metapopulations outside of Maiden Gully.

2.2.3.4 City of Greater Bendigo Roadside Management Policy

Roadside vegetation contributes to biological diversity, aesthetic amenity and landscape values, provides wildlife habitat and seed sources, affects road safety, and may include sites of cultural heritage. In order to manage roadside values, the CoGB works within the context of a 'Roadside Management Policy', and associated documents: 'Strategic Directions – Rural Roadside Conservation Plan' and the 'Strategic Directions – Urban Roadside Vegetation Management Plan'. These documents operate within the context of the Road Management Plan, providing guidelines and direction as to how roadsides within the municipality will be managed.

3. PROJECT METHODOLOGY

3.1 Desktop Review

3.1.1 Ecological Values

Prior to and following ground-truthing, a range of desktop-based resources were accessed to identify the ecological values present, or likely present, within each of the proposed Growth Areas. These same information sources were also accessed during ground-truthing to further determine the ecological values within each Growth Area.

Database and mapping sources accessed and used as part of this Assessment in relation to ecological values in particular, are listed in Table 5 below.

Table 5. Databases and resources reviewed for ecological values assessment

Resource	Purpose
Database layers associated with: • property boundaries • land tenure • contours • cadastre, along with zoning and relevant overlay • waterways and roads	Determination of site boundaries, land tenure, applicable zones and overlays, and other relevant Planning Scheme clauses relevant to ecology.
Aerial photography, available via Google Earth and NearMap	To identify the presence of native vegetation and habitat and used as part of preliminary mapping prior to and during ground-truthing within each Growth Area; also considered when determining likelihoods of State and Commonwealth listed communities and species.
NatureKit, Department of Environment, Land, Water and Planning (DELWP 2018b)	Access to maps and information relating Victoria's biodiversity, native vegetation, flora and fauna data. Used to determine EVCs, modelled habitat scores, location risk and ascertain biodiversity attributes of each Growth Area.
Victorian Biodiversity Atlas (VBA) (DELWP 2020)	A web-based information system designed to manage information about flora and wildlife in Victoria. Used to compile a list of significant species records listed at a State and Federal level within and up to 5 kilometres of each Growth Area for determination of likelihoods of occurrence of such species.
Protected Matters Search Tool (PMST), managed by the Commonwealth Department of the Environment and Energy (DOEE 2019)	Used to compile a list of potentially occurring MNES listed under the EPBC Act to within 5 kilometres of the Study Area.

A review of other relevant information was also undertaken to provide an understanding of ecological values occurring or potentially occurring in each Growth Area and the wider locality. Relevant reports and information used as part of this Report are, where required, referenced throughout Part A and Part B of this study.

3.1.2 Bushfire Risk

The desktop review in relation to bushfire risk involved a pre- and post- ground-truthing analysis of existing materials pertaining to each of the 12 Growth Areas considered as part of this Assessment.

Databases, mapping sources and other resources accessed and used as part of this Assessment in relation to bushfire risk, are listed in the table below.

Table 6. Databases and resources reviewed for bushfire values assessment

Resource	Purpose
Database layers associated with: - property boundaries - land tenure - contours - cadastre, along with zoning and relevant overlay - waterways and roads	Determination of site boundaries, land tenure, applicable zones and overlays, and other relevant Planning Scheme clauses relevant to bushfire.
Aerial photography, available via Google Earth and NearMap	To identify the presence of likely vegetation types throughout each Growth Area prior to ground-truthing and during ground-truthing; identify existing built assets include roadways for access and egress.
<i>Australian Standards 3959- 2018: Construction of Buildings in Bushfire Prone Areas (AS3959-2018)</i>	Various sections accessed with particular emphasis on vegetation types and slopes, to determine distances required to meet the defensible space requirements.
Fire history layers of most recently fires	Publicly accessible data layer derived from FIRE_HISTORY data and represents the spatial extent of the last fires recorded, primarily on public land. The layer stores details of the last time an area was known to be burnt by wildfire or prescribed burning and represents a consecutive overlay of all FIRE_HISTORY layers, from older fire seasons to the most recent fire seasons. This data set is current to 2020/21 fire season.
DSE's Overall Fuel Hazard Assessment Guide (Hines et al. 2010b)	A guide that allows users to make rapid, visual assessment of fuel arrangement, and gain an understanding of how this will affect the chances of controlling a bushfire.
Victorian Fire Risk Register	Database to identify assets at risk of bushfires, to facilitate improvements in bushfire management planning through the availability of evidence-based data, and to enable risk assessment of public assets.
Clause 53.02 Bushfire Planning	This clause details the requirements for applications under the BMO and the requirements are considered the current benchmark for bushfire safety. Considering the requirements of this clause provides insight into what will be expected from an area when an application is lodged and whether or not it can be feasibly attained.

Other relevant information was also considered to provide an understanding of bushfire risk associated with each Growth Area. Relevant reports and information used as part of this Report are, where required, referenced throughout Part A and Part B of this study.

3.2 Ground-truthing

Ground-truthing with regard to both ecological values and bushfire risk aimed largely to clarify, refine and confirm data collected as a desktop exercise beforehand. Consequently, all necessary information for use in the field based on the desktop data analysis completed prior was presented on maps, and formed the basis of base layers on GPS-enabled tablets to refine desktop data and collect additional information as required.

The ground-truthing was completed as a rapid, due-diligence type exercise through a vehicular-based inspection of each of the 12 Growth Areas from publicly accessible roads (excluding sites where public access was not possible), with no private land sites accessed as part of this process.

Two teams of two consultants – two ecologists and two bushfire specialists – undertook assessments at all 12 Growth Areas across the week of 28th July 2021, with the exception of the assessment of ecological values within the Heathcote Township Growth Area, which was undertaken on 30th November 2021.

Further detail regarding the data refined and confirmed as part of determination of ecological values and bushfire risk is outlined below in Section 3.2.1 and Section 3.2.2. Relevant policy and other related material that guided data collection, both at the desktop review phase of the Assessment, and subsequently ground-truthing, are also provided below.

3.2.1 Ecological Values Assessment

3.2.1.1 Vegetation Categorisation, Classification and Quality

Vegetation was assessed for its categorisation according to the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017c), then it's EVC.

With regard to quality, note that Habitat Hectare assessments were not completed as part of the ecological values assessment. Data in relation to quality relied on DELWP modelled vegetation quality scores.

Further detail on the methods and definitions used to document native vegetation is provided below.

3.2.1.2 Vegetation Categories

Vegetation within each Growth Area was categorised in accordance with the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017c) which defines native vegetation as :

- **Native vegetation**
 - *Native Vegetation* as per the Victoria Planning Provisions (Clause 72): plants that are indigenous to Victoria, including trees shrubs, herbs and grasses.

- **Native vegetation patch**
 - A *patch* of native vegetation is either:
 - an area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native
 - any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, and/or
 - any mapped wetland included in the current wetlands layer available in the Department of Environment, Land, Water and Planning's (DELWP) Native Vegetation Information Management tool and other DELWP systems.
- **Native canopy tree**
 - A *native canopy tree* is a mature tree (i.e. that is able to flower) that is greater than 3m in height and is normally found in the upper layer of the relevant vegetation type.
 - Trees are measured by diameter at breast height (DBH) at 1.3 metres above ground level.
- **Large Tree**
 - A Large Tree is either: a live tree that is equal to or greater than the Large Tree benchmark for the species in the relevant EVC; or a standing dead tree has a DBH measurement of 40 centimetres or greater.
 - A Large Tree can be either a Large Tree within a Habitat Zone, or a Large Scattered Tree.
- **Scattered Tree:**
 - A Scattered Tree is a native canopy tree that does not form part of a patch.
 - Scattered Trees have 2 size classes, Large Trees and Small Trees, i.e. those that have a DBH that is less than the Large Tree benchmark for the species in the relevant EVC.

3.2.1.3 Ecological Vegetation Classes

Ecological Vegetation Classes (EVCs) are a method of systematic organisation of plant communities into common types that occur in similar environmental conditions throughout Victoria. Each vegetation type is identified on the basis of its floristic composition (the plant species present), vegetation structure (woodland, grassland, saltmarsh), landform (gully, foothill, plain) and environmental characteristics (soil type, climate).

Modelled EVC distribution was accessed to preliminarily map the EVCs likely to occur within each Growth Area (DELWP 2018b) as part of desktop research post fieldwork. EVCs were then identified during ground-truthing according to observable attributes within each Growth Area, including dominant and characteristic species consistent with the benchmark descriptions (DELWP 2019).

3.2.1.4 Vegetation Quality Data

As outlined above, on-site Vegetation Quality Assessment also known as Habitat Hectare Assessments, were not completed as part of this Assessment.

A Habitat Hectare assessment is used to determine the condition and significance of a defined patch of native vegetation. The methodology used in undertaking a Habitat Hectare assessment is outlined in the *Vegetation Quality Assessment Manual–Guidelines for Applying the Habitat Hectares Scoring Method (DSE 2004)*. A Habitat Hectares assessment involves making visual and quantitative assessments on various characteristics of native vegetation according to established criteria that are set against an optimum benchmark. This process begins with the identification of the EVC, with each EVC having an optimal benchmark representing its mature, natural (pre-1750) state.

In lieu of completing on-site Habitat Hectare Assessments for native vegetation within each Growth Area, DELWP modelled vegetation quality scores accessed and subsequently used to run native vegetation impact scenarios and determine offsets for each Growth Area. It is noted here that DELWP modelled vegetation quality score will most likely differ from the scores achieved from an on-site assessment of vegetation condition; depending on the site and the modelling, the modelled scores may be higher or lower than those achieved as part of an on-site assessment.

3.2.1.5 Threatened Ecological Communities

As there was potential for FFG Act and/or EPBC Act listed communities to be present within each Growth Area, patches of native vegetation identified were considered against published criteria and/or characteristics that define these threatened communities.

While there are no specific criteria which determine the presence of FFG Act communities, an informal method of comparing site characteristics and floristics with community descriptions in the document: *Characteristics of Threatened Communities – Flora and Fauna Guarantee Act 1988* (FFG SAC undated) is generally undertaken. This document summarises the characteristics of FFG Act threatened communities, to assist with field recognition. Given the nature of this study, FFG Act communities expected to occur within each Growth Area was largely based on modelled information from DELWP. This is based on modelled EVCs deemed most likely to align with certain FFG Act communities. The *Characteristics of Threatened Communities – Flora and Fauna Guarantee Act 1988* (FFG SAC undated) was however also considered when determining the FFG Act communities likely to occur.

The EPBC Act listed communities deemed likely to occur within each Growth Area were based on the list of MNES indicated as potentially occurring within a five kilometre radius in reports produced using the PMST. Under the EPBC Act, there are key diagnostic criteria and conditions thresholds as defined by Commonwealth Threatened Species Scientific Committee (TSSC) that assist in identifying EPBC listed communities. Given the high-level nature of this Assessment, consideration of the presence of

EPBC Act communities was based on aligning the EVCs identified in each Growth Area with those EVCs nominated in the listing advice of the relevant EPBC Act listed community.

3.2.1.6 Tree Census Data

Detailed information regarding individual trees across each Growth Area was not documented as part of this study.

Only trees which met the definition of a Scattered Tree were marked as such during the desktop review phase and subsequent ground-truthing and are individually shown on the ecological maps that accompany Part B of this study. It is these individual trees that are discussed for each Growth Area in relation to Scattered Trees within the information presented in Part B, which is also summarised below. The number of Scattered Trees within each Growth Area presented in this study should however be considered indicative. Also note that while information on the general size of Scattered Trees within each Growth Area is provided in text within Part B, the maps prepared, and the EnSym Scenario Tests completed assume that all Scattered Trees are Large as a “worst-case scenario”.

Note that in addition to the above, Large Trees within native vegetation patches were not individually documented during ground-truthing. While the DELWP modelled vegetation quality scores used to complete EnSym Scenario Tests is expected to account for the presence of Large Trees within patches, standard procedure when undertaking an ecological assessment is to document individual Large Trees within patches of native vegetation. This is particularly important as there are specific offset requirements under Clause 52.17 for the removal of Large Trees from within a patch. Consequently, EnSym Scenario Tests completed for each Growth Area as part of this study, and the associated offsets for Large Trees should be considered indicative only.

3.2.1.7 Classification of Exotic and Planted Vegetation

Vegetation within each Growth Area that did not meet the definition of a Native Vegetation Patch or Scattered Tree was considered either Exotic or Planted Vegetation. Areas considered Exotic Vegetation included for example mown areas dominated by exotic species. These areas did not generally contain any trees or shrubs.

Areas with non-indigenous revegetation or planted trees were considered ‘Planted Vegetation’. This included areas dominated by Australian/Victoria natives, garden beds planted with exotic and non-indigenous species for example. It also includes planted trees that were not considered indigenous to the local Bendigo area.

Note that as the focus of ground-truthing was on native vegetation triggering permit requirements under Clause 52.16, the definition of a native canopy tree within (DELWP 2017c) was taken into consideration when defining vegetation within each Growth Area. A canopy tree is defined as one normally found in the upper layer of the relevant EVC. Consequently, the DBH for trees ‘Native to Australia’, ‘Exotic’ or ‘Native to Victoria’, but not normally found within the local area, were not recorded during ground-truthing. The location of Exotic and Planted Vegetation has, therefore, not been recorded maps associated with this assessment.

3.2.2 Bushfire Risk Assessment

Ground truthing in relation to bushfire risk focussed on confirming and expanding existing information collected during the desktop review. It included the following:

- determination of vegetation types and fuel load levels based on the standards within AS3959–2018, including an analysis of general condition and structure as it relates to the vegetation across the Growth Areas
- confirmation of slopes, particularly at strategic locations where higher downhill slopes in relation to potential development areas were detected and could influence bushfire risk
- determination of what impact vegetation and slopes could have in relation to fire behaviour within and around the Growth Areas
- strategic assessments of the fuel loads at various locations within the Growth Areas completed as per DSE's Overall Fuel Hazard Assessment Guide (Hines et al. 2010a), and focussing on determining the fuel load of vegetated areas to determine tonnes per hectare of fuel based on site conditions
- a review of the access conditions within each of the Growth Areas
- consideration of mechanisms to address bushfire risk while avoiding and minimising ecological impacts.

Ground-truthing aimed to cover as much of each Growth Area as possible, but was however limited to public land and roads, with no access to private property.

The bushfire hazards within each Growth Area were also considered at the landscape and local scale to determine how a bushfire could impact each Growth Area and the adjacent areas. Clause 13.02–1S contains strategies regarding 'Bushfire hazard identification and assessment' that guided this ground-truthing. This includes the following:

- applying the best available science to identify vegetation, topographic and climatic conditions that create a bushfire hazard
- considering the best available information about bushfire hazard including the map of designated bushfire prone areas prepared under the Building Act 1993 or regulations made under that Act
- applying the Bushfire Management Overlay to areas where the extent of vegetation can create an extreme bushfire hazard
- considering and assessing the bushfire hazard on the basis of:
 - landscape conditions – meaning conditions in the landscape within 20 kilometres (and potentially up to 75 kilometres) of a site

- local conditions – meaning conditions in the area within approximately 1 kilometre of a site
 - neighbourhood conditions – meaning conditions in the area within 400 metres of a site
 - the site for proposed development
- consulting with emergency management agencies and the relevant fire authority early in the process to receive their recommendations and implement appropriate bushfire protection measures
 - ensuring that strategic planning documents, planning scheme amendments, planning permit applications and development plan approvals properly assess bushfire risk and include appropriate bushfire protection measures
 - not approving development where a landowner or proponent has not satisfactorily demonstrated that the relevant policies have been addressed, performance measures satisfied, or bushfire protection measures can be adequately implemented.

Information gathered as part of ground-truthing was subsequently compiled with modelled data provided by the *Phoenix RapidFire* bushfire modelling provided by DEWLP, assessments performed under AS3959–2018 based on observed conditions and existing information within the Victorian Fire Risk Register (VFRR) provided by council.

It should be noted that this level of assessment cannot address all the bushfire risk, and subsequent assessments will still be needed to address the bushfire risk should the CoGB wish to proceed with detailed planning within these Growth Areas. This assessment should provide guidance on the types of development which are appropriate however and allow zoning and other planning controls to prevent unsuitable developments from being suggested, which should streamline the planning for growth within these areas.

3.2.3 Ground-truthing Limitations

As noted above, ground-truthing was completed through a vehicular-based inspection of each of the 12 Growth Areas from publicly accessible roads, with no private land sites accessed as part of this process. As it largely aimed to clarify, refine and confirm data collected as a desktop exercise beforehand, the following considerations should therefore be made regarding the limitations of the assessment as it relates to the information captured during ground-truthing.

3.2.3.1 Ecological Values Assessment Limitations

The following limitations are relevant to the ecological values assessment and ground-truthing exercise completed as part of this project:

- the site assessments were vehicular-based, and aimed at confirming data gathered during site assessments from publicly accessible roads

- EVCs were based on a combination of modelled mapping of EVCs that were subsequently amended on site based on site conditions and observations from accessible roadsides within each Growth Area
- given the nature of the assessment, it may be the case that large open paddock areas that were not highly visible from adjacent accessible roads could contain native grasslands or derived grasslands that were not marked as native vegetation (detailed assessments of all private properties and public land are required for this level of information)
- no Vegetation Quality Assessments (also known as Habitat Hectare Assessments), were completed as part of ground-truthing and the data presented and used to run native vegetation impact scenarios is based on DELWP modelled vegetation quality scores
- the determination of threatened ecological communities listed under the FFG Act or EPBC Act was based on aligning EVCs observed with those EVCs known to represent these communities as identified in various governmental documents, such that a detailed analysis to determine the presence of these communities was not undertaken
- Large Trees were not recorded in patches of Native Vegetation, consequently, the offsets associated with native vegetation removal within each Growth Area, as presented in this study, are likely to be less than what would likely be realised with a detailed on-site assessment of all areas
- Scattered Trees are marked on maps as Large and this consideration as Large Trees was used to also run EnSym Scenario Tests as part of this study on a “worst-case scenario” basis; in reality the number of Scattered Trees considered large if subject to a detailed tree census is likely to be less
- Scattered Trees as presented in this study require further investigation within some of the Growth Areas as they may have been planted for aesthetic and amenity purposes and would be exempt under the provisions of Clause 52.17; this applies for example to a number of the Scattered Trees recorded throughout the Heathcote Township Growth Area.

Also note that ground-truthing was undertaken in July (winter) 2021, with only Heathcote later assessed in November 2021. Aside from Heathcote, surveys were therefore not undertaken in the optimum time for flora survey, which is spring for most species. While detailed flora surveys were not undertaken, the Growth Areas are likely to each contain an abundance of flora species, inclusive of indigenous flora species. Based on local records, flora species listed under the EPBC Act and/or FFG Act have the potential to be within each Growth Area, as highlighted below in Section 4.1.4 and in Part B of this study.

In regard to fauna, the likely presence of significant fauna species was determined primarily through habitat assessments. This is a more conservative approach likely to include species that are difficult to detect even if suitable habitat was observed in the Study Area, and if that species was known to occur regionally.

Spatial data collection in the field was carried out using a combination of a mobile mapping devices (tablets) enabled device, and aerial photography. Data and mapping should be considered approximate only.

3.2.3.2 Bushfire risk assessment Limitations

The following limitations are relevant to the bushfire risk assessment and ground-truthing exercise completed as part of this project:

- it was undertaken during winter when there is a higher moisture content which can impact the results of the fuel load assessments (higher moisture content means less surface fuels and more greenery)
- the assessments were performed over a limited period which was enough time to gather the information required but limited the time available to assess the Growth Areas in great detail
- some of the Growth Areas had a limited amount of access and/or were only viewable from roads and freeways where the potential to stop within certain areas was limited
- due to limited access, fuel load assessments were performed on public land meaning that larger vegetation patches on private land could not be assessed (such assessments are best performed within larger vegetation patches away from managed areas).

The bushfire risk assessment limitations that applied most to specific Growth Areas have been detailed in Part B of this study along with details of how the assessment was completed in a manner that aimed to compensate for these limitations.

3.3 Post Ground-Truthing Analysis

Following on from ground-truthing, scoring systems and risk assessments were completed in relation to ecology and bushfire risk respectively to inform reporting and mapping as presented in Part A and Part B of this study. Further detail is provided below.

3.3.1 Ecological Scoring System

Following on from fieldwork, an *Ecological Scoring System* as devised by the City of Greater Bendigo for the proposed Growth Area was applied to each Growth Area. This System aimed to provide an overall qualification of ecological values present within each Growth Area to allow for the subsequent development of suitable recommendations for the Managed Growth (Settlement) Strategy.

The Biodiversity Desktop Scoring System is based on consideration of a number of ecological values through both desktop research, and in this case, the ground-truthing exercise that was undertaken. The following ecological values (e.g. EVCs, Threatened Species, Strategic Biodiversity Value) were considered as part of the Desktop Scoring System:

- **Dominant EVC:** Based on the dominant EVC is within the proposed Growth Area, with the EVC of the highest conservation significance becoming the default score for the Growth Area

- **Threatened Species:** Based on the likely presence of threatened flora and fauna within a 5km radius of the area using sightings since 1990 or from the VBA
- **Strategic Biodiversity Value:** based on the using the Strategic Biodiversity Values map from NatureKit to give an average score for the Growth Area
- **Scattered Paddock Large trees:** Based on aerial photography to determine if areas of seemingly cleared paddocks contain scattered large trees
- **Native Vegetation cover %:** Based on the % of native vegetation cover within the Growth Area
- **Neighbourhood native vegetation cover:** Based on determining the % of native vegetation cover within the 5km radius surrounding the Growth Area
- **Site Biolink Present:** Based on use of aerial photography identify if there is an intact or partially intact vegetated biolink present within the designated area that is linking two or more larger patches of vegetation (e.g. creek, gully, road reserve)
- **Broad Landscape Biolink:** Based on using aerial photography to identify if the designated area forms part of a broader landscape biolink
- **Distance to Vegetated Crown Land:** using aerial photography calculate the distance to protected vegetated Crown land
- **Location Map:** Based on determining if DEWLP Category 3 mapping is present within the Growth Area, as a trigger that threatened species have been observed
- **Native Vegetation Condition Score:** Based on the average the condition score within the Growth Area
- **Existing natural Waterway:** Based on using mapping to determine if any kind of natural waterway is present within the Growth Area, either fully, partially or non-vegetated

Table 7 below details the scores allocated to the varying ecological values highlighted above based on the quality of vegetation/habitat within each Growth Area.

Table 7. City of Greater Bendigo Ecological Scoring System, NV = Native Vegetation

	Applicable Score
Dominant EVC significance	
Endangered	10
Vulnerable	7
Depleted	4
Least Concern	1
Threatened species (sighting since 1990) (5km radius)	
> 3	8
3 – 1	5
none	0
Strategic biodiversity value	
100 – 80	10
79 – 60	7
59 – 40	4
40 – 0	1
Scattered paddock large tree present	
Yes	5
No	0
NV cover % within boundary	
100 – 70	10
70 – 40	7
40 – 20	4
20 – 0	1
Neighbourhood NV 5km radius %	
80%	10
60%	7
40%	4
20%	1
Site Biolink present	
> 1 present	8
1 present	5
None	0
Part of broad landscape Biolink	
Yes	5
No	0
Distance to NV crown land	
Contagious	7
<1km	4
1 – 5km	1
Overlays (ESO, VPO)	
Yes	3
No	0
Location map (Naturekit)	
Location 3 present	5
Location 3 not present	0
NV condition score (NVIM)	
0.81 – 1.00	10
0.61 – 0.80	7
0.41 – 0.60	4
0.21 – 0.40	1
Existing natural waterway	
Yes	5
No	0

This scoring system was applied to each Growth Area with results presented within Part B of this study and summarised below in Section 4.1.5. The total score applicable to each Growth Area was used to rank each according to their ecological value such that:

- Sites with an overall Ecological Score of less than 46 are deemed to have lower-level ecological values present, and therefore lower ecological risk as it relates to future development based on this scoring system
- Site with an overall Ecological Score of between 46 and 69 are deemed to have medium level ecological values present, and therefore medium ecological risk as it relates to future development based on this scoring system
- Site with an overall Ecological Score of greater than 69 are deemed to have higher level ecological values present, and therefore lower ecological risk as it relates to future development based on this scoring system.

Note however that the results of this ecological scoring system and these associated ranking should not be considered alone with regard to determining ecological risk associated with future development in the proposed Growth Areas. It should therefore only be used as a guide to ecological risk, and other factors including offsets and matters related to State and Federally-listed species and communities need to be considered in due course and factored into the decision-making processes.

3.3.2 Bushfire Risk Determination

Hazards were identified through the International Standards Organisation's (ISO) 31000 – Risk management – Guidelines (2018) in order to provide the best possible risk identification and response (see Figure 1). Hazards were identified based on the bushfire and ecological aspects discussed previously against the assets and features present in various areas of each Growth Area.

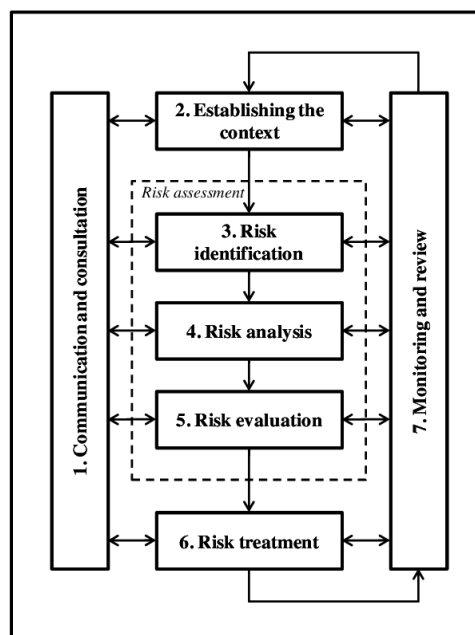


Figure 1. Risk management process as per ISO 31000:2018

The Growth Areas were divided into sub-sections or areas based on the observed risk weighed against the ecological constraints determined alongside this assessment. These smaller areas were determined through observed changes in the land usage and the likely bushfire conditions which would be present.

It should also be noted that the areas selected were assessed based on risk and hazard in order to provide a more detailed picture of the conditions. An area's risk is how threatened it is from a bushfire (the chances of a bushfire igniting there and the potential impacts of the area burning) while the hazard is the danger posed to adjacent areas from the area itself (what are the chances of this area igniting and how will it impact the surroundings).

The risk and hazard categories; Low, Medium and High were determined through the following criteria which, ideally, can be applied to other areas in future to determine the appropriate development and usages. The criteria for each category are detailed below:

3.3.2.1 Low Risk/Hazard

This category is applied to areas where there can be minimal restrictions on the types of development proposed within it. Areas in this category can consider risk and hazard simultaneously since the chances of them igniting and sustaining a bushfire which cannot be addressed before it threatens adjacent areas is low. These should not require any planning or additional management which cannot be addressed through subsequent planning applications.

The criteria for an area to be considered Low Risk are as follows:

1. At least three of the following statements regarding bushfire risk can be considered accurate:
 - the area cannot be directly subjected to the determined primary bushfire threat or threats to the overall Growth Area
 - the area has been urbanized with high-density residential development and associated infrastructure, and/or commercial development
 - the area is managed for purposes other than conservation and is either predominately free of vegetation or is actively managed (farmland, industrial areas, larger residential properties, etc.)
 - less than 20% of this area contains classified vegetation other than Grassland as per AS3959-2018
 - the area has good access and/or the high potential for access; the potential for access is determined through the area's ability to accommodate a full road network with multiple entry points and clear egress to more developed areas
 - the area is not within the Bushfire Management Overlay and is not likely to be placed within the Bushfire Management Overlay based on this assessment.

Particular combinations of the above statements being considered to not apply to a Growth Area can potentially result in a Medium Risk/Hazard rating. We therefore recommend considering the Medium Risk/Hazard criteria as the default, before considering the area High or Low Risk.

2. The area does not contain any ecological values of high quality or significance, as determined by a qualified Ecologist or similar environmental professional.

Areas can potentially contain the ecological values listed above if all six of the conditions in Criteria 1 are accurate. This will need to be determined by a BPAD Accredited Practitioner and qualified environmental professional as to whether the risk is low enough and/or if the ecological values within the site will not increase the risk in future.

3. The area is not adjacent to another area which has a Medium or High hazard rating or is considered large enough to mitigate the hazard generated from the adjacent (to be determined by a suitably qualified and experienced bushfire expert). Areas which do not meet this criteria should be considered Medium or High Risk but should not be considered anything above Low Hazard since the hazard is not coming from this area.

Note that unlike the Medium and High Risk/Hazard ratings there are not additional criteria based on the hazard, as it is assumed that Low Risk areas (i.e. areas with little fuel load inside) will therefore, by default, not cause a hazard to other areas.

3.3.2.2 Medium Risk/Hazard

Medium Risk areas have a clearly defined risk which can be addressed. These areas will receive the most recommendations in regard to proposed usage and measures which should be incorporated into subsequent planning applications as they will be expected to act as a buffer between the Low Risk and High Hazard areas (the full extent of this buffer will need to be defined on a case-by-case basis).

It should be noted that a Medium Risk/Hazard rating cannot always be brought down to Low Risk/Hazard as it may not be possible to remove the feature which creates this rating (placement within surrounding vegetation, high value habitat present, limited access, etc.). Note that some areas which have been classified as High Risk/Hazard could be reduced to Medium due if the risk/hazard can be managed in perpetuity.

The criteria for an area to be considered Medium Risk are as follows:

1. ANY of the following statements regarding bushfire risk can be considered accurate:
 - The area can be directly subjected to a full bushfire front from classified vegetation other than Grassland as per AS3959-2018.
 - There is sufficient vegetation within the area that a bushfire could develop based on a localized ignition.
 - The area is adjacent to densely vegetated areas on more than one aspect.
 - The area has a High to Very High-Risk Rating within the VFRR.

AND, at least one of the statements below can be considered accurate:

- The area is predominately vacant due to the presence of public land, farmland or largely unoccupied residential or rural areas.

- The majority of the area is managed and/or the vegetation present is present within residential areas.
 - The area has good access and/or the high potential for access. The potential for access is determined through the area's ability to accommodate a full road network with multiple entry points and clear egress to more developed areas.
 - The area is separated from adjacent areas which carry a Medium or High Hazard rating either by managed vegetation or by a Low Hazard area
2. The area contains any ecological values of high quality or significance, as determined by a qualified Ecologist or similar environmental professional.

The criteria for an area to be considered a Medium Hazard are as follows:

1. A bushfire has the potential to move into the area through this area under prevailing conditions (determined through the landscape scale assessments).
2. The area contains sufficient vegetation to sustain a large fire from a localised ignition.
3. There is access present through vegetated areas which can be utilised by emergency services.

3.3.2.3 High Risk/Hazard

High Risk/Hazard areas are designed to identify areas where the risk is considered extreme or there are factors which prevent it from being addressed. Our primary goal with these areas is to reduce them to Medium Risk as opposed to Low Risk as the amount of management and works required to achieve this is not considered feasible and the reasons an area was considered High Risk need to be remembered and addressed in perpetuity.

Some areas cannot be reduced from High Risk/Hazard however due to their status as public land managed for conservation which works from this perspective since these areas will not be developed. Reducing the hazard posed will therefore be the primary goal although, as mentioned previously, we want to keep some areas at Medium Risk to ensure the risk is continually addressed by planners and developers in perpetuity.

The criteria for an area to be considered High Risk are as follows:

1. MORE THAN ONE of the following statements regarding bushfire risk can be considered accurate:
 - the area can be directly subjected to a full bushfire front from classified vegetation other than Grassland as per AS3959-2018
 - there is sufficient vegetation within the area that a bushfire could develop based on a localised ignition
 - the area is adjacent to densely vegetated areas on more than one aspect
 - the area has a Very-High to Extreme-Risk Rating within the VFRR.

AND, none of the statements below can be considered accurate:

- the area is predominately vacant due to the presence of public land or largely unoccupied residential or rural areas
 - the majority of the area is managed and/or the vegetation present is present within residential areas
 - the area has good access and/or the high potential for access. The potential for access is determined through the area's ability to accommodate a full road network with multiple entry points and clear egress to more developed areas
 - the area is separated from adjacent areas which carry a Medium or High Hazard rating either by managed vegetation or by a Low Hazard area.
2. The area contains any ecological values of high quality or significance, as determined by a qualified Ecologist or similar environmental professional.

The criteria for an area to be considered a High Hazard are as follows:

1. The area can be considered Medium to High Risk.
2. A bushfire has the potential to move into the area through this area under prevailing conditions (determined through the landscape scale assessments).
3. The area contains sufficient vegetation to sustain a large fire from a localised ignition.
4. Access in and around this area is limited (predominately dirt trails and/or minimal boundary tracks separating vegetation from developed areas).

4. SUMMARY OF RESULTS

4.1 Ecological values

4.1.1 Native Vegetation: Types and Classification

All of the Growth Areas assessed as part of this study contain at least some native vegetation, as identified through the desktop review and/or ground-truthing. This includes both native vegetation defined as a patch within the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017a), as well as Scattered Trees.

Note that Large Trees within native vegetation patches are likely to be also present, however for the purposes of this study were not individually recorded. It is assumed however that the DELWP modelled scores used to determine vegetation quality of the patches identified would incorporate the assumption of at least some Large Tree presence.

Table 8 below summarises:

- the size of each Growth Area
- the bioregions that occur within each Growth Area
- the EVCs that were recorded in each based on the cover of native vegetation patches
- the conservation status of the EVC within the applicable bioregion
- the number of Scattered Trees that were documented within each Growth Area.

Further detail on each of these values is presented within Part B of this study for each Growth Area.

Table 8. Summary of native vegetation documented within each proposed Growth Area

Bioregion	EVC (number: name)	BCS *	Growth Area																																								
			Huntly East (593 hectares)			Allies Road, Myers Flat (672 hectares)			Calder Highway, Kangaroo Flat (59 hectares)			Heathcote Township (1079 hectares)			McIvor Highway, Junortoun (298 hectares)			Lockwood Road, Kangaroo Flat (78 hectares)			Sparrowhawk Road, Maiden Gully (45 hectares)			Olympic Parade, Maiden Gully (957 hectares)			Ravenswood Run (2486 hectares)			Simpsons Road, Eaglehawk (238 hectares)			Strathfieldsaye South East (644 hectares)			Watsons Street, White Hills (207 hectare)							
			Area EVC (ha)	% GA^ Patch	#ST	Area EVC (ha)	% GA^ Patch	#ST	Area EVC (ha)	% GA^ Patch	#ST	Area EVC (ha)	% GA^ Patch	#ST	Area EVC (ha)	% GA^ Patch	#ST	Area EVC (ha)	% GA^ Patch	#ST	Area EVC (ha)	% GA Patch ^	#ST	Area EVC (ha)	% GA^ Patch	#ST	Area EVC (ha)	% GA^ Patch	#ST	Area EVC (ha)	% GA^ Patch	#ST	Area EVC (ha)	% GA^ Patch	#ST								
Goldfields	20: Heathy Dry Forest	LC	-	-	-	-	-	-	-	-	-	1.89	<1	-	2.03	1	-	-	-	-	-	-	-	-	-	-	18.09	2	-	0.10	<1	-	-	-	-	-	-	-	-	-	-		
	22: Grassy Dry Forest	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	136.4	5	7	-	-	-	-	-	-	-	-	-	-	-			
	47: Valley Grassy Forest	V	-	-	-	-	-	-	-	-	-	3.48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	48: Heathy Woodland	D	-	-	-	-	-	-	-	-	-	1.35	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	55: Plains Grassy Woodland	E	-	-	-	-	-	-	-	-	-	9.00	<1	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	56: Floodplain Riparian Woodland	E	-	-	-	-	-	-	-	-	-	67.69	6.27	122	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	61: Box Ironbark Forest	D	40.50	7	34	60.90	9	79	21.55	37	59	99.11	9.19	138	53.51	18	117	43.07	55	35	38.8	86	42	763.7	80	93	-	-	-	127.68	54	103	6.55	1	-	4.33	2	8					
	67: Alluvial Terraces Herb-rich Woodland	E	-	-	-	-	-	-	-	-	-	-	-	-	26.4	9	222	-	-	-	-	-	-	-	-	-	-	-	-	-	12.08	5	6	-	-	-	-	-	-	-	-	-	
	68: Creekline Grassy Woodland	E	4.19	1	9	18.25	3	-	4.37	7	16	14.97	1.39	19	9.64	3	29	3.5	4	6	-	-	-	54.82	6	37	12.79	1	6	-	-	-	13.59	2	4	-	-	-	-	-	-	-	
	70: Hillcrest Herb-rich Woodland	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31.50	1	-	-	-	-	-	-	-	-	-	-	-	-	-		
	72: Granitic Hills Woodland	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	314.10	13	157	-	-	-	-	-	-	-	-	-	-	-	-	-	
	175: Grassy Woodland	V	48.70	8	270	201.05	30	138	-	-	-	-	-	-	17.36	6	22	-	-	-	-	-	-	-	-	-	646.68	26	471	3.51	1	2	-	-	-	-	-	-	-	-	-	-	-
	175_62: Granitic Grassy Woodland	V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	151.22	73	88					
	175_65: Grassy Woodland, Sedge-rich Woodland	V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	109.43	17	307	-	-	-	-	-	-	
	803: Plains Woodland	E	1.07	0.2	2	16.83	3	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Victorian Riverina	68: Creekline Grassy Woodland	E	15.59	3	21	2.08	<1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	175: Grassy Woodland	E	7.10	1	27	0.95	<1	62	-	-	-	165.77	15.36	468	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	803: Plains Woodland	E	11.44	2	56	18.78	3	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.61	3	64	-	-	-	-	-	-	-		
TOTAL:			128.56	22	419	312.85	47	349	25.92	44	75	363.26	34	758	108.94	37	279	46.57	60	41	38.8	86	42	836.61	87	130	1141.57	46	641	143.27	60	111	146.18	23	375	155.55	75	96					
* BCS: Bioregional Conservation Status																																											
D: Depleted. E: Endangered. V: Vulnerable. LC: Least Concern																																											
^ % of total Growth Area occupied by Native Vegetation Patches																																											

Table 9 below reiterates information within Table 8, with regard to the total area of each Growth Area occupied by native vegetation patches as documented by this study. This is also presented as a percentage of the whole Growth Area occupied by such patches. The total number of Scattered Trees within each Growth Area is also again presented.

Table 9. Summary of percentage cover native vegetation patches and scattered trees

Growth Area:	Total area of proposed Growth Area (ha)	Total Area of Native Vegetation Patches (ha)	% Growth Area occupied by Native Vegetation Patches	Number of Scattered Trees Documented
Huntly East	593	128.56	22%	419
Allies Road, Myers Flat	672	312.85	47%	349
Calder Highway, Kangaroo Flat	59	25.92	44%	75
Heathcote Township	1079	363.26	34%	758
Mclvor Highway, Junortoun	298	108.94	37%	279
Lockwood Road, Kangaroo Flat	78	46.57	60%	41
Sparrowhawk Road, Maiden Gully	45	38.80	86%	42
Olympic Parade, Maiden Gully	957	836.61	87%	130
Ravenswood Run	2486	1141.57	46%	641
Simpsons Road, Eaglehawk	238	143.27	60%	111
Strathfieldsaye South East	644	146.18	23%	375
Watsons Street, White Hills	207	155.55	75%	96

Figure 2 below visually presents the information presented within Table 9 to illustrate the proportion of each Growth Area occupied by patches of native vegetation as identified by this study. As shown, the Sparrowhawk Road, Olympic Parade and Watsons Street Growth Areas have 75% or greater of their total area occupied by native vegetation patches, and outside of these patches, a number of Scattered Trees also occur. Lockwood Road and Simpsons Road also have over half of their area occupied by native vegetation patches and a number of Scattered Trees. While the remaining Growth Areas have less than 50% of their total area occupied by patches of native vegetation, there are number of Scattered Trees in the remaining areas.

Given the limitations with access as part of this study, note that an absence of marked native vegetation within the maps accompanying this study does not mean that it does not occur. A detailed analysis of the areas surrounding Scattered Trees and through open grassed areas will still be required in due course as part of ongoing planning associated with these Growth Areas to identify if native vegetation and associated habitat, particularly for rare or threatened flora and fauna, is present within these areas.

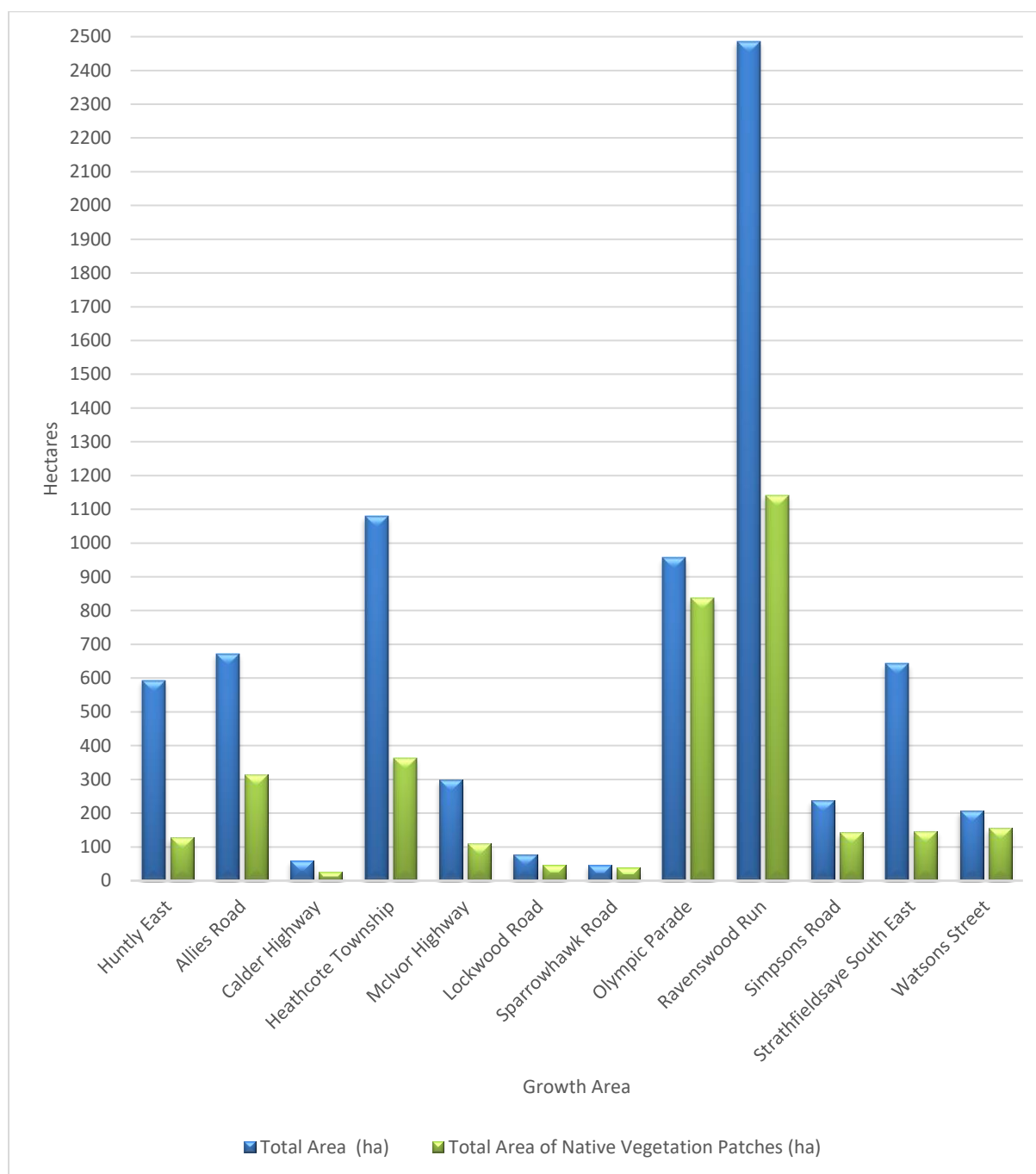


Figure 2. Proportion of proposed Growth Areas occupied by mapped Native Vegetation Patches

4.1.2 Native Vegetation: Quality

As outlined above, on-site Vegetation Quality Assessment also known as Habitat Hectare Assessments, were not completed as part of this study. Instead DELWP modelled vegetation quality scores were accessed and subsequently used to run native vegetation impact scenarios and determine offsets for each Growth Area.

Provided below in Table 10 is the average condition score across all EVCs identified within each Growth Area. This information is based on modelled data regarding vegetation scores from DELWP, with this average score also used part of the Ecological Scoring System applied to each Growth Area.

It is apparent that the average condition scores for Growth Areas that are continuous to, or contain, a higher proportion of native vegetation, are modelled as having a higher score. This applies, for example, to the Lockwood Road, Sparrowhawk Road and Olympic Parade Growth Areas.

It is noted here that detailed site assessments are likely to yield different results from what has been modelled by DELWP, such that in reality the Vegetation Quality Assessment data for individual native vegetation patches across each Growth Area is likely to be lower or higher than what is in the table. The data presented is therefore indicative only to highlight the likely quality of native vegetation patches within each Growth Area.

Table 10. Average modelled native vegetation condition score for each Growth Area

Growth Area:	Total area of proposed Growth Area (ha)	Total Area of Native Vegetation Patches (ha)	Average Condition Score* of Native Vegetation Patches based on DELWP modelling
Huntly East	593	128.56	0.41 – 0.60
Allies Road, Myers Flat	672	312.85	0.41 – 0.60
Calder Highway, Kangaroo Flat	59	25.92	0.41 – 0.60
Heathcote Township	1079	363.26	0.21 – 0.40
McIvor Highway, Junortoun	298	108.94	0.41 – 0.60
Lockwood Road, Kangaroo Flat	78	46.57	0.61 – 0.80
Sparrowhawk Road, Maiden Gully	45	38.80	0.61 – 0.80
Olympic Parade, Maiden Gully	957	836.61	0.61 – 0.80
Ravenswood Run	2486	1141.57	0.41 – 0.60
Simpsons Road, Eaglehawk	238	143.27	0.61 – 0.80
Strathfieldsaye South East	644	146.18	0.41 – 0.60
Watsons Street, White Hills	207	155.55	0.41 – 0.60
* Maximum Vegetation Quality Score Achievable is 1.00			

4.1.3 Significant ecological communities likely to occur within Growth Areas

Provided below in Table 11 are the FFG Act and EPBC Act communities expected to occur within each Growth Area.

As shown, three FFG Act and four EPBC Act communities have the potential to occur within the proposed Growth Areas. Further information on these communities is provided below.

Table 11. FFG Act and EPBC Act communities expected to occur in Growth Areas

Significant Ecological Community with likely presence	FFG Act communities			EPBC Act communities			
	Creekline Grassy Woodland (Goldfields)	Northern Plains Grassland	Grey Box – Buloke Grassy Woodland	Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	White Box–Yellow Box–Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Buloke Woodlands of the Riverina and Murray–Darling Depression Bioregions	Natural Grasslands of the Murray Valley Plains
Huntly East	✓	✓	–	✓	✓	–	–
Allies Road, Myers Flat	✓	✓	–	✓	✓	?Unlikely	Unlikely
Calder Highway, Kangaroo Flat	✓	–	–	✓	✓	–	–
Heathcote Township	✓	–	✓	✓	✓	–	–
McIvor Highway, Junortoun	✓	–	–	✓	✓	✓	–
Lockwood Road, Kangaroo Flat	✓	–	–	✓	✓	Unlikely	–
Sparrowhawk Road, Maiden Gully	–	–	–	✓	✓	–	–
Olympic Parade, Maiden Gully	✓	–	–	✓	✓	–	–
Ravenswood Run	✓	–	–	✓	✓	Unlikely	–
Simpsons Road, Eaglehawk	✓	–	–	✓	✓	–	–
Strathfieldsaye South East	✓	–	–	✓	✓	✓	–
Watsons Street, White Hills	–	–	–	✓	✓	–	–

As noted in 3.2.1.5, the FFG Act communities expected to occur within each Growth Area were largely based on modelled information from DELWP, with further consideration on published information about each community published by DELWP. Other FFG Act listed communities may occur beyond what is nominated in the Table below. This includes for example the *Grey Box –Buloke Grassy Woodland* and the *Victorian Temperate–Woodland Bird Communities* which have the potential to occur within the Growth Areas beyond those shown in Table 11 but are not mapped by DELWP in conjunction with a specific EVC. Detailed on-ground assessments are required to determine the actual presence of such communities within each Growth Area.

This is also the case for EPBC Act communities. For these, their likely presence as part of this study was based on aligning the EVCs identified in each Growth Area with those EVCs nominated in the listing advice of the relevant EPBC Act listed community. Again, on-ground assessments are required to determine the actual presence of such communities within each Growth Area.

4.1.3.1 FFG Act listed communities

Two listed FFG Act communities are modelled across the Growth Areas: Creekline Grassy Woodland (Goldfields) and Northern Plains Grassland.

Creekline Grassy Woodland (Goldfields)

The Creekline Grassy Woodland (Goldfields) Community occurs as small remnants within the box-ironbark ecosystems of Victoria.

Two sub-communities have been identified. Both have River Red Gum (*Eucalyptus camaldulensis*) forming open overstorey canopy, often with larger old trees. Groundcover is a dense layer of grasses and sedges including Weeping Grass *Microlaena stipoides* var. *stipoides*, Tall Sedge *Carex appressa*, rushes *Juncus* spp., Wirilda *Acacia retinodes*, Black Wattle *Acacia mearnsii*, and Rough-barked Honey myrtle *Melaleuca parvistaminea*. Yellow Box *Eucalyptus melliodora* and Grey Box *Eucalyptus microcarpa* occur in one of the sub-communities, whereas the other has a characteristic understorey dominated by Common Tussock-grass *Poa labillardierei* var. *labillardierei* and Kangaroo Grass *Themeda triandra*.

The community occurs as a woodland interface between the undulating sedimentary rises and the geologically younger alluvial plains. It fringes shallow or ephemeral drainage lines on the lower slopes of box-ironbark forests but is distinct from the riparian vegetation found along permanently flowing streams on the alluvial plains.

Across the Growth Areas, this community is most likely to align within patches of EVC 68: Creekline Grassy Woodland.

Northern Plains Grassland

The Northern Plains Grassland Community is restricted to the naturally treeless plains of northern Victoria, and dominated by largely perennial tussocky grasses and an occasional, sparse occurrence of trees or large shrubs. The community is a tussock grassland dominated by native grass species, together with a variety of shrubs and herbs. The families Asteraceae and Chenopodiaceae are characteristic, and the community is readily distinguished from other grasslands and grassy woodlands in Victoria by the absence of Kangaroo Grass *Themeda triandra*.

The Northern Plains Grassland Community extends from Echuca in the east to the Patho Plains near the Loddon River in the west. Its soil type and rainfall are probably the two main influences on its floristic composition, although this has been much modified by land-use practices. Soils are heavy and vary from calcareous clay loams to cracking clays that may be inundated for short periods. The

higher rainfall regions to the east tend to have greater representation of native perennial grasses while the drier areas to the west tend to be richer in chenopods.

This FFG Act community is mapped by DELWP as potentially occurring within a number of the proposed Growth Areas including Huntly East and Allies Road, Myers Flat, which occur to the north-east and north-west of Bendigo respectively. This community is likely to be represented by the patches of EVC 803: Plains Woodland that occur within these Growth Areas.

Grey Box – Buloke Grassy Woodland

The Grey Box – Buloke Grassy Woodland Community is a mainly grassy woodland found on flat or very gently undulating plains in northern Victoria and a few places in central Victoria. It tends to develop in the absence of fire on sites with relatively fertile, fine-grained soils. Grey Box is usually the structurally dominant tree over a lower stratum of Buloke *Allocasuarina luehmannii*. Where fire is absent over a very long period, buloke may become the dominant species.

This FFG Act community is mapped by DELWP as potentially occurring within the Heathcote Township Growth Area. This community is likely to be represented by the patches of EVC 48: Heathy Woodland and EVC 55: Plains Grassy Woodland present within this Growth Area.

4.1.3.2 EPBC Act listed communities

The Protected Matter Reports completed for each Growth Area identified four EPBC Act listed communities overall. These EPBC Act listed communities are listed in Table 12 along with a brief description of each community.

Note that for native vegetation to qualify as the EPBC Act listed community, it must meet certain key diagnostic criteria and condition thresholds. Detailed on-ground assessments are therefore required to determine the actual presence of such communities within each Growth Area and the information on the presence of these communities as part of this study should be considered indicative only.

Table 12. EPBC Act listed community likely to occur on site

Listed communities	Description
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	<i>Grey Box</i> (<i>Eucalyptus microcarpa</i>) <i>Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia</i> mostly occurs from central NSW, through northern/central Victoria into eastern South Australia. The ecological community occurs in two forms, a grassy woodland form and as a derived native grassland. This is the most common form of the ecological community that comprises a tree layer and a native understorey with a varying proportion of shrubs, grasses and herbs. This grassy woodland form has a tree canopy that is dominated or co-dominated by Grey Box <i>Eucalyptus microcarpa</i>. Patches of derived native grassland* can occur where the tree canopy and mid layer has been almost entirely removed but the native ground layer remains largely intact. Across the Growth Areas this community could occur with patches of EVC 61: Box Ironbark Forest, EVC 68: Creekline Grassy Woodland, EVC 175 – Grassy Woodland and EVC 803 – Plains Woodland present on site.

Listed communities	Description
White Box–Yellow Box–Blakely's Red Gum Grassy Woodland and Derived Native Grassland	White Box–Yellow Box–Blakely's Red Gum Grassy Woodland and Derived Native Grassland can be a component of the following EVCs within the Highlands – Northern Fall, Highlands – Southern Fall, Northern Inland Slopes, Riverina and Goldfields Bioregions: EVC 47: Valley Grassy Forest, EVC 55: Plains Grassy Woodland and EVC 175: Grassy Woodland. Across the Growth Areas there is potential that a number of EVCs where Yellow Box occurs could represent this EPBC Act community.
Buloke Woodlands of the Riverina and Murray–Darling Depression Bioregions	Buloke Woodlands are characterised by the Buloke tree, which is a leafless casuarina or sheoak tree that grows to about 15m and has twisted branchlets and cones. Buloke woodlands support many types of plants. The understorey of Buloke woodlands is generally grassy with native grasses such as wallaby grasses as well as many herbs. In other areas the understorey is made up of smaller shrubs and herbs. In Victoria, Buloke Woodlands occur throughout the Riverina bioregion, except for immediately adjacent to major rivers, including the Murray River intrusion of Riverina into the adjoining Murray–Darling Depression bioregion. There is some potential this this EPBC Act community could occur within the proposed Growth Areas, such as the McIvor Highway Growth Area. This is given that EVC 67 – Alluvial Terraces Herb-rich Woodland can contain Buloke.
Natural Grasslands of the Murray Valley Plains	The Natural Grasslands of the Murray Valley Plains ecological community occurs on the plains of western and northern Victoria, extending into southern New South Wales. The grasslands are naturally treeless or almost so, with sparse tree cover. Most occurrences of the Natural Grasslands of the Murray Valley Plains ecological community are associated with Quaternary alluvial sediments, consisting of calcareous clay loams and clays on wetter sites, including self-mulching (cracking) clays. The ecological community is mainly restricted to the heavy-textured grey, brown and red clays (DSEWPC 2012a). The ecological community ranges from open to closed tussock grassland but may also be dominated or co-dominated by a range of forb species, depending on seasonal conditions and management history. At other sites, the grassland may grade into an open grassy shrubland where low chenopod shrubs become co-dominant with the grass component. Trees and large shrubs are generally absent to sparse. While this EPBC Act PMST states that this community may occur within the Aliies Road, Myers Flat Growth Area, this is not likely to be the case based on the types of EVCs present on site.

4.1.4 Significant flora and fauna species likely to occur within Growth Areas

Rare or threatened species expected to occur within the Growth Areas are listed under the FFG Act and/or the EPBC Act.

Ausfeld's Wattle *Acacia ausfeldii* was observed on roadsides during ground-truthing completed as part of this study within the Huntly East and Olympic Parade, Maiden Gully Growth Areas. This species is listed as Endangered under the FFG Act and is likely to occur within the other Growth Areas being considered as part of this study also.

Beyond this listed flora species, there are a number of other species of rare or threatened flora and fauna listed under the FFG Act and/or EPBC Act that are likely to occur within the Study Area. A full overview of the species documented on the VBA for a 5m radius around each Growth Area, or predicted to occur based on the EPCB Act PMST, are presented in Part B of this study. This includes a detailed analysis of the likelihood of occurrence for each of these species in relation to each Growth Area.

Overall, each Growth Area is likely to support at least some of the FFG Act and EPBC Act listed species documented on the databases accessed as part of this study. Key flora and fauna species that are deemed to have a moderate or higher likelihood of occurring across all of the Growth Areas are presented in Table 13 below, noting that other FFG Act and EPBC Act listed species are also likely to occur within each Growth Area as highlighted in Part B.

For these species in particular, further exploration will be required to further determine their actual presence within each Growth Area. The results presented below should be considered a sub-set of those in Part B and this additional document should be read in conjunction with the below. Note that the species listed below along with those fully presented in Part B as having a moderate or higher likelihood of occurrence should be considered preliminary only – further investigation is required to fully determine the potential presence of these species.

Information regarding permit and or referral requirements under the FFG Act and EPBC Act in relation to listed species is discussed in Section 2 above and further explored in Section 5 below.

Table 13. FFG Act and EPBC Act listed species with moderate or higher likelihood of occurrence

Status*			Scientific name	Common name
Treaty	EPBC Act	FFG Act		
Flora				
		En	<i>Acacia ausfeldii</i>	Ausfeld's Wattle
		Vu	<i>Acacia williamsonii</i>	Whirrakee Wattle
		Cr	<i>Allocasuarina luehmannii</i>	Buloke
		En	<i>Austrostipa breviglumis</i>	Cane Spear-grass
		En	<i>Cassinia diminuta</i>	Dwarf Cassinia
		Cr	<i>Crowea exalata subsp. revoluta</i>	Whipstick Crowea
		Cr	<i>Dianella tarda</i>	Late-flower Flax-lily
	VU	Vu	<i>Glycine latrobeana</i>	Clover Glycine
		En	<i>Goodia medicaginea</i>	Western Golden-tip
		En	<i>Grevillea dryophylla</i>	Goldfields Grevillea
		En	<i>Olearia tubuliflora</i>	Rayless Daisy-bush
		En	<i>Phebalium festivum</i>	Dainty Phebalium
		Cr	<i>Pterostylis maxima</i>	Large Rustyhood
Fauna				
	VU	En	<i>Aprasia parapulchella</i>	Pink-tailed Worm-Lizard
C J		Vu	<i>Ardea alba modesta</i>	Eastern Great Egret
		Vu	<i>Aythya australis</i>	Hardhead
	VU	En	<i>Delma impar</i>	Striped Legless Lizard
		Cr	<i>Falco subniger</i>	Black Falcon
B R J C			<i>Gallinago hardwickii</i>	Latham's Snipe
		Vu	<i>Hieraaetus morphnoides</i>	Little Eagle
C R J	VU	Vu	<i>Hirundapus caudacutus</i>	White-throated Needletail
	CR	Cr	<i>Lathamus discolor</i>	Swift Parrot
	VU	Vu	<i>Litoria raniformis</i>	Growling Grass Frog
		Vu	<i>Lophoictinia isura</i>	Square-tailed Kite
		En	<i>Oreoica gutturalis</i>	Crested Bellbird
		Vu	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale
		En	<i>Pseudophryne bibronii</i>	Brown Toadlet
	VU	Vu	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox
	CR	Vu	<i>Synemon plana</i>	Golden Sun Moth
		En	<i>Varanus varius</i>	Lace Monitor

* Listing Status Key:

International Treaty B: Bonn Convention; C: CAMBA; J: JAMBA; R: ROKAMBA.

EPBC Act 1999 conservation status: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant.

FFG Act 1988 status: Status under FFG Act: Cd: Conservation dependant, Cr: Critically endangered, En: Endangered, Ex: Extinct, Th: Threatened, Vu: Vulnerable En(ExV): Endangered (extinct in Vic)

4.1.5 Ecological Scoring System Results

Table 14 below summarises the total score resulting from the Ecological Scoring System methodology established by the CoGB to determine the overall ecological values associated with each Growth Area. The associated ranking of each Growth Area – being low, medium or high – in conjunction with the overall score achieved is also presented in the table.

A full overview of the score applied to each Growth Area for each component of this scoring system that was considered is provided in Part B of this study. It is noted that for most of the Growth Areas, the maximum score associated with EVCs was applied given that the dominant EVC present has an 'endangered' bioregional conservation status. In relation to threatened species, scattered paddock trees and biolink presence, maximum scores were also achieved across all of the Growth Area. Variation in scores between Growth Areas is noted in relation to the percentage of native vegetation cover present, the percentage cover of native vegetation within 5km of each Growth Area, native vegetation average quality scores and the presence of existing natural waterways.

As shown in Table 14, despite some differences in individual components of the scoring system between individual Growth Areas, eight of the Growth Areas achieved a ranking of "high" based on this scoring system implemented. Three Growth Areas achieved a score of medium, these being Heathcote Township, Mclvor Highway and Strathfieldsaye South East.

Table 14. Total score and ranking for each Growth Area based on CoGB Ecological Scoring System

Growth Area:	Total Score Achieved (max. 100)	Ecological Value based on Score Achieved
Huntly East	72	High
Allies Road, Myers Flat	78	High
Calder Highway, Kangaroo Flat	75	High
Heathcote Township	67	Medium
Mclvor Highway, Junortoun	67	Medium
Lockwood Road, Kangaroo Flat	81	High
Sparrowhawk Road, Maiden Gully	73	High
Olympic Parade, Maiden Gully	84	High
Ravenswood Run	75	High
Simpsons Road, Eaglehawk	78	High
Strathfieldsaye South East	67	Medium
Watsons Street, White Hills	75	High

4.1.6 Native Vegetation Impact Analysis: EnSym Scenario Tests

As highlighted in Section 2.1.1.10, a permit will be required under Clause 52.17 (or potentially Clause 52.16 for Huntly East) to remove native vegetation from any of the Growth Areas. Where such losses occur, the provisions of the provisions of the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017c) will apply in relation to the determination of offset requirements.

For each Growth Area, a "worst-case scenario" approach to future development within each was applied in order to determine potential offset requirements associated with future growth in these areas. While a detailed outline of Clause 52.17 offset requirements is provided for each Growth Area in Part B of this study, Table 15 below provides a summary of the offset requirements for each Growth Area.

Table 15. Summary of Clause 52.17 offset requirements based on “worst-case scenario”

Growth Area:	Clause 52.17 Offset Requirements				
	General Habitat Units (GHUs)	Vicinity of Offset	Minimum SBV* Score	Large Trees	Species Units^
Huntly East	0.053	North Central Catchment Management Authority (CMA) or Greater Bendigo City Council (where GHUs required only)	0.292	419	Offsets for 47 separate species required, with over 100 units required for most species
Allies Road, Myers Flat	0.000		N/A	349	Offsets for 52 separate species required, with over 300 units required for most
Calder Highway, Kangaroo Flat	18.557		0.428	75	N/A
Heathcote Township	1.144		0.157	758	Offsets for 19 separate species required, with over 300 units required for most
Mclvor Highway, Junortoun	0.403		0.188	279	Offsets for 26 separate species required, with over 100 units required for most species
Lockwood Road, Kangaroo Flat	0.000		N/A	41	Offsets for 22 separate species required, with over 50 units required for most species
Sparrowhawk Road, Maiden Gully	0.000		N/A	42	Offsets for 28 separate species required, with over 40 units required for most species
Olympic Parade, Maiden Gully	0.025		0.488	130	Offsets for 62 separate species required, with over 1100 units required for most species
Ravenswood Run	0.047		0.647	641	Offsets for 28 separate species required, with over 1200 units required for most species
Simpsons Road, Eaglehawk	0.010		0.104	111	Offsets for 45 separate species required, with over 160 units required for most species
Strathfieldsaye South East	0.166		0.190	375	Offsets for 31 separate species required, with over 100 units required for most species
Watsons Street, White Hills	0.034		0.080	96	Offsets for 37 separate species required, with over 150 units required for most species
* SBV: Strategic Biodiversity Value					
^ Refer to Part B for details regarding species units					

As shown in Table 15 for all but one of the proposed Growth Areas there are very high offset requirements for a range of specific species based on this worst-case scenario approach. It is likely the case that even some retention of the native vegetation within the Growth Area will still result in relatively high offset amounts some of which are likely to be very difficult to secure as discussed in Section 5.

The individual species for which Species Units have been triggered for each of the proposed Growth Areas, bar the Calder Highway Growth Area (as not applicable) are presented in Table 16.

Table 16. Species Unit triggers within Growth Areas

	Huntly East	Allies Road, Myers Flat	Calder Highway, Kangaroo Flat	Heathcote Township	McIvor Highway, Junortoun	Lockwood Road, Kangaroo Flat	Sparrowhawk Road, Maiden Gully	Olympic Parade, Maiden Gully	Ravenswood Run	Simpsons Road, Eaglehawk	Strathfieldsaye South East	Watsons Street, White Hills
Arching Flax-lily, <i>Dianella sp. aff. longifolia</i> (Benambra)	✓				✓				✓	✓	✓	✓
Ausfeld's Wattle, <i>Acacia ausfeldii</i>	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Barking Owl, <i>Ninox connivens</i>	✓	✓		✓	✓	✓				✓	✓	✓
Bearded Dragon, <i>Pogona barbata</i>	✓	✓			✓					✓	✓	✓
Bent-leaf Wattle, <i>Acacia flexifolia</i>	✓	✓				✓	✓	✓		✓		✓
Black Falcon, <i>Falco subniger</i>									✓			
Blue Burr-daisy, <i>Calotis cuneifolia</i>	✓	✓					✓	✓				
Blue Mallee, <i>Eucalyptus polybractea</i>	✓	✓					✓	✓		✓		✓
Bristly Greenhood, <i>Pterostylis setifera</i>	✓					✓	✓	✓		✓		✓
Buloke, <i>Allocasuarina luehmannii</i>				✓								
Brolga, <i>Grus rubicunda</i>	✓	✓										
Broom Bitter-pea, <i>Daviesia genistifolia s.s.</i>	✓					✓	✓	✓		✓		✓
Brown Toadlet, <i>Pseudophryne bibronii</i>	✓	✓		✓	✓	✓	✓			✓	✓	✓
Brush-tailed Phascogale, <i>Phascogale tapoatafa</i>					✓	✓	✓		✓	✓	✓	
Buloke, <i>Allocasuarina luehmannii</i>		✓							✓			
Bush Stone-curlew, <i>Burhinus grallarius</i>	✓	✓			✓				✓		✓	✓
Cane Spear-grass, <i>Austrostipa breviglumis</i>	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
Castlemaine Spider-orchid, <i>Caladenia clavescens</i>									✓			
Chestnut-rumped Heathwren, <i>Calamanthus pyrrhopygius</i>		✓		✓					✓	✓	✓	
Clover Glycine, <i>Glycine latrobeana</i>											✓	
Cobberas Grevillea, <i>Grevillea brevifolia</i>									✓			
Cottony Cassinia, <i>Cassinia ozothamnoides</i>	✓	✓			✓	✓	✓		✓	✓	✓	✓
Dainty Phebalium, <i>Phebalium festivum</i>	✓	✓					✓	✓		✓		
Dwarf Cassinia, <i>Cassinia diminuta</i>					✓	✓	✓			✓	✓	✓
Eltham Copper, <i>Paralucia pyrodiscus lucida</i>		✓			✓	✓	✓	✓	✓	✓	✓	✓
Emerald-lip Greenhood, <i>Pterostylis smaragdina</i>	✓					✓		✓		✓		✓
Erect Peppergrass, <i>Lepidium pseudopapillosum</i>	✓	✓					✓	✓		✓		✓
Flat-leaf Bush-pea, <i>Pultenaea platyphylla</i>									✓			
Floodplain Fireweed, <i>Senecio campylocarpus</i>					✓						✓	
Fuzzy New Holland Daisy, <i>Vittadinia cuneata var. morrisii</i>	✓									✓		✓
Golden Sun Moth, <i>Synemon plana</i>				✓					✓			
Goldfield Boronia, <i>Boronia anemonifolia subsp. aurifodina</i>		✓										
Goldfields Grevillea, <i>Grevillea dryophylla</i>	✓				✓	✓	✓	✓		✓	✓	✓
Grassland Earless Dragon, <i>Tympanocryptis pinguicollis</i>									✓			
Grey Falcon, <i>Falco hypoleucos</i>		✓								✓		
Grey-crowned Babbler, <i>Pomatostomus temporalis</i>	✓	✓			✓		✓			✓	✓	✓

Preliminary Ecological and Bushfire Risk Assessment for 12 Potential Growth Areas

	Huntly East	Allies Road, Myers Flat	Calder Highway, Kangaroo Flat	Heathcote Township	Mclvor Highway, Junortoun	Lockwood Road, Kangaroo Flat	Sparrowhawk Road, Maiden Gully	Olympic Parade, Maiden Gully	Ravenswood Run	Simpsons Road, Eaglehawk	Strathfieldsaye South East	Watsons Street, White Hills
Growling Grass Frog, <i>Litoria raniformis</i>	✓											
Hairy Tails, <i>Ptilopus erubescens</i>	✓							✓		✓		✓
Hardhead, <i>Aythya australis</i>				✓								
Half-bearded Spear-grass, <i>Austrostipa hemipogon</i>				✓					✓			
Inland Pomaderris, <i>Pomaderris paniculosa</i> subsp. <i>paniculosa</i>	✓							✓		✓		
Jericho Wire-grass, <i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	✓				✓		✓	✓		✓	✓	✓
Kamarooka Mallee, <i>Eucalyptus froggattii</i>	✓	✓						✓		✓		✓
Lace Monitor, <i>Varanus varius</i>		✓							✓			
Late-flower Flax-lily, <i>Dianella tarda</i>	✓			✓	✓				✓	✓	✓	✓
Long Eryngium, <i>Eryngium paludosum</i>	✓	✓						✓		✓		
Mclvor Spider-orchid, <i>Caladenia audasii</i>					✓						✓	
Murray Cod, <i>Maccullochella peelii</i>				✓								
Painted Honeyeater, <i>Grantiella picta</i>	✓	✓		✓	✓	✓			✓	✓	✓	✓
Pink-tailed Worm-lizard, <i>Aprasia parapulchella</i>						✓	✓		✓	✓	✓	
Purple Diuris, <i>Diuris punctata</i>												✓
Regent Honeyeater, <i>Anthochaera phrygia</i>	✓	✓		✓		✓	✓			✓		✓
Rising Star Guinea-flower, <i>Hibbertia humifusa</i> subsp. <i>humifusa</i>				✓	✓				✓		✓	
Sikh's Whiskers, <i>Pterostylis boormanii</i>	✓	✓					✓	✓		✓		✓
Slender Club-sedge, <i>Isolepis congrua</i>					✓						✓	
Slender Mint-bush, <i>Prostanthera saxicola</i> var. <i>bracteolata</i>	✓	✓			✓					✓	✓	✓
Small-flower Mat-rush, <i>Lomandra micrantha</i> subsp. <i>tuberculata</i>				✓								
Small Milkwort, <i>Comesperma polygaloides</i>	✓	✓								✓		
Small Monkey-flower, <i>Elacholoma prostrata</i>								✓	✓			
Small-leaf Goodenia, <i>Goodenia benthamiana</i>	✓	✓				✓	✓	✓		✓		✓
Snowy Mint-bush, <i>Prostanthera nivea</i> var. <i>nivea</i>	✓	✓				✓	✓	✓		✓		✓
Southern Shepherd's Purse, <i>Ballantinia antipoda</i>									✓			
Southern Swainson-pea, <i>Swainsona behriana</i>	✓									✓		
Spear-grass, <i>Austrostipa trichophylla</i>									✓			
Speckled Warbler, <i>Chthonicola sagittatus</i>	✓	✓		✓	✓	✓	✓			✓	✓	✓
Spiny Rice-flower, <i>Pimelea spinescens</i>								✓				
Spiny Rice-flower, <i>Pimelea spinescens</i> subsp. <i>spinescens</i>	✓								✓			✓
Square-tailed Kite, <i>Lophoictinia isura</i>		✓		✓						✓		
Squirrel Glider, <i>Petaurus norfolcensis</i>	✓	✓						✓		✓		✓
Sutton Grange Greenhood, <i>Pterostylis agrestis</i>									✓			
Swift Parrot, <i>Lathamus discolor</i>	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓
Velvet Daisy-bush, <i>Olearia pannosa</i> subsp. <i>cardiophylla</i>					✓						✓	

Preliminary Ecological and Bushfire Risk Assessment for 12 Potential Growth Areas

	Huntly East	Allies Road, Myers Flat	Calder Highway, Kangaroo Flat	Heathcote Township	McIvor Highway, Junortoun	Lockwood Road, Kangaroo Flat	Sparrowhawk Road, Maiden Gully	Olympic Parade, Maiden Gully	Ravenswood Run	Simpsons Road, Eaglehawk	Strathfieldsaye South East	Watsons Street, White Hills
Waterbush, <i>Myoporum montanum</i>	✓	✓								✓	✓	
Western Golden-tip, <i>Goodia medicaginea</i>	✓			✓		✓		✓		✓		✓
Western Rat-tail Grass, <i>Sporobolus creber</i>									✓			
Whipstick Westringia, <i>Westringia crassifolia</i>	✓	✓					✓	✓		✓		
Whirrakee Wattle, <i>Acacia williamsonii</i>	✓	✓			✓	✓	✓	✓		✓	✓	✓
Woodland Leek-orchid, <i>Prasophyllum sp. aff. validum A</i>					✓						✓	
Yellow-tongue Daisy, <i>Brachyscome chrysoglossa</i>	✓	✓						✓				✓

A series of recommendations to avoid and minimise impacts on native vegetation and habitat, and therefore minimize the potential offsets required for the Growth Areas is also provided in Section 5.

Note that the above offsets are only in relation to State level offsets associated with the removal of native vegetation in order to meet the requirements of Clause 52.17 (or Clause 52.16 if applicable). Should it be the case that impacts on EPBC Act communities or species associated with future development in any of the Growth Areas be deemed “significant”, separate EPBC Act offsets may also apply in addition to these State offsets. Refer to Section 2.1.1.1 and Section 5 below for more information on potential EPBC Act offsets.

4.2 Bushfire Risk Assessment

During bushfire season, bushfires within south-eastern Australia are generally propelled by powerful hot north-westerly winds from central Australia before a south-westerly change occurs. This south-westerly change brings cooler, humid winds from the Southern Ocean which can reduce bushfire intensity or result in less intense bushfires approaching from the south-west.

A summary of bushfire risk for each proposed Growth Area in the context of prevailing weather patterns is presented below.

Note that only a summary is provided here; a detailed analysis of bushfire risk is provided in Part B of this study. This includes the results of the site analysis completed during ground truthing, which segregated each Growth Area into sections based on current use and bushfire threat.

Information on the opportunities, constraints and recommendation as they relate to each of these Growth Areas based on the findings of the risk assessment completed is provided in Section 5 below. This includes recommendations for each of the sections each Growth Area was segregated into as discussed above.

4.2.1 Huntly East

Fire runs emanating within the Greater Bendigo National Park to the north-west of the proposed Huntly East Growth Area would be largely buffered by the presence of open pasture, residential development and road network within this aspect. A fire front is unlikely to impact, with the main hazard from this aspect likely from ember attack from a bushfire occurring within the National Park. Fire runs from the south or south-west pose a greater risk to this Growth Area, as they could result in a fire front impacting the site and moving across it due to the connective vegetation present. Ember attack from this aspect is also likely.

4.2.2 Allies Road, Myers Flat

Fire runs from the north-west could occur through the Marong Bushland Reserve which could see fire front impact within the western extent of the proposed Allies Road, Myers Flat due to the connective vegetation present. Allies Road itself would act as a buffer from this aspect, although ember attack could promote spotting within the western corner of the site. Fire runs from the south-west could also see a fire front impact the southern boundary of this Growth Area. While existing road network,

specifically the Calder Highway and Hermitage Road would act as a buffer from this aspect, spotting via ember attack is also likely.

4.2.3 Calder Highway, Kangaroo Flat

The proposed Calder Highway, Kangaroo Flat Growth Area is susceptible to fire front impacts from both the north-west and south-west. These fire runs could affect the woodland vegetation that is present within this Growth Area largely on its western flank unimpeded given there is only some clearance of vegetation present surrounding the water reservoirs and dirt walking tracks in this area. The northern corner of this Growth Area could be impacted by such a fire front in particular given the high cover of treed vegetation that is present. Fire progression further east into this Growth Area would likely see a full fire front become disrupted and transition to localized fire events relative to the fragmented patches of vegetation present. Additionally, ember attack from either the north-west or south-west could see spot fires creating localized fire events across this Growth Area.

4.2.4 Heathcote Township

Fire runs from the north-west through the One Eye State Forest could see a fire front impact the north-western corner of the proposed Heathcote Township Growth Area. A dirt road network is present within the area which can act as a buffer to some degree although no road along the Growth Area boundary is present. A fire front moving through this section would reduce in intensity upon impact due to the presence of grassland and residential development onsite. A similar scenario can be said for approach from the south-west, along the western boundary of the Heathcote Township Growth Area, although the majority of the boundary has separation from the main hazard via open farmland.

4.2.5 Mclvor Highway, Junortoun.

Fire runs approaching the Mclvor Highway, Junortoun Growth Area from the north have the potential to be in excess of 10km and could intersect with the Woodland vegetation present immediately north of this Growth Area, which is located on flat topography. This run could therefore see a fire front impact along the northern boundary of the Growth Area itself. While this is the case, some buffers are present through the existing road network both within the state forest and within the confines of the Growth Area along its northern boundary. Due to the minimal vegetation present within the proposed Growth Area itself, an approaching fire front would become fragmented and see the provision of localized fire events amongst the existing vegetation. Fire runs from the south-west would be buffered by the existing development south of this Growth Area. The main threat from this aspect would be spot fires through ember attack.

4.2.6 Lockwood Road, Kangaroo Flat

The proposed Lockwood Road, Kangaroo Flat Growth Area is susceptible to a fire front impact from both the north-west and south-west. These fire runs have the potential to progress up to and through this Growth Area, particularly through the western and southern sections of this site given the amount of treed vegetation present. Fire runs would transition to lower intensity grassfires further into this Growth Area prior to arriving at Lockwood Road. Spot fires through ember attack pose a considerable risk due to the amount of vegetation present onsite.

4.2.7 Sparrowhawk Road, Maiden Gully

Fire runs from the north-west of the Sparrowhawk Road, Maiden Gully Growth Area would intersect a mixture of fragmented woodland vegetation interspaced by grassland and low-density development. Impact from this aspect could still occur and provided the density of vegetation present, fire progression could continue further south through this Growth Area. A fire front approaching from the south-west would be buffered by the road network, particularly the Calder Highway and existing residential development. Ember attack from this aspect is therefore considered the main threat from particularly due to the amount of vegetation present within this Growth Area.

4.2.8 Olympic Parade, Maiden Gully

Fire runs from the north-west of the Olympic Parade, Maiden Gully Growth Area would transect woodland vegetation covering approximately 3km of land prior to impact. Edwards Road would act as a buffer to an extent although ember attack would still pose a severe risk from this aspect provided the amount of vegetation present within this Growth Area.

Fire runs from the south-west could see fire front impact to the western and southern boundary of the Growth Area. The southernmost portion of the Growth Area is particularly susceptible to fire runs from this aspect as there is the potential for a longer unimpeded run. The amount of vegetation present would also support fire progression through the Growth Area, potentially all the way through to the northern boundary. Ember attack also poses a considerable threat due to the amount of vegetation present that could support a spot fire.

4.2.9 Ravenswood Run

A fire run from the north-west would transect fragmented Woodland vegetation which would see a transition to a lower intensity grassfire prior to impact and further south into the proposed Ravenswood Run Growth Area. Fire runs from the north-west could also pass through the treed areas of this Growth Area that occur adjacent to the eastern site boundary, although prevailing winds are likely to push a fire front further to the south-east of the site and not impact this area. Fire runs emanating the south-west of this Growth Area would transect predominately grassland vegetation and would be of lower intensity comparatively to a fire front from the north-west. The Calder Highway would also act as a buffer from a south-west fire front.

4.2.10 Simpsons Road, Eaglehawk

A fire run from the north or north-west of the potential Simpsons Road, Eaglehawk Growth Area could see fire front impact along the northern boundary due to the contiguous treed vegetation present. Vegetation within the Growth Area itself is fragmented however, and would likely see the transition to a lower intensity grass fire upon impact. The patches of existing Woodland vegetation would likely create localised fire events. Fire runs from the south-west would be shorter in length, occurring between existing residential development and the site. This area could support fire front progression up to this Growth Area however. Ember attack from either aspect is also a threat and could see spot fire ignition within the present vegetation.

4.2.11 Strathfieldsaye South East

The far northern portion of the Strathfieldsaye South East Growth Area is located adjacent to an area of low-density residential development amongst Woodland vegetation. The site is however separated from this area Woodland vegetation via open farmland. Fire front impact within this area is unlikely with the main threat, which would be through ember attack which could cause spotting within the grassland vegetation onsite.

The western end of the site is however susceptible to a fire front impact from both the north-west and south-west aspects. Tannery Lane to the north would act as a buffer from this aspect along with immediate open farmland within the site which reduces the risk. The vegetation along the southern boundary of the western corner could support the transmission of a fire front further into the site although as mentioned a transition to open farmland does occur within this area. Ember attack within this western end does pose a considerable threat although would likely result in localised fire event due to the minimal vegetation present.

4.2.12 Watson Street, White Hills

Comparatively short Fire runs from the north-west could impact the northern end of the Watson Street, White Hills Growth Area, as some contiguous treed vegetation is present up to and within its boundaries. Impact could also occur from the south-west although less likely, as Crane Street would act as a buffer from this aspect. In addition to fire front risks, ember attack from either aspect could occur and would pose a considerable threat due to the amount of vegetation present.

5. OPPORTUNITIES, CONSTRAINTS AND RECOMMENDATIONS

5.1 Ecological Values

As highlighted throughout Section 4.1 above, and Part B of this study, the 12 Growth Areas assessed as part of this study contain a range of ecological values within their boundaries. This includes patches of native vegetation and Scattered Trees representative of a number of EVCs across both the Goldfields and Victorian Riverina Bioregions, with this native vegetation also having the potential to represent ecological communities listed under the FFG Act and/or the EPBC Act. The habitat within these Growth Areas has further potential to support a range of State and Federally listed flora and fauna species, some of which were observed during ground-truthing or have been previously recorded within the confines of certain Growth Areas according to the VBA. For all the Growth Areas, the ecological value present has resulted in the majority achieving a ranking of “high” based on the methodology developed by the CoGB.

Beyond the above, the key sobering finding as it relates to the proposed Growth Areas are the high numbers of species units that will be required for most Growth Areas based on a “worst-case” scenario to native vegetation loss under the provisions of Clause 52.17. As summarised in Section 4.1.6, such State level native vegetation removal offsets are required for multiple species within the vast majority of the Growth Areas, with high to very high quantities of unit requirements for each species. While the General Habitat Units required for most Growth Areas, aside from the Calder Highway Growth Area, are relatively low, the high number of species units across most of the Growth Areas are likely to provide extremely difficult or most likely impossible to source. Such impacts on native vegetation within most of the Growth Areas which would see all native vegetation lost to accommodate development is therefore untenable and will require mechanisms in place to avoid and minimise impacts. It should still be highlighted here however, that even a reduction in the areas cleared to accommodate at least some development within each Growth Area still runs the risk of species units of a high quantity. This was recently exemplified by information compiled and processes in relation to a Native Vegetation Precinct Plan for a precinct within Maiden Gully, completed by Practical Ecology for the CoGB. Even with retention of larger patches of native vegetation and associated habitat, the State level Clause 52.17 offsets, particularly for species units remained high and at a level where sourcing them would still prove extremely difficult.

Note that the above does not consider the potential for the level of impacts associated with proposed development to trigger the need for an Environmental Effects Statement (EES) under the EEA Act, where works could be ‘reasonably considered to have or be capable of having a significant effect on the environment’. This could be based on the areas of native vegetation to be removed, where it is of an endangered EVC and exceeds 10ha, or through impacts to State listed communities or species. As shown in Table 16 the level of ecological values and their broadscale removal is widescale development is proposed across each Growth Area, could at a minimum require further self-assessment under the EES and referral to the Planning and Environment Minister. The level of impacts could trigger the requirements for an EES. Further discussion with planning experts is recommended on this front.

Beyond the State level offsets discussed above, Federal level offsets could also be required under the EPBC Act where the level of expected impacts to MNES is deemed “significant”. As summarised in Section 4.1 above and in Part B of this study, this could include both Federal level flora and fauna species, as well as ecological communities. Further detailed assessments will be required to determine the presence of such species and/or communities within each Growth Area is development proceeds, and the potential for a “significant” impact on such MNES will need to be considered based on proposed impacts. If such impacts are deemed to be “significant”, offsets based on the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (DSEWPC 2012) may be required in addition to, or in conjunction with, State level offsets under Clause 52.17.

Provided below in Table 17 provide is an overview of the findings of the ecological assessment completed as part of this study for each Growth Area in the context of implications from a policy and legislative perspective to outline the opportunities and constraints in relation to potential future growth in these areas.

As noted in Table 17 opportunities to avoid and minimise the impacts to native vegetation and habitat across the Growth Area must be explored in line with principles that are common to both State and Federal legislation and associated policy documents. The high levels of State offsets under the provisions of the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017c) based on a “worst-case scenario” to native vegetation loss provide clear evidence that avoiding impacts on identified ecological values will be required if future development is to occur with the proposed Growth Areas.

Key opportunities to reduce impacts and protect ecological values include the avoidance of development in areas containing native vegetation, through careful placement of roads, infrastructure, building lots and open space during the design phase. In particular, this should focus on the avoidance and protection of Large Old and hollow-bearing trees, EPBC and FFG listed ecological communities, habitat for rare and threatened species, wetlands and waterways, habitat corridors and landscape connectivity for flora and fauna and higher quality areas of native vegetation.

Table 17. Policy and legislative implications of ecological findings

Applicable Legislation	Key clauses/ documents / policies	Huntly East	Allies Road, Myers Flat	Calder Highway, Kangaroo Flat	Heathcote Township	Mclvor Highway, Junortoun	Lockwood Road, Kangaroo Flat	Sparrowhawk Road, Maiden Gully	Olympic Parade, Maiden Gully	Ravenswood Run	Simpsons Road, Eaglehawk	Strathfieldsaye South East	Watsons Street, White Hills
Commonwealth Legislation													
Environment Protection & Biodiversity Conservation Act 1999	EPBC Act Environmental Offsets Policy	- EPBC Act listed communities and species could be present within each of these Growth Areas as shown by the findings of this study. - If development is deemed to have a significant impact on such communities, an EPBC Act referral will need to be recommended in due course and Federal level offsets for the removal of this MNES will likely be required in accordance with the EPBC Act Environmental Offsets Policy. Further detailed investigations are required to determine true status of EPBC Act matters. - It is recommended that impacts on native vegetation and associated habitat identified as part of this study that could be representative of, or provide habitat for, EPBC Act listed communities and species are avoided and minimised as far as reasonably practicable to mitigate impacts on MNES and ameliorate the potential ramifications of federal level offsets. Like State offsets under Clause 52.17 such offsets may be difficult to impossible to source on large scales.											
State Legislation													
The following thresholds associated could trigger the need for an EE Act referral for individual subdivisions and developments in due course, given the presence of the following in each Growth Area:													
Environmental Effects Act 1978	Ministerial guidelines for assessment of environmental effects under the EE Act	- Greater than 10ha of native vegetation patches from an Endangered EVC - Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Growth Area contains greater than 10ha of native vegetation patches from an Endangered EVC - Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Growth Area contains greater than 10ha of native vegetation patches from an Endangered EVC - Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Growth Area contains greater than 10ha of native vegetation patches from an Endangered EVC - Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Greater than 10ha of native vegetation patches from an Endangered EVC - Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Greater than 10ha of native vegetation patches from an Endangered EVC - Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Greater than 10ha of native vegetation patches from an Endangered EVC - Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Greater than 10ha of native vegetation patches from an Endangered EVC - Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost	- Contains FFG listed ecological communities with an area that if lost could be deemed significant - Range of endangered or threatened species that could utilise this Growth Area and could be lost

Preliminary Ecological and Bushfire Risk Assessment for 12 Potential Growth Areas

Applicable Legislation	Key clauses / documents / policies	Huntly East	Allies Road, Myers Flat	Calder Highway, Kangaroo Flat	Heathcote Township	Mclvor Highway, Junortoun	Lockwood Road, Kangaroo Flat	Sparrowhawk Road, Maiden Gully	Olympic Parade, Maiden Gully	Ravenswood Run	Simpsons Road, Eaglehawk	Strathfieldsaye South East	Watsons Street, White Hills
<i>Flora and Fauna Guarantee Act 1988</i>		- FFG Act listed communities and species could be present within each of these Growth Areas as shown by the findings of this study; the provisions of this Act however only apply to areas of public land. - For FFG Act listed communities and plant species and protected flora species, a permit from DELWP will be required to 'take' (to kill, injure, disturb or collect) FFG Act protected taxa from public land areas such as roadsides. - For FFG Act listed species, consideration needs to be given to ongoing changes to the FFG Act particularly as it relates to declarations of Critical Habitat for fauna species that are expected to occur in each Growth Area; at present, there are no specific approvals or referral requirements to DELWP as it relates to FFG Act listed fauna or their habitat however a permit from DELWP may be required and they are also likely to have input on such matters in relation to development in these Growth Areas where the removal of native vegetation and associated habitat triggers DELWP referral requirements under the CoGB Planning Scheme.											
<i>Flora and Fauna Guarantee Amendment Act 2019</i>		- The FFG Amendment Act will need to be considered by the CoGB when performing functions in relation to the proposed Growth Areas that might impact ecological values. - Potential impacts to FFG Act listed communities and species must therefore be considered, inclusive of long- and short-term impacts associated with development within the proposed Growth Areas, and potentially threatening processes.											
<i>Wildlife Act 1975</i>		- The habitat across each of the Growth Areas, particularly associated with patches of native vegetation is likely to support a range of fauna species. - Ongoing planning needs to consider the Wildlife Act 1975, as the handling, salvage or movement of fauna as part of future works within the Growth Areas, including the need for relocation of fauna species, will require authorisation from DELWP under this Act by any professionals undertaking such tasks.											
<i>Planning and Environment Act 1987</i>	Clause 12 Environmental and Landscape Values	- Clause 12.01-1S and Clause 12.01-2S relate to the protection of biodiversity and native vegetation management respectively - While this study forms part of the strategies to be implemented under Clause 12.01-1S by the CoGB to document and strategically plan for biodiversity, further consideration of cumulative impacts and the need to avoid impacts of land use on important areas of biodiversity. The development of the Growth Areas investigated at a high intensity that would see the large-scale removal of native vegetation and associated habitat is likely to go against the strategies proposed under Clause 12.01-1S, in that cumulative impacts will not only be high but important areas of biodiversity on private land in particular would also be impacted across relatively large areas. Consideration therefore needs to be given the reducing the level of clearing required in each Growth Area - in line with the recommendations provided below as they relate to bushfire - as these will ensure that impacts to biodiversity are at least minimised. - With regard to Clause 12.01-2S, strategies to be implemented largely relate to the three-step approach outline in the Guidelines for the removal, destruction or lopping of native vegetation, with these being avoid, minimise and offset. For each of these Growth Areas consideration needs to be given to the ways in which impacts to native vegetation can be avoided in the first instance, particularly given the high quantity of State level offsets required under the provisions of these guidelines based on a "worst-case scenario" as demonstrated by this study.											
	Clause 13 Environmental Risks	Clause 13 aims to ensure that planning adopt a best practice environmental management and risk management approach which aims to avoid or minimise environmental degradation and hazards. While the provisions of Clause 13.02-1S are incorporated into this study as they relate to bushfire risk, impacts on other environmental values also need to be considered. These include climate change, floodplains, soil degradation, erosion and landslip, noise and air and air quality, all of which can entwine with the preservation and ongoing management of native vegetation and associated habitat. Environmental risk should continue to be considered during ongoing planning of the proposed Growth Areas, along with their construction and ongoing management should it be the case that future development takes place in these areas.											
	Clause 22.01 Urban/Forest Interface Policy	All of the Growth Areas assessed as part of this study include private and/or public forest within their confines and/or abutting their boundaries; a Design and Development overlay may therefore need to be applied to any proposed new development areas to guide the way in which each development proceeds and the way in which ongoing management takes place in relation to native vegetation and fire management.											
	Clause 52.16 including <i>Guidelines for the removal, destruction or lopping of native vegetation</i>	- The Huntly Township Plan NVPP covers part of the proposed Huntly East Growth Area, to the north of the train line. This NVPP nominates vegetation to be removed and native vegetation to be retained. If vegetation proposed to be retained in the NVPP is subsequently proposed for removal as a result of future growth the provisions of the <i>Guidelines for the removal, destruction or lopping of native vegetation</i> (DELWP 2017) will need to be applied. - For other Growth Areas not applicable, unless NVPP developed to manage native vegetation in due course as part of ongoing Growth Area planning											

Preliminary Ecological and Bushfire Risk Assessment for 12 Potential Growth Areas

Applicable Legislation	Key clauses / documents / policies	Huntly East	Allies Road, Myers Flat	Calder Highway, Kangaroo Flat	Heathcote Township	McIvor Highway, Junortoun	Lockwood Road, Kangaroo Flat	Sparrowhawk Road, Maiden Gully	Olympic Parade, Maiden Gully	Ravenswood Run	Simpsons Road, Eaglehawk	Strathfieldsaye South East	Watsons Street, White Hills
	Clause 52.17 including <i>Guidelines for the removal, destruction or lopping of native vegetation</i> (CFA 2017) Zones and Overlays	- All of these Growth Areas have native vegetation as patches or as Scattered Trees present as defined by the <i>Guidelines for the removal, destruction or lopping of native vegetation</i> (DELWP 2017) - On a "worst-case scenario" approach to native vegetation loss under Clause 52.17, based on that documented as part of this study through a desktop review and associated ground-truthing, the levels of offsets that are required for each Growth Area particularly as they relate to Species Units may be attainable. For all Growth Areas aside from the Calder Highway Growth Area (only requires General Habitat Units at this stage) there are multiple species for which Species Units are required, with higher end numbers for each of these species in terms of the units required. - Key to reducing this level of impacts will be consideration of avoiding and minimising impacts on native vegetation through ongoing planning. In saying that however, it is likely that for some of the Growth Areas, there may be Species Units required where areas with seemingly less native vegetation impacts are proposed for development. Focussing impacts on areas with Scattered Trees for example, as opposed to patches of native vegetation, to reduce impacts may therefore not necessarily reduce required Species Unit offsets to a point where they are achievable more than what they are on a "worst-case scenario" basis. A concerted effort will therefore be required to ensuring that impacts on native vegetation in the context of future development are avoided and minimised as much as possible. This will also likely assist will ameliorating other legislative and policy impactions associated with development under other legislation, such as the EPBC Act, the EE Act and the FFG Act.											
<i>Catchment and Land Protection Act 1994</i>		- Each Growth Area is covered by a range of zones and overlays, some of which such as the various ESOs and VPOs contain specific objectives associated with the management of biodiversity and vegetation. As above, the principles of avoid and minimising impacts in line with the provisions of Clause 52.17 and the <i>Guidelines for the removal, destruction or lopping of native vegetation</i> (DELWP 2017) will contribute to the potential for development within the Growth Areas to meet the objectives of these overlays. - Each of the proposed Growth Areas is likely to contain noxious weeds and pest animals listed under the CaLP Act. - As part of future growth, provisions should be put in place to ensure that all landowners are educated about their obligations under this Act.											

5.2 Bushfire Risk

As stated previously, the Growth Areas were divided into sub-sections or smaller areas based on the conditions observed, and the hazard from, and risk to each area was determined. As detailed in Section 2.1.1.8, these areas need to be considered against Clause 13.02-1S, in particular the strategies regarding settlement planning to ensure population growth is directed to areas of low risk. This needs to be applied to both the new residents and the residents of adjacent existing or proposed areas as multiple areas of high population adjacent to high bushfire threats creates issues regarding resources and the ability to evacuate.

Areas considered too high risk to support higher population development such as residential housing developments can still be utilised for lower-density populations through low-density residential areas, rural residential or small farming properties and even industrial development. These developments create the infrastructure needed to allow occupants to evacuate and emergency services to defend while also allowing for faster evacuation and less strain on the adjacent BAL-LOW areas providing refuge. There will also be developments and management present which will reduce the intensity of a front and make containment easier.

The ecological assessment determined that the majority of the vegetation present outside of treeless sections of each Growth Area considered native vegetation patches, such that removing vegetation to reduce the bushfire risk is not a viable option for most of the Growth Areas particularly given the level of vegetation offsets required under Clause 52.17.

Based on this logic and consideration of the bushfire risks and ecological values present within the proposed Growth Areas, four categories have been established to assist in guiding potential future growth within the various areas used to define the bushfire risk and hazard across each Growth Area. The location of the sub-areas referred to in the table below is shown on Map 7 and Map 8 for each of the respective Growth Areas within Part B of this study.

The details on these categories are provided below and the classifications along with additional details for each of the Growth Areas is provided in Table 18:

- **High-density appropriate (HDA):** higher density residential development or a higher density population (the overall density to be determined by the CFA and the CoGB) is considered appropriate as the risk can be mitigated through infrastructure placement and planning. The future development of this area as a location for higher density development would not increase the risk to adjacent population centres (existing or proposed).
- **Low-density appropriate (LDA):** a higher density development and associated population is considered inappropriate because it would place too many people within close proximity of an immediate threat and/or it would result in an increased risk to adjacent high population areas. A lower density population is advised, as it provides an impetus to update existing infrastructure, such as roads, which will reduce the bushfire hazard overall and a lower population can be easily managed during an emergency without diverting resources from the higher population centres.

- **No further development advised (NFD):** areas where the risk can be considered too high even for a lower-density population and/or the vegetation clearance/management required to make the risk acceptable is not deemed viable considering the ecological values present
- **Not applicable (N/A):** the assessment completed for each Growth Areas included the terrain within 150m of the boundaries of each, as future developments will need to account for this area in their bushfire assessments. Designated areas completely outside the Growth Areas therefore need to be considered but are not the subject of this assessment or the recommendations.

Table 18. Summary of the bushfire recommendations for the 12 Growth Areas

Growth Area	Sub-area	Risk^	Hazard^	Response category*	Comments
Huntly East	1	L	L	HDA	Existing residential areas adjacent to main road
	2	M	L	N/A	North of Midland Highway outside of the Growth Area
	3	M	L	N/A	North of Midland Highway outside of the Growth Area
	4	L	L	HDA	- Open paddocks directly adjacent to main roads and separated from bushfire hazards to the south. - Paddocks do not appear to have native vegetation present but need to be mindful of potential native grassland
	5	L	L	N/A	Patch of Woodland currently approved for development and entirely outside the Growth Area
	6	M	L	HDA & LDA	This area is large enough that it can accommodate higher density populations (especially if Area 4 is already developed) but areas directly adjacent to Areas 7, 8 and 9 should have lower density populations as a buffer to protect the higher density areas.
	7	H	M	NFD	- Proximity to Area 8 and potential bushfire risk from south-west makes higher-density development inappropriate. - Low-density development is advised to manage the bushfire risk to adjacent areas, but the amount of native vegetation and associated habitat present means new development is unlikely be able to meet the planning requirements. - Existing development has exemptions for existing structures and can manage the land accordingly so maintaining the current properties is the best option to reduce ecological planning responses and ensure the bushfire risk does not increase.
	8	H	H	N/A	- Dense Woodland entirely outside the Growth Area - A boundary road around the Growth Area between Areas 7 and 8 is recommended to provide some separation from hazards to the south.
	9	M	M	NFD	- The risk is much lower than Areas 7 and 8 but there is still a pathway which could allow bushfire to enter the Growth Area from the south-west. - Low-density development is advised to manage the bushfire risk to adjacent areas, but the amount of native vegetation and associated habitat present means new development is unlikely be able to meet the planning requirements. - Existing development has exemptions for existing structures and can manage the land accordingly so maintaining the current properties is the best option to reduce ecological planning responses and ensure the bushfire risk does not increase.
	10	M	L	LDA	- Considering that only a small area is within the Growth Area, and it is separated from Greater Bendigo by the vegetated creek line, lower density development is more appropriate. - This development will account for the distance from more populated areas and also provide a buffer for future development further east which will be able to allow higher density development as a result of this buffer.
Allies Road, Myers Flat	1	M	M	NFD	The existing golf course provides an excellent management buffer from the north-eastern slopes, so no further action is required.
	2	M	M	LDA	- This area is in close proximity to more developed areas and has immediate access to main roads so it can safely accommodate a higher population. - The amount of native vegetation and associated habitat present however makes higher density development inappropriate however so low-density development similar to what is already present is advised.
	3	M	M	LDA	- This area is in close proximity to more developed areas and has immediate access to main roads so it can safely accommodate a higher population. - The amount of native vegetation and associated habitat present however makes higher density development inappropriate however so low-density development similar to what is already present is advised. - It is important to ensure that fuel levels do not increase as we also need to consider the risk to adjacent areas so rural properties should not be ruled out.
	4	L	L	HDA & LDA	- This area is well positioned to accommodate higher density development, especially if Area 7 is developed in a similar manner. - Lower density development is advised along the boundary with Area 6 however to provide a buffer from the vegetation within this area.
	5	M	L	N/A	An existing residential area outside the Growth Area
	6	H	M	NFD	This denser Woodland vegetation contains some dwellings but is native vegetation and associated habitat and the impacts from developing it or performing fuel management are too high to be considered feasible, so the best option is to leave it and manage adjacent areas in response.
	7	M	L	HDA & LDA	- This area is well positioned to accommodate higher density development with Allies Road and the farmland to the north providing adequate separation from bushfire hazards further north and the development of Areas 3 and 4 to the south providing additional protection. - Lower density development is advised along the boundary with Area 6 however to provide a buffer from the vegetation within this area.
	8	M	H	LDA	- This area is in close proximity to more developed areas and has immediate access to main roads so it can safely accommodate a higher population. - The amount of native vegetation and associated habitat present however makes higher density development inappropriate however so low-density development similar to what is already present is advised. - While the amount of native vegetation and habitat present does mean development should be limited, the risk this area poses to adjacent areas means some development should be considered.
	9	M	M	N/A	A patch of Woodland within a reserve which is entirely outside the Growth Area.
	10	M	L	HDA	- This area could accommodate higher density development considering the development, which is possible within Areas 2, 3, 7 and 8 along with the immediate access to main roads and proximity to Greater Bendigo. - The type of development which proceeds within Area 8 will determine the kind of buffers required within this area.
Calder Highway, Kangaroo Flat	1	M	L	HDA & LDA	- This area is well positioned to accommodate higher density development along the eastern side which separated from the vegetation to the west and has immediate access onto the Calder Highway. - Lower density development is advised along the boundary with Area 4 however to provide a buffer from the vegetation within this area.
	2	M	M	HDA & LDA	- This area is well positioned to accommodate higher density development along the eastern side which separated from the vegetation to the west and has immediate access onto the Calder Highway. This can be an extension of the existing residential development present - Lower density development is advised along the boundary with Area 3 and 4 however to provide a buffer from the vegetation within this area. - As some areas on the western side are already densely developed, management within Area 8 will need to be used to provide adequate separation.

Growth Area	Sub-area	Risk^	Hazard^	Response category*	Comments
	3	M	M	NFD	- This area contains native vegetation and associated habitat with some residential development and while managing this area is preferable to buffer Areas 1 and 2, the ecological impacts are considered to be too high. - Ensuring existing properties maintain their requirements under the BMO into the future will assist in reducing the hazard present.
	4	H	H	NFD	This area contains native vegetation and associated habitat (predominantly outside the Growth Area which should not have development placed within it, so the best option is to leave it and manage adjacent areas in response.
	5	M	M	N/A	Woodland and Coliban Water infrastructure which is entirely outside of the Growth Area.
	6	M	L	HDA & LDA	- This area is well positioned to accommodate higher density development along the eastern side which separated from the vegetation to the west and has immediate access onto the Calder Highway. - Lower density development is advised along the boundary with Area 4 however to provide a buffer from the vegetation within this area. This should also be considered to the south depending on how Area 5 is managed.
	7	M	M	HDA & LDA	- This area is well positioned to accommodate higher density development along the eastern side which separated from the vegetation to the west and has immediate access onto the Calder Highway. - Lower density development is advised along the boundary with Area 4 however to provide a buffer from the vegetation within this area. - Consideration is advised regarding the amount of native vegetation within this area despite the development also present and so development can proceed accordingly.
	8	M	M	LDA	- This area can still potentially have sufficient access to the Calder Freeway to accommodate higher density populations but the proximity to Area 4 along with the amount of vegetation present indicates a low-density population is more appropriate. - Development of this area will be a key factor as to whether higher population density is viable in Areas 1, 7 and 9.
	9	M	L	HDA	This area is well positioned to accommodate higher density development considering the immediate access to the Calder Highway. This will be dependent on how Areas 1, 7 and 8 are managed however.
	10	L	L	N/A	Areas along the Calder Highway which is entirely outside the Growth Area.
	11	L	L	N/A	- Urban development outside of the Growth Area. - This area is separated from the Growth Area by the Calder Highway and poses minimal threat as a result.
	12	L	L	N/A	- Woodland terrain outside of the Growth Area. - This area is separated from the Growth Area by the Calder Highway and poses minimal threat as a result.
	1	H	M	LDA	- The space between the vegetated terrain to the north-east and south-west is too narrow to consider lower density populations buffering higher density ones. - As there is already rural and low-density development present, this can continue without increasing the risk.
	2	H	H	NFD	- Most of this area is outside the Growth Area but some extends within it. - The native vegetation an associated habitat on these slopes is too high quality to manage so the best option is to leave it and manage adjacent areas in response.
Heathcote Township	3	H	H	NFD	- Most of this area is outside the Growth Area but some extends within it. - The native vegetation an associated habitat on these slopes is too high quality to manage so the best option is to leave it and manage adjacent areas in response. - Caution is advised for existing residences observed within this area as minimal support can be safely provided in an emergency unless the access conditions are improved.
	4	M	L	NFD	- The existing golf course provides an excellent management buffer from the north-eastern slopes, so no further action is required. - Removal of this golf course in favour of residential development is not advised considering the proximity to higher risk areas within Area 3.
	5	M	M	NFD	- The existing residential area is in close proximity to Area 3 but is also shielded by Area 4 and has good access, so the risk is reduced. - Lower density development would normally be advised here but since this development is already present, meets the requirements of the BMO and is not likely to be altered, it can be retained although increasing the number of lots is not advised.
	6	M	H	HDA	While there is the possibility of a grassfire from the north-west, this area can be considered the lowest risk area within the township and is suitable for a higher density population.
	7	H	H	NFD	- Most of this area is outside the Growth Area but some extends within it. - The native vegetation an associated habitat on these slopes is too high quality to manage so the best option is to leave it and manage adjacent areas in response. - Caution is advised for existing residences observed within this area as minimal support can be safely provided in an emergency unless the access conditions are improved.
	8	H	M	LDA	- This area already contains rural properties and scattered residential development and, unlike Area 1, has enough space to allow for more development. - Focusing a lower population here provides a buffer for Areas 5 and 6 with a lower population being able to easily evacuate into Heathcote or to the west towards Bendigo without increasing the strain on existing services.
	9	M	L	HDA	The town centre is buffered by development within Area 5 and paddocks within Area 10 and already contains the majority of the towns infrastructure so it can handle an increased population.
	10	M	L	LDA	This area is primarily open paddocks which could support higher density residential development but they're also directly adjacent to the bushfire hazard to the south-west and need to provide a buffer for the developed areas within Area 9.
	11	H	M	NFD	- Contains an existing reserve which, considering the native vegetation and associated habitat present, cannot be managed to reduce the fuel levels present. - The best option is to leave it and manage adjacent areas in response.
	12	H	M	NFD	- This area contains unique terrain and native vegetation an associated habitat, so management to reduce the fuel levels is not advised. - There is some development present which has exemptions to manage fuel levels so maintaining the current properties is the best option to reduce ecological planning responses and ensure the bushfire risk does not increase.
	13	M	M	N/A	An existing vineyard entirely outside the Growth Area.
	14	H	M	N/A	A patch of Woodland entirely outside the Growth Area.
	15	H	M	LDA	- The space between the vegetated terrain to the north-east and south-west is too narrow to consider lower density populations buffering higher density ones. - As there is already rural and low-density development present, this can continue without increasing the risk to surrounding areas.

Growth Area	Sub-area	Risk^	Hazard^	Response category*	Comments
McIvor Highway, Junortoun	1	M	M	N/A	A patch of Woodland entirely outside the Growth Area.
	2	M	L	N/A	- Residential and urban development entirely outside the Growth Area. - The development and fuel management observed does create an appropriate buffer for higher density development within Area 10.
	3	M	M	N/A	A patch of Woodland entirely outside the Growth Area.
	4	M	M	N/A	- A patch of high-density residential development entirely outside the Growth Area. - The development and fuel management observed does create an appropriate buffer for higher density development within Area 10.
	5	M	M	N/A	- A patch of low-density residential development entirely outside the Growth Area. - The development and fuel management observed does create an appropriate buffer for higher density development within Area 10.
	6	M	H	NFD	- This area contains native vegetation and associated habitat within private property so installing any new development will result in potentially unacceptable ecological impacts. - There is an existing development present within this area which will have exemptions to manage fuel levels so maintaining the current properties is the best option to reduce ecological planning responses and ensure the bushfire risk does not increase.
	7	M	H	NFD	- Contains an existing reserve which, considering the native vegetation and associated habitat present, cannot be managed to reduce the fuel levels present. - The best option is to leave it and manage adjacent areas in response.
	8	M	M	LDA	- Bushfire can approach this area from the north-west through the large Woodland patch or the south-west through vegetated low-density residential properties so higher density development is not advised. - Considering the adjacent development and the development already present, low-density residential is an acceptable option which will also reduce the ecological impact as opposed to higher density development.
	9	H	H	N/A	- Contains a large Woodland patch and Commonwealth (military) land entirely outside the Growth Area. - The best option is to leave it and manage adjacent areas in response. A main road along the northern boundary of the Growth Area would assist in reducing this risk.
	10	M	L	HDA	- Despite being immediately adjacent to higher risk areas within Area 9, there is management present within this Woodland and a higher population can be considered acceptable as long as proper separation is maintained. - The area also has immediate and safe access to Greater Bendigo so the increased population should not increase the strain on emergency services.
Lockwood Road Kangaroo Flat	1	H	H	NFD	- This area is predominantly outside the Growth Area but there is an area within it which is also native vegetation an associated habitat which will have limited clearing options. - There is an existing development present within this area which will have exemptions to manage fuel levels so maintaining the current properties is the best option to reduce ecological planning responses and ensure the bushfire risk does not increase. - Another option is to leave it and manage adjacent areas in response. A main road along the western boundary of the Growth Area would assist in reducing this risk.
	2	H	H	NFD	- This area contains some low-density residential development and farmland but is predominantly covered in native vegetation an associated habitat which is potentially too high-quality to manage for fuel reduction. - There is an existing development present within this area which will have exemptions to manage fuel levels so maintaining the current properties is the best option to reduce ecological planning responses and ensure the bushfire risk does not increase.
	3	H	L	LDA	- This area contains open farmland which provides an excellent buffer for the properties to the east. - The risk too it is too higher to allow for a higher population, so a lower population is advised and is feasible as long as immediate access onto Lockwood Road is present. - It is essential that the fuel hazard does not increase significantly so larger lots focused on rural uses as opposed to low-density residential is advised.
	4	M	M	LDA	- As with Area 3, this area contains farmland which buffers the development further east but there is more vegetation present which increase the hazard. - The risk too it is too higher to allow for a higher population, so a lower population is advised and is feasible as long as immediate access onto Lockwood Road is present. - Considering the vegetation present, low-density residential areas are advised here as they provide greater opportunity of maintaining native vegetation and associated habitat within lots while also providing fuel management (this will be dependent on the ecological values present).
	5	H	H	NFD	- This area contains some low-density residential development and farmland but is predominantly covered in native vegetation an associated habitat which is potentially too high-quality to manage for fuel reduction. - There is an existing development present within this area which will have exemptions to manage fuel levels so maintaining the current properties is the best option to reduce ecological planning responses and ensure the bushfire risk does not increase.
	6	M	L	N/A	- An industrial area entirely outside the Growth Area. - This type of development is a good example of alternative low population development as it creates a large area of managed terrain with a greater guarantee of being unoccupied during a bushfire event.
	7	L	L	HDA	- The immediate access to areas of Greater Bendigo to the east along with the buffer provided by development to the south and potential low-density residential areas to the west means a higher population is an option here. - This will be dependent on whether low-density development can be placed within Area 4 with the ecological conditions present.
	8	L	L	N/A	An existing higher density residential area entirely outside of the Growth Area.
	9	L	M	N/A	A residential area outside of the Growth Area.
	10	M	M	N/A	A residential area outside of the Growth Area.

Growth Area	Sub-area	Risk^	Hazard^	Response category*	Comments
Sparrowhawk Road Maiden Gully	1	H	H	NFD	- A bushfire within this area could threaten adjacent existing residential areas so developing to reduce the risk is preferable but the access conditions (a single point to the South) make the risk to new developments unacceptable. - The ecological impacts from development within this area are also unacceptable.
	2	H	M	LDA	- This area contains native vegetation an associated habitat but is also managed farmland and low-density residential so the impact can be mitigated. - Development in this can be considered appropriate as there is access along the northern and southern sides. - Development within this area will also reduce the risk to the existing residential areas within Area 4.
	3	H	M	N/A	Existing low-density residential areas and rural areas entirely outside of the Growth Area.
	4	M	L	N/A	Partially constructed high density residential areas entirely outside of the Growth Area.
	5	H	H	N/A	Lower density residential areas entirely outside of the Growth Area.
	6	H	M	N/A	- High density residential areas entirely outside of the Growth Area. - Additional caution is advised within this area and the areas to the west considering their high-risk surroundings.
Olympic Parade Maiden Gully	1	H	H	NFD	This area contains high quality Woodland with very few developments present so the ecological impacts for installing these developments and the necessary infrastructure to support/protect them is not feasible.
	2	H	L	NFD	This single dwelling was built recently and is therefore likely to be compliant with the BMO but there is not an enormous amount of expansion possible considering ecological impacts
	3	M	L	N/A	An area of managed farmland outside the Growth Area
Olympic Parade Maiden Gully	4	M	L	N/A	An area of residential land outside the Growth Area.
	5	M	M	N/A	An area of residential land outside the Growth Area.
	6	H	L	LDA (northern end only)	Considering the amount of vegetation to the east and west of this paddocked area, a lower population is the only safe development, and this should be focused on the northern end of this area where there is access onto a main road and into more residential areas.
	7	H	M	NFD	- This area of low-density residential and rural properties covers a large enough area that low-density development could be feasible but the lack of access along with the bushfire hazards present on several sides make any development irresponsible. - Development within this area should be considered on a smaller scale and on a case-by-case basis.
	8	H	M	NFD	- This area of open farmland is a significant distance from any developed areas which could provide access/egress and the infrastructure required to make it feasible will result in too high an ecological impact. - Development within this area should be considered on a smaller scale and on a case-by-case basis.
	9	H	M	NFD	While this area does have direct access onto a main road, there is still dense vegetation present on all sides so directing a higher population is considered to be irresponsible.
	10	M	M	LDA (adjacent to Wicks Road and Olympic Parade only)	There is still too much vegetation to the west to consider a higher density population, but this area does have immediate access to a main road and is closer to lower risk areas to the north and south and considering the amount of development already present, a low-density population focused around the main roads is feasible.
	11	M	L	N/A	An area of residential land outside the Growth Area.
	12	H	M	NFD	- Unlike Area 10, this area has a significantly higher ratio of native vegetation and associated habitat compared to developed areas and, while there are boundary roads present, there is not enough road access internally to consider a higher population as the development required to install it would create an unacceptable ecological impact. - Development within this area should be considered on a smaller scale and on a case-by-case basis.
	13	M	L	N/A	An area of residential land outside the Growth Area.
	14	M	L	N/A	An area of residential land outside the Growth Area.
Ravenswood Run	1	L	L	N/A	An existing low-density residential area entirely outside of the Growth Area.
	2	L	L	LDA	- While this area could potentially support a higher density population, a lower density population is more 'in-line' with the existing developments and accounts for any risk from Area 3 of the vegetated areas to the south. - Paddocks do not appear to have native vegetation present but need to be mindful of native grasslands and survey them accordingly.
	3	M	L	NFD	Densely vegetated slopes to north which will be difficult to develop, have too high an ecological rating and would create unnecessary risk so not developing them at all is advised.
	4	L	L	N/A	While sections of this area are within the Growth Area, it is the area covering the Calder Highway so no actions outside of managing the road to its current condition are advised.
	5	L	L	HDA & LDA	- While a buffer of lower-density development such as low-density residential or rural properties is advised at the northern end of this area to account for any risk from Area 6, the remaining areas are suitable for higher density populations along with the infrastructure required to sustain them (schools, medical facilities, etc.). All of the risk present comes from the north and there is plenty of room to mitigate this. - If a town centre is considered here or within Area 7, a Neighbourhood Safer Place is recommended to reduce the risk or residents seeking shelter to the north. - Paddocks do not appear to have native vegetation present but need to be mindful of native grasslands and survey them accordingly.
	6	M	L	NFD	Densely vegetated slopes to north which will be difficult to develop, have too high an ecological rating and would create unnecessary risk so not developing them at all is advised.

Growth Area	Sub-area	Risk^	Hazard^	Response category*	Comments
Simpsons Road Eaglehawk	7	L	L	HDA & LDA	- While a buffer of lower-density development such as low-density residential or rural properties is advised at the northern end of this area to account for any risk from Area 6, the remaining areas are suitable for higher density populations along with the infrastructure required to sustain them (schools, medical facilities, etc.). All of the risk present comes from the north and there is plenty of room to mitigate this. - If a town centre is considered here or within Area 5, a Neighbourhood Safer Place is recommended to reduce the risk or residents seeking shelter to the north. - Paddocks do not appear to have native vegetation present but need to be mindful of native grasslands and survey them accordingly.
	1	M	M	HDA & LDA	While a buffer of lower-density development such as low-density residential or rural properties is advised at the northern and eastern ends of this area to account for any risk from Area 5, the remaining areas are suitable for higher density populations considering the immediate access to main roads and more developed areas to the south.
	2	H	M	LDA	This area has immediate access to more developed areas to the south and could potentially accommodate a higher density population on the southern side, but the amount of native vegetation and associated habitat present within farmland indicates that ecological impacts will be too high and lower density development is more appropriate.
	3	H	M	LDA	This area contains open farmland, so the ecological impact is reduced but there is dense Woodland to the north-east and south-west and a lot of uncertainty regarding Area 4 to the north so low-density development is advised.
	4	H	M	NFD	- This area contains a lot of native vegetation and associated habitat amongst scattered residential and rural development so any development may have to contend with a high ecological impact. - The area is also surrounded by vegetation to the north, east and west and has limited access present so any development would require a significant amount of infrastructure to be considered safe which is not considered feasible with the ecological values present. - Development within this area should be considered on a smaller scale and on a case-by-case basis.
	5	H	H	N/A	Woodland areas entirely outside of the Growth Area.
	6	L	L	N/A	Residential areas entirely outside of the Growth Area.
	7	M	L	N/A	Low-density residential areas entirely outside of the Growth Area.
	8	M	L	N/A	Residential areas entirely outside of the Growth Area.
Strathfieldsaye South-East	9	M	L	HDA	Despite the proximity to Area 5, the development of Areas 2 and 3 along with proper setbacks from the western boundary should allow for higher density development as observed in the terrain to the south.
	1	M	L	NFD	- This area is mostly outside of the Growth Area but consists of low-density residential amongst dense vegetation. - This area should remain in its current condition to avoid unnecessary ecological impacts and no action is required within this area to address the bushfire risk (sufficient space within Area 2 to provide adequate separation and protection measures).
	2	L	L	HDA	- This area is well separated from the bushfire threats to the west and is adjacent to other high density residential and farmland so it can easily handle a higher population. - The area is also large enough to provide adequate protection from the hazards present within Areas 1 and 3 so no buffer of lower density development is required.
	3	M	M	NFD	This area contains open Woodland within a reserve so there is existing protection and minimal need to reduce the bushfire risk as it is well separated from bushfire hazards to the west so any bushfire hazards can be addressed through town planning within Areas 2 and 5.
	4	M	M	NFD	- This area contains low-density residential development amongst Woodland vegetation. There is minimal need to contain this hazard considering how separated it is from the vegetation to the west and any hazard can be contained through town planning within Area 5. - This area could support a higher density population, but the existing residences appear to be well established and the ecological impacts of listing this space for a denser population are unnecessary so development within this area should be considered on a smaller scale and on a case-by-case basis.
	5	L	L	HDA	- This area is well separated from the bushfire threats to the west and is adjacent to other high density residential and farmland so it can easily handle a higher population. - The area is also large enough to provide adequate protection from the hazards present within Areas 3, 4 and 7 so no buffer of lower density development is required.
	6	M	L	N/A	Farmland areas entirely outside of the Growth Area.
	7	M	M	LDA	This area does contain native vegetation and associated habitat across farmland and low-density residential development but is also directly adjacent to larger bushfire hazards to the west so developing this area with a low-density population as a buffer for the higher density development within Area 5 is considered the responsible approach.
	8	H	H	NFD	- This area contains dense Woodland vegetation with scattered residential development present throughout. The ecological impact is too great to consider further development within this area and the low-density development proposed within Areas 7 and 9 can address the risk present. - Development within this area should be considered on a smaller scale and on a case-by-case basis.
	9	M	L	LDA	This area does contain native vegetation and associated habitat across farmland and low-density residential development but is also directly adjacent to larger bushfire hazards to the west so developing this area with a low-density population as a buffer for the higher density development within Area 5 is considered the responsible approach.
	10	H	H	NFD	- Residential and Woodland areas entirely outside of the Growth Area. - Tannery Lane and management within the low-density development within Area 9 should address any risk this area poses.
Watson Street White Hills	11	L	L	N/A	Residential areas entirely outside of the Growth Area.
	1	M	L	N/A	Farmland areas entirely outside of the Growth Area.
	2	M	L	HDA	Despite the proximity to the high-risk areas within Area 17, this area is directly adjacent to dense residential/urban development and has access to the north and east so a higher density population is advised, and the risk can be mitigated through town planning.
	3	M	M	LDA	While this area could potentially support a higher-density population, the amount of native vegetation present makes a lower-density population more appropriate as there is infrastructure present, and the layout of this development can be conscious of the ecological values present.
	4	M	L	N/A	Residential areas entirely outside of the Growth Area.
	5	M	L	LDA	This area is similar to Area 2 and could potentially support a higher-density population but, unlike Area 2 which has farm and a main road to the north, there is a longer run to the north-west where a bushfire could approach from and, considering how narrow this area is, having it as a low-density area provides a buffer for the development within Area 4.

Growth Area	Sub-area	Risk [^]	Hazard [^]	Response category [*]	Comments
	6	M	M	HDA or LDA	- This area is wide enough to provide for higher-density population on the eastern side and a lower-density population on the western side to provide a buffer, but this amount of native vegetation and associated habitat present indicates clearing options are greatly limited. - There is scattered development and some cleared areas throughout this patch which indicate the ecological value may be lower than projected but this needs to be confirmed prior to any change in zoning or development plans.
	7	M	L	HDA or LDA	- This area could be developed one of two ways depending on the adjacent areas. If the ecological impact is low enough to allow a higher-density population on the eastern side of Areas 6 and 8 then some or all of this farmland could be developed to support a higher density population as the hazard from the north-west is mitigated by the residential development in this direction. - If Areas 6 and 8 cannot support a higher density development or minimal development because of the ecological values present, then it is too risky to have a higher-density population in this area since it will be isolated from other higher density areas.
	8	M	M	HDA or LDA	- This area is wide enough to provide for higher-density population on the eastern side and a lower-density population on the western side to provide a buffer, but this amount of native vegetation and associated habitat present indicates clearing options are greatly limited. - There is scattered development and some cleared areas throughout this patch which indicate the ecological value may be lower than projected but this needs to be confirmed prior to any change in zoning or development plans.
	9	M	M	N/A	Low-density residential areas outside of the Growth Area.
	10	L	L	N/A	Residential areas entirely outside of the Growth Area.
	11	M	M	LDA (dependent of the ecological values present)	- This area is at a lower risk due to the development to the north-west which prevents a bushfire front from moving through it from this aspect so it could support a higher density population as a part of the development within Area 14, but the amount of native vegetation and associated habitat present means this is not feasible. - A lower-density population is therefore advised, and this will be entirely dependent on the ecological factors present as there will be management to install the required infrastructure.
	12	M	L	N/A	Woodland areas entirely outside of the Growth Area.
	13	M	M	LDA (dependent of the ecological values present)	- A bushfire could potentially approach the Growth Area from the south-west through Area 13 which would threaten the majority of the remaining areas present, so some development is advised. - A lower-density population is therefore advised, and this will be entirely dependent on the ecological factors present as there will be management to install the required infrastructure.
	14	L	L	N/A	Partially constructed residential areas entirely outside of the Growth Area.
	15	L	M	N/A	Woodland areas entirely outside of the Growth Area.
	16	M	L	N/A	Partially constructed residential areas entirely outside of the Growth Area.
	17	H	M	N/A	Woodland areas entirely outside of the Growth Area.

Table Legend:

- [^] Risk and Hazard – L: Low; M: Moderate; H: High
- ^{*} Response Category – HDA: • High-density appropriate; LDA: Low-density appropriate; NFD: • No further development advised; N/A: Not applicable.

Areas which are 'N/A' are relatively straightforward in that they are outside the scope of this study, but have been included since future development within the proposed Growth Areas will need to factor in everything within 150m which has now been considered and accounted for. Areas recommended for high-density development are similarly straightforward from a bushfire safety standpoint, although a detailed assessment of ecological values within these areas is still required to account for native vegetation. It is still most likely however that development at a high-density in these areas can most likely proceed from a bushfire perspective as long as the standards under the BMO and Clause 13.02-1S are met. The remaining recommendations require some additional consideration.

As mentioned previously, a lower-density population is recommended for areas adjacent to bushfire fronts as this will result in an area with access that meets CFA requirements; have a lower population that can evacuate quickly and result in less hindrance for emergency services; and result on properties which are better equipped to withstand a bushfire front (managed farmland and horse paddocks, large properties with managed gardens, or industrial or warehouse developments which result in large paved areas with minimal vegetation). It will still need to be made clear where these are located and how appropriate they are considering the ecological values of these areas and constraints associated with the attainment of at least State, if not Federal level offsets for native vegetation and/or habitat removal.

These lower density areas could be established in places such as Huntly East or Ravenswood Run where lower density areas naturally lead into higher density areas further from the hazard (the width of lower density development required will need to be determined on a case-by-case basis where both high- and low-density development is advised). The fact that an area is suitable for higher populations also aligns with relatively lower ecology-related issues, resulting in potentially less restriction on the types of development as long as they result/support the high or low population aim. Some areas need to consider the ecology more carefully, however.

Areas in which only a low-population density is advised are considered as such because the risk to them is too great (areas within Heathcote), it is beneficial to have the buffer to protect more suitable areas and/or the ecological values present cannot allow for excessive management (areas within Lockwood Road, Kangaroo Flat for example). The kind of management also needs to be considered here as developments like farmland or industrial are potentially only suitable where the ecological values are low while areas with any available habitat strategically designed around to accommodate low-density residential properties with minimal impact. Although there are scenarios where even this is not a possibility.

Many areas have been recommended to have no further development. This includes areas containing nothing but native vegetation in patches and associated habitat (reserves within the Heathcote Township Growth Area and the vegetated slopes at the northern end of the Ravenswood Run Growth Areas are good examples of these) or areas which are primarily comprised of such ecological values (areas within Lockwood Road, Kangaroo Flat and Sparrowhawk Road, Maiden Gully). These areas are normally connected to large, vegetated areas which present a higher risk, so the amount of clearing required to make them acceptable low-density areas will result in too high an impact from an ecological perspective, so the best thing to do is focus on the adjacent areas to reduce the hazard.

This does not mean that the risk will remain high however, especially for areas with development already present. Maintaining the current zoning and preventing further subdivision will mean any development will be focused on the existing structures which can be exempted under Clause 52.12 Bushfire Protection: Exemptions; to create defendable space, install better access and maintain fence lines with fuel breaks. Having adjacent development will also result in more development within these properties which will need to address the BMO and meet the requirements of Clause 52.17 which will be much easier for individuals than at the municipal planning scale.

In terms of the areas which can be developed, the following items need to be considered. This applies to high- and low-density recommended areas although the placement of high-density areas and the placement of buffering low-density areas around them will make implementing these items much simpler:

- Based on the recommendations detailed above, a clear list of areas within the Growth Areas which can and cannot be developed needs to be developed. Areas which cannot be developed require little to no changes to their current planning requirements or zoning, but this does not mean individual applications should be automatically dismissed (although information regarding inappropriate developments should be considered and provided). It is just better to have these applications considered individually as conditions change, as opposed to part of a more general growth strategy.
- The kinds of low-density development will need to be reviewed based on the areas. Developments which are likely to result in more clearing (farming, industry, etc.) can be focused on areas with minimal ecological features while low-density residential and other developments which are more likely to retain habitat can be focused on areas which are more likely to have vegetation present.
- Proper access is essential for emergency services and can also be utilised to ensure the proper separation is present from vegetation patches. The proposed arrangement of higher density areas surrounded by lower density areas means it is unlikely that a higher density area will be directly adjacent to a bushfire hazard but, if this is the case, classifying the vegetation and the slope will provide all of the information required to provide the appropriate setback and subsequent planning can ensure a boundary road and managed park or similar can be present. For lower-density areas, boundary roads will be sufficient and larger lot sizes can account for any excess separation required.
- Ensuring BAL-12.5 is achievable for any new development can be easily enforced through Clause 13.02-1S but, outside of residential development and for small subdivisions, this can be harder to enforce. A schedule to the BMO which requires all new developments to prove that BAL-12.5 is attainable is an option as applicants can potentially apply for an exemption on a case-by-case basis which can include ecological impacts while the remainder can have their applications streamlined by simply complying with the schedule.
- An adequate water supply is the last factor which need to be considered and will be based on the development present. Higher density areas will have smaller lots and more infrastructure so the water supply and hydrant requirements under the BMO will be sufficient. Lower-density areas should be considered on a case-by-case basis with a BMO schedule having the potential of changing the water supply requirements based on the developments. This will primarily allow larger lots in low-density residential areas with hydrants to have a reduced water supply

requirement which will match the risk present and make things easier for developers and future landowners.

- Ensuring adequate information is available will be essential in ensuring that this process can proceed smoothly. The CFA can distribute details regarding the bushfire risk and community meetings discussing the usage and limitations within areas can be held. Ensuring that all parties are aware of the potential uses and restrictions along with the reasoning behind them will reduce the number of inappropriate proposals and applications in the future as well as reducing the potential for priorities not aligning between Council and the public.

5.3 Summary

As highlighted above, the ecological values present across the proposed Growth Areas along with bushfire risk present both opportunities and threats to proposed development within these areas. While some development may be feasible in certain locations across each Growth Area, the intensity of development requires consideration along with a balance between the need to avoid and minimise impacts on native vegetation, and ecological values in general.

Table 19 aims to provide an overall summary of the potential for development within each of the Growth Areas by combining the results of the ecological and bushfire assessment components of this study. This culminates in an overall assessment of the potential difficulty of meeting bushfire risk requirements while managing ecological values in the context of relevant policy and legislative constraints.

Table 19. Opportunities, Constraints and Recommendations Summary

Growth Area	Ecological Values	Bushfire Risk	Overall development potential
Huntly East	22% of Growth Area contains Native Vegetation Patches 419 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units - Offsets at a Federal level and other approvals may be required	Some sub-areas across Growth Area marked for possible high-density and low-density development, although development is not recommended in some areas due to ecological values and bushfire risk	- Broad scale development across this entire Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - While this is the case, there is still potential for future growth to occur within the Huntly East Growth Area particularly to the north-east where ecological values and bushfire risk are less significant. This includes the potential for high-density development in this area. - In comparison to the other Growth Areas investigated as part of this study at least some development within the Huntly East Growth Area is likely feasible from an ecological and bushfire perspective.
Allies Road, Myers Flat	47% of Growth Area contains Native Vegetation Patches 349 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	Some sub-areas across Growth Area marked for possible high-density and low-density development, although development is not recommended in some areas due to ecological values and bushfire risk	- Broad scale development across this entire Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - While this is the case, there is still potential for some future growth to occur within the Allies Road Growth Area in areas without, or with lower level, ecological values present. This includes the potential for high-density development in some areas. Low-density development may also be appropriate but only through ongoing planning that facilitates impacts to ecological values being avoided and minimised as much as possible. - In comparison to the other Growth Areas investigated as part of this study at least some development within the Allies Road Growth Area could occur but will be restricted in its extent to avoid and minimise impacts on ecological values and manage for bushfire risk.
Calder Highway, Kangaroo Flat	44% of Growth Area contains Native Vegetation Patches 75 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are at this stage General Habitat Units only and may be possible to obtain easier than Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	Some sub-areas across Growth Area marked for possible high-density and low-density development, although development is not recommended in some areas due to ecological values and bushfire risk	- Broad scale development across this entire Growth Area will result in State level native vegetation offset requirements although no Species Units area triggered based on a "worst-case scenario". Other approvals and requirements from an ecological perspective may however prove more prohibitive. - There is potential for some future growth to occur within the Calder Highway Growth Area within areas without, or with lower level, ecological values present. This includes the potential for high-density development in some areas. Low-density development may also be appropriate but only through ongoing planning that facilitates impacts to ecological values being avoided and minimised as much as possible. - In comparison to the other Growth Areas investigated as part of this study at least some development within the Calder Highway Growth Area could occur but should still be restricted in its extent to avoid and minimise impacts on ecological values and manage for bushfire risk.

Preliminary Ecological and Bushfire Risk Assessment for 12 Potential Growth Areas

Growth Area	Ecological Values	Bushfire Risk	Overall development potential
Heathcote Township	34% of Growth Area contains Native Vegetation Patches 758 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	Some sub-areas across Growth Area marked for possible high-density and low-density development, although development is not recommended in some areas due to ecological values and bushfire risk	- Broad scale development across this entire Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - While this is the case, there is still potential for some future growth to occur within the Heathcote Township Growth Area within areas without, or with lower level, ecological values present. This includes high-density development in some areas. Low-density development may also be appropriate but only through ongoing planning that facilitates impacts to ecological values being avoided and minimised as much as possible. - In comparison to the other Growth Areas investigated as part of this study at least some development within the Heathcote Township Growth Area could occur but will be restricted in its extent to avoid and minimise impacts on ecological values and manage for bushfire risk.
Mclvor Highway, Junortoun	37% of Growth Area contains Native Vegetation Patches 279 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	One sub-areas across Growth Area marked for possible high-density and one low-density development; development is not recommended in some areas due to ecological values and bushfire risk	- Broad scale development across this entire Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - While this is the case, there is still potential for some future growth to occur within the Mclvor Highway Growth Area within areas without, or with lower level, ecological values present. This includes high-density development in some areas. Low-density development may also be appropriate but only through ongoing planning that facilitates impacts to ecological values being avoided and minimised as much as possible. - In comparison to the other Growth Areas investigated as part of this study at least some development within the Mclvor Highway Growth Area could occur but will be restricted in its extent to avoid and minimise impacts on ecological values and manage for bushfire risk.
Lockwood Road Kangaroo Flat	60% of Growth Area contains Native Vegetation Patches 41 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	One sub-area across Growth Area marked for possible high-density and two for low-density development; development is not recommended in some areas due to ecological values and bushfire risk	- Broad scale development across this entire Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - While this is the case, there is still potential for some future growth to occur within the Mclvor Highway Growth Area within areas without, or with lower level, ecological values present. This includes high-density development in some areas. Low-density development may also be appropriate but only through ongoing planning that facilitates impacts to ecological values being avoided and minimised as much as possible. - In comparison to the other Growth Areas investigated as part of this study the scale of development that may be achievable across the Lockwood Road Growth Area is likely to be less given the amount of native vegetation that is present and the offsets likely to be triggered by the removal of this native vegetation; while development could occur it will need to be restricted in its extent to avoid and minimise impacts on ecological values and manage for bushfire risk.

Preliminary Ecological and Bushfire Risk Assessment for 12 Potential Growth Areas

Growth Area	Ecological Values	Bushfire Risk	Overall development potential
Sparrowhawk Road Maiden Gully	86% of Growth Area contains Native Vegetation Patches 42 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	One sub-area across Growth Area marked for possible low-density development; development is not recommended in some areas due to ecological values and bushfire risk	- Due to the high cover of native vegetation, even a moderate level of development within this Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - Given the cover of native vegetation across this Growth Area, only low-density development in one area of the site may be appropriate which would need to be completed still in a manner that ensures ecological values being avoided and minimised as much as possible. - In comparison to the other Growth Areas investigated as part of this study the scale of development that may be achievable across the Sparrowhawk Road Growth Area is likely to be far less given the amount of native vegetation that is present and the offsets likely to be triggered by the removal of this native vegetation; while development could occur it will need to be restricted in its extent to avoid and minimise impacts on ecological values and manage for bushfire risk, as well as ensuring that Species Units are reduced to a level where they are realistic to obtain.
Olympic Parade Maiden Gully	87% of Growth Area contains Native Vegetation Patches 130 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	Development is not recommended within this Growth Area due to ecological values and bushfire risk	- Due to the high cover of native vegetation, even a moderate level of development within this Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - Given the cover of native vegetation across this Growth Area, future development is not recommended given the ecological values present and the levels of bushfire risk within this Growth Area.

Preliminary Ecological and Bushfire Risk Assessment for 12 Potential Growth Areas

Growth Area	Ecological Values	Bushfire Risk	Overall development potential
Ravenswood Run	46% of Growth Area contains Native Vegetation Patches 641 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	Some sub-areas across Growth Area marked for possible high-density and low-density development, although development is not recommended in some areas due to ecological values and bushfire risk	- Broad scale development across this entire Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - While this is the case, there is still potential for some future growth to occur within the Ravenswood Run Growth Area within areas without, or with lower level, ecological values present. This includes high-density development in some areas. Low-density development may also be appropriate but only through ongoing planning that facilitates impacts to ecological values being avoided and minimised as much as possible. - In comparison to the other Growth Areas investigated as part of this study the scale of development that may be achievable across the Ravenswood Run Growth Area is likely to be far less given the amount of native vegetation that is present and should be restricted to areas without native vegetation patches where Scattered Trees can be managed in the context of proposed development; while development could occur it will still need to avoid and minimise impacts on ecological values and manage for bushfire risk, as well as ensuring that Species Units are reduced to a level where they are realistic to obtain..
Simpsons Road, Eaglehawk	60% of Growth Area contains Native Vegetation Patches 111 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	Some sub-areas across Growth Area marked for possible high-density and low-density development, although development is not recommended in some areas due to ecological values and bushfire risk	- Broad scale development across this entire Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - While this is the case, there is still potential for some future growth to occur within the Simpsons Road Growth Area within areas without, or with lower level, ecological values present. This includes high-density development in some areas. Low-density development may also be appropriate but only through ongoing planning that facilitates impacts to ecological values being avoided and minimised as much as possible. - In comparison to the other Growth Areas investigated as part of this study at least some development within the Simpsons Road Growth Area could occur but will be restricted in its extent to avoid and minimise impacts on ecological values and manage bushfire risk.
Strathfieldsaye South-East	23% of Growth Area contains Native Vegetation Patches 375 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	Some sub-areas across Growth Area marked for possible high-density and low-density development, although development is not recommended in some areas due to ecological values and bushfire risk	- Broad scale development across this entire Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - While this is the case, there is still potential for future growth to occur within the Strathfieldsaye South-East Growth Area particularly where ecological values and bushfire risk are reduced. This includes high-density development along with low-density development as appropriate and can be managed in the context of avoiding and minimising ecological impacts. - In comparison to the other Growth Areas investigated as part of this study at least some development within the Strathfieldsaye South-East Area is likely feasible from an ecological and bushfire perspective.

Preliminary Ecological and Bushfire Risk Assessment for 12 Potential Growth Areas

Growth Area	Ecological Values	Bushfire Risk	Overall development potential
Watson Street White Hills	75% of Growth Area contains Native Vegetation Patches 96 Scattered Trees documented - FFG Act and EPBC Act Communities and Species likely present or supported - High Ecological Value based on CoGB Scoring System "Worst-case scenario" approach to native vegetation removal leads to State level offsets under Clause 52.17 that are unlikely to be obtainable with regards to Species Units as per other Growth Areas - Offsets at a Federal level and other approvals may be required	Some sub-areas across Growth Area marked for possible high-density and low-density development, although development is not recommended in some areas due to ecological values and bushfire risk	- Due to the high cover of native vegetation, even a moderate level of development within this Growth Area is likely to result in offsets at a State level for native vegetation removal that cannot be obtained. Other approvals and requirements from an ecological perspective may also prove prohibitive. - While this site is suitable for high or low density development, particularly given its content amidst already developed areas, the level of native vegetation is cover across this Growth Area is relatively high. While development potential is presented, the risks associated with obtaining offsets under Clause 52.17 may outweigh the potential for high-density development within this Growth Area. If low-density development occurs sites should be large enough to allow for the management of native vegetation within individual lots while also considering the need to manage for bushfire risk. - In comparison to the other Growth Areas investigated as part of this study the scale of development that may be achievable across the Watson Street Growth Area is likely to be far less given the amount of native vegetation that is present and the offsets likely to be triggered by the removal of this native vegetation; while development could occur it will need to be restricted to avoid and minimise impacts on ecological values and manage for bushfire risk, as well as ensuring that Species Units are reduced to a level where they are realistic to obtain.

As outlined in Table 19, the only Growth Area where future development is not recommended is Olympic Parade, Maiden Gully. This potential Growth Area has a very high cover of native vegetation, and its amidst large areas of bushland presents higher level bushfire risks.

For the remaining eleven Growth Areas, there is at least some development potential across most of these although it should be restricted in its extent to avoid and minimise ecological impacts while implementing strategic bushfire planning. This includes selected areas more suitable for higher-density development from a bushfire perspective as also highlighted in Table 18 above, and those where growth could occur but at a lower-density to not only manage bushfire risk, but reduce impacts to ecological values.

Overall, large scale development across any of the Growth Areas that would see broad-scale removal of ecological values is not recommended, particularly given the quantity and type of offsets required for native vegetation at a State level that would be required. Note here however that even smaller-scale developments at refined locations within each of these Growth Areas may still result in at least State level native vegetation offsets. Where Species Units are triggered, their attainment may prove difficult. Establishing offset sites specifically with the purposes of meeting offset requirements is an option to consider exploring in the early phases of future planning to cover such State (and potentially Federal) level offsets.

Approvals and requirements in relation to other Federal and State policy and legislation – outside of Clause 52.17 – as relevant to ecology also needs to be considered and explored further, particularly given the potential for impacts to MNES to be deemed ‘significant’ under the EPBC Act, for other communities and species listed at a State and/or Federal level to also be impacted by future development. The potential for an EES to be required should impacts to biodiversity be substantial enough also requires consideration. .

As highlighted throughout this study, detailed ecological and bushfire risk assessments will be required where the CoGB wishes to further explore future development within the proposed Growth Areas. It is essential that as in this study, ecology and bushfire risk are considered simultaneously and with collaborative planning, in order to ensure best practice outcomes from both perspectives. This will include refinement of approvals and requirements associated with both ecology and bushfire risk.

REFERENCES

- CFA (2017) *Guidelines for remote outlets on water tanks in the Bushfire Management Overlay*. CFA, CFA.
- CoGB & SoC (2009) *North Central Biolinks Principles and Approaches*. City of Greater Bendigo & Shire of Campaspe.
- DELWP (2017a) *Assessor's Handbook – Applications to remove, destroy or lop native vegetation*. Department of Environment, Land, Water and Planning, Government of Victoria, Melbourne.
- DELWP (2017b) *Exemptions from requiring a planning permit to remove, destroy or lop native vegetation – Guidance*. Department of Environment, Land, Water and Planning, Government of Victoria, Melbourne.
- DELWP (2017c) *Guidelines for the removal, destruction and lopping of native vegetation*. Department of Environment, Land, Water and Planning, Government of Victoria, Melbourne.
- DELWP (2018a) *Applicant's guide – Applications to remove, destroy or lop native vegetation*.
- DELWP (2018b) *NatureKit*. Department of Environment, Land, Water and Planning, Government of Victoria. Accessed via: <http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit>
- DELWP (2019) *Ecological Vegetation Class (EVC) Benchmarks*. Department of Environment, Land, Water and Planning, Government of Victoria. Accessed via: <https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks>
- DELWP (2020) *Victorian Biodiversity Atlas*. Department of Environment, Land, Water and Planning, Government of Victoria. Accessed via: <https://vba.dse.vic.gov.au>
- DEWHA (2009) *Matters of National Environmental Significance. Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*. Arts, D. o. t. E. W. H. a. t., Australian Capital Territory.
- DEWHA (2010a) *Survey guidelines for Australia's threatened birds*. Australian Government, Canberra.
- DEWHA (2010b) *Survey guidelines for Australia's threatened frogs*. Australian Government, Canberra.
- DEWHA (2011) *Survey guidelines for Australia's threatened fish*. Australian Government, Canberra.
- DoE (2013a) *Draft survey guidelines for Australia's threatened orchids*
- DoE (2013b) *Matters of National Environmental Significance. Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth of Australia, Department of the Environment, Australian Capital Territory.
- DOEE (2019) *Environment Protection and Biodiversity Conservation: Protected Matters Search Tool*. Commonwealth Government, Department of the Environment and Energy, Canberra. Accessed via: <http://www.environment.gov.au/epbc/pmst/index.html>

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| DSE (2004) Vegetation Quality Assessment Manual–Guidelines for Applying the Habitat Hectares Scoring Method | Act Scientific Advisory Committee, Government of Victoria. |
| DSE (2005) Creekline Grassy Woodland – Endangered in the Goulburn Broken Catchment. | Hines, F., Tolhurst, K. G., Wilson, A. A. G. & McCarthy, G. J. (2010a) <i>Overall fuel hazard assessment guide</i> . Department of Sustainability and Environment, Victoria, T. S. o., Melbourne. |
| DSE (2006) <i>Ministerial Guidelines for Assessment of Environmental Effects Under the Environmental Effects Act 1978</i> . DSE. | Hines, F., Tolhurst, K. G., Wilson, A. A. G. & McCarthy, G. J. (2010b) <i>Overall fuel hazard assessment guide</i> 4th edn. Department of Sustainability and Environment, Government of Victoria, East Melbourne. |
| DSEWPC (2004) <i>Survey guidelines for Australia's threatened reptiles</i> . Australian Government, Canberra. | |
| DSEWPC (2011) <i>Survey guidelines for Australia's threatened mammals</i> . DSEWPC. | Standards Australia (2018) <i>Australian Standard 3959–2018 Construction of buildings in bushfire-prone areas (incorporating Amendment No. 1)</i> . SAI Global, Sydney. |
| DSEWPC (2012) <i>Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy</i> . DSEWPAC. | |
| FFG SAC (undated) Characteristics of Threatened Communities. Flora and Fauna Guarantee | |

