Parkwood Planning Proposal

Bushfire Management Strategy

Ginninderry Project, NSW/ACT Border

August 2017

DOCUMENT TRACKING

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Contents

List of Figures

List of Tables

Executive Summary

The report provides a bushfire risk assessment of the proposed re-zoning for the Parkwood Planning proposal as part of the Ginninderry Project, which crosses the ACT and NSW border. This report provides bushfire protection measures that meet the statutory and policy requirements for bushfire protection in NSW. The statutory and policy requirements for the ACT component of the development were addressed in a previous report (ELA 2014). The ACT Territory Plan Variation (DV351) was approved in 2015 with an amendment to the National Capital Plan announced in July 2016.

The proposal includes up to 6,500 dwellings within the ACT and up to 5,000 dwellings in NSW. The perimeter of this development, including its various stages abuts bushfire prone land and is vulnerable to bushfire attack. The assessment assumes a worst likely bushfire attack scenario on a day of catastrophic bushfire danger (i.e. Fire Danger Rating of 100).

A number of strategies have been provided in the form of planning controls such that the risk from bushfire is reduced to an appropriate level and a level that meets or exceeds the deemed to satisfy bushfire protection requirements for both the ACT and NSW. The bushfire protection measures applied represent at least national best practice bushfire risk reduction, and take into consideration developing bushfire research, including dynamic fire propagation.

The strategies used to reduce the bushfire risk associated with the re-zoning, include:

- Setbacks from bushfire prone vegetation (APZs)
- Fuel management within the IAPZ that is appropriate for the management of adjacent Pink Tailed Worm Lizard habitat and the Yellow Box – Blakely's Red Gum Woodland
- Integration of non-combustible infrastructure within APZs such as roads, easements and parking areas
- Access and egress from the site through a well-designed road system
- Landscaping and garden design principles and guidance to minimise bushfire risk
- Underground electricity and gas services
- Compliant water supplies
- Emergency response planning
- Interim APZs and perimeter roads provided for each stage of development
- SFPP and more vulnerable development types are located further from the hazard.

More detailed bushfire assessment to accurately prescribe setbacks, roading and landscaping is required for each stage of subdivision, however the re-zoning application has provisions that allow this more detailed designed to occur smoothly and achieve the deemed to satisfy standards for subdivisions within NSW.

1 Introduction

1.1 Purpose of assessment

The report provides a bushfire risk assessment of the proposed re-zoning for the Parkwood Planning proposal, the NSW component of the larger Ginninderry Project (hereafter referred to as the subject land). It specifically addresses:

- Whether the statutory and policy requirements for bushfire protection NSW are met by the structure plan
- The extent to which best practice approaches to bushfire planning are achieved.

The existing and potential bushfire hazard and associated risk (post development) is assessed using Planning for Bushfire Protection 2006 (PBP) Guidelines (NSW RFS, 2006).

1.2 Location

Figure 1 shows the location and extent of the subject land.

1.3 Description of re-zoning proposal and process

The Parkwood planning proposal is for the development in NSW for residential and related purposes. This proposal forms part of the Ginninderry Project with adjoining land at West Belconnen in the ACT. The Ginninderry Project provides a contiguous conservation corridor along the Murrumbidgee River and Ginninderra Creek. It will include open space, community, school and recreation facilities, wetlands and Creeks, roads, streets and an off-road movement system as well as retailing and employment uses.

In NSW approximately 206ha, or 34% of the total 600ha, is proposed for inclusion in the conservation corridor along the Murrumbidgee River and Ginninderra Creek corridors. The balance of land, 394ha is anticipated to yield up to 5,000 dwellings, and forms the Parkwood Planning Proposal.

Of the total area of 889ha in the ACT approximately 371ha or 42% is proposed to be zoned for river corridor or conservation purposes – the proposed “conservation corridor”. The balance of the land is anticipated to yield up to 6,500 dwellings.

Development will commence in the ACT in September 2017 at Stockdill Drive (the eastern boundary of the site) following the approval of the draft Variation 351 to the Territory Plan in October of 2015 and the Development application approval for Stage 1 of the Ginninderry projects first suburb of Strathnairn. The project will extend westward in stages to, and then across, the ACT/NSW border. Notionally each stage will be about 300 residential blocks although this will vary depending on the nature of the topography and market demand.

The proposed rezoning of the subject land will involve changes to the planning controls that currently apply over the site, on both sides of the border. This means a change to the types of development permissible.

This report is part of a thorough process of environmental assessment and planning review at Commonwealth, Territory, State and Local Government levels. For the ACT, the Territory Plan variation (V351) was approved on 23 October 2015. The National Capital Plan has been approved

(2016). Umwelt (2017) prepared a strategic assessment in accordance with section 146 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The next step in the strategic assessment will be for the Minister to consider whether or not to endorse the Program under s. 146 of the EPBC Act and if endorsed whether or not to approve a class of actions for urban development (under s. 146B). These steps are expected to occur in 2017.

For the NSW land a 'gateway determination' was made in May 2015. This means that the project has merit to continue to work towards a rezoning. The rezoning process and community consultation phase is anticipated to commence in late 2017, with a decision anticipated in 2018.

Other matters that are also important elements of the total environment such as social and economic impacts, traffic, noise and odour, are required to be assessed under NSW legislation. These are included in reports that will accompany the Local Environment Study documentation that will be prepared as part of the NSW rezoning process.

The various statutory agencies that will oversight, and ultimately determine, the environmental approvals and rezoning for the subject land are:

- Yass Valley Council
- NSW Department of Planning and Infrastructure
- Commonwealth Department of the Environment.

The planning approval processes administered by these agencies all involve substantial periods of formal community consultation.

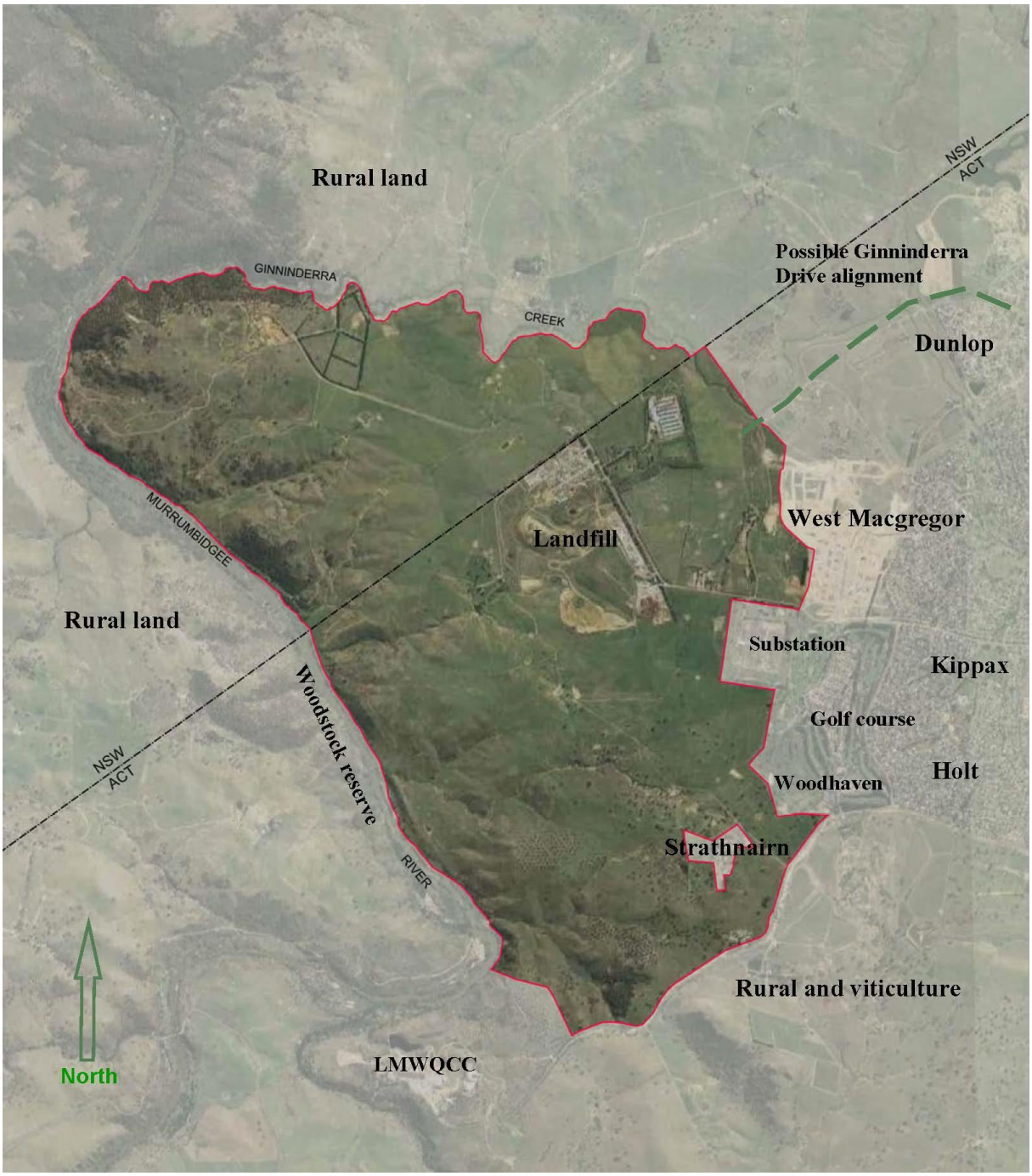

Figure 1: Location of subject land

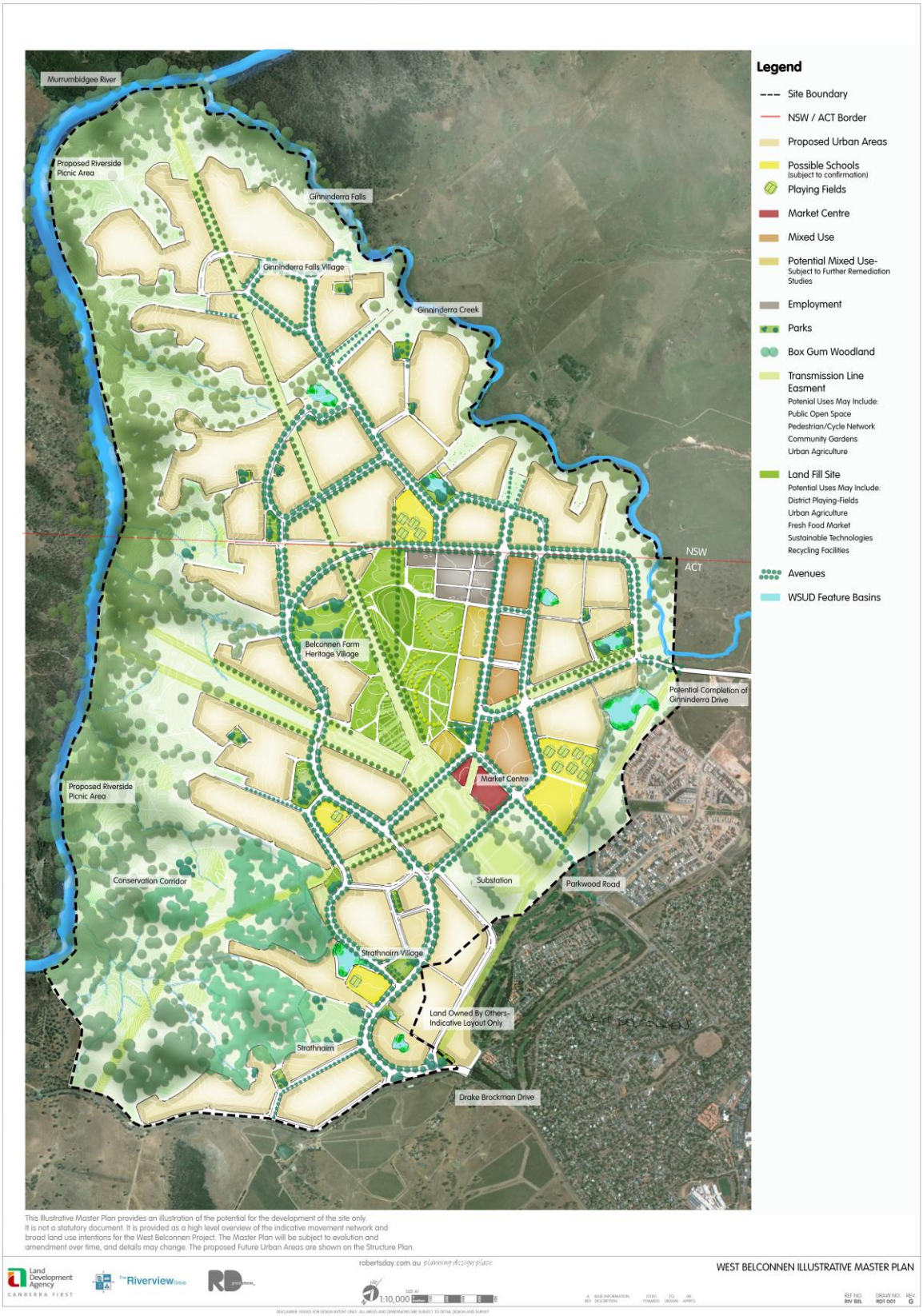

Figure 2: Proposed Master Plan

1.4 Legislative and policy requirements

1.4.1.1 Environmental Planning and Assessment Act 1979

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal planning legislation for the state, providing a framework for the overall environmental planning and assessment of development proposals. Various legislation and instruments, such as the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Rural Fires Act 1997 (RF Act) are integrated with the EP&A Act.

Section 117(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) issues directions to be followed when considering rezoning. Direction 4.4, *Planning for Bushfire Protection* identifies matters for consideration for planning proposals that will affect, or are in proximity to land mapped as bush fire prone. The relevant planning authority, in the preparation of a planning proposal, must:

> '…*consult with the Commissioner of the NSW Rural Fire Service following receipt of a gateway determination under section 56 of the Act, and prior to undertaking community consultation in satisfaction of section 57 of the Act, and take into account any comments so made*'.

1.4.1.2 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) aims to protect and encourage the recovery of threatened species, populations and communities listed under the Act. The TSC Act is integrated with the EP&A Act and requires consideration of whether a development (Part 4 of the EP&A Act 1974) is likely to significantly affect threatened species, populations and ecological communities or their habitat.

In relation to bushfire, the TSC Act also identifies high frequency fire regimes as a key threatening process.

1.4.1.3 Rural Fires Act, 1997

A large proportion of the bushfire issues in NSW are regulated by the *Rural Fires Act 1997* (RF Act). Both the EP&A Act and the RF Act were modified by the *Rural Fires and Environmental Assessment Legislation Amendment Act 2002* to enhance bushfire protection through the development assessment process (NSW RFS, 2006b). Key requirements of the RF Act include:

- The need for a bushfire safety authority to be issued by the RFS under section 100B of the RF Act for any development applications for subdivision (therefore considered integrated development)
- All landowners to exercise a duty of care to prevent bushfire from spreading on or from their land under Section 63 of the RF Act. This relates to the appropriate provision and maintenance of Asset Protection Zones (APZ), landscaping and any retained vegetation when developing land (NSW RFS, 2006b).

1.4.1.4 Planning for Bush Fire Protection 2006 (PBP)

Planning for Bush Fire Protection 2006 (PBP) was developed by the NSW Rural Fire Service (NSW RFS) to provide development standards for building in bush fire prone areas in NSW. It provides for the protection of human life and helps to minimise the impacts on property from the threat of bush fire.

Development on bushfire prone land must satisfy the requirements of *PBP* which includes having regard to the following planning principles:

- Provision of a perimeter road with two-way access which delineates the extent of the intended development
- Provision at the urban bushland interface for the establishment of adequate asset protection zones for future housing
- Specifying minimum residential lot depths to accommodate asset protection zones for lots on perimeter roads
- Minimising the perimeter of the area of land, interfacing the hazard, which may be developed
- Introduction of controls which avoid placing inappropriate developments in hazardous areas
- Introduction of controls on the placement of combustible materials in asset protection zones.

PBP also provides performance and acceptable solutions for a range of bushfire protection measures required to minimise the risk associated with bushfire attack.

Planning for Bush Fire Protection 2006 has been reviewed by the NSW RFS to incorporate lessons learnt from major bush fire events such as the 2009 Victorian Black Saturday fires, along with changes to building code and construction standards. A public consultation period on the revised draft PBP closed in July 2017, and the release of the final publication is expected in early 2018.

1.5 Building Code of Australia

The Building Code of Australia (BCA) is adopted in NSW through the EP & A Act. It contains provisions, which can be used for construction to resist bushfires in order to reduce the risk to life and minimise the risk of property loss in designated bushfire prone areas.

The BCA specific 'deemed to comply' measure is the *Australian Standard AS3959 Construction of buildings in bushfire-prone areas*.

1.6 Australian Standard AS3959-2009 Construction of buildings in bushfire-prone areas

The standard is applied throughout Australia to the construction of buildings on bushfire prone lands. Its objectives are to prescribe particular construction details for buildings to reduce the risk of ignition from a bushfire while the fire front passes. NSW has a number of alternate provisions to AS3959-2009 for BAL FZ but these are unlikely to be applicable to this proposal.

1.7 Bushfire prone lands

The subject land is mapped as bushfire prone land on the Yass Bushfire Prone Land map.

1.8 Assessment framework

The planning process for the Ginninderry Project has involved considerable consultation with the NSW and ACT Rural Fire Services and various other agencies with an interest in bushfire protection. Preliminary Draft Land Use / Structure Plan and Precinct Plans have been discussed. The following section outlines how the relevant types of development will be assessed in accordance with PBP.

1.8.1 NSW Residential

Future residential subdivision will be assessed under Section 100B of the RF Act and a Bush Fire Safety Authority (BFSA) must be obtained from the NSW RFS. Section 100B of the RF Act specifies conformance with the intent and performance criteria of the Bushfire Protection Measures outlined in PBP. The bushfire protection measures relevant to 100B of the RF Act within PBP 2006 are:

- *The provision of clear separation of buildings and bushfire hazards, in the form of fuel-reduced APZ (and their subsets, inner and outer protection areas and defendable space)*
- *Construction standards and design*
- *Appropriate access standards for residents, fire fighters, emergency service workers and those involved in evacuation*
- *Adequate water supply and pressure*
- *Emergency management arrangements for fire protection and/or evacuation; and*
- *Suitable landscaping, to limit fire spreading to a building.*

1.8.2 NSW Special Fire Protection Purpose (SFPP)

SFPP developments include developments where occupants may be more vulnerable to bushfire attack. These developments require considerably larger APZs than residential developments and include the following types of uses:

- *A school*
- *A child care centre*
- *A hospital (including a hospital for the mentally ill or mentally disordered)*
- *A hotel, motel or other tourist accommodation*
- *A building wholly or principally used as a home or other establishment for mentally incapacitated persons*
- *Housing for older people or people with disabilities within the meaning of State Environmental Planning Policy No 5 - Housing for Older People or People with a Disability (now State Environmental Planning Policy (Seniors Living))*
- *A group home within the meaning of State Environmental Planning Policy No 9 - Group Homes*
- *A retirement village*
- *Any other purpose prescribed by the regulations. (Section 100B (6) of the RF Act).*

For these developments, the specific objectives of SFPP developments within PBP should be followed in addition to the requirements for residential developments. The specific objectives for SFPP developments are:

- *Provide for the special characteristics and needs of occupants. Unlike residential subdivisions, which can be built to a construction standard to withstand the fire event, enabling occupants and firefighters to provide property protection after the passage of fire, occupants of SFPP developments may not be able to assist in property protection. They are more likely to be adversely affected by smoke or heat while being evacuated*
- *Provide for safe emergency evacuation procedures. SFPP Developments are highly dependent on suitable emergency evacuation arrangements, which require greater separation from bushfire threats. During emergencies, the risk to firefighters and other emergency services personnel can be high through prolonged exposure, where door-to-door warnings are being given and exposure to the bushfire is imminent.*

1.8.3 NSW Industrial, Commercial, Other Development

Commercial, employment and/or industrial uses are classified in PBP 2006 as 'Other Development'. As such these developments need to satisfy the aims and objectives of PBP and a proposal needs to incorporate these considerations along with an adequate combination of relevant bushfire protection measures (BPM). Generally, the BPMs listed in PBP 2006 for residential development can be used as a guide and are discussed in the following sections. The aim and objectives of PBP 2006 are as follows.

Aim of PBP

To use the NSW development assessment system to provide for the protection of human life (including firefighters) and to minimise impacts on property from the threat of bush fire, while having due regard to development potential, on-site amenity and protection of the environment.

Objectives of PBP

(i) Afford occupants of any building adequate protection from exposure to a bush fire

(ii) Provide for a defendable space to be located around buildings

(iii) Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition

(iv) Ensure that safe operational access and egress for emergency service personnel and residents is available

(v) Provide for ongoing management and maintenance of bush fire protection measures, including fuel loads in the asset protection zone (APZ); and

(vi) Ensure that utility services are adequate to meet the needs of firefighters (and others assisting in bush fire fighting).

2 Bushfire Hazard Assessment

The bushfire hazard was assessed using the method prescribed in PBP and is described in the following sections. Additionally, recently published research and understanding of dynamic fire behaviour, including vorticity-driven lateral fire spread (VLS) and eruptive fire behaviour (EFB) (Thomas et al 2017; Sharples et al 2012; Sharples et al 2013; Simpson et al 2014, Sharples et al 2017) has been reviewed and considered in the assessment of bushfire risk for the site.

2.1 Vegetation

Figure 3 shows the vegetation of the subject land and a line representing the edge of the 'conservation corridor'. This line is coded according to the vegetation classification used in determining the size of the APZ required. The colour coded line overlaying the vegetation map enables review of the appropriateness of the vegetation classification input into the hazard assessment.

Low hazard vegetation (as classified under AS3959-2009) is proposed within the various 'internal green areas' such as those associated with existing powerlines. No APZ have been identified for these internal green areas as they will be APZ compliant as orchards, playing fields, managed landscapes etc. More detailed description of the vegetation management within these areas will be provided at later stages in the process.

2.2 Slope

Figure 4 shows the slope on the subject land using the slope classes of PBP. A line representing the edge of the 'conservation corridor' is coded according to this slope classification for use in determining the size of the APZ required.

2.3 Interpretation of the vegetation and slope assessment

Vegetation

Subsequent stages in the development planning process will include APZ appropriate to each stage of implementation based upon the vegetation likely to affect each stage up until it is removed under subsequent development. The re-zoning proposal can provide a compliant APZ at its final extent and at each stage of development.

The low hazard vegetation within the various internal vegetated areas (See **Figure 2**) will be a mix of urban agriculture, greenhouses and parkland.

The proposed spatial patterns of the low hazard vegetation within the corridors will inhibit the potential spread of wildfire. This is in part achieved by alternating the types of low hazard vegetation along the corridors and providing the least hazardous types at the point where the corridors connect with the bushfire hazard beyond the development perimeter.

Slopes

Whilst steeper slopes occur along the river corridor, the slopes abutting most the development perimeter and within the low hazard corridors are typically gentle.

Steeper slopes in the river corridor will contribute to the development of bushfire intensity, particularly with fire approaching from the west and north-west. The proposed APZ and the management of the river corridor will mitigate this risk.

2.4 Dynamic fire propagation

There is increasing evidence that fire propagation can be significantly affected by dynamic feedback processes that result in the continual escalation of fire spread rates and intensities even when environmental conditions are consistent (e.g. eruptive fire behaviour and vorticity-driven lateral spread discussed in more detail below) (Duff et al 2016). Dynamic fire propagation arises from complex interactions between the terrain, the atmosphere and the fire.

While several advances have been made in understanding bushfire development under extreme conditions, these have not been quantified in a manner that is suitable for inclusion in a fire behaviour modelling framework (Duff et al 2016). Therefore, a precautionary approach has been taken in considering dynamic fire propagation in term of the subject site, including identifying areas that may have the required environmental conditions for VLS and EFB to occur based on published works and discussions with Associate Professor Jason Sharples.

2.4.1 Vorticity-driven lateral spread

Several environmental conditions need to be satisfied for VLS to occur, including slope, aspect, wind speeds and fuel loads. Sharples et al. (2013) demonstrated the existence of a threshold in the background wind speed for VLS of greater than 20 km/hour. Sharples et al. (2012) found that there were thresholds in the terrain slope and wind direction relative to the terrain aspect for VLS events in the 2003 Canberra bushfires. While further research is needed to explore the sensitivity of VLS to additional aspects of the fire environment, research to date indicates the fuel type and load required for VLS is heavy (forest) fuels 15 – 20 t/ha, the terrain slope is greater than 20 – 25 degrees, and aspect of the lee slope in relation to wind direction is within 30 – 40 degrees of the wind. An improved understanding of these environmental thresholds will facilitate improved operational predictability of VLS (Simpson et al 2014).

Based on the environmental conditions identified above, an analysis of the area surrounding the subject land to identify areas prone to VLS was undertaken using the following parameters:

- Slopes >= 20°
- Aspect >= 95 & <= 175 (based on prevailing wind direction)
- Fuel >= 15 t/ha

The results of the analysis are displayed in Figure 5, and show that the nearest occurrence of a VLS prone site is approximately 205 m from the subject land boundary. The proposal's response to the predicted VLS is to enlarge the area covered by BAL 12.5 and prescribe best practice landscaping design for bushfire prone areas.

2.4.2 Eruptive fire behaviour

EFB is described as a sudden intensification and acceleration of burning with high energy release. These phenomena create their own wind patterns that can be strong enough to uproot trees and loft embers (Blanchi et al 2011). Viegas and Simeoni (2011) identified that EFB is more likely to occur on steep slopes and especially in canyons, and that the mechanisms that could explain EFB are linked to external conditions (change in wind intensity and direction, development of thermal belt and instability

above the fire) and the individual characteristics of the fire (convective feedback from the fire, a flow attachment, gas accumulation or spotting).

Based on research and discussions with Associate Professor Jason Sharples, an analysis of the area surrounding the subject land to identify sites prone to EFB was undertaken using the following parameters:

- Slopes > 24°
- Aspect >= 275 & <= 355.

The results of the analysis are displayed in **Figure 6**, and show that the nearest occurrence of EFB prone site is approximately 68 m from the subject site boundary.

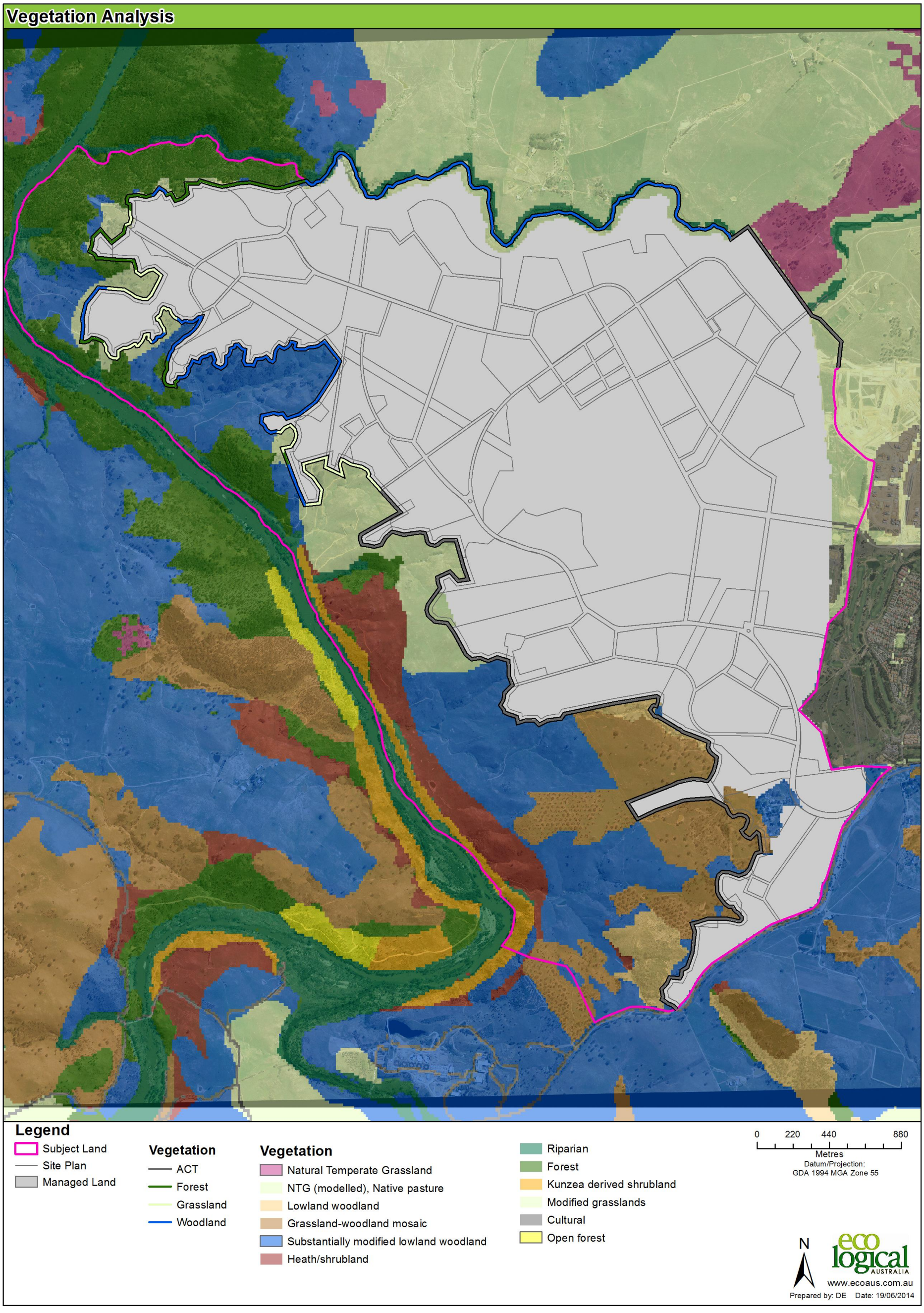

Figure 3: Vegetation Assessment

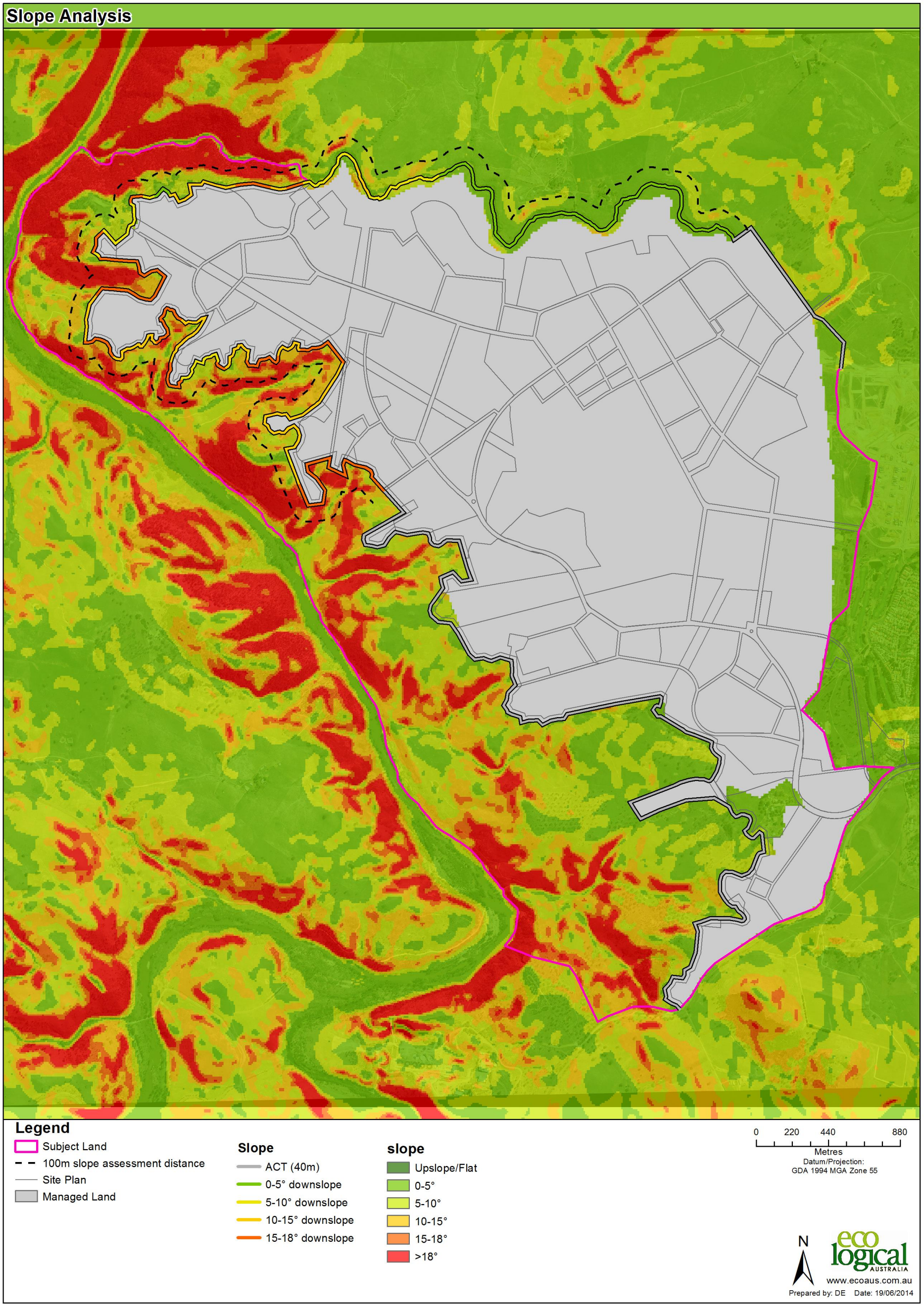

Figure 4: Slope assessment

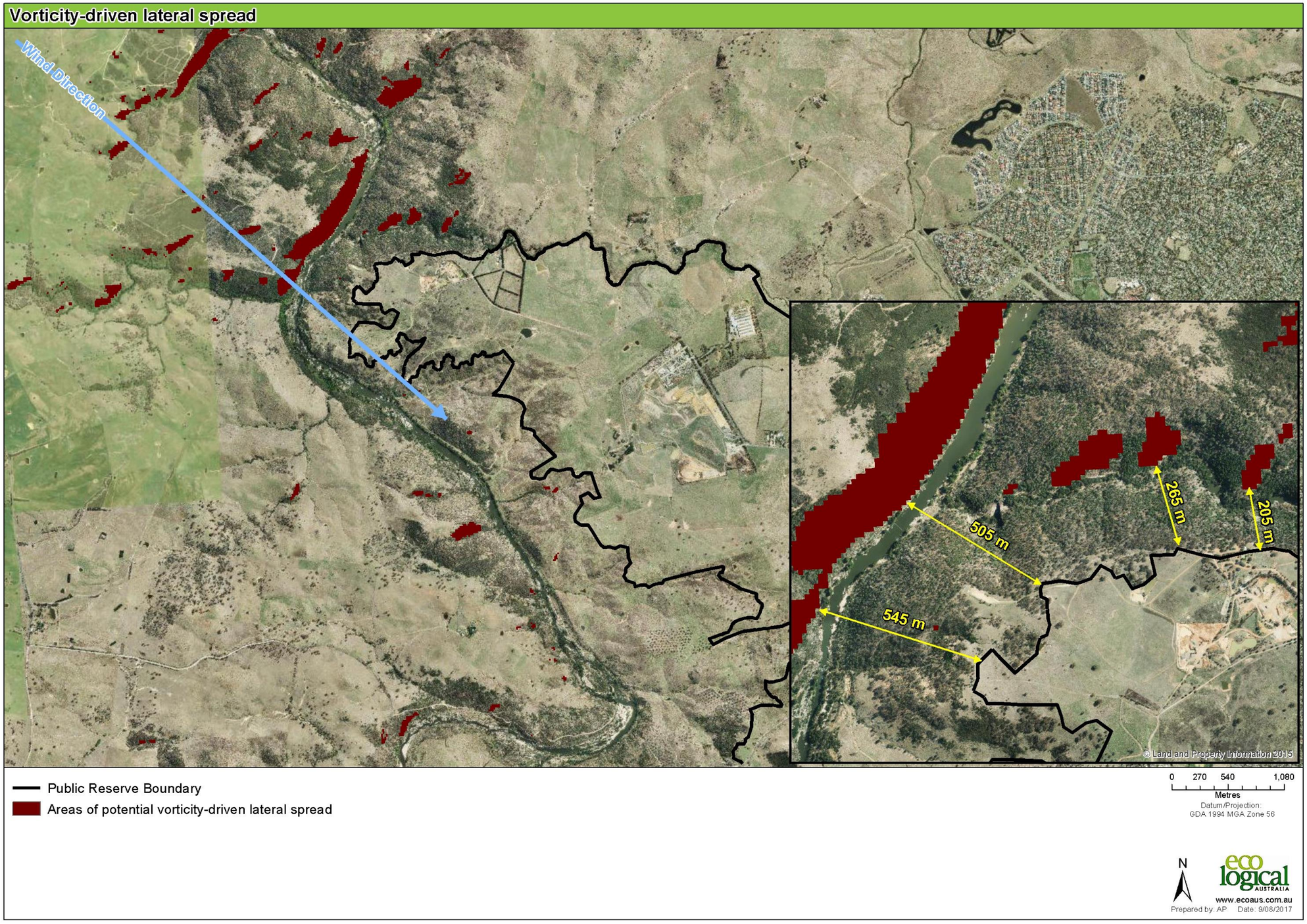

Figure 5 Areas of potential vorticity-driven lateral spread

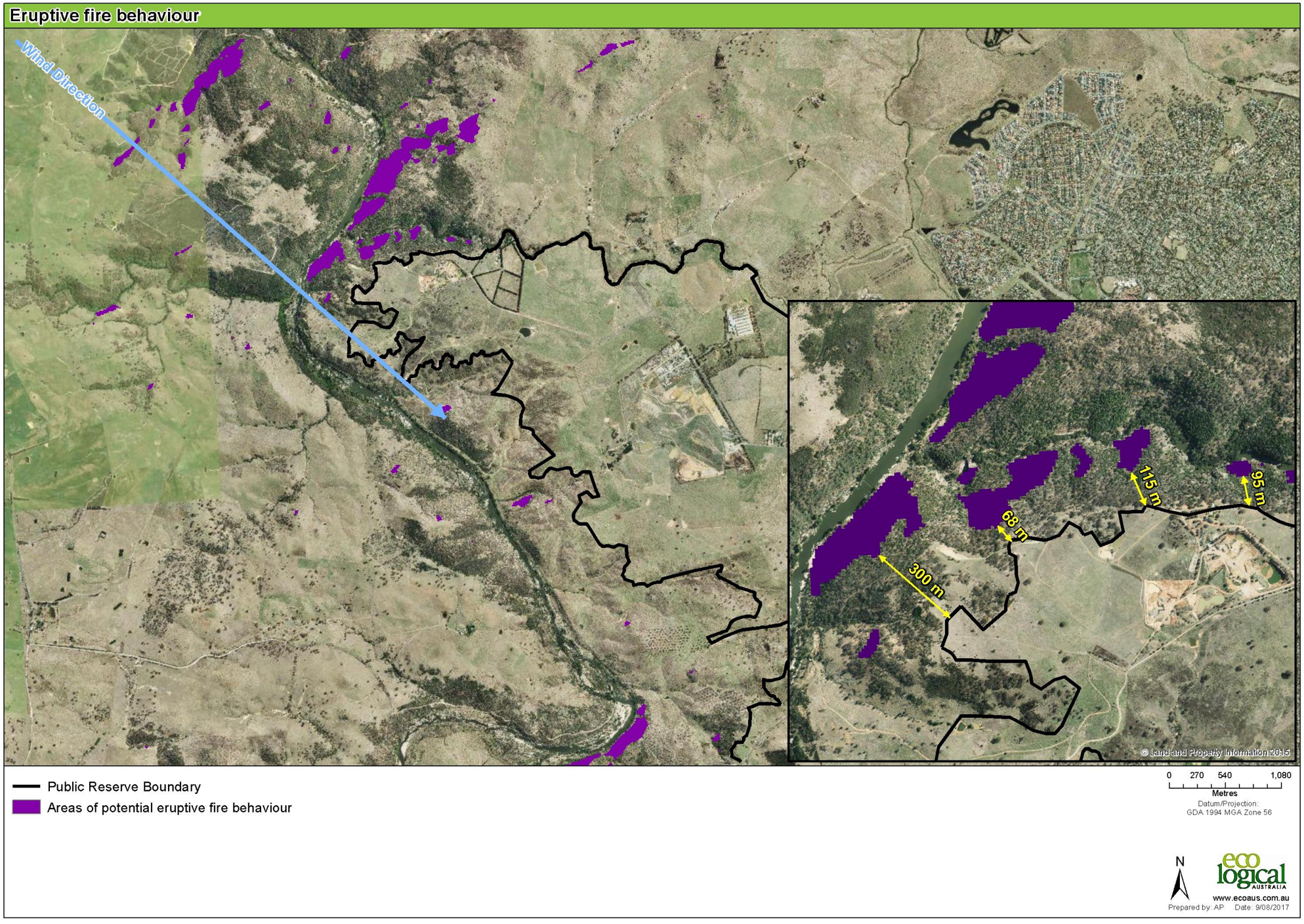

Figure 6 Areas of potential eruptive fire behaviour

3 Bush Fire Protection Measures

Application of the bushfire protection measures described in PBP minimise the risks from bushfire and ensure that the aims and objectives of PBP are met. This PBP approach has been applied for the subject site, with additional measures beyond PBP proposed in response to recent research on dynamic fire propagation (see Section 2.4).

The following key bushfire protection measures are addressed in this assessment:

- Asset Protection Zones (APZs)
- Water supplies
- Infrastructure (including access road provisions and other services)
- Evacuation and emergency management (including emergency access/egress arrangements)
- Landscape management and garden design principles.

3.1 Asset Protection Zones (APZs)

APZs are areas located between bushfire hazards and development to provide a defendable space in which to undertake emergency operations and to provide a buffer from direct flame contact, and the impacts of radiant heat, smoke and embers.

The width of APZs is based on a combination of:

- Predominant vegetation (using structural classification)
- Effective slope (i.e. slope most affecting fire behaviour adjacent to the interface)
- Fire Danger Index (FDI) of 100 (a catastrophic fire weather day).

In NSW, PBP and the APZ dimension for residential development is currently undergoing review by the RFS as previously indicated (Section 1.4.1.4). The revised APZ requirements will therefore be applied in the future.

APZ are typically refined during subdivision stages with the Structure Plan at re-zoning stage ensuring the APZ dimensions required at subdivision stage can be achieved. The APZ dimensions cited in this assessment will be refined for future subdivision as a more detailed assessment of slope, vegetation and bushfire attack is required for each individual allotment, and the revised requirements of PBP 2017 will be applied.

Additionally, in recognition of the potential for eruptive fire behaviour, it is proposed to enlarge the APZ by 10 m in specific locations where eruptive fire behaviour has potential radiant heat loads above that recognised under PBP and AS3959-2009. This additional 10 m setback may be adjusted at time of subdivision based upon any advancement in understanding of the radiant heat load associated with eruptive fire behaviour, however, there is insufficient research at this stage to more specifically identify the extent of an enlargement to APZ. It is noteworthy that the nearest eruptive fire behaviour is 68 m from the beginning of the proposed APZ which meets PBP standards and this APZ has been enlarged by 10 m. The total separation distance from the site of nearest potential eruptive fire behaviour is therefore considerable, and the nearest buildings will be constructed to withstand Bushfire Attack Levels of 29 kW/m2.

APZs should be wholly contained within the proposed lot or subject land for which they are benefitting or protecting. However, in some circumstances APZs may consist of managed areas outside an allotment e.g. managed open space, managed service easements and roads. Perimeter roads form part of the APZ's throughout the site except within the powerline corridors which are low hazard and are separated by a road or trail where it abuts higher hazard areas.

Figure 7 shows the proposed APZ for the subject land. **Table 1** identifies the slope and vegetation type used to determine the APZ in NSW. The vegetation and slope used to determine the size of the APZ in NSW is also evident in **Figure 3** and **Figure 4** (respectively).

For land in the ACT part of the Ginninderry Project, a 40 m IAPZ is provided as agreed with the Emergency Management Agency (see Commissioner's two letters, dated 11th and 21st June 2014 provided as **Appendix 1**) and shown in **Figure 6**.

Table 1: APZ proposed within the NSW portions of the subject land

Effective slope	Predominant vegetation	IAPZ*[1, 2]	OAPZ
Upslope/ flat	Grassland	10m	none proposed
	Grassy woodland	10m	none proposed
	Forest	20m	none proposed
>0 – 5	Grassland	15m	none proposed
	Grassy woodland	15m	none proposed
	Forest	25m	none proposed
>5 – 10	Grassland	12m	none proposed
	Grassy woodland	20m	none proposed
	Forest	35m	none proposed
>10 - 15	Grassland	15m	none proposed
	Grassy woodland	25m	none proposed
	Forest	50m	none proposed
>15 - 18	Grassland	15m	none proposed
	Grassy woodland	30m	none proposed
	Forest	60m	none proposed

*[1] The APZ in NSW are entirely IPA. OPA are replaced by IPA to achieve a higher level of risk reduction

*[2] Where increased radiant heat levels due to potential eruptive fire behaviour has been identified, APZ has been increased by an additional 10m.

3.1.1 Fuel management within the APZ

The APZs are to be maintained by the owner of each future lot; where the APZ is part of a road reserve or public place it will be maintained by the agency responsible e.g. Yass Valley Council. It is proposed that the total APZ will be managed to an Inner Protection Area standard, except where it adjoins forest, where an Outer Protection Area of a size permissible under Table A2.7 of PBP will be applied.

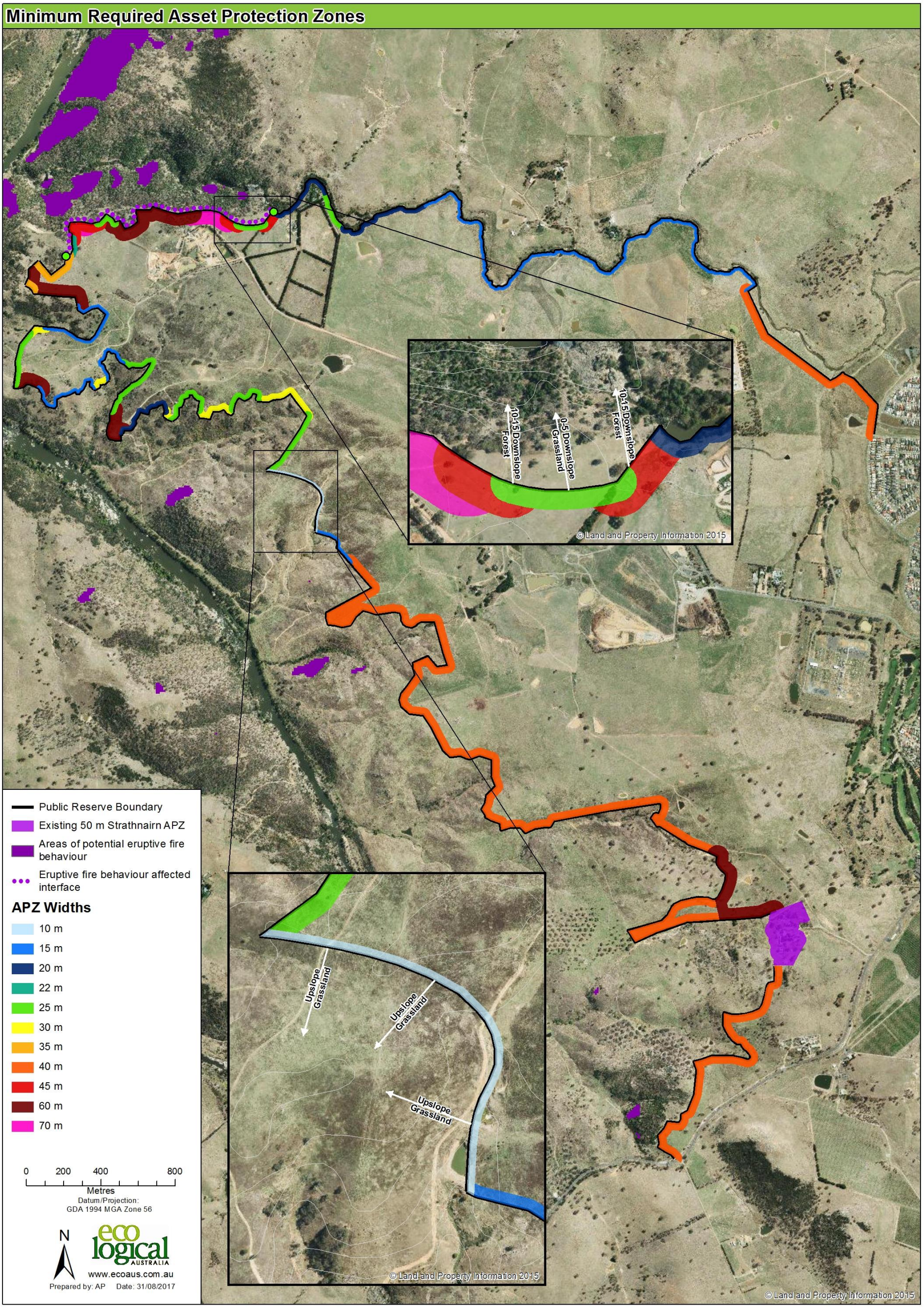

Figure 7: Asset Protection Zone (APZ)

3.1.2 Vegetation Management Requirements

The measures described in Appendix 5 of PBP (RFS 2006b) for landscaping of APZ and gardens etc will be applied in the subject site. These measures will assist in mitigating burning debris attack on gardens and subsequently buildings. It will be applied to residential, industrial and public zoned lots. A summary of these measures is below.

3.1.3 APZ maintenance

When establishing and maintaining an APZ the following requirements should apply as applicable:

- canopy cover should be less than 15% (at maturity);
- trees (at maturity) should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above ground;
- preference should be given to smooth barked and evergreen trees;
- avoid connective pathways across the ground toward a building;
- small isolated clumps needs to be site specific in design;
- avoid creating fuel ladders (shrubs, bark, dropped branches, leaves etc);
- select suitable plants (low flammability, avoid dense and elevated fine fuels);
- no plants near vulnerable building components (windows, decks); and
- leaves and vegetation debris should be removed.

3.1.3.1 Fuel management within APZs adjacent to conservation corridor

Habitat of the Pink Tailed Worm Lizard (a Nationally Vulnerable species) and an Endangered Ecological Community (Yellow Box - Blakely's Red Gum Woodland) is adjacent to portions of Inner Asset Protection Zone (IAPZ). Osborne (2013) has provided management guidelines for these important ecological assets and the compatibility of these with the performance requirements of PBP are assessed below.

Pink-tailed Worm Lizard (PTWL)

The habitat occupied by the PTWL is rocky and naturally carries fuel loads that are near to meeting the performance requirements for IAPZ. Where fuel loads exceed that required by the ACT SBMP some small scale ecological burning or hand slashing may be periodically required. In addition to the rocky habitats a 20m buffer zone has been identified around each rocky area (Osborne 2013) which in some cases extends into the IAPZ where more active fuel management is required to meet the IAPZ requirements. This fuel management within the habitat buffer will most commonly be slashing but may include a mix of burning, manual slashing or herbicide treatments.

Endangered Ecological Community (Yellow Box - Blakely's Red Gum Woodland)

Osborne (2013) identified appropriate fuel management techniques within the woodland as burning, grazing and, selective manual slashing. Some habitat areas are adjacent to the IAPZ and a 20 m buffer zone occurs around these with some of these buffer areas extending into the IAPZ. Given these areas are small in size mechanical slashing as part of the program of slashing the remainder of the IAPZ is most likely to be applied. Other appropriate techniques include, burning, hand slashing and grazing.

3.1.3.2 Fuel management within dynamic fire propagation prone areas

Investigation of the potential for fuel management to remove the risk from dynamic fire behaviour associated with specific conditions on lee slopes is being undertaken, and appropriate fuel management techniques will be applied taking into consideration operational and environmental parameters.

3.1.4 Bushfire Management Plan

A bushfire management plan is proposed for the Conservation Corridor to specify the spatial and temporal patterns of fuel management through ecologically and environmentally appropriate fire regimes. The spatial and temporal patterns of fire and grazing can be designed to achieve best practice management of ecological and environmental assets and the mitigation of wildfire threats.

An Environmental Trust will manage the Conservation Corridor. Further information on the proposed Environmental Trust is contained within the rezoning submission in a 2014 report by Elton Consulting titled “An environmental Trust for West Belconnen”. A draft management plan for the Conservation Corridor has been prepared (TRC, 2016).

3.2 Access

Safe access, egress and defendable spaces are required for emergency services. Emergency management arrangements are also required such as procedures and routines for evacuation and consideration of safer places.

Specific management and evacuation plans may be required at a later stage especially where SFPP developments are proposed (e.g. schools, seniors living). The emergency management requirements of the ESA and their capacity to meet response times and related safety measures is also critical.

Bushfire and other related emergency services for the development will likely be provided from the ACT, as it is unlikely to be feasible to establish a NSW RFS brigade for the NSW portion of the development as this brigade would have insufficient bushland to manage to sustain a typical brigade. An ACT based bushfire response could be augmented by provision of basic fire equipment at key locations for residents.

Given the importance of rapid first attack on bushfires the travel times for the nearest ACT Fire and Rescue Service and ACT RFS units is important. The West Belconnen station at Charnwood is the nearest ACT Fire and Rescue station and the Molonglo RFS station is the nearest RFS brigade located at Holt. These stations will provide good response times on completion of roads for the subject development

A key to emergency access is a perimeter road with frequent direct access to the internal road system for easy and rapid access/egress. Feeder roads off the perimeter road should where possible radiate away from the bushfire hazard. Specifications for public roads and property access roads are provided below. **Figure 2** shows the indicative roading as part of the masterplan.

3.2.1 Public roads

Public roads include both the perimeter road and the internal road system. A safe operational access to structures and water supply for emergency services personnel, while residents are seeking to evacuate from an area is required. Key requirements include road size (safe/efficient access/egress) and suitable location of water supply points (readily accessible during bushfire). **Appendix 2** provides additional details for NSW.

3.2.2 Perimeter roads

The requirements for perimeter roads are as follows:

- Located between (or within) the Asset Protection Zone and the boundary of the allotments.
- Providing fire fighters with easier access to structures, allowing more efficient use of fire fighting resources
- Providing a safe retreat for fire fighters
- Providing a clear control line from which to conduct hazard reduction or back burning operations
- Providing two-way access (carriageway 8 metres kerb to kerb) and compliance with the design specifications identified in PBP 2006 (see **Appendix 2**).

3.2.3 Property access roads

PBP 2006 states that property access is access from the public road system onto private land and to the habitable building by fire fighters. The intent is to provide safe access to/from the public road system for fire fighters providing property protection during a bushfire and for occupants faced with evacuation.

Property access road requirements are identified below:

- Short access roads are preferable; therefore buildings should be located as close as possible to the public road system
- No access requirements apply to an urban development where the furthest part of the building is no farther than 70 m (unobstructed) from the public road system
- Any building located more than 200 m from a public through road must provide one alternative property access road
- Access roads should have a minimum width of 4 m
- Additional detail is provided in **Appendix 3**.

3.3 Services – Water, electricity and gas

3.3.1 Water

The proposal will be serviced by a reticulated water supply. **Table 2** identifies the acceptable solution requirements of Section 4.1.3 of PBP for which the proposal is compliant with, subject to the following specifications:

Table 2: Performance criteria for reticulated water supplies (PBP page 27)

Performance Criteria	Acceptable Solutions	Complies
The intent may be achieved where:		
• water supplies are easily accessible and located at regular intervals	• reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads. • fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles. • hydrants are not located within any road carriageway	complies complies

Performance Criteria	Acceptable Solutions	Complies
	• all above ground water and gas service pipes external to the building are metal, including and up to any taps. • the provisions of parking on public roads are met.	complies complies complies

3.3.2 Electricity services

Electricity supply to / within the subject land is located underground and therefore complies with Section 4.1.3 of PBP.

3.3.3 Gas services

Gas services (reticulated or bottle gas) are compliant with Section 4.1.3 of PBP, subject to the following specifications:

- Any gas services are to be installed and maintained in accordance with Australian Standard AS/NZS 1596 *The storage and handling of LP Gas* (SA 2014). Metal piping is to be used;
- All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation;
- If gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal; and
- Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used.

3.4 Emergency management

The proximity of emergency services to the precinct are considered adequate, subject to the timing of completion of all access roads including Ginninderra Drive (see discussion in Section 3.2).

Consultation with the ACT and NSW RFS and Fire and Rescue services will occur during subdivision design to ensure adequate emergency response during all phases of construction and occupation of development on the subject land.

4 Development Staging

The APZ required for the interim 'bushland' interface of each stage of subdivision will be wide enough to provide the building construction standard envisaged under AS3959-2009 at the completion of development for the whole site. As part of the increased bushfire protection measures for the subject land, considering assessment of recent research and ongoing research into predicted VLS fire behaviour, BAL12.5 will be extended to the whole NSW development. This is over and above the current standards (see **Section 3.1**).

Perimeter roads or trails are also to be provided for each stage of subdivision to separate development from the hazard.

5 Conclusions

A number of strategies have been provided in the form of planning controls such that the risk from bushfire is reduced to an appropriate level and a level that meets the deemed to satisfy bushfire protection requirements for NSW. The bushfire protection measures applied exceed national best practice bushfire risk reduction by taking into consideration research on dynamic fire propagation.

The strategies used to reduce the bushfire risk associated with the re-zoning, include:

- Setbacks from bushfire prone vegetation (APZs), including increased APZs in areas potentially subject to eruptive fire behaviour
- Expansion of ember protection to all future dwellings within the planning proposal
- Fuel management within the IAPZ that is appropriate for the management of adjacent Pink Tailed Worm Lizard habitat and the Yellow Box – Blakely's Red Gum Woodland
- Integration of non-combustible infrastructure within APZs such as roads, easements and parking areas
- Access and egress from the site through a well-designed road system
- Underground electricity and gas services
- Compliant water supplies
- Emergency response planning
- Interim APZs and perimeter roads provided for each stage of development
- BAL12.5 under AS3959-2009 applied to the entire development site
- SFPP and more vulnerable development types are located further from the hazard.

More detailed bushfire assessment to accurately prescribe setbacks, roading and landscaping is required for each stage of subdivision, however the re-zoning application has provisions that allow this more detailed designed to occur smoothly and achieve the deemed to satisfy standards for subdivisions within NSW.

6 Recommendation

It is recommended that the re-zoning application be approved based upon the bushfire protection measures identified in this report.

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Appendix 1: EMA letter regarding bushfire protection measures

ACT Government

Mr David Maxwell
THE RIVERVIEW GROUP PTY LTD
PO Box 3908
MANUKA ACT 2603

Dear Mr Maxwell,

Re: ESA Bush Fire Concerns Proposed Riverview Development

Following our recent discussions, I have grave concerns for Public Safety for any developments on the Murrumbidgee Corridor due to the extreme risk of bush fires. However, I look forward to your development proposal if it provides a higher level of safety to the people of Canberra. In relation to your request for guidance on standards and obligations upon the proposed development, I would like to take this opportunity to provide you with advice on such requirements. As I have previously advised, as part of the review of the Strategic Bushfire Management Plan (SBMP) the ESA is considering revision of the current policy and standards for the provision of bushfire protection measures for new developments. The Draft SBMP version three will be provided for public consultation shortly and will include the following:

Asset Protection Zones: APZ need to be identified. As a standard approach, intensively managed Inner APZs will be identified within the footprint of the developable area. In considering the issues associated with management of the adjacent areas that were outlined in meetings with you, it is recommended a minimum Inner APZ width of 40 m be applied to grassland / grassy woodland areas. This width may also apply to adjacent forest areas as long as the adjoining areas is managed to Strategic Fire fighting Advantage Zone (SFAZ) Standards. If SFAZ standards cannot be met higher standards may apply.

The Fuel management standards in these zones will be the same as for the current SBMP version 2.

Construction Standards: Concurrent to the review of the SBMP, the ACT Government is working towards extending formal declaration Bushfire Prone Areas (BPAs) to include part of the built-up area of Canberra. This extension is for the purpose of allowing Australian Standards AS 3959 – Construction of building in bushfire prone areas to be applicable for structures in these areas.

- Blocks for residential development are not permitted within the Flame Zone or BAL 40 assessed as per AS 3959
- Blocks to be assessed under AS3959 to determine the appropriate level of construction, as well as a **minimum** application of BAL 12.5 construction for 60 m from the edge of grassland vegetation that does not meet the criteria for exempt vegetation under AS 3959, and 150m for forest vegetation
- Note that Inner APZs can be considered exempt vegetation

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Edge Roads: A sealed edge road is required for new estate development. Sealed edge roads should be located within the within the Inner Asset Protection Zones (APZs) and be at a suitable standards for urban fire fighting appliances. Internal roads and laneways should also consider access for emergency services and the ability to provide for safe egress for members of the community away from the interface areas.

Permissible developments: Developments that will concentrate members of the community at high risk from bushfire in declared BPAs may not permissible.

Water supplies: Reticulated water supplies will need to meet the requirements for effective fire-fighting operations. This includes a main water supply of specified capacity (Minimum 150mm F5) around the outer perimeter of new estate developments, as well as hydrants and hardstands.

Urban Plantings: New urban plantings need to consider bushfire risk management in determining the location, species, density, extent and ongoing maintenance of plantings.

I hope this assistwith your planning. Please do not hesitate to contact e if you wish to clarify any of these matters.

Yours sincerely

Dominic Lane AFSM
Commissioner
ACT Emergency Services Agency

// June 2014

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Page 2

ACT Government

Mr David Maxwell
The Riverview Group Pty Ltd
PO Box 3908
MANUKA ACT 2603

David

Dear Mr Maxwell

Strategic Bushfire Management Plan (SBMP V3) Review

The JACS Directorate is appreciative of the recent opportunity to meet with your organisation regarding the SBMP and future development proposals for the ACT.

The future development on the western border of the ACT provides the opportunity to protect the city from bushfire into the longer term future and I look forward to working with you and your directorate as the proposal comes forward.

Further to my recent letter, the ESA is currently preparing Version Three of the ACT Government's SBMP. One of the key themes for the review as part of the plan is that future development proposals meet sustainable outcomes for ongoing public safety with a focus on the Molonglo River Valley and other such areas on Canberra's western fringe.

The draft SBMP V3 is now available for comment and I would like you and your directorate to take the opportunity to provide have input into the document. This can be done so via the ESA website (www.esa.act.gov.au), and I would also encourage you to review the draft plan which is now available.

Yours sincerely

Dominic Lane AFSM
Commissioner
ACT Emergency Services Agency

21 June 2014

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Appendix 2: Road standards public roads (PBP 2006)

Performance Criteria	Acceptable solutions
The intent may be achieved where:	
• firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources)	• public roads are two-wheel drive, all weather roads.
• public road widths and design that allow safe access for firefighters while residents are evacuating an area	• urban perimeter roads are two-way, that is, at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions. Non perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle). • the perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas. • traffic management devices are constructed to facilitate access by emergency services vehicles. • public roads have a cross fall not exceeding 3 degrees. • all roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard. • curves of roads (other than perimeter roads) are a minimum inner radius of six metres and minimal in number, to allow for rapid access and egress. • the minimum distance between inner and outer curves is six metres. • maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient. • there is a minimum vertical clearance to a height of four metres above the road at all times.
• the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles.	• the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicate load rating.

Performance Criteria	Acceptable solutions
• roads that are clearly sign- posted (with easily distinguishable names) and buildings/properties that are clearly numbered.	• public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression. • public roads between 6.5 metres and 8 metres wide are No Parking on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression.
• there is clear access to reticulated water supply	• public roads up to 6.5 metres wide provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression. • one way only public access roads are no less than 3.5 metres wide and provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression.
• parking does not obstruct the minimum paved width	• parking bays are a minimum of 2.6 metres wide from kerb edge to road pavement. No services or hydrants are located within the parking bays. • public roads directly interfacing the bushfire hazard vegetation provide roll top kerbing to the hazard side of the road.

Appendix 3: Property access road standards (PBP 2006)

Performance Criteria	Acceptable solutions
The intent may be achieved where:	
• access to properties is provided in recognition of the risk to fire fighters and/ or evacuating occupants.	• at least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200 metres from a public through road
• the capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles. • all weather access is provided.	• bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes • roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge).
• road widths and design enable safe access for vehicles	• a minimum carriageway width of four metres for rural-residential areas, rural landholdings or urban areas with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building (or footprint). *Note: No specific access requirements apply in a urban area where a 70 metres unobstructed path can be demonstrated between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles (i.e. a hydrant or water supply).* • in forest, woodland and heath situations, rural property access roads have passing bays every 200 metres that are 20 metres long by two metres wide, making a minimum trafficable width of six metres at the passing bay. • a minimum vertical clearance of four metres to any overhanging obstructions, including tree branches. • internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum 12 metre outer radius. • curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress. • the minimum distance between inner and outer curves is six metres. • the crossfall is not more than 10 degrees. • maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads. *Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.* • access to a development comprising more than three dwellings have formalised access by dedication of a road and not by right of way.

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