Australian Capital Territory

Planning and Development (EIS Exemption Application – Denman Prospect Deferred Area and Bushfire Protection Zone) Consultation Notice 2016

Notifiable Instrument NI2016–543

Made under the

Planning and Development Act 2007, s211C (EIS Exemption Application – Public Consultation)

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1 Name of instrument

This instrument is the *Planning and Development (EIS Exemption Application – Denman Prospect Deferred Area and Bushfire Protection Zone) Consultation Notice 2016.*

2 Commencement

This instrument commences on the day after its notification.

3 EIS exemption application

I have received an application for EIS Exemption under s211C of the *Planning and Development Act 2007* (the Act) as included in the schedule.

EIS means environmental impact statement, see sections 208 of the Act.

EIS exemption see section 211 of the Act.

EIS exemption application see section 211B of the Act.

4 Public consultation

The public consultation period (consultation period) on the EIS exemption application commences on the day this instrument commences and ends 15 working days later.

Anyone may give a written submission to the Chief Planning Executive (delegate) about the EIS exemption application.

Submissions may be given only during the consultation period.

5 Making of submissions

Submissions should be addressed to the Chief Planning Executive and sent by:

- email to EPDCustomerServices@act.gov.au;

- mail to:
  Environment and Planning Directorate Customer Service
  GPO Box 158
  Canberra ACT 2601; or
- hand to the Environment and Planning Directorate's Customer Service Centre at 16 Challis Street, Dickson.

Submissions should include the application reference number (DA201500255) and the name and contact details of the person making the submission.

Note 1: The EIS exemption application is available during the consultation period on the planning and land authority website at www.actpla.act.gov.au For direct access please visit: http://www.planning.act.gov.au/topics/design_build/da_assessment/environmental_assessment/exemption_from_requiring_and_eis_s211

Note 2: Printed copies of the EIS exemption application and background documents are available for inspection and purchase at the Environment and Planning Directorate Customer Service Centre, 16 Challis Street, Dickson. The Customer Service Centre is open Monday to Friday (except public holidays) between 8:30am and 4:30pm. Please call 6207 1923 to arrange a copy for purchase.

Note 3: As required by s211F of the Act copies of submissions will be made publicly available on the planning and land authority website (see Note 1) until the consultation period ends or the submission is withdrawn. Also, copies of submissions will be provided to the proponent. Published submissions will include the name and contact details of the person making the submission as well as the other content of the submission. A request for exclusion of information from publication can be made under section 411 or 412 of the Act. A request for exclusion under these sections must be made in writing, clearly identifying what exclusions are sought and how the request satisfies the exclusion criteria in sections 411, 412 of the Act.

Dorte Ekelund
Delegate of the Minister
22 September 2016

Schedule

See Section 3

ACT Government
Environment and Planning

Planning and Development Act 2007, s425

APPLICATION FOR:

SCOPING DOCUMENT

ENVIRONMENTAL SIGNIFICANCE OPINION S211

EXEMPTION FROM EIS

Form 1M

1. Type of Application

☐ **Request for Scoping Document OR**

☒ **Request for Exemption to Provide Environmental Impact Statement** *Section 211 Planning and Development Act 2007 OR*

☐ **Application for Environmental Significance Opinion** *Section 138AA Planning and Development Act 2007 OR*

☐ **Additional Information as requested by the planning and land authority for any application for Scoping, EIS, or ESO**

If you attended a pre-application meeting or written pre-application advice in relation to the proposal that is the subject of this application please provide proposal number **Proposal Number 20______________**

Project Name Denman Prospect - Deferred Area & Bushfire Protection Zone

Project Description A small area of urban development, plus works associated with the urban development of areas previously subject to s211 exemption, including minor works and the establishment of bushfire risk mitigation areas.

2. Lease/Site Details *Please Print*

Provide the following details for each lease/site: Please see Attachment A

Site 1

Block: **Section:** **Suburb:**

Street Address (if applicable)

Land Use Zone/s applicable to this site

Site 2

Block: **Section:** **Suburb:**

Street Address (if applicable)

Land Use Zone/s applicable to this site

Site 3

Block: **Section:** **Suburb:**

Street Address (if applicable)

Land Use Zone/s applicable to this site

If more than three sites please provide details on separate page

Approved form AF2014-88 approved by Dorte Ekelund, Director-General, Environment and Planning Directorate on 8 September under section 425 of the *Planning and Development Act 2007* and revokes AF2013-54
Authorised by the ACT Parliamentary Counsel—also accessible at www.legislation.act.gov.au

3. Applicant Details *Please Print*

Surname	Gordon	First Name	Tom
Name of Company/Department/ Government Agency	Land Development Agency ~~Economic Development~~ Chief Minister, Treasury & Economic Development Directorate		
Position held in Company/Department/Government Agency	Executive Director, Land Development.		
Australian Company/Business Number (ACN/ABN)	20 419 925 579		
Postal Address	Transact House, 470 Northbourne Ave		
Suburb	Dickson	State	ACT
Postcode	2602		
Phone Number Business Hours	62075553	Mobile	
EMAIL ADDRESS	tom.gordon@act.gov.au		

4. Lessee (Property Owners) or Government Land Custodian Details *Please Print*

SITE 1 Please refer to List at Attachment A

1st Lessee or Land Custodian Details		2nd Lessee or Land Custodian Details	
Full Name:	Daniel Iglesias	Full Name:	
Company Name:	Territory & Municipal Services Directorate	Company Name:	
Position Held in Company:	Director	Position Held in Company:	
ACN Number:	37 307 569 373	ACN Number:	
Postal Address:	GPO Box 158 Canberra City ACT 2601	Postal Address:	
Telephone BH:	62076997	Telephone BH:	
Mobile:		Mobile:	
Email Address:	daniel.iglesias@act.gov.au	Email Address:	

SITE 2

1st Lessee or Land Custodian Details

Full Name:	
Company Name:	
Position Held in Company:	
ACN Number:	
Postal Address:	
Telephone BH:	
Mobile:	
Email Address:	

2nd Lessee or Land Custodian Details

Full Name:	
Company Name:	
Position Held In Company:	
ACN Number:	
Postal Address:	
Telephone BH:	
Mobile:	
Email Address:	

SITE 3

1st Lessee or Land Custodian Details

Full Name:	
Company Name:	
Position Held in Company:	
ACN Number:	
Postal Address:	
Telephone BH:	
Mobile:	
Email Address:	

2nd Lessee or Land Custodian Details

Full Name:	
Company Name:	
Position Held In Company:	
ACN Number:	
Postal Address:	
Telephone BH:	
Mobile:	
Email Address:	

All *lessees* ***must*** *sign authorising the lodgement of this application. In doing so the lessee gives authority to the applicant to negotiate any dealings in relation to the application through to its determination. If there are more than two lessees please ensure that the details and authorisation are attached to the application.*

If a lessee signature ***can not be obtained*** *and either a land acquisition or lease withdrawal is underway to facilitate the project to which the EIS Scope relates then the applicant* ***must*** *submit documentary evidence that such land acquisition or lease withdrawal is occurring and that the lessee is aware of the project to which the EIS Scope relates.*

5. EIS Requirements – complete this part for Application for Scoping Document ONLY

Please identify why your proposal requires an Environmental Impact Statement and include applicable references to the *Planning and Development Act 2007 (P&D Act).*

☐ The proposal is a type listed under schedule 4 of the P&D Act. **Please list item numbers:** ______ ______ ______ ______ ______

☐ The proposal is not an EXEMPT, CODE, or MERIT track development where the development is allowed under an existing lease

☐ The proposal is permissible under the National Capital Plan but listed as prohibited in the relevant development table

☐ The proposal has been declared under section 124 and section 125 of the P&D Act

☐ The proposal is not listed anywhere in the relevant development table (in-nominate use)

6. Complete this part for Application for Environmental Significance Opinion ONLY

S138AA Planning and Development Act 2007

Are you seeking an Environmental Significance Opinion? ☐ **YES** ☒ **NO**

IF YES - identify the item(s) for opinion under Schedule 4 of the *Planning and Development Act 2007*

☐ **Section 4.2 Item 3 (c)** ☐ **Section 4.2 Item 3 (d)** ☐ **Section 4.3 Item 1**

☐ **Section 4.3 Item 2 (a)** ☐ **Section 4.3 Item 2 (b)** ☐ **Section 4.3 Item 3**

☐ **Section 4.3 Item 6**

Note: Applications for Environmental Significance Opinion from the ACT Heritage Council must be accompanied by a Statement of Heritage Effects prepared by a suitably qualified heritage professional regarding the potential impacts of the proposal.

7. Complete this part for Request for Exemption to Provide Environmental Impact Statement ONLY

S.211 Planning & Development Act 2007

The Minister may exempt a development proposal from a requirement to include an EIS if satisfied that the expected environmental impact of the development proposal has already been sufficiently addressed by another study, whether or not the study relates to the particular development proposal.

If the proposal is a type listed under Schedule 4 of the P&D Act, **please list the item numbers:** Part 4.3 Item 1, Part 4.3 Item 2; Part 4.3 Item 3

Please supply supporting documentation to justify s211 consideration and a statement as to how the supporting documentation satisfies the requirement of s.211 and s50A of the P&D Regulation. ☐ **Documentation Attached**

8. Environment Protection and Biodiversity Conservation Act 1999

Does the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC) affect your proposal? ☐ **NO** ☐ **YES**

If YES - attach copies of the Commonwealth Department of the Environment "Notification of Referral Decision" and "Decision on Assessment Approach"

NOTE: Copies of these documents must be attached to this application form before it can be accepted for processing by the planning and land authority.

IF NO - Have you had meetings/discussions with the Department of the Environment? ☐ **NO** ☐ **YES**

If YES - Please provide the contact details of the Department of the Environment officer

Name: ______________________________ **Contact No.** ______________________________

9. Your Proposal – Required for ALL application types

Please attach to this application form a document that provides sufficient detail to enable prescribed entities to obtain an understanding of the full extent of your proposal and any associated works, including:

1. a statement outlining the objectives of the project and why it is needed;
2. a description of the nature/type of project proposed by providing location map(s) of the project site(s), preliminary design drawings and satellite/aerial photographs;
3. a preliminary risk assessment (PRA) based on the guidance document attached to this form (not required for an ESO application);
4. a description of the natural conservation values of the site based on the considerations listed in the "Preparation of an application for scoping and preparation of an ESO" guideline available from the EPD website;
5. a description of measures within the proposal that seek to avoid and minimise (and as a last resort offset) impact on identified conservation values (for ESO and Section 211 applications only);
6. any decision made under the EPBC Act in relation to this proposal.
7. For s211 applications only, the following additional information is required:
   - details of qualifications, expertise and experience of the person(s) who conducted previous studies supporting the application;
   - details of public consultation undertaken, as part of statutory requirement, for projects or previous studies included as supporting documentation undertaken. Details of public consultation not required for a statutory process should also be included;
   - verification from a qualified person that the information in the previous studies supporting the application is still current.

10. Prescribed Entities

Have you had any meetings/discussions with relevant prescribed entities?

☐ NO
☒ YES

IF YOU ANSWERED YES TO THE QUESTION – please complete the following table and provide meeting minutes:

ENTITY (please tick)	DATE/s OF MEETING/s	ENTITY CONTACT
☐ ACTEW Corporation Ltd		
☐ ACTEWAGL Distribution		
☐ Conservator Flora & Fauna		
☒ Emergency Services	Refer to Bushfire Risk Strategy Report	Nick Lhuede
☐ Environment Protection		
☐ Heritage Council		
☐ Health Policy		
☒ Territories & Municipal Services	Refer to Bushfire Risk Strategy Report	Neil Cooper
☒ Custodian of the Land	Refer to Bushfire Risk Strategy Report	Dave Richardson
☐ Other: ____________ Please specify		

11. Conflict of Interest Declaration

Does the applicant or lessee have any association with EPD staff?

☒ NO
☐ YES

If YES please provide details:

NOTE: There are penalties for deliberately giving false and misleading information. The planning and land authority or Minister may revoke an approval if satisfied that the approval was obtained by fraud or misrepresentation.

12. Other Application Requirements

DOCUMENTATION AND PLANS

All required documentation must be provided in an electronic format on compact disc/DVD or via email and meet the following requirements (Form can be submitted in hardcopy if lodged over the counter)

- Each document must be saved as a PDF and named in accordance with the naming convention as detailed on the EPD website.
- All plans must be to scale.
- All plans must be rotated to the correct orientation i.e. they are the right way up when opened
- All plans are to be clear and concise and generally consistent with Australian Standard 1100.301 - 1985 and Australian Standard 1100.301 supplementary - as updated from time to time.
- The documentation provided on CD/DVD either over the counter or via an electronic lodgment process (email or internet) will be considered to be the relevant documentation associated with this application.

HARDCOPY DOCUMENTATION REQUIREMENTS FOR ALL APPLCATION TYPES

In addition to the documentation being provided on CD/DVD one bound and one unbound hard copy must also be provided.

13. Applicant and Lessee Declaration

I/we the undersigned, declare that this application is accompanied by all of the required information and or documents and understand that the documentation provided on CD/DVD or via electronic lodgement process (email or internet) will be considered to be the relevant documentation associated with this application; and understand that the information submitted with this application form will undergo a documentation check. I/we understand that this application will be considered lodged once the relevant application fees have been paid;

I/we hereby authorise ACT Government officers to access the subject property(s) for the purpose of evaluating the proposal;

I/we the undersigned (lessee) appoint the applicant whose name and signature appear below to act on my/our behalf in relation to this application. This authorises the applicant to pay for all application fees, bonds, and securities, liaise with the planning and land authority when required, alter amend or provide further information as necessary and receive any communications relating to this application;

I/we declare that all the information given on this form and its attachments is true and complete;

If signing on behalf of a company, organisation or Government agency: -
I/we the undersigned, declare I/we have the appropriate delegation or authority to sign on behalf of the company, organisation or Government agency.

X

Applicant Signature (s)	[signature]	Date	25.5.16
SITE 1 1st Lessee Signature	[signature]	Date	30/5/16
2nd Lessee Signature		Date	
Govt Land Custodian Signature (unleased land only)		Date	
Delegate of the planning and land authority (unleased land only)		Date	

SITE 2

1st Lessee Signature		Date	
2nd Lessee Signature		Date	
Govt Land Custodian Signature (unleased land only)		Date	
Delegate of the planning and land authority (unleased land only)		Date	

SITE 3

1st Lessee Signature		Date	
2nd Lessee Signature		Date	
Govt Land Custodian Signature (unleased land only)		Date	
Delegate of the planning and land authority (unleased land only)		Date	

Privacy Notice

The personal information on this form is provided to the Environment and Planning Directorate (EPD) to enable the processing of your application. The collection of personal information is authorised by the *Planning and Development Act 2007*. If all or some of the personal information is not collected EPD cannot process your application. The Planning and Development Act 2007 requires the details of applications, decisions and orders to be kept on a register and made available for public inspection. Information and documentation relevant to a development application may be made available via the Internet. The personal information you provide may be disclosed to Australian Bureau of Statistics, ACT Revenue Office, the Registrar General's Office, ACTEW Corporation, ActewAGL, Territory and Municipal Services Directorate and other Government agencies with a direct interest in the development assessment process. The information may also be disclosed where authorised by law or court order, or where the Directorate reasonably believes that the use or disclosure of the information is reasonably necessary for enforcement-related activities conducted by, or on behalf of, an enforcement body. EPD's Information Privacy Policy contains information about how you may access or seek to correct your personal information held by EPD, and how you may complain about an alleged breach of the Territory Privacy Principles. The EPD Information Privacy Policy can be found at www.environment@act.gov.au

Does the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC) affect your proposal?

The EPBC came into operation on 16 July 2000. It establishes an environmental assessment and approval system that is separate and distinct from the ACT system. It does not affect the validity of ACT development assessment and approval processes, but may affect the assessment track. The ACT cannot provide preliminary advice on whether a proposal falls within the definition of a controlled action, or requires referral to the Commonwealth. You should consult with the Commonwealth to determine if your proposal is a controlled action before seeking any approvals under the *Planning and Development Act 2007*. For information about the EPBC, including the referral process and when a referral should be made, contact the Commonwealth Department of the Environment www.environment.gov.au

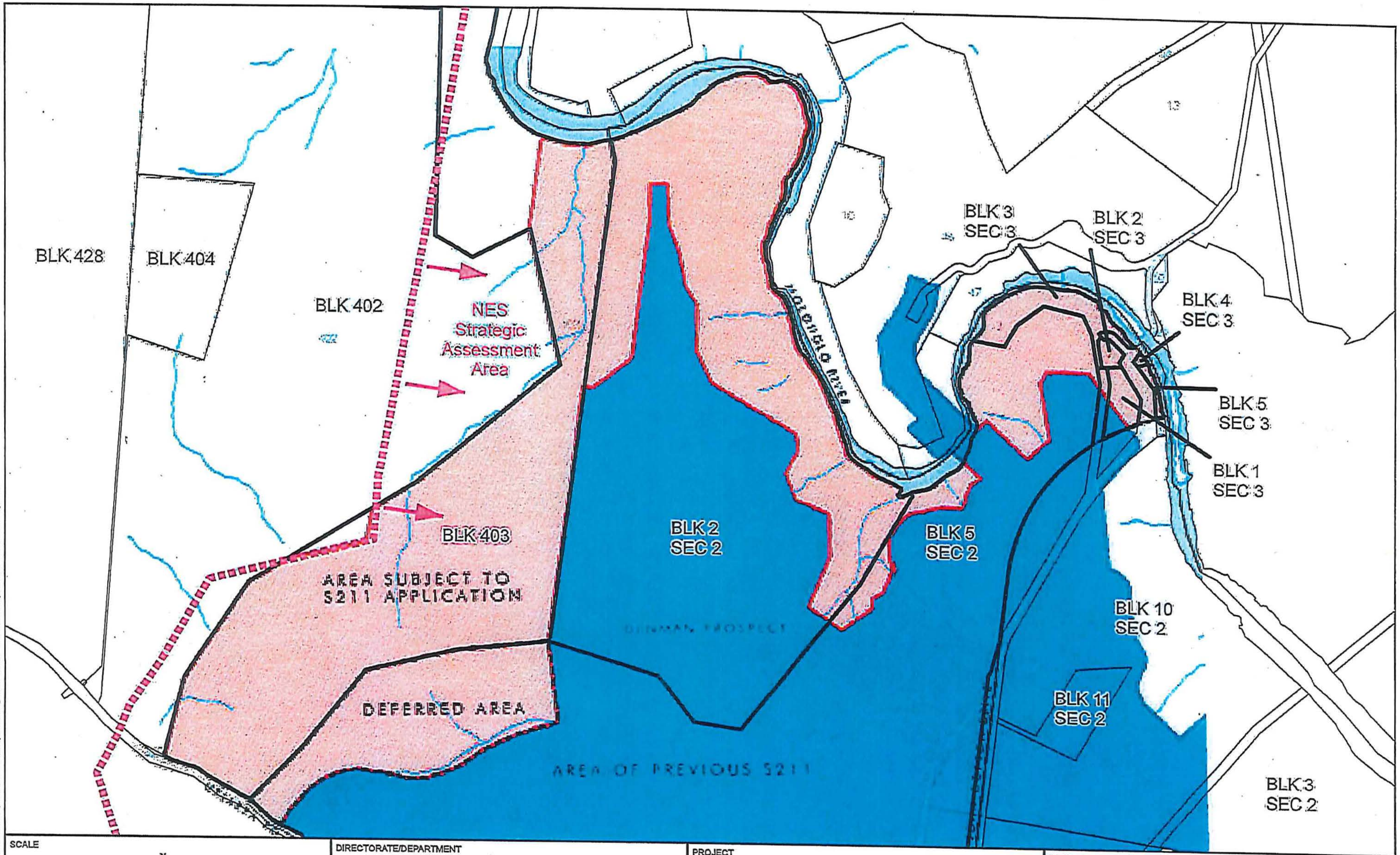
Contact Details:
Environment and Planning Directorate
Customer Service Centres
GPO Box 158, Canberra City 2601
8 Darling Street Mitchell, ACT 2911
16 Challis Street Dickson ACT 2602
Business Hours: 8.30am to 4.30pm weekdays (excluding Public Holidays)
Phone: (02) 6207 1923 TTY: (02) 6207 2622
Email: epdcustomerservices@act.gov.au Website: www.environment@act.gov.au

Form 1M Attachment A

Lease/Site Details

Block	Section	Suburb	District
Part 403			Stromlo
Part 5 (Formerly Part 1)	2	Denman Prospect	Molonglo Valley
Part 2	2	Denman Prospect	Molonglo Valley
Part 1	3	Denman Prospect	Molonglo Valley
2	3	Denman Prospect	Molonglo Valley
Part 3	3	Denman Prospect	Molonglo Valley
Part 4	3	Denman Prospect	Molonglo Valley
Part 5	3	Denman Prospect	Molonglo Valley

DATE: 30/10/2015



SCALE	DIRECTORATE/DEPARTMENT	PROJECT	DRAWING TITLE
N W E S 0 100 200 400 600 800 Meters	ACT Government Land Development Agency CANBERRA FIRST	DENMAN PROSPECT	Deferred Area Section 211 Exemption Application - Block Detail Clarification PROJECT NUMBER: P01157

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Denman Prospect
Deferred Area & Bushfire Protection Zone

Application for Section 211 Exemption

Prepared for:

Land Development Agency

September 2016

CANBERRA TOWN PLANNING

Prepared by:
Canberra Town Planning

Kip Tanner
Director

Phone: 0409 883 435
kip@canberratownplanning.com.au
canberratownplanning.com.au

Version Control
07.12.15 :: Draft for Technical Check
17.05.16 :: Draft for Submission
25.07.16 :: Revised for Submission
07.09.16 :: Final

Contents

1 Introduction

1.1 Brief Project Description

Molonglo Valley is a greenfield development area to the west of Canberra. It has the capacity to develop accommodation for 55,000 residents over a 30-year timeframe. Molonglo Valley Stage 2, comprising the suburbs of Denman Prospect and Molonglo, is one component of this project planned to accommodate up to 18,000 of the 55,000 residents. When complete Denman Prospect and Molonglo will include residential neighbourhoods, local centres, community facilities and the district's principal commercial centre.

A Planning and Development Framework for Molonglo Stage 2 was prepared in 2012 and development has commenced in the area. At the time of the Planning and Development Framework decisions about an area adjacent to the western boundary were deferred.

This report deals with the deferred area of Molonglo Stage 2 (now known as part of Denman Prospect) and the bushfire protection zones which extend into the deferred area and the Molonglo River Corridor. These areas were excluded from previous s211 considerations.

1.2 Purpose of This Report

Proponents of a project that trigger or potentially trigger impact track assessment under the Planning and Development Act are required to use approved Form 1M to either:

- Request a Scoping Document for an EIS; or
- Apply for an Environmental Significance Opinion under Section 138AA; or
- Request an Exemption from the Minister for an EIS under Section 211; or
- Provide additional information to support an existing application.

This document has been prepared to request an Exemption for an EIS under Section 211 of the Planning and Development Act 2007 (the P&D Act). This report responds to the requirements of Form 1M and collates the relevant information about the proposed works within the deferred area and adjacent bushfire asset protection zone. A S211 exemption has previously been granted for the remainder of the Molonglo Stage 2.

The basis for the previous Section 211 exemptions for the Molonglo Valley have related to the extensive studies undertaken to support the rezoning of the land for urban development, assessments under the EPBC Act and the work undertaken to prepare the Planning and Design Framework for Molonglo Stage 2.

In July 2013 Minister Corbell granted a single s211 exemption for Molonglo Stage 2 that repealed the two previous exemptions and linked the new exemption to the approved NES Plan for the area. This provides an exemption with an expiry date of December 2041.

This suggests that, if this application is successful, the resultant exemption would also be given an expiry date of December 2041.

1.3 Structure of This Report

This report has been structured around the information requirements identified in Form 1M. Specifically the requirements at Part 9 of the form are addressed in Table 1.

WHERE THIS REPORT DIRECTLY RESPONDS TO THESE REQUIREMENTS OR OTHER SECTIONS OF THE GUIDELINES, THE TEXT FROM THE FORM OR GUIDELINES IS REPRODUCED IN COLOURED CAPITALISED TEXT.

Table 1 – Structure of this Report

Document Requirements:	In this report:
A statement outlining the objectives of the project and why it is needed;	Chapter 2.
Description of the nature/type of project proposed by providing location map(s) of the project site(s), preliminary design drawings and satellite/aerial photographs;	Chapter 3
A preliminary risk assessment (PRA) based on the guidance document attached to this form;	Chapters 8, 9, 10 and 11
A description of the natural conservation values of the site based on the considerations listed in the "Preparation of an application for scoping and Preparation of an ESO" guideline available from the ESDD website;	Chapter 7
A description of measures within the proposal that seek to avoid and minimise (and as a last resort offset) impact on identified conservation values (for ESO and Section 211 applications only).	Chapter 10
Any decision made under the EPBC Act in relation to this proposal.	Chapter 12
For s211 applications only, the following additional information is required: Details of qualifications, expertise and experience of the person(s) who conducted previous studies supporting the application;	Chapter 13
Details of public consultation undertaken, as part of statutory requirement, for projects or previous studies included as supporting documentation undertaken. Details of public consultation not required for a statutory process should also be included;	Chapter 14
Verification from a qualified person that the information in the previous studies supporting the application is still current.	Not Applicable

1.4 Prescribed Criteria

Section 211 of the Planning and Development Act 2007 provides the opportunity for development applications in the Impact Track to be exempt from requiring an EIS. The Minister may exempt a development application from a requirement to include an EIS if satisfied that the expected environmental impact of the development proposal has already been sufficiently addressed by another study, whether or not the study relates to the particular development proposal.

The Planning and Development Regulation 2008 prescribes criteria that the Minister must take into account in deciding whether the environmental impact of the development proposal has been sufficiently addressed by the other study.

The following criteria are prescribed:

Table 2 - Criteria for consideration

Criteria	Comments
(a) whether the study was conducted by an appropriately qualified person with relevant expertise and experience in relation to the environmental values of the land in the proposal;	Refer to details provided in Chapter 13
(b) if the study does not relate directly to the proposal—whether there is sufficient detail to allow assessment of the environmental impacts likely to occur if the proposal proceeds;	Not applicable. The studies relate directly to the proposal.
(c) whether the part of the study relevant to the proposal required public consultation through a statutory process or as part of a government policy development;	A summary of public consultation undertaken to date is provided in Chapter 14
(d) that the study is not more than 5 years old;	None of the studies relied upon are more than 5 years old.
(e) if the study is more than 18 months old—that an appropriately qualified person with no current professional relationship with the proponent verifies that the information in the study is current.	Refer to details provided in Chapter 13

2 Objectives and need

STATEMENT OUTLINING THE OBJECTIVES OF THE PROJECT AND WHY IT IS NEEDED

This project relates to the Deferred Area which forms the remaining component of the Molonglo Stage 2 development footprint (identified as the suburbs of Denman Prospect and Molonglo) plus the area outside the development footprint of Denman Prospect that may be subject to bushfire fuel management.

The Deferred Area is 26 hectares of land on the western edge of Denman Prospect that has previously been identified as potentially developable. It was excluded from the previous S211 application due to information gaps identified prior to the preparation of the Preliminary Risk Assessment (PRA): Molonglo Valley Urban Development Stage 2 and Supporting Infrastructure (nghenvironmental, 2011). Necessary investigations have now been undertaken allowing thorough assessment of development impacts within the deferred area. Due to the topography and other constrains the majority of the area is now proposed to be bushfire asset protection zones rather than urban development.

This exemption application report also considers the potential impacts of bushfire hazard management on land adjacent to Denman Prospect. Figure 1 indicates the maximum extent of management activities and hence the area subject to this application. A description of the proposed works in this area is provided in Chapter 3.

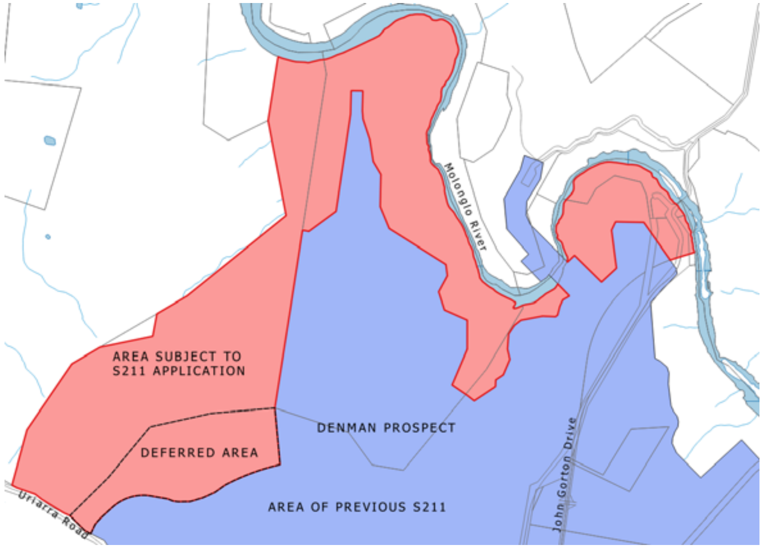


Figure 1 - Site overview

The management of bushfire risk is a significant issue for land development, particularly on the urban fringe, requiring a balance to be found between maintaining the character of the 'bush capital' and the risk bushfire poses to life, property and infrastructure.

The Canberra fires in 2003 demonstrated the vulnerability of existing housing stock to direct bushfire attack, particularly when close to native bushland. As a result, the management of native vegetation areas and their bushfire fuel levels has become a critical consideration when planning new residential developments.

In addition, severe fire weather conditions are often associated with strong winds, and the convection plumes from major fires can exacerbate wind effects, spreading embers and increasing the potential for direct damage to buildings.

The western areas of Denman Prospect are identified as bushfire prone and will require considered management to minimise the threat of bushfire to life, property and infrastructure.

These areas also have ecological values and require management for ecological purposes; to control weed invasion, maintain species diversity and habitat areas.

The proposed bushfire fuel management works are essential to achieving these dual outcomes.

3 Description of the project

DESCRIPTION OF THE NATURE OF PROJECT PROPOSED

3.1 The proposal

The proposal is for a small area of low density residential development at the northern part of Denman Prospect (outside the previous s211 area) plus works associated with urban development and bushfire planning provisions such as inner and outer asset protection zones and strategic firefighting advantage zones on the adjoining land (including within the Deferred Area). The works within the s211 area are described below:

Within the small area that will be subject to urban development (refer to Figure 2 & Figure 3):

- Development of blocks and construction of dwellings and other works associated with establishing an urban area.
- Clearing of vegetation.
- Installation of services and facilities including water supply, sewerage, stormwater, electricity, gas and telecommunications.
- Construction of roads, cycle paths and walking tracks.
- Water Sensitive Urban Design measures including drainage, ponds and pipes.
- Erosion and sediment control measures.
- Landscaping of open space.
- Peri-urban land management consistent with bushfire risk mitigation requirements.

Within the remainder of the s211 area:

- Infrastructure and works (subject to detailed design) supporting the urban development on the adjoining land which may include utility services, WSUD measures, landscaping and other land management initiatives.
- Peri-urban land management consistent with bushfire risk mitigation requirements.

The development of housing within the deferred area is not currently proposed due to the slopes and other natural features. provides an illustration of the currently proposed urban development area (shaded grey).

Where the urban development area extends into the s211 area, it is limited to a small area of former pine forest (refer to Figure 3). There are no mapped environmental constraints in this area.

On the adjoining land the works will be limited to works associated with the urban development and the management of bushfire hazard through the establishment and maintenance of inner asset protection, outer asset protection and strategic fire advantage zones.

A plan showing the proposed fire management zones is provided at Appendix B.

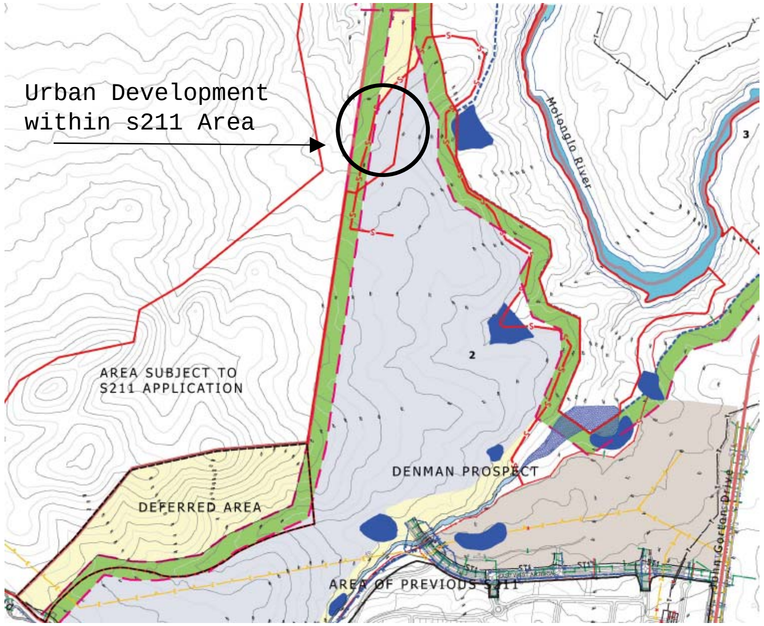


Figure 2 – Approximate Developable Areas Plan

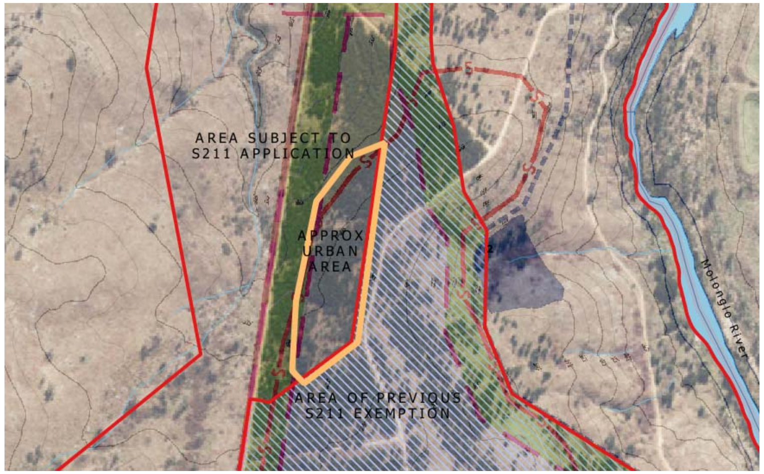


Figure 3 – Approximate Developable Area within s211 area (within former pine forest)

The vast majority of the s211 area will be a Strategic Fire Advantage Zone, some of which will require additional bushfire fuel reduction to reduce the risk to the urban development.

With the exception of a small portion of the subject area that lies within the Lower Molonglo Nature Reserve, the subject area is already identified as an Agricultural Strategic Firefighting Advantage Zone. The area within the Nature Reserve is currently identified as a Landscape Fire Management Zone and will continue to be managed in this way.

Much of the area already meets the requirements of a Strategic Fire Advantage Zone and will require no physical work. The establishment of the zone represents a commitment to maintain the current condition.

Details of the fire management works are provided in the Bushfire Risk Strategy report (Appendix C).

Where work is required to establish and maintain the bushfire risk mitigation zones a mosaic of various actions are proposed that will help to maintain the ecological values of the areas. These include:

- Hazard reduction burns in the Red Stringybark Dry Sclerophyll Forest in a mosaic of areas every five to ten years.
- Hazard reduction burns in Box-Gum Woodland areas no more frequently than every 10 years, longer if fuel levels remain naturally low or are kept low by other management techniques.
- Hazard reduction burning to be avoided in areas of known Pink-tailed Worm Lizard habitat unless absolutely necessary. If it must occur, it is to be limited to late winter to mid spring.
- Silvicultural thinning to also help accelerate an open woodland structure in areas of regrowth.
- Grazing to maintain fuel loads but also as a mechanism to maintain ecological health and diversity.

- Slashing, primarily in inner asset protection zones where fuel management by grazing or burning may be impractical.

The preliminary budget estimates provided in the Bushfire Risk Strategy Report relate to works in three areas, only one of which is relevant to this s211 application. Works North of the Molonglo River will be subject to a separate approvals process.

The works identified within Denman Prospect are substantially covered by the existing s211 exemption (with the exception for the small proportion of works within the deferred area).

The other works described as “South of the Molonglo River” are works to occur within the area that is the subject of this application. The cost estimate consists of $2.7 million over 2 years for vegetation establishment and management and just $119,000 over 3 years for the establishment and management of fire trails. The existing fire trail network is to be used with only minor upgrades. The majority of the budget is allocated to the task of sivicultural thinning and establishing hazard reduction burns to achieve the desired fuel loads.

These works are consistent with the commitments made in the NES Plan for Molonglo Valley.

All of the proposed works will be undertaken in a manner that is consistent with the Molonglo Adaptive Management Strategy (Appendix E). This strategy represents the key commitments arising out of the Molonglo Valley Plan for the Protection of Matters of National Environmental Significance (NES Plan, Appendix F).

4 Site Description

Figure 4 - Site context

4.1 Location

The site is located within the Molonglo Valley, approximately 10 kilometres due west of Canberra City. The location relative to Canberra City is illustrated in Figure 4 above. An aerial photograph illustrating the boundaries of the site is provided at Appendix B.

4.2 Land custodianship

The subject area is unleased land. It is identified in ACTmapi as being under the custodianship of TAMS Forests (now incorporated into the Parks and Conservation Service). The area within the river corridor is public land.

4.3 Schedule of Blocks

The following blocks are included within the application area. Details of the application area are shown on the plan provided at Appendix A:

Block	Section	Suburb	District
Part 403			Stromlo
Part 5	2	Denman Prospect	Molonglo Valley
Part 2	2	Denman Prospect	Molonglo Valley
Part 1	3	Denman Prospect	Molonglo Valley
2	3	Denman Prospect	Molonglo Valley
Part 3	3	Denman Prospect	Molonglo Valley
Part 4	3	Denman Prospect	Molonglo Valley
Part 5	3	Denman Prospect	Molonglo Valley

4.4 Territory Plan

The area is subject to the Future Urban Areas overlay in the Territory Plan.

Within this overlay, the land use zones remain flexible but development is expected to conform to the relevant structure plan and be generally in accordance with the zones.

The Deferred Area is identified for residential use. The remainder of the area is identified as Hills Ridges & Buffer Areas and River Corridor.

The proposed uses and land management regimes are consistent with the zoning.

5 Description of the natural environment

5.1 Flora and fauna

The vegetation within the site transitions from the dry forest/woodland communities on the upper slopes through to a remnant of box-gum woodland to the north of the deferred area.

Detailed assessment of vegetation within and adjoining the deferred area was undertaken by Openlines in 2012 and reassessed in 2014 to inform the land planning purposes for Molonglo Stage 2. The assessment was undertaken cognizant of the need for vegetation to be managed to reduce bushfire risk to dwellings within the proposed Molonglo development.

Umwelt prepared an Analysis of Vegetation Structure and Fire Risk specifically to inform the Bushfire Risk Strategy (Appendix D – appended to the Bushfire Risk Strategy).

The subject area contains a range of vegetation types with varying conservation significance, including the following communities.

Red Stringbark – Scribbly Gum Tableland Forest

Red Stringybark – Scribbly Gum Tableland Forest including both woodland and derived native grassland structures.

The woodland is in a moderate to good condition and exhibits moderate diversity and good cover of native species and low number of exotics. The woodland is typical of a regenerating remnant of Red Stringybark – Scribbly Gum Tableland Forest within the ACT with a high density of early regenerating E. macrorhyncha and E. rossii from the Canberra fires of 2003.

The derived native grassland shows typical features of grazed grasslands.

Yellow box – Blakely's Red Gum Tableland Grassy Woodland

Yellow Box – Blakely's Red Gum Tableland Grassy Woodland is representative of an endangered ecological community as defined under ACT legislation (Nature Conservation Act 1980) and a critically endangered ecological community as defined under Commonwealth legislation (EPBC Act).

The Yellow Box – Blakely's Red Gum Tableland Grassy Woodland is in moderate condition and meets the definition of 'woodland' as defined by the Strategic Bushfire Management Plan (ACT Government, 2009). The Woodland community has an overstorey 10- 30 m in height and a projected foliage cover of less than 30%.

Figure 5 – Mapped Woodland Areas (ACTMAPi)

Exotic Grassland

Approximately 1ha of exotic grassland occurs in the study area. This area has been significantly modified due to current land use and past clearing for agricultural practices, such as grazing and is dominated by exotic grass species. The area exhibited a low condition and contains low habitat values for native flora and fauna.

Habitat

The vegetation assessment also identified potential habitat for native fauna within the study area.

The study area in its current form provides a limited, but relatively diverse range of habitats and refuge features for fauna.

These habitats vary considerably in response to the regeneration of the vegetation communities across all stratums and are expected to evolve as vegetation communities re-establish.

Fauna habitats are most prevalent in the less disturbed areas and particularly in association with Red Stringybark – Scribbly Gum Tableland Forest, where there are rock outcrops, fallen timber and tree hollows, and in association with Yellow Box – Blakely's Red Gum Tableland Grassy Woodland where tree hollows exist.

Table 3 summarises the key habitat features on site and the fauna for which each feature would provide potential habitat. However, it is unlikely that all types of fauna exist within the current study area due to its history of disturbance from fires and land uses.

Table 3 - Key habitat features

Habitat feature	Fauna species supported	Relative occurrence of feature
Hollow bearing trees/stags	Arboreal mammals, microchiropteran bats, hollow dependent birds including owls, and reptiles	Rare/occasional
Rocky outcrops	Reptiles and amphibians	Occasional to common
Tussock grasses	Birds, ground-dwelling mammals, amphibians, and reptiles	Rare to Common
Flowering myrtaceious trees and shrubs	Foraging resources for brids and mammals (summer flowering Eucalypts)	Common to Abundant
Fallen timber	Small mammals, amphibians, woodland birds and reptiles	Occasional
Leaf litter	Amphibians, reptiles, ground-dwelling mammals	Occasional
Defoliating bark	Microchiropteran bats, woodland birds, and reptiles	Occasional

Woodland birds

The occurrence of woodland birds was assessed by Umwelt with a total of 29 species recorded during the survey.

Observations included:

- Scarlet robin (Petroica boodang) which is listed as vulnerable under the Nature Conservation Act and threatened under the NSW Threatened Species Conservation Act.
- Satin flycatcher (Myiagra cyanoleuca) which is considered to be a migratory species in accordance with the EPBC Act.

None of the other species observed are currently listed under the ACT (Nature Conservation Act 1980) or Commonwealth legislation (EPBC Act) as threatened species.

Pink-tailed Worm-lizard

The NES Plan identifies several areas of moderate and high quality potential Pink-tailed Worm-lizard habitat within the subject area (Osborne and Wong, 2010) and this information is reflected in ACTMAPi.

Detailed management and monitoring of this habitat is an ongoing task in accordance with the Molonglo Adaptive Management Strategy.

During 2014 the ACT Government undertook significant works to link areas of habitat within the river corridor. The works included weed controls, signage, fencing and the placement of suitable habitat rocks (see Figure 6). The management of this habitat is consistent with the requirements for management of bushfire risks.

Figure 6 - PTWL habitat works

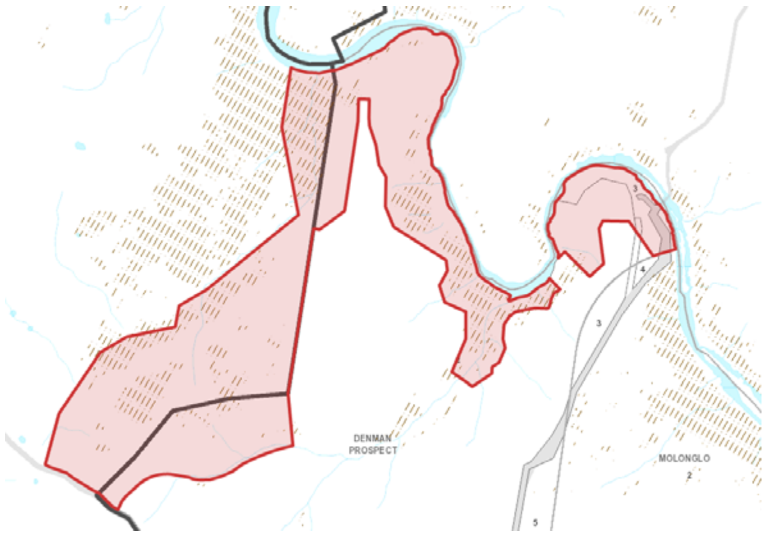


Figure 7 - Location of PTWL habitat (ACTMAPi)

5.2 Hydrology, including water flows

As shown in Figure 8, the eastern portion of the site lies within the Molonglo River Corridor. A number of minor creeks and drainage lines extend across the site and drain to the river.

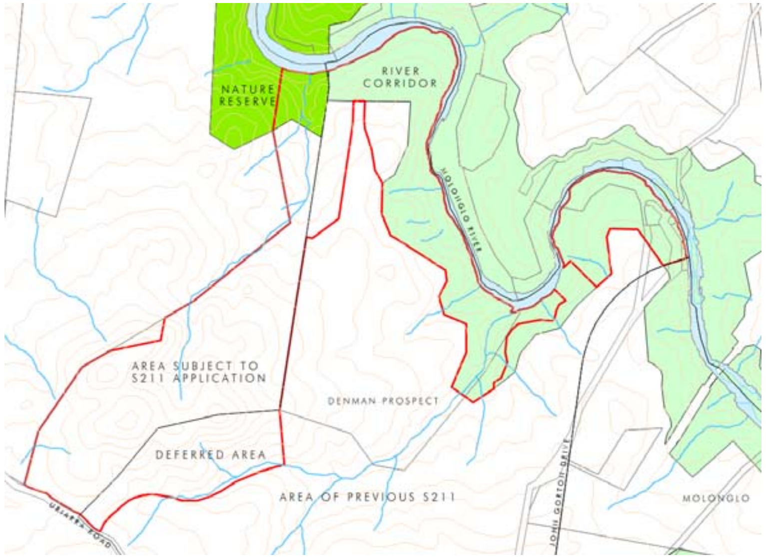


Figure 8 - Drainage lines

5.3 Soil and Geology

The results of the Phase 1 Environmental Site Assessment completed by Aecom in 2010 identified that the geology of the site and the surrounding area is underlain by Mount Painter Volcanics forming part of the Hawkins Volcanic Suite. Mount Painter Volcanics are of middle Silurian age and are characterised by dacitic ignimbrite with lithic xenoliths and dacitic autoliths, minor tuffs and ashstone.

5.4 Gradient

The site is characterized by steep slopes along the river corridor and on the hills in the deferred area. Figure 9 highlights areas of greater than 10% slope in blue and greater than 20% slope in red.

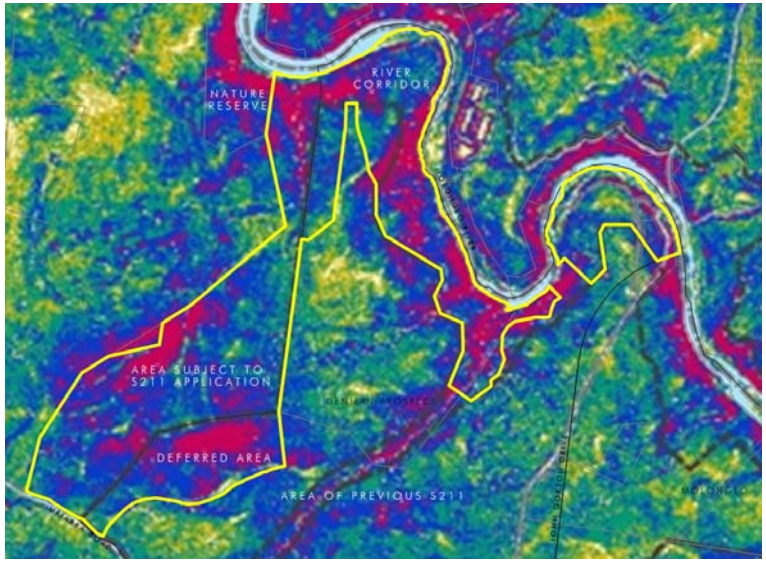


Figure 9 – Slope Analysis

The steep slopes are not a concern for most of the area as the proposed works consist only of monitoring (and managing if necessary) the bushfire fuel loads.

The steep south-facing slopes within the previously deferred area have influenced the boundary of the proposed urban development.

5.5 Heritage

The Planning and Design Framework identifies two key heritage items within the project area; a Surveyors Tree and the Molonglo Geological Site. Both of these sites are within areas that are proposed for bushfire fuel hazard monitoring and management if necessary. It is expected that management of fire hazard can be achieved in a manner that preserves the heritage values of both items.

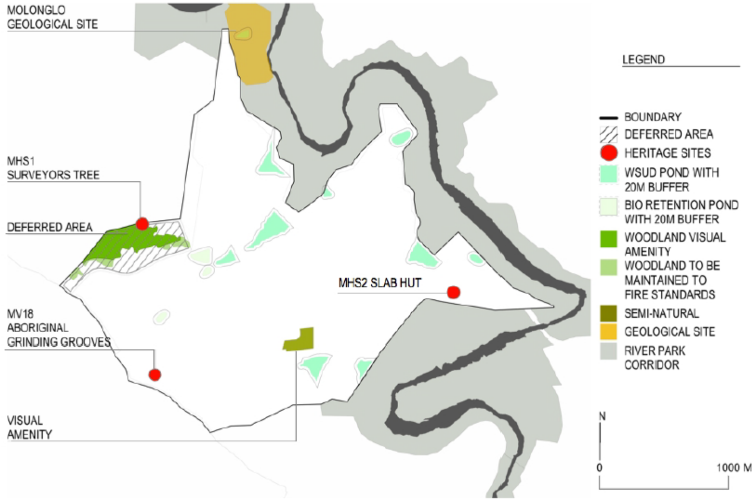


Figure 10 - Indicative location of key heritage items in Molonglo Valley[1]

[1] SGS Economics and Planning, 2011. Molonglo Valley stage 2 draft planning and design framework – technical report.

6 Assessment track

6.1 Impact track assessment

There are 5 types of development application that are required to be assessed in the Impact Track, and hence must be accompanied by a completed EIS (or be exempted by the Minister). These 5 types are listed in the relevant zone development table and are discussed below.

Table 4 – Development types required to be assessed in the impact track

Development	Commentary
1. A development that is not an Exempt, Code Track or Merit Track development where the development is allowed under an existing lease.	**Not applicable.** The development is proposed for an area of unleased Territory Land.
2. A development that would be permissible under the National Capital Plan but which is identified as prohibited development in the relevant zone Development Table.	**Not applicable.** The proposed development is not prohibited by the Territory Plan.
3. Development specified in Schedule 4 of the Planning and Development Act 2007 and not listed as prohibited development in the relevant zone Development Table.	**Applicable.** The potentially relevant triggers are reproduced in Table 5 below, along with a discussion about the likelihood of them being triggered.
4. Development declared under Section 123 and Section 124 of the Planning and Development Act 2007 and not listed as prohibited development in the relevant zone Development Table.	**Potentially applicable.** Sections 123 and 124 of the Act provide for the Minister for Planning, the Minister for Health, or the Commonwealth Minister responsible for the EPBC ACT to make declarations that require a proposal to be assessed in the Impact Track. It is not possible to determine whether the Planning or Health ministers will make such a declaration, although it is considered unlikely. The NES Plan endorsed in 2011 by the Commonwealth Minister responsible for the EPBC Act approves all actions associated with the development of East Molonglo, including the subject site. Accordingly, provided that development of the site is in accordance with the NES Plan no further assessment under the EPBC Act is required. Refer to Chapter 12.
Any development not listed in the relevant zone Development Table	**Not Applicable** The site is part of a Future Urban Area and the development is consistent with the structure plan.

The following table lists potentially relevant triggers for an EIS from Schedule 4 of the Planning and Development Act. Three potential triggers are identified.

Table 5 - Potential EIS triggers: Areas and Processes

	Trigger	Commentary
1	proposal that is likely to have a significant adverse environmental impact on 1 or more of the following, unless the conservator of flora and fauna produces an environmental significance opinion that the proposal is not likely to have a significant adverse environmental impact: (a) a species or ecological community that is endangered; (b) a species that is vulnerable; (c) a species that is protected; (d) a species with special protection status; (e) a species or ecological community if a threatening process has been declared under the Nature Conservation Act 1980, s 38 (4) in relation to the species or community; (f) a species or ecological community if the flora and fauna committee has stated criteria for assessing whether the committee should recommend the making of a declaration under the Nature Conservation Act 1980, s 38; (g) an endangered species, …, if the potential impact of the proposal will be on the species or community in New South Wales	Triggered The Strategic Fire Advantage Zone and some areas of the Outer Asset Protection Zones will extend into areas of moderately modified Yellow Box - Red Gum Grassy Woodland and also areas of Pink-tailed Worm-lizard habitat (*Aprasia parapulchella*).
2	proposal involving— (a) the clearing of more than 0.5ha of native vegetation ... unless the conservator of flora and fauna produces an environmental significance opinion that the clearing is not likely to have a significant adverse environmental impact; or (b) the clearing of more than 5.0ha of native vegetation on land that is designated as a future urban area under the territory plan unless the conservator of flora and fauna produces an environmental significance opinion that the clearing is not likely to have a significant adverse environmental impact.	Triggered The subject site is identified as a Future Urban Area under the Territory Plan. As the pattern of subdivision within the s211 area is yet to be determined, the exact extent of clearing of native vegetation cannot be quantified. It is considered likely to be close to the 5 hectare threshold. In addition, while clearing of vegetation within the remainder of the subject areas is not proposed, some minor works or upgrades to bushfire access may be required that would add to the total area cleared.

3	proposal for development on land reserved under s315 for the purpose of a wilderness area, national park, nature reserve or special purpose reserve, unless the conservator of flora and fauna produces an environmental significance opinion that the proposal is not likely to have a significant adverse environmental impact	Triggered The north western corner of the site extends into an area of Nature Reserve adjacent to the Molonglo River Corridor (Figure 8). While no specific development is proposed in this area it will become part of the Strategic Fire Advantage Zone and hence may be subject to fire fuel management consistent with the objectives of the Molonglo Adaptive Management Strategy.
4	proposal that is likely to have a significant adverse environmental impact on— (a) a domestic water supply catchment; or (b) a water use purpose mentioned in the territory plan …; or (c) a prescribed environmental value mentioned in the territory plan … of a natural waterway or aquifer	Not Triggered The proposal will not be a significant water user or generator of additional runoff. Nor is it likely to have a significant impact on water quality.
5	proposal that is likely to result in environmentally significant water extraction or consumption, other than a proposal for an urban lake, pond or retardation basin or a wastewater reuse scheme— (a) in an existing urban area or on land that has been designated as a future urban area; and (b) that is designed in accordance with the water sensitive urban design general code under the territory plan	Not Triggered The proposal will not be a significant water user.
6	proposal that is likely to have a significant adverse impact on the heritage significance of a place or object registered under the Heritage Act 2004, unless the heritage council produces an environmental significance opinion that the proposal is not likely to have a significant adverse impact	Not Triggered The proposal is not likely to have a significant adverse impact on any registered place or object.
7	proposal involving land included on the register of contaminated sites under the Environment Protection Act 1997	Not Triggered The site is not included on the register of contaminated sites.
8	proposal, other than on land in an existing urban area or land that is designated under the territory plan as a future urban area, with the potential to adversely affect the integrity of a site where significant environmental or ecological scientific research is being conducted by a government entity, a university or another entity prescribed by regulation	Not Triggered The site is identified as a future urban area.

7 Nature conservation values

The following sections provide specific responses to the questions included in the ACTPLA publication “Preparation of an application for scoping/Preparation of an application for an Environmental Significance Opinion”.

7.1 Existing processes and natural systems

IS THE LOCATION IMPORTANT IN MAINTAINING EXISTING PROCESSES OR NATURAL SYSTEMS OF THE ACT?

The site is a very important link in the natural systems of the ACT, providing habitat connectivity between areas of woodland in a north-south direction and along the riparian environments of the river corridor.

The small areas within the s211 area where land development and associated works are proposed only make a minor contribution to these values.

The remainder of the subject area makes a significant contribution to local habitat. The proposed works in this area consist only of the monitoring and maintenance of bushfire fuel loads. This proposed management regime will be consistent with the maintenance of the biodiversity values[2]. Land management works in these areas will be consistent with the requirements of the Molonglo Adaptive Management Strategy.

7.2 Diversity of flora, fauna or landscape

IS THE LOCATION IMPORTANT IN EXHIBITING UNUSUAL RICHNESS OF DIVERSITY OF FLORA, FAUNA OR LANDSCAPES?

As the subject area traverses a large and diverse area topographically, it is reasonable to expect considerable diversity of flora and fauna. Flora, fauna and landscapes identified on the site are typical of the surrounding areas and do not exhibit unusual richness or diversity.

7.3 Uncommon communities, landscapes or phenomena

IS THE LOCATION IMPORTANT IN ITS POSSESSION OF UNCOMMON, RARE OR ENDANGERED FLORA, FAUNA, COMMUNITIES, NATURAL LANDSCAPES OR PHENOMENA?

Yellow Box – Blakely’s Red Gum Tableland Grassy Woodland is located within the subject area, but not within the extent of impact associated with the proposed urban development.

The Pink-tailed Worm-lizard is known to live within the subject area however no identified habitat areas will be disturbed by urban development.

[2] Umwelt (April 215)

Where bushfire asset protection zones coincide with areas of woodland or other habitat it is possible to manage the fuel loads to achieve desired fire management objectives without significantly impacting the value of habitat. Fire fuel management already occurs across the subject site in accordance with the Strategic Bushfire Management Plan.

The Bushfire Risk Strategy for Molonglo has been specifically designed to balance the objectives of reduced fire risk and ecological outcomes.

All management works will be in accordance with the Molonglo Adaptive Management Strategy which commits to the ongoing monitoring of ecological values to ensure conservation performance targets are met.

7.4 Landscape and ecosystem characteristics

IS THE LOCATION IMPORTANT IN DEMONSTRATING THE PRINCIPAL CHARACTERISTICS OF THE RANGE OF LANDSCAPES, ENVIRONMENTS OR ECOSYSTEMS, THE ATTRIBUTES OF WHICH IDENTIFY THEM AS BEING CHARACTERISTIC OF THEIR CLASS?

The site is not considered important in demonstrating the principal characteristics of any landscapes, environments or ecosystems. It is typical of the agriculturally modified landscape of the broader Molonglo Valley district.

7.5 Information resource

IS THE LOCATION IMPORTANT FOR INFORMATION CONTRIBUTING TO A WIDER UNDERSTANDING OF THE ACT'S NATURAL HISTORY, BY VIRTUE OF ITS USE AS A RESEARCH SITE, TEACHING SITE, TYPE LOCALITY, REFERENCE OR BENCHMARK SITE?

The site is not a research, teaching, reference or benchmark site.

8 Preliminary risk assessment

8.1 Methodology

The matrix methodology outlined below has been adopted from ACTPLA's guideline document. It is consistent with AS/NZS ISO 14004:2004 (environmental management systems) and AS/NZS ISO 13000:2009 (risk management).

8.2 Identifying possible impacts

The possible impacts associated with the project have been identified using a number of resources including consultation with agencies, reviews of recent environmental impact statements, scoping documents and other environmental assessments of major projects.

In addition, project specific matters were considered based upon the preliminary design work that has been undertaken and the consultant reports completed to date.

8.3 Significant environmental impact

Central to the assessment process is the consideration of whether the project is likely to cause a significant adverse environmental impact. This is irrespective of the scale, or type of development.

The interpretation of significance is context dependent and relative to multiple elements (e.g. spatial, temporal, cultural, ecological, social, economic or institutional). Section 124A of the Planning and Development Act provides guidance on how the significance of an adverse impact is to be determined for the purposes of the Act. Section 124A states:

An adverse environmental impact is significant if—

- the environmental function, system, value or entity that might be adversely impacted by the development proposed is significant, or
- the cumulative or incremental effect of the development proposed might contribute to a substantial adverse impact on an environmental function, system, value or entity.

In deciding whether an adverse environmental impact is significant, the Minister must consider the following:

- the kind, size, frequency, intensity, scope and length of time of the impact
- the sensitivity, resilience and rarity of the environmental function, system, value or entity likely to be affected.

The consideration of ‘significance’ is relevant as the assessment of potential impacts is appropriately focused on impacts that are potentially significant.

8.4 Evaluating likelihood

The likelihood of an impact occurring is best described in terms of probability. Overlaying this is the need to recognise the uncertainty that may be associated with potential impacts, particularly during the preliminary risk assessment process. Best practice dictates that where there is scientific uncertainty, a cautious approach is warranted which will in turn identify a higher level of risk.

Each identifiable potential impact can be assigned a likelihood between ‘remote’ and ‘almost certain’.

Table 6 identifies the criteria used to determine the likelihood of an impact.

Table 6 - Description of likelihood

Likelihood	Description	Probability
Remote	May occur in exceptional circumstances	<1%
Unlikely	Not expected to occur in most circumstances	1-20%
Possible	May occur	21-49%
Likely	Probably will occur	50-85%
Almost Certain	Expected to occur	>85%

8.5 Evaluating consequence

The consequences of an impact require a degree of subjective assessment as they may consist of several elements. For the purpose of the preliminary risk assessment the elements considered are described in Table 7 and Table 8. Several of the elements are interrelated and a consequence is considered to be major if any one of the elements can be expected to be a major impact. A subjective decision is needed for each possible impact as to the level of consequence taking a balanced view of the impact against each of the elements.

The consequence of an impact used in the risk assessment is the reasonably foreseeable consequence. If there is a large amount of uncertainty, then the consequence may be worse.

Table 7 - evaluating consequence (General Elements)

Element		Description
Magnitude	Spatial	The area over which the impact will occur, from square metres to square kilometres.
	Intensity	The level of impact within the spatial area, from minor disruption to total destruction. A low intensity impact over a large area could be worse than a high intensity impact in a small area, depending upon other elements.
Temporal	Duration	The length of time of the impact, from a single event to a permanent change.
	Timing	Short term events may create significant impacts if they occur often. They may also coincide with particularly sensitive times in the receiving environment such as breeding cycles.
Ecological	Values	The quality of the receiving environment, generally identified through the declaration of conservation areas, identification of protected species and other features of natural conservation value.
	Sensitivity	The capacity of the receiving environment to regenerate or adapt to the impact (resilience). The sensitivity of an environment to a potential impact will require informed judgement.
Social	Number of people	The number of people directly or indirectly affected through lost opportunities for enjoyment or other values such as equity or existence values.
	Heritage	The impact on known or possible items of heritage or cultural value.
	Political	The measure of the likely political implications or level of community interest.
Economic		The financial cost of the impact through lost productivity or the cost of remediation.

Table 8 - Evaluating consequence (Project specific elements)

Consequence	Minimal	Minor	Moderate	Major	Catastrophic
Magnitude					
Spatial	A single point	Less than half a hectare	More than half a hectare, but less than 20	More than 20 hectares	Hundreds of hectares
Intensity	Low level behavioural, lifespan or condition effect	Acute impacts on some species	Moderate impacts on growth, recruitment or survival rates	Lethal impacts on some species	Lethal for individuals or communities
Temporal					
Duration	Single incident or transient event	Short term impact, single generation	Medium term	Long term, multiple generations	Permanent
Timing	Occurs outside breeding times	Occasional interruption of feeding or breeding	Interrupts one life cycle	Regularly interrupts life cycle	Permanent interruption of life cycle
Ecological					
Values	Previously disturbed areas	Parkland	Nature conservation area	Conservation area, listed species or other conservation feature of ACT significance	Wilderness, nationally threatened species or other conservation feature of national significance
Sensitivity	Will recover completely	Will recover with some changes	Moderate change to ecosystem functioning	Significant change to ecosystem functioning	Will not recover
Social					
Number of people	Some people indirectly impacted	Some people directly impacted or several indirectly	Several people directly impacted or many indirectly	Large number of people directly impacted	Loss of life
Heritage	Impact on item of minimal significance	Impact on multiple items of low significance	Impact on significant item	Impact on multiple significant items	Major impact on protected item
Political	Single negative press article	Multiple negative press articles	Significant public interest	Leads to an inquiry	Change of government
Economic	Minimal losses	Several thousand dollars lost revenue or remediation costs	Half million dollars in lost revenue or remediation costs	One million dollars in lost revenue or remediation costs	Several million dollars in lost revenue or remediation costs

Based on the assessment of likelihood and consequence any foreseeable impact can be assigned a risk rating.

Table 9 illustrates the risk rating process as a matrix. Increased consequence from left to right and increased likelihood from top to bottom. The resulting juncture of consequence and likelihood produces the risk rating on a scale of negligible to significant.

Table 9 - Risk assessment matrix

Consequence	Minimal	Minor	Moderate	Major	Catastrophic
Likelihood					
Remote	Negligible	Negligible	Very low	Low	Medium
Unlikely	Negligible	Very low	Low	Medium	High
Possible	Very low	Low	Medium	High	Very high
Likely	Low	Medium	High	Very high	Significant
Almost certain	Medium	High	Very high	Significant	Significant

9 Project risks considered

Table 10 - Unmitigated Risk Assessment

	Identified Risks	Commentary	Likelihood	Consequence	Unmitigated Risk
	Traffic and Transport				
1	Transport – damage to road infrastructure by construction or delivery vehicles.	While some machinery will be brought to site for civil works these are unlikely to exceed the bearing capacity of the existing roads. Forestry tracks will continue to be utilised in the establishment and maintenance of the asset protection zone.	Possible	Minor	Low
2	Traffic – increased traffic, delays and road safety issues.	There will be a minor increase in road traffic during construction related to material delivery and construction workers. Once constructed, dwellings will be accessed by residents and visitors using the street network designed for this purpose.	Almost Certain	Minor	High
	Utilities				
3	Energy – excessive demand for energy during construction and operation	The total demand for energy on a territory scale will increase as a result of the development however use will be of a residential/commercial nature in line with existing Canberra suburbs.	Unlikely	Minor	Very Low
4	Mains Water – excessive consumption during construction or operation	The total demand for water on a territory scale will increase as a result of the development however use will be of a residential/commercial nature in line with existing Canberra suburbs.	Unlikely	Moderate	Low
5	Stormwater – pollution of stormwater	Construction and operation do not require the use of significant potential pollutants. Sediment and Erosion is considered the most likely risk to stormwater quality.	Likely	Moderate	High
6	Stormwater – inadequate flood contingency arrangements	Significant rainfall events during construction could lead to uncontrolled release of stormwater from site.	Possible	Moderate	Medium

7	Sewerage – inappropriate management	Sewerage connections for dwellings need to meet ACTEW requirements	Unlikely	Moderate	Low
8	Service Relocations – interruption to existing utilities	The proposal plans to work around the existing power and communications services. New areas will be serviced during development.	Possible	Minimal	Very Low
9	Damage to utilities	The urban development area site is located away from existing major utilities. The strategic fire zone includes major utilities but they are unlikely to be impacted.	Unlikely	Moderate	Low
	Material Use and Waste				
10	Material Use – excessive consumption of raw materials	A significant quantity of raw materials and energy will be utilised by the project. The quantity will be comparable to other urban development projects.	Possible	Minor	Low
11	Waste Management – inappropriate generation, reuse and disposal of waste streams	Any development project has the capacity to generate waste streams. Waste management systems are in place for all developments in the Territory.	Possible	Minor	Low
12	Toxic and Hazardous Materials – inappropriate handling leading to pollution event.	Hydrocarbons and other potentially hazardous materials will be used onsite during construction.	Unlikely	Moderate	Low
13	Dispersal of litter and other gross pollutants	The development of the area and subsequent operation could result in the dispersal of litter and other gross pollutants into the receiving environment.	Possible	Minor	Low
	Landscape and Visual Impacts				
14	Landscape Character – negative impacts on the visual amenity from vantage points.	The development will be visible from surrounding areas, however is sufficiently removed from established residential areas. During construction and operation the area will be visible from Mount Stromlo however views will not be inconsistent with surrounding areas.	Likely	Minimal	Low
15	Land Values – changes to the value of land in the locality	The presence of the development could impact upon land values in the area either positively or negatively.	Possible	Minor	Low

	Soils and Geology				
16	Land Disturbance – unacceptable loss of vegetation and topsoil resources	The proposal will require the clearing of vegetation for urban development. The clearing of top soil may impact the seedbank and native plan propagules. The management of fire fuel loads will not require the clearing of vegetation, rather vegetation will be thinned.	Likely	Moderate	High
17	Erosion	The site is moderately steep, increasing the erosion potential of disturbed areas.	Likely	Moderate	High
18	Soil compaction	Soil compaction during construction may limit potential for revegetation.	Possible	Moderate	Medium
19	Topsoil Preservation – loss of topsoil through excess handling and incorrect stockpiling.	Topsoil is a valuable resource. Where the land is re-shaped topsoil may be available for use elsewhere on the site.	Possible	Minor	Low
	Water Quality and Hydrology				
20	Groundwater – interception and altered drainage regimes	The project will not utilise groundwater resources.	Unlikely	Moderate	Low
21	Surface Water Flows – alteration of natural drainage regimes	The installation of impervious surfaces may increase runoff in some storm events. Natural drainage lines will be affected by urban development	Likely	Moderate	High
22	Surface Water Quality – water quality impacts downstream	Refer to risks 5 and 6 above.			
	Climate Change & Air Quality				
23	Extreme Storms	The buildings, infrastructure and vegetation may be susceptible to damage by extreme wind, rain or hail events. The frequency of these events may increase as a result of predicted climate change.	Remote	Major	Low
24	Protracted Drought	Residents, buildings and infrastructure, and surrounding flora and fauna are susceptible to the impacts of protracted drought and associated water scarcity.	Possible	Moderate	Medium
25	Climate Change	Other than extreme storms addressed above, the climactic changes predicted for the region will be within the tolerances of modern urban infrastructure and housing.	Likely	Minimal	Low

26	Greenhouse Gas Emissions – project contribution to greenhouse gas emissions.	The construction and operation of the proposal will contribute to greenhouse gas emissions.	Likely	Minimal	Low
27	Bushfire	The development adjoins a bushfire prone area and may be susceptible to damage in the event of a bushfire.	Likely	Major	Very High
28	Air Quality – emissions of dust or odour during construction or operation.	Works within the construction footprint will potentially generate dust and odours. During operation some dust will be generated by vehicles on unsealed roads within the asset protection area.	Likely	Minor	Medium
29	Release of sequestered carbon	Removal of vegetation and disturbance of top soil will result in the release of sequestered carbon.	Likely	Minimal	Low
	Noise Vibration and Lighting				
30	Lighting – Impacts on urban amenity and nocturnal fauna during construction and operation	The urban development area will be lit temporarily during construction and permanently during occupation. Due to the proximity, lighting may adversely impact on sensitive receivers including surrounding residents and the Mount Stromlo Observatory (ANU).	Likely	Moderate	High
31	Noise and Vibration – Impacts of construction activity on urban amenity and local flora.	No blasting or work in bedrock is anticipated.	Unlikely	Moderate	Low
	Biodiversity and Nature Conservation				
32	Native vegetation - Impacts on residual native vegetation	While the proposed urban area is within former pine forest, the proposed works will impact native vegetation within the s211 area.	Almost Certain	Minor	High
33	Threatened Species and Communities - Yellow Box - red Gum Grassy Woodland Endangered Ecological Community (EEC).	The proposed urban development works are located outside of identified Yellow Box - red Gum Grassy Woodland. Where the bushfire risk management works coincide with woodland areas minimal or no works are required to achieve the target fuel loads.	Unlikely	Moderate	Low

34	Threatened Species and Communities – Pink-tailed Worm-lizard	The proposed urban development area does not encroach upon potential Pink-tailed Worm-lizard habitat. Where the bushfire risk management works coincide with habitat, minimal or no works are required to achieve the target fuel loads.	Possible	Minor	Low
35	Native fauna - habitat fragmentation	Proposed fire fuel management works will remove some habitat features including trees, fallen timber, and shrubs.	Likely	Moderate	High
36	Invasive Species – introducing or encouraging the presence of invasive flora or fauna.	Construction activities and future human habitation could potentially introduce invasive pest species. Some areas are already populated by weeds and additional disturbance could encourage their spread.	Likely	Moderate	High
37	Aquatic Biology – causing change in the aquatic biology downstream.	The site is traversed by drainage lines which ultimate drain to the Molonglo River.	Unlikely	Minimal	Negligible
	Cultural Heritage				
38	Places and Objects – unplanned impacts on cultural heritage places or objects.	There are no known Aboriginal sites within the proposed development area. Relatively steep slopes make it unlikely additional Aboriginal sites of high conservation value will be found.	Unlikely	Moderate	Low
39	Values – impacts on cultural values	A surveyors tree with low to moderate conservation value is located within the site as is a geological site. Both are in areas of fire fuel management rather than urban development.	Unlikely	Moderate	low
	Social				
40	Failure to incorporate requirements of other stakeholders	Stakeholders, in particular the ESA have specific requirements that are required to be met.	Unlikely	Moderate	Low
41	Level of Interest – interest from community not catered for	Major projects typically provide a portal for information to the community. A lack of information provided by the proponent can result in misinformation being propagated by vested interests.	Unlikely	Moderate	Low
42	Recreational Opportunities – loss of recreational amenity or area	The land is not regularly used for recreational purposes.	Unlikely	Minimal	Negligible

43	Human Error - damage to the environment through ignorance, carelessness or failure to follow instruction.	Construction Workers or Plant Operators may undertake works outside their instructed scope without understanding the consequences	Possible	Moderate	Medium
44	Malicious Act	The proposal could be the target of sabotage or vandalism.	Remote	Moderate	Very Low
45	Failure to meet community needs and expectations	The community will have expectations in relation to development and bushfire protection works.	Unlikely	Moderate	Low
	Health				
46	Contaminated Land - the project occurs on contaminated land, exposing workers or the environment to potential toxins.	The land has been subject to a long history of agricultural use and some areas may have become contaminated.	Unlikely	Moderate	Low
47	Public Safety - accidental harm to the public	The urban development area will be fenced to avoid accidental intrusion by members of the public. The fire management areas will remain publicly accessible.	Unlikely	Major	Medium
	Economic Impacts				
48	Cost Benefit Analysis – Project returns a negative value.	If there are unforseen costs, the project may fail to proceed to completion, resulting in unmanaged abatement zones and a failure of the ACT Government to realise its risk management objectives.	Unlikely	Major	Medium
	Compliance				
49	Failure to adhere to guiding documentation	Failure to comply with project documentation, in particular the CEMP, and relevant environmental legislation may lead to unforeseen impacts.	Possible	Major	High

10 Measures to avoid impacts

DESCRIPTION OF MEASURES WITHIN THE PROPOSAL THAT SEEK TO AVOID AND MINIMISE (AND AS A LAST RESORT OFFSET) IMPACT ON IDENTIFIED CONSERVATION VALUE

Table 11 below presents the identified risks from Table 10 that have been assessed to have an unmitigated risk level of Medium or higher. For each risk a number of mitigation measures are discussed, resulting in a Mitigated Risk level.

The mitigation measures identified in this table will be adopted by the LDA in the design and construction of the development. Additional controls may apply to future owners of the land or land managers.

The majority of risks considered in the PRA were determined to be mitigated through the implementation of environmental management controls both during construction and occupation of the area.

Table 11 - Mitigated Risk Assessment

	Identified Risks	Unmitigated Risk	Mitigation Measures	Likelihood	Consequence	Mitigated Risk
	Traffic and Transport					
2	Traffic – increased traffic, delays and road safety issues.	High	Detailed design will be informed by a traffic assessment of both construction and operation phases.	Unlikely	Minor	Very Low
	Utilities					
5	Stormwater – pollution of stormwater	High	The estate works will trigger the need for an Environmental Protection Agreement. Sediment and erosion control will be managed in accordance with industry best practice. A sediment and erosion control plan will be endorsed by the EPA prior to construction commencing. Ongoing management requirements for sediment and erosion control will be documented in Construction and Operational Environmental Management Plans that will be endorsed by the EPA.	Unlikely	Moderate	Low

6	Stormwater – inadequate flood contingency arrangements	Medium	Detailed design will be informed by hydraulic modelling which will allow accurate prediction of likely flows. Flow management and diversion structures will be built on the basis of this modelling.	Unlikely	Moderate	Low
	Soils and Geology					
16	Land Disturbance – unacceptable loss of vegetation and topsoil resources	High	The quantum of vegetation clearing will be minimised. Earthworks on site will be designed to minimise the need to import or export soil Where topsoil is removed it will be either stockpiled in low piles or redistributed on site immediately. All areas of disturbance will be revegetated immediately following construction.	Remote	Moderate	Very Low
17	Erosion	High	As identified at Risk 5, the works will trigger the need for an Environmental Protection Agreement. Sediment and erosion control will be managed in accordance with the requirements of the Agreement.	Possible	Moderate	Medium
18	Soil compaction	Medium	The use of heavy machinery on areas to be revegetated will be minimised.	Unlikely	Moderate	Low
	Water Quality and Hydrology					
21	Surface Water Flows – alteration of natural drainage regimes	High	As identified as Risk 6 detailed design will be informed by hydraulic modelling. Flow management and diversion structures will be designed and built on the basis of this modelling with the intention of minimising any change to downstream hydrology. The urbanised areas will be required to meet the Water Sensitive Urban Design General Code. Bushfire fuel management works will not cause significant change to natural drainage.	Unlikely	Moderate	Low

	Climate Change and Air Quality					
24	Protracted Drought	Medium	Canberra's water supply has been designed to cater for drought conditions. Native vegetation is well adapted to variable climate conditions.	Likely	Minor	Medium
27	Bushfire	Very High	The establishment of proposed advantage zones, asset protection zones and design and construction of buildings in accordance with the basic ember protection (AS3959 BAL 12.5) will reduce the consequence of future bushfires.	Possible	Major	High
28	Air Quality – emissions of dust or odour during construction or operation.	Medium	During construction, dust will be controlled using water if necessary.	Possible	Minor	Low
	Noise Vibration and Lighting					
30	Lighting – Impacts on urban amenity and nocturnal fauna during construction and operation	High	Lighting within the site will be consistent with the surrounding urban context. Ongoing negotiations with ANU in relation to other parts of Molonglo have resulted in a street hierarchy and lighting design which minimises impacts on the operation of the observatory.	Unlikely	Moderate	Low
	Biodiversity and Nature Conservation					
32	Native vegetation - Impacts on residual native vegetation	High	The removal of vegetation will be minimised and will be consistent with the requirements of the NES plan. Within the strategic fire zones the proposed work is limited to the maintenance of fuel loads through appropriate grazing, slashing or burning[3].	Likely	Minor	Medium

[3] The NES Plan commits the ACT Government to the development of a management plan for the areas of Box Gum Woodland to the west of Molonglo Stage 2 (Action 16). Section 4.6 of the NES plan provides information about what the Management Plans will address. It includes an acknowledgement that fire fuel management may occur within Box Gum woodland and Pink-tailed Worm Lizard habitat on the proviso that these mitigation measures take into account the ecological thresholds of these species and communities. They will also include biomass control to maintain environmental condition targets and other typical land management activities.
In relation to the Box Gum Woodland to the west of the Molongo Stage 2 area, the NES Plan specifically commits the ACT Government to the management and protection of the woodland as a critical consideration when undertaking fuel hazard management (Action 17).

35	Native fauna – habitat fragmentation	High	The fuel management works will thin vegetation or remove it via burning in a mosaic pattern. Recommendations for ecologically sensitive management are provided in the Bushfire Risk Strategy.	Possible	Minor	Low
36	Invasive Species – introducing or encouraging the presence of invasive flora or fauna.	High	The works will trigger the need for an Environmental Protection Agreement. Weed management will be considered as part of this requirement. Future residents will be informed about appropriate plant choices for gardens.	Possible	Moderate	Medium
	Social					
43	Human Error - damage to the environment through ignorance, carelessness or failure to follow instruction.	Medium	Construction of the urban areas will require an Environmental Protection Agreement. An Environmental Management Plan will also be prepared, a requirement of this plan will be that all operators be adequately skilled, trained and supervised to undertake their duties.	Unlikely	Moderate	Low
	Health					
47	Public Safety - accidental harm to the public	Medium	During construction the site will be fenced to avoid accidental intrusion by members of the public.	Remote	Major	Low
	Economic Impact					
48	Cost Benefit Analysis – Project returns a negative value	Medium	Requirements for funding and responsibilities for implementation are identified within the Bushfire Risk Strategy.	Unlikely	Moderate	Low
	Compliance					
49	Failure to adherence to guiding documentation	High	Regular toolbox talks, briefings and education sessions will be conducted with construction personnel to ensure compliance with documented practices	Unlikely	Major	Medium

The NES Plan also contains specific commitments in relation to the combined impacts on high and moderate quality Pink Tailed Worm Lizard Habitat within East Molonglo and the river corridor (Action 28). Actions relating to fire fuel management are required to be undertaken in a manner consistent with these commitments.

11 Risk assessment summary

While some of the unmitigated risks are identified as high and potentially significant, the mitigation measures that are identified demonstrate that all of the risks can be managed to an acceptable level.

The mitigation measures will be incorporated into the design for the estate development application for the urban areas and further assessed as the project develops through detailed design, development approvals and other post DA approvals (in particular the environmental protection agreement).

The management of the bushfire fuel loads will continue to be negotiated with cooperation between the LDA and relevant ACT Government agencies.

12 Decisions under the EPBC Act

The proposed development in the Molonglo Valley has been subject to assessment under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Based on assessment undertaken in accordance with the requirements of the Commonwealth and ACT Governments, the Molonglo Valley Plan for the Protection of Matters of National Environmental Significance (the NES Plan), Strategic Assessment and Supplementary Assessment Report were prepared.

The NES Plan addressed the matters of national environmental significance potentially impacted by the development of the entire Molonglo area, and identified mitigation, management and offset measures for:

- Box gum woodland.
- Natural temperate grassland.
- Pink-tailed worm-lizard habitat.
- Superb parrot and swift parrot.

Following endorsement on 7 October 2011, the Commonwealth Minister approved all actions associated with the proposed urban development in East Molonglo on 20 December 2011.

The approval included consideration of the subject s211 area and therefore, provided the development remains in accordance with the NES Plan, no further assessment under the EPBC Act is required.

A copy of the signed approval instrument is at Appendix F.

13 Qualifications and expertise of consultants

13.1 Information sources

The sources providing key technical data for the assessment are listed in Table 12.

Table 12 - Technical sources and currency of information

Source	Report Age (months)	Verified as current	Author Qualifications, Expertise and Experience.
ACT Government (2011) Molonglo Valley Plan for the Protection of Matters of National Environmental Significance: NES Plan		The NES Plan and Supplementary Report have been assessed by SEWPaC as the basis of the strategic assessment approval under the EPBC Act. This approval was made on 20 December 2011 and is in effect until 2041. It is considered that these reports have been subject to adequate review to be considered verified and current.	
ACT Government (2013) Molonglo Adaptive Management Strategy		This document remains the basis for current management and monitoring in the subject area.	
Umwelt (04.2015) Analysis of Vegetation Structure and Fire Risk, West Denman Prospect	17	N/A Less than 18 months old.	Rob Armstrong has a bachelor of Science (Forestry) and a Masters of Science (Botany). He has over 12 years of experience working as a vegetation ecologist focussing primarily on vegetation and habitat survey, mapping and classification in NSW and the ACT.
ABPP (08.2015) Bushfire Risk Strategy Molonglo Stage 3; Denman Prospect & the Molonglo River Corridor	13	N/A Less than 18 months old.	Graham Swain is the Director of Australian Bushfire Protection Planners. He has over 25 years of experience as a fire officer and incident controller and over 15 years of experience as a bushfire planning consultant.

14 Public information and consultation

This Section 211 application for the Deferred Area has not been subject to specific public consultation, however extensive ongoing consultation has been undertaken for the wider Molonglo Valley precinct. This includes:

- Project information currently available from the ESDD website and provision of an email address for the receipt of public comment.
- Public comment sought during the preparation of the NES Plan and Strategic Assessment Report (available for comment from 17 March to 23 April 2010). These documents guide the ultimate design and development of the site and remain available for public viewing on the ACT Government website.
- Earlier consultation relating to the Molonglo Valley accompanied the preparation of the *Canberra Spatial Plan* (2004) the *Molonglo Valley Structure Planning Study* (2006), Territory Plan variation (plan variation No. 281) and the *Molonglo and North Weston Structure Plan* (2008).
- In April 2012, a community engagement program supported the preparation of the Molonglo Valley Stage 2 Planning and Design Framework. All consultation that has happened to date is available on the EPD website.
- Public consultation will also be required for future development applications for the proposed urban areas.

15 Appendices

Appendix A – Map of s211 Area

(refer to separate document)

Appendix B – Aerial Image and APZ's

(refer to separate document)

Appendix C – Bushfire Risk Strategy

(refer to separate document)

Appendix D – Analysis of Vegetation Structure and Fire Risk

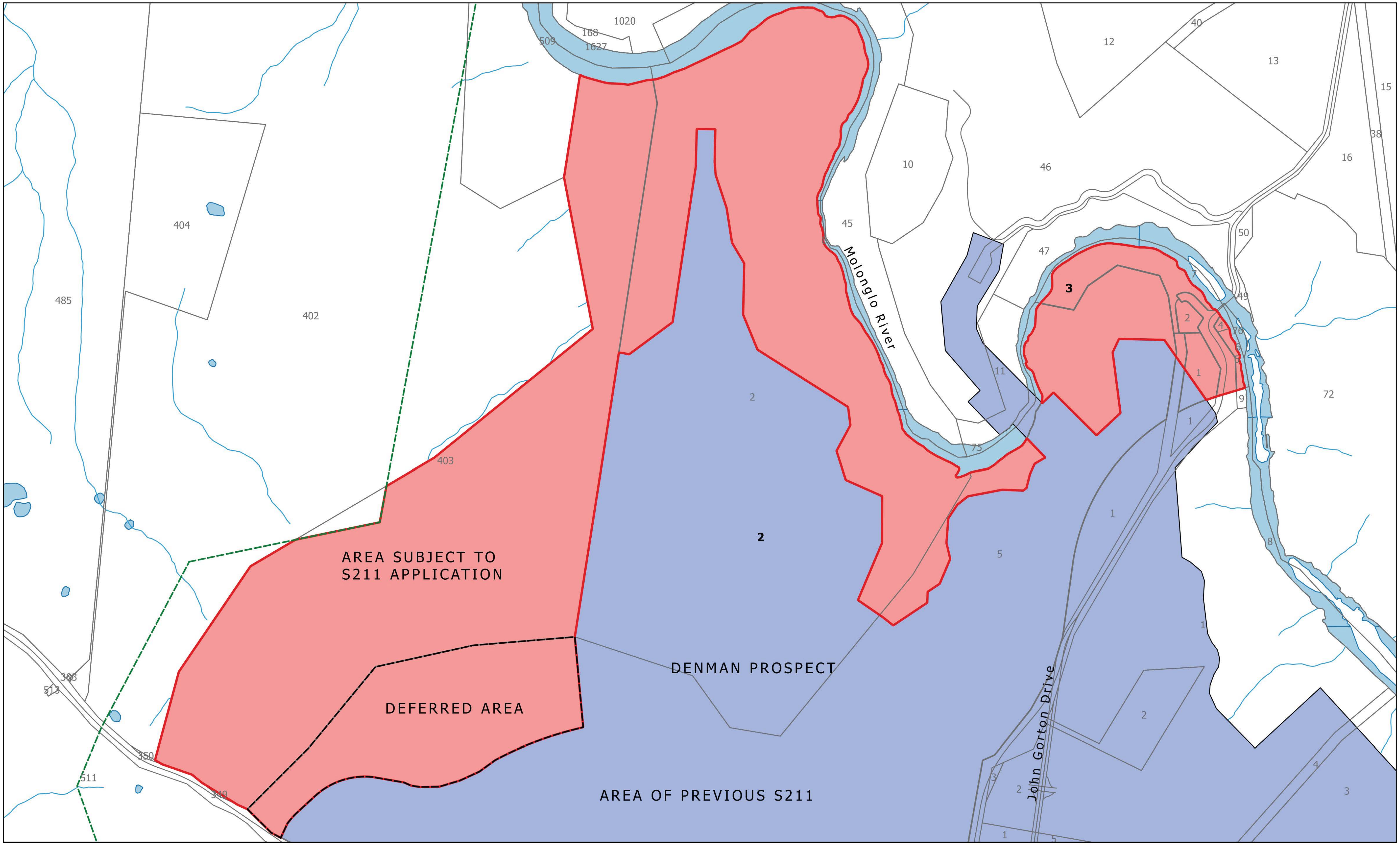
(refer to separate document)

Appendix E – Adaptive Management Strategy

(refer to separate document)

Appendix F – NES Plan and NES Plan approval

(refer to separate document)



Molonglo Deferred Area and Bushfire Management Zones
Section 211 Exemption Application

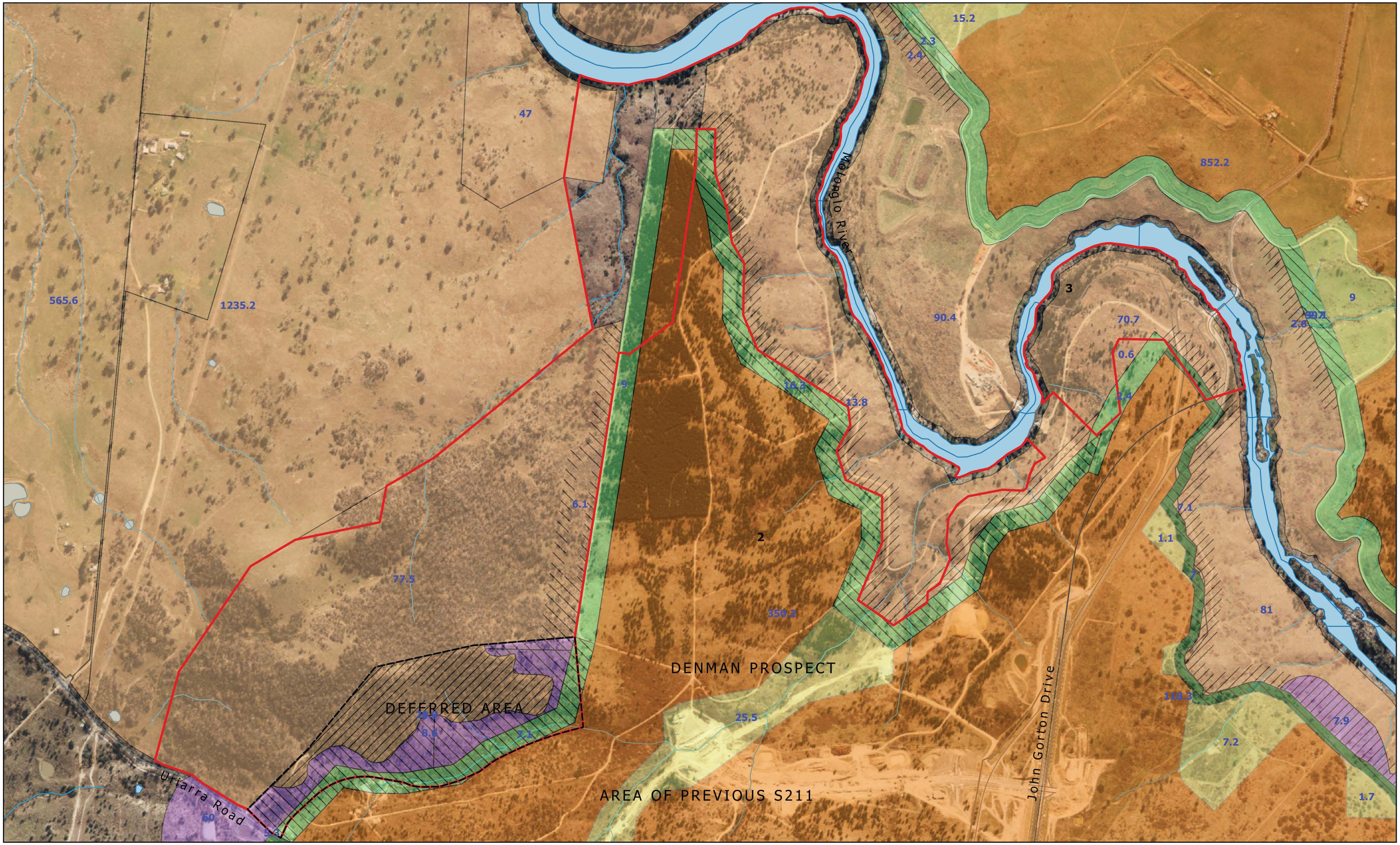
Scale :: 1:10,000 @ A3
Drawn :: K Tanner
Date :: 17.05.2016
Revision :: A

Legend

NES Boundary
Deferred Area
Sections
Blocks
s211 Area
Previous s211
Creeks
Water

N

CANBERRA
TOWN
PLANNING



Molonglo Deferred Area & Fire Management Zones
Section 211 Exemption Application
Aerial Photo and Fire Management Zones

Scale :: 1:10,000 @ A3
Drawn :: K Tanner
Date :: 25.07.2016
Revision :: B

Legend

- s211 Area
- Deferred Area
- Sections
- Molonglo River

Bushfire Management Plan: Areas in hectares

Bushfire Management

- IAPZ - 60m to be finalised at EDP
- SFAZ to be finalised through EDP
- Indicative LMZ - variable width
- Indicative IAPZ - 30m minimum
- Indicative IAPZ - 60m minimum
- Indicative OAPZ
- Indicative SFAZ
- Indicative Urban Open Space
- Indicative Urban Area

N

CANBERRA TOWN PLANNING

BUSHFIRE RISK STRATEGY MOLONGLO

STAGE 3, DENMAN PROSPECT &

THE MOLONGLO RIVER CORRIDOR

AUSTRALIAN CAPITAL TERRITORY

PREPARED FOR THE LAND DEVELOPMENT AGENCY

Australian Bushfire Protection Planners Pty Limited

Bushfire Consultants
ACN 083 085 474
32 Old Dog Trap Road
SOMERSBY 2250 NSW
Phone: (02) 43622112 Fax: (02) 43622204
Email: abpp@bigpond.net.au

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PREPARED FOR THE LAND DEVELOPMENT AGENCY

Assessment Number	Document	Preparation Date	Issue Date	Directors Approval
B132154 – A4	Final	25.8.2015	21.4.2016	*G.L.Swain*

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

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Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

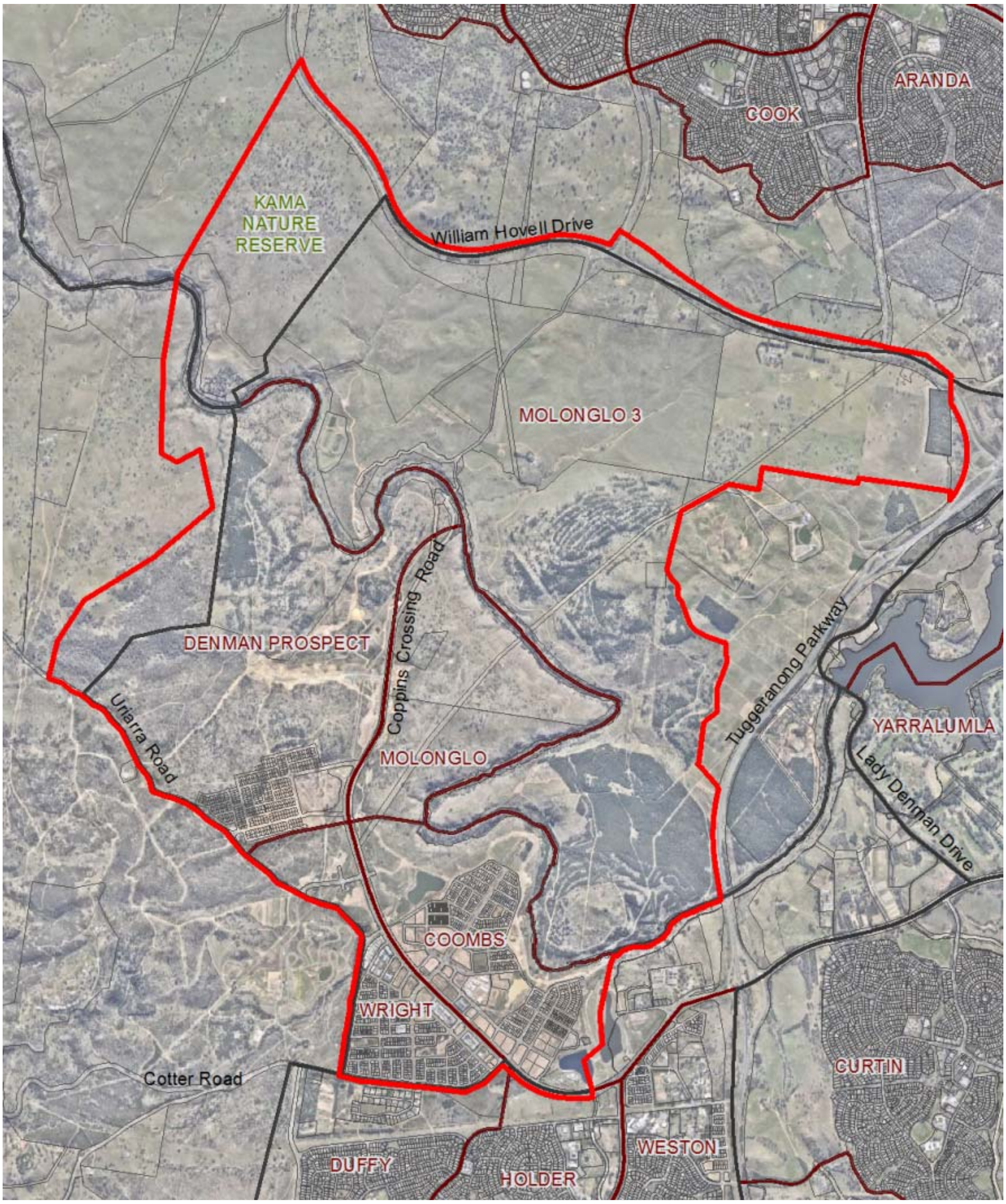
SECTION 1

INTRODUCTION

1.1 Background.

Australian Bushfire Protection Planners Pty Limited has been commissioned by the Land Development Agency [LDA] to undertake a Bushfire Study for Molonglo Stage 2, Stage 3 and the Molonglo River Corridor. **Figure 1** shows the study area.

Figure 1 – Plan of Study Area.



Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

The objective of the brief is to guide the development of the Land Development Agency Masterplan for the Molonglo Stage 3 study area, review the bushfire protection measures to Molonglo Stage 2 [Denman Prospect] and the Molonglo River Corridor and prepare a report on the findings of the study detailing the recommended bushfire protection measures identified by the study group.

Scope of Work – Molonglo Stage 2/3 and Molonglo River Corridor Study:

1. Review existing literature/reports & studies;

2. Review the study undertaken by Umwelt to determine the ecological constraints and opportunities for fuel hazard reduction management;

3. Attend pre-workshop site familiarisation;

4. Attend and participate in a workshop between LDA, Umwelt, TaMS Fire Management Unit and EPD to discuss all issues related to the protection of the north-western edge of Molonglo Stage 3; the western edge of Molonglo Stage 2 and the Molonglo River corridor;

5. Examine the results of the workshop, liaise with LDA & Umwelt and others [as required] to identify the measures which are required to be implemented to mitigate the potential bushfire risk;

6. Attend and participate in a follow-up workshop between LDA, Umwelt, TaMS Fire Management Unit, EPD, ESA, ACTRFS, Fire & Rescue ACT and other selected Stakeholders to present the findings/results of the initial workshop and the recommendations determined in the review of these findings/results;

7. Review the results of the follow-up workshop, liaise with LDA & Umwelt and others as required, to finalise the measures which are required to be implemented to mitigate the potential bushfire risk;

8. Prepare, in co-operation with Umwelt, a report which details the findings of the studies undertaken, the results of the workshops and the final recommendations on those measures required to be implemented to mitigate the bushfire risk to the western, north-eastern urban edge and the Molonglo River corridor;

9. Attend and participate in a final workshop between LDA, Umwelt, TaMS Fire Management Unit, EPD, ESA, ACTRFS, Fire & Rescue ACT and other selected Stakeholders to present the final report;

10. Generally, liaise with LDA, Umwelt, TaMS, ESA, ACTRFS, Fire & Rescue ACT and other ACT Government Departments as required.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

1.2 Information Reviewed.

The following report/studies were reviewed as part of the scope of works:

- The Molonglo River Park – Concept Plan prepared by Hassell – September 2011;
- The Molonglo Valley Plan for the Protection of Matters of National Environmental Significance [NES Plan] September 2011;
- Molonglo Vegetation Survey – Baseline Condition Assessment prepared by Ecological Australia – July 2013;
- Molonglo Stage 3 Slope Analysis – LDA;
- Bushfire Risk Assessment Report – Molonglo Structure Plan – prepared for ACTPLA, 19.7.2005;
- Updated Bushfire Risk Assessment Report – Molonglo Structure Plan – prepared for ACTPLA – 26.4.2006;
- Bushfire Risk Assessment Report – Molonglo Stage 2 Group Centre prepared for Indesco 23.8.2012;
- Territory Plan - ACTMAPi;
- Molonglo Stage 2 Vegetation Conservation Assessment prepared by Openlines, February 2014;
- Indicative Fire Management Strategy – Urban Area – TaMS – 2015;
- Indicative Fire Management Strategy – Molonglo Valley – TaMS – 2015;
- Analysis of Vegetation Structure and Fire Risk – Umwelt – April 2015;
- Molonglo River Reserve [Kama] Operational Plan 2014 – 2017 – TaMS;
- ACT Strategic Bushfire Management Plan – Version 3 – 2014;
- ACT Bushfire Management Standards – Strategic Bushfire Management Plan – Version 3 – 2014;
- Briefing Note on the Ecological Values of the Kama Nature Reserve – Molonglo Stage 3 Outer Asset Protection Zone – Umwelt – October 2013;
- Bushfire Risk Assessment for the north-western edge of Denman Prospect [Aurecon Australia Pty Ltd – 25.2.2014] - Incomplete.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

1.3 Review of Documents.

The following documents have been reviewed and a brief summary of the findings/recommendations of each follows. A more complete summary is at **Appendix A**:

1. Bushfire Risk Assessment Reports prepared by Australian Bushfire Protection Planners Pty Ltd [ABPP] for the Molonglo Structure Plan [August 2005 & April 2006];
2. The Molonglo River Park Concept Plan – ESDD (Hassell) – 2012;
3. The NES Plan – ACTPLA - 2011;
4. The Adaptive Management Strategy – TaMS – 2013; and
5. The Draft Indicative Fire Management Strategy – Molonglo Valley – TaMS – 2015.

1.4 Summary of the Review of Reports.

The following is a summary of the findings/recommendations of the documents reviewed:

1. **Bushfire Risk Assessment Reports prepared by ABBP – 2005 & 2006:**

The Bushfire Risk Assessment Report 2005 prepared by ABPP stated:

"The long exposure of the north-western edge of the precinct to uphill burning fires, influenced by hot, dry, strong north-westerly winds, will result in significant fire impact either directly or indirectly from ember attack, depending on the level of protection provided by active management of the fuels within the river corridor.

Similar impacts may also occur to the western / south western edge from westerly and south-westerly wind-driven fires and the influence of wind turbulence in the Mount Stromlo area.

The northern edge will be impacted by fires burning within the habitat corridor, north of William Hovell Drive.

Due to the level of risk and to address the potential impacts of future bushfires to the exposed urban edge and the concerns over the long-term viability of minimising fuel loads within the abatement zone, a Critical Management Zone should be provided to a minimum width of 300 metres.

The objective of land uses within the Critical Management Zone should be to provide permanent management of the hazardous fuels to levels which prevent the spread of fire into the urban edge.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

The Molonglo River Corridor will separate the eastern development node from the western development node and therefore provide a direct fire path into the suburbs adjoining the corridor and to the International Arboretum to the south east.

The river corridor separating the north-eastern and south-western nodes of the East Precinct should be activity managed as a recreation reserve/public park to mitigate the effects of fire runs along the river".

The Bushfire Risk Assessment Report 2006 prepared by A B P P retained the recommendation for the provision of a Critical Management Zone to the north-western edge of Molonglo and notes that the Draft Structure Plan had introduced 'Lake Molonglo' with the construction of a new dam on the Molonglo River.

For the Critical Management Zone [CMZ] the report stated:

- ***Purpose.***

To provide a permanently managed fuel reduced zone, wide enough to mitigate the impact of radiant heat and ember transfer to the urban edge during major bushfire events.

- ***Location.***

The Critical Management Zone shall be located beyond the edge of the Inner Asset Protection Zone on the north-western and northern edge of the western "node" and the south-western edge of the East Molonglo precinct; the northern, north-western, western and south-western edge of the Central Molonglo.

- ***Depth.***

A minimum width of 300 metres shall be provided. (Minimum 100 metres width provided to the north-western edge of the East Molonglo precinct).

- ***Establishment & Maintenance.***

The Critical Management Zone shall be established on the hazard side of the Inner Asset Protection Zone and shall extend to the widths nominated.

The zone may contain agricultural pursuits which permanently minimise combustible fuel ground litter, (vineyards, orchards); or land uses that utilize irrigation supply drawn from grey water recycling, or irrigation from the new lake created by the damming of the Molonglo River. Such land uses may include the cultivation of summer crops/Lucerne.

The Critical Management Zone may also include recreation and open space facilities such as Golf Courses, Sports Fields, Carparks etc.

Where these land uses are not utilized to provide the Critical Management Zone and the zone consists of Habitat Corridors/Rural Land, a stock proof fence with access gates shall be provided on the outer edge of the zone. A 30 metre wide wind break shall be established by planting smooth barked trees on the outer edge of the zone.

A second wind break shall be established to a width of 10 metres, 10 metres from the Inner Asset Protection Zone/Critical Management Zone boundary.

A four (4) metre wide fire trail shall be established on the centre line of the Critical Management Zone, with link roads provided to the edge road at approximately 500 metre intervals.

Management of the combustible fuels within the CMZ shall be undertaken to maintain a Low – Moderate Overall Fuel Hazard, in accordance with the methodology provided by the NRE Overall Fuel Hazard Guide.

Management shall be implemented by regular stocking of the zone, or by a combination of mechanical slashing/stocking/hazard reduction burning. A Fuel Management Plan shall be prepared for the maintenance of the Critical Management Zone, irrespective of land use".

The final Structure Plan for Molonglo removed the damming of the Molonglo River, primarily due to the results of ecological studies, and replaced the lake with the Molonglo River Park [Nature Reserve] and established the Kama Nature Reserve to the northwest of Molonglo Stage 3.

These changes to the Draft Structure Plan – i.e. establishment of a Nature Reserve to the northwest of Molonglo Stage 3 and within the Molonglo River corridor, increase the bushfire risk to future development located adjacent to the north-western edge and to both sides of the river corridor.

The examination of the mitigation measures required to provide a reduction of this risk forms the core objective of the Working Group established by the Land Development Agency.

2. Molonglo River Park Concept Plan – ESDD (Hassell) – 2012

The Molonglo River Park Concept Plan prepared by Hassell supports the recommendation of the provision of the 300 metre wide 'Critical Management Zone' to the north-western edge. Note that the Hassell concept plan was completed after the NES Plan and before the Adaptive Management Strategy and presented recommendations for the management and development of the river corridor.

The Concept Plan also recommended that the river corridor should be managed for ecological values with the corridor being broken into precincts to prevent the 'wick' effect and in particular the management of the western entrance to the river park and the area around the sludge ponds to mitigate the passage of fire along the river.

It calls for strategic discontinuity zones within the riparian corridor which aim to reduce the ability of a fire to move continuously up the corridor and into the urban areas, and provide access for defense and fuel management.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

One of those areas would be located around and to the west of Coppins Crossing, from the proposed sewer line crossing to the proposed John Gorton Drive crossing the river. Another one would be at Misery Point.

The Hassell report goes on to describe the vegetation in the recreation areas would contain large areas of groomed grassland maintained to a height of less than 100mm with scattered tree planting as well as formal parks and gardens with irrigated plantings.

3. **The NES Plan – 2011:**

The NES Plan provided, under Section 2.3 – Bushfire Management Framework a 'motherhood' statement about bushfire management which reads:

"Within the strategic assessment area fire management will be aimed at protection of both built assets and MNES values. This will be achieved through the identification of appropriate asset protection zones and application of hazard reduction techniques that will both:

- *Ensure that the standards for fuel loads in the SBMP are met; and*
- *Protect MNES values through the use of sympathetic management techniques".*

The aim of this document does not address the recommendation that the vegetation in the river corridor or on the land to the west of Molonglo 3 [Kama] and Denman Prospect be managed to mitigate the impact of fire on the north- western edge of the future urban development and from a fire spreading along the river corridor.

In the document under Management and offsetting it called for the establishment of a buffer outside of the Kama Nature Reserve on its eastern side to protect the ecological values of the reserve. It went on under Commitments to MNES:

"Establish a buffer outside the Kama Nature Reserve between the reserve and the proposed development area, and allow for appropriate uses consistent with nature conservation uses of the reserve. The buffer will be developed to ensure that fire management is undertaken outside of the Kama Nature Reserve and will provide protection against urban edge effects."

It assumed that ESA would agree to no bushfire management inside Kama Nature Reserve despite there being a requirement underlying strategic bushfire management in the ACT that individual land managers are responsible for bushfire management on the land they manage. It also assumed that no bushfire management would be undertaken despite Kama being identified on the ESA website as being managed as an SFAZ (agricultural).

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

There are no dimensions provided in the NES Plan for the width of the buffer.

The document does not address the potential bushfire risk to the future development adjacent to the north-western edge or the river corridor.

4. The Molonglo Adaptive Management Strategy – TaMS 2013

The Molonglo Adaptive Management Strategy (AMS) was a key commitment from the NES Plan. Its purpose was to define a set of measures designed to achieve the conservation outcomes and performance targets for MNES in Molonglo strategic assessment area.

One of the outcomes of the baseline condition assessment was that an assessment of the buffer zone consisting of patches O2, O3 and O4 located to the east of Kama Nature Reserve found that these patches were not representative of a Threatened Ecological Community.

Under Management Objectives for fire, the document makes the statement that fire management activities for the purposes of protecting the urban development east of Kama Nature Reserve will be undertaken outside Kama Nature Reserve. It goes on to mention:

"The prescribed eastern buffer zone for Kama Nature Reserve is to ensure that fire management is undertaken outside of the Reserve and will provide protection against edge effects."

There are no dimensions provided in the AMS that defines the width of the buffer to Kama Nature Reserve.

The document does not address the potential bushfire risk potential to the future development adjacent to Kama Nature Reserve.

5. Draft Indicative Fire Management Strategy – TaMS 2015:

TaMS have prepared a draft Indicative Fire Management Strategy – Urban Area and the Indicative Fire Management Strategy – Molonglo Valley. It is considered that the recommended bushfire management strategies contained within the Molonglo River Concept Plan were not translated into the management strategies proposed by TaMS.

The recommendation provided in the Australian Bushfire Protection Planners reports and the Molonglo River Concept Plan that a 'Critical Management Zone' [CMZ] be provided to the northwest of the urban development [and river park] was not adopted in favour of the retention of ecological and habitat values.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

Similarly, the Molonglo River Concept Plans' recommendation that the river corridor be broken into precincts to prevent the 'wick' effect and in particular the management of the western entrance to the river park and the area around the sludge ponds to mitigate the passage of fire along the river was not adopted.

1.5 Working Group.

In late 2013 the LDA identified the need to establish a working group to examine the outstanding issues relating to the bushfire risk to the north-western edge of Molonglo 3; Molonglo Stage 2 [Denman Prospect] and the Molonglo River Corridor.

The brief of the Working Group was to bring together all Government Agencies involved in the development of the Molonglo East precinct to enable consideration of previous studies, undertake site inspections and consider all options available so as to develop a report that establishes the principles, processes and funding required to address the bushfire risk. Representatives of Government Agencies included:

- Dave Richardson [LDA];
- Kerry Browning [LDA];
- Adam Carmody [LDA];
- Dylan Kendall [TaMS];
- Adam Leavesley [TaMS];
- Nick Lhuede [ESA];
- Greg Potts [ACT RFS];
- Conrad Barr [Acting Chief Officer] ACT Fire & Rescue;
- Andrew Starke – Commissioner ACT Rural Fire Service;
- Ros Ransome [TaMS];
- Steven Gianakis [EPD];
- Daniel Iglesias [TaMS];
- Tony Corrigan [TaMS]; and
- Stuart McKenzie [EPD]

Two external companies were commissioned to provide assistance to the Working Group, Umwelt to undertake a peer review of the previous ecological studies and additional ecological investigations and ABBP to provide advice on bushfire risk, fire protection strategies and the preparation of a Bushfire Report.

These companies were represented by;

- Peter Cowper Armstrong [Umwelt];
- Rob Armstrong [Umwelt]; and
- Graham Swain [ABPP].

Appendix B provides details on the Working Group, including meeting and site inspection dates, attendees and decisions/resolutions determined.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

1.6 Studies Undertaken by Umwelt.

Stemming from the second meeting of the Working Group the LDA commissioned Umwelt to undertake a study into the ecological values of the Kama Nature Reserve – Molonglo Stage 3 Outer Asset Protection Zone.

A copy of the study prepared by Umwelt [15th October 2013] is attached as **Attachment A**.

The purpose of the study was to provide LDA with a comparison of the ecological values of the 200 metre zone either side of the interface between Kama Nature Reserve and the Molonglo Stage 3 development.

The findings of the study identified that the condition of the 200 metre wide area inside the eastern boundary of Kama Nature Reserve is variable, comprised of a mosaic of high condition box-gum woodland, low condition natural temperate grassland and low condition Scribbly Gum woodland.

The ecological condition of the 300 metre wide area of the western boundary of Molonglo Stage 3 [adjoining Kama Nature Reserve] is generally low, consisting of degraded exotic pasture, and an area containing scattered Blakely's red gum with an exotic understorey and is not the Box-gum Woodland community.

The report confirms that the area is dominated by exotic pasture grasses and the only feature of ecological significance is the presence of five potential pink- tailed worm lizard habitat areas.

One of these [location PTWL1] is within a patch of diverse native grasses, whereas the others are of moderate to low value due to a higher abundance of Phalaris and wild oats. These areas are mapped as moderate habitat quality by Osborne & Wong [2010].

Refer to **Figure 2** – Ecological Assets of the Outer Asset Protection Zone including potential Pink-tailed Worm Lizard habitat.

Figure 3 provides a copy of the project area studied by Umwelt, the location of the Outer Asset Protection Zone within the urban boundary of Denman Prospect; the Strategic Fire Advantage Zones and the 'Interface Zone' to the west of Denman Prospect.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

Figure 2 - Ecological Assets of the Outer Asset Protection Zone including potential Pink-tailed Worm Lizard habitat – Umwelt Briefing Note 15th October 2013 – Kama and Molonglo 3.

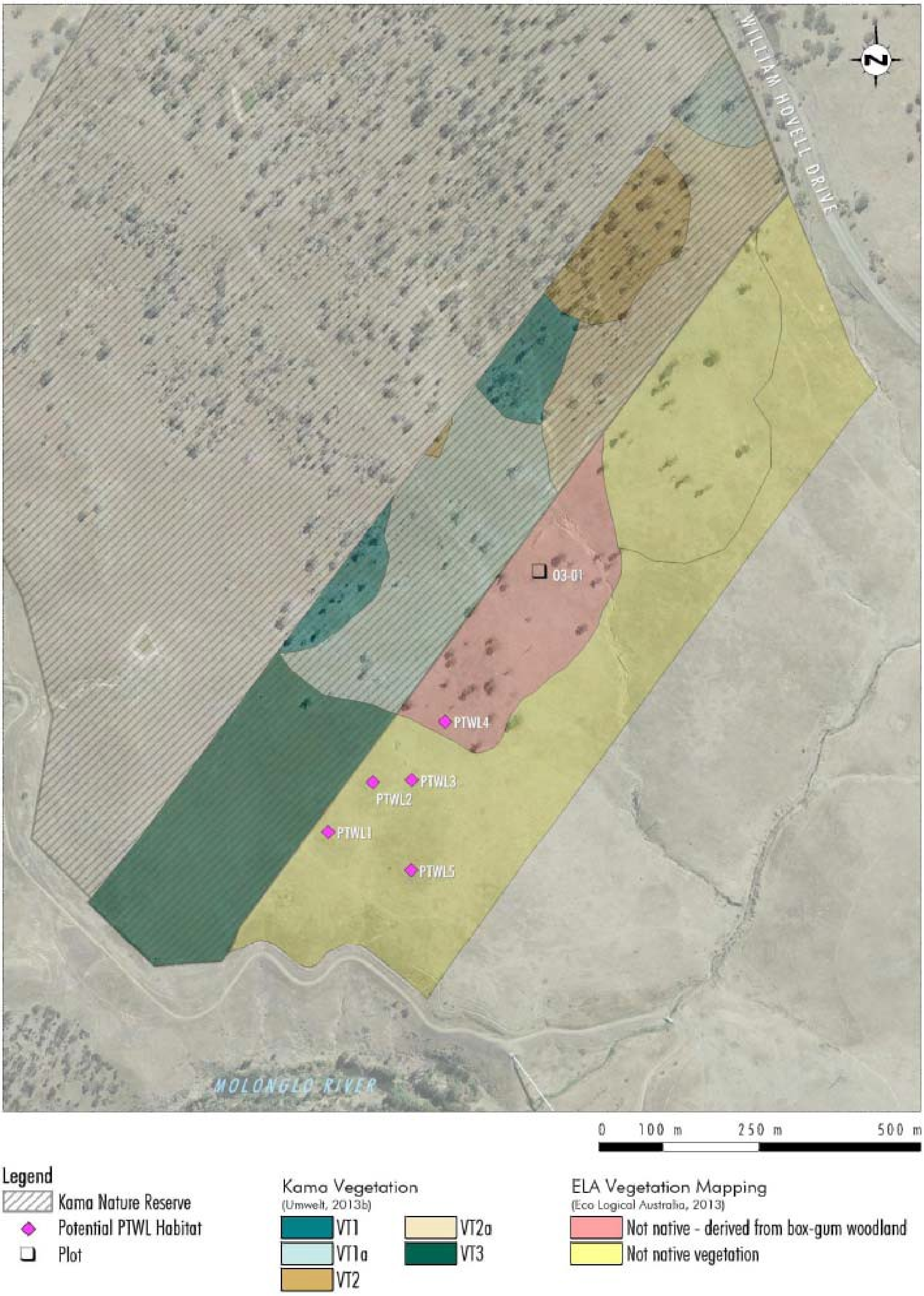
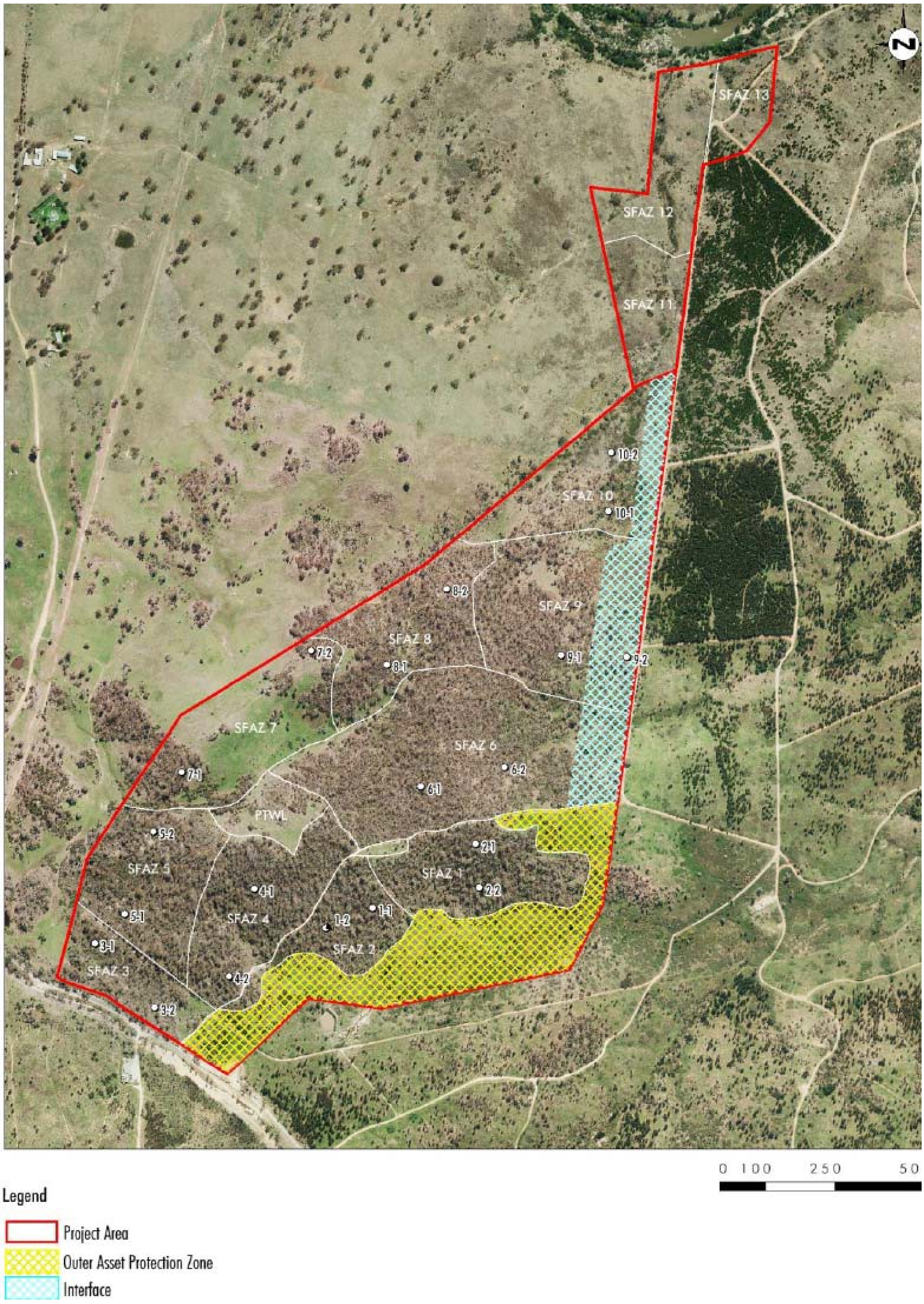


Figure 3.1 - Ecological assets of the outer asset protection zone including potential pink-tailed worm lizard habitat.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

Figure 3 – Plan showing the study area, the location of the Outer Asset Protection Zone; Strategic Fire Advantage Zones and Interface Zone – Denman Prospect, prepared by Umwelt April 2015



Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

The LDA commissioned Umwelt to undertake an analysis of vegetation values in areas west of Denman Prospect and identify practical solutions to meet joint objectives of fuel hazard management and biodiversity conservation.

A copy of the final report dated April 2015 is at **Attachment B**.

The key messages of the report include:

1. Much of the vegetation within the Project Area is in a regenerating thicket state from the 2003 wildfires;

2. Vegetation in a regenerating thicket state will benefit from active management to promote restoration of the remnant to a state which accelerates the provision of structural diversity important for both fauna and flora diversity. This is demonstrated through discussion of the state and transition model concept;

3. Active management of regenerating thicket vegetation will provide greater opportunity for fire management and suppression, reducing the likelihood of a major fire event compromising biodiversity values in the future;

4. Research outlined in the report suggests that reducing the density of smaller stems that compete strongly for resources leads to greater structural and floristic diversity and subsequent greater conservation values. The use of hazard reduction burning as a tool to achieve this is unlikely to reduce understory vegetation diversity provided burn intervals are set at the lower limits by maturity of smaller plants and non-breeding periods of poorly dispersed or rare birds, and at the upper limits by the longevity of plants which usually required fire as part of the reproductive cycle;

5. Hazard reduction burns in Red Stringybark Dry Sclerophyll Forest within the project area should be initially undertaken in a mosaic every five to ten years. For Box-Gum Woodland burns should not occur in periods of less than 10 years and longer should fuel levels remain naturally low or other fuel management techniques be used.

   Practical implementation of this measure should be done in consultation with ACT Government Conservation Planning and Research officers to determine the most appropriate interval between burns, particularly to each Strategic Fire Advantage Zone [SFAZ];

6. Management should be undertaken with adaptive management principles in mind. This will ensure an iterative process of robust decision making in the face of uncertainty, with uncertainty reduced over time as determined by monitoring;

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

7. Hazard reduction burning should be avoided in areas of known Pink-tailed Worm Lizard habitat; if hazard reduction burning occurs this should happen between late winter and mid spring [preferably in August to September].

Section 6 – 'Conclusion' of the Umwelt report provides recommendations for the management of the Strategic Fire Advantage Zones, including by hazard reduction burning; silvicultural thinning; combined approach and the management of areas known to contain Pink-tailed Worm Lizards.

Section 6 also provided recommendations on the management of the Outer Asset Protection Zone, including hazard reduction burning and silviculture within the 'Box-Gum Woodland' along the eastern boundary.

Section 6.3 covers the management of the 'Urban Interface' along the eastern edge of the project area [to the western edge of Denman Prospect]. This zone consists of a 100 metre wide corridor adjacent to the urban interface and is considered to be a primary fire threat to the proposed Denman Prospect development. It also contains natural assets including 'Box-Gum Woodland' in an advanced regeneration state. This vegetation is likely to regenerate into an open forest structure without management.

The report states:

"In order to protect important values within the 'Box-Gum Woodland' area and to mitigate bushfire risk to the adjacent urban development, it is recommended to use silviculture thinning to accelerate an open woodland structure as a primary management tool in this area. This treatment is only required for SFAZ6 and SFAZ 7.

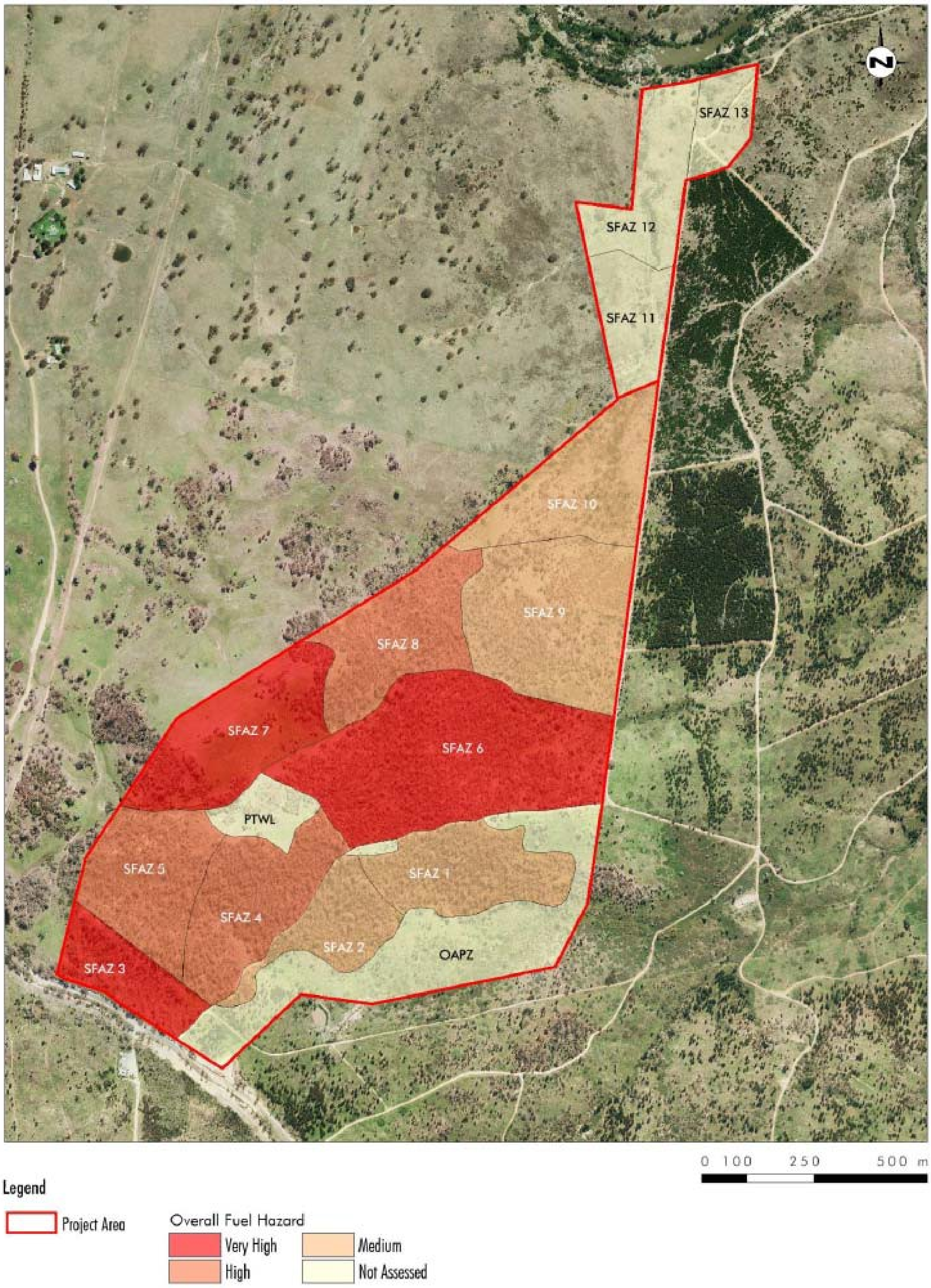
Ongoing management of grassy sward fuel may be required in the event of grassland fire hazard exceeds 35 when grass curing is > 70% [refer to Table 21.5 and Table 21.8 in the ACT Strategic Fire Management Plan – 2014 – Version 3'.

Figure 4 below identifies the maximum 'Overall Fuel Hazard Assessment' ratings for each SFAZ.

Figure 5 on page 19 shows the distribution of Box-Gum Woodland within the Project Area.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

Figure 4 – Denman Prospect maximum 'Overall Fuel Hazard Assessment' ratings for each Strategic Fire Advantage Zone – Umwelt April 2015



Note: due to subjectivity in the assessment method, areas with a 'Medium' hazard may in fact be 'High', or tending to 'High' i the near future as stringybark bark matures, stem charring is reduced and leaf litter accumulates.

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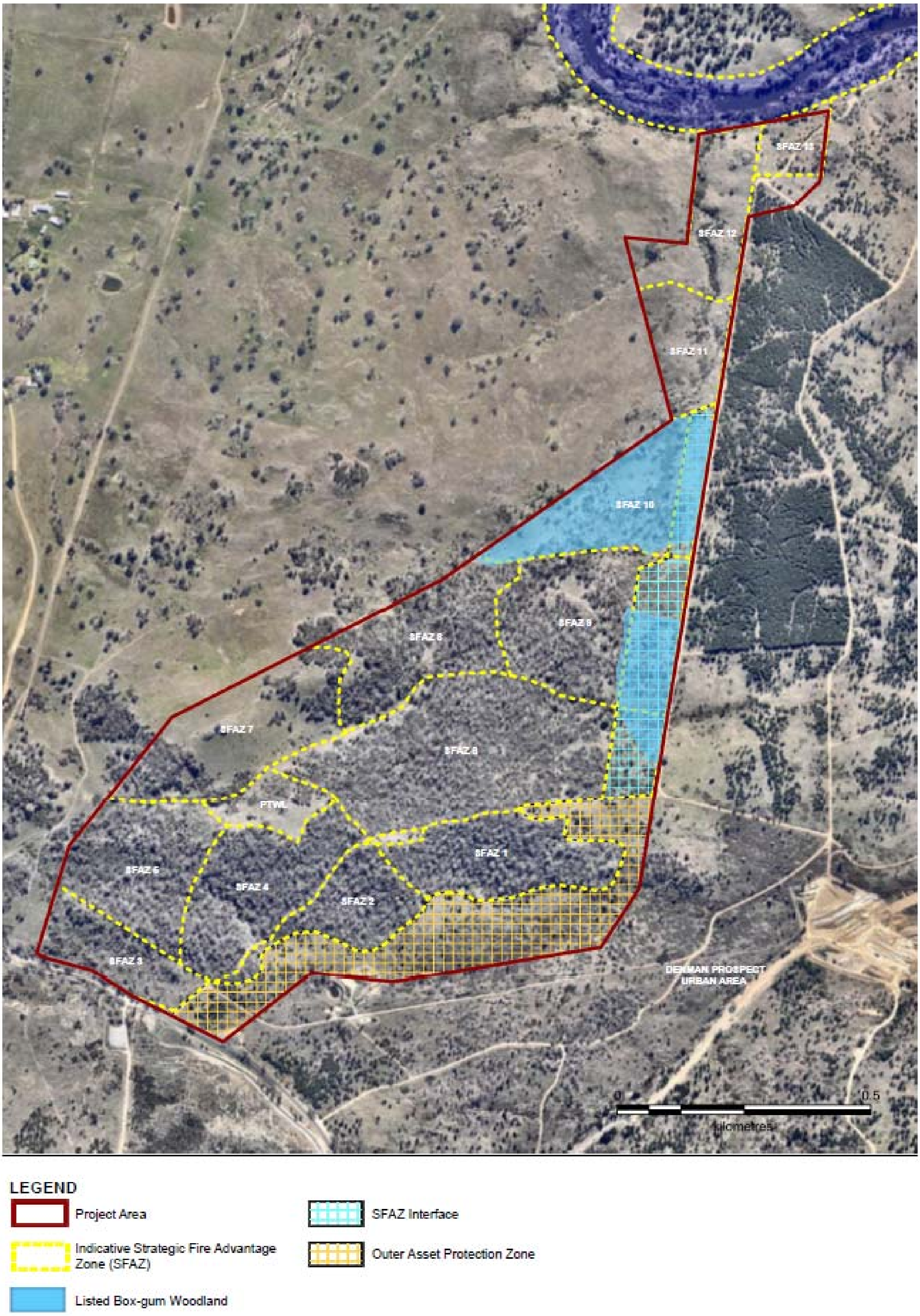
Figure 5 – Denman Prospect distribution of Box-Gum Woodland within the Project Area – Umwelt April 2015



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Email. abpp@bigpond.net.au

SECTION 2
BUSHFIRE RISK ASSESSMENT

2.1 Introduction.

The Australian Standard AS/NZS ISO 31000:2009, the ACT Government Enterprise-wide risk management framework and the Emergency Management Australia (EMA) emergency risk management process provide the framework for establishing the context, analysis, evaluation, treatment, monitoring and communication of risk.

Risk has two elements: Likelihood, the chances of a bushfire occurring and consequence, the impact of a bushfire when it occurs.

Bushfire risk is defined as the chance of a bushfire occurring that will have harmful consequences to human communities and the environment. Bushfire risk is usually assessed through consideration of the likelihood of ignition and consequences of a bushfire occurring. Risk reduction can be achieved by reducing the likelihood of a bushfire, the opportunity for a bushfire to spread or the consequence of a bushfire (on natural and built assets).

Bushfire management should have a clear objective to reduce both the likelihood of bushfires and reduce the negative impacts of bushfires. It should also consider the costs, inconvenience and dangers of measures taken to reduce the risk of bushfires.

The consequences of bushfire management activities and the failure to implement programs also need to be considered. A range of factors influence bushfire risk – these include:

- The likelihood of human and natural fire ignitions, as influenced by time, space and demographics;
- The potential spread and severity of a bushfire, as determined by fuel, topography and weather conditions;
- The proximity of assets vulnerable to bushfire fuels, and likely bushfire paths; and
- The vulnerability of assets including natural assets, or their capacity to cope with, and recover from bushfire.

An assessment of bushfire risk must firstly define the problem. This involves the identification of the nature and scope of issues to be addressed and defining the possible boundaries for the assessment *(Emergency Risk Management – Applications Guide. (EMA Echo Press, 2000), and AS/NZS* ISO 31000:2009*).*

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

For the purpose of analysing fire risks that might emerge in the ACT, a dangerous and damaging fire has the potential to occur when the following conditions prevail:

- Continuous available fuel – fuel at moisture content sufficiently low to enable rapid combustion, arising from drought effects or the maturing and drying, of grasslands;

- Exposure of vulnerable assets. The 'catchment' for such fires may be within several hundred metres or many (60-70) kilometres from the asset/s;

- A combination of weather conditions that generate a forest or grass fire danger index of Very High (24) or greater. Typically in the ACT, prevailing adverse fire weather will have a strong northerly, through south-westerly wind influence;

- Fire in the landscape not effectively suppressed.

2.2 Risk Assessment.

Australian Bushfire Protection Planners Pty Limited prepared a Bushfire Risk Assessment Report in 2005 for the Molonglo Structure Plan.

The findings of this report, in respect to the bushfire risk, fire paths and potential fire scenarios are applicable for the Molonglo Stage 3, Denman Prospect and the Molonglo River Corridor – refer to Attachment A.

An extract from this report states under 'Summary of Bushfire Risk':

"Major Bushfires have occurred in the Molonglo Valley in 1926, 1939, 1952, 1991, 1994, 2001 and 2003.

The topography and landform of the valley predisposes the valley to impacts of fires burning under north-westerly and westerly wind influences and to a slightly lesser extent, south-westerly wind influences.

The slope of the valley to the north-west and the ridgelines/ gullies will influence the spread of fire from the northwest, west and south west and result in sporadic fire runs.

Fuel loads within the retained Habitat Corridors and Parklands, Nature Reserves and Lease Holdings, unless managed, will promulgate future bushfires up to the urban edge and into the vegetated corridors within the urban precinct.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

Whilst the Overall Fuel Hazard for the vegetation within the valley is Very High there is, due to the fire history, topography, aspect, wind influence and climatic conditions within the valley, an extreme risk of damaging bushfires impacting the north western edge of the East Precinct [Molonglo Stage 3 and Denman Prospect].

The 'Conclusion' of the 2005 Bushfire Risk Assessment Report stated:

"The orientation of the Molonglo Valley and the ability for northwest, west and south-west wind-driven fires to impact the proposed development edge will continue the extreme level of risk to any development proposed in the valley with the potential to cause major damage to buildings and infrastructure.

Subsequent to the preparation of the original Bushfire Risk Assessment Report [19.7.2005] an updated report was prepared by ABPP, dated 26.4.2006. The Executive Summary of this report stated:

The Molonglo Stage 2 Bushfire Risk Assessment quantifies the current level of risk to future development within the Molonglo Valley, prior to the implementation of mitigation measures as ***Extreme.***

Mitigation measures which have been identified within the report as necessary to reduce the level of potential risk to future development include the creation and permanent management of a Critical Management Zone to the north- western edge of the East Molonglo Precinct and to the western and south- western edge of the Central Molonglo Precinct.

The provision of the Critical Management Zone (CMZ) replaces the Outer Asset Protection Zone, as defined in the Strategic Bushfire Management Plan for the ACT and the management of this zone, in accordance with the performance standards defined in this report, are considered to be a mandatory requirement in the reduction of the bushfire risk to the future development within the Molonglo Valley.

In addition to the provision of a Critical Management Zone to the north-western edge of East Molonglo Precinct, this report recommends, due to the risk of fire over-run along the Molonglo River corridor and into the future suburb, the damming of the Molonglo River below Coppins Crossing and the creation of Lake Molonglo".

This recommendation was not adopted in the final Molonglo Structure Plan.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

SECTION 3

PROTECTION MEASURES TO BE IMPLEMENTED TO REDUCE THE BUSHFIRE RISK TO THE NORTH-WESTERN EDGE OF MOLONGLO STAGE 3 & DENMAN PROSPECT AND THE MOLONGLO RIVER CORRIDOR.

3.1 Introduction.

The primary purpose of the LDA established Working Group was to establish solutions to the problem of providing bushfire protection measures to the north-western edge of Molonglo Stage 3 and Denman Prospect and to the Molonglo River Corridor which would not only mitigate the bushfire risk but also be acceptable to ACT Government Agencies.

The solutions also had to be achievable, ecologically and economically sustainable and able to be funded in the long term – in perpetuity.

Consideration was also given to the 'alternate solutions' provided by the updated ACT Strategic Bushfire Management Plan – Version 3, particularly in respect to the ability to increase the width of the Inner Asset Protection Zone so as to remove the need to provide and manage an Outer Asset Protection Zone on ecologically sensitive land.

Having considered the total removal of the Outer Asset Protection Zone and the potential for catastrophic bushfire events to impact the north-western edge of Molonglo Stage 3 and Denman Prospect and development adjacent to the Molonglo River corridor, the Working Group has adopted a policy of implementing a bushfire protection zone to future development. This contains an Inner Asset Protection Zone supported on the outside by a Strategic Fire Advantage Zone [SFAZ] within Kama to the northwest of Molonglo Stage 3 as well as within the land to the northwest and west of Denman Prospect and broadly within the Molonglo River Park.

The study undertaken by Umwelt, in concert with TaMS Fire Management Unit (FMU) has formed the basis upon which the decision has been taken to implement the establishment of a SFAZ within Kama Nature Reserve. It is noted that consensus has been reached that the performance criteria of a SFAZ, as required by the ACT Strategic Bushfire Management Plan – 2014 – Version 3 can be achieved whilst maintaining the ecological biodiversity of the reserve.

Similarly, the study undertaken by Umwelt, in concert with TaMS FMU has formed the basis upon which the decision has been taken to implement the establishment of a SFAZ on the land to the northwest and west of Denman Prospect – refer to Attachment B – Analysis of Vegetation Structure and Fire Risk.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

Discussions with TaMS FMU and the need to manage the vegetation within the Molonglo River corridor to mitigate the spread of fire have also formed the basis upon which the establishment of the SFAZ has been recommended within the Molonglo River Park.

This report also recommends the inclusion of the community facility located at the former Sludge Ponds and the western end of the River Park as detailed in the Molonglo River Park Concept Plan prepared by Hassell.

For completeness, this report also provides recommendations on the bushfire protection zones to the northern and eastern edge of Molonglo Stage 3.

The SBMP Version 3 highlights the need on rural land inside the Bushfire Abatement Zone for the development of property-level fire management plans under the Farm Firewise Program, the legislative requirements for the development and approval of a bushfire operational plan (BOP) under the Emergencies Act 2004. The BOPs are to be reviewed every 5 years.

It calls for undertaking a planned, whole-of-property approach to reduce the risk of bushfire in addition to considering the risk of fires starting and spreading. Through this approach, identified actions should:

- Complement activities undertaken on adjacent rural or government-managed lands;
- Consider safety as a priority, as well as environmental and legal issues, and long-term sustainability;
- Consider bushfire recovery.

Property level fire management plans developed under the Farm Firewise Program will meet the requirements for BOPs according to the SBMP Version 3.

The SBMP Version 3 also highlighted the Broad area bushfire fuel reduction across the natural and rural landscape through the use of Strategic Firefighting Advantage Zones (SFAZs). These have the objective of reducing the intensity and spread of fires across large landscape units contributing to the success of firefighting under moderate weather conditions and reducing impacts of unplanned fires on catchment values.

In these areas, specific actions amongst others include:

- Land managers preparing BOPs that detail fuel management works in SFAZs to meet the standards in the ACT Bushfire Management Standards with the BOPs audited and assessed to ensure compliance;
- The implementation of landscape fuel management treatments will be reported on a cumulative basis;
- The location and timing of fuel reduction activities in SFAZs for the period 2019-24 will be developed.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

The ESA and TaMS measure the IAPZ width from the back of kerb on the block side to the IAPZ/SFAZ interface where an edge road is provided. The LDA on the other hand measures the width to the block boundary which is easy to define on the ground whereas roads and road verges can be of variable widths and variable distances from the block boundaries.

Note that TaMS does not consider the road verge on the block side of an edge road in the IAPZ to be part of its management responsibility. Note however, that lessees are not responsible for the management of road verges as they are unleased Territory land. Hence, for example, a 60m IAPZ from the ACT Bushfire Management Standards measured to the back of kerb would result in a total distance of 67 to 70m to the block boundary.

The LDA through discussion in the Working Group received support from the ESA for consideration of a 50m IAPZ (measured from back of kerb where an edge road will be provided). Taking this one step further, a 50m IAPZ to the back of kerb would result in a total width of 57 to 60m to the block boundary.

The reference to an IAPZ width of 60m in the remaining parts of this document is the ESA suggested 50m plus 7.5 to 10m of verge to the block boundary.

Plans outlining the urban edge outcomes are at **Attachment C**. Note that they contain an aerial photograph image including contours and the agreed position of the urban edge boundary.

Refer to **Figure 6** on page 29 for locations of the mitigation measures.

The following section details the Working Groups' recommendations.

3.2. North-western edge to Molonglo Stage 3:

1) There shall be established and maintained a minimum 60.0 metre wide Inner Asset Protection Zone to the north-western edge of the urban development, managed to the prescriptions as detailed in the ACT Strategic Fire Management Plan 2014 – Version 3. This zone shall contain an edge road and also a gravel fire trail located adjacent to the eastern boundary of Kama and shall include stormwater treatment ponds, cycleway/pedestrian access and electrical power lines, as required.

2) There shall be established and maintained, over the whole of Kama Nature Reserve, a Strategic Fire Advantage Zone, cyclically managed to the prescriptions as detailed in the ACT Strategic Fire Management Plan 2014 – Version 3;

3) There shall be established and maintained a six [6] metre wide fire break located inside the eastern boundary of Kama Nature Reserve;

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

4) The existing access/fire trails within Kama Nature Reserve shall be upgraded and maintained to provide access for management works and fire-fighting operations.

3.3 North-western/Western edge to Denman Prospect:

1) There shall be established and maintained a minimum 60.0 metre wide Inner Asset Protection Zone to the north-western and western edge of the urban development within Denman Prospect, managed to the prescriptions as detailed in the ACT Strategic Fire Management Plan 2014 – Version 3. This zone shall include an edge road and where provided, stormwater treatment ponds and shall also include cycleway/ pedestrian access as required – refer to Denman Prospect **Figure 6** on Page 29.

2) There shall be established and maintained, to the location as shown on **Figure 6** on Page 29, an Outer Asset Protection Zone of varying widths, managed to the prescriptions as detailed in the ACT Strategic Fire Management Plan 2014 – Version 3;

3) There shall be established and maintained to the area as shown on **Figure 6** on Page 29, a series of Strategic Fire Advantage Zones, cyclically managed to the prescriptions as detailed in the ACT Strategic Fire Management Plan 2014 – Version 3 and in accordance with the recommendations contained in the *Analysis of Vegetation Structure and Fire Risk* report prepared by Umwelt - 2015;

4) There shall be established a series of Fire Trails, generally as located as shown on **Figure 6** on Page 29 – also refer to the *Analysis of Vegetation Structure and Fire Risk* report prepared by Umwelt - 2015.

These trails shall be maintained to provide access for management works and fire-fighting operations.

3.4 Molonglo River Park:

1) There shall be established and maintained a minimum 60.0 metre wide Inner Asset Protection Zone to the north and south of the Molonglo River Park, to the extent detailed on **Figure 6** on Page 29, managed to the prescriptions as detailed in the ACT Strategic Fire Management Plan 2014 – Version 3. This zone shall include an edge road and where provided the managed easement for services [sewer / water / electricity], stormwater treatment ponds and shall also include cycleway/pedestrian access as required.

Note on the south side of the river the locations of the IAPZs will be determined at the EDP stages.

2) There shall be established and maintained, to the area as shown on **Figure 6** on Page 29, a series of Strategic Fire Advantage Zones, cyclically managed to the prescriptions as detailed in the ACT Strategic Fire Management Plan 2014 – Version 3.

   Note on the south side of the river, the locations of the SFAZs will be determined at the EDP stages.

3) There shall be provided, to the locations as shown on **Figure 6** on Page 29, a Landscape Fire Management Zone of varying width to each side of the Molonglo River.

   Fuel management standards do not apply to this zone;

4) The existing fire trail/access roads within the river corridor shall be maintained to provide access for management works and fire-fighting operations.

5) There shall be established and maintained access for management works and fire-fighting operations within the Group Centre precinct.

6) The recommendations provided in the Molonglo River Concept Plan report prepared by Hassell, in respect to the establishment of a community facility in the location of the Sludge Ponds and the western end of the Molonglo River Park shall be included in the Park Management Plan.

3.5 Molonglo Stage 3 – Northern and Eastern Edges:

1) To the northern edge of the Molonglo Stage 3 precinct the full width of the William Hovell Drive carriageway shall be maintained as an Inner Asset Protection Zone, managed to the prescriptions as detailed in the ACT Strategic Fire Management Plan 2014 – Version 3;

2) To the eastern edge of the Molonglo Stage 3 precinct, adjacent to the National Arboretum, there shall be provided an Inner Asset Protection Zone having a minimum width of 40 metres, managed to the prescriptions as detailed in the ACT Strategic Fire Management Plan 2014 – Version 3. This zone shall include an edge road and where provided, the managed easement for services [sewer/water/electricity], stormwater treatment ponds and shall also include cycleway/pedestrian access as required.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

3.6 Bushfire Construction Standards to Buildings.

Except for the future buildings within Denman Prospect, all buildings located within 100 metres of land that is subject to, or likely to be subject to, bushfire attack [bushfire prone land] shall be constructed to comply with the standards required by Australian Standard A.S. 3959 – 2009 – *'Construction of Buildings in Bushfire Prone Areas'.*

Note: Refer to the ACT Strategic Bushfire Management Plan for the location of Bushfire Prone Land.

The minimum level of construction for buildings located adjacent to the Inner Asset Protection Zone shall be BAL 29 for the first row of houses adjacent to the IAPZ. The minimum construction standard of all other buildings located within 100 metres of bushfire prone land shall be BAL 12.5.

For Denman Prospect, all buildings located within 400 metres of the forest/woodland vegetation on the land to the northwest and west of Denman Prospect shall be constructed to comply with the standards required by Australian Standard A.S. 3959 – 2009 – *'Construction of Buildings in Bushfire Prone Areas'.* The minimum level of construction for buildings located adjacent to the Inner Asset Protection Zone shall be BAL 29 for the first row of houses adjacent to the IAPZ. The minimum construction standard of all other buildings located within 400 metres of bushfire prone land shall be BAL 12.5.

For buildings adjacent to the IAPZ along the Molonglo River corridor, the BAL levels will be confirmed at the time of the EDPs. As a guide until that occurs, it is expected that the minimum BAL levels will be BAL 12.5 with a possible maximum of BAL 29. The distance that the application of BAL levels will apply into each estate will also be determined at the same time.

3.7 Support Infrastructure.

3.7.1 Access for fire-fighting Operations:

Edge roads shall be designed to comply with the access code for heavy rigid and articulated vehicles and the ACT Bushfire Management Standards under SBMP Version 3.

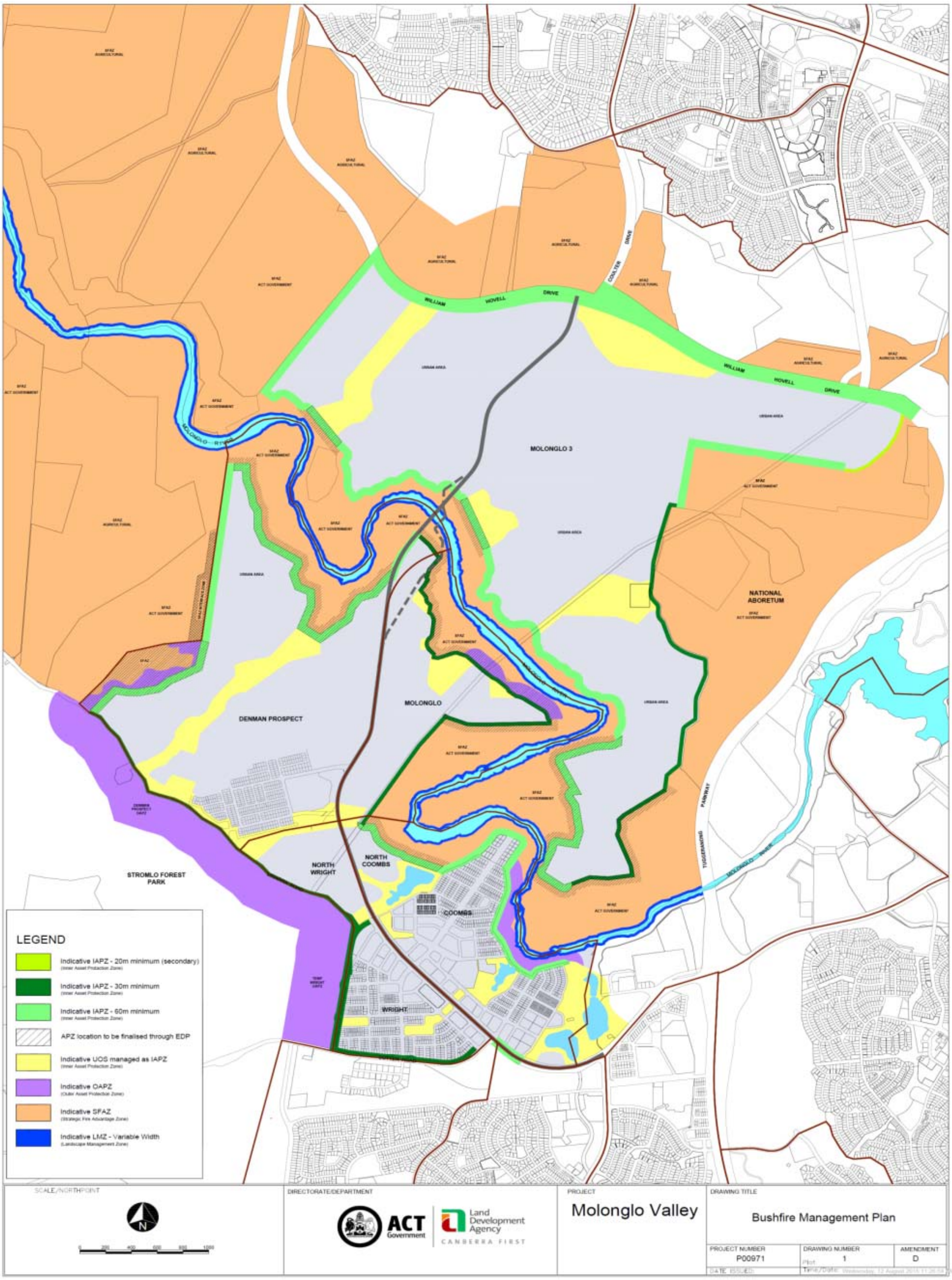
3.7.2 Water Supplies for Fire Fighting Operations:

A fire-fighting water supply shall be installed to comply with F4 and the standards agreed by ACTEW and ACT Fire & Rescue.

Type F5 standard 45 l/s single hydrants at 60 metre intervals shall be installed within the Edge Road.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

Figure 6 – Bushfire Risk Strategy showing Management Outcomes



Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

SECTION 4

FUNDING FOR BUSHFIRE MANAGEMENT WORKS

4.1 General

Residential and infrastructure development in the Molonglo Valley is proceeding in accordance with the Government's Indicative Land Release Programs and associated budget appropriations for capital works funding to support land release.

Subdivision construction is continuing in Molonglo Stage 1 (Coombs) over the life of the Program with the first releases in Molonglo Stage 2 (Denman Prospect) in 2014-15. Molonglo Stage 3 on the north side of the Molonglo River is programmed to commence in 2018-19.

The LDA/EDD are undertaking due diligence assessment investigations based on the approved Molonglo Valley Structure Plan and other documentation across a range of significant issues in Molonglo Stage 2 and Stage 3 including but not limited to ecological, contamination, infrastructure provision, UXO and bushfire risk. These assessments, especially bushfire in conjunction with TaMS, can materially influence the location of land use boundaries due to impacts and responsibilities for cost efficient land management.

The TaMS has a management parameter to manage all the Government's assets. This includes managing the ever increasing asset base such as new roads, urban open space associated with Greenfield development.

Bushfire risk and the associated mitigation measures can have a significant impact on ecological, economic and social parameters. Since the 2003 Canberra bushfire, there has been a significant shift in the increase of the awareness and delivery of bushfire mitigation measures across Government. This commenced immediately after the bushfire with changes to subdivision design and the introduction of edge roads and specific controls within asset protection zones both within the urban area and outside it. This in turn has led to revisions of standards, guidelines, expectations and responsibilities both public and private.

It has also increased the responsibility of TaMS to manage a large proportion of the asset protection zones possibly to higher standards than was necessary before the bushfire.

4.2 Typical Cross Section of Zones at the Urban/Non-urban Interface.

A typical cross section at the urban/non-urban interface today would include:

- House asset protection zone – extending from the front of the residential block boundary into the suburb for distances up to 100m or more depending on risk and mitigating against ember attack.

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- This requires housing design and construction (and landscaping) to meet specific Bushfire Attack Levels (BALs) under the Australian Standard. Management of this area lies partly with TaMS (public open space and roads including verges) and individual block owners.

- Inner asset protection zone – extends from the front of the residential block boundary to the edge of the urban/non-urban interface. Distances vary depending on risk and management requirements. A usual width would be a minimum of 30 to 40m and include significant infrastructure such as subdivision edge road, fire trail, stock proof fencing at the urban/non-urban interface, stormwater cut-off drains, hydraulic services for fire fighting, and street trees on the block side of the edge road. Management includes control of fuel loads by slashing. Management of this area lies with TaMS.

- Outer asset protection zone or Strategic fire fighting advantage zone – extends into the non-urban area for some distance depending on risk and management requirements. These could be 100m to around 300m in width and contain fire trails to aid management. Management methods depend on fuel loads and may include thinning of existing inappropriate vegetation, weed management, grazing or other ecological controls that ensures fuel loads are not exceeded during the fire season. Management of this area lies with TaMS and may be on a private lease.

4.3 Current Process of Conversion of Rural Land to Urban Land.

The development/management process that transforms rural land to urban land is typically set out below:

- Rural land and Canberra Nature Parks including Nature Reserves are managed by TaMS as the land custodian.

- LDA/EDD undertakes due diligence assessments to gain necessary approvals to clear the way to proceed to preparation of individual Estate Development Plans (EDPs) and gain budget approvals for the delivery of infrastructure associated with land delivery.

- LDA/EDD prepares EDP and capital works program. Note capital works may have started ahead of the EDP preparation by as much as a couple of years but may not be required to deliver some items for years after land development and block occupation is complete - i.e. staged infrastructure.

- Land custodianship transferred from TaMS to LDA usually prior to lodging EDP for approval.

- EDP lodged for final circulation and approval as a DA. Note EDP usually contains site specific Bushfire risk assessment.

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Note however that in the case of Molonglo Stages 2 and 3, the western edge and river corridor bushfire risk assessment is designed to cover the whole of the remaining development. In the meantime detailed design has commenced and readied for submitting to TaMS for design approval.

- DA approved by EPD followed by design approval by TaMS.
- Construction commences and includes the provision of bushfire mitigation measures.
- Blocks sold by the LDA but settlement is delayed until after consolidation is complete.
- Construction finishes and consolidation period commences.
- Consolidation period ends.
- Blocks in private ownership after settlement.
- Other areas handed back to Government (usually TaMS) for continuation of approved management including bushfire risk mitigation measures and management of public open space, roads and other land.
- TaMS prepares budget bids to maintain management on a year-by-year basis within the constraints of the ACT Government budget parameters.

4.4 Requirements for the Current Process.

There are a number of requirements for the current process to be considered. In the case of development in the Molonglo Valley, these include:

- There is a need for a whole-of-Government outcome for the delivery of Molonglo 2 and 3 and the Molonglo River Corridor.
- A solution would be where the initial funding is provided by the LDA or a private developer for a period associated with construction timing for the implementation of management regimes but with a sunset clause specifying when TaMS would be required to take over responsibility which includes funding.

  For example, LDA or a private developer could construct and implement bushfire mitigation management regimes while land development is proceeding generally adjacent to the non-urban edge. The issue is how long a time period would LDA or a private developer be practically required to fund and manage such an arrangement and when TaMS would be expected to take over. While this could be a set period of time, there is an issue when or if there is a slowdown in the private sector development or there is a reduction in the demand for new housing. This could mean that the LDA or a private developer would need to be involved for a longer period of time.

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Email. abpp@bigpond.net.au

- The requirement of bushfire mitigation management measures is not restricted to the Molonglo Valley. It encompasses on- going management at the edges of all development areas at the interface with the rural or broadacre land use zones in Canberra. As the urban area expands, so too does the bushfire mitigation management issue thus requiring increases in funding.

4.5 Funding Options.

A number of funding options were discussed in the preparation of this assessment.

However, it was agreed the existing arrangements met the overall strategies and objectives of Government.

It does allow the guarantee of prioritising critical management to protect residents and assets from bushfire risk on a season by season basis.

However, there is a distinct risk that the subsequent year or years may require extra funding which may have to be guaranteed by Treasury regardless ahead of the normal yearly budget consideration.

As part of the guarantee mentioned above, a solution may be that Treasury may require, at a minimum, an agreed rolling bushfire mitigation management document for say a 5 year period to plan ahead for Budget predictions. This may allow for expenditure variations such as changing seasonal needs and the reaction to catastrophic events. This could be "signed off" by the responsible directorate after agreement at Directors-General level and Treasury. Such a recommendation is not included in this document.

After consultation with other members of the Working Group, it was agreed that the existing funding arrangements based on annual budget bids to Treasury would continue to be the method to fund recurrent bushfire risk mitigation work.

These arrangements do not stop the consideration of the possibility of adding the 'flexibility' mentioned above to the existing funding methodology.

4.6 Costs

In line with the discussion in this chapter, the LDA would expect to put in place and fund bushfire mitigation measures including management regimes while land development is proceeding. This includes:

- The use and management of temporary asset protection zones while stages of estates are gradually advancing to the final edge of development;
- The development of the IAPZs, OAPZs and more recently, SFAZs to the point of handover to TaMS for continued management after asset acceptance; and

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Email. abpp@bigpond.net.au

- OAPZs on privately leased land such as at Bonner in Gungahlin where on-going management is required to be undertaken by the lessee in accordance with a Land Management Agreement after asset acceptance.

In the case of Molonglo Stage 3 western edge, the LDA, or a developer in the case of an englobo sale, will put in place and fund the development infrastructure associated within the IAPZ adjacent to Kama Nature Reserve. This will include to the requirements of the ACT Bushfire Management Standards:

- The public edge road to the estates;
- Fire trails along the entire western edge of the development areas with connection to Kama;
- Utility services infrastructure including water supply for fire-fighting purposes;
- Storm water cut-off drains;
- Fencing the IAPZ at the outer edge of the zone including gates to the Kama boundary;
- Establishing and initially managing the IAPZ to the required fuel management standards;
- Providing opportunities for the location of other infrastructure services as required.

Once the estates are accepted at asset acceptance stage, the entire IAPZ will become the management responsibility of TaMS including securing recurrent funding.

In the case of Denman Prospect at the western edge of Molonglo Stage 2, the LDA, or a developer in the case of an englobo sale, will put in place and fund the development infrastructure associated within the IAPZ, the OAPZ and the SFAZs adjacent to suburb boundary. This will include, to the requirements of the ACT Bushfire Management Standards:

- The public edge road to the estates;
- Fire trails along the entire western edge of the development areas with connection to area to the west;
- Utility services infrastructure including water supply for fire-fighting purposes;
- Storm water cut-off drains;
- Fencing the suburb boundary including gates to the western edge;
- Establishing and initially managing the IAPZ, OAPZ and SFAZs to the required fuel management standards;
- Providing opportunities for the location of other infrastructure services as required.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

Once the estates are accepted at asset acceptance stage, the entire IAPZ, OAPZ and SFAZs will become the management responsibility of TaMS including securing recurrent funding.

In the case of Kama Nature Reserve, the area is being managed already to the standard required for an SFAZ and this has been occurring for a number of years and is acknowledged on the ESA website. The LDA, or a developer in the case of an englobo sale for the land opposite Kama, will fund the initial upgrading of firetrails within Kama Nature Reserve to the satisfaction of TaMS Fire Management Unit. The responsibility for other management within Kama remains with TaMS.

In the case of Denman Prospect, the area immediately to the west of the suburb boundary, on TaMS land, has been assessed as being capable of being managed as a series of SFAZs. Here the LDA or a developer, in the case of an englobo sale, will assist TaMS in setting up the SFAZs by funding for a two year period their initial development to the requirements of the ACT Bushfire Management Standards. This is expected to include:

- Fire trails around and separating each of the SFAZs;
- Establishing the initial management of the SFAZs.

After that period of time, the ongoing management of the SFAZs will pass to TaMS including recurrent funding.

4.7 Costs of Implementing the 60m IAPZ

The LDA has investigated the costs of setting blocks back from the edge of Kama Nature Reserve and the western edge of Denman Prospect in order to comply with the Strategic Bushfire Management Plan version 3 where OAPZs are not supported in the non-urban land.

In order to identify the quantum of costs associated with implementing the bushfire risk strategy recommendations, the LDA engaged Coleman Engineering Services. The investigation specifically targeted the bushfire mitigation measures and developing urban infrastructure along the boundaries of Kama Nature Reserve and the suburb of Denman Prospect over and above the costs to service other comparable subdivisions in the ACT but keeping in mind the requirements of version 3 of the Strategic Bushfire Management Plan and the associated standards.

This latter point is important to note because the standards allowable for IAPZs have been revised to reflect the combinations of IAPZs, OAPZs and SFAZs now considered acceptable by the ESA but point out that the applications of the zones require approval by the ESA in each circumstance.

Also, it should be noted that ESA expects individual land managers to manage their land for bushfire management.

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Email. abpp@bigpond.net.au

The use of SFAZs does allow the management for biodiversity to be protected where other APZs would not meet that requirement.

For example, for an IAPZ in combination with an OAPZ on a primary interface for forest and woodland, the respective widths should be 30m and a minimum of 200m (target 300m). Where an OAPZ is not achievable, such as within a nature reserve, the IAPZ should be widened to 60m to compensate.

In the case of Molonglo, Kama Nature Reserve is already managed as an SFAZ or multiple SFAZs and it is the intention that the area to the west of Denman Prospect also be managed as a series of SFAZs.

Section 8 of the Coleman report sets out the likely establishment and recurrent costs to put in place the IAPZ and the SFAZs along the western edge of Denman Prospect and adjacent to and within Kama Nature Reserve. The following summary encapsulates those expected indicative costs.

Note that the summary has adjusted the costs in the Coleman report to take account of items not normally provided, for example in the development of fire trails such as removing & stockpiling topsoil and then re-spreading the topsoil towards the end of the project.

North of the Molonglo River:

Inside Kama Nature Reserve (SFAZs):

- Upgrade existing firetrails for TaMS - $24,000.

Outside Kama Nature Reserve (IAPZ):

- Fire trail establishment cost - $420,000
- Fire trail recurrent cost (over 5 years) - $11,000
- Edge road establishment cost - $1,400,000
- IAPZ recurrent cost - $70,400 (over 5 years).

South of the Molonglo River

Outside Denman Prospect (SFAZs):

- Vegetation establishment & management cost (over 2 years) - $2,712,500
- Fire trail establishment & management cost (over 3 years) - $119,000.

Inside Denman Prospect (IAPZ, OAPZ and SFAZ):

- Fire trail establishment cost - $870,000
- Fire trail recurrent cost (over 5 years) - $20,000
- Edge roads establishment cost - $2,900,000
- IAPZ recurrent cost (over 5 years) - $146,200.

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Email. abpp@bigpond.net.au

These expected indicative costs will be firmed up during the design stage for the adjacent developments. Note that the costs identified inside Kama Nature Reserve and outside Denman Prospect will be finalised with TaMS Fire Management Unit ahead of estate design so that the measures above can be incrementally implemented in the correct timeframe.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

SECTION 5
CONCLUSION

The bushfire protection measures detailed in Section 3 of this report have been determined by the Working Group with the aim of mitigating the potential bushfire risk to the future development within Molonglo Stage 3, Denman Prospect and the development precincts which adjoin the Molonglo River Park.

However, a level of residual risk will remain as not all of the bushfire threat can be completely removed – only managed to reduce fuel loads.

Another matter that will influence the level of risk reduction, and therefore residual risk, is the commitment for ongoing management of the recommended bushfire protection zones and funding of these works in perpetuity.

Bushfire Operations Plans [BOPs] will be required to be prepared annually, by TaMS, for the works and there will be an expectation that Government will meet the funding requirements to enable the BOPs to be undertaken.

For Molonglo 3, Denman Prospect and the Molonglo River corridor, the initial establishment of the recommended fire protection measures shall be funded by the developer of the land – i.e. LDA or private developer or joint venture partners with LDA for a set period of time.

The initial funding shall be made available for the construction and maintenance of fire trails and fire breaks, the provision of fencing and access gates and initial clearing and establishment of the Asset Protection Zones.

LDA, or the private developer, shall provide initial seed funding to TaMS for hazard reduction and land management activities such as the establishment of the Strategic Fire Advantage Zones.

Graham Swain Managing Director
Australian Bushfire Protection Planners Pty Limited.
21.4.2016

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

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Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

APPENDIX A – PRECISE OF REPORTS REVIEWED

Bushfire Risk Assessments prepared by ABPP [2005 & 2006]:

Australian Bushfire Protection Planners Pty Limited was commissioned to undertake a study of bushfire risk for the preparation of the Molonglo Structure Plan and produced a Bushfire Risk Assessment, dated 19.07.2005, for the ACT Planning Authority [ACTPLA].

An extract from this report states under 'Summary of Bushfire Risk':

"Major bushfires have occurred in the Molonglo Valley in 1926, 1939, 1952, 1991, 1994, 2001 and 2003.

The topography and landform of the valley predisposes the valley to impacts of fires burning under north-westerly and westerly wind influences and to a slightly lesser extent, south-westerly wind influences.

The slope of the valley to the north-west and the ridgelines/ gullies will influence the spread of fire from the northwest, west and south west and result in sporadic fire runs.

Fuel loads within the retained Habitat Corridors and Parklands, Nature Reserves and Lease Holdings, unless managed, will promulgate future bushfires up to the urban edge and into the vegetated corridors within the urban precinct.

Whilst the Overall Fuel Hazard for the vegetation within the valley is Very High there is, due to the fire history, topography, aspect, wind influence and climatic conditions within the valley, an extreme risk of damaging bushfires impacting the north western, western and south western edges of the West 1 and West 2 Precincts, the north western edge of the East Precinct and a high risk of damaging bushfires impacting the south western edge of the East Precinct".

Figure 12 on Page 41 provides an extract from the Molonglo Concept Plan Bushfire Risk Assessment Report 2005 identifying the Study Area.

Figure 13 on Page 42 provides an extract from the Molonglo Concept Plan Bushfire Risk Assessment Report 2005 identifying the potential north-westerly fire path.

Figure 14 on Page 43 provides an extract from the Molonglo Concept Plan Bushfire Risk Assessment Report 2005 identifying the potential westerly fire Path.

Figure 12 – Extract from the Molonglo River Structure Plan Bushfire Risk Assessment Report 2005 showing the study areas

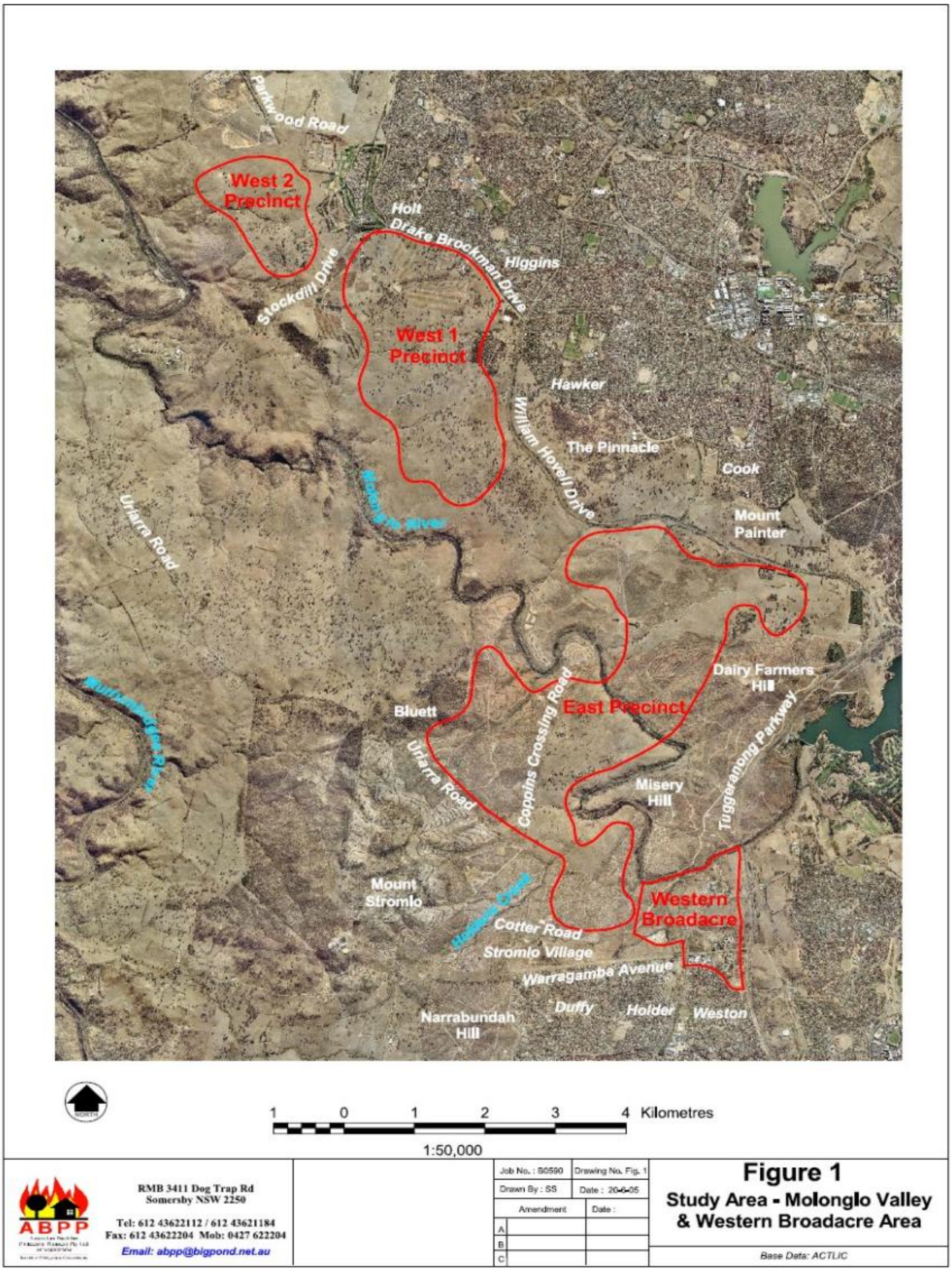


Figure 13 – Extract from the Molonglo River Structure Plan Bushfire Risk Assessment Report 2005 showing the Diagrammatic Northwest fire run

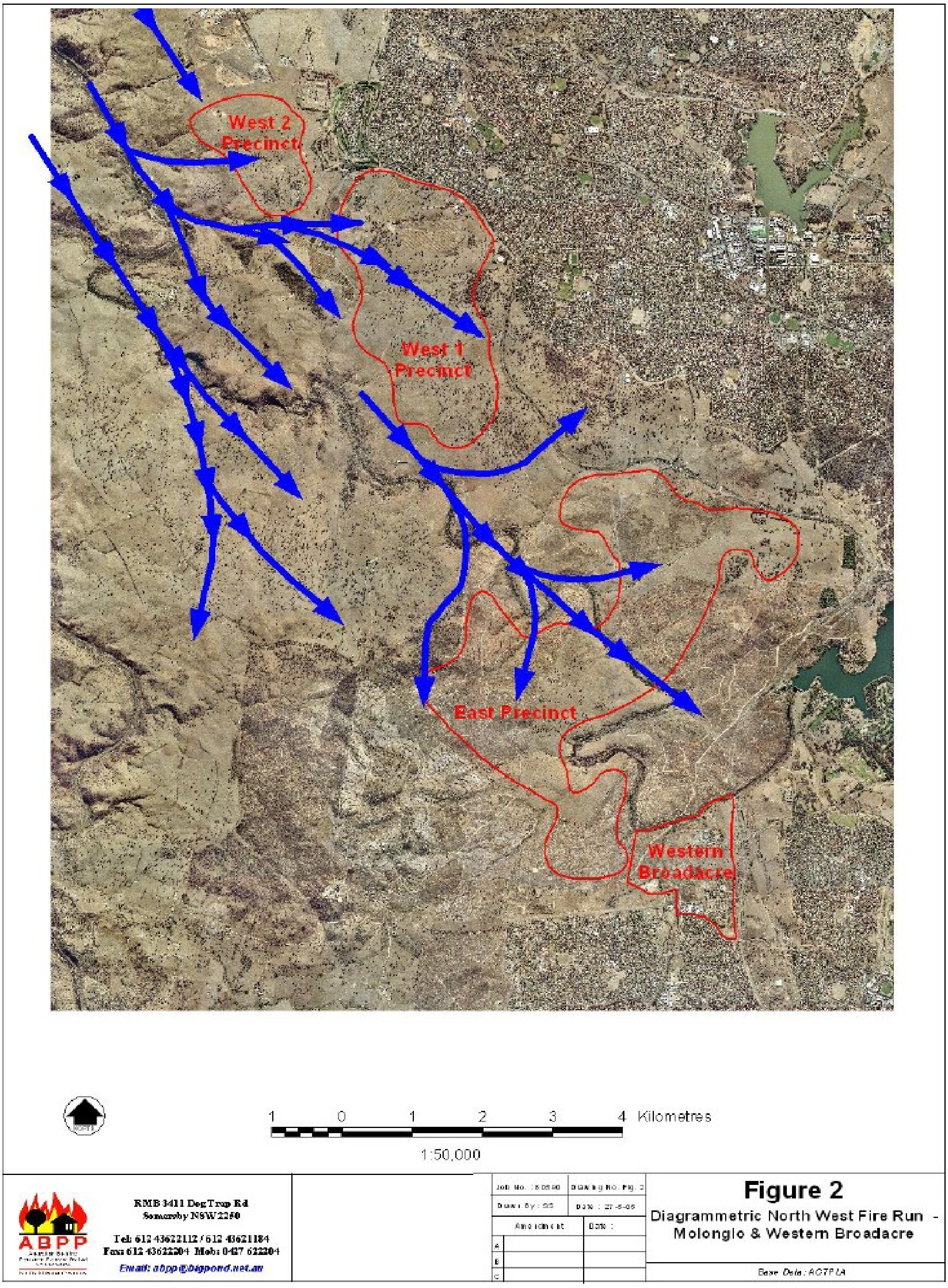
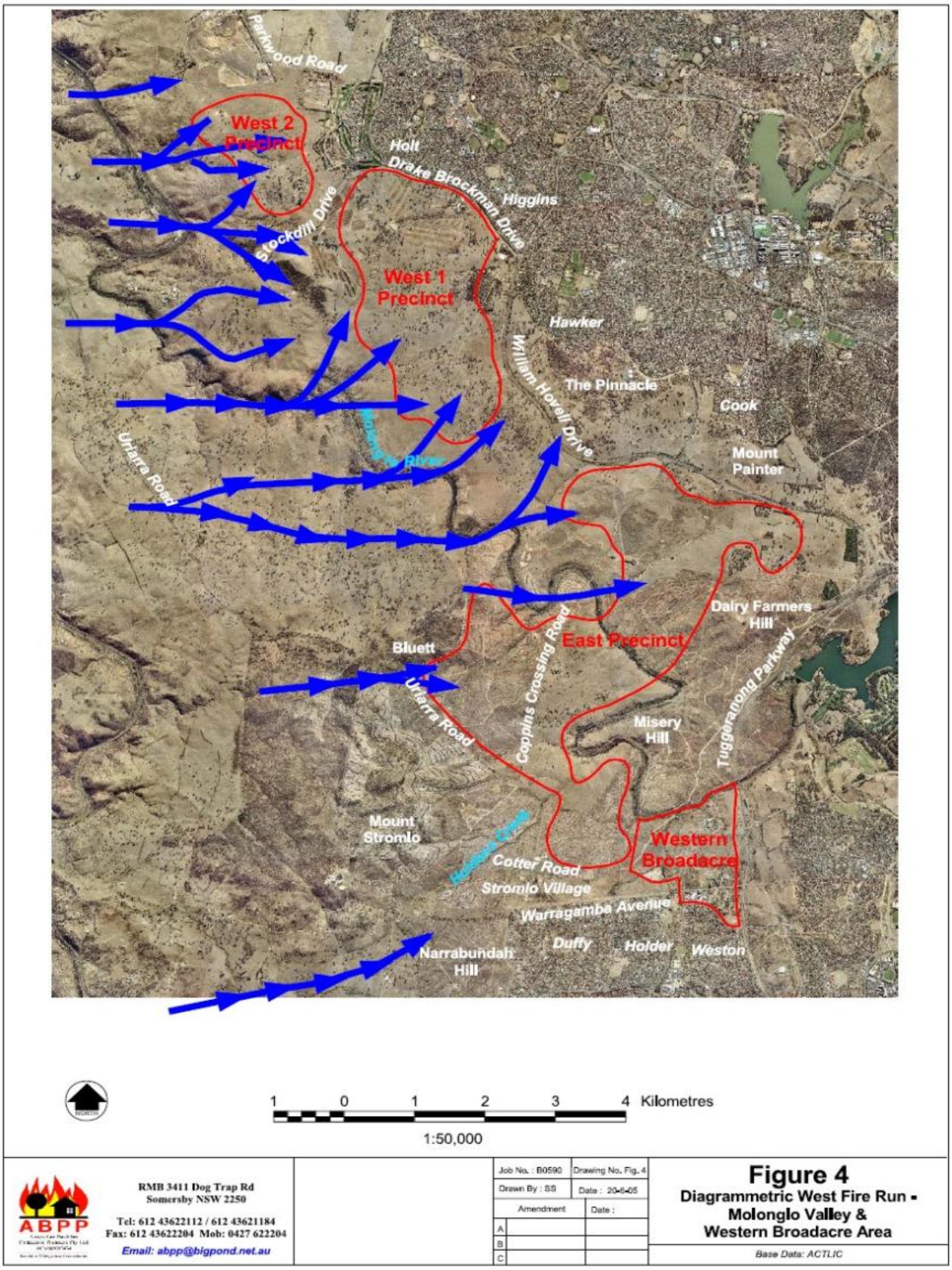


Figure 14 – Extract from the Molonglo River Structure Plan Bushfire Risk Assessment Report 2005 showing the Diagrammatic West fire run



Under Section 6.1 Management of the Vegetation beyond the Urban Interface the ABPP report states:

"The Strategic Bushfire Management Plan for the ACT (Version1) states:

"Under the Emergencies Act 2004 the ESA has declared an area of the ACT to be a Bushfire Abatement Zone. The purpose of the Bushfire Abatement Zone is to reduce the impact of bushfires on the built up areas within the ACT.

Bushfire preparation within the BAZ requires collaborative development of fuel management guidelines and the provision of advice to land managers consistent with land use. Guidelines for bushfire management must achieve a reasonable balance between the increasing community demands on ACT lands for recreation and existing use for farming, forestry and conservation".

"Bushfire fuel hazard is the only factor of bushfire behaviour that can be influenced by land managers and residents. However, fuel management alone is not the panacea for bushfire protection and it ***will not eliminate future severe bushfires.***

"The use of fire in land management requires land managers to make decisions about complex balances and trade-offs between bushfire protection and often-divergent social, environmental and economic requirements".

Heavy emphasis has been placed on the effectiveness of hazard reduction burning as the most cost effective means of management within the Abatement – Zone, however the Strategic Bushfire Management Plan states :

"The opportunity to schedule and implement prescribed burning within a desirable window of favourable conditions is relatively limited".

"Land managers and owners must take into account the potentially limited number of days and the possible interaction with air quality guidelines in the development, costing and implementation of prescribed burning programs".

Therefore the viability of maintaining the urban edge protection by hazard reduction burning and / or mechanical means needs to be established to guarantee the integrity of the Molonglo and Western Broadacre urban edge against damaging fire impact.

Under 6.2 – Shape of the Development Precincts [Page 32] the ABPP reports states:

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East Precinct.

"The long exposure of the north-western edge of the precinct to uphill burning fires, influenced by hot, dry, strong north-westerly winds, will result in significant fire impact either directly or indirectly from ember attack, depending on the level of protection provided by active management of the fuels within the river corridor.

Similar impacts may also occur to the western / south western edge from westerly and south-westerly wind-driven fires and the influence of wind turbulence in the Mount Stromlo area.

The northern edge will be impacted by fires burning within the habitat corridor, north of William Hovell Drive.

The Molonglo River Corridor will separate the eastern development node from the western development node and therefore provide a direct fire path into the suburbs adjoining the corridor and to the International Arboretum to the south east".

Under Section 6.4 – Habitat Corridors – Gazetted Nature Parks the ABPP report states:

"The Landscape and Environmental Analysis Plan in the Molonglo Valley Suitability Study identifies habitat connectivity for wildlife movement corridors from The Pinnacle to the north-west and alternate and /or additional Habitat Corridors between the three development precincts.

If the Habitat Corridor identified extending to the north-west of The Pinnacle remains it will allow fire to enter the West 1 Precinct and expose the adjoining urban development to fire impact.

The alternative Habitat Corridors will allow fires to penetrate between the development precincts. Management of these corridors for Habitat Protection and ecological protection will conflict with the need to provide active management of fuel hazards within the abatement zones to the perimeters of the urban precincts.

The Lower Molonglo River Nature Reserve will provide a direct northwest fire path for future bushfires to impact the central portion of the north western edge of the East Precinct and the return edges to the north east and south west of the Reserve".

Section 10.1 – Conclusion – Molonglo Valley [Page 43] of the ABPP report states:
"The orientation of the Molonglo Valley and the ability for northwest, west and south-west wind-driven fires to impact the proposed development edge will continue the extreme level of risk to any development proposed in the valley with the potential to cause major damage to buildings and infrastructure.

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Whilst the McLeod Report recommendation was for implementation of an Abatement Zone to the west and south-west of the City, the extent of the zone and the management abilities of those responsible for the fuel maintenance measures recommended, may not provide a level of defence which will remove the risk of devastating fires impacting to the north-western edge of the Molonglo East Precinct and the north-western, western and south-western edge of the Molonglo West 1 and West 2 Precincts".

It is therefore recommended that for development to proceed, the primary protection against the impact of fires to the north-western edge of Molonglo East and the north- western, western and south-western edge of Molonglo West 1 should be provided by the provision of a land use that creates a Critical Management Zone which is permanently fuel-managed by the nature of the land use. (i.e. vineyards / sporting grounds).

"The Molonglo River Corridor through the East Precinct should be actively managed as a Village Park to prevent fire extension into the precinct".

Figure 15 on Page 47 provides an extract from the Molonglo Concept Plan Bushfire Risk Assessment Report 2005 identifying the recommended bushfire protection measures. Subsequent to the preparation of the original Bushfire Risk Assessment Report [19.7.2005] an updated report was prepared by ABPP, dated 26.4.2006. The Executive Summary of this report states:

The Molonglo Stage 2 Bushfire Risk Assessment quantifies the current level of risk to future development within the Molonglo Valley, prior to the implementation of mitigation measures as ***Extreme.***

Mitigation measures which have been identified within the report as necessary to reduce the level of potential risk to future development include the creation and permanent management of a Critical Management Zone to the north-western edge of the East Molonglo Precinct and to the western and south-western edge of the Central Molonglo Precinct.

The provision of the Critical Management Zone (CMZ) replaces the Outer Asset Protection Zone, as defined in the Strategic Bushfire Management Plan for the ACT and the management of this zone, in accordance with the performance standards defined in this report, are considered to be a mandatory requirement in the reduction of the bushfire risk to the future development within the Molonglo Valley.

In addition to the provision of a Critical Management Zone to the north-western edge of East Molonglo Precinct, this report recommends, due to the risk of fire over-run along the Molonglo River corridor and into the future suburb, the damming of the Molonglo River below Coppins Crossing and the creation of Lake Molonglo".

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Figure 15 – Extract from the Molonglo River Structure Plan Bushfire Risk Assessment Report 2005 showing the recommended Bushfire Protection Strategies.

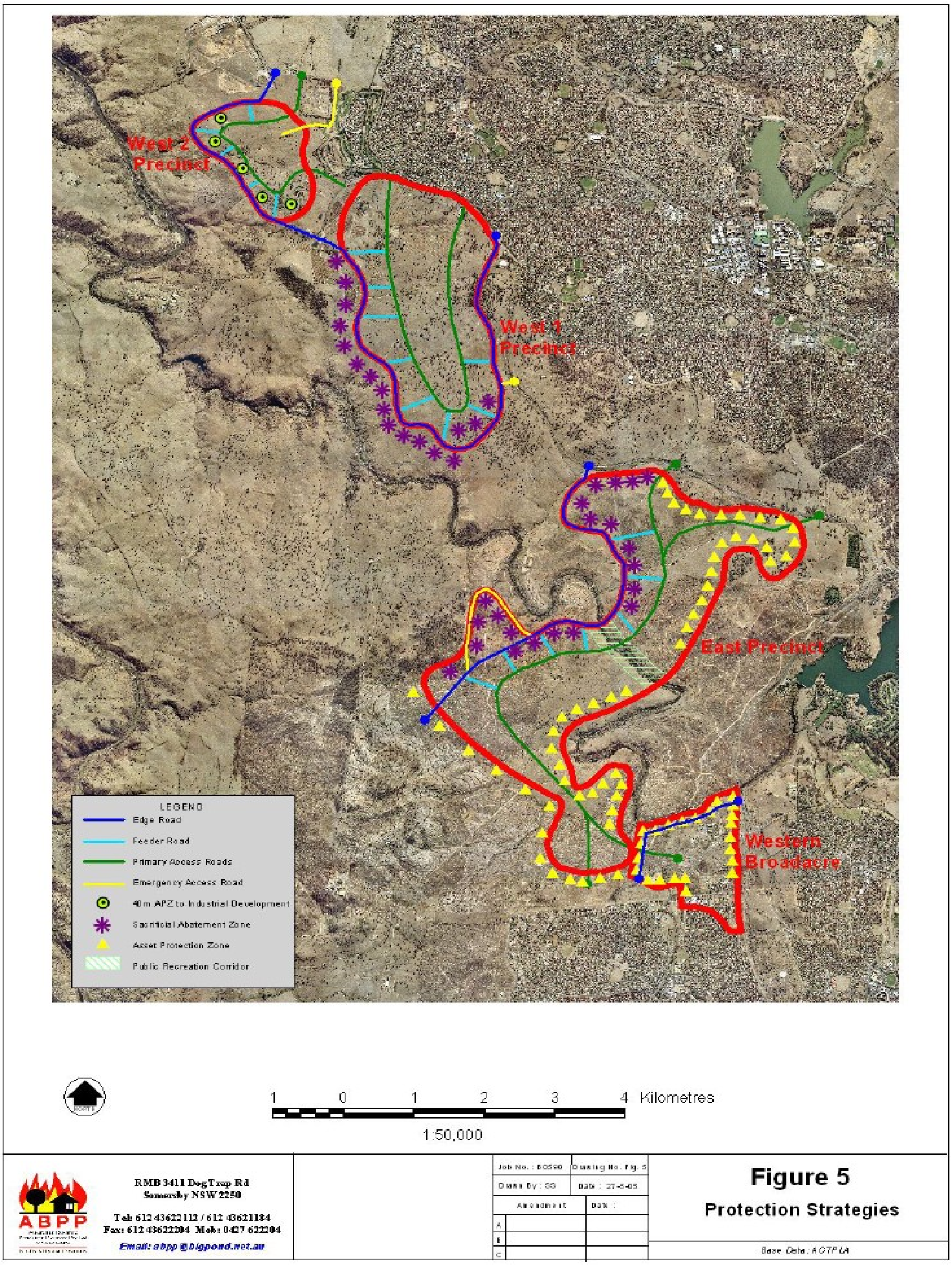
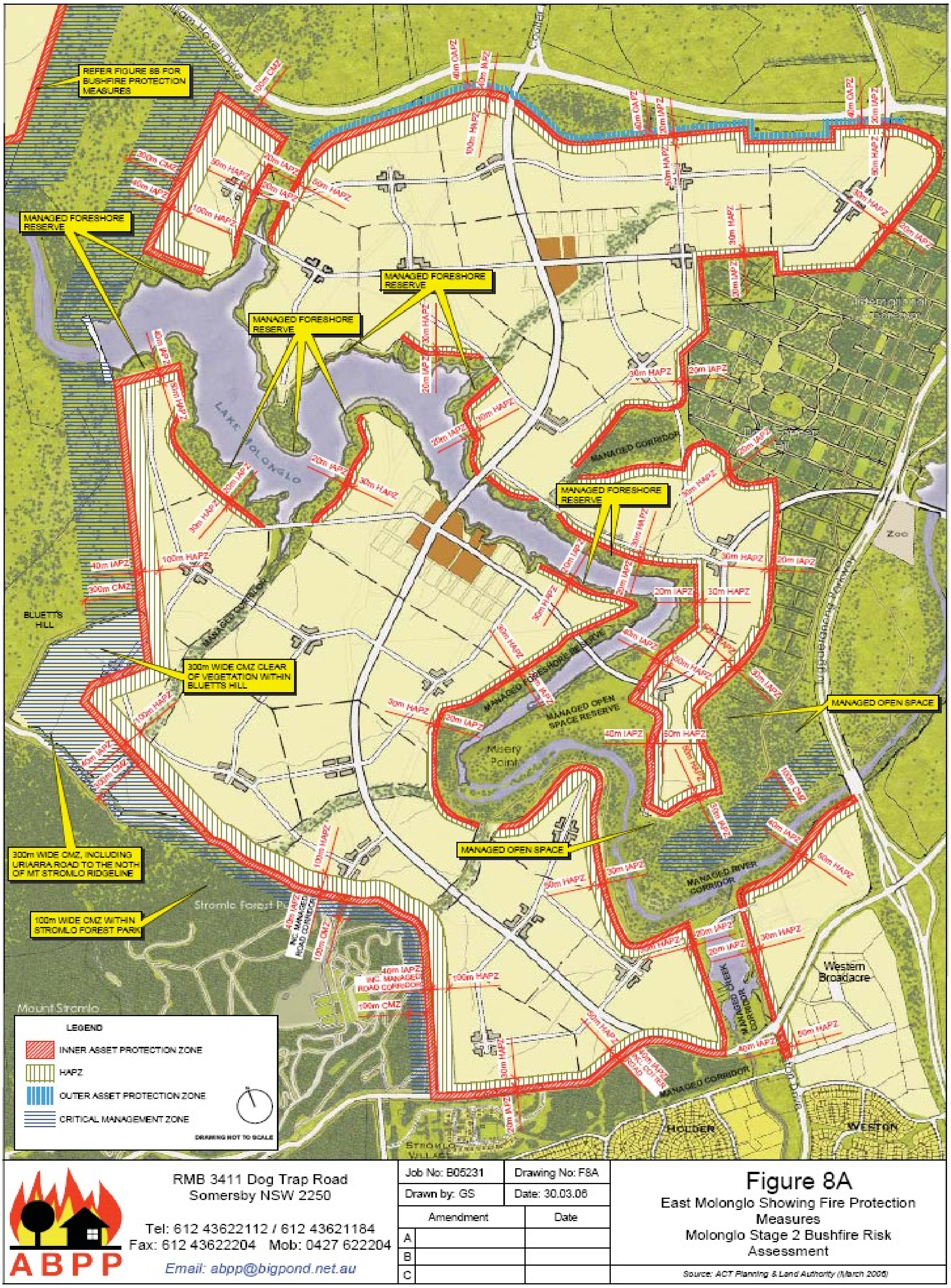


Figure 16 – Extract from the Molonglo River Structure Plan Bushfire Risk Assessment Report Stage 2 - 2006 showing the recommended Bushfire Protection Strategies



The recommendation contained within the latter report that damming of the Molonglo River below Coppins Crossing should occur to remove the bushfire risk along the river corridor was originally implemented in the Strategic Planning process, however is now not included in the Territory Plan.

The comments about the level of risk to the north-western edge and the risk posed by the retention of vegetation within the river corridor therefore defaults back to the original Bushfire Risk Assessment [19.7.2005] [refer to Figure 4 on Page 17] which recommended the implementation and management of a Critical Management Zone of at least 300 metres to the north-western edge of the new suburb and that the *"Molonglo River Corridor through the East Precinct should be actively managed as a Village Park to prevent fire extension into the precinct".*

Molonglo Valley Plan for Protection of Matters of National Environmental Significance – NES Plan (2011):

A review of the Molonglo Valley Plan for Protection of Matters of National Environmental Significance – NES Plan – September 2011 prepared by ACT Planning & Land Authority has identified that the aim of this document is to enhance the areas of Box Gum Woodland not only within the Molonglo River corridor but also within the Kama Nature Reserve and pockets of retained vegetation within the Molonglo Stage 3 precinct.

The document provides, under Section 2.3 – Bushfire Management Framework a 'motherhood' statement about bushfire management which reads:

"Within the strategic assessment area fire management will be aimed at protection of both built assets and MNES values. This will be achieved through the identification of appropriate asset protection zones and application of hazard reduction techniques that will both:

- *Ensure that the standards for fuel loads in the SBMP are met; and*
- *Protection MNES values through the use of sympathetic management techniques".*

The aim of this document does not address the recommendation that the river corridor is managed as a *'Village Park'* or the land to the west of Molonglo 3 and Denman Prospect is managed to mitigate the impact of fire on the north-western edge of the future urban development and from a fire spreading along the river corridor.

In the document under Management and offsetting it called for the establishment of a buffer outside of the Kama Nature Reserve on its eastern side to protect the ecological values of the reserve. It went on under Commitments to MNES:

"Establish a buffer outside the Kama Nature Reserve between the reserve and the proposed development area, and allow for appropriate uses consistent with nature conservation uses of the reserve. The buffer will be developed to ensure that fire management is undertaken outside of the Kama Nature Reserve and will provide protection against urban edge effects."

The NES Plan recommends that the following reports be prepared:

1. 'Molonglo River Park Concept Plan';
2. Kama Management Plan;
3. Management Plan for Patch GG; and
4. Management Plans for High and Moderate PTWL habitat.

Molonglo River Park – Concept Plan prepared by Hassall (2012):

This document was prepared by Hassell in 2011 and finalised in 2012 and states that one of the primary objectives of the plan is to manage bushfire risk and details the need to provide Inner and Outer Asset Protection Zones as required by the *Strategic Bushfire Management Plan for the ACT 2009* with the Inner Asset Protection Zone located within the urban envelope and the Outer Asset Protection Zone and Strategic Fire Advantage Zone [SFAZ] located within the park.

Section 3 – Investigation Summary of the Concept Plan states:

"Risk assessments completed for Coombs and Stage 2 urban development areas identified a high to extreme bushfire risk for future urban areas. The most significant risk is that of a fire moving from the west or northwest, from which it would not only threaten the peripheral urban development in these areas but also potentially penetrate deeper onto the development area by moving up the Molonglo River corridor".

Under 'Additional Strategies' the report suggests that relevant group(s) further investigate the establishment of a 300 metre wide 'Critical Management Zone' to the northwest of the site – extending in a downstream direction from the north west limit of the park.

The table on page 51 is an extract from the Concept Plan identifying the Fire Management Objectives and Strategies.

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Email. abpp@bigpond.net.au

Objectives and strategies

Objectives of fire management	Strategies
Mitigate bush fire hazard.	Active management of fuels associated with vegetation within the park.
Mitigate the potential for the riparian area to have a 'wicking' effect that could carry a fire deep into the urban area.	Creation of a mosaic landscape in which the potential for long runs of fire fuels are minimised.
Afford the occupants of the urban areas adjacent to the park protection from exposure to a bushfire.	Development and maintenance of an outer APZ that complies with ACT Emergency Services Agency (ESA) standards. (ACT SBMP)
Provide defendable space and adequate separation to minimise the chance of direct flame contact and material ignition, for any assets that could be vulnerable to a fire, which would be located within the park lands.	
Provide for the ongoing maintenance of fuel loads and vegetation continuity within the outer APZ and parklands.	
Ensure that emergency service personnel and parkland users have access to adequate access and egress in the event of a bush fire.	Development and maintenance of a network of roads and fire trails that meet emergency services access requirements.
Ensure that utility services, particularly water supplies, are adequate to meet the needs of fire fighters.	Provide water supplies suitable for use during fire and fuel management exercises.

The Molonglo River Park Concept Plan Report's focus of the 'Fire Management Theme' is on strategies for the control of vegetative fuels within the following specific areas:

- Critical Management Zone [CMZ] to the west of the park;
- Strategic discontinuity zones within the riparian corridor which aim to reduce the ability of a fire to move continuously up the corridor and into the urban areas, and provide access for defence and fuel management;
- Outer APZ adjacent to the urban interface [Inner APZ within the statutory urban area, not in the riparian parkland].

The Molonglo River Park Concept Plan Report states that the Critical Management Zone forms a key component of the overall strategy to reduce the potential for a fire to move up the riparian parkland and into the urban areas.

"The Critical Management Zone is a 300 metre wide zone extending from the western boundary of the proposed urban areas and the riparian parkland, in a downstream direction. This area would be managed to provide a strategic fire break or control line to reduce the impact of a fire moving from the west/northwest, towards the urban areas".

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

The report continues with advice on the strategic discontinuity zones and states that these zones "would be located at intervals within the parkland to reduce the potential for a fire to move continuously along the riparian corridor and potentially fuel an intense fire that could have catastrophic effects on the adjacent urban areas".

"The development of strategic discontinuities within the riparian parkland responds to the significant hazard potentially affecting this area, which is located on the north-west fringe of Canberra and is therefore directly exposed to extreme fire weather and the potential fire hazard associated".

"This strategy also responds to the potential of the riparian corridor itself to act as a 'wick', funneling a fire, driven by hot, dry, north-westerly winds, onto the heart of the urban area. This risk is a function of the physical location and the orientation of the river corridor itself".

"The discontinuity areas would be located:

- At the northwest extreme of the riparian area;
- Around, and to the west of Coppins Crossing, from the proposed sewer line crossing to the proposed extension of John Gordon Drive crossing the river;
- At Misery Point.

These areas would be characterised by more concentrated vehicle access and intense location of recreational facilities such as playing fields, parking areas, irrigated gardens and picnic areas. Alternatively, they would comprise open woodland/grassland habitat".

"Vegetation in the recreation areas would have the following characteristics:

- Large areas of groomed grassland maintained to a height of less than 100mm;
- Scattered tree planting;
- Formal parks and gardens with irrigated plantings.

"Generally fuels in these areas would be maintained by mechanical mowing/slashing. Where areas of PTWL habitat occur, fuels would be managed in accordance with the TAMS *Pinked Tail Worm Lizard Fuel & Fire Suppression Guidelines [TAMS 2011]".*

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

“Outer Asset Protection Zones would be developed in accordance with ESA standards and the following OAPZ are required: Primary asset interface classification – 100m; Secondary asset interface classification – 0 metres.

All vegetation within the riparian zone would be maintained as grassland or open woodland.

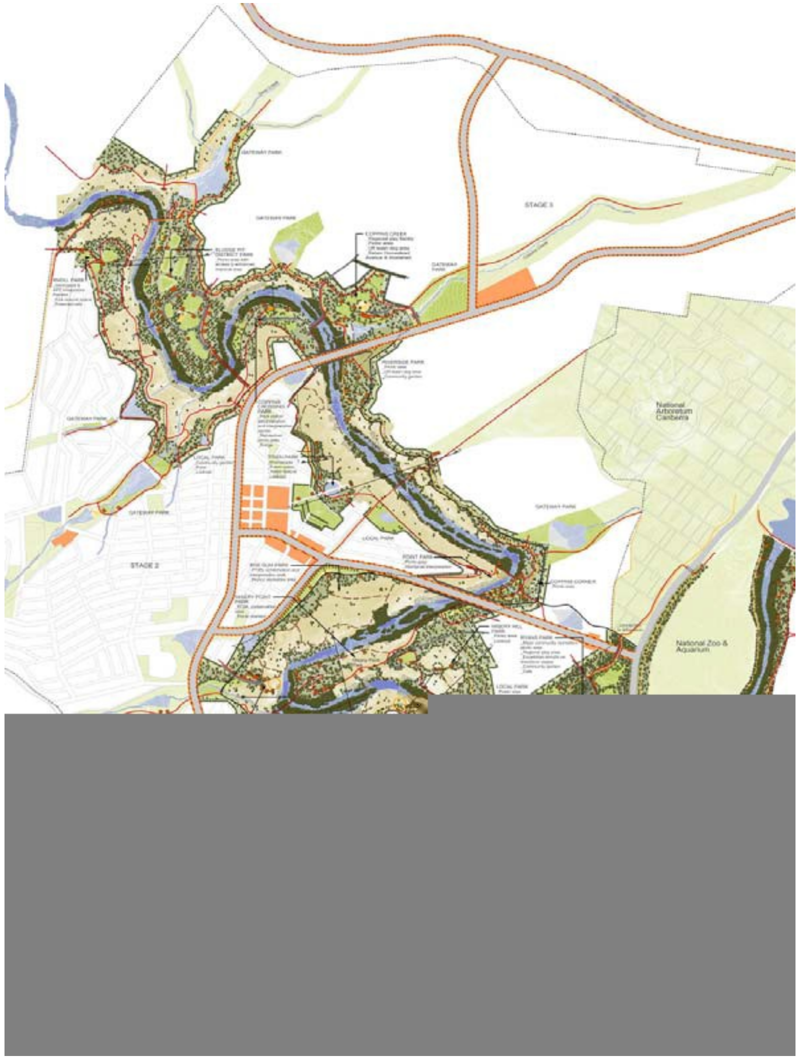
Figure 17 shows the Molonglo River Park Illustrative Concept Plan prepared by Hassell.

Figure 18 shows the Molonglo River Park Illustrative Landscape setting Plan prepared by Hassell.

Figure 19 shows the Molonglo River Park Fire Management Plan concept prepared by Hassell.

Tel. 612 43622112 / 612 43621184
Email. abpp@bigpond.net.au

Figure 17 – Molonglo River Park Illustrative Concept Plan – Hassell.



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3.2.10 Strategic Fire-fighting Advantage Zone 10

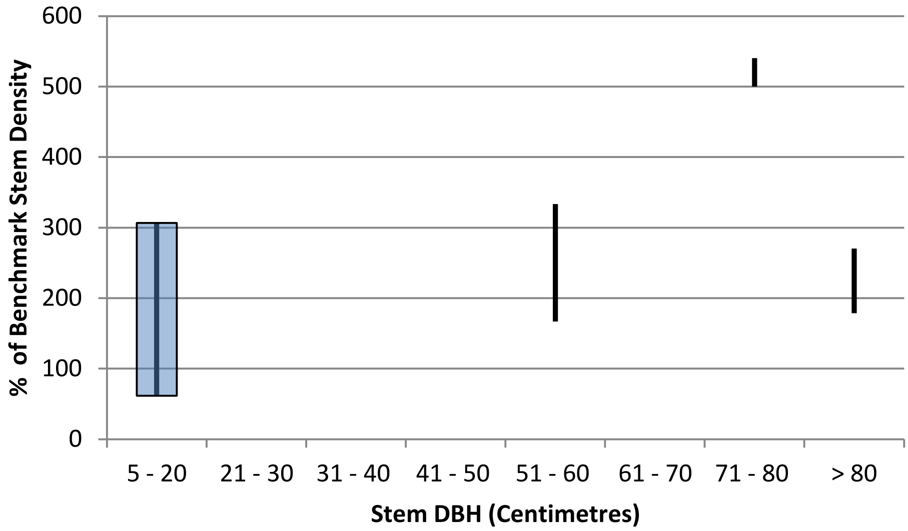
Plot 10-1

Plot 10-2

Box-Gum Woodland (Gum Dominated)	
Upper	*Eucalyptus blakelyi;* 10-15%, 16-20 (18) metres.
Mid	*E. blakelyi, Rubus fruticosus* agg.; 5-30%, 0.5-5 (2) metres.
Ground	*Microlaena stipoides* var. *stipoides, Bromus hordeaceus, Themeda triandra;* 85-90%, 0.1-0.4 (0.2) metres.

SFAZ 10 is largely box-gum woodland: the canopy is open with patches of regeneration being denser in the south (Plot 10-1). The understorey is dense, and characterised by native and exotic grasses. Patches of blackberry (*Rubus fruticosus* agg.) are common.

Stem Size Classes (Actual versus Benchmark)



Stems < 5cm DBH: 7 - 78 per 0.1 hectare plot

Overall Fuel Hazard

	Plot 10-1	*Plot 10-2*	*Max*
Bark	M	L	**M**
Elevated Fine Fuel	M	L	
Near-Surface Fine Fuel	VH	M	
Surface Fuel	L	L	
Combined Surface / Near-Surface Fuel	H	L	
Overall Fuel Hazard	**M**	**L**	

3.2.11 Other Strategic Fire-Fighting Advantage Zones

Due to a lack of concern regarding the fuel hazard, SFAZs 11, 12, 13 were not assessed as part of this project; these are shown in **Figure 3.3**. Rapid observation confirmed that a mosaic of native and exotic understorey exists in these zones. These areas may be managed by grazing or slashing should their fuel loads be deemed of a level where grassfire can rapidly spread. Grazing is likely to be the best strategy given the presence of Pink-tailed Worm Lizard.

Figure 3.3 – Other Strategic Fire-Fighting Advantage Zones

SFAZ 11

SFAZ 12

SFAZ 13

3.2.12 Additional Values

As mentioned in **Section 3.1.2**, the Project Area is known to contain notable species including Scarlet Robin and Satin Flycatcher. The former is listed as a threatened species in NSW while the latter is considered to be a migratory species in accordance with the EPBC Act. Given the size and habitat provisions within the Project Area, it is plausible that additional notable or even threatened birds that occupy open forest and woodland may utilise the area.

Extensive habitat for Pink-tailed Worm Lizard is mapped in ACTMAPi (ACT Government 2015). The presence of this species was confirmed as part of this project through observation of a live specimen (**Figure 3.4**) and sloughed skins. As discussed in **Section 2.5.2**, the source of habitat mapping is unknown and requires further verification in forested areas; even though Pink-tailed Worm Lizard have been recorded in rocky outcrops in dry sclerophyll forest, these are generally in more open area than those mapped as habitat in the Project Area.

Figure 3.4 – Pink-Tailed Worm Lizard, Rocky Outcrop SFAZ 7

Photo: Rob Armstrong

SFAZs 9 and 10 contain box-gum woodland. These values are discussed further in **Appendix 1**. SFAZ 3 may also contain box-gum woodland, although this has strong affinities with dry sclerophyll forest in this location and requires further assessment.

3.2.13 Summary

3.2.13.1 Stem Density and Vegetation Structure

The 'Open-Low-High-Close' charts demonstrate the abundance of stems in each size class expressed as a percentage of the upper and lower stem benchmark as determined by Gibbons *et al.* (2010). Additional to this, a large abundance of stems < 5 centimetres DHB occurs across much of the project Area. The density of these stems, as well as stems in the 5 – 20 centimetre DBH class, is shown in **Table 3.2**.

Table 3.2 – Stem Densities (Size Classes < 20 centimetres DBH)

SFAZ	Stem Density (Centimetres)[1]					Main species
	< 5	5 - 10	10 - 20	5 - 20	< 20	
1	39 – 43	74 – 86	28 - 77	102 - 163	141 - 206	Red Stringybark
2	71 - 160	83 – 112	9 - 21	104 - 121	175 - 281	Red Stringybark, Apple Box
3	0 - 27	25 - 54	1 - 10	26 – 64	26 – 91	Scribbly Gum, Blakely's Red Gum
4	86 - 210	67 - 70	10 - 14	71 – 80	167 – 290	Red Stringybark, Scribbly Gum
5	30 - 51	45 - 122	16 - 27	61 – 149	91 – 200	Red Stringybark, Scribbly Gum
6	385 - 520	49 - 79	3 - 6	52 – 85	470 – 572	Scribbly Gum, Red Stringybark
7	12 - 46	35 - 161	26 - 52	87 - 187	99 – 233	Red Stringybark, Scribbly Gum
8	57 - 160	74 - 88	34 - 58	122 - 132	179 - 292	Red Stringybark
9	96 - 260	19 - 147	8 - 11	30 - 155	126 – 415	Red Stringybark, Blakely's Red Gum
10	7 - 78	12 - 34	2 - 4	14 - 38	21 - 116	Blakely's Red Gum

[1] per 0.1 Hectares, based on representative plots.

Table 3.2 shows that the majority of SFAZs contain a large density of stems within the < 5 centimetre size cohort. This is particularly pronounced in SFAZ 2, 4, 6, 8 and 9. Based on observations in SFAZs 5 and 7, where stems formerly in this size cohort have progressed to a larger size while retaining a high stem density, it is apparent that, at least at this stage of maturity after the 2003 fire event, tree growth within SFAZs will progress slowly and under intense competition. Such competitive stress among eucalypts is likely to delay the development of a mature canopy, and suppress growth and diversity of groundcover species, and habitat provisions for species relying on larger trees for nesting and foraging opportunities (Jones *et al*. in press).

3.2.13.2 Overall Fuel Hazard

The ultimate fuel hazard rating is highly sensitive to subjective assessment of individual fuel components. For example, if the 'Bark Hazard' is deemed 'Very High' or 'Extreme', a patch with 'Low', 'Elevated Fine Fuel Hazard' and Moderate', 'Combined Surface and Near-Surface Fine Fuel Hazard' is considered to represent a 'Very High' fuel hazard. If the 'Bark Hazard' is 'High' and the other parameters remain the same, the fuel hazard is considered 'Medium'.

The dominance of Red Stringybark throughout much of the Project Area (or, at a minimum, at least 10% of proportional abundance within a given location) elevates the fire risk significantly. For example, using this assessment method if the bark of these trees is completely charred, the 'Bark Hazard' rating is 'Moderate'. Where there are a large amount of trees (including advanced regrowth) with minimal or no charring, the 'Bark Hazard' rating is 'Very High' or 'Extreme'. This is due to the ability of bark on stringybark species to produce massive quantities of embers and short-distance spotting, rendering fires difficult to suppress (Hines *et al.* 2010).

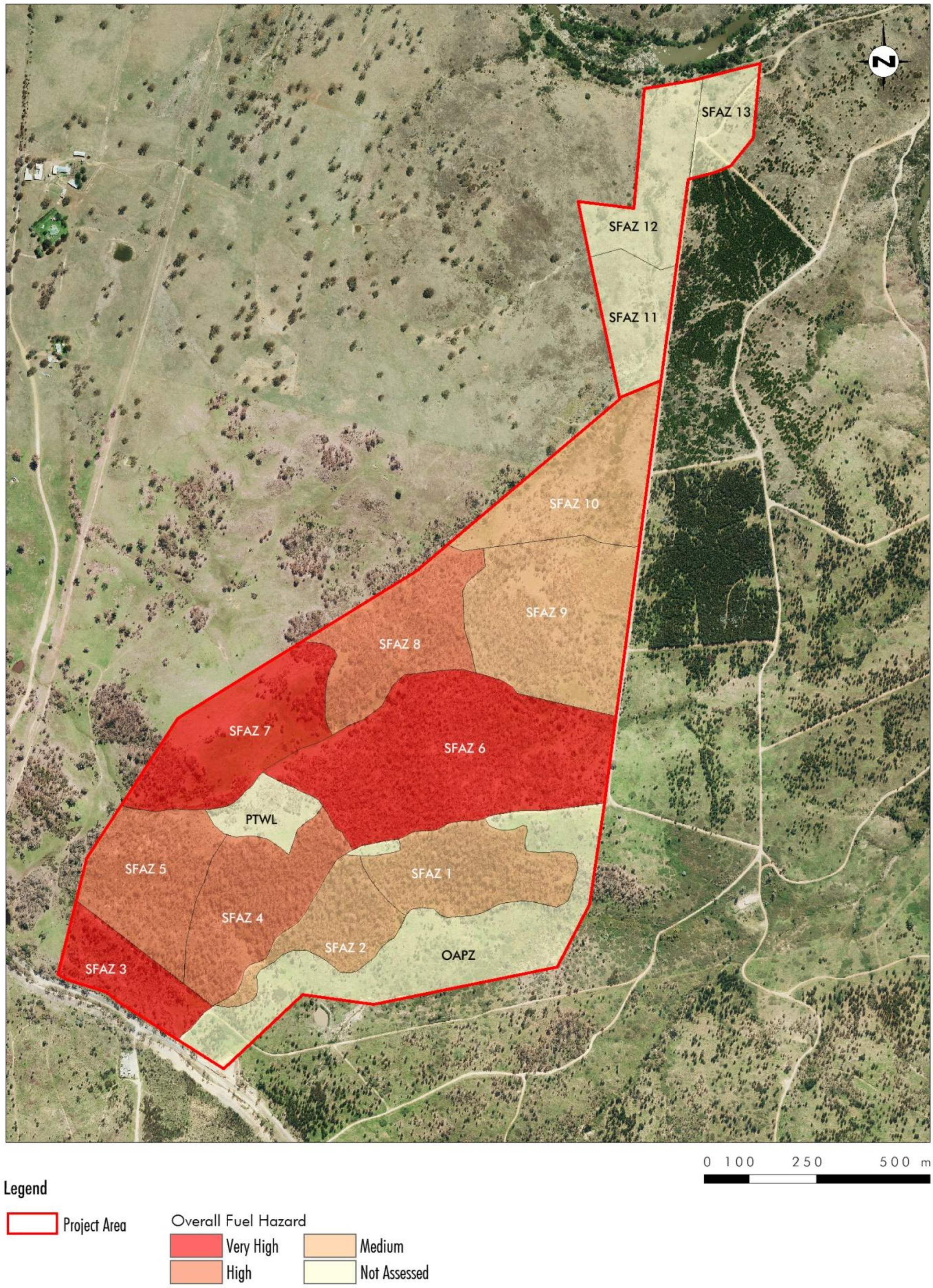
Using the 'Overall Fuel Hazard Assessment' method, the fuel hazard is considered to range from 'Very High' in areas of un-charred dense advanced regeneration of Red Stringybark with large amounts of elevated fine fuel and/or combined near-surface and surface fuel (SFAZs 3, 6 and 7), through to 'Medium' and 'Low' in an area of open Blakely's Red Gum with a low grassy understorey (SFAZ 10). While the method and assessment is open to subjectivity and results of this assessment should be audited by Territory and Municipal Services fire ecologists, this assessment showed that at least six of the 10 SFAZs assessed within the Project Area are currently considered to range from 'High' to 'Very high' fuel hazard. **Figure 4.5** shows the maximum overall fuel hazard rating recorded in each SFAZ. Note that this is based on the higher of two samples within each SFAZ, and further assessment and mapping may delineate areas on fire risk if appropriate.

3.2.14 Limitations

While this Project demonstrates that there are large areas of dense regeneration and subsequent higher fire risk, the assessment is limited by the following:

- Due to subjectivity in the assessment method, areas with a 'Medium' hazard may in fact be 'High', or tending to 'High' in the near future as stringybark bark matures, stem charring is reduced and leaf litter accumulates.
- Field assessment is based on two plot samples per SFAZ. Statistically, this is not considered adequate in determining the variation within each SFAZ. However, this is partially alleviated through the plot selection process, whereby plots were selected based on representative values determined as part of meandering survey through each SFAZ.
- SFAZs 3 and 9 contained two vegetation types ('Red Stringybark' and 'Box-Gum Woodland' alliances, with one plot surveyed within each (the project scope included survey of two plots per SFAZ). For these zones, stem densities were analysed against benchmarks in Gibbons *et al.* (2010) for the 'Red Stringybark' alliance. While a lower stem density is permissible in the 'Box-Gum' alliance, examples of this alliance within SFAZs 3 and 9 were ecotonal, with understorey characteristics akin to the 'Red Stringybark' alliance. Further, treating these areas as part of the 'Red Stringybark' alliance allows for the retention of a greater number of stems.
- The 'Overall Fuel Hazard Assessment' focuses on a 20 metre circle. Much of the area assessed is not displayed in site photographs, which were taken to demonstrate stem density.
- The 'Overall Fuel Hazard Assessment' focuses on fuel arrangement. While this is more valid than fuel loads, it does not consider the effects of the following:
  - Topographic effects of fire behaviour;
  - The relationship between a site location and prevailing areas of fire run (i.e. if a site is located in a prevailing direction and adjacent to an area of high threat.
  - The flammability of vegetation within the elevated fine-fuel, near-surface and surface layers. It is noted that the sclerophyllous shrubs and tussock grasses within the Project Area are relatively flammable;

While the 'Overall Fuel Hazard Assessment' guides land managers in determining if or when fuel hazard reduction is required, it does not consider the above factors. These factors are critical to fire behaviour within the Project Area.



Note: due to subjectivity in the assessment method, areas with a 'Medium' hazard may in fact be 'High', or tending to 'High' in the near future as stringybark bark matures, stem charring is reduced and leaf litter accumulates.

Figure 4.5 – Maximum 'Overall Fuel Hazard Assessment' ratings for each SFAZ

4.0 Habitat Requirements for Listed Threatened Species

As noted in **Section 3.2.12**, Pink-tailed Worm Lizard is known to occur in rocky habitat in cleared areas within the Project Area. Habitat for this species is mapped broadly across the Project Area (**Figure 2.2**), however the source of the mapping included in ACTMAPi is unknown and appears to map all rocky outcrops in dry sclerophyll forest and open areas. While this species has been recorded in at times in dry sclerophyll forest, it is generally found in more open areas within this vegetation type, and preferentially in derived native grassland (Wong 2013).

The Significant Species Database accompanying the Draft Environmental Offsets Methodology (ACT Government 2013a[21]) was reviewed to consider which threatened flora, fauna and ecological communities may be present within the Project Area, and what habitat provisions are important for their persistence. While the methodology is yet to be formally released, it is assumed that the accompanying database provides current information with respect to the potential values that may be associated with habitats within the Project Area. **Table 4.1** provides an appraisal of key habitat requirements of species predicted to occur in the Project Area.

Apart from Pink-tailed Worm Lizard, Varied Sittella is the only species considered likely to occur. Box-Gum Woodland occurs at lower elevations in SFAZ 9 and 10 (refer to **Appendix 1**).

Unless otherwise indicated, information in **Table 4.1** is sourced from the Significant Species Database.

Table 4.1 – Key Habitat Requirements for Species Predicted to Occur in the Project Area

Name		Status (Act)		Key Habitat Requirements
Common	**Scientific**	**EPBC**	**NC**	
Birds				
Varied Sittella	*Daphoenositta chrysoptera*	-	V	Moderate to high likelihood of occurrence. Preference for areas containing Red Stringybark (*E. macrorhyncha*) (ACT Government 2004[22]) with hollows or dead branches (Birdlife 2015[23]).
Regent Honeyeater	*Anthochaera phrygia*	E, M	E	Low likelihood of occurrence. Occasional migrant in Northern ACT, utilising woodlands, open forest and street plantings. In natural areas, they appear to have a preference for Box-Gum Woodland along the lower slopes of Mounts Ainslie and Majura, extending through Mulligan's Flat Nature Reserve to the Sutton and Lake George areas.

V = Vulnerable; E = Endangered; M = Migratory.

[21] ACT Government (2013) *Environmental Offsets Assessment Methodology*. ACT Environment and Sustainable Development Directorate. Version 20130301.
[22] ACT Government (2004) *Woodlands for Wildlife: ACT Lowland Woodland Conservation Strategy*. Action Plan 27. Environment ACT, Canberra.
[23] Birdlife (2015) *Varied Sittella – Profile* [URL Accessed 29/01/2015: http://www.birdlife.org.au/bird-profile/varied-sittella].

Table 4.1 (cont.) – Key Habitat Requirements for Species Predicted to Occur in the Project Area

Name		Status (Act)		Key Habitat Requirements
Common	Scientific	EPBC	NC	
Little Eagle	*Hieraaetus morphnoides*	-	V	Low likelihood of occurrence. This conspicuous species was recorded as breeding in three locations in the ACT lowlands this spring/summer. This species nests in large mature eucalypts. No large conspicuous raptor nests were observed during surveys undertaken by Umwelt, and suitable nesting provisions are scant based on the 2003 wildfires.
Bats				
Eastern Long-eared Bat	*Nyctophilus corbeni*	V	-	Low likelihood of occurrence. Prefers a defined canopy and dense cluttered shrub layer (Australian Government, 2015a[24]), roosting in tree hollows, bark fissures and branch fissures (Churchill, 1998[25]). Roosting provisions are rare within the Project Area.
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	-	Low likelihood of occurrence. Occasional summer visitor, which has established a roosting site in Commonwealth Park north of Lake Burley Griffin. This species has a broad foraging range, with a nightly feeding range of 20 to 50 kilometres, and feeds on a variety of eucalypts, figs and fruit trees (Churchill 1998).
Reptiles				
Pink-tailed Worm Lizard	*Aprasia parapulchella*	V	V	Known to occur. Extensive habitat is mapped (refer to **Section 2.5.2**). This species was not predicted to occur in habitat within the Project Area by the Significant Species Database.
Plants				
Hoary Sunray	*Leucochrysum albicans* var. *tricolor*	E	-	Low likelihood of occurrence. Occurs in a variety of habitats, including open areas within Box-Gum Woodland and Red Stringybark Open Forest. The species is able to be identified year round (PlantNet, 2015[26]). Although targeted survey has not been undertaken, the species has not been recorded opportunistically.
Pale Pomaderris	*Pomaderris pallida*	V	-	Low likelihood of occurrence. In the ACT, is species is only known from riverbanks (Australian Government 2015b[27]).

V = Vulnerable; E = Endangered; M = Migratory.

[24] Australian Government (2015a) *Nyctophilus corbeni – South-eastern long-eared Bat. SPRAT Profile*. [URL Accessed 25/02/2015: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=83395]
[25] Churchill, S. (1998) *Australian Bats*. New Holland Publishers, Sydney.
[26] PlantNet (2015) *Leucochrysum albicans var. tricolor (DC.) Paul G. Wilson* [URL Accessed 29/01/2015: http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=in&name=Leucochrysum~albicans ~var.+tricolor].
[27] Australian Government (2015b) *Pomaderris pallida – Pale Pomaderris. SPRAT Profile*. [URL Accessed 25/02/2015: h http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=13684].

5.0 State and Transition Model Concept

Considering the over-abundance of stems in a range of size classes compared to pre-European benchmarks predicted by Gibbons *et al.* (2010), it may be appropriate to consider adaptive management of the Project Area to achieve the dual functions of advancing habitat restoration and maintaining a manageable fire risk in a remnant adjacent to the future urban interface at Denman Prospect. Such an approach would allow for management of the site, with frequent monitoring and interpretation of outcomes of management. **Figure 5.1** outlines the adaptive management process as defined in the Molonglo NES Plan (ACT Government 2011[28]) and the Molonglo Adaptive Management Strategy (ACT Government 2013a).

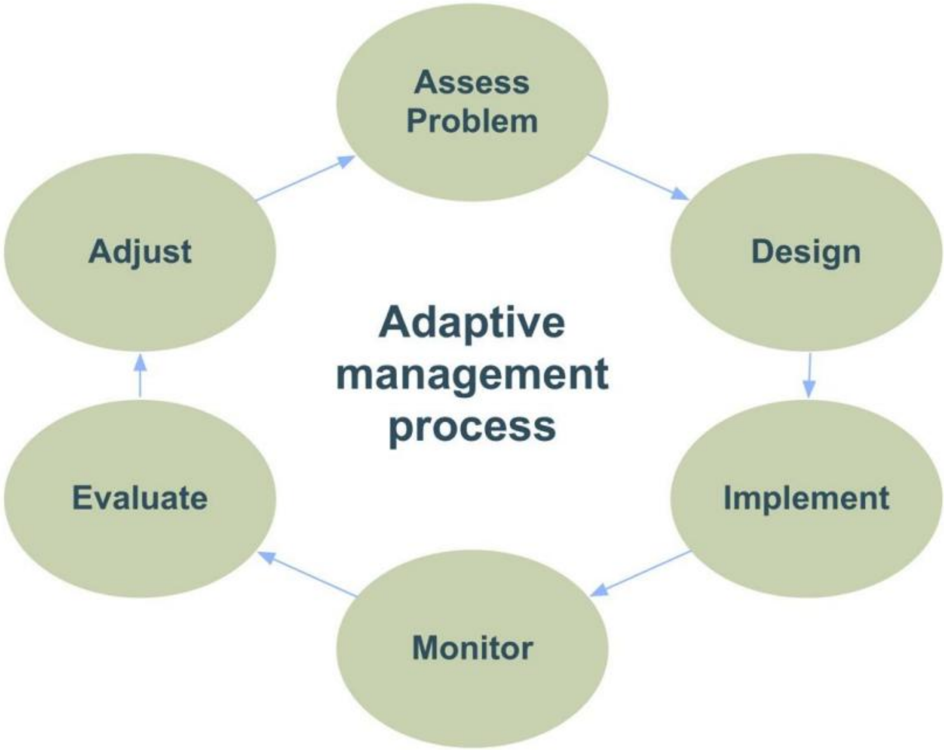


Figure 5.1 – Adaptive Management Process

A conceptual state-and-transition model for adaptive management of native woodlands produced by Rumpff *et al.* (2011[29]) demonstrates the concept of restoring a landscape to a near natural state (or reference condition). This model, shown in **Figure 5.2**, steps through the process of identifying which state a remnant is in, and the logical transition steps to restore a remnant to a near natural state. While this model has been developed for non-riparian woodlands, it can easily be adapted to reflect open forest benchmarks such as within the red stringybark alliance as defined by Gibbons *et al.* (2010).

[28] ACT Government (2011) *Molonglo Valley Plan for the Protection of Matters of National Environmental Significance*. NES Plan September 2011. ACT Planning & Land Authority.
[29] Rumpff L, Duncan DH, Vesk PA, Keith DA & Wintle BA (2011) *State-and-Transition Modelling for Adaptive Management of Native Woodlands. Biological Conservation* **144**: 1224-1236.

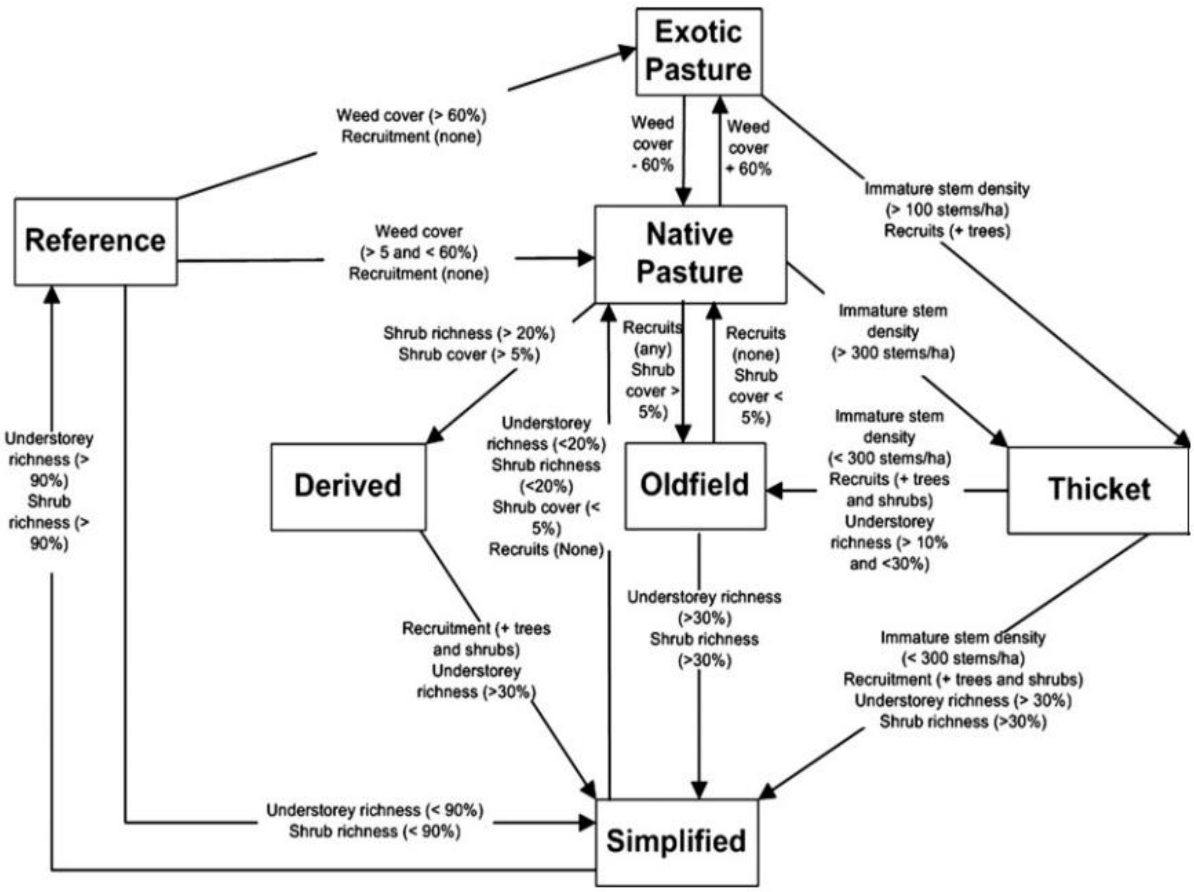


Figure 5.2 – Conceptual State-and-Transition Model

Box 1: Relevant definitions for Figure 5.2

Reference: Sites which are largely intact in terms of structural and species diversity, with a low cover of exotic species. Sites that have been little altered since European settlement fall into this category, but the reference state does not necessarily have to represent pre-European vegetation condition.

Thicket: Sites with a dense regrowth of overstorey species, and a relatively low cover/richness of the understorey and midstorey component. For instance, sites may have had a change in land-use (e.g. removal of grazing or logging) and climatic conditions that were favourable for natural regeneration of woody species.

Simplified: Sites may have a relatively intact understorey, overstorey, or midstorey structure, but one or more of these strata is likely to be simplified. Species richness may be high, but unlikely to reach that of reference levels. An example of this state is vegetation that has been intermittently grazed at low intensity and/or moderately cleared in the past

Native Pasture: Sites with a simplified overstorey, and a low cover and richness of both the midstorey and understorey. The cover of weeds may be low-moderate. Such sites will typically include those that have been cleared and grazed at a high frequency and intensity, but without the addition of fertilizer.

From Rumpff *et al.* (2011)

While the values within this model may not reflect open forest (e.g. stem density values), the concept of state-and-transition still applies. Due to the intense 2003 fire event and subsequent regeneration, the majority of vegetation within the Project Area is in a ‘thicket’ state. In order to resort to a near natural or reference state, a disturbance event to create a simplified structure is required. Alternatively, natural thinning may occur over time due to stem competition between regenerating eucalypts, but give the fire history of the site there is a significant risk that wildfire events will continue on some level, creating a cyclical state of native pasture (or remnant sparse mature trees) to 'thicket' (based on subsequent natural regeneration), returning to native pasture when the next wildlife occurs. For this reason, the option of undertaking an environmentally sensitive treatment to return the Project Area to a 'simplified' and ultimately 'reference' structure may be desirable as long as a 'reference' state can be easily managed in a fire-prone landscape.

The above explanation is simplified, and used to demonstrate a concept as to how and why the Project Area may benefit from intervention. By restoring the remnant to a 'reference' state using stem densities as defined by Gibbons *et al*. (2010) and additional benchmarks, biodiversity values should be improved based on increased diversity of habitat provisions. Additionally, assuming that a near natural or 'reference' state provides greater opportunity for fire management and suppression, this may reduce the likelihood of a major fire event reducing biodiversity values.

5.1 Maintaining Structural Diversity

If the conceptual state-and-transition model is considered valid, treatment should be undertaken in stages within the Project Area to ensure that ecological values (particularly fauna) are maintained and able to occupy remaining habitats while recovery from a 'simplified' state is taking place. This is particularly important for woodland bird species that preferentially utilise these 'thicket' habitat provisions.

Fire may be a key management tool in reducing stem thickets. If this is to be applied, mosaics of thickets should be retained within each SFAZ, or at the very least, SFAZ burn schedules be designed to ensure that patch diversity is maintained in adjacent areas during recovery. This is particularly important to maintain bird habitat.

6.0 Conclusion

Information within this report assesses the vegetation structure as it relates to biodiversity values and overall fuel hazard. The report relies on existing ecological information as well as information on stem densities gathered as part of this assessment, and assumes that overarching peer reviewed studies that suggest that biodiversity values are optimised at certain stem densities (e.g. Gibbons *et al.* 2010) and the principles outlined in other research are comprehensive and suitable for consideration in this assessment.

Analysis of stem density data and consideration of benchmark stem densities (Gibbons *et al.* 2010) and the effect of stem densities on understorey vegetation diversity (Jones *et al.* in press) support a reduction in stem densities in the 5-20 centimetre DBH size class. Both of these papers support the need to maintain vegetation structure in a range of size classes in order to optimise biodiversity values. They do not address the issue of an abundance of stems less than 5 centimetres DBH; however while some of these may self-thin over an extended period, others will eventually become part of the 5-20 centimetre DBH cohort.

6.1 Strategic Fire-fighting Advantage Zone Management

In the event of the Project Area being managed as a mosaic of SFAZs, it is likely that this will be done with mosaic burning, silvicultural thinning, or a combination of both. In developing management options, the following should be considered:

Hazard Reduction Burning

1. Controlled hazard reduction burning is likely to be an effectove method of reducing stem densities in lower size classes. With controls in place, stem thickets may be retained in strategic locations to ensure that a mosaic of smaller stems is maintained for structural diversity.

2. Ecological guidelines for hazard reduction burning suggest that biodiversity values will be maintained if lower limit fire intervals are set as follows:

    a. 'Red Stringybark Dry Sclerophyll Forest' - five (NSW Government 2004) to 10 years (ACT Government 2009). Practical implementation of this measure should be done in consultation with ACT Government Conservation Planning and Research officers to determine the most appropriate interval between burns particular to each SFAZ.

    b. 'Box-Gum Woodland': 10 years (ACT Government 2009, NSW Government 2004). This is acceptable within the Project Area as the stem density and fuel loads are not high and, assuming stem densities and regenerating weeds are managed, are likely to be manageable without a greater frequency of burning in the SFAZ areas.

3. The timeframe for hazard reduction burning should be determined with adaptive management principles in mind, enabling the regime to shift as required to maintain biodiversity values while protecting life and assets.

4. Hazard reduction burns should be designed with consideration of broad habitat mosaics, allowing for sufficient recovery of ecological values and availability of a range of heterogeneous habitat structures within the Project Area at any one time.

5. As the focus of hazard reduction burning is to increase opportunities for control of wildlife through reducing fire intensity within a remnant, any burning regime will need

to ensure that reduced fuel loads are maintained in key areas to protect life and urban infrastructure. As such, SFAZs that are likely to either be ignition points (e.g. SFAZ 3) or produce a high intensity fire (e.g. SFAZ 4 and 6) may need to be managed at a greater frequency than others (refer to point 2a above).

6. Mosaic burning may reduce flammable habitat provisions such as woody debris. This should also be considered in designing a patch burn mosaic.
7. In areas of known Pink-tailed Worm Lizard habitat, if hazard reduction burning occurs this should happen between late winter and mid spring (preferable August to September). As mentioned in **Section 2.5.2**, large areas of mapped habitat within dry sclerophyll forest should be verified; this is important if hazard reduction burning is undertaken outside of the August to September period.

Silvicultural Thinning

Silvicultural thinning is generally a feasible operation as fire management staff can be operational in this task outside of peak fire management periods. As such, silvicultural thinning may be a suitable option in reducing stem densities provided thinned stems are removed.

Combined Approach

A combined hazard reduction burn and silvicultural thinning approach may be considered. At the very least, it will provide greater flexibility for adaptive management of habitat values while working towards the goal of reducing the threat of an uncontrolled wildfire on biodiversity, infrastructure and human life.

Areas Requiring Other Treatment

The Project Area contains SFAZs which contain minimal trees (i.e. SFAZs 11, 12, 13 and part of SFAZ 7). Rocky outcrops within these open areas are known to contain Pink-tailed Worm Lizards. These areas may be preferentially managed by grazing or slashing should their fuel loads be deemed of a level where grassfire can rapidly spread.

6.2 Outer Asset Protection Zone

It is proposed to maintain an OAPZ up to 100 metres within the southern boundary of the Project Area, as well as to the south of SFAZs 1, 2 and 3. Along the eastern boundary, much of the area is Box-Gum Woodland, whereas south of SFAZs 1, 2 and 3 they are understood to be primarily cleared exotic pastures with remnant trees (these areas were not assessed as part of this project).

Hazard Reduction Burning

1. In areas of 'Box-Gum Woodland' along the eastern boundary, hazard reduction burning should not take place more than once every ten years.
2. In the event of the grassy fuel load being above the threshold for OAPZ management [(Overall fuel hazard ≤ Moderate and Grassland Fire Hazard ≤ 35 when grassland curing ≥ 70%; Table 21.5 of ACT Government (2014[30])], stock grazing or slashing options should be considered to reduce grassy fuel loads particularly if the lower limit for hazard reduction burns (10 years) has not been reached. However, due to complexities related

[30] ACT Government (2014) *Draft ACT Strategic Bushfire Management Plan 2014 (Version 3).* Emergency Services Agency.

to preparation, infrastructure and impacts, these options should only be considered should hazard reduction burning not meet fuel management objectives. Grazing is preferred to slashing, and may be feasible providing suitable fencing and water infrastructure is installed and access to stock is guaranteed.

Silvicultural Thinning

1. Silvicultural thinning is generally a feasible operation as fire management staff can be operational in this task outside of peak fire management periods. Additionally, it can be undertaken at greater frequencies than hazard reduction burning in sensitive areas such as 'Box-Gum Woodland'.

2. Undertaking silvicultural management will reduce impacts outlined for mosaic burning in sensitive areas; ACT Conservation Planning and Research should advise on the best method of disposal of thinned stems.

6.3 Urban Interface

Along the eastern edge of the Project Area, an urban interface of up to 100 metres has been identified. This area is considered to be a primary fire threat to the proposed Denman Prospect development, and also contains natural assets including 'Box-Gum Woodland' in an advanced regeneration state. In SFAZ 6 and SFAZ 7 this vegetation is likely to regenerate to an open forest structure without management; in SFAZ 10 this is not an issue in its current structure.

In order to protect important values within the 'Box-Gum Woodland' area and to mitigate bushfire risk to the adjacent urban development, it is recommended to use silvicultural thinning to accelerate an open woodland structure as a primary management tool in this area. This treatment is only required for SFAZ 6 and SFAZ 7.

Ongoing management of grassy sward fuel may be required in the event of grassland fire hazard exceeds 35 when grass curing is ≥ 70% (refer to Table 21.5 and Table 21.8 in ACT Government (2014).

6.4 Inner Asset Protection Zone

It is recommended to maintain a 60 metre wide inner asset protection zone (IAPZ) outside of the Project Area, within Denman Prospect.

6.5 Timing

Should hazard reduction burning be required in the Project Area, treatment should commence prior to the establishment and populating of suburbs. This will enable residents to be familiar with the management regime at an early stage.

6.6 Limitations

While this Project demonstrates that there are large areas of dense regeneration and subsequent higher fire risk, the assessment is limited by the following:

- Field assessment is based on two plot samples per SFAZ. Statistically, this is not considered adequate in determining the variation within each SFAZ. However, this is partially alleviated through the plot selection process, whereby plots were selected based on representative values determined as part of meandering survey through each SFAZ.

- SFAZs 3 and 9 contained two vegetation types (‘Red Stringybark’ and ‘Box-Gum Woodland’ alliances, with one plot surveyed within each (the project scope included survey of two plots per SFAZ). For these zones, stem densities were analysed against benchmarks in Gibbons *et al.* (2010) for the ‘Red Stringybark’ alliance. While a lower stem density is permissible in the ‘Box-Gum’ alliance, examples of this alliance within SFAZs 3 and 9 were ecotonal, with understorey characteristics akin to the ‘Red Stringybark’ alliance. Further, treating these areas as part of the ‘Red Stringybark’ alliance allows for the retention of a greater number of stems.

- The ‘Overall Fuel Hazard Assessment’ focuses fuel arrangement. While this is more valid than fuel loads, it does not consider the effects of the following:

  - Topographic effects of fire behaviour;
  - The flammability of vegetation within the elevated fine-fuel, near-surface and surface layers. It is noted that the sclerophyllous shrubs and tussock grasses within the Project Area are relatively flammable;
  - The relationship between a site location and prevailing areas of fire run (i.e. if a site is located in a prevailing direction and adjacent to an area of high threat.

While the ‘Overall Fuel Hazard Assessment’ guides land managers in determining if or when fuel hazard reduction is required, it does not consider the above factors.

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APPENDIX 1

Box-Gum Woodland Values
within the Project Area

Within SFAZ 9 and 10, areas of 'White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland' critically endangered ecological community (Box-Gum Woodland) as listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are present. The location of these remnants is shown in **Figure A1.1**.

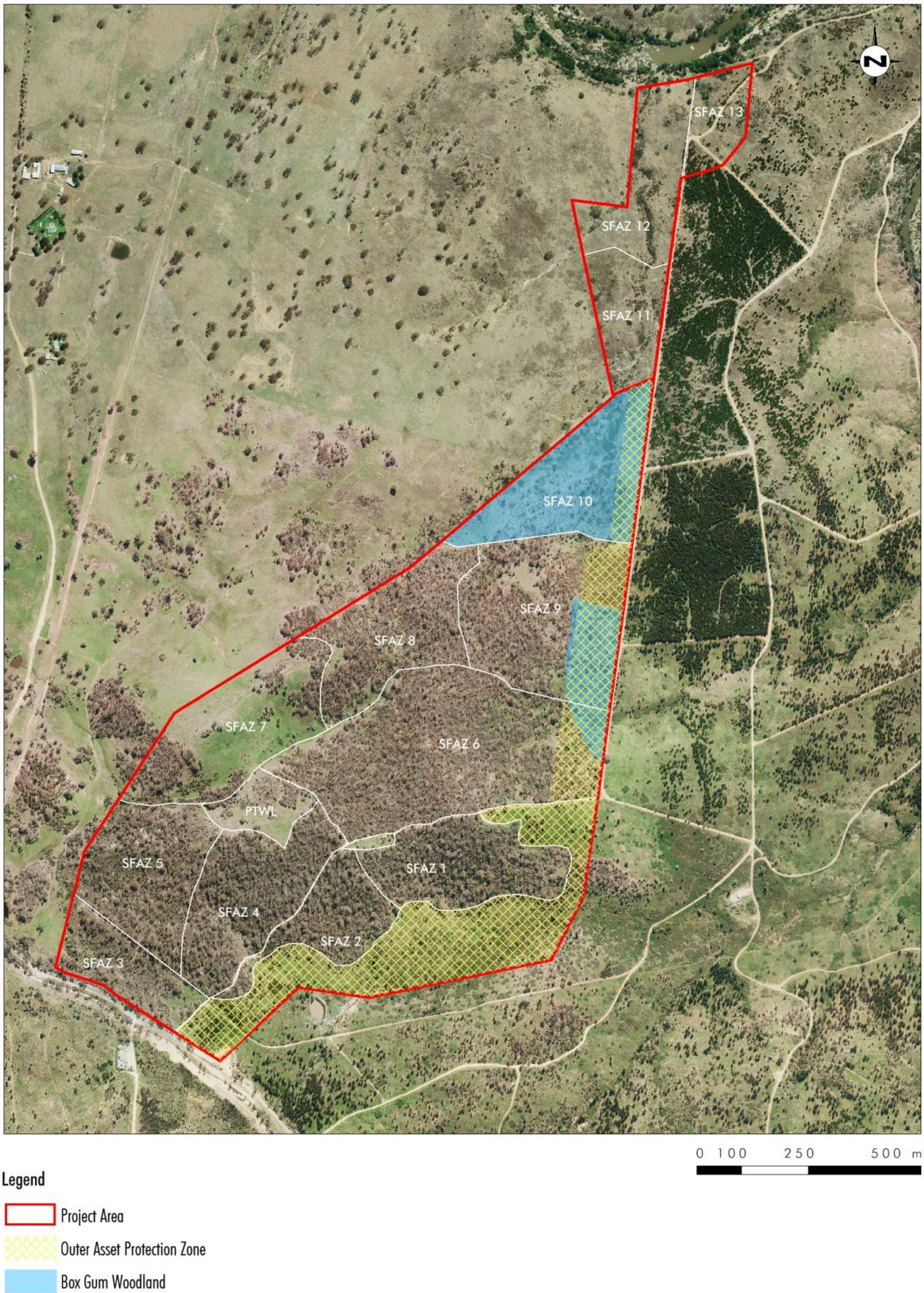


Figure A1.1 – Distribution of Box-Gum Woodland within the Project Area

Box-Gum Woodland within SFAZ 9

SFAZ 9 contains approximately 3.1 hectares of box-gum woodland. It satisfied EPBC Act listing advice criteria as it contains:

- At least one of the most common overstorey species is (or was) white box (*Eucalyptus albens*), yellow box (*E. melliodora*) or Blakely's red gum (*E. blakelyi*) (n = 1);
- A predominantly native groundcover;
- Less than 30% shrub cover;
- An area greater than 0.1 hectares in size;
- 12 or more non-grass native understorey species (n = 12); and
- One or more important species (n = 2).

This community is shown in **Figure A1.2**. Further information on floristics and condition of the patch is shown in **Table A1.1**.

Figure A1.2 – Box-Gum Woodland, SFAZ 9

Table A1.1 – 'SFAZ 9 Box-Gum Woodland Floristics and Condition

Canopy	Blakely's red gum (*E. blakelyi*). Woodland cover of approximately 20%, with some open areas. Red stringybark (*E. macrorhyncha*) is present in lower abundance, indicative of this area being ecotonal with red stringybark open forest up slope.
Midstorey	Patches of regenerating Blakely's red gum, long with patches of exotic blackberry (*Rubus fruticosus* agg.).
Goundlayer	Native grassy understorey dominated by *Aristida ramosa*, *Rytidosperma* spp. and *Microlaena stipoides* var. *stipoides*, with some annual exotic species present.
Non-grass Native Understorey Species	*Acaena ovina, Cheilanthes* spp.*, Chrysocephalum apiculatum, Geranium solanderi* var. *solanderi, Glycine tabacina, Gonocarpus tetragynus. Lomandra filiformis, Oxalis perennans, Rumex brownii, Xerochrysum viscosum, Wahlenbergia communis* and *W. luteola.*
Important Species	*Chrysocephalum apiculatum* and *Glycine tabacina.*

Box-Gum Woodland within SFAZ 10

SFAZ 10 contains 8.29 hectares of box-gum woodland. It satisfied EPBC Act listing advice criteria as it contains:

- At least one of the most common overstorey species is (or was) white box (*Eucalyptus albens*), yellow box (*E. melliodora*) or Blakely's red gum (*E. blakelyi*) (n = 1);
- A predominantly native groundcover;
- Less than 30% shrub cover;
- An area greater than 0.1 hectares in size;
- 12 or more non-grass native understorey species (n = 17); and
- One or more important species (n = 3).

This community is shown in **Figure A1.3**. Further information on floristics and condition of the patch is shown in **Table A1.2**.

Table A1.2 – 'SFAZ 10 Box-Gum Woodland Floristics and Condition

Canopy	Blakely's red gum (*E. blakelyi*). Woodland cover varies from approximately 20% to less than 5%.
Midstorey	Patches of regenerating Blakely's red gum, long with patches of exotic blackberry (*Rubus fruticosus* agg.).
Goundlayer	Native grassy understorey dominated by *Themeda triandra* and *Rytidosperma* spp., with and the annual exotic *Bromus hordeaceus*.
Non-grass Native Understorey Species	*Acaena ovina, Carex appressa, Carex inversa, Cheilanthes* spp.*, Convolvulus angustissimus* subsp*. angustissimus, Chrysocephalum apiculatum, Dichondra repens, Geranium solanderi* var. *solanderi, Glycine tabacina, Haloragis heterophylla, Hydrocotyle laxiflora, Juncus filicaulis, Lomandra filiformis, Oxalis perennans, Rumex brownii, Schoenus apogon* and *Tricoryne elatior.*
Important Species	*Chrysocephalum apiculatum, Glycine tabacina* and *Tricoryne elatior.*

Figure A1.3 – Box-Gum Woodland, SFAZ 10

ACT Government

Territory and Municipal Services

MAY 2013

MOLONGLO ADAPTIVE MANAGEMENT STRATEGY

Contents

Glossary of Terms

Baseline ecological condition: The condition of an MNES that exists at the time the baseline condition assessment is carried out and the results recorded. Baseline conditions are not necessarily pristine or optimal conditions.

Enhance: Raise the ecological condition of a particular MNES to a level which exceeds the established baseline condition.

EPBC Act: Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999*. (EPBC Act)

Maintain: Preserve the ecological condition of a particular MNES at the same level as determined by the baseline condition assessment.

MNES: Matters of National Environmental Significance under the EPBC Act.

Operational plans: the day-to-day management planning tool that will provide detail about on-ground works and activities that will implement the key components of the AMS. The operational plans, together with the Ecological Management Guidelines (nghenvironmental et al in prep) will be the primary mechanism for providing for adaptive management approaches based on the results of monitoring, evaluation and review.

Statutory plan of management: management plan required for certain land zones in the ACT under the *Planning and Development Act 2007*.

Strategic Assessment Area: the area of the Molonglo Valley subject to the EPBC Act strategic assessment (see Figure 1).

1. Introduction

The *Molonglo Valley Plan for the Protection of Matters of National Environmental Significance* (NES Plan) (ACTPLA 2011) establishes the Australian Capital Territory (ACT) Government's commitments regarding urban development and broadacre land use in East and West Molonglo (see Figure 1), including commitments to protect matters of national environmental significance (MNES).

The *Molonglo Adaptive Management Strategy* (AMS) is a key commitment arising out of the NES Plan. It forms the foundation on which the MNES values in the Molonglo area are protected and enhanced through ongoing improvement in management practices.

1.1 Molonglo Valley Strategic Assessment and the NES Plan

In September 2008, the ACT and Commonwealth Governments commenced a strategic assessment under Section 146 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Strategic assessments under the EPBC Act encourage a bigger picture approach to assess how MNES can best be protected while allowing sustainable development. This is achieved through addressing a number of individual actions or a class of actions (by several proponents) on a regional scale that would otherwise be assessed on a project-by-project basis.

The nature and scale of the proposed urban development and the significance of the MNES in the Molonglo Valley resulted in both the Commonwealth and Territory governments agreeing that optimal environmental results would be achieved through a strategic approach to land use and environmental planning in the area.

The NES Plan (which details the ACT Government's commitments to protect MNES in the Molonglo Valley) was strategically assessed by the Commonwealth and endorsed in October 2011. Actions associated with urban development within East Molonglo were then approved in December 2011.

The NES Plan commits the ACT Government to certain scheduling requirements. Commitments must either commence or be completed within a specified period of time from the strategic assessment endorsement date of 7 October 2011.

1.2 Purpose of the AMS

The AMS adopts a set of measures that are designed to achieve the conservation outcomes and performance targets for MNES in the Molonglo strategic assessment area. It achieves this by setting out the way in which the MNES values of the area will be assessed, monitored, and adaptively managed.

The AMS gives practical effect to the recognition that MNES exist in an area subject to the increasing and ongoing pressures of urban development. These pressures are not always known and their effects may be uncertain.

The AMS deals with these anthropogenic uncertainties as well as natural uncertainties (such as climate variability) by prescribing monitoring and assessment processes which iteratively update the state of knowledge and the subsequent direction of management. It provides a plan for:

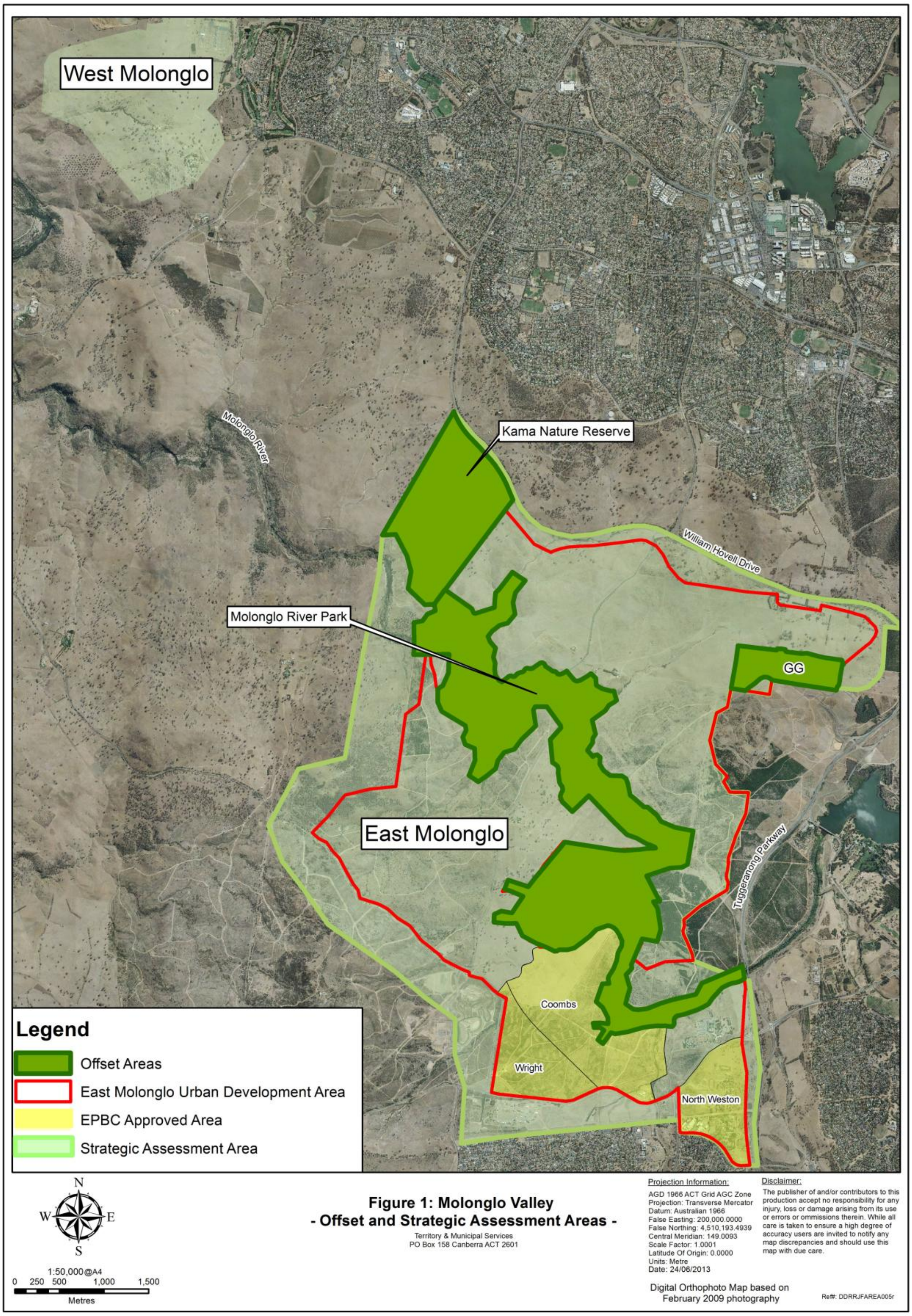
- establishing the current ecological condition and value of MNES within the Molonglo strategic assessment area;
- identifying performance targets and objectives;
- monitoring and evaluation of management actions;
- revising actions as required; and
- ensuring that the NES Plan's objectives for MNES continue to be met.

The AMS also identifies the key threats to MNES conservation as well as uncertainties in relation to management and the achievement of performance targets and objectives. The AMS establishes measures to deal with these threats and uncertainties.

1.3 Scope of the AMS

The AMS applies to MNES values within the managed lands of the Molonglo strategic assessment area (shown in Figure 1). The strategic assessment area is located between Black Mountain and Mount Stromlo. It is centrally located between the ACT town centres of Belconnen, Woden and Canberra City.

Figure 1: Molonglo Valley Offset and Strategic Assessment Areas



NB: Following the endorsement of the NES Plan by the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities on 7 October 2011, an error in the extent of the EPBC pre-approved Area relating to North Weston was found. The NES Plan indicates that all of North Weston received prior EPBC approval. This is incorrect, only North Weston south of the Cotter Road received prior EPBC approval. The Holdens Creek valley at Coombs was removed from the River Park offset area on 16 April 2010, through the reconsideration decision of EPBC 2009/5050. Accordingly, Figure 1 (of the AMS) has been updated to reflect the correct EPBC pre-approved area.

1.4 Key MNES in the Molonglo Strategic Assessment Area

The NES Plan identifies the following key MNES within the Molonglo strategic assessment area:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland).
- Natural Temperate Grassland of the Southern Tablelands of NSW and the ACT (Natural Temperate Grassland).
- Pink-tailed Worm-lizard (*Aprasia parapulchella*).
- Superb Parrot (Polytelis swainsonii).
- Swift Parrot (Lathamus discolor).

These key MNES are the focus of the conservation outcomes of the NES Plan. However, it should be noted that other MNES are present in the strategic assessment area and will benefit from ongoing management of conservation areas. For example, the Rainbow Bee-Eater (*Merops ornatus*) is known to occur within the river corridor.

Figure 2 and Figure 3 provides an overview of the areas of Box-Gum Woodland, Natural Temperate Grassland and Pink-tailed Worm-lizard habitat that will be protected within the strategic assessment area. It should be noted that the extent and condition presented in Figure 2 and Figure 3 were obtained recently through the baseline ecological condition of MNES established in accordance with the approved AMS (see Section 2) and therefore do not reflect precisely the mapping in the NES Plan. Potential Superb and Swift Parrot habitat is predominately associated with the Box-Gum Woodland and is not mapped separately.

The NES Plan also identifies the conservation outcomes for the key MNES (see Table 1) and prescribes a set of commitments or actions to achieve the outcomes. The AMS aims to ensure the conservation outcomes are delivered by providing a consistent framework for adaptive management across the strategic assessment area.

Table 1: Conservation Outcomes for MNES (taken from NES Plan)

MNES	Conservation outcomes
Box-Gum Woodland **NES Plan p.20**	a) Impacts to Box-Gum Woodland will be limited to a maximum of 110 ha and a range of measures will be implemented to minimise these impacts. b) Three offset sites will be established within the strategic assessment area (Kama Nature Reserve, Molonglo River Park, Patch GG) that will provide for the long term protection of 234 ha of Box-Gum Woodland. The three offset sites will be adaptively managed to maintain and enhance the ecological condition***** of the Box-Gum Woodland that occurs there. c) Adaptively manage 28 ha of Box-Gum Woodland within the strategic assessment area to maintain and enhance its ecological condition*. This will be made up of patches C, H and N. d) Adaptively manage 45.4 ha of Box-Gum Woodland within the strategic assessment area to maintain its ecological condition*. This will be made up of patches I, L, M and P e) Maintenance and enhancement of the Box-Gum Woodland that occurs within the West Molonglo component of the strategic assessment area. f) Improving and applying the knowledge about the management of Box-Gum Woodland.
Natural Temperate Grassland **NES Plan p.27**	a) No impacts to Natural Temperate Grassland. b) Adaptive management of the Natural Temperate Grassland that occurs within the Kama Nature Reserve to maintain and enhance its ecological condition*****.
Pink-tailed Worm-lizard **NES Plan p.29**	a) Impacts to high and moderate quality Pink-tailed Worm-lizard habitat will be limited to a maximum of 27 ha and a range of measures will be implemented to minimise these impacts. b) Two offset sites will be established within the strategic assessment area (Kama Nature Reserve and the Molonglo River Park) that will provide for the long term protection of 66 ha of high and moderate quality Pink-tailed Worm-lizard habitat. These areas will be adaptively managed to maintain and enhance the ecological condition* of the Pink-tailed Worm-lizard habitat that occurs there. c) Continued protection of 28.1 ha of high and moderate quality Pink-tailed Worm-lizard habitat within the Lower Molonglo Nature Reserve. These areas will be adaptively managed to maintain the ecological condition* of the Pink-tailed Worm-lizard habitat that occurs there. d) Protection of an additional 23.3 ha of high and moderate quality Pink-tailed Worm-lizard habitat within the strategic assessment area outside of the development and offset areas. These areas will be adaptively managed to maintain and enhance the ecological condition* of the Pink-tailed Worm-lizard habitat that occurs there e) Improving and applying the knowledge about the management of Pink-tailed Worm-lizard.
Superb and Swift Parrot **NES Plan p.34**	Given the clear link between Box-Gum Woodland areas and habitat values for these two species, the conservation outcomes and actions for Box-Gum Woodland will also provide positive outcomes for the Superb and Swift Parrots.

* The NES Plan specifies requirements for the measurement of ‘ecological condition’. The methodology for the ongoing measurement of ecological condition is provided in Section 7 of the AMS.

Figure 2: Protected Areas Box-Gum Woodland and Natural Temperate Grassland

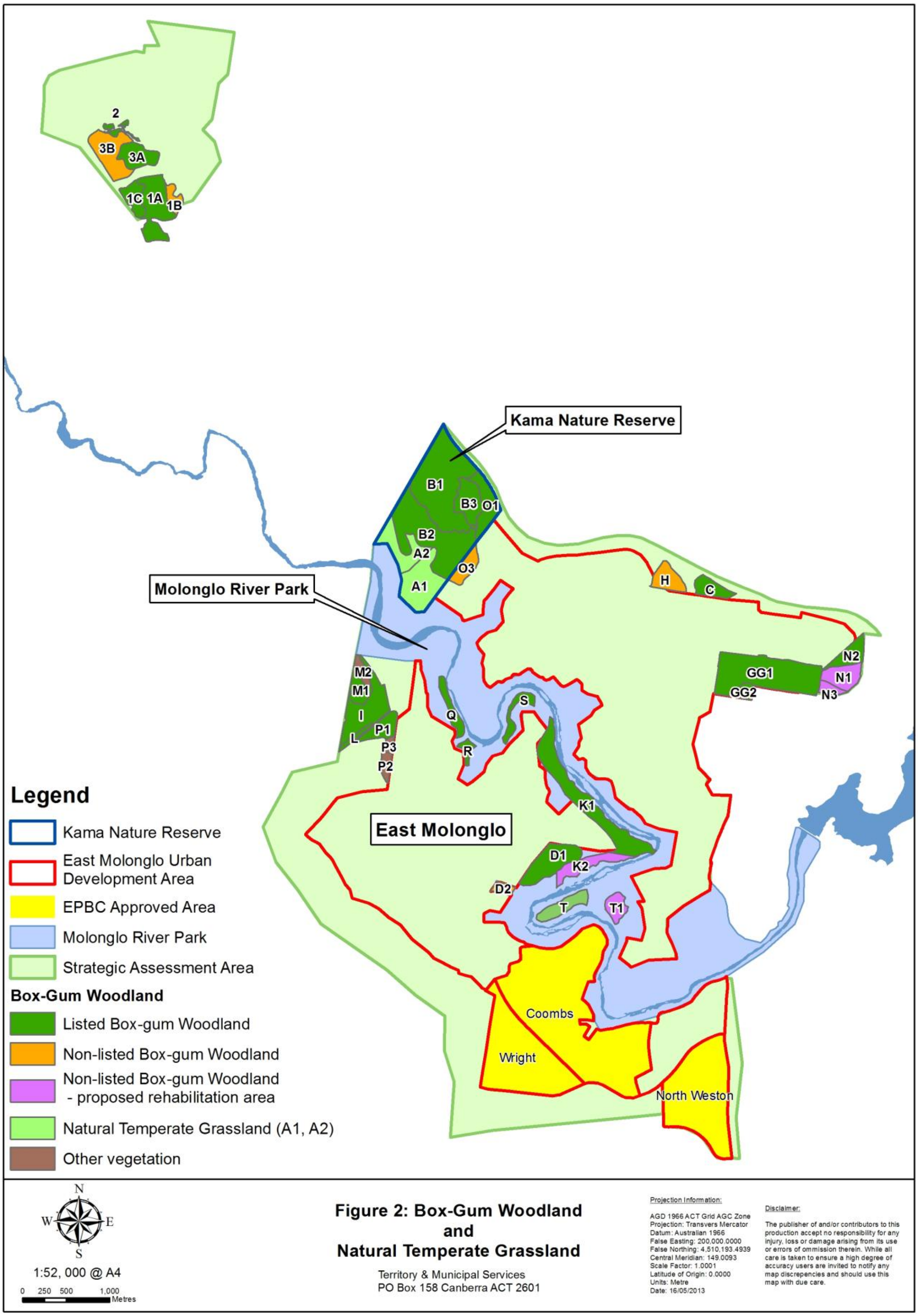
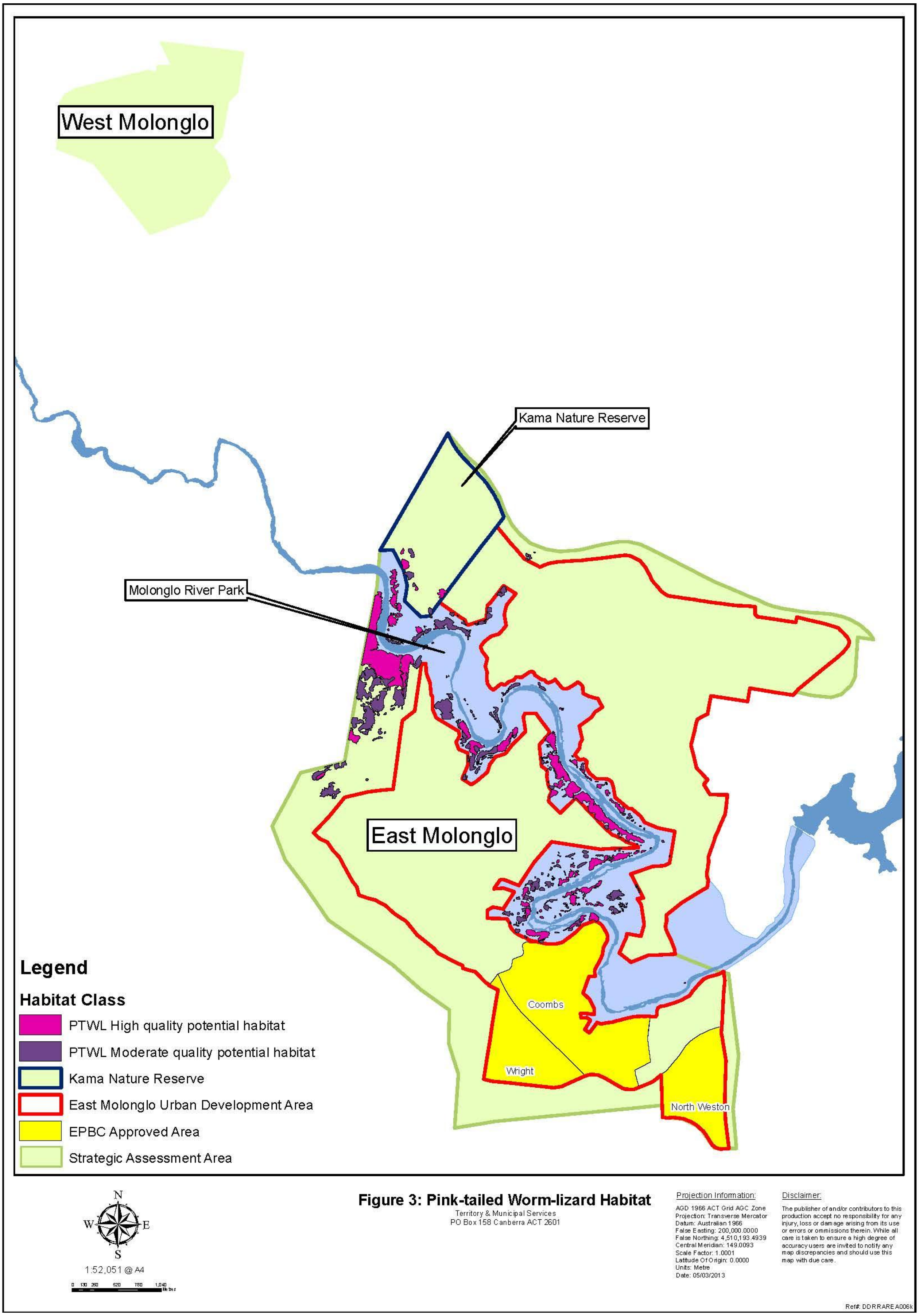
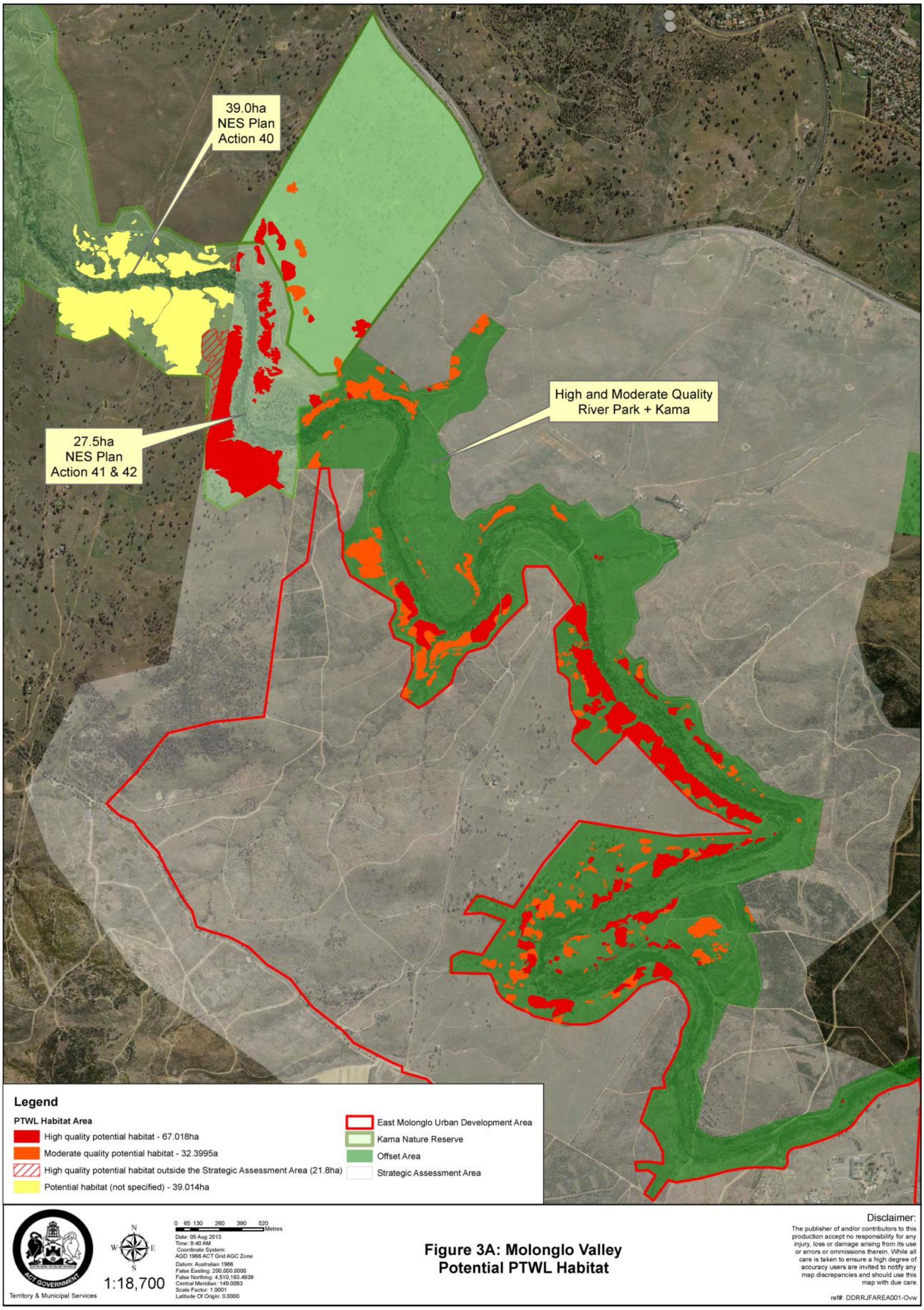


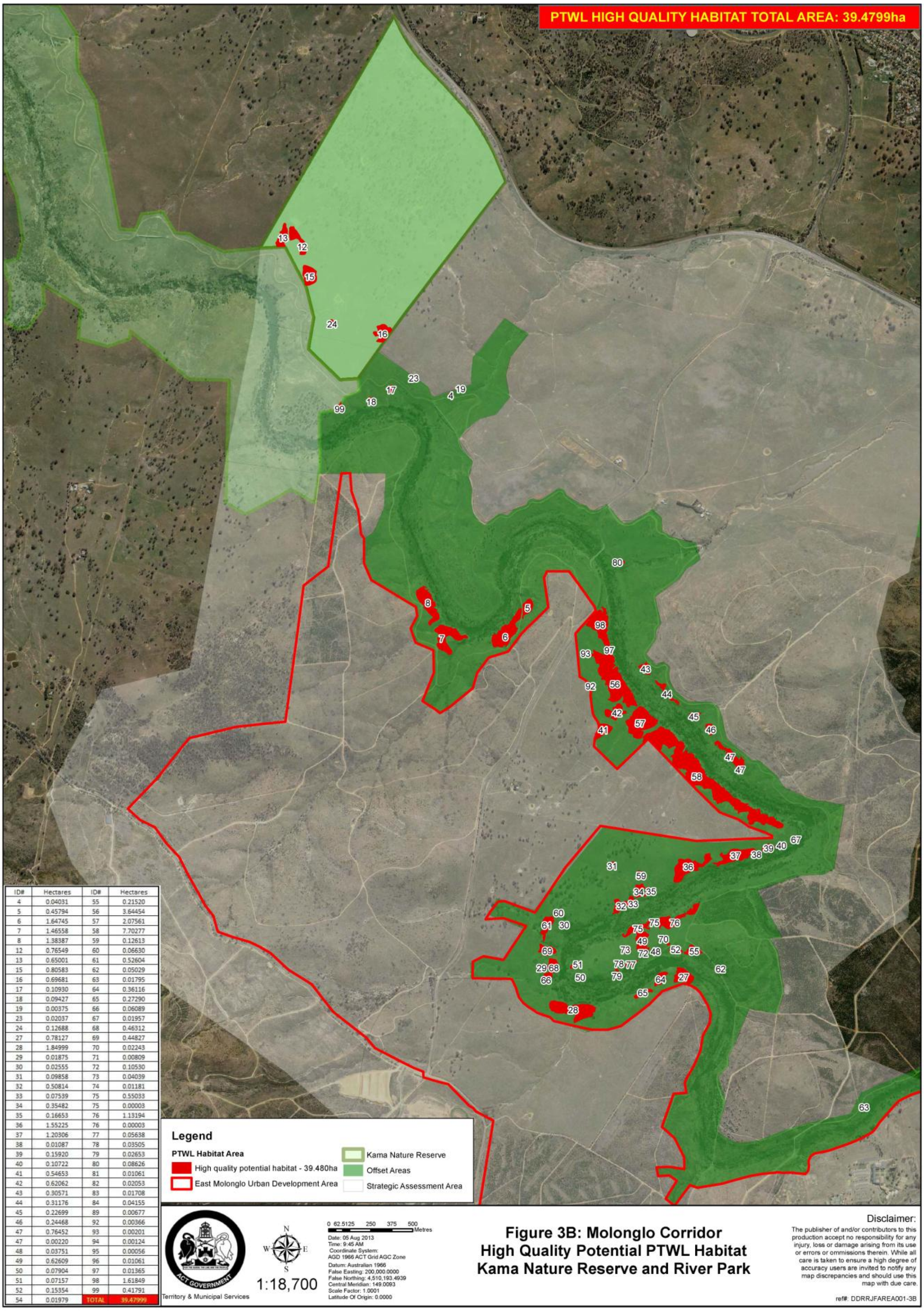
Figure 3: Protected Areas Pink-tailed Worm-lizard habitat



Molonglo Valley Potential Pink-tailed Worm-lizard Habitat



Molonglo Corridor High Quality Potential Pink-tailed Worm-lizard Habitat



ID#	Hectares	ID#	Hectares
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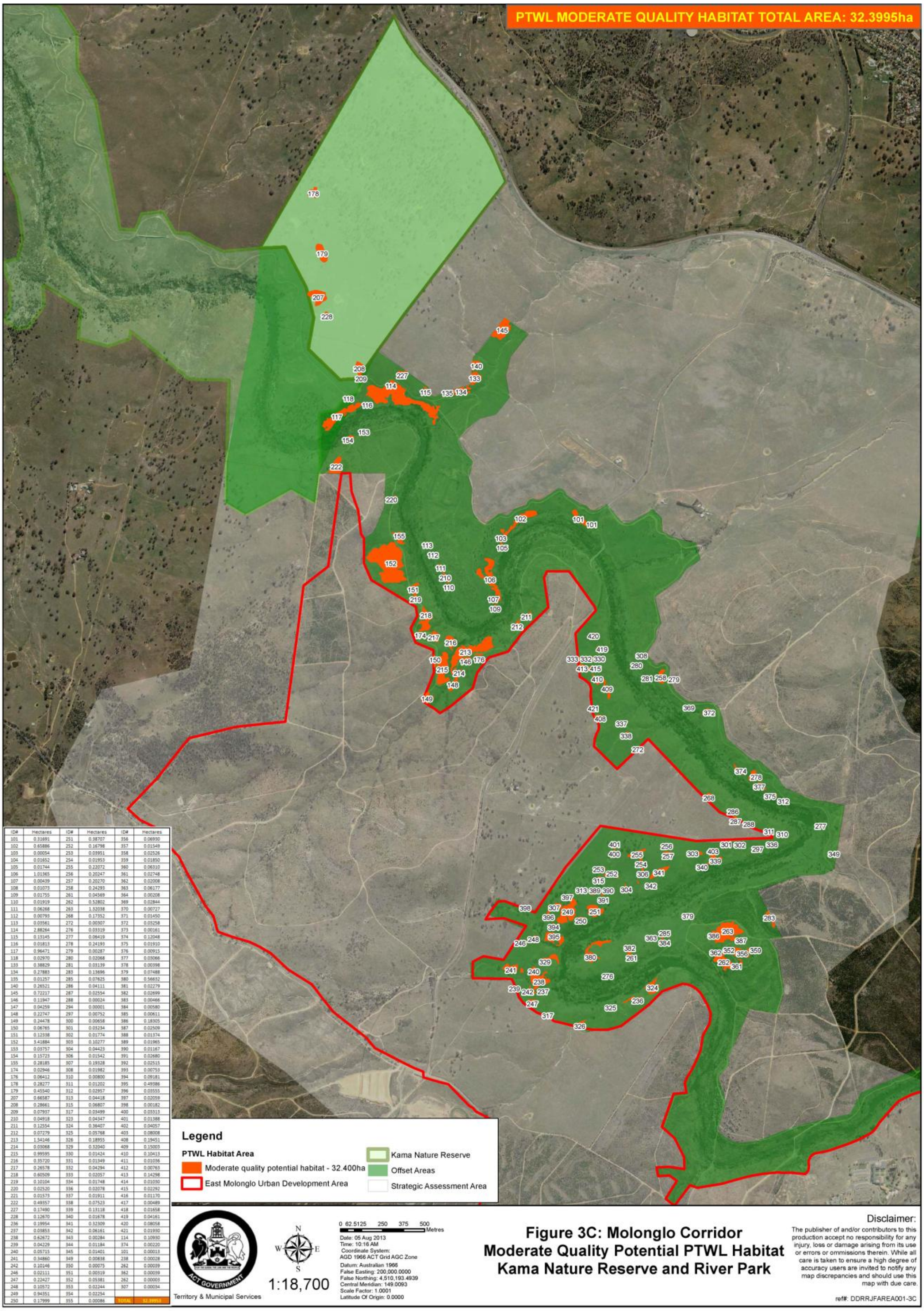
5	0.45794	56	3.64454
6	1.64745	57	2.07561
7	1.46558	58	7.70277
8	1.38387	59	0.12613
12	0.76549	60	0.06630
13	0.65001	61	0.52604
15	0.80583	62	0.05029
16	0.69681	63	0.01795
17	0.10930	64	0.36116
18	0.09427	65	0.27290
19	0.00375	66	0.06089
23	0.02037	67	0.01957
24	0.12688	68	0.46312
27	0.78127	69	0.44827
28	1.84999	70	0.02243
29	0.01875	71	0.00809
30	0.02555	72	0.10530
31	0.09858	73	0.04039
32	0.50814	74	0.01181
33	0.07539	75	0.55033
34	0.35482	75	0.00003
35	0.16653	76	1.13194
36	1.55225	76	0.00003
37	1.20306	77	0.05638
38	0.01087	78	0.03505
39	0.15920	79	0.02653
40	0.10722	80	0.08626
41	0.54653	81	0.01061
42	0.62062	82	0.02053
43	0.30571	83	0.01708
44	0.31176	84	0.04155
45	0.22699	89	0.00677
46	0.24468	92	0.00366
47	0.76452	93	0.00201
47	0.00220	94	0.00124
48	0.03751	95	0.00056
49	0.62609	96	0.01061
50	0.07904	97	0.01365
51	0.07157	98	1.61849
52	0.15354	99	0.41791
54	0.01979	TOTAL	39.47999

Molonglo Corridor Moderate Quality Potential Pink-tailed Worm-lizard Habitat



ID#	Hectares	ID#	Hectares	ID#	Hectares
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102	0.65886	252	0.16798	357	0.01549
103	0.00054	253	0.03951	358	0.02526
104	0.01652	254	0.01953	359	0.01850
105	0.01744	255	0.22072	360	0.06310
106	1.01365	256	0.20247	361	0.02748
107	0.00439	257	0.20270	362	0.02008
108	0.01073	258	0.24293	363	0.06177
109	0.01755	261	0.04569	364	0.00208
110	0.01919	262	0.52802	369	0.02844
111	0.06268	263	1.32038	370	0.00727
112	0.00793	268	0.17352	371	0.01450
113	0.03561	272	0.00307	372	0.03258
114	2.88264	276	0.03319	373	0.00161
115	0.13145	277	0.06419	374	0.12048
116	0.01813	278	0.24193	375	0.01910
117	0.96471	279	0.00287	376	0.00915
118	0.02970	280	0.02068	377	0.03066
133	0.38829	281	0.03139	378	0.00398
134	0.27883	283	0.13696	379	0.07488
135	0.01257	285	0.07625	380	0.56632
140	0.26521	286	0.04111	381	0.02279
145	0.72217	287	0.02554	382	0.02699
146	0.11947	288	0.00024	383	0.00466
147	0.04259	294	0.00001	384	0.00580
148	0.22747	297	0.00752	385	0.00611
149	0.24478	300	0.00658	386	0.18305
150	0.06765	301	0.03234	387	0.02509
151	0.12338	302	0.01774	388	0.01374
152	3.41884	303	0.10277	389	0.01965
153	0.03757	304	0.04423	390	0.01167
154	0.15723	306	0.01542	391	0.02680
155	0.28185	307	0.19328	392	0.02515
174	0.02946	308	0.01982	393	0.00753
176	0.06412	310	0.00800	394	0.09181
178	0.28277	311	0.01202	395	0.49386
179	0.45540	312	0.02957	396	0.03555
207	0.66587	313	0.04418	397	0.02059
208	0.28661	315	0.06807	398	0.00182
209	0.07937	317	0.03499	400	0.03313
210	0.04918	323	0.04347	401	0.01388
211	0.12554	324	0.36407	402	0.04057
212	0.07279	325	0.05768	403	0.08008
213	1.54146	326	0.18955	408	0.19451
214	0.03068	329	0.32040	409	0.15003
215	0.99595	330	0.01424	410	0.10413
216	0.35720	331	0.01349	411	0.01036
217	0.26578	332	0.04294	412	0.00763
218	0.60509	333	0.02057	413	0.14298
219	0.10104	334	0.01748	414	0.01050
220	0.02520	336	0.02078	415	0.02292
221	0.01573	337	0.01911	416	0.01170
222	0.49357	338	0.07523	417	0.00489
227	0.17490	339	0.13118	418	0.01658
228	0.12670	340	0.01678	419	0.04161
236	0.19954	341	0.32309	420	0.08058
237	0.03853	342	0.06161	421	0.01930
238	0.62672	343	0.00284	114	0.10930
239	0.04229	344	0.01184	374	0.00220
240	0.05715	345	0.01401	101	0.00013
241	0.34860	349	0.00838	238	0.00028
242	0.10146	350	0.00075	262	0.00039
246	0.02111	351	0.00319	362	0.00039
247	0.22427	352	0.05381	262	0.00003
248	0.10572	353	0.02244	307	0.00034
249	0.94351	354	0.02254		
250	0.17999	355	0.00086	TOTAL	32.39953

1.5 What is Adaptive Management?

Adaptive management is a scientific approach that combines research, management and monitoring to effectively manage complex ecosystems in the face of threats and uncertainties. Threats and uncertainties generally take the form of pressures or stressors on MNES. These pressures may be anthropocentric (e.g. barriers to movement or disturbance) or natural (e.g. climate variability or 100 year flood events). Resolving threats and uncertainties is a key feature of the adaptive management process.

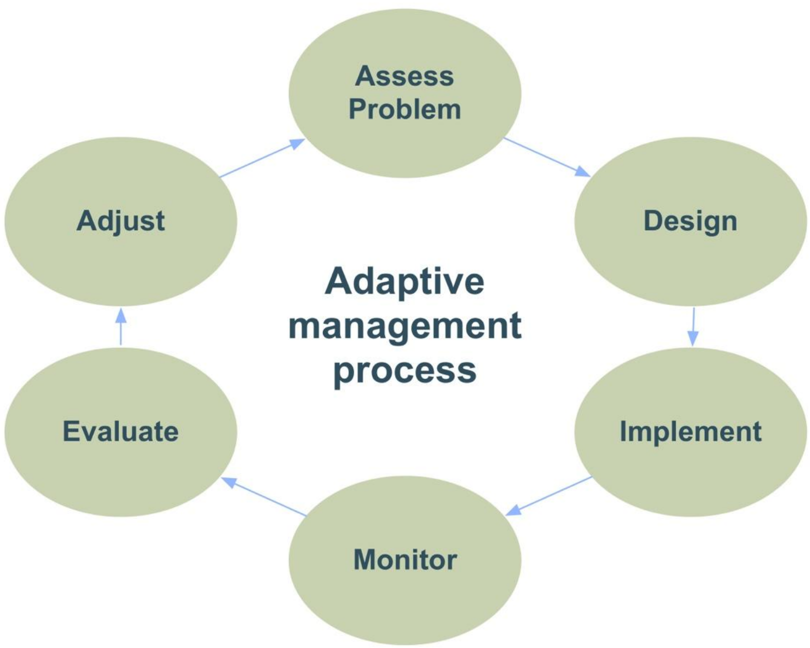
Adaptive management promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood.

In terms of process, adaptive management works through the identification of clear objectives, identifying areas of uncertainty and alternative hypotheses, testing assumptions, monitoring to provide feedback about the system and actions, learning from the system as actions are taken to manage it, and incorporating what is learned into future actions (see Diagram 1).

In summary adaptive management:

- allows resource managers to maintain flexibility in their decisions, knowing that uncertainties exist;
- provides managers the latitude to change direction;
- improves understanding of ecological systems to achieve management objectives; and
- ensures actions are taken to improve progress towards desired outcomes.

Diagram 1: Adaptive Management Process (taken from the NES Plan page 36)



In the case of Molonglo, threats to MNES from stressors such as weeds, pests and recreational impacts will be adaptively managed through a program of monitoring and evaluation, and the review and modification of management decisions. Uncertainties, resulting from lack of scientific certainty, will be addressed through a number of targeted studies. These studies form part of the NES Plan commitments (specifically NES Plan action 43). The data collected from these projects will be evaluated and the results incorporated into management planning for the MNES.

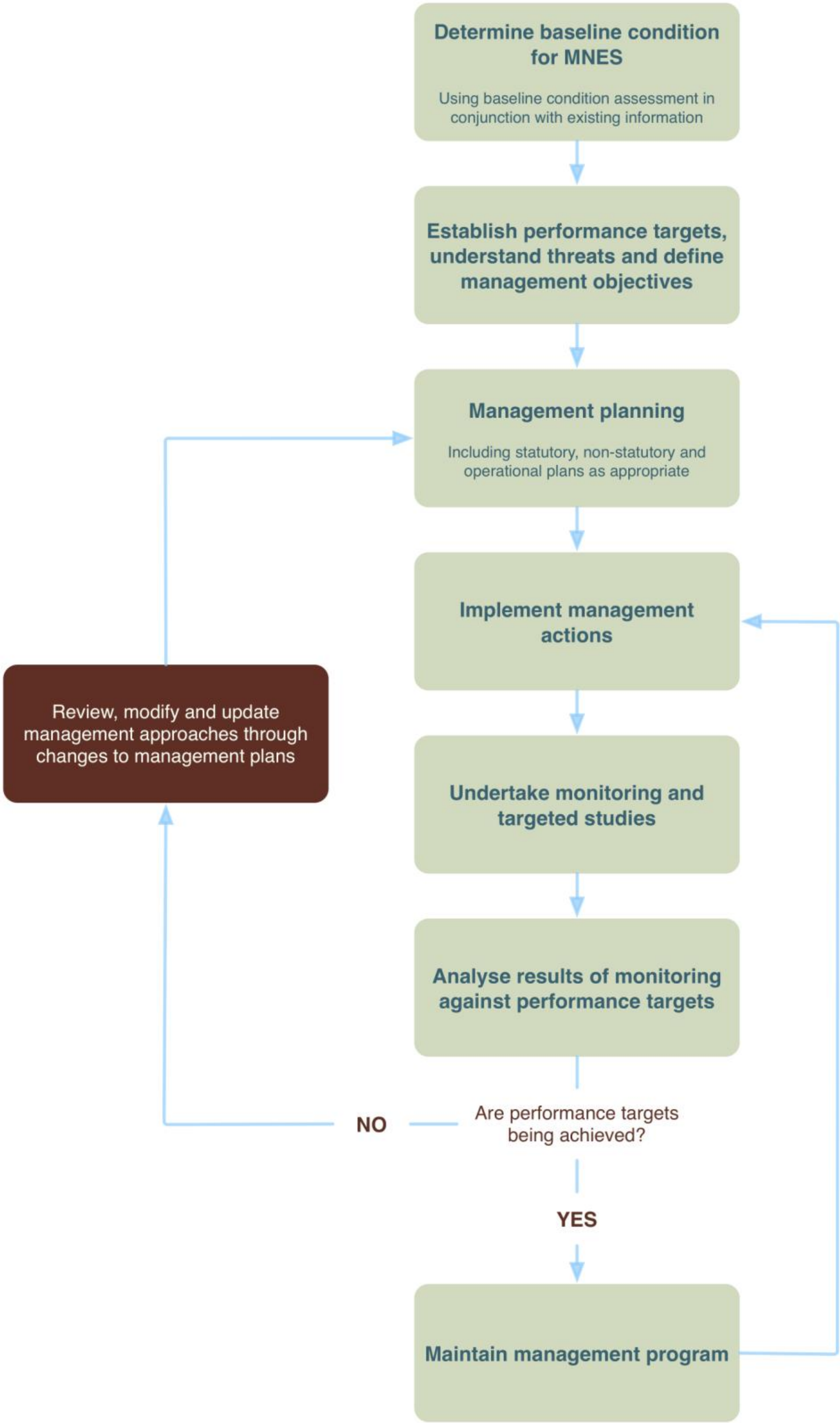
1.6 Framework and Structure of the AMS

The Molonglo AMS has been designed to provide consistent and achievable adaptive management of MNES to help ensure the conservation outcomes of the NES Plan are achieved.

The framework of the AMS is shown in Diagram This is based around a practical application of the adaptive management process (outlined in Section 1.5). The AMS is presented in accordance with this framework as follows:

- Section 2 – Baseline condition assessment.
- Section 3 – Performance targets and milestones for management.
- Section 4 – Threats and management objectives.
- Section 5 – Management planning.
- Section 6 – Uncertainties and targeted studies.
- Section 7 – Monitoring.
- Section 8 – Evaluation and review.
- Section 9 – Reporting.
- Section 10 – Amending the AMS.

Diagram 2: Framework of the AMS



2. Baseline Condition Assessment

Determining the baseline ecological condition of MNES within the strategic assessment area is a critical first step in the establishment of adaptive management within Molonglo. It enables a consistent understanding about the starting conditions for MNES and allows future monitoring to guide management and understand its effects.

While many ecological studies have been conducted throughout Molonglo, they were predominantly undertaken to identify areas containing (or likely to contain) threatened communities and/or species, and were not carried out with the aim of measuring condition within a framework of an ongoing monitoring program. As a result, baseline condition assessment is required within the strategic assessment area to identify the condition of MNES, issues pertaining to management of those areas, and the monitoring that is required to measure change in condition of MNES over time (this is described in detail within Section 7).

The methodology for the baseline condition assessment is established by Sharp 2012 *Procedures Manual - Baseline Condition Assessment in the Lower Molonglo River Valley Conservation Areas* (the 'Procedures Manual'). A summary of this process is provided here and for further detail reference should be made to the Procedures Manual itself.

2.1 Baseline Condition Assessment for Box-Gum Woodland and Natural Temperate Grassland

The baseline condition assessment for Box-Gum Woodland and Natural Temperate Grassland was carried out in early summer of 2012.

2.1.1 Aims

The aims of the baseline condition assessment for Box-Gum Woodland and Natural Temperate Grassland were to (Sharp 2012):

- Collect data to understand the starting conditions for Box-Gum Woodland and Natural Temperate Grassland and provide a benchmark (of condition and diversity) against which changes over time can be compared.
- Identify a strategic conservation goal and desired outcomes for each conservation area.
- Assist in the identification of actions required to manage the conservation areas for conservation (e.g. fencing or revegetation requirements) incorporated into an operational plan for each conservation area.
- Identify what should be monitored to determine if the management being applied has realised the desired outcomes.

It is critical to note that the baseline condition assessment for Box-Gum Woodland and Natural Temperate Grassland helps to establish the on-going monitoring that will be conducted within each patch (see Section 7), and it is not expected that this initial assessment will be exactly the same as the on-going monitoring.

2.1.2 Methodology

The baseline condition assessment involved:

- Identifying the vegetation community that occurs within each patch.
- Identifying the diversity of plant species and vegetation structure present in each patch and conservation area.
- Identifying habitat features that may be supporting particular groups of fauna species.
- Identifying the condition of each conservation area.
- Identifying issues present that require management intervention (e.g. rabbit disturbance, dumping, erosion and invasive weeds) in each remnant and patch to guide the development and implementation of operational plans.

As part of identifying the condition of the vegetation, a quantitative score will be applied to each patch (out of 100 where benchmark = 100) using the methodology of Gibbons et al 2009 (as adapted for the ACT). This quantitative method provides one means of comparing vegetation condition over the life of the NES Plan (ACTPLA 2011). Other quantitative measurements have also been made that allow for comparison of vegetation and habitat quality within sites over time and between sites at one or more times. These include changes in abundance and distribution of populations of threatened species and invasive weeds and modification to other habitat features (including creation of unauthorised tracks) (see Section 7 for more information).

2.1.3 Application

The baseline condition assessment for Box-Gum Woodland and Natural Temperate Grassland was applied to the areas shown in Figure 2 and which are described below.

Kama Nature Reserve

Comprising 154.6 ha and incorporating patches:

- Patch A1 (Natural Temperate Grassland) – 22.1ha
- Patch A2 (NTG) – 14.5ha
- Patch B1 (Box-Gum Woodland). – 51.2ha
- Patch B2 (BGW). – 42.7ha
- Patch B3(BGW). – 12.1ha
- Patch O1 (BGW) – 12.0ha

An assessment was undertaken of the buffer zone (Patches O2, O3 & O4) located to the east of the reserve which is not representative of a Threatened Ecological Community.

Arboretum Patch GG and Patch N

- Patch GG1 (BGW) – 43.9ha
- Patch GG2 (BGW) – 3.7ha

- Patch N1 (BGW) – 10.2ha (for rehabilitation)
- Patch N2 (BGW) – 7.8ha
- Patch N3 (BGW) – 3.1ha (for rehabilitation)

Patch N is contiguous with Patch GG.

Patches C and H

- Patch C (BGW) – 6.9ha
- Patch H (BGW) – 8.6ha (not representative of a Threatened Ecological Community)

Patches I, L, M and P

- Patch I (BGW) – 20.7ha
- Patch L (BGW) – 2.2ha
- Patch M1 (BGW) – 6.7ha
- Patch M2 (BGW) – 3.1ha (not representative of a Threatened Ecological Community)
- Patch P1 (BGW) – 7.8ha
- Patch P2 (BGW) – 1.7ha (not representative of a Threatened Ecological Community)
- Patch P3 (BGW) – 3.2ha (not representative of a Threatened Ecological Community)

Patches Q, R, S, T, K and D (Molonglo River Park)

Comprising 71 ha of Box-Gum Woodland these six patches occur within a matrix of other woodland, shrubland and grassland within the Molonglo River Park

- Patch Q(BGW) – 6.0ha
- Patch R(BGW) – 2.5ha
- Patch S (BGW) – 5.6ha
- Patch T (BGW) – 6.4ha
- Patch T1 (BGW) – 4.5ha (for rehabilitation)
- Patch K1(BGW) – 33.2ha
- Patch K2 (BGW) – 10.2ha (for rehabilitation)
- Patch D1 (BGW) – 17.2ha
- Patch D2 (BGW) – 2.3ha (not representative of a Threatened Ecological Community)

Patches West Molonglo

Comprising 38.8ha of Box-Gum Woodland within West Molonglo within Patches 1, 2&3.

2.2 Baseline Condition Assessment for Pink-tailed Worm-lizard

Baseline condition of Pink-tailed Worm-lizard habitat in the strategic assessment area has been assessed through previous surveys and mapping as part of the EPBC Act strategic assessment process. Figure 3 and 3A-C show the results of these studies for the areas to be conserved within the strategic assessment area.

The baseline condition of Pink-tailed Worm-lizard habitat within the strategic assessment area has been based on qualitative descriptions of habitat condition (Osborne and Wong 2010 and updated from Wong et al 2011) under the following categories:

- high quality (least disturbed - predicted to be occupied by the species);
- moderate quality (intermediate disturbance - predicted to be occupied by the species, abundance may be lower); or
- low quality (most disturbed - likely to no longer support the species).

The monitoring methods for Pink-tailed Worm-lizard habitat are described in detail in Section 7.

2.3 Baseline Condition Assessment for Superb Parrot and Swift Parrot

A targeted Survey will be undertaken in 2013 to establish the baseline condition of Superb Parrots within the strategic assessment area based on distribution, abundance and breeding status. Monitoring will be carried out subsequently. The surveys will be consistent with Superb Parrot surveys commissioned by the Conservation, Planning and Research unit within the ACT Government within the central Molonglo Valley and Throsby.

In addition, a Survey will be undertaken to establish the baseline condition of Woodland birds in the strategic assessment area. Monitoring will be carried out subsequently and at appropriate intervals. The Woodland bird survey will pick up any changes in the significance of the area to the Swift Parrot.

3. Performance Targets and Milestones for Management

The NES Plan establishes the conservation outcomes for MNES in the Molonglo area (see Table 1 in Section 1.4). These take the form of both:

- ecological outcomes for MNES which include outcomes such as protecting MNES values within the strategic assessment area, enhancing the ecological value of certain areas of Box-Gum Woodland, undertaking targeted studies into the Pink-tailed Worm-lizard and a restoration project for Box-Gum Woodland; and
- administrative actions to achieve these outcomes such as amending the East Molonglo development boundary to reduce the impact of development on Box-Gum Woodland and the development and approval of an AMS.

This section provides:

- performance targets which focus on providing a measurable and quantifiable way to determine if the ecological outcomes for MNES are being achieved; and
- a process for establishing milestones for management.

3.1 Performance Targets for MNES

3.1.1 Performance Targets for Box-Gum Woodland

The performance targets for Box-Gum Woodland are to ensure that:

The Box-Gum Woodland that occurs within the protected areas of the strategic assessment area (see Figure 2) continues to meet the EPBC Act listing criteria for the ecological community (NES Plan Conservation Outcome for Box-Gum Woodland Section 4.1 Outcomes b, c, d & e).

- The ecological condition scores for Box-Gum Woodland in the Kama Nature Reserve, the Molonglo River Park and Patches C, GG1, GG2, N1, N2 AND N3 will be maintained and enhanced (as measured by the ecological condition assessment methodology for Box-Gum Woodland contained in Section 7) (NES Plan Section 4.1 Actions 5, 6, 9, 10, 12, 13, 14 & 15).
- The ecological condition score for Box-Gum Woodland Patches I, L, M1 & P1 will be at least maintained (as measured by the ecological condition assessment methodology for Box-Gum Woodland contained in Section 7) (NES Plan Section 4.1 Actions 16, 17 & 18).
- West Molonglo in accordance with Action 21

3.1.2 Performance Targets for Natural Temperate Grassland

The performance targets for Natural Temperate Grassland within the Kama Nature Reserve (see Figure 2) are to ensure that:

- The Natural Temperate Grassland continues to meet the EPBC Act listing criteria for the ecological community. (NES Plan Section 4.2 Outcome b).

- The ecological condition of Natural Temperate Grassland will be maintained and enhanced (as measured by the ecological condition assessment methodology for Natural Temperate Grassland contained in Section 7) (NES Plan Section 4.2 Actions 25 & 26).

3.1.3 Performance Targets for the Pink-tailed Worm-lizard

The performance targets for the Pink-tailed Worm-lizard are to ensure that:

- The ecological condition of high and moderate quality Pink-tailed Worm-lizard habitat located within the Offset Areas of the strategic assessment area (other than on the Lower Molonglo Nature Reserve) (see Figure 3B and C) will be maintained and enhanced (as measured by the ecological condition assessment methodology for Pink-tailed Worm-lizard habitat contained in Section 7) (NES Plan Section 4.3 Actions 32, 33, 34, 35, 36, 37, 38, 41 & 42).
- The ecological condition of high and moderate quality Pink-tailed Worm-lizard habitat located within the Lower Molonglo Nature Reserve (see Figure 3A) will be maintained (as measured by the ecological condition assessment methodology for Pink-tailed Worm-lizard habitat contained in Section 7) (NES Plan Action 40).
- The Pink-tailed Worm-lizard is protected within the strategic assessment area outside of the development and offset areas (Figure 3A) (Action 41 & 42).

3.1.4 Performance Targets for the Superb and Swift Parrots

The NES Plan states that “given the clear link between Box-Gum Woodland areas containing an overstorey and habitat values for these two species, many of the conservation outcomes and actions for Box-Gum Woodland will also provide positive outcomes for the Superb and Swift Parrots” (NES Plan Section 4.4 p 34). As such, it is anticipated that the achievement of performance targets and the management of Box-Gum Woodland will provide positive outcomes for the Superb and Swift Parrots. This assumption will be tested through monitoring (see Section 7.4).

3.2 Milestones for Management

Within the overarching framework established by the performance targets, a key aim of the AMS for many of the conservation areas is to ensure ‘enhancement’ of ecological condition. This is a process that will provide for continual improvement and in order to achieve that, milestones for ecological condition will need to be set and revised over time.

The process of setting and revising milestones for management (in line with performance targets) will occur as part of the adaptive management cycle. Key elements of this cycle are described in particular in:

- Section 5 – Management planning; and
- Section 8 – Evaluation and review.

4. Threats and Management Objectives

The identification of key threats to the achievement of conservation outcomes and performance targets for MNES is crucial to the AMS. It is the pre-emptive identification of threats and the subsequent account of them into management planning that distinguishes an adaptive management approach from one of trial and error.

It is important to note the distinction between threats and uncertainties. In the context of the Molonglo AMS, threats refer to pressures on MNES which can be managed with a high degree of certainty to ensure that conservation outcomes and performance targets are met. Uncertainties relate to those areas of MNES ecology where current scientific practices and ecological knowledge is more limited. The achievement of conservation outcomes and performance targets does not necessarily result in the management and resolution of uncertainties. Uncertainties and their management through targeted studies are explained in Section 6.

The key threats to achieving the conservation outcomes and performance targets for the MNES are as follows:

- weeds;
- pests;
- fire and fuel suppression;
- impacts from recreation;
- soil and water contamination;
- soil erosion;
- tree planting in Natural Temperate Grassland and tree planting or revegetation projects in Pink-tailed Worm-lizard habitat; and
- increased resource competition from both native and exotic species.

The adaptive management of these issues is addressed through the setting of objectives for each threat and through the monitoring of MNES to ascertain where any changes to management may be required.

4.1 Management Objectives for Weeds

The objectives for weed management in the MNES areas protected under the NES plan are (to the greatest extent possible):

- control the major environmental weeds or reduce them to ecologically benign maintenance levels;
- reduce the incursion and spread of new weeds through coordinated action, hygiene controls, visitor management, surveillance, staff training, community education and rapid response following reports of new weeds and following disturbance events such as earthworks, fire, drought or floods; and

- locate, design and manage infrastructure, facilities and activities to minimise potential weed risks.

These objectives will be attained through implementation of the operational plans (see Section 5) for each area of protected MNES in the strategic assessment area. These operational plans will be guided by the:

- Ecological Management Guidelines for the Molonglo River Corridor (nghenvironmental et al in prep);
- determination of Weeds of National Significance (Thorp & Lynch n.d.);
- list of species declared under section 7 of the *Pest Plants and Animals Act 2005*;
- ACT Weeds Strategy 2009-2019 (DECCEW 2009); and
- performance targets for the MNES contained in this strategy.

ACT Weeds Strategy 2009-2019

Along with a range of other listed statutory and policy tools, the ACT Weeds Strategy 2009-2019 underpins the operational plans (see Section 5). It is based on the following best practice principles:

- Weed management is essential for the sustainable management of natural resources and the environment and for social well-being, and requires an integrated, community-wide approach.
- Prevention and early intervention are the most cost-effective approaches that can be deployed against weeds.
- Successful weed management requires a coordinated approach involving all levels of government in partnership with industry, landholders and community.
- All land managers have a duty of care to manage weeds on their land.
- Community interests shall be protected from weeds by appropriate legislation.

4.2 Management Objectives for Pests

The objectives for pest management in the MNES areas protected under the NES plan are (to the greatest extent possible):

- control major pest animal populations or reduce them to ecologically benign maintenance levels;
- reduce the incursion and spread of new pest animals through coordinated action, fencing, surveillance, staff training, community education and rapid response following reports of new pests; and
- locate, design and manage infrastructure, facilities and activities to minimise potential pest risks.

These objectives will be attained through implementation of the operational plans (see Section 5) for each area of protected MNES in the strategic assessment area. These operational plans will be guided by the:

- Ecological Management Guidelines for the Molonglo River Corridor (nghenvironmental et al in prep);
- ACT Pest Management Strategy 2012–2022 (ESDD 2012);
- ACT Vertebrate Pest Management Strategy (Environment ACT 2002); and
- Pest Animal Control Plan which covers the MNES conservation areas.

The ACT Pest Management Strategy 2012–2022 (ESDD 2012) and the ACT Vertebrate Pest Management Strategy (Environment ACT 2002) underpin the operational plans and provide a framework for managing pest animals across all land tenures in the ACT.

ACT Pest Management Strategy 2012–2022

The ACT Pest Management Strategy 2012–2022 (ESDD 2012) is based on a series of principles, including:

- The need to understand the attitudes and concerns of the key individuals and groups that have a significant interest in the pest animals.
- Prevention and early intervention are the most cost-effective management techniques.
- Management programs should strategically target actual (rather than perceived) pest problems.
- Pest animal damage should be managed using a risk-based, whole-of-system approach.
- Accurate monitoring and evaluation of management programs is required.
- Coordination between government agencies, industry, land and water managers and the community is required.

ACT Vertebrate Pest Management Strategy

The ACT Vertebrate Pest Management Strategy (Environment ACT 2002) is based on the following principles:

- Management of pest animal damage.
- Management of new or potential pests.
- Coordination of vertebrate pest management programs.
- Increasing knowledge, awareness and understanding.
- Monitoring and assessment.

Pest Animal Control planning

Pest animal control planning will be incorporated into the operational plans for the MNES conservation areas and will address the following principles and protocols:

- Pest control planning will consider the need for management action, the feasibility of control and the assessment of an integrated set of control options, including habitat destruction or modification, biological control (disease), fertility control and pesticides.
- Major pest animal occurrences and the extent and significance of impacts of these species will be identified, mapped and monitored. Potentially significant or potential future problems will also be recorded, mapped and monitored (such as hollows colonised by European Bees and European Wasps and aquatic organisms).
- Priority species for control will include species predating on or displacing native fauna, inhibiting the revegetation and regeneration of woodland and grassland ecological communities and riparian areas, representing threatening processes affecting threatened species.
- Control measures will be managed to ensure that they do not significantly impact non-target native fauna, or have undesirable indirect consequences (such as exacerbating other pest animal or plant problems).
- Ongoing management access for pest animal control will be maintained throughout the strategic assessment area, and coordinated with access requirements for weed control and fire protection.

4.3 Management objectives for fire

The objectives for fire management and biomass control in relation to MNES are to ensure ecological condition targets are achieved through:

- balancing the priorities of biodiversity conservation, fire management and urban development;
- maintaining acceptable fire regimes within the MNES protected areas which support the conservation of significant flora and fauna species, vegetation communities and key fauna habitats, the protection of soils and water quality and the protection and enhancement of landscape function. As required under the *Emergencies Act 2004*, meeting the fuel management and other standards as specified in the Strategic Bushfire Management Plan Version Two (ACT Government 2009);
- managing herbaceous groundcover biomass using slashing, grazing, burning or other methods to reduce fire fuel, where this will not negatively impact ecological values by destroying or reducing habitat values, increasing weed invasion, destroying revegetation or preventing natural regeneration. Where it is considered biomass management techniques threaten to negatively impact ecological values, other biomass or urban design features will be developed to meet the standards specified in the Strategic Bushfire Management Plan Version Two (ACT Government 2009); and
- maintaining fuel hazard levels which meet biodiversity conservation as well as human life and property protection objectives.

These objectives will be attained through implementation of the operational plans (see Section 5) for each area of protected MNES in the strategic assessment area. These operational plans will be compatible with the Strategic Bushfire Management Plan Version Two (ACT Government 2009) and the Fire Management Plan for the Molonglo River Park (ACT Government in prep).

Strategic Bushfire Management Plan Version Two

This plan identifies strategies and actions to suppress and reduce the impacts of bushfires while taking into account the management of built, environmental (ecological, hydrological and physical), agricultural and cultural assets.

The Strategic Bushfire Management Plan Version Two (ACT Government 2009) identifies a series of core principles which apply to fire management and the management of MNES within the strategic assessment area. These principles include:

- rapid fire detection and response;
- science-based risk management;
- strategic use of planned fires for fuel reduction;
- the identification of desirable fire regimes to maintain the ecological integrity of ecosystems; and
- that adverse biodiversity impacts may occur if planned fire regimes do not reflect natural processes adequately, noting that in some cases, planned fire regimes may differ from the natural regimes, and may cause changes to natural ecosystems.

Fire Management Plan for the Molonglo River Valley

The Fire Management Plan for the Molonglo River Park will specifically address the conservation of MNES values. The Plan will consider the interplay between Box-Gum Woodland and Natural Temperate Grassland resilience and connectivity and Pink-tailed Worm-lizard habitat requirements with fire protection objectives. It will also consider access trail locations and strategic advantage zones and develop a prioritised program of works.

Fire management activities for the purposes of protecting the urban development east of Kama Nature Reserve will be undertaken outside Kama Nature Reserve. The prescribed eastern buffer zone for Kama Nature Reserve is to ensure that fire management is undertaken outside of the Reserve and will provide protection against urban edge effects.

4.4 Management objectives for recreation

The objective for managing impacts from recreation on the MNES areas protected under the NES plan is:

- the control of public use commensurate with promoting an appreciation of ecologically sensitive areas.

This objective will be attained through implementation of the operational plans (see Section 5) for each area of protected MNES in the strategic assessment area. These operational plans will be guided by the Molonglo River Park Concept Plan (see Section 5). This plan addresses the protection of Pink-tailed Worm-lizard habitat through establishing principles and protocols for recreational use including:

- identification of high use sites such as picnic areas, fishing spots, walking trails and vantage points;
- identification of vehicular and pedestrian river crossing sites;
- identification and management of illicit disturbance such as turning or rolling rocks and rock theft;
- control of pedestrian routes through the strategic placement of walking tracks and barriers; and
- regulation of horse riding, mountain bike riding and unleashed dogs.

The statutory plan of management, described in Section 5.2, will provide the legislative basis for these recreation management objectives.

4.5 Management Objectives for Soil and Water

The objectives for soil and water management in the MNES areas protected under the NES plan are:

- to maintain and enhance the ecological functions and processes;
- to prevent active erosion;
- to stabilise existing active erosion;
- to ensure water run-off into the river corridor is of high quality; and
- to avoid soil compaction, disturbance and increased nutrient levels.

There are several comprehensive references which guide the protection of soils and water in the ACT. These guides are used both during and post construction and development. They include:

- Landcom (2004) Managing Urban Stormwater: Soils and Construction (the 'Blue Book');
- DECC (2008b) Managing Urban Stormwater, Soils and Construction; and
- ACT Think Water (ACT Government 2004), ACT Water Sensitive Urban Design General Code (ACTPLA 2009).

The implementation of these guidelines, both within and around the Molonglo Valley, will promote the protection of soil and water values and dependent flora, fauna and ecosystems.

Water quality and environmental flows in the Molonglo strategic assessment area are regulated by the following statutory instruments:

- Schedule 4 of the *Environment Protection Regulation 2005* which prescribes allowable standards for various water uses; and

- the *Water Resources Act 2007* which requires that water needed to maintain river systems and associated ecosystems is identified and reserved for that purpose. The ACT Environmental Flow Guidelines 2011 (ESDD 2011) give effect to this requirement.

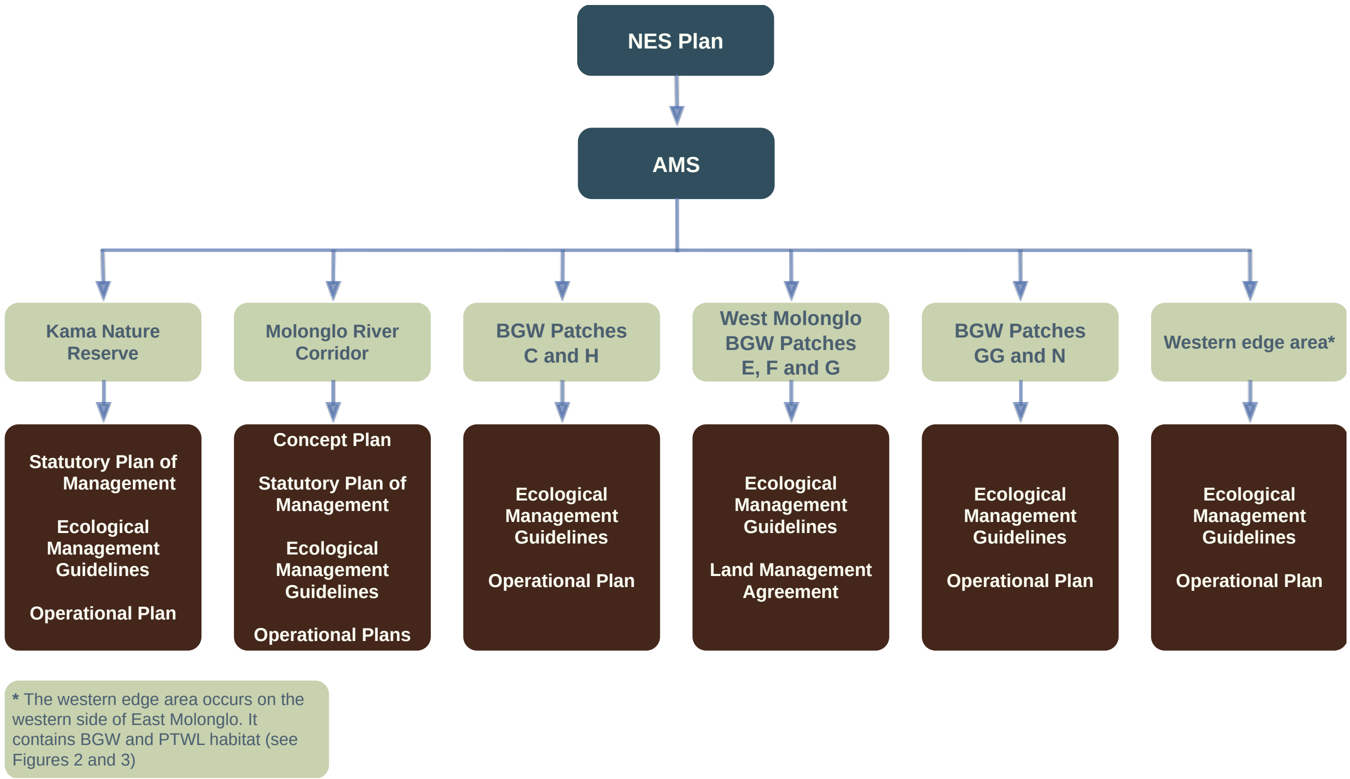
5. Management Planning

The NES Plan sets out the planning regime for protecting MNES in the Molonglo strategic assessment area. In doing so the NES Plan commits the ACT Government to the development of the following suite of plans:

- Molonglo River Park Concept Plan;
- Statutory plans of management for Kama Nature Reserve and the Molonglo River Corridor; and
- Management plans for different areas of MNES (refer to footnote 4 below).

The AMS refines this planning process to ensure the NES Plan's conservation outcomes are met. The planning framework for the AMS is illustrated in Diagram 2 and 3. Importantly, in terms of adaptive management it is the operational plans that are of most significance. These plans have no statutory prescriptions and are hence best placed to respond to the evaluation results and recommendations arising from the monitoring program (Section 7), and it is the operational plans which complete the adaptive management loop (Diagram 2 and 3).

Diagram 3: AMS Management Planning Framework



It is important to note that:

- The NES Plan commits the ACT Government to developing and implementing management plans for:
- Kama Nature Reserve (for Box-Gum Woodland, Natural Temperate Grassland and high and moderate quality Pink-tailed Worm-lizard habitat).

- Molonglo River Park (for Box-Gum Woodland and high and moderate quality Pink-tailed Worm-lizard habitat).
- Box-Gum Woodland patches:
- GG;
- C, H & N; and
- I, L, M & P.
- The high and moderate quality Pink-tailed Worm-lizard habitat that occurs within the strategic assessment area and outside of the development and offset areas.
- The NES Plan provides a set of overarching principles that will inform both the AMS and the management plans. The NES Plan also provides a list of issues to be incorporated into the management plans. These principles and issues have been incorporated into:
- this Adaptive Management Strategy; and/or
- the Ecological Management Guidelines (nghenvironmental et al in prep) and/or
- the operational plans (see figure 4 and figure 5); and/or
- in the case of establishing 20 m buffers to protect high and moderate quality Pink-tailed Worm-lizard habitat, the Molonglo River Park Concept Plan.

Collectively these plans encompass the NES Plan’s commitments to developing and implementing management plans.

- The NES Plan commits the ACT Government to developing statutory plans of management for Kama Nature Reserve and the Molonglo River Park. These statutory plans will be developed as one document and will incorporate the Lower Molonglo River Corridor 2001 statutory plan of management.
- The Ecological Management Guidelines (nghenvironmental et al in prep) combined with the operational plans for the MNES areas fulfill the NES Plan commitment (NES Plan section 4.6) to develop management plans.

5.1 Molonglo River Park Concept Plan

The Molonglo River Park Concept Plan (Concept Plan) is one of the major commitments in the NES Plan. The Concept Plan is relevant to the AMS as it informs the development of the statutory plan of management for Kama and the Molonglo River corridor.

The Concept Plan was developed in 2011 and finalised in 2012 in parallel with the Molonglo Valley Stage 2 planning and design framework. It was developed because the interrelationship between the Molonglo Valley development and the river park is critical to the overall future success of Molonglo Valley as Canberra’s newest residential area.

The Concept Plan was developed to:

- enhance environmental values in the river corridor, including protection of threatened flora and fauna species, weed removal and heritage protection;

- provide appropriate recreation opportunities to the Molonglo River for the community that does not impact on environmental values;
- provide trail networks for a range of users including walkers, cyclists, vehicles and maintenance, that links with the wider National Capital Open Space System; and
- provide a plan for bushfire management, land-care and landscape works, and public education, interpretation and research.

The Concept Plan also establishes areas to be designated as nature reserve and special purpose reserve.

5.2 Statutory Plan of Management

The *Planning and Development Act 2007* (Planning Act) is the main ACT Government statute governing the management of the Molonglo River Corridor and Kama Nature Reserve, and the MNES values within these areas.

The Planning Act (s. 317, Schedule 3) provides for the identification of Public Land and defines management objectives for these areas. The Molonglo River Corridor[1] and Kama Nature Reserve are Public Land reserved for the purposes of Special Purpose Reserve and Nature Reserve respectively. Under Schedule 3 the management objectives for a Nature Reserve are:

- To conserve the natural environment.
- To provide for public use of the area for recreation, education and research.

The statutory requirements for plans of management are extensive. Part 10.4 of the Planning Act prescribes that plans must be subject to a full public consultation process, they must be referred to a Legislative Assembly Standing Committee, they must receive Ministerial approval, and they must be presented to the ACT Legislative Assembly as a Disallowable Instrument. Statutory Plans of Management must be reviewed at least every 10 years.

It is important to note that the NES Plan commits the ACT Government to developing statutory plans of management for Kama Nature Reserve and the Molonglo River Park. These plans however are to be combined into one and, further, the Lower Molonglo River Corridor Statutory Plan of Management (2001) will also be integrated into this single document. The conservation outcomes from the amalgamation of these three areas will be significant. A single plan will ensure consistency of objectives and management for each of the MNES while reducing the risk of fragmentation and inconsistent management approaches for the different locations of MNES.

5.3 Ecological Management Guidelines

The Ecological Management Guidelines (nghenvironmental et al in prep) have been developed to guide the conservation of natural values in the Lower Molonglo River Valley. They are

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[1] Note that as at September 2012 the Molonglo River Corridor was zoned Special Purpose Reserve under s317, Schedule 3 of the Planning Act. Rezoning of parts of the river corridor to Nature Reserve will be considered pursuant to the River Park Concept Plan, the NES Plan commitment for the Concept Plan to establish the management areas for the river corridor, and the development of the statutory plan of management for the river corridor.

complementary with the AMS and required outcomes for MNES defined in the NES Plan. They are intended for use by design professionals, land managers and planners to inform conservation planning, design and development activities.

The Ecological Management Guidelines cover the conservation of natural values of MNES within the strategic assessment area as well as broader biodiversity values such as Riparian Woodland, Snow Gum Woodland, Red Stringybark – Scribbly Gum Tableland Forest, Black Cypress Pine Tableland Open Forest, and the flora and fauna within these communities. These non-MNES communities are subject to different regulatory prescriptions under ACT laws and policies.

The Ecological Management Guidelines will inform the content of the operational plans and works plans, and contain general management principles which set out the objectives, protocols and methods, and monitoring and management recommendations for:

- protecting ecological values;
- fire management and biomass control;
- weed control;
- pest animal control;
- soils and water protection; and
- restoration and extension.

In addition to the Ecological Management Guidelines, the ACT Government has developed a Procedures Manual (Sharp 2012) that sets out in detail the methods for undertaking the baseline condition assessment and the ongoing monitoring.

5.4 Operational Plans

Operational plans are the key day-to-day management planning tool that will provide detail about on-ground works and activities that will implement the key components of the AMS. The operational plans, together with the Ecological Management Guidelines (nghenvironmental et al in prep) will be the primary mechanism for providing for adaptive management approaches based on the results of monitoring, evaluation and review. Operational plans incorporate the requirements of the statutory plan of management, the ACT Strategic Bushfire Management Plan, the ACT Weeds Strategy and other ACT Government plans and policies as relevant.

Development of the specific management approaches outlined in the operational plans will be informed by the:

- MNES values of each operational plan area;
- conservation outcomes and performance targets for MNES;
- key documents identified in relation to management objectives (see Section 4);
- Ecological Management Guidelines; and
- results of monitoring, evaluation and review described in this AMS.

Operational plans will be developed and implemented across the areas identified in figure 4 and figure 5. They will be subject to review and updated as necessary (see Section 8). They are developed by the TAMS Directorate. Operational plans provide the following information:

- GIS information relating to:
- physical assets;
- ecological assets;
- fire history;
- regional bushfire planning; and
- location of specific studies or activities (e.g. monitoring, survey and research programs).
- Past management actions including grazing, fuel hazard reduction, pest and weed control and fencing.
- Any research, monitoring or survey programs that have been or are being conducted on the land.
- Management issues, for example a description of fallen timber, pressure from kangaroo grazing, rabbit numbers, prevalence of weed species, bushfire mitigation actions, plantings and visitor use.
- Performance targets and management objectives for the area.
- Prioritised actions necessary to achieve the performance targets and management objectives.

Operational plans are put into effect through works programs. Work programs will be reviewed and updated annually. Works programs are a set of instructions providing relevant personnel with the following information:

- description of activity;
- plant and equipment requirements, such as herbicide application instructions and vehicle numbers and type;
- location of work (map references and size of area);
- scheduled start and finish times;
- training requirements; and
- stand-by or contingency arrangements, for instance certain rainfall levels will reduce the effectiveness of herbicide.

5.5 Land Management Agreements

Land Management Agreements (LMAs) are required for all rural leases under section 283 of the Planning Act. LMAs provide a basis for co-operative land management regimes between lessees of land in the Australian Capital Territory and ACT Government agencies responsible for managing rural and non-urban land for the Territory.

While LMAs are a cooperative mechanism between landholders and the government, they are subject to compliance and enforcement action under sections 339 and 361 and Schedule 2 of the Planning Act. Further, under the *Nature Conservation Act 1980*, the Conservator of Flora and Fauna can issue conservation directions to the occupier of land for the protection or conservation of native animals, native plants and native timber on the land.

LMAs are the regulatory mechanism by which the NES Plan commitments and the AMS can ensure the conservation objectives for Box-Gum Woodland on rural leases are met.

5.6 Patch GG and the Arboretum

Patch GG is to be incorporated into the National Arboretum Canberra (Arboretum). The operational plan for Patch GG will be managed through the Arboretum's planning regime in accordance with the AMS. The adaptive management of Patch GG through the AMS is assured through the Arboretum’s administrative and regulatory provisions.

Planning and development of the Arboretum is overseen by an ACT Government constituted Board of Governors. The Board is made up of academic experts and executive administrators. The Arboretum is under the jurisdiction of the TAMS Directorate.

Figure 4: Operational Plan Areas Within the Strategic Assessment Area

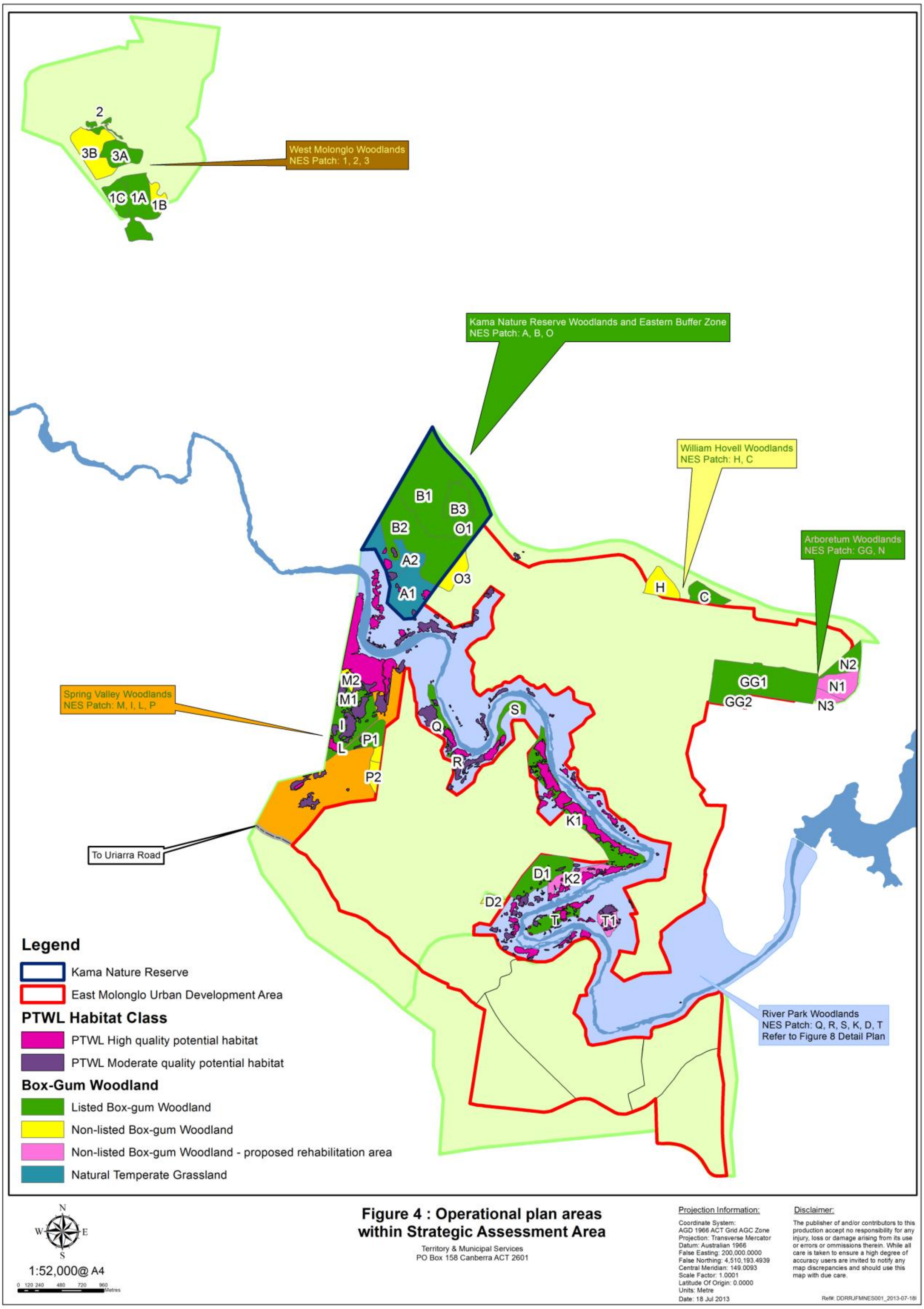
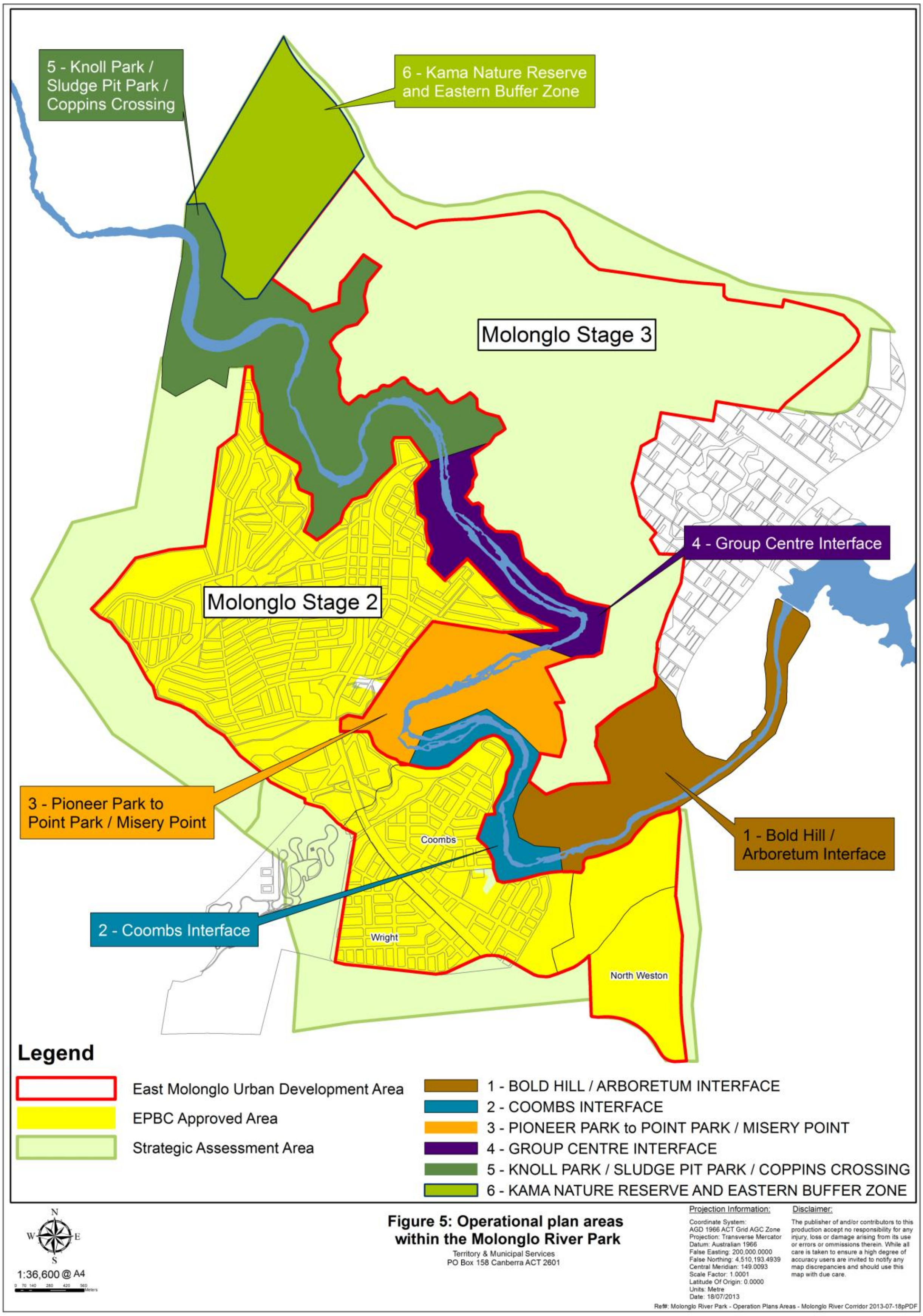


Figure 5: Operational Plan Areas Within the Molonglo River Corridor



6. Uncertainties and Targeted Studies

Uncertainty in relation to the management of ecological systems is unavoidable due to the inherent complexity of the biological, physical, chemical and social interactions within such systems.

Key uncertainties for the management of MNES in the Molonglo strategic assessment area include:

- the best methods for the restoration and rehabilitation of Box-Gum Woodland;
- how to monitor populations of the Pink-tailed Worm-lizard in a low impact way; and
- the best methods for the restoration of Pink-tailed Worm-lizard habitat.

Targeted studies will be carried out to address each of these issues, and the results of the studies will be assessed and incorporated into the adaptive management process through review and evaluation (see Section 8).

6.1 Box-Gum Woodland Restoration Project

The Box-Gum Woodland restoration project involves the use of species indigenous to the Molonglo valley with a view to restoring Box-Gum Woodland on Misery Hill[2]. Seed collected from within the strategic assessment area will also be stored for future restoration projects (Section 4.7 NES Plan).

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[2] Misery Hill has been nominated for a change of name to “Barrer Hill” by the Bush on the Boundary (Molonglo) and Molonglo Catchment Groups.

Table 2 outlines the activities that will be undertaken as part of the project. It is important to note that the monitoring and evaluation activity described in

Table 2 will be undertaken as part of the AMS review and evaluation process outlined in Section 8.

In terms of process the following activities will apply:

- Establishment of baseline condition through vegetation surveys which were carried out in two stages through a winter 2012 and a spring 2012 survey.
- Establishment of baseline condition (see Section 2) will inform the development of a restoration plan for the Misery (Barrer) Hill Box-Gum Woodland. Note that this restoration plan will contain all the activities described in

- Table 2.
- The restoration plan will inform the operational plan (see Section 5) to be developed and implemented at Misery (Barrer) Hill.
- Restoration works will complement existing ecological values. For example, no tree planting will occur in areas of existing or potential Pink-tailed Worm-lizard habitat and planting of any understorey vegetation in these areas will be undertaken only after agreement by reptile ecologists.

Table 2: Box-Gum Woodland Restoration Project

Core Activity	Activity Description
1. Site assessment & recommendations	Field visits to Box-Gum Woodland sites to be lost to development and sites to be kept and enhanced: 1. Identify presence and frequency of plant species - native and exotic 2. Recommend species to introduce, reintroduce or increase underrepresented populations 3. Investigate the merits and processes of translocating Box-Gum Woodland species from areas to be lost to Misery Hill (especially key understorey species) 4. Develop a seed supply and propagation works plan referencing items 1 & 2 above and drawing on the availability of collecting plant material from nearby sites of higher quality
2. Rehabilitation Scoping Study	Scope a woodland revegetation and restoration plan that will factor development stages, weed management & incorporate local knowledge about species availability and successful reestablishment approaches
3. Seed supply & plant rescue future use at Misery Hill	1. Identify current provenance stock in regional seed banks that would be suitable for use in high-conservation box gum woodland restoration 2. Collect, process and store needed seed in accordance to the national code of practice, "FloraBank" 3. Rescue plants or collect plant material from species of significance that will be destroyed – this may involve establishing temporary or permanent seed production areas in consultation with the ACT Government
4. Plant production	Seasonally propagate plants in accordance to the rehabilitation plan e.g. quantities and species
5. On-ground rehabilitation works	Deliver staged works in accordance to the rehabilitation plan. This will be seasonally influenced by the weather e.g. best time for planting is autumn & spring
6. Monitoring and evaluation	Establish benchmark data & monitor rehabilitation success using scientifically credited performance measurements already adopted by regional leaders in rehabilitation assurance Throughout the duration of the 30 year plan results will be used to review on-ground ecological performance and where relevant implement best practice change or modification

6.2 Pink-tailed Worm-lizard Targeted Studies

The following two targeted studies will be undertaken in relation to the Pink-tailed Worm-lizard (Section 4.8 NES Plan).

6.2.1 Direct Low Impact Monitoring Methods for the Pink-tailed Worm-lizard

Background

The construction of urban infrastructure immediately adjacent to occupied habitat in the Lower Molonglo River corridor may have adverse effects on the Pink-tailed Worm-lizard. Although the habitat may not obviously change, there may be an increase in some threatening processes (for example increased predation by cats, changes in soil surface hydrology, disturbance to rocks and spread of weeds). A further potential threat to the Pink-tailed Worm-lizard habitat is the spread of Burgan (*Kunzea ericoides*), which is a native shrub capable of colonising open ground, including Pink-tailed Worm-lizard habitat, and forming dense thickets.

The Draft National Recovery Plan (Brown in prep) for the Pink-tailed Worm-lizard notes that monitoring the species by the standard survey method of searching beneath stones is problematic because it results in considerable disturbance when the stones are moved. Due to the fact that monitoring requires repeated visits to a site, and hence repeated turning of stones, the plan recommends that the technique of rock turning should only be used once at a site unless effective alternative low impact techniques are discovered or if impacts can be mitigated.

There is no obvious alternative to the technique of searching beneath rocks as an approach to surveying the species. In the past some specimens have been caught in pitfall traps (Rauhala 1993). However, an extensive trial of pitfall traps near suitable occupied habitat at the Lower Molonglo Water Quality Control Centre undertaken by Jones (1999) was unsuccessful – no lizards were caught despite months of trapping.

In order to address the recommendations in the Draft Recovery Plan and ensure the objectives and performance targets for the Pink-tailed Worm-lizard are met, a less invasive procedure for monitoring the relative abundance of the species is required.

Study outline

The study is based on the potential for artificial refuges to be incorporated into the monitoring program (see Section 7). The provision of artificial refuges (e.g. shelter sites made by placing concrete slabs, bricks, boards, roof tiles, corrugated iron on the ground at suitable locations) has been successfully used for many species of ground layer reptiles (Croak et al 2010; Grant et al 1992) including other species of legless lizards (Brown in prep).

In the ACT it appears that rocks are the preferred shelter substrates because they favour the establishment of ant colonies that the Pink-tailed Worm-lizard feeds on and because they provide ideal thermal conditions and protection from predators. Very few individuals have ever been found under logs or timber in the ACT (Wong et al 2011). The species has been found under rocks and paving bricks placed within or near occupied habitat, under dislodged stones in areas that have been previously ripped for tree planting (Osborne and Wong unpublished observation), and recently under roof tiles laid out as part of a survey for striped legless lizard in East Fyshwick.

There will be four strategically placed sites for conducting the artificial habitat trials. Population monitoring will occur at these sites and the results will be evaluated and incorporated into the adaptive management review and evaluation process (see Section 8).

6.2.2 Pink-tailed Worm-lizard Habitat Restoration

Background

The Molonglo River corridor is particularly important for the Pink-tailed Worm-lizard because the interconnected linear nature of the reserve and adjacent landscapes provides extensive corridors of habitat that potentially allow for dispersal and gene flow between populations. The maintenance of such processes is essential for effective conservation and is an important consideration with respect to the planning of urban development in the Molonglo Valley. Parts of the corridor are in very poor ecological condition because of the former use of the area for softwood production, and the clearing of native vegetation and establishment of exotic pasture.

There have been no studies conducted to determine whether Pink-tailed Worm-lizard habitat can be restored to a condition suitable for re-occupation by the species. However, it may be possible, using the knowledge of the species habitat (e.g. Jones 1999; Wong et al 2011) to design an approach that is practicable.

Study outline

The project will involve the development and implementation of guidelines for restoration of habitat located in the Lower Molonglo Valley. These guidelines will focus on habitat occurring within the Molonglo River Corridor reserve upstream of the western edge of the former Blewett's pine forest block. There is considerable potential for this area to be rehabilitated as habitat for the species. The guidelines will take an experimental approach to landscape restoration that includes the establishment of key corridor linkage areas and the rehabilitation of disturbed areas within the study area. The guidelines will also include a description of a series of in situ experimental treatments involving different types of planted grass cover and rock placement.

Areas rehabilitated in accordance with the guidelines will be monitored in accordance with the monitoring methodology described in Section 7. Monitoring results will be evaluated and incorporated into the adaptive management review and evaluation process (see Section 8).

6.2.3 Implementation program

The Pink-tailed Worm-lizard targeted studies described above and outlined in the NES Plan (Section 4.8) will be undertaken as outlined in Table 3.

Table 3: Pink-tailed Worm-lizard Targeted Studies

NES Plan Section 4.8 reference	Description of study	Scope of study	Status
1a	Mt Taylor habitat disturbance, including fragmentation, and the effect of habitat proximity to urban areas		• Complete

NES Plan Section 4.8 reference	Description of study	Scope of study	Status
1b	In accordance with the draft National Recovery Plan for Pink-tailed Worm-lizard (Brown in prep), develop low impact survey and monitoring techniques for the species	• Preparation of a research plan • Description of an approach for monitoring habitat condition • Location of suitable site • Recommendation of suitable shelter substrates that can be trialed • Preparation of habitat restoration guidelines • Research plan for evaluation of rehabilitation works • Recommendation of suitable areas for rehabilitation trials	• Dr Will Osborne engaged • Start date 14 September 2012 • Completion December 2012
2c	Extensive survey work to determine population densities in areas of low, moderate and high quality Pink-tailed Worm-lizard habitat in the Strategic Assessment Area	• Baseline surveys have been completed for low, moderate and high quality Pink-tailed Worm Lizard habitat within the Strategic Assessment area. Further condition assessments of habitat will be conducted of research plots in conjunction with 2d and 2e below	• To commence on completion of 1b in 2013
2d	Field trials, to be conducted in areas of low quality habitat only, involving different methods of restoration and relocation	• Field trials to be conducted in accordance with 1b findings	• To commence on completion of 1b in 2013
2e	Research and field trials involving methods for reducing habitat fragmentation and increasing connectivity	• Field trials to be conducted in accordance with 1b findings	• To commence on completion of 1b in 2013

NES Plan Section 4.8 reference	Description of study	Scope of study	Status
3	Monitoring and adaptive management of Pink-tailed Worm-lizard habitat	• Monitoring incorporating the findings of 1b	• To commence on completion of 2c

7. Monitoring

Ongoing monitoring of MNES is a key component of the AMS. Monitoring provides the opportunity to understand if performance targets and management objectives are being achieved, and to determine if changes to management are required.

This section outlines the:

- general approach to monitoring that will be applied under the AMS (Section 7.1);
- methods for measuring the ecological condition of Box-Gum Woodland and Natural Temperate Grassland (Section 7.2);
- methods for measuring the ecological condition of Pink-tailed Worm-lizard habitat (Section 7.3);
- methods for monitoring Superb and Swift Parrots (Section 7.4);
- monitoring studies to measure particular responses (Section 7.5;
- timing and frequency of monitoring (Section 7.6).

More detail about monitoring methods and techniques is provided in the Ecological Management Guidelines (nghenvironmental et al in prep) and the associated Procedures Manual (Sharp 2012).

7.1 General Approach to Monitoring

Monitoring will be undertaken by suitably qualified experts under the guidance of the ACT Government.

7.1.1 Objectives of Monitoring Under the AMS

The objectives of the monitoring program under the AMS are to:

- Measure changes in the condition of MNES and the landscape more broadly within conservation areas.
- Understand the population status of MNES fauna within conservation areas.
- Inform management approaches as part of the adaptive management process.

7.1.2 Principles of Monitoring Under the AMS

The monitoring program will be based on the following principles:

- Application of the same methodology across a range of sites to provide replication.
- Repeatability: consistency of technique to collect data.
- Monitoring for an adequate length of time for changes to be statistically measureable and to be able to interpret causes.

- Ideally, include control sites where specific management is not applied (this may be provided through replication of sites with different management activities applied) to assist in interpreting cause and effect.

7.1.3 Scope of Monitoring Under the AMS

Under the AMS, monitoring will be undertaken at three levels:

- Vegetation condition (Box-Gum Woodland and Natural Temperate Grassland).
- Fauna (Pink-tailed Worm-lizard, Superb Parrot, Swift Parrot).
- Detailed monitoring studies, as required.

Together, these three levels of monitoring will provide a comprehensive picture of the state of MNES and ecological condition within the Molonglo strategic assessment area. Further details about each level of monitoring are provided below.

7.2 Ecological Condition Assessment Methodology for Box-Gum Woodland and Natural Temperate Grassland

The NES Plan (ACTPLA 2011) requires that the ecological condition of Box-Gum Woodland and Natural Temperate Grassland be "measured using a peer reviewed, repeatable and scientifically robust methodology". The ACT Government will meet this requirement using three complementary approaches:

- Monitoring the EPBC Act listing status of Box-Gum Woodland and Natural Temperate Grassland patches in accordance with the EPBC Act listing criteria for those ecological communities.
- Monitoring the ecological condition of Box-Gum Woodland and Natural Temperate Grassland patches based on the methodology of Gibbons et al (2009) as applied to vegetation condition and adapted for ACT vegetation types.
- Use of a number of other indicators for determining condition as required to inform management.

The aims of this approach are to:

- ensure that Box-Gum Woodland and Natural Temperate Grassland patches continue to meet the minimum threshold for being listed as threatened ecological communities under the EPBC Act;
- be able to measure and quantify the ecological condition of the vegetation using a well recognised and established methodology (i.e. Gibbons et al 2009); and
- to inform ongoing management decisions.

7.2.1 Monitoring the EPBC Act listing Status of Box-Gum Woodland and Natural Temperate Grassland

The first component to measuring the ecological condition of Box-Gum Woodland and Natural Temperate Grassland will be to monitor the EPBC Act listing status of the various patches over time. Ensuring the vegetation continues to meet the minimum threshold for being listed as threatened ecological communities under the EPBC Act provides a base level condition to be achieved through management.

The EPBC Act definitions of Box-Gum Woodland (TSSC 2006) and Natural Temperate Grassland (ESSS 2000) are provided by the Commonwealth Government. The data that will be collected as part of the condition assessment methodology (see Section 7.2.2) will provide the necessary information to determine if the patches continue to meet the EPBC Act listing criteria for Box-Gum Woodland and Natural Temperate Grassland.

7.2.2 Monitoring Ecological Condition

Comparing Data Against the Benchmark and Assessing Ecological Condition

Gibbons et al (2009) provides a consistent and repeatable process for measuring the ecological condition of vegetation types. The process involves:

- collecting vegetation data against ten variables such as species diversity and percentage of native ground cover; and
- comparing the data against the ideal benchmark for that vegetation type (i.e. how close the vegetation is to a pristine ecosystem) and quantifying the results to provide an overall score of ecological condition.

This data will be collected using a combination of plots and transects within patches. The detailed methodology for this process is provided in the Procedures Manual (Sharp 2012).

Following data collection, the ecological condition of each patch of Box-Gum Woodland and Natural Temperate Grassland will be assessed by comparing the measured values for each of the ten variables against the ACT benchmarks for Box-Gum Woodland and Natural Temperate Grassland. The ACT benchmarks have been prepared by the ACT Government (Mulvaney et al 2010) and are adapted from the NSW process. The ACT benchmarks are specific to the nature of the vegetation within the Territory.

Measuring Change in Ecological Condition using Raw Data

In addition to the application of Gibbons et al (2009), other indicators for assessing condition of Box-Gum Woodland and Natural Temperate Grassland may be used. The Ecological Management Guidelines (nghenvironmental et al in prep) provide a suite of indicators that can be drawn on to answer specific questions about particular patches as they are managed over time.

The detailed analysis of raw data will provide quantitative assessments of changes relevant to particular issues in the patches. For example, whether weed cover has reduced or native plant diversity has increased. Other factors not included in the benchmark that may have particular importance to certain patches including changes in habitat features or landscape attributes, abundance and distribution of environmental weeds or rare or uncommon species will be measured at sites (where relevant). The Procedures Manual (Sharp 2012) describes the methods recommended for use to collect this data. The operational plans will identify which attributes should be monitored within each Box- Gum Woodland patch.

7.3 Ecological Condition Assessment Methodology for Pink-tailed Worm-lizard Habitat

The NES Plan (ACTPLA 2011) requires that the ecological condition of Pink-tailed Worm-lizard habitat be "measured using the criteria described in *Osborne, W., and Wong, D. (2010) Extent of potential pink-tailed worm-lizard (Aprasia parapulchella) habitat in the Stage 2 Investigation Area – East Molonglo downstream of Coppins Crossing. Report commissioned by ACTPLA*". The ACT Government will meet this requirement using two complementary approaches:

- Monitoring the ecological condition of Pink-tailed Worm-lizard habitat by building on the work of Osborne and Wong (2010) and using the most recent survey methods (noting that advancements in understanding of Pink-tailed Worm-lizard habitat have already occurred since the completion of the NES Plan).
- Direct monitoring of the population status of the species when suitable low impact methods are devised (see Section 6.2.1).

The aims of this approach are to:

- be able to measure the ecological condition of Pink-tailed Worm-lizard habitat using the most up-to-date approaches;
- understand the population status of the species over time; and
- to inform ongoing management decisions.

7.3.1 Pink-tailed Worm-lizard Habitat Condition Monitoring

The habitat of the Pink-tailed Worm-lizard is described in detail by Wong et al (2011). Techniques for describing the ecological condition of the habitat of the species have been developed in recent years (e.g. Osborne and Wong 2010) and have been further refined (Wong and Osborne unpublished data). This information is now incorporated into the Ecological Management Guidelines (nghenvironmental et al in prep).

The highest quality sites are those dominated by a moderate to high diversity of native grasses and forbs (typically including *Themeda triandra* and/or species such as *Aristida ramosa*, *Cymbopogon refractus*, *Poa sieberiana* and *Lomandra* spp.) as well as disturbance sensitive forbs. High quality sites with Pink-tailed Worm-lizards often also include a strong presence of exotic annual grasses such as *Vulpia bromoides*, *Aira elegantissima* and *Avena fatua* as well as forbs such as *Trifolium* spp.

In more disturbed sites (moderate quality habitat) potential habitat has a much lower diversity of native grasses and forbs. The sites are often dominated by just a few species (particularly spear grasses *Austrostipa* spp. and wallaby grasses (*Rytidosperma* spp). Native and exotic forbs are also typically present in the inter-tussock spaces and around the edges of rocks.

Low quality habitat has suitable rocks but typically completely lacks a cover of native grasses and forbs, although Corkscrew *Austrostipa scabra* may be present. The sites may display high levels of disturbance to the ground surface, rocks and vegetation (for example in areas that previously supported pine forest) and may be dominated by exotic pasture grasses (pasture improved paddocks) as well as other agronomic species and weeds. Some rocky areas that may be considered to be potential habitat are likely to be unsuitable for the species because they only include large very deeply embedded boulders.

Osborne and Wong (2010) provide three categories of potential habitat which are described in Table 4.

Table 4: Pink-tailed Worm-lizard Potential Habitat Categories

(Osborne and Wong 2010 and updated from Wong et al 2011)

Pink-tailed Worm-lizard potential habitat category*	**Description**
High quality	Suitable rocky areas dominated by, or with a large component of, kangaroo grass (*Themeda triandra*) - and also often containing *Aristida ramosa*, *Cymbopogan refractus*, *Poa sieberiana* and *Lomandra* spp. - and often a high diversity of disturbance sensitive native forbs. Exotic annual species such as Haresfoot Clover (*Trifolium arvense*) and *Vulpia* spp. may also be present
Moderate quality	Suitable rocky areas usually dominated by Spear Grasses (Austrostipa spp.) and Wallaby Grasses (*Austrodanthonia spp*.). Native forb species and exotic annual species such as Haresfoot Clover (*Trifolium arvense*), Wild Oats (*Avena sp*.), and Saffron Thistle (*Carthamus lanatus*) may also be present
Low quality	Suitable rocky areas that have been subject to high levels of disturbance in the recent past (e.g. areas previously under mature pine plantation) displaying high levels of disturbance to the soil layer or dominated by sown pasture grasses, other agronomic species and weeds; includes former sheep camps that no longer support native ground cover

* It is important to note that the habitat categories represent areas of potential habitat. The species is likely to occur in most areas of moderate and high quality habitat, although population density is predicted to be higher in high quality habitat. Low quality habitat is generally unlikely to support the species.

Surveys of Pink-tailed Worm-lizard habitat will be undertaken to collect data in relation to the criteria for each potential habitat category.

7.3.2 Direct Population Monitoring

In addition to habitat condition monitoring, direct population monitoring will be undertaken for the Pink-tailed Worm-lizard.

However, previous techniques for direct monitoring are thought to be problematic as they have the potential to negatively impact on the species if conducted frequently at the same site. Direct monitoring methods will therefore only be applied broadly across the strategic assessment area on completion of the targeted study to identify appropriate new low impact methods (Section 6.2.1).

7.4 Monitoring Methods for Superb and Swift Parrots

In the ACT, the Canberra Ornithologists Group (COG) is active and well informed in relation to the presence of birds. They undertake annual surveys and have a particular interest in the Superb Parrot. The ACT Government will work closely with COG in Molonglo to ensure information is shared about Superb and Swift Parrots and management of conservation areas takes into account habitat values for those species.

7.4.1 Superb Parrot

Surveys for the Superb Parrot will be undertaken in known and potential habitat within the strategic assessment area between September and January (as appropriate). The methodology to be applied will be consistent with Davey (2011).

7.4.2 Swift Parrot

Regular surveys for the Swift Parrot are not possible given the species' variable use of the landscape each season. However, the species is notable and it will be well known when it is present in the ACT. Where that is the case, surveys in areas where the species is present will be undertaken.

7.5 Monitoring Studies to Measure Particular Responses

In addition to the specific methods for measuring the ecological condition of key MNES described above, analysis of broader landscape attributes may also be undertaken to inform the adaptive management process. A number of methods are available for use depending on the nature of the site being managed and the key management questions. These may include biomass assessment, landscape function analysis (Tongway and Hindley 2004), ephemeral drainage line stability (Tongway and Ludwig 2011), riparian condition (e.g. Rapid Appraisal of Riparian Condition (RARC) Version 2 (Jansen et al 2005) and remote sensing. Such methods allow for more detailed studies and analysis of particular processes, such as erosion of slopes and drainage lines and changes in vegetation cover.

The methods applied to each conservation area will be determined in the development of the operational plans (Section 5) and the ongoing evaluation and review process (Section 8). Prior to the implementation of monitoring in the conservation areas the proposed program tailored for each patch and area will be assessed by suitably qualified ecologists.

7.6 Timing and Frequency of Monitoring

The timing and frequency of monitoring is outlined in Table 5.

Table 5: Timing and frequency of monitoring

MNES value	Monitoring focus	Timing	Frequency
Box-Gum Woodland	Ecological condition	Spring	Annually
Natural Temperate Grassland	Ecological condition	Spring	Annually
Pink-tailed Worm-lizard	Ecological condition of habitat	Spring	Annually
	Population status	Spring*	Every five years
Superb Parrot	Population status	Spring	Annually
Swift Parrot	Frequency of use of Molonglo strategic assessment area	When present	When present

* Direct population monitoring for Pink-tailed Worm-lizards will commence within the conservation areas of the strategic assessment area on completion of the targeted study described in Section 6.2.1 and development of an appropriate methodology.

8. Evaluation and Review

The final steps in the adaptive management process are to evaluate and update management (these mechanisms include the various plans described in Section 5) in light of the knowledge gained through monitoring. The updating and review process might simply increase the confidence in the suitability of existing management. However, this process may also uncover new insights about the ecology of MNES and/or how management actions are affecting the achievement of conservation outcomes, performance targets and management objectives.

Three key sources of information will be evaluated to assess whether, and to what extent, management is achieving the environmental outcomes and performance targets for the MNES. These are:

- statistical analysis of the results of the monitoring program outlined in Section 7;
- the results of the targeted studies described in Section 6; and
- new information arising out of other relevant adaptive management and research programs and peer reviewed scientific literature.

Management will be amended based on this information to ensure that MNES values are being maintained and improved.

8.1 Implementation of the Evaluation and Review Program

The TAMS Directorate will establish an expert panel made up of scientists and land managers with established expertise in Box-Gum Woodland, Natural Temperate Grassland, Pink-tailed Worm-lizard and Superb and Swift Parrot ecology. Given that this panel will be making recommendations which may have resource impacts on the Territory the panel will have representatives from both the government and non-government sectors.

The expert panel will:

- Meet within one year of approval of the AMS.
- Establish a methodology for evaluating the results of the monitoring program and other relevant information. This will include information arising out of:
- the monitoring program;
- the targeted studies; and
- other relevant adaptive management and research programs.
- Consider the implications of the results as evaluated in relation to the operational plans for the MNES.
- Provide a report containing advice and recommendations for any amendments necessary to ensure the operational plans are achieving the conservation outcomes and performance targets for the MNES.

Timing for the evaluation and review program will be as follows:

- The results of the monitoring program (Section 7) will be internally reviewed when the results of monitoring come to hand. Internal review will be undertaken by ACT Government ecologists and environmental managers.
- The results of these internal reviews will be used to check and, if required, amend the operational plans once results become available.
- Monitoring and trial data will be analysed statistically every five years.
- At a minimum, the expert panel will convene every five years to consider the results as evaluated in relation to the operational plans for the MNES. Where substantial issues are shown to arise through the internal reviews, the expert panel may be called on at that point to provide comment and input, particularly if it is demonstrated that benchmark condition is not being maintained.
- At a minimum, the expert panel will provide a report every five years containing advice and recommendations for any amendments necessary to ensure the operational plans are achieving the conservation outcomes and performance targets for the MNES.

8.2 Contingency Response

As part of the adaptive management cycle, a process for contingency responses in the case of negative changes to MNES will be applied. This will be based on a graded hierarchy of responses to ensure the causes of any problems are understood and changes to management are applied to reverse the situation.

The contingency response process will include:

- increased monitoring to help determine the cause of the problem;
- internal review by ACT Government ecologists to analyse the issue;
- additional expert analysis if required;
- identification and evaluation of possible solutions;
- implementation of revised management actions;
- further monitoring, evaluation and review to determine if the problem has been addressed; and
- incorporation of the outcomes of the process in the annual report (see Section 9).

9. Reporting

Reporting outcomes for MNES against the NES Plan's commitments will be carried out in accordance with Sections 6, 8 and 9 of the NES Plan.

The ACT Government will report annually to the public on the implementation of the NES Plan. This annual report will highlight the conservation outcomes achieved, and any non-conformance, in the previous year and will be published by the ACT Government and provided to the Commonwealth's Environment Department. The report will include:

- the results of the monitoring program outlined in Section 7; and
- the results of the targeted studies described in Section 6.

The annual report will be completed within five months of the end of each financial year and will be made publically available.

The NES Plan and its associated actions will be audited by an independent, third party expert and provided to SEWPaC every 5 years for a 30 year period.

The results of annual and audit reports will inform the adaptive management process.

10. Amending the Adaptive Management Strategy

The ACT Government is committed to ensuring the conservation outcomes for MNES through adherence to the management measures documented in this AMS.

The ACT Government also recognises that, over the 30 year life of this strategy, there may be unforseen scientific changes that warrant amendments to the AMS.

In the event that any such amendment is deemed necessary, the ACT Government will ensure that:

- any proposed amendment is consistent with, and necessary to achieve, the NES Plan's conservation outcomes for MNES; and
- any amendment that may have a substantive effect on the commitments contained in this AMS and directly related to MNES conservation outcomes will be approved by the Commonwealth Environment Minister or a delegate of the Minister.

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Molonglo Valley Plan for the Protection of Matters of National Environmental Significance

NES PLAN

SEPTEMBER 2011

ACT Planning & Land Authority

CONTENTS

1. INTRODUCTION

1.1 The Molonglo Valley Plan for the Protection of Matters of National Environmental Significance (the NES Plan)

Early in 2008 the Australian Capital Territory (ACT) recognised that the nature and scale of proposed development in the Molonglo Valley would be complex and involve multiple stakeholders. It was also apparent that environmental protection in the Molonglo Valley would be best served through higher level planning. It was therefore considered that, within this context, a strategic assessment under Part 10 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) would be preferable to projects which would otherwise be assessed on a case by case basis.

On 16 September 2008, the Australian Capital Territory (ACT) and Commonwealth Governments entered into an Agreement to conduct a strategic assessment under the EPBC Act.

Initially the Agreement was to give effect to, and assess, the Molonglo Valley Structure Plan. The Agreement was then amended and signed by delegates on 16 March 2010, to provide for the assessment of impacts under the *Molonglo Valley Plan for the Protection of Matters of National Environmental Significance* (the NES Plan), regarding urban development, associated infrastructure and broadacre land use at East and West Molonglo and North Weston in the ACT.

See Figure 1 for a map of the regional location of the area.

The NES Plan:

- reflects the development activities proposed for the Molonglo Valley as set out in the Molonglo and North Weston Structure Plan (the Structure Plan); and
- establishes the ACT Government’s commitments to protect matters of national environmental significance (MNES) within the strategic assessment area.

See Figure 2 for a map of the strategic assessment area.

The Molonglo and North Weston Structure Plan is part of the ACT statutory Territory Plan. The Structure Plan guides urban development and associated infrastructure in the Molonglo Valley through the establishment and implementation of the following principles:

- walkable neighbourhoods and centres;
- a clear and easily understood urban structure;
- special places at key locations including centres;
- strong connections to the surroundings;
- a response to the strong topographic character of the Valley;
- protection of hills, ridges and views;
- retention of significant trees and tree stands;
- protection of significant natural corridors and habitats;

- strong recreational links along the Valley to Mt. Stromlo, Black Mountain, the National Arboretum and Lake Burley Griffin; and
- continuation of the country/city feel of Canberra.

The Structure Plan will be implemented over approximately the next 30 years.

The Structure Plan map is included at Appendix 1. While guiding the placement of infrastructure the map may be subject to technical amendment.

In order to ensure conservation outcomes and protect MNES adjacent to the development area in the lower Molonglo Valley, the ACT Government will make necessary amendments to the Structure Plan. These amendments, how they will be implemented, and further information about MNES protection will be available on the website of the Directorate of Environment and Sustainable Development at www.environment.act.gov.au.

1.2 The EPBC Act and strategic assessments

The EPBC Act is the Commonwealth Government's key piece of environmental legislation. It protects matters of national environmental significance (MNES) which include:

- World heritage sites;
- National heritage places;
- Wetlands of international importance;
- Nationally threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas;
- Nuclear actions; and
- The Great Barrier Reef Marine Park.

Strategic assessments are conducted under Part 10 of the EPBC Act. They provide a mechanism to move away from project-by-project impact assessment and examine proposed developments at a broader landscape scale in relation to the requirements of the EPBC Act.

The Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) administers the strategic assessment provisions of the EPBC Act and provides advice to the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities (the Minister) throughout the process.

1.3 Scope of this assessment

This strategic assessment includes all of East Molonglo with the exception of the suburbs of North Weston, Wright and a portion of Coombs. These three suburbs have prior approval under the EPBC Act (Reference numbers: 2009/5041, 2009/4752 and 2009/5050) and are therefore not included in the analysis or outcomes of this process. See Figure 2.

West Molonglo is included within the scope of the strategic assessment as it includes MNES and was part of the same overall process to establish the Structure Plan.

1.4 Purpose and structure of the NES Plan

The strategic assessment comprises three key documents:

1. The draft Strategic Assessment Report which was publicly exhibited and which provided a detailed assessment of the implications of the draft NES Plan.
2. The Supplementary Assessment Report which addresses the issues raised in the public exhibition process and analyses the outcomes of the final NES Plan.
3. The final NES Plan (this document) which identifies the commitments and undertakings of the ACT Government for the protection and management of matters of national environmental significance protected under the EPBC Act.

Under the strategic assessment process, the NES Plan is the document that is intended to satisfy the Minister that the Commonwealth Government's Endorsement Criteria, outlined in the Strategic Assessment Agreement as amended between the ACT and the Commonwealth under s146(1) of the EPBC Act, has been met.

Following endorsement of the NES Plan under the EPBC Act, actions (or classes of actions) that will occur to implement the endorsed NES Plan may be approved by the Minister.

The NES Plan is structured as follows:

- Section 1 provides an introduction to the NES Plan.
- Section 2 provides a description of the activities that will take place under NES Plan.
- Section 3 outlines how the NES Plan will be implemented.
- Section 4 provides the ACT Government commitments to conservation outcomes for the relevant MNES.
- Section 5 provides a description of the monitoring, evaluation and reporting mechanisms to ensure that actions committed to in the NES Plan are being met and publicly reported.
- Section 6 provides reasonable assurance in relation to implementation of the NES Plan.

1.5 Key Matters of National Environmental Significance

As outlined in the Molonglo Draft Strategic Assessment Report and Supplementary Assessment Report, the key MNES that require commitments through the NES Plan are:

- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box-Gum Woodland).
- *Natural Temperate Grassland of the Southern Tablelands of NSW and the ACT* (Natural Temperate Grassland).
- *Aprasia parapulchella* (Pink-tailed Worm Lizard).

- *Polytelis swainsonii* (Superb Parrot).
- *Lathamus discolour* (Swift Parrot).

See Figure 3 and Figure 4 for maps of Box-Gum Woodland, Natural Temperate Grassland and Pink-tailed Worm Lizard habitat in the strategic assessment area.

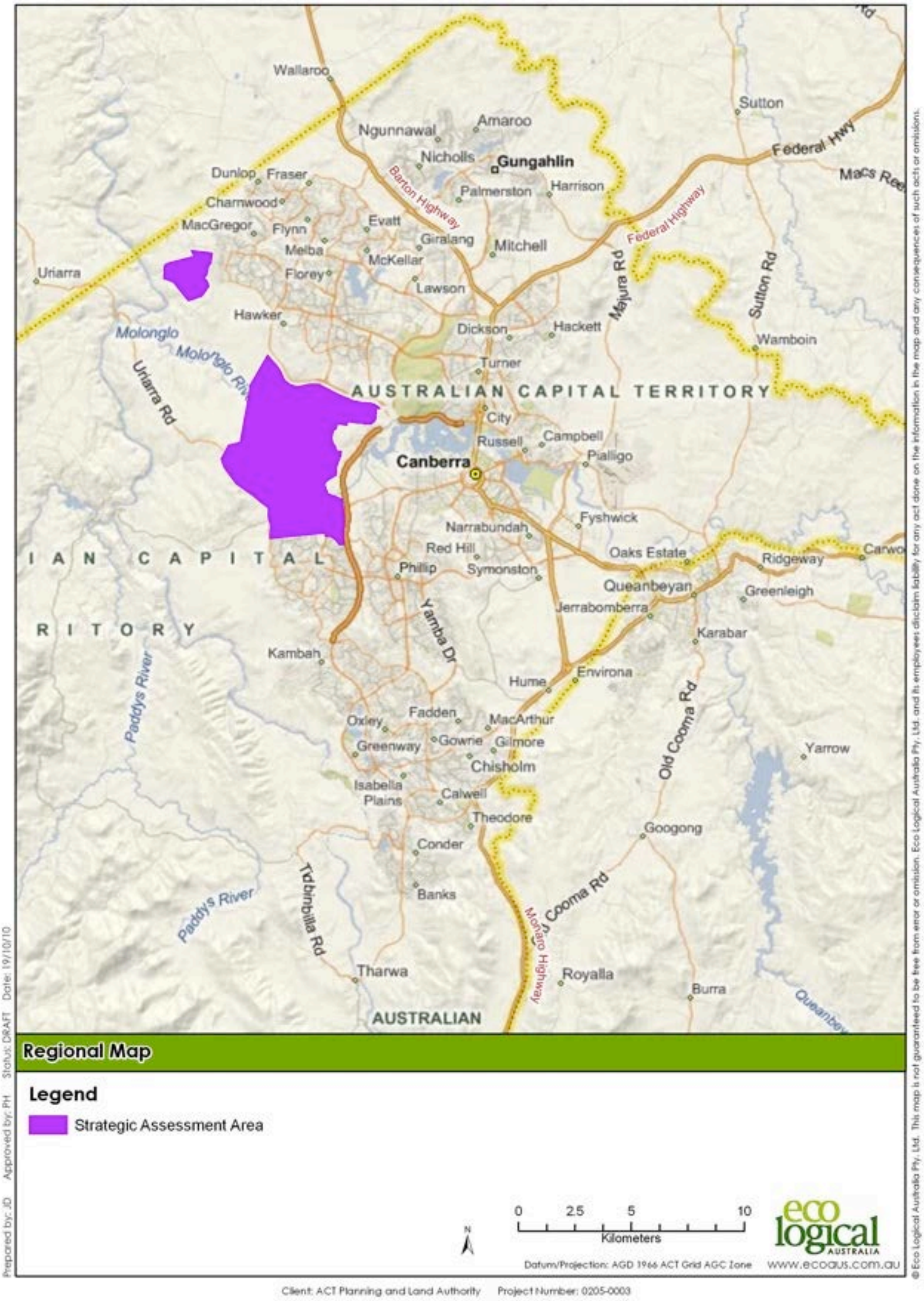

Figure 1:**Regional setting for the Molonglo Valley strategic assessment area**

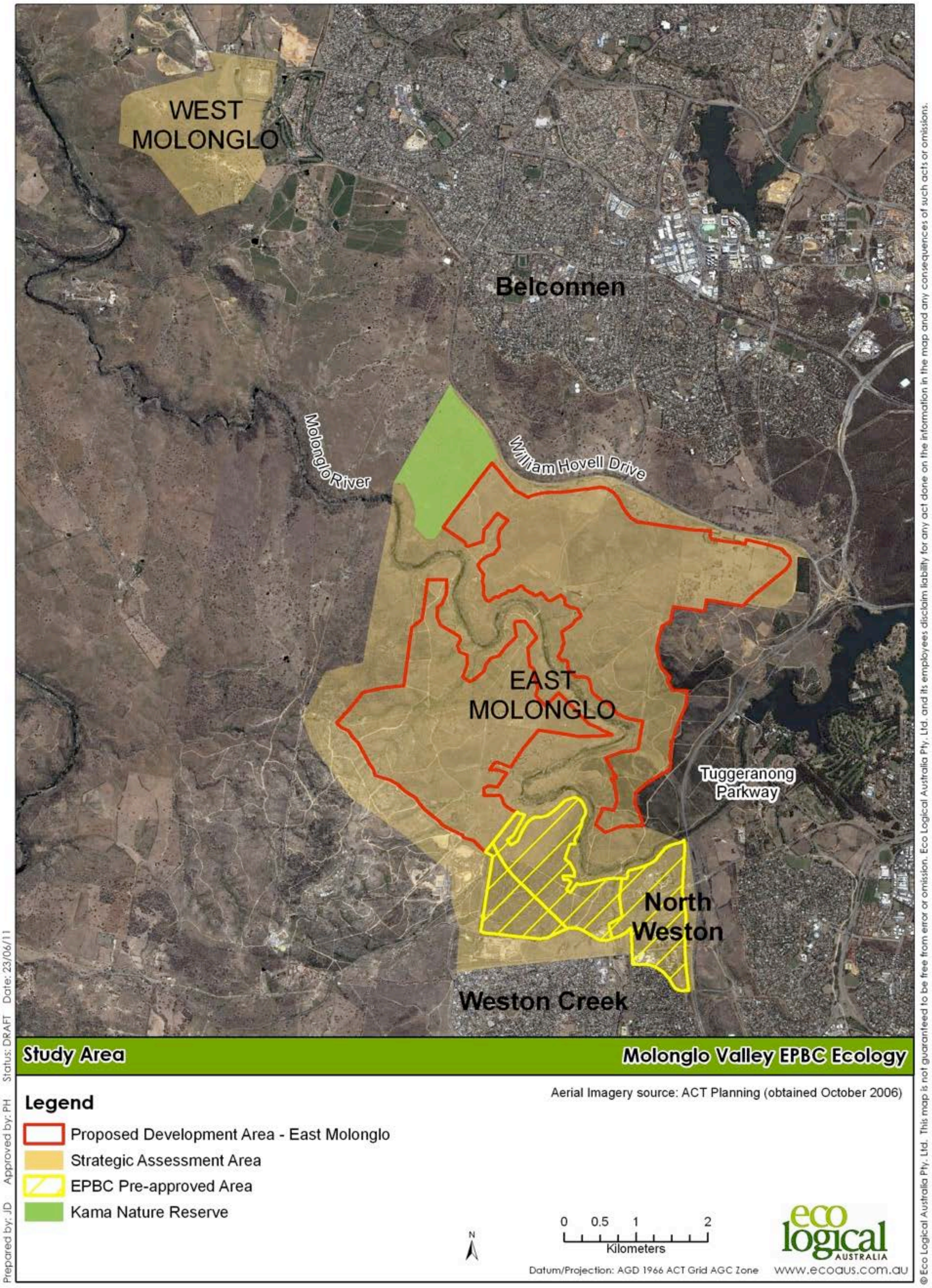

Figure 2: **Molonglo Valley strategic assessment area**

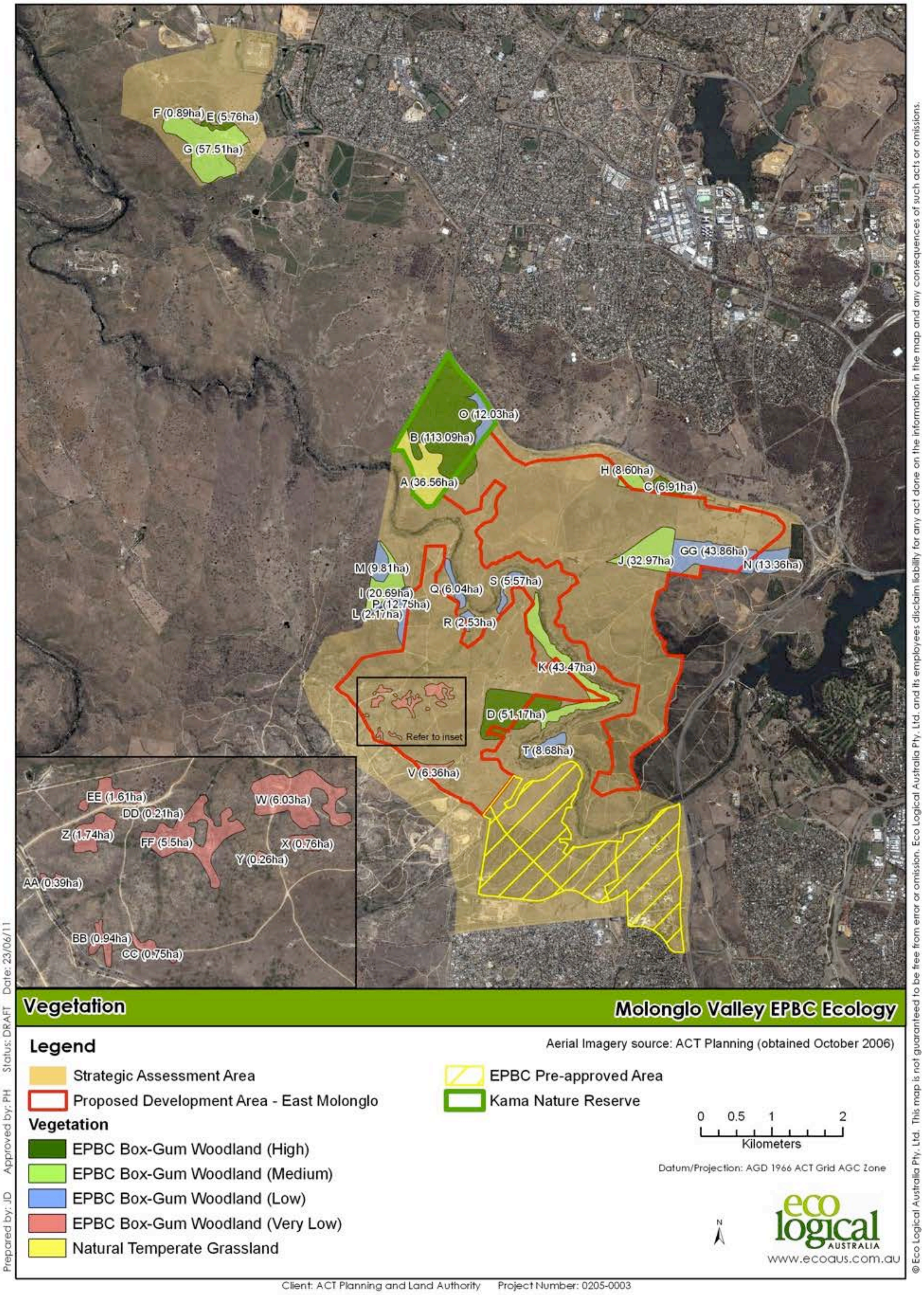

Figure 3: **Box-Gum Woodland[1] and Natural Temperate Grassland**

[1] Box-Gum Woodland patch quality definitions are described in the Supplementary Report.

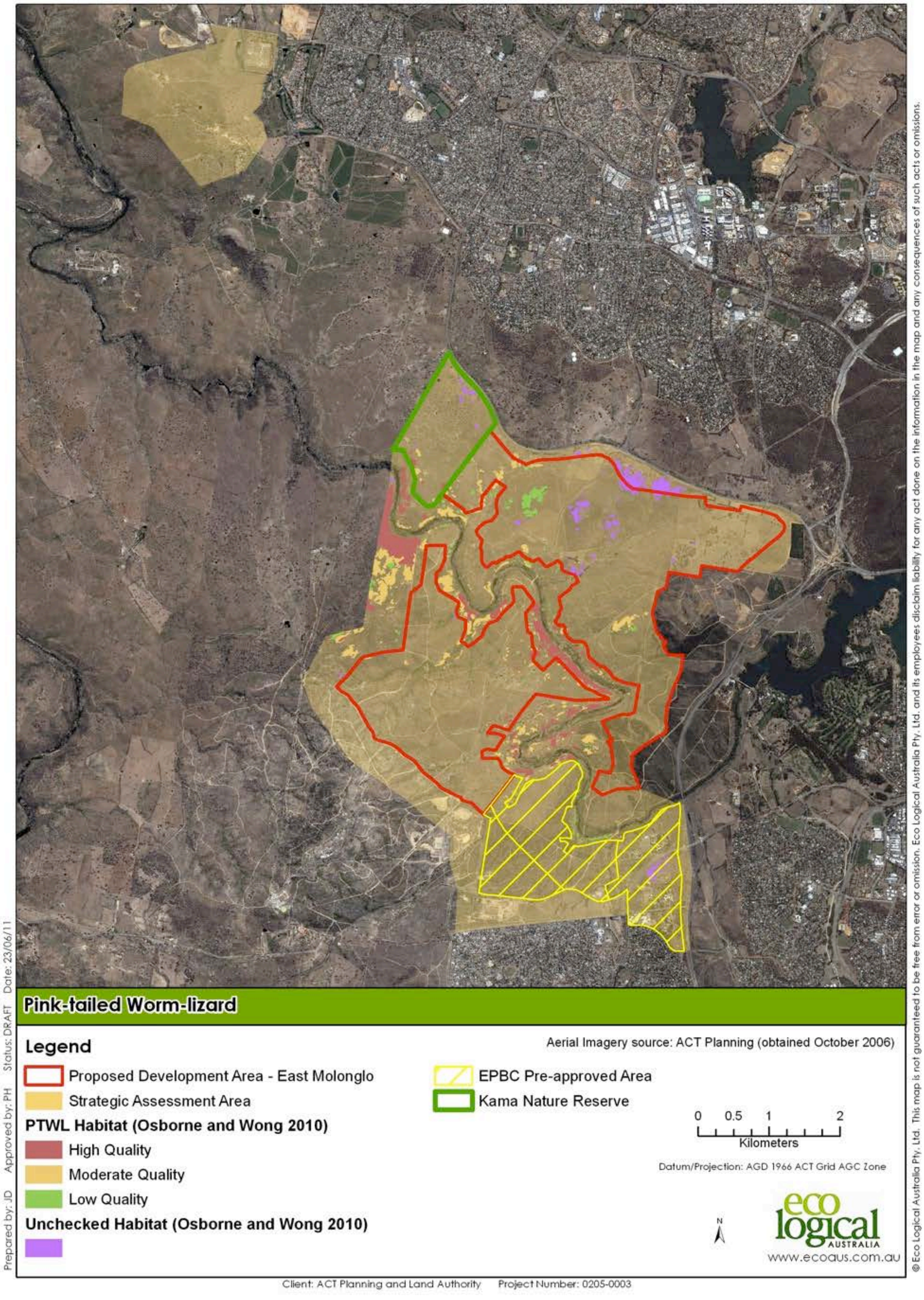

Figure 4: Pink-tailed Worm Lizard Habitat

2. DESCRIPTION OF ACTIVITIES UNDER THE NES PLAN

The NES Plan provides for urban development within the Molonglo Valley and establishes the ACT Government's commitments to protect MNES. This section of the NES Plan provides a high level description of the:

- development activities;
- conservation activities; and
- bushfire management framework.

2.1 Development activities

East Molonglo

East Molonglo will support an expected population of about 55,000 within a thirty year planning horizon. The Structure Plan map (Appendix 1) broadly outlines the elements which will make up East Molonglo. They include residential areas, open space and areas promoting ecological connectivity, major roads, neighbourhood areas, a major group centre in the south, a minor group centre in the north, and a range of neighbourhood activity nodes.

The area is divided by the Molonglo River into two distinct sections and there are two major roads which will connect these northern and southern areas. There will be a north-south arterial road and an east-west arterial road linking to the Tuggeranong Parkway. The area of development within East Molonglo (excluding the pre-approved area) is 1,356 ha (547 ha to the south of the Molonglo River and 809 ha to the north).

The Molonglo river corridor between the northern and southern areas will be an important area for both conservation and recreation. Development activities that will occur within the river corridor to support a population within East Molonglo include infrastructure to support development and a range of recreational facilities such as walking and cycling paths and community areas.

Infrastructure within the river corridor comprises the following activities and will be staged to be most cost effectively developed (in the following order):

- John Gorton Drive which includes the construction of dual bridges crossing the Molonglo River;
- East-West Arterial Road bridge crossing of the Molonglo River;
- water quality control ponds; water mains, sewer mains and sewer pump stations; and
- a combined sewer / pedestrian / cycle bridge.

Planning and development in East Molonglo is anticipated to occur in a three staged approach:

- **Stage 1** (planning complete and construction underway at the time of finalising the NES Plan) includes the suburbs of Coombs, Wright and North Weston;

- **Stage 2** is part of the ACT Government's accelerated land release program and will include residential suburbs to house up to 18,000 people and a principal commercial centre for the valley; and
- **Stage 3** which is anticipated for development to commence on or after 2021.

See Figure 5 for a map of the Development Stages.

West Molonglo

Under the Territory Plan West Molonglo is currently zoned broadacre. The land use specifications in this area are peri-urban rather than residential. Broadacre development codes permit the establishment and operation of agricultural and educational establishments, animal care facilities, tourist facilities and similar.

2.2 Conservation activities

The NES Plan also establishes a set of conservation activities to protect MNES. These are broadly based around two processes:

1. avoidance and mitigation of impacts on MNES; and
2. on-ground management and offsetting to provide maintenance and improvement of MNES values in important areas.

A summary of these processes is provided below and the detailed commitments that will give effect to these conservation activities are provided in Section 4.

Avoidance and mitigation

As a result of the EPBC Act strategic assessment process, the ACT Government has implemented and will continue to implement measures to avoid impacts on MNES. This will be achieved through:

- Variations to the East Molonglo development boundary to minimise the impact on MNES values. A particular focus of this is the reduction of impacts on moderate and high quality Pink-tailed Worm Lizard habitat.
- Designing infrastructure that will occur in the river corridor to avoid or minimise impacts to MNES. This process includes:
    - re-aligning the location of the major bridges (as compared to the original location proposed in the Molonglo Structure Plan) to minimise impacts on moderate and high quality Pink-tailed Worm Lizard habitat; and
    - aligning other infrastructure to avoid moderate and high quality Pink-tailed Worm Lizard habitat and Box-Gum Woodland where this can be achieved.
- A design principle to maintain ecological values within the East Molonglo development area where possible.
- A commitment to avoid impacts on MNES within West Molonglo.

It is important to note that at the time of finalising the NES Plan, these processes had yet to be finalised.

In relation to mitigation measures, the ACT Government will ensure that all construction activities (whether in the urban area or in the river corridor) will be subject to construction environmental management plans (CEMPs). These CEMPs will help to ensure that unnecessary impacts from construction (e.g. through the uncontrolled movement of machinery) are avoided. A detailed description of the content of CEMPs is provided in Section 4.

Management and offsetting

In addition to the processes to avoid and mitigate impacts, the ACT Government will adaptively manage and offset important areas within the strategic assessment area. These measures include:

- Establishment and management of the “Molonglo River Park” as an offset site along the East Molonglo River Corridor (see Figure 6). This process will occur in two stages.
    1. Stage One entails the development of a Park Concept Plan. This Plan will establish management zones within the Park, specifically identifying areas to be designated for conservation as well as identifying recreation areas and resolving public access. The Plan will also be complementary to the management approaches developed for the area of the river corridor adjacent to Coombs as required in relation to EPBC referral 2009/5050.
    2. Stage Two involves the development and implementation of a management plan for the river corridor with a focus on providing long-term outcomes for Box-Gum Woodland and the Pink-tailed Worm Lizard. This management plan will then inform a statutory Plan of Management for the East Molonglo River Corridor (as described in Section 5).
- Recognition of the Kama Nature Reserve as an offset site and ongoing management of the area with a focus on its MNES values (see Figure 6). This process will include the development and implementation of management plan for the Kama Nature Reserve that will provide for adaptive management and condition improvement of the reserve. This management plan will then inform a statutory Plan of Management for Kama Nature Reserve (as described in Section 5).
- The establishment of a buffer outside of the Kama Nature Reserve on its eastern side to protect the ecological values of the reserve.
- Establishment and management of Patch GG as an offset site by incorporating the area into the National Arboretum which is directly to the east (see Figure 6).
- Management of Box-Gum Woodland patches C, H and N to maintain and enhance their ecological values.
- Management of Box-Gum Woodland patches I, L, M and P to maintain their ecological values.
- Implementation of a number of research projects to improve the knowledge relating to conservation of Pink-tailed Worm Lizard and Box-Gum Woodland.
- Management of moderate and high quality Pink-tailed Worm Lizard habitat on the western boundary of East Molonglo to maintain and enhance their ecological values.

These measures are described in detail in Section 4.

2.3 Bushfire management framework

The Strategic Bushfire Management Plan (SBMP) for the ACT identifies the necessary strategies and actions which the ACT Government and the community of the ACT will implement to enhance the ACT's ability to suppress bushfires and reduce their consequences. The SBMP is available on the ACT Emergency Services website at http://www.esa.act.gov.au.

The SBMP considers a range of assets which may be impacted by bushfires including built, environmental (ecological, hydrological and physical), agricultural and cultural assets.

The SBMP is prepared in accordance with the requirements of the *Emergencies Act 2004* and assists with elements of land use planning in the ACT, particularly those areas susceptible to bushfires including areas proposed for new subdivisions. Consistent with the provisions of the *Planning and Development Act 2007* and the Territory Plan, there is a hierarchical approach to planning in the ACT from the broad district level (that is a Structure Plan), to the suburb level (that is a concept plan and precinct code) and then to site specific development applications (subdivision and development).

The SBMP provides for the application of bushfire management zones. These zones provide the cornerstone for prevention activities and inform the development of Regional Fire Management Plans detailing what and where specific actions will be undertaken.

Bushfire management zoning:

- provides an ACT-wide approach to bushfire risk mitigation, and is developed in a tenure neutral manner;
- strategically allocates areas of land to zones and where appropriate, with measurable treatment standards;
- locates and aligns the risk of bushfires starting, spreading and causing damage; and
- considers the principal purpose for land use, including ecological or production requirements, proximity to natural or built assets and appropriate strategies for bushfire control operations.

Within the strategic assessment area fire management will be aimed at the protection of both built assets and MNES values. This will be achieved through the identification of appropriate asset protection zones and the application of hazard reduction techniques that will both:

- ensure that the standards for fuel loads in the SBMP are met; and
- protect MNES values through the use of sympathetic management techniques.

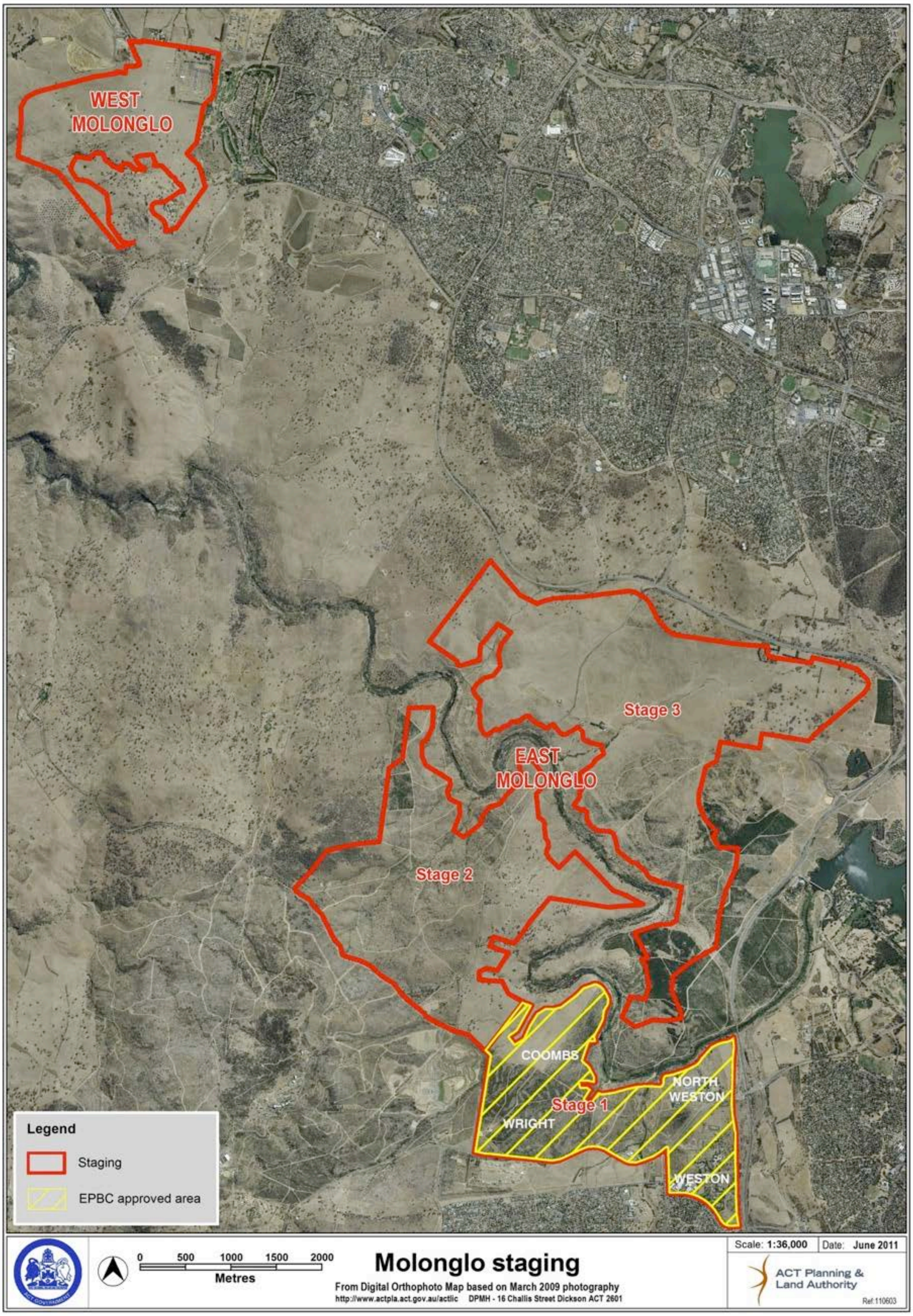

Figure 5: Staging of development

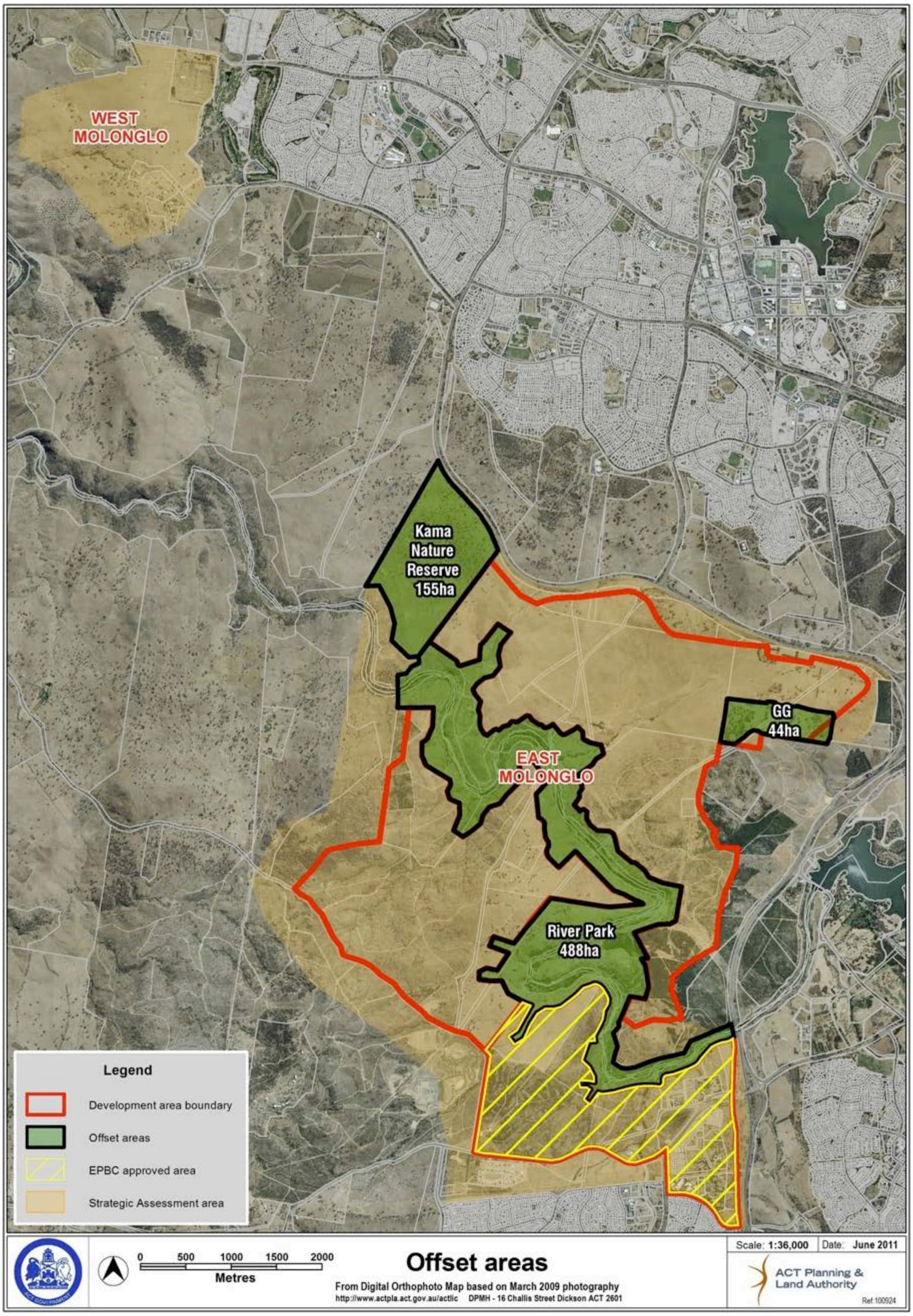

Figure 6: **Offset areas**

3. IMPLEMENTATION OF THE NES PLAN

The legislative framework for implementation of the NES Plan is described in this section.

3.1 Legislative framework

The introduction of self-government for the ACT in 1988 created a situation where the Commonwealth government and the ACT government share responsibility for the future development of Canberra and the territory.

All land in the territory belongs to the Commonwealth. However, pursuant to the *Australian Capital Territory (Planning and Land Management) Act 1988* (Cth) (Planning and Land Management Act), land within the territory is divided into two categories:

- national land which is declared by the Commonwealth Minister to be national land under s.27 of the *Planning and Land Management Act* and is managed by the National Capital Authority (NCA) and other Commonwealth Departments; and
- territory land which is the remainder of the land that has not been declared national land and is managed by the Environment and Sustainable Development Directorate.

The Commonwealth's Planning Responsibility

The Commonwealth's planning responsibility relates to Canberra as a national capital. It is established through the National Capital Plan (NCP), which describes the broad pattern of land uses that can be adopted in the development of the ACT. This ensures that Canberra broadly retains the characteristics with which it was originally planned.

National Capital Plan

The object of the NCP is to ensure that Canberra and the territory are planned and developed in accordance with their national significance (s.9 Planning and Land Management Act). In essence, the NCP is a blueprint for the future development of Canberra. It provides a framework of land uses within which the Territory Plan (TP) sits, as well as managing those aspects of Canberra and the territory that are special to the national capital role.

The NCP sets out planning policies, including a range of permitted uses. The land use policies contained in the Territory Plan are then chosen from this range of permitted uses.

The Territory's Planning Responsibility

The Australian Capital Territory's planning responsibility relates to Canberra as a city. It is established through the TP, managed by the Environment and Sustainable Development Directorate, under the *Planning and Development Act 2007* (Planning Act).

Like all territory legislation the Planning Act has no effect to the extent that it is inconsistent with the NCP, or in fact with the EPBC Act, but under s.11 of the Commonwealth *Planning and Land Management Act*, it is taken to be consistent with the NCP to the extent that it can operate concurrently with it.

Sustainable development within the territory

Throughout the Planning Act and the TP there is a strong emphasis on sustainable development. The object of the Planning Act (s.6) is to provide a planning and land system that contributes to the orderly and sustainable development of the ACT, consistent with the social, environmental and economic aspirations of the people of the ACT; and in accordance with sound financial principles. Sustainable development in this Act means (s.9) the effective integration of social, economic and environmental considerations in decision-making processes, achievable through implementation of the following principles:

- the precautionary principle— if there is a threat of serious or irreversible environmental damage, a lack of full scientific certainty should not be a reason to postpone preventative measures;
- the inter-generational equity principle—ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;
- conservation of biological diversity and ecological integrity; and
- appropriate valuation and pricing of environmental resources.

Under s.12, the Environment and Sustainable Development Directorate is required to exercise its functions in a way that, as far as practicable, gives effect to sustainable development. In addition there are several clauses within Part 5 of the Planning Act which require ‘sustainability principles’ and ‘principles for sustainable development’.

The Territory Plan (TP)

The TP, like the NCP, is established under the Commonwealth Planning and Land Management Act (s.25). The object of the TP is to ensure that planning and development provides the people of the ACT with an attractive, safe and efficient environment in which to live, work and have their recreation (s.48 of the Planning Act). Section 50 of the Planning Act states that nobody can do or approve an act that is inconsistent with the TP.

The Planning Act also requires that the TP contain a statement of strategic directions (s.51) which may contain planning principles covering areas of national, regional and territory interest, including principles for sustainable development (s.52). Chapter 5 of the Planning Act sets out the framework for the TP, which must include the following:

- a statement of strategic directions;
- objectives for each zone;
- development tables;
- codes; and
- a map (the TP map).

The TP may identify Future Urban Areas and include the structure plans that apply to those areas; identify areas of public land reserved in the plan (for example national parks and nature reserves) and make provision in relation to affordable residential housing.

The Molonglo Valley was identified as a Future Urban Area as part of this process. As required by the TP the corresponding Structure Plan set out the principles and policies for development of the area.

Chapter 5 of the *Planning and Development Act 2007* allows technical amendments to be made to the Structure Plan for Molonglo. These amendments must be consistent with the "policy purpose and policy framework" contained in the Structure Plan.

Canberra Spatial Plan

The Canberra Spatial Plan is intended to guide the Territory in its allocation of resources, such as the use of land and the construction of capital works as well as to inform changes to both the National Capital Plan and the Territory Plan. The Spatial Plan does not replace the Territory Plan – it is a strategic document to guide more detailed planning. It sets the framework for spatially based decision making in the future and outlines the actions needed to achieve the strategic direction for Canberra over the next 30 years.

ACT legislation and MNES in the strategic assessment area

The ACT has an environmental legal framework which provides for the protection, management and regulation of flora, fauna and aquatic and terrestrial environments in the ACT.

Compliance with the ACT's key environmental statutes is prescribed in the Planning Act. It is also important to note that under Division 3.3 of the *Nature Conservation Act 1980*, Pink-tailed Worm Lizard has been declared a vulnerable species and Natural Temperate Grassland and Box Gum Woodland[2] are declared endangered communities. The effect of these statutory declarations is that these species and communities need to be managed in accordance with a prescribed Action Plan, prepared by the Conservator for Flora and Fauna.

Action Plans are designed to:

- ensure, as far as is practicable, the identification, protection and survival of the species, or the ecological community; and
- minimise the effect of any process which threatens any species or ecological community.

3.2 Planning and design framework

A Planning and Design Framework is a guide for the development of a suburb or suburbs. It explains the location and layout of:

- future land uses such as housing, shops, schools and community facilities;
- infrastructure such as water and sewerage reticulation;
- road and open space networks; and
- services, such as electricity.

[2] The ACT Box Gum Woodland, Yellow Box – Red Gum Grassy Woodland, listed under the *Nature Conservation Act 1980*, is a component of the EPBC Act listed White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community.

A Planning and Design Framework is, in effect, a long term masterplan for a Future Urban Area and is based on background studies and analysis. Community involvement about the planning issues, challenges and possible options for the Molonglo Valley is a critical component of the Planning and Design Framework process.

Construction in the Molonglo Valley stage 2 and stage 3 will not commence before completion of the respective Planning and Design Frameworks for both stages 2 and 3. The final Planning and Design Frameworks will incorporate NES actions and commitments.

3.3 MNES protection in the Strategic Assessment area and ACT planning

All actions in the Strategic Assessment area, which would otherwise be controlled actions under Part 7 of the EPBC Act, are prescribed as assessable developments under Part 7 of the Planning Act. This means that the developer, in this case the ACT Government, must submit a development application to the Environment and Sustainable Development Directorate.

The ACT Government, as the proponent, will ensure that all development concerning MNES in the Strategic Assessment area is incorporated into any future development application and associated documentation to ensure any Commonwealth requirements are reflected in the decision by the Environment and Sustainable Development Directorate.

4. COMMITMENTS TO MNES

The ACT Government is committed to protecting MNES as part of development within the Molonglo valley. This section describes:

- The conservation outcomes that the ACT Government will deliver to protect MNES; and
- the actions that will be undertaken to achieve those outcomes.

As outlined previously, the key MNES within the strategic assessment area which are the focus of commitments in the NES Plan are:

- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box-Gum Woodland).
- *Natural Temperate Grassland of the Southern Tablelands of NSW and the ACT* (Natural Temperate Grassland).
- *Aprasia parapulchella* (Pink-tailed Worm Lizard).
- *Polytelis swainsonii* (Superb Parrot).
- *Lathamus discolour* (Swift Parrot).

See Figure 3 and Figure 4 for maps of Box-Gum Woodland, Natural Temperate Grassland and Pink-tailed Worm Lizard habitat in the strategic assessment area.

For detailed information about these MNES, reference should be made to:

1. the draft Strategic Assessment Report which was publicly exhibited and which provided a detailed assessment of the implications of the draft NES Plan; and
2. the Supplementary Assessment Report which addresses the issues raised in the public exhibition process and analyses the outcomes of the final NES Plan.

4.1 Box-Gum Woodland

Approximately 482 ha of EPBC Act listed Box-Gum Woodland (*White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland*) occurs in a number of fragmented patches of varying size and quality within the strategic assessment area (see Figure 3).

Conservation outcomes

The ACT Government will deliver the following conservation outcomes for Box-Gum Woodland:

a) Impacts to Box-Gum Woodland will be limited to a maximum of 110 ha and a range of measures will be implemented to minimise this area of impact.

b) Three offset sites will be established within the strategic assessment area (Kama Nature Reserve, Molonglo River Park, Patch GG) that will provide for the long term protection of 234 ha of Box-Gum Woodland (see Figure 6). The three offset sites will be adaptively managed to maintain and enhance the ecological condition***** of the Box-Gum Woodland that occurs there.

c) Adaptively manage 28 ha of Box-Gum Woodland within the strategic assessment area to maintain and enhance its ecological condition*****. This will be made up of patches C, H and N (see Figure 3).

d) Adaptively manage 45.4 ha of Box-Gum Woodland within the strategic assessment area to maintain its ecological condition*****. This will be made up of patches I, L, M and P (see Figure 3).

e) Maintenance and enhancement of the Box-Gum Woodland that occurs within the West Molonglo component of the strategic assessment area (see Figure 3).

f) Improving and applying the knowledge about the management of Box-Gum Woodland.

***** "Ecological condition" for Box-Gum Woodland will be measured using a peer reviewed, repeatable and scientifically robust methodology for examining and comparing the condition of woodland and derived grassland patches over time.

Actions to achieve the conservation outcomes

Conservation outcome (a) Impacts to Box-Gum Woodland will be limited to a maximum of 110 ha and a range of measures will be implemented to minimise this area of impact.		
Action	**Responsibility**	**Timing**
1. Ensure that the combined impacts on Box-Gum Woodland from development within East Molonglo and construction of infrastructure within the river corridor do no exceed 110 ha.	Environment and Sustainable Development Directorate	Throughout and on completion of the final Planning and Design Framework for both stages 2 and 3
2. Amend the East Molonglo river corridor boundary, in stages 2 and 3 respectively with a view to reducing the impacts to Box-Gum Woodland. This process will ensure that connectivity within the river corridor is maintained.	Environment and Sustainable Development Directorate	On completion of the final Planning and Design Framework for stages 2 and 3, respectively
3. Design the infrastructure that will occur in the river corridor to minimise impacts to Box-Gum Woodland.	Environment and Sustainable Development Directorate	Prior to the construction of infrastructure
4. Develop, implement and independently monitor Construction Environmental Management Plans (CEMPs) to ensure that unforseen direct or indirect impacts from construction activities within the development area and the river corridor are avoided. ***See Section 4.5 for information about the content of CEMPs.***	Environment and Sustainable Development Directorate	Development of the CEMPs prior to construction Implementation of the CEMPs during construction

Conservation outcome (b) Three offset sites will be established within the strategic assessment area (Kama Nature Reserve, Molonglo River Park, Patch GG) that will provide for the long term protection of 234 ha of Box-Gum Woodland (see Figure 6). The three offset sites will be adaptively managed to maintain and enhance the ecological condition of the Box-Gum Woodland that occurs there.		
Action	**Responsibility**	**Timing**
5. Develop a management plan for the Kama Nature Reserve to provide for the maintenance and enhancement of the ecological condition of Box-Gum Woodland within the reserve (approximately 117 ha). ***See Section 4.6 for information about the content of management plans.***	Environment and Sustainable Development Directorate and Territory and Municipal Services Directorate	Development prior to the commencement of the construction of Sewer 3 East[3] or within 2 years and 6 months of endorsement of the NES Plan; whichever occurs first.
6. Implement the management plan for the Kama Nature Reserve to provide for the maintenance and enhancement of the ecological condition of Box-Gum Woodland within the reserve.	Territory and Municipal Services Directorate	Commencement on completion of Action 5 Implementation ongoing
7. Establish a buffer outside the Kama Nature Reserve between the reserve and the proposed development area, and allow for appropriate uses consistent with nature conservation uses of the reserve. The buffer will be developed to ensure that fire management is undertaken outside of the Kama Nature Reserve and will provide protection against urban edge effects.	Environment and Sustainable Development Directorate	As part of the final Planning and Design Framework for stage 3

[3] Sewer 3 East

1. Sewer 3 East will be contained partially within the development boundary of Molonglo Stage 2 and partially within the river corridor (Section 2.1). It is proposed to start from south west of Coppins Crossing and traverse in a south easterly direction for approximately 1.5 km;
2. Construction will consist of the excavation of a trench, installation of pipe (150 mm to 375 mm diameter) and its backfill, and the construction of manholes;
3. Development in the northern half of Molonglo Stage 2 east of John Gorton Drive including a significant proportion of the Group Centre, cannot be provided with sewerage services without the completion of this sewer.

8. Develop a Park Concept Plan for the “Molonglo River Park” which will occur along the East Molonglo river corridor. This Plan will establish management zones within the Park, specifically identifying areas to be designated for conservation as well as identifying recreation areas and resolving public access. A key focus of this plan will be the protection of Box-Gum Woodland.	Environment and Sustainable Development Directorate	Development prior to the commencement of construction of John Gorton Drive Stage 2A[4] or within 1 year of endorsement of the NES Plan; whichever occurs first.
9. Develop a management plan for the Molonglo River Park to provide for the maintenance and enhancement of the ecological condition of Box-Gum Woodland within the park (approximately 73 ha). ***See Section 4.6 for information about the content of management plans.***	Environment and Sustainable Development Directorate and Territory and Municipal Services Directorate	Development prior to the commencement of the construction of the Sewer 3 East or within 2 years and 6 months of endorsement of the NES Plan; whichever occurs first.
10. Implement the management plan for the Molonglo River Park to provide for the maintenance and enhancement of the ecological condition of Box-Gum Woodland within the park.	Territory and Municipal Services Directorate	Commencement on completion of Action 9 Implementation ongoing
11. Establish Patch GG as an offset site by incorporating the area into the National Arboretum.	Environment and Sustainable Development Directorate	Established within 6 months of endorsement of the NES Plan
12. Develop a management plan for Patch GG to provide for the maintenance and enhancement of the ecological condition of Box-Gum Woodland within the park (approximately 44 ha). ***See Section 4.6 for information about the content of management plans.***	Territory and Municipal Services Directorate	Development prior to the commencement of the construction of the Sewer 3 East or within 2 years and 6 months of endorsement of the NES Plan; whichever occurs first.
13. Implement the management plan for Patch GG to provide for the maintenance and enhancement of the ecological condition of Box-Gum Woodland.	Territory and Municipal Services Directorate	Commencement on completion of Action 12 Implementation ongoing

[4] John Gorton Drive Stage 2A

1. John Gorton Drive Stage 2A will be a 2 lane, on each carriageway, arterial road. This section of the road will be a continuation of John Gorton Drive from the boundary between Molonglo Stages 1 and 2. It will continue in a northerly direction for approximately 1.6 km to link back(in the short term) to the existing Coppins Crossing Road near the site of the future Group Centre;
2. The road reservation width will be approximately 45 m with 2 carriageways (10 m each) separated by a median 12 m wide sufficient to accommodate an inter-town public transport (IPT) route including light rail if necessary;
3. This section of road is required to provide access into central Molonglo Stage 2. The road will also contain services required for the release of this land (water, electricity, gas, telecommunications).

Conservation outcome (c) Adaptively manage 28 ha of Box-Gum Woodland within the strategic assessment area to maintain and enhance its ecological condition*. This will be made up of patches C, H and N (see Figure 3).		
Action	**Responsibility**	**Timing**
14. Develop management plans for Box-Gum Woodland patches C, H, and N (see Figure 3) to provide for the maintenance and enhancement of the ecological condition of Box-Gum Woodland within these areas. ***See Section 4.6 for information about the content of management plans.***	Environment and Sustainable Development Directorate and Territory and Municipal Services Directorate	Development prior to the completion of the final Planning and Design Framework for stage 3
15. Implement management plans for Box-Gum Woodland patches C, H, and N (see Figure 3) to provide for the maintenance and enhancement of the ecological condition of Box-Gum Woodland within these areas.	Territory and Municipal Services Directorate	Commence on completion of Action 14 Implementation ongoing

Conservation outcome (d) Adaptively manage 45.4 ha of Box-Gum Woodland within the strategic assessment area to maintain its ecological condition*. This will be made up of patches I, L, M and P (see Figure 3).		
Action	**Responsibility**	**Timing**
16. Develop management plans for Box-Gum Woodland patches I, L, M and P (see Figure 3) to provide for the maintenance of the ecological condition of Box-Gum Woodland within these areas. ***See Section 4.6 for information about the content of management plans.***	Environment and Sustainable Development Directorate and Territory and Municipal Services Directorate	Development after completion of the adaptive management strategy (see Section 7) and within 2 years and 6 months of endorsement of the NES Plan
17. Undertake fuel hazard management in patches I, L, M and P (see Figure 3) with the management and protection of Box-Gum Woodland as a critical consideration (within the constraints of ensuring the safety of the urban population).	Territory and Municipal Services Directorate	On completion of Action 16
18. Annually monitor the condition of the Box-Gum Woodland patches I, L, M, P (total area of 45.4 ha) on the western boundary of East Molonglo to ensure that fuel hazard management is not negatively impacting on the Box-Gum Woodland values.	Territory and Municipal Services Directorate	On completion of Action 16
19. Should the monitoring in Action 18 show that: • for a period of two consecutive years; • more than 30% of the combined area of patches I, L, M, P (total area of 45.4 ha) no longer meets the EPBC Act listing criteria for Box-Gum Woodland; then the ACT Government will establish an offset site within two years of those monitoring results that meets the following criteria: • the offset will be in the Molonglo Valley; and • the offset will include a minimum of 90.8 ha of EPBC Act listed Box-Gum Woodland.	Chief Minister and Cabinet Directorate	If required
20. Should an offset site be required under Action 19, then the offsite site will be established as a Nature Reserve and managed consistently with the other offset sites (Kama Nature Reserve, Molonglo River Park, Patch GG).	Territory and Municipal Services Directorate and Environment and Sustainable Development Directorate	If required

Conservation outcome (e) Maintenance and enhancement of the Box-Gum Woodland that occurs within the West Molonglo component of the strategic assessment area (see Figure 3).		
Action	**Responsibility**	**Timing**
21. Manage the Box-Gum Woodland that occurs in West Molonglo in accordance with the terms of a Land Management Agreement (LMA). LMAs are required by Part 9.7 of the *Planning and Development Act 2007* for all non-urban leases. The LMA covering the BGW in West Molonglo contains a Land Action Plan which ensures that: • the ecological functioning and integrity of BGW on the lease is retained and improved; • the extent and character of the BGW is preserved; and • there is an Action Plan which details the activities, timeframes and performance measures put in place to ensure the conservation outcomes are met.	Territory and Municipal Services Directorate	Ongoing
22. West Molonglo is zoned broadacre and is not part of the ACT Government's current land release program. In the event that West Molonglo is developed in the future for broadacre uses or residential development then, subject to confirmatory ecological assessment of Box-Gum Woodland, the area of EPBC Act Box-Gum Woodland that occurs there will be set aside as a Nature Reserve.	Environment and Sustainable Development Directorate	If required the Nature Reserve will be established prior to construction in West Molonglo commencing

Conservation outcome (f) Improving and applying the knowledge about the management of Box-Gum Woodland.		
Action	**Responsibility**	**Timing**
23. Establish and manage an off-site restoration project, as an indirect offset, for Box-Gum Woodland. ***See Section 4.7 for information about the off-site restoration project.***	Territory and Municipal Services Directorate	Before development commences in Stage 2

4.2 Natural Temperate Grassland

Approximately 36 ha of Natural Temperate Grassland (*Natural Temperate Grassland of the Southern Tablelands of NSW and the ACT*) occurs within the Kama Nature Reserve (see Figure 3).

Conservation outcomes

The ACT Government will deliver the following conservation outcomes for Natural Temperate Grassland:

a) No direct or indirect impacts to Natural Temperate Grassland.

b) Adaptive management of the Natural Temperate Grassland that occurs within the Kama Nature Reserve to maintain and enhance its ecological condition*****.

***** "Ecological condition" for Natural Temperate Grassland will be measured using a peer reviewed, repeatable and scientifically robust methodology for examining and comparing the condition of grassland patches over time.

Actions to achieve the conservation outcomes

Conservation outcome (a) No direct or indirect impacts to Natural Temperate Grassland.		
Action	**Responsibility**	**Timing**
24. Protection of the Natural Temperate Grassland within the Kama Nature Reserve.	Territory and Municipal Services Directorate	Ongoing

Conservation outcome (b) Adaptive management of the Natural Temperate Grassland that occurs within the Kama Nature Reserve to maintain and enhance its ecological condition.		
Action	**Responsibility**	**Timing**
25. Develop a management plan for the Kama Nature Reserve to provide for the maintenance and enhancement of the ecological condition of Natural Temperate Grassland within the reserve. ***See Section 4.6 for information about the content of management plans.***	Environment and Sustainable Development Directorate and Territory and Municipal Services Directorate	Development prior to the commencement of the construction of the Sewer 3 East or within 2 years and 6 months of endorsement of the NES Plan; whichever occurs first.
26. Implement the management plan for the Kama Nature Reserve to provide for the maintenance and enhancement of the ecological condition of Natural Temperate Grassland within the reserve.	Territory and Municipal Services Directorate	Commencement on completion of Action 25 Implementation ongoing
27. Establish a buffer outside the Kama Nature Reserve between the reserve and the proposed development area, and allow for appropriate uses consistent with nature conservation uses of the reserve. The buffer will be developed to ensure that fire management is undertaken outside of the Kama Nature Reserve and will provide protection against urban edge effects.	Environment and Sustainable Development Directorate	As part of the final Planning and Design Framework for stage 3

4.3 Pink-tailed Worm Lizard

The Molonglo river corridor supports an important population of the Pink-tailed Worm Lizard (see Figure 4).

Conservation outcomes

The ACT Government will deliver the following conservation outcomes for Pink-tailed Worm Lizard (PTWL):

a) Impacts to high and moderate quality PTWL habitat will be limited to a maximum of 27 ha and a range of measures will be implemented to minimise this area of impact.

b) Two offset sites will be established within the strategic assessment area (Kama Nature Reserve and the Molonglo River Park) that will provide for the long term protection of 66 ha of high and moderate quality PTWL habitat (see Figure 6). These areas will be adaptively managed to maintain and enhance the ecological condition***** of the PTWL habitat that occurs there.

c) Continued protection of 28.1 ha of high and moderate quality PTWL habitat within the Lower Molonglo Nature Reserve (see Figure 4). These areas will be adaptively managed to maintain the ecological condition***** of the PTWL habitat that occurs there.

d) Protection of an additional 23.3 ha of high and moderate quality PTWL habitat within the strategic assessment area outside of the development and offset areas (see Figure 4). These areas will be adaptively managed to maintain and enhance the ecological condition***** of the PTWL habitat that occurs there.

e) Improving and applying the knowledge about the management of PTWL.

***** “Ecological condition” of PTWL habitat will be measured using the criteria described in “Osborne, W., and Wong, D. (2010) *Extent of potential pink-tailed worm-lizard (Aprasia parapulchella) habitat in the Stage 2 Investigation Area – East Molonglo downstream of Coppins Crossing*. Report commissioned by ACTPLA”.

Actions to achieve the conservation outcomes

Conservation outcome (a) Impacts to high and moderate quality PTWL habitat will be limited to a maximum of 27 ha and a range of measures will be implemented to minimise this area of impact.		
Action	**Responsibility**	**Timing**
28. Ensure that the combined impacts on high and moderate quality PTWL habitat from development within East Molonglo and construction of infrastructure within the river corridor do not exceed 27 ha.	Environment and Sustainable Development Directorate	On completion of the final Planning and Design Framework stages 2 and 3 respectively
29. Amend the East Molonglo river corridor boundary in stages 2 and 3 respectively with a view to reducing impacts to high and moderate quality PTWL habitat. This process will ensure that connectivity within the river corridor is maintained.	Environment and Sustainable Development Directorate	On completion of the final Planning and Design Framework stages 2 and 3 respectively
30. Design the infrastructure that will occur in the river corridor to minimise impacts to high and moderate quality PTWL habitat.	Environment and Sustainable Development Directorate	Prior to the construction of infrastructure
31. Develop, implement and independently monitor Construction Environmental Management Plans (CEMPs) to ensure that unforseen direct or indirect impacts from construction activities within the development area and the river corridor are avoided. ***See Section 4.5 for information about the content of CEMPs.***	Environment and Sustainable Development Directorate	Development of the CEMPs prior to construction Implementation of the CEMPs during construction

Conservation outcome (b) Two offset sites will be established within the strategic assessment area (Kama Nature Reserve and the Molonglo River Park) that will provide for the long term protection of 66 ha of high and moderate quality PTWL habitat (see Figure 6). These areas will be adaptively managed to maintain and enhance the ecological condition* of the PTWL habitat that occurs there.		
Action	**Responsibility**	**Timing**
32. Develop a management plan for the Kama Nature Reserve to provide for the maintenance and enhancement of the ecological condition of all PTWL habitat within the reserve (approximately 6 ha which includes 3.33 ha of high and moderate quality habitat). ***See Section 4.6 for information about the content of management plans.***	Environment and Sustainable Development Directorate and Territory and Municipal Services Directorate	Development prior to the commencement of the construction of the Sewer 3 East or within 2 years and 6 months of endorsement of the NES Plan; whichever occurs first.
33. Implement the management plan for the Kama Nature Reserve to provide for the maintenance and enhancement of the ecological condition of all PTWL habitat within the reserve.	Territory and Municipal Services Directorate	Commencement on completion of Action 32 Implementation ongoing
34. Establish a buffer outside the Kama Nature Reserve between the reserve and the proposed development area, and allow for appropriate uses consistent with nature conservation uses of the reserve. The buffer will be developed to ensure that fire management is undertaken outside of the Kama Nature Reserve and will provide protection against urban edge effects.	Environment and Sustainable Development Directorate	As part of the final Planning and Design Framework for stage 3
35. Develop a Park Concept Plan for the “Molonglo River Park” which will occur along the East Molonglo river corridor. This Plan will establish management zones within the Park, specifically identifying areas to be designated for conservation as well as identifying recreation areas and resolving public access. A key focus of this will plan will be the protection of high and moderate quality PTWL habitat.	Environment and Sustainable Development Directorate	Development prior to the commencement of construction of John Gorton Drive Stage 2A or within 1 year of endorsement of the NES Plan; whichever occurs first.
36. Develop a management plan for the Molonglo River Park to provide for the maintenance and enhancement of the ecological condition of high and moderate quality PTWL habitat within the park (approximately 62 ha). ***See Section 4.6 for information about the content of management plans.***	Environment and Sustainable Development Directorate and Territory and Municipal Services Directorate	Development prior to the commencement of the construction of the Sewer 3 East or within 2 years and 6 months of endorsement of the NES Plan; whichever occurs first.

37. Establish a 20 m buffer around high and moderate quality Pink-tailed Worm Lizard habitat (other than, for example the areas to be impacted by the bridge crossings and strategically placed walking tracks) within the East Molonglo river corridor. Manage these areas to ensure the maintenance of their conservation value. Management measures (as outlined in Section 3) will be incorporated into the management plan for the river corridor.	Environment and Sustainable Development Directorate	On completion of the final Planning and Design Framework for stage 2 and completion of the Park Concept Plan.
38. Implement the management plan for the Molonglo River Park to provide for the maintenance and enhancement of the ecological condition of high and moderate quality PTWL habitat within the park.	Territory and Municipal Services Directorate	Commencement on completion of Action 36 Implementation ongoing
39. Register a disallowable instrument under the *Domestic Animals Act 2000* to effect a cat containment policy for the Molonglo area.	Territory and Municipal Services Directorate	30 June 2012

Conservation outcome (c) Continued protection of 28.1 ha of high and moderate quality PTWL habitat within the Lower Molonglo Nature Reserve (see Figure 4). These areas will be adaptively managed to maintain the ecological condition* of the PTWL habitat that occurs there.		
Action	**Responsibility**	**Timing**
40. Continued implementation of the Plan of Management for the Lower Molonglo Nature Reserve to provide for the maintenance of the ecological condition of the high and moderate quality PTWL habitat that occurs there (approximately 28.1 ha).	Territory and Municipal Services Directorate	Ongoing

Conservation outcome (d) Protection of an additional 23.3 ha of high and moderate quality PTWL habitat within the strategic assessment area outside of the development and offset areas (see Figure 4). These areas will be adaptively managed to maintain and enhance the ecological condition* of the PTWL habitat that occurs there.		
Action	**Responsibility**	**Timing**
41. Develop management plans for the other areas of high and moderate quality PTWL habitat that occurs within the strategic assessment area and outside of the development and offset areas (approximately 23.3 ha) to provide for the maintenance and enhancement of the ecological condition of the PTWL habitat within these areas. ***See Section 4.6 for information about the content of management plans.***	Environment and Sustainable Development Directorate	Development after completion of the adaptive management strategy (see Section 7) and within 2 years and 6 months of endorsement of the NES Plan
42. Implement management plans for the other areas of high and moderate quality PTWL habitat that occurs within the strategic assessment area and outside of the development and offset areas (approximately 23.3 ha) to provide for the maintenance and enhancement of the ecological condition of the PTWL habitat within these areas.	Territory and Municipal Services Directorate	Commencement on completion of Action 41 Implementation ongoing

Conservation outcome (e) Improving and applying the knowledge about the management of PTWL.		
Action	**Responsibility**	**Timing**
43. Undertake a research project examining the effects on PTWL of disturbance and proximity to urban areas. ***See Section 4.8 for information about the PTWL research project.***	Environment and Sustainable Development Directorate	Commencement within 6 months of endorsement and incorporated into the Planning and Design Frameworks for both stages 2 and 3
44. Amend the development boundary, adjacent to high and moderate quality PTWL habitat on the western edge to avoid: • direct impact from bushfire management – the Outer Asset Protection Zone (OAPZ) and Inner Asset Protection Zones (IAPZ) will be between the PTWL habitat and the development boundary; and • indirect impacts from urban development.	Environment and Sustainable Development Directorate	Boundary amendment will be incorporated immediately into the draft Planning and Design Framework for stage 2. The boundary amendment will be prescribed by a Territory Plan amendment, post completion of the Estate Development Plan (EDP) for stage 2

4.4 Superb Parrot and Swift Parrot

Remnant patches of Box-Gum Woodland, particularly to the west of East Molonglo, provide suitable and potential habitat for the Superb and Swift Parrots.

Conservation outcomes and actions

The implementation of the NES Plan will result in the direct loss of approximately 40 ha of Box-Gum Woodland that supports mature overstorey species. However, approximately 313 ha of the Box-Gum Woodland that will be retained in the strategic assessment area supports important overstorey species that may provide foraging habitat for Superb and Swift Parrots. Given the clear link between Box-Gum Woodland areas containing an overstorey and habitat values for these two species, many of the conservation outcomes and actions for Box-Gum Woodland (see Section 4.1) will also provide positive outcomes for the Superb and Swift Parrots.

The most important conservation outcome for these species is the protection and ongoing management of the Kama Nature Reserve which includes approximately 117 ha of Box-Gum Woodland. Most of the Box-Gum Woodland in the reserve includes a healthy and diverse overstorey which provides potential habitat for the Superb and Swift Parrots.

Additionally, conservation outcomes detailed in Section 4.1 for Patches C, D, H, I, L, M, P, T, West Molonglo and Patch GG will benefit Superb and Swift Parrots.

4.5 Construction Environmental Management Plans (CEMPs)

This section is relevant to Actions 4 and 31.

In order to manage the potential indirect impacts from construction activities within the development area and the river corridor, construction environmental management plans (CEMPs) for the various construction phases and activities will be developed and implemented.

These plans will be required as part of the Development Approval process under the *Planning and Development Act 20*07 and will be developed by qualified environmental professionals with a focus on protecting adjacent areas.

The CEMPs will include (at a minimum):

- Safeguards for controlling heavy machinery movement to avoid adjacent habitat areas (e.g. temporary fencing).
- Erosion prevention and mitigation measures. For example, the use of mesh sediment fences to prevent construction materials from entering adjacent habitat areas.
- Weed and disease control measures.
- Measures to relocate animals that are found within construction areas.
- Appropriate monitoring and reporting.

Where impacts to Pink-tailed Worm Lizard occur as part of the development, the CEMPs will also include a habitat rehabilitation component. They will be developed by an expert in Pink-tailed Worm Lizard management and guided by information in the Draft Recovery Plan for the Pink-tailed Worm Lizard (Brown, G .2010. *National Recovery Plan for the Pink-tailed Worm-Lizard Aprasia parapulchella*. Draft for Comment 2010) [5]. They will include (at a minimum):

- For areas that will be impacted directly, habitat features (e.g. rocks and topsoil) will be stockpiled for use in rehabilitation.
- Rehabilitation activities will be focused on areas that will improve the connectivity and size of existing high and moderate quality habitat within the river corridor.
- Efforts to promote the movement of the species throughout the river corridor, including under the bridges (e.g. through placement of suitable rocks under the bridges).
- Weed control and fencing of habitat areas to promote their resilience.
- Appropriate monitoring and reporting of outcomes.

4.6 Management plans

This section is relevant to actions 5, 9, 12, 14, 16, 25, 32, 36 and 41.

Management plans will provide the conservation management framework and specify the actions that the ACT Government will carry out to maintain and enhance the MNES values within the strategic assessment area. This section outlines the process by which management plans will be developed and implemented.

Conservation management experience

The ACT Government has significant experience in conservation management. For example, the ACT Government has substantial expertise and experience with managing woodland and grassland ecosystems through its Nature Reserve system (e.g. Mulanggari, Gungaderra, Crace, Mulligans Flat, Mount Ainslie and Mount Majura).

There are a number of resources that provide useful guidance about the management requirements for MNES values within the strategic assessment area. The best practice management approaches from these resources will be adopted. They include:

- ACT Government (2004) *Woodlands for Wildlife: ACT Lowland Woodland Conservation Strategy*. Action Plan No. 27.
- ACT Government (2005) *A Vision Splendid of the Grassy Plains Extended: ACT Lowland Native Grassland Conservation Strategy*. Action Plan No. 28.
- ACT Government (2007) *Ribbons of Life: ACT Aquatic Species and Riparian Zone Conservation Strategy*. Action Plan No. 29.
- Osborne, W. (2008a) *Environmental planning principles for the protection of the Pink-tailed Worm Lizard Aprasia parapulchella in the Lower Molonglo Valley, ACT*.

[5] And subsequent final release of the recovery plan

- Osborne, W. (2008b) *Assessment of Pink-tailed Worm Lizard (Aprasia parapulchella) habitat along the proposed Molonglo Trunk Sewer. Implications of the EPBC Act*.
- ACT Government (2002) *Lower Molonglo River Corridor Plan of Management.*
- Brown, G (2010) *National Recovery Plan for the Pink-tailed Worm-Lizard Aprasia parapulchella*. Draft for Comment 2010[6].
- Department of Environment, Climate Change and Water NSW. 2010. *Draft National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. Department of Environment, Climate Change and Water NSW, Sydney[7].

In addition to drawing on these resources, the management plans will:

- incorporate the research findings from the projects required as a result of EPBC referral 2009/5156; and
- be complementary to the management approaches developed for the area of the river corridor adjacent to Coombs as required in relation to EPBC referral 2009/5050.

Adaptive management

Adaptive management is a key principle for the management of MNES values within the strategic assessment area. It is a systematic process for continually improving management practices through monitoring and evaluation. Figure 7 below shows the general adaptive management process.

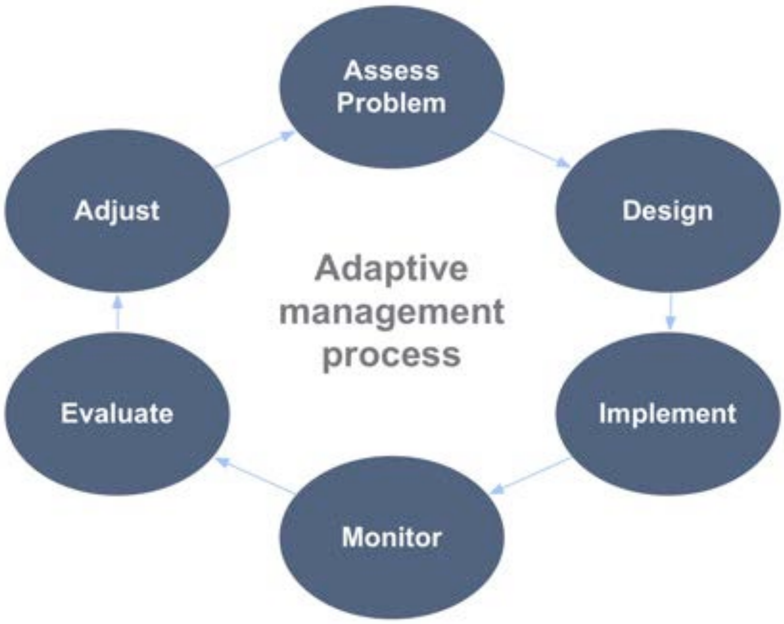

Figure 7: Adaptive management process

[6] And subsequent final release of the recovery plan

[7] And subsequent final release of the recovery plan

This adaptive management approach will be built into the Adaptive Management Strategy (Section 7) and individual management plans.

Content of the management plans

Each of the management plans will be developed by experts in species and conservation management within the ACT Government and be based on:

- a set of overarching principles; and
- more detailed considerations that are relevant to the MNES values of each area.

The overarching principles that will inform the Adaptive Management Strategy (Section 7) and each of the management plans are:

- Management will be based on an adaptive management process.
- Management will be focused on the ecological condition of MNES values. Ecological condition is defined differently depending on the specific MNES (see Sections 4.1 to 4.3). Baseline monitoring will be conducted to determine the starting point for ecological condition in the strategic assessment area.
- Objectives, performance targets and measurable performance indicators for each management area will be set. These will include management, performance and MNES condition milestones to be achieved over time. For example, in the three offset areas the objective of management will be to maintain and enhance the ecological condition of the MNES values, and so these targets will set a trajectory for their attainment within an active adaptive management framework.
- Conservation strategies, processes and timeframes will be defined to achieve targets and implement the plans, including allocation of responsibilities and identification of the necessary resources.
- Mechanisms will be established to monitor, evaluate, and annually report on progress to achieve objectives for management, including how management actions will be adjusted to account for new information. This new information will include new, peer reviewed scientific literature. Annual reports will be made publicly available.

In terms of more detailed considerations for management, the following issues will be incorporated into the management plans:

- Protection of MNES values. Box-Gum Woodland, Natural Temperate Grassland and high and moderate quality Pink-tailed Worm Lizard habitat will be protected.
- For high and moderate quality Pink-tailed Worm Lizard habitat, 20 m buffers will be provided (other than areas to be impacted by infrastructure construction). The buffer areas will be managed specifically for conservation. Facilities such as major paths or roads will be built outside this zone. However, facilities that contribute to the long term conservation outcomes for the habitat may be provided within habitat or buffer areas (as long as the maximum area of habitat to be impacted is not exceeded). For example, access points to the river will be provided at strategic points in order to provide controlled movement of people in the area. These may cross habitat at appropriate points in order to minimise uncontrolled movement of people. Planning for

these potential facilities will be incorporated into the management planning framework for the river corridor.

- Appropriate fire management. The application of fire and other fuel mitigation measures will take into account ecological fire thresholds for Box-Gum Woodland, Natural Temperate Grassland and Pink-tailed Worm Lizard habitat.
- Appropriate biomass control to achieve/maintain environmental condition targets.
- Control of access to achieve/maintain environmental condition targets.
- Weed management, with priority given to reducing weed species that have the greatest adverse ecological impact.
- Feral animal management to avoid native animal predation and rabbit grazing.
- Management of hydrological processes.
- Restoration of the ecological attributes lost within the lower Molonglo Valley landscape.
- Appropriate condition monitoring. The monitoring regime will take into account and track the ecological condition of Box-Gum Woodland, Natural Temperate Grassland and the Pink-tailed Worm Lizard habitat against the objectives for management.

4.7 Box-Gum Woodland off-site restoration project

This section is relevant to action 23.

The indirect offset project for Box-Gum Woodland is designed to provide long term conservation outcomes. It addresses one of the key challenges in relation to woodland restoration and rehabilitation, that of limited information. It also addresses the need for the highest level of certainty possible in relation to the design of indirect offset projects.

The ACT Government will deliver an off-site restoration project in collaboration with local partners with expertise in the field of land restoration. The program will involve seed collection from within the strategic assessment area with a view to using that resource for Box-Gum Woodland restoration within Patch GG. Seed will also be stored for potential use in future restoration projects.

The program will be delivered through six key restoration stages. The activities are tabled below and will include engaging with local stakeholder groups and project partners, and referencing current plans and strategies and applying best practice. An adaptive management process will be used so that restoration interventions can be tailored based on system responses and changing circumstances.

Core Activity	Activity Description
1. Site assessment & recommendations	Field visits to Box-Gum Woodland sites to be lost to development and sites to be kept and enhanced: 1. Identify presence and frequency of plant species - native and exotic 2. Recommend species to introduce, reintroduce or increase underrepresented populations 3. Investigate the merits and processes of translocating Box-Gum Woodland species from areas to be lost into patch GG (especially key understorey species) 4. Develop a seed supply and propagation works plan referencing items 1 & 2 above and drawing on the availability of collecting plant material from nearby sites of higher quality
2. Rehabilitation Scoping Study	Scope a woodland revegetation and restoration plan that will factor development stages, weed management & incorporate local knowledge about species availability and successful reestablishment approaches
3. Seed supply & plant rescue future use at Patch GG	1. Identify current provenance stock in regional seed banks that would be suitable for use in high-conservation box gum woodland restoration 2. Collect, process and store needed seed in accordance to the national code of practice, "FloraBank" 3. Rescue plants or collect plant material from species of significance that will be destroyed – this may involve establishing temporary or permanent seed production areas in consultation with the ACT Government
4. Plant production	Seasonally propagate plants in accordance to the rehabilitation plan e.g. quantities and species
5. On-ground rehabilitation works	Deliver staged works in accordance to the rehabilitation plan. This will be seasonally influenced by the weather e.g. best time for planting is autumn & spring
6. Monitoring and evaluation	Establish benchmark data & monitor rehabilitation success using scientifically credited performance measurements already adopted by regional leaders in rehabilitation assurance Throughout the duration of the 30 year plan results will be used to review on-ground ecological performance and where relevant implement best practice change or modification

4.8 Pink-tailed Worm Lizard research project

This section is relevant to action 43.

Scientific data, especially in relation to the management and conservation of the Pink-tailed Worm Lizard in, and adjacent to, areas of urban development, is incomplete.

The potential indirect effects of urban development include weed spread, increased feral animal predation, direct disturbance by people traversing habitat, construction of urban infrastructure such as roads, and inappropriate management of asset protection buffers.

It is an objective of the ACT Government to ensure that the potential for residential impacts on the Pink-tailed Worm Lizard be avoided or mitigated. To better understand how to achieve this objective the ACT Government will implement an indirect offset in the form of a research project examining the long term survival of Pink-tailed Worm Lizard in an urbanised landscape.

The research project will adopt a tri-staged approach:

1. Mt. Taylor, a reserve unit within Canberra Nature Park, is surrounded by an urban matrix (housing, roads, facilities, easements etc). The focus of this first stage of the study will be:
    a. habitat disturbance, including fragmentation, and the effect of habitat proximity to urban areas.
    b. In accordance with the draft National Recovery Plan for Pink-tailed Worm Lizards (Brown 2010), develop low-impact survey and monitoring techniques for the species.

    The outcomes of this research will be applied to management within the East Molonglo strategic assessment area.

2. The results of the Mt Taylor study will be incorporated into the second stage of the project. The second stage will involve the following sub-projects:
    c. extensive survey work to determine population densities in areas of low, moderate and high quality Pink-tailed Worm Lizard habitat in the Strategic Assessment area;
    d. field trials, to be conducted in areas of low quality habitat only, involving different methods of translocation; and
    e. research and field trials involving methods for reducing habitat fragmentation and increasing connectivity.

3. The NES Plan actions (see Section 4) include the monitoring of Pink-tailed Worm Lizard in the Strategic Assessment area. This monitoring is vital to ensure the long term survival and enhancement of the lizard population. Monitoring also provides a warning system should the population and/or habitat begin to show any signs of decline.

This third stage of the project provides a link between the stage 2 research and the monitoring of Pink-tailed Worm Lizard in the Strategic Assessment area. Where population and habitat monitoring show any change to base-line data (established prior to Stage 2 development) the results of the stage 2 research will be applied to establish possible causes and to mitigate adverse impacts.

5. STATUTORY PLANS OF MANAGEMENT

Plans of Management are a statutory requirement under the *Planning and Development Act 2007* and provide a policy framework for ongoing management. The Conservator of Flora and Fauna (established under the *Nature Conservation Act 1980*) can determine management objectives to be incorporated into Plans of Management.

Statutory Plans of Management will be developed for both the Kama Nature Reserve and the Molonglo River Park. These Plans will formalise the management plans that will already have been developed and implemented for these areas (see Section 4).

The Plans of Management will be developed within 3 years of endorsement of the NES Plan or prior to commencement of the Molonglo Group Centre Infrastructure Stage 1[8]; whichever occurs first.

6. ANNUAL REPORTING

The ACT Government will monitor and report annually to the public on the implementation of the NES Plan. The primary purpose of monitoring and reporting is to ensure that the conservation outcomes described in the NES Plan are achieved.

An annual report highlighting the conservation outcomes achieved in the previous year will be published by the ACT Government and be provided to SEWPaC. The Report will include the monitoring results on the condition of the MNES, conservation outcomes (as listed in Section 4) and the outcomes of enhancement projects. The report will be completed within five months of the end of each financial year and will be made publicly available.

7. ADAPTIVE MANAGEMENT STRATEGY

The Adaptive Management Strategy will set out the framework for achieving the NES Plan's commitments through monitoring, evaluation, experimental design, reporting, auditing and continuous improvement processes.

The Strategy will inform the content and timing of specific management plans and actions to ensure a consistent, integrated and efficient application of adaptive management principles

[8] Molonglo Group Centre

1. The Group Centre will be located generally at the centre of Molonglo Stage 2.
2. Infrastructure associated with the Group Centre will consist of roads, sewers, water mains and, other services such as gas, electricity and communications. The roads will define the development blocks;
3. Development of the Group Centre and the sale of blocks cannot proceed without this infrastructure.

and practices to achieve long term conservation outcomes for MNES. The Strategy will set out:

- How the process and principles outlined in Section 4.6 will be applied.
- How the baseline ecological condition of MNES will be established, measured and monitored in accordance with commitments in Sections 4.1 to 4.3, including:
    - monitoring methods, tools, standards, timing and frequency, and
    - accountabilities for monitoring, evaluation and reporting tasks.
- A map of managed lands within the strategic assessment area.
- How the Strategy will be applied to protect and/or enhance (a) moderate and high quality Pink-tailed Worm Lizard habitat, (b) Natural Temperate Grassland and (c) Box Gum Woodlands protected and/or enhanced under the NES Plan.
- The MNES objectives and performance targets for the strategic assessment area.
- The process for determining the conservation objectives, performance targets, measurable performance indicators and milestones (in terms of outputs and condition outcome) for each parcel of managed land within the strategic assessment area.
- Contingency planning to respond to desired maintenance and/or enhancement objectives not being met, and to unforseen impacts and/or effects, including identifying thresholds and triggers.
- How management plans will be updated and will respond to findings from:
    - the monitoring, evaluation and reporting programs for MNES objectives and performance targets;
    - relevant learnings from lands outside of the strategic assessment area and how they will be applied[9] within the continuous improvement framework;
    - research conducted to address key uncertainties[10]; and
    - new peer reviewed scientific literature and how it will be applied within a continuous improvement framework.
- A framework for reporting MNES condition outcomes against the NES Plan commitments.

The timing for the completion and approval of the Adaptive Management Strategy will be prior to the commencement of construction of the Sewer 3 West[11] or within 18 months of endorsement of the NES Plan, whichever occurs first.

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[9] E.g. outcomes from Mulligan's Flat Nature Reserve, Goorooyaroo Nature Reserve and other

[10] E.g. including outcomes from the Pink-tailed Worm Lizard research discussed in Section 4.8

[11] Sewer 3 West

1. Sewer 3 West will be contained wholly within the development boundary of Molonglo Stage 2. It is proposed to start at the site of Cravens Creek water quality control pond on Cravens Creek and traverse in a north westerly direction for approximately 1.3 km;
2. Construction will consist of the excavation of a trench, installation of pipe (300 mm to 375 mm diameter) and its backfill, and the construction of manholes;
3. Development in the majority of the area west of Coppins Creek cannot be provided with sewerage services without the completion of this sewer.

The Adaptive Management Strategy will be submitted for approval by the Minister or delegate.

The approved Adaptive Management Strategy will be implemented by the ACT Government.

8. COMPLIANCE AND ENFORCEMENT

The Annual Report will be the primary mechanism for identifying:

- achievement of the MNES conservation outcomes identified in Section 4;
- progress in completing the actions listed in Section 4; and
- any deviation or non-compliance with the actions outlined in Section 4.

The EPBC Act precludes the taking of any action that is likely to have a significant impact on MNES without a valid approval.

Where a development activity that is undertaken in a way that is not in accordance with the requirements or commitments documented in the NES Plan (thereby potentially contravening any approval) the following procedure will be used:

1. Annual Report identifies deviation from or non-compliance with a MNES conservation outcome or action to achieve an outcome.
2. Commonwealth Government analyses the deviation / non-compliance and considers the importance in terms of impacts on MNES.
3. Commonwealth Government advises that either:
    - deviation / non-compliance is minor or trivial and no further action is required; or
    - deviation / non-compliance requires corrective action.
4. In the event that corrective action is required the Director General, ACT Chief Minister's Directorate will be provided with an opportunity to correct the non-compliance. For example, in the case of non-compliance with a conservation outcome, the ACT Government must submit a remedial plan for addressing non-compliance for approval by the commonwealth Government. The Commonwealth government may approve the remedial plan and actions must be taken to the Commonwealth Minister's satisfaction.

9. AUDITING

The NES Plan and its associated actions will be audited by an independent, third party expert every five years, for a 30 year period.

A customised audit protocol will be developed with the auditor to ensure that:

- commitments made by the ACT Government in the NES plan are being adhered to; and
- conservation outcomes for the MNES are being achieved.

The audit reports will be provided to SEWPaC for their consideration.

10. REASONABLE ASSURANCE

The ACT Government is committed to ensuring the conservation outcomes for the MNES. The legislative, administrative and financial resources to effect this assurance are committed by the ACT government through:

- the NES Plan;
- statutory requirements under the ACT’s legislative framework; and
- the establishment of evaluation, reporting and monitoring mechanisms.

The Treasury Directorate will ensure that the commitments and actions in the NES Plan are funded.

Commensurate with the structure of the ACT Government, the Director General, ACT Chief Minister’s Directorate, has primary responsibility for this assurance.

APPENDIX 1: STRUCTURE PLAN

The Structure Plan may be subject to technical amendments as more detailed planning progresses. It is shown here for indicative purposes only.

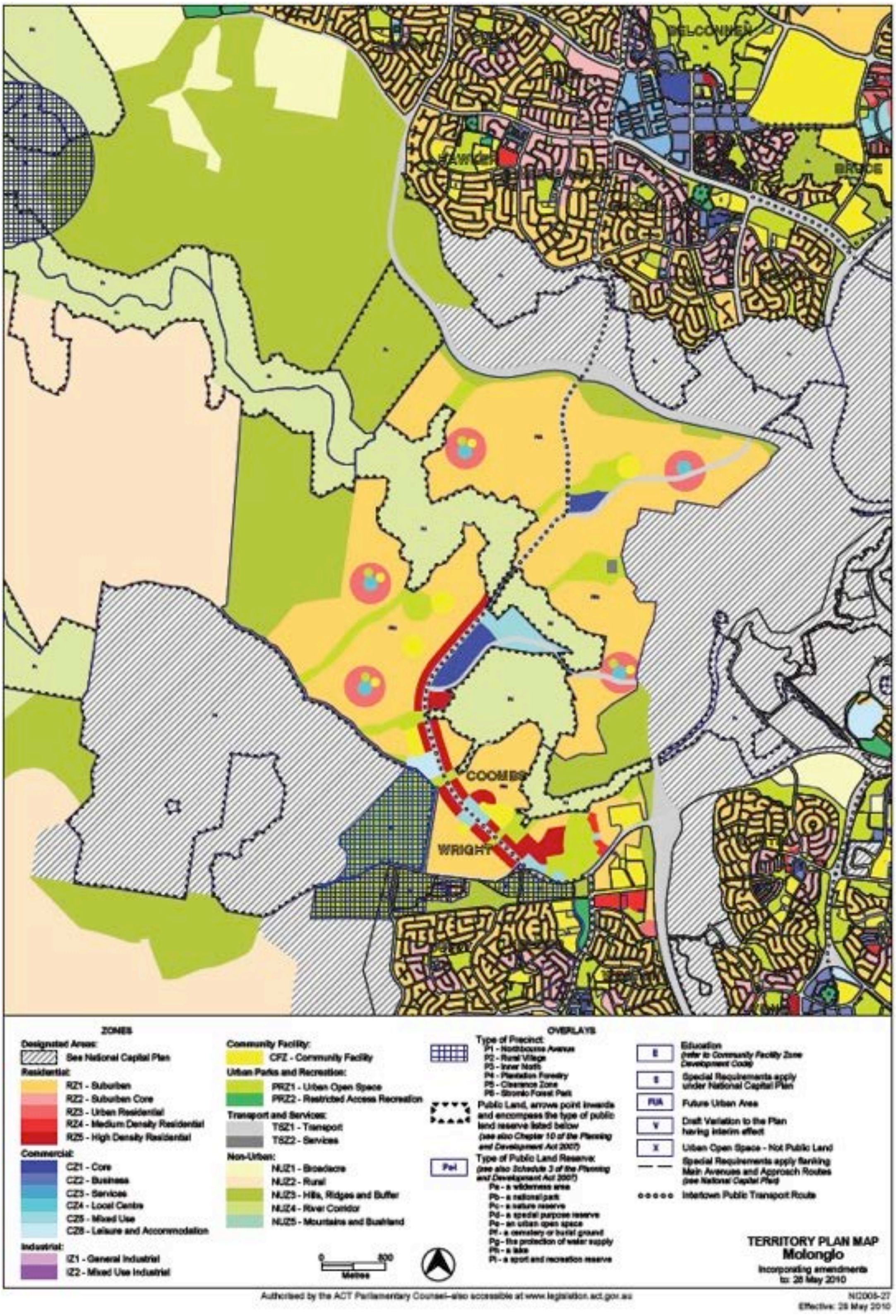


Figure 8: **Molonglo and North Weston Structure Plan**

Environment Protection and Biodiversity Conservation Act 1999

Notification of

DECISION TO ENDORSE THE MOLONGLO VALLEY PLAN FOR THE PROTECTION OF MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE, AUSTRALIAN CAPITAL TERRITORY

This decision is made under Section 146 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Endorsement decision

Policy, plan or program that is endorsed	*Molonglo Valley Plan for the Protection of Matters of National Environmental Significance* (ACT Government, September 2011).
Content of the policy, plan or program	The Plan outlines commitments regarding urban development, and broadacre land use in East and West Molonglo, ACT (shown in Annexure 1), including commitments to protect matters of national environmental significance

Person authorised to make decision

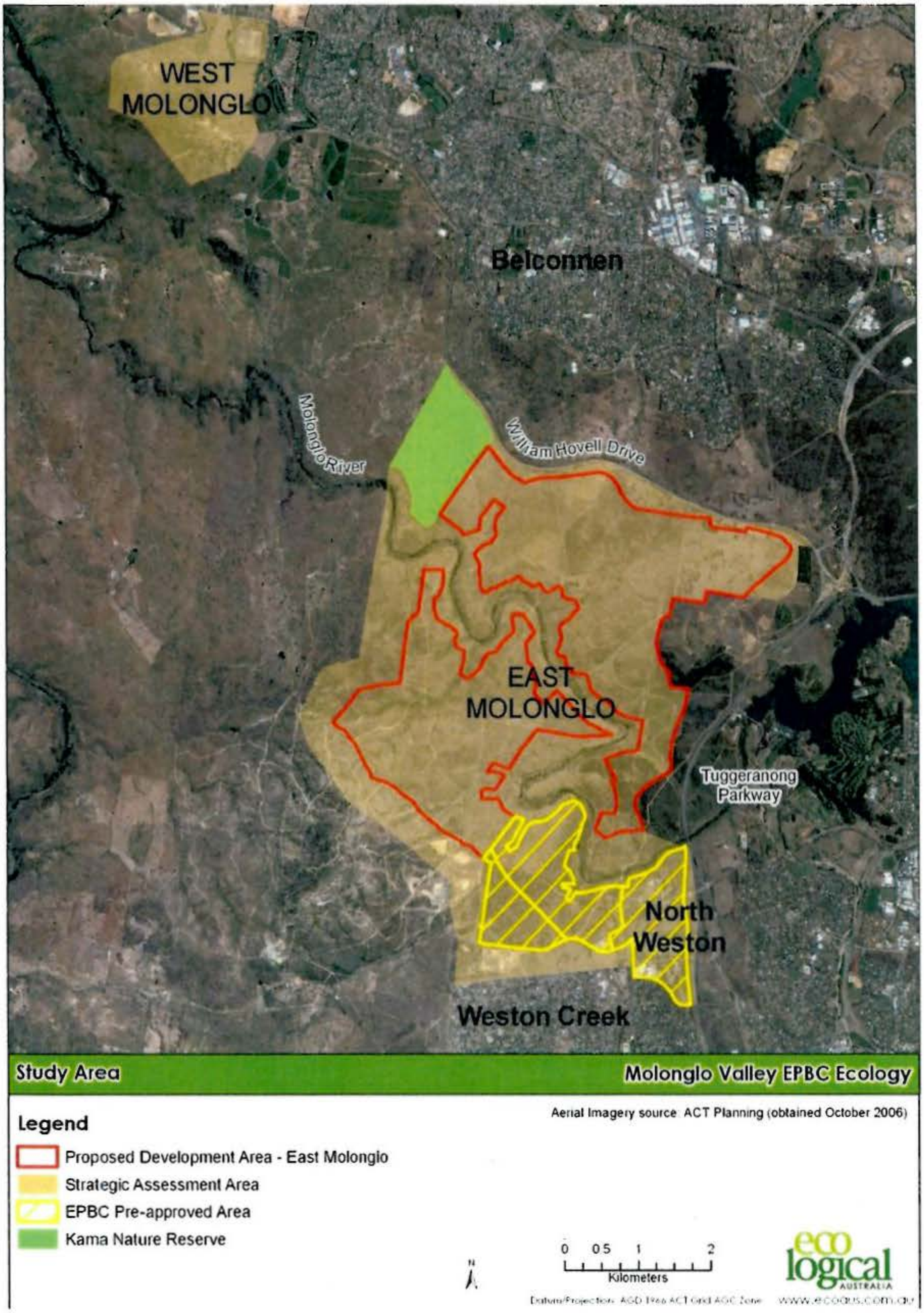
Name and position	The Hon Tony Burke MP Minister for Sustainability, Environment, Water, Population and Communities

Signature

Tony Burke

Date of decision 7.10.11

Annexure 1: Strategic assessment area and development boundary[1]



[1] "EPBC Pre-approved area" denotes the suburbs of North Weston, Coombs and Wright which were assessed and approved under separate EPBC Act Part 9 referrals (EPBC referrals 2009/4752, 2009/5041 and 2009/5050), and are not part of the strategic assessment

APPROVAL DECISION FOR THE TAKING OF ACTIONS IN ACCORDANCE WITH AN ENDORSED PLAN UNDER THE *ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999* (EPBC ACT)

MOLONGLO VALLEY PLAN FOR THE PROTECTION OF MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE, AUSTRALIAN CAPITAL TERRITORY

General	Further explanatory information related to this approval decision is at Annexure 1.
Approved action/class of actions	All actions associated with urban development in East Molonglo as described in the *Molonglo Valley Plan for the Protection of Matters of National Environmental Significance* (ACT Government, September 2011) provided such action takes place wholly within the strategic assessment area in East Molonglo (as shown in Annexure 2).
Relevant controlling provisions	The approval has effect for: • Listed threatened species and communities (sections 18 & 18A) • Listed migratory species (sections 20 & 20A)
Period for which approval has effect	The approval has effect until 31 December 2041

Person authorised to make decision

Name and Position	The Hon Tony Burke MP Minister for Sustainability, Environment, Water, Population and Communities
Signature	Tony Burke
Date of decision	20.12.4

ANNEXURE 1

Explanatory information

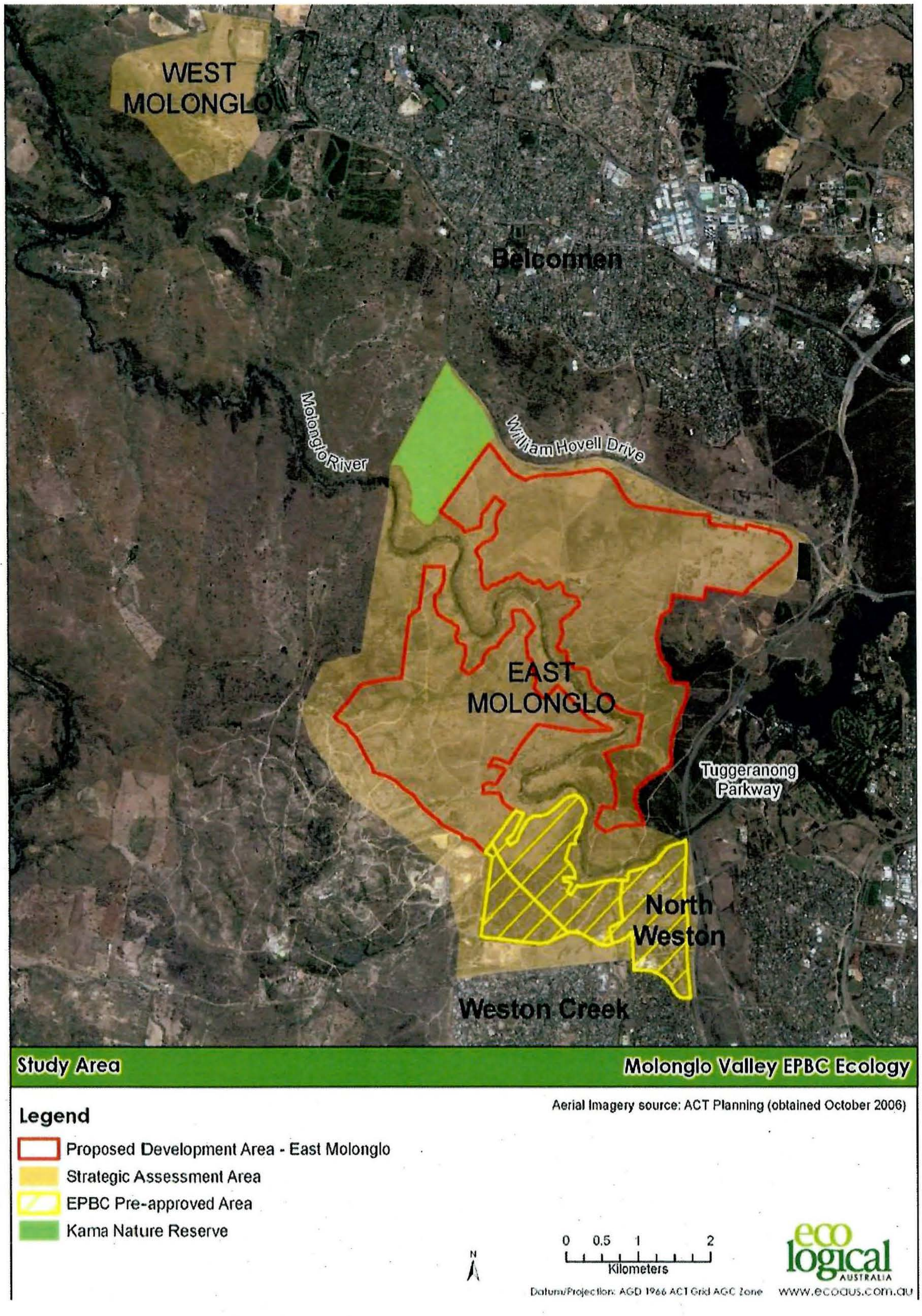
This approval decision is made under section 146B of the EPBC Act which provides for the Minister to approve actions, or classes of actions, undertaken in accordance with a policy, plan or program that has been endorsed following a strategic assessment being undertaken under Part 10 of the EPBC Act. An approval under section 146B of the EPBC Act has the same effect as an approval given under Part 9 of the EPBC Act, therefore actions approved under this decision will not require separate referral, assessment or approval under the EPBC Act prior to being taken.

On 7 October 2011 the Minister for Sustainability, Environment, Water, Population and Communities, the Hon Tony Burke MP (the Minister), endorsed the *Molonglo Valley Plan for the Protection of Matters of National Environmental Significance* (ACT Government, September 2011) (the Plan). The Plan is in respect of urban development, and broadacre land use in East and West Molonglo, ACT (as shown in Annexure 2), and details commitments to protect matters of national environmental significance.

The endorsed Plan provides for all actions associated with development within East and West Molonglo, including infrastructure (such as bridges) and services within the proposed development areas.

This approval applies to all actions associated with urban development in East Molonglo as described in the *Molonglo Valley Plan for the Protection of Matters of National Environmental Significance* (ACT Government, September 2011) provided such action takes place wholly within the strategic assessment area in East Molonglo (as shown in Annexure 2).

Strategic assessment area and development boundary[1]



[1] "EPBC Pre-approved area" denotes the suburbs of North Weston, Coombs and Wright which were assessed and approved under separate EPBC Act Part 9 referrals (EPBC referrals 2009/4752, 2009/5041 and 2009/5050), and are not part of the strategic assessment