

Bushfire Assessment Report

Master Plan Proposal for Enterprise Zone 475 Badgerys Creek Road, Bradfield

Prepared for Ingham Property Group



Version 3.0 17 June 2024



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Glossary

This section defines those core terms and concepts which are adopted throughout the body of this report.

Term	Definition
Asset Protection Zone (APZ)	A fuel-reduced area surrounding a built asset or structure which provides a buffer zone between a bushfire hazard and an asset. The APZ includes a defendable space within which firefighting operations can be carried out. The size of the required APZ varies with slope, vegetation and Forest Fire Danger Index.
Bushfire	A general term used to describe fire in vegetation, includes grass fire.
Bushfire Assessment Report (BAR)	Provides an assessment of the suitability of an individual development, subdivision, or Master Plan.
Bushfire attack mechanisms	The various ways in which a bushfire can impact upon people and property and cause loss or damage. These mechanisms include flame contact, radiant heat exposure, ember attack, fire wind and smoke.
Bushfire Attack Level (BAL)	A means of measuring the severity of a building's potential exposure to ember attack, radiant heat, and direct flame contact. The BAL is used as the basis for establishing the requirements for construction to improve protection of building elements and to articulate bushfire risk.
Bushfire Design Requirements	A separate (Attachment 17) design document to assist the master planning with requirements and specifications to provide compliance with PBP 2019.





Bushfire prone land (BPL)	An area of land that can support a bushfire or is likely to be subject to bushfire attack, as designated on a bushfire prone land map.
Bushfire Hazard	Any vegetation that has the potential to threaten lives, property, or the environment.
Bushfire Strategic Study (BAR)	Provides the opportunity to assess whether new development is appropriate in the bushfire hazard context.
Bushfire Threat	Potential bushfire exposure of an asset due to the proximity and type of a hazard and the slope on which the hazard is situated.
Hazard	A hazard is any source of potential harm or a situation with a potential to cause loss. A hazard is therefore the source of risk.
Likelihood	The chance of an event occurring. Likelihood may be represented as a statistical probability (such as an annual exceedance probability), or whether this is not possible, it can be represented qualitatively using measures such as 'likely', 'possible' and 'rare'.
Managed land	Land that has vegetation removed or maintained to a level that limits the spread and impact of bushfire. This may include developed land (residential, commercial, or industrial), roads, golf course fairways, playgrounds, sports fields, vineyards, orchards, cultivated ornamental gardens and commercial nurseries. Most common will be gardens and lawns within curtilage of buildings. These areas are managed to meet the requirements of an APZ.
Mitigation	The lessening or minimizing of the adverse impacts of a bushfire event. The adverse impacts of bushfire cannot be prevented fully, but their scale or severity can be substantially lessened by various strategies and actions. Mitigation measures include engineering techniques, retrofitting and hazard-

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	resistant construction as well as on ground works to manage fuel and separate assets from bushland.
Planning for Bushfire Protection 2019 (PBP)	NSW Rural Fire Service publication effective from 1 March 2020 which is applicable to all new development on bushfire prone land in NSW.
Resilience	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management. UNDRR 2017
Risk	The degree of risk presented by that interaction will depend on the likelihood and consequence of the bushfire occurring. Risk may be defined as the chance of something happening, in a specified period of time that will have an impact on objectives. It is measured in terms of consequences and likelihood.
Risk assessment	A systematic process of evaluating the potential risks that may be involved in a projected activity or undertaking, having regard to factors of likelihood, consequence, vulnerability, and tolerability.
Risk-based land use planning	The strategic consideration of natural hazard risk and mitigation in informing strategic land use planning activities.

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1. Badgerys Creek Master Plan – Project Overview

The Ingham Property Group (IPG) site is located at located at 475 Badgerys Creek Road, Bradfield, and has a total area of 184 ha. The site is legally defined as Lots 99 & 100 in DP1287207. Lot 99 is the zone substation and Lot 100 is the remainder of the site. The site forms part of the Aerotropolis Core Precinct within the Western Sydney Aerotropolis and is predominately zoned for ENT Enterprise use under the State Environmental Planning Policy (Precincts – Western Parkland City) 2021 (WPC SEPP).

The site comprises a total area of 184 hectares along Badgerys Creek Road, strategically located within the heart of the Western Parkland City. The large majority of the site is under the ownership of IPG, with a small portion of land earmarked for the North Bradfield Zone Substation owned by Endeavour Energy. The site is largely defined by grass land and is largely clear of vegetation as it is currently used for agricultural purposes. There is also an internal road network within the site which had previously connected the now demolished sheds and ancillary structures dispersed across the site. The site is suitable for development and free of contamination which has been confirmed by environmental testing and site investigations. The site is situated within the Western Sydney Aerotropolis, with a direct interface with the Western Sydney International Airport (WSI). The site is bound by two significant riparian corridors which define Western Sydney, with South Creek to the east and Badgerys Creek to the northwest. The immediate surroundings of the site are characterised by large rural landholdings used predominately for agricultural and light manufacturing purposes, all of which will redeveloped in accordance with the Aerotropolis Precinct Plan vision.

IPG has undertaken an extensive the Master Plan pathway with the Technical Assurance Panel (TAP), which is an optional design process established under the WPC SEPP to amend the Aerotropolis Precinct Plan as it applies to the site. IPG has prepared a final a Master Plan (Version T), as part of a co-design process with the TAP, for the site which will be formally lodged to the Department of Planning, Housing and Infrastructure (DPHI) in accordance with the Western Sydney Aerotropolis Master Plan Guidelines.

The IPG Master Plan was informed by a detailed assessment of the site-specific considerations through preliminary site investigations. The Master Plan breaks down the general application of the Enterprise zone across the site and provides a more granular approach to land use planning with considerations made to the opportunities and constraints of the site. The structure plan is made up of four key land uses which include enterprise and light industry, business and enterprise, and employment zone centres.

IPG has engaged Blackash Bushfire Consulting to prepare a Technical Report to inform the bushfire risk assessment requirements for the master plan and co-design process.



2. Introduction to the Bushfire Assessment Report

Blackash Bushfire Consulting has been engaged by Ingham Property Group (IPG), to provide a Bushfire Assessment Report (BAR) to support the Master Plan for the rezoning of the IPG land (legally known as Lots 99 & 100 DP1287207) at 475 Badgerys Creek Road, Bradfield (site shown as Figure 1). The site has been rezoned by the *State Environmental Planning Policy (Precincts – Western Parkland City)* Chapter 4 – Western Sydney Aerotropolis, predominantly as Enterprise Zone. This document will be referred to as the WPC SEPP in this BAR. The site is shown in context with the Aerotropolis as Figure 2. The Master Plan process has included significant iterative design development from a range of consultants and the Department of Planning, Housing and Infrastructure (DPHI) over an extended period. The Master Plan is shown as at Figure 3, and the Landscape Master Plan is shown as Figure 4, demonstrating the significant role of water in the future local landscape. This BAR will demonstrate that the Master Plan is capable of meeting all future bushfire management requirements during subsequent development applications.

The site is on Bushfire Prone Land (BPL). The Master Plan has been designed to meet the bushfire requirements within the Environmental Planning and Assessment Act, 1979 (EPA Act), specifically Direction 4.3 Planning for Bush Fire Protection which applies to Master Plans that affect, or are in close proximity to, land mapped as BPL. This BAR demonstrates compliance with the NSW Rural Fire Service (RFS) document Planning for Bushfire Protection 2019 (PBP).

The site and surroundings have been highly modified over time, and through the current development of the new airport and accompanying infrastructure. The site itself has long been used for agriculture and is largely cleared, with limited native vegetation present. Large fire runs cannot penetrate the site, and the site is considered a Low Bushfire Management Risk overall. The predominant land use zone is ENT Enterprise which reflects previous confirmation of this Low risk and the site will continue to evolve with the new uses.

Small areas of remnant bushland are retained within the site and Forested Wetland vegetation will be enhanced and rehabilitated along the riparian corridors, along with extensive pedestrian networks and a detailed Water Sensitive Urban Design approach retaining significant water in the landscape. The resulting vegetation patterns will therefore be highly fragmented, often with a wetland, linear in form and generally bordered by road infrastructure.









Date: 26/05/2023 0 500 1,000 Metres Coordinate System: GDA 1994 MGA Zone 56 Imagery: © Nearmap

Figure 1: Location adjacent to Nancy Bird Walton Airport

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Figure 2: Western Sydney Aerotropolis Precinct Plan (Urbis report to Technical Assurance Panel #3)



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Figure 3: Master Plan - note stormwater basins and access in riparian corridors



Landscape Masterplan



Plan 1:8000 @ A3



IPG Masterplan Bradfield Public Domain Landscape Strategy



Figure 4: Landscape Master Plan Proposal (p.9) - note significant water features in landscape



3. Credentials

This assessment has been prepared by David Lemcke and Lew Short from Blackash Bushfire Consulting. Current Curriculum Vitae are at Appendix 2.

David Lemcke is a Senior Planner & Bushfire Specialist who is an active senior RFS volunteer, with over 20 years in the service, a field officer for 14 years, incident management experience at local level and he has held multiple brigade Executive roles. Dave is an experienced town planner with over 20 years experience in local government holding numerous qualifications including a Master of Environmental Planning and Advanced Diploma of Public Safety (Emergency Management).

Lew Short is the Principal at Blackash Bushfire Consulting (FPAA BPAD-A Certified Practitioner No. BPD-PA-16373) who is recognised by the RFS as qualified in bushfire risk assessment and has been accredited by the Fire Protection Association of Australia as a Level 3 BPAD qualified consultant.

Lew established and led the Community Resilience Group for the RFS. His areas of responsibility included land use planning, community engagement, education, vulnerable communities, bunkers, Neighbourhood Safer Places, business systems and projects, social media, integrated risk management and environmental management. He was responsible for the establishment, management and leadership of the development assessment function for the RFS at a State level where he was responsible for the assessment of over 80,000 development applications in Bush Fire Prone Areas.

Lew holds several qualifications including undergraduate and post graduate level in environmental management and specialising in bushfire management. Lew is an active Crew Leader with Ku-ring-gai Rural Fire Brigade and has significant operational experience.

Both Lew and David are experts in the bushfire field and can interpret and apply legislation, policy and bushfire requirements while drawing on extensive professional expertise and operational experience.



4. Approach to the Bushfire Assessment Report

This BAR is based upon the principles and requirements of PBP. It will consider both the principles and requirements of Chapter 4 – Strategic Planning and Chapter 8 – Other Development of PBP, despite already being predominantly zoned as an Enterprise Zone under SEPP PWPC, as the BAR considers the master planning of the entire 184 ha IPG site.

The BAR will demonstrate that due to a combination of factors the site is both confirmed as being of Low bushfire risk for development, and that the proposed Master Plan will ensure future subdivision and individual complying development certificates can meet the deemed to satisfy requirements of PBP. No alternative solutions or performance-based assessment have been undertaken or relied upon for any part of this assessment. These factors include:

- the bushfire risk context in the landscape;
- the non-residential development type;
- the scale of water and fresh water wetlands within the retained corridors reducing the potential for bushfire to develop or spread;
- the ongoing management of the riparian corridors for multiple uses;
- the scale and type of future vegetation being predominantly Forested Wetlands; and
- the general development design standards suitable for an Enterprise Zone.

The Master Plan process provides the opportunity to determine if the site can comply with the various competing legislative and design requirements (e.g. transport, services, ecological, water management). This process involves significant engagement with the Department of Planning, Housing and Infrastructure (DPHI), Department of Climate Change, the Environment and Water DCCEW) and other regulatory stakeholders in an iterative process to identify issues and allow for consideration and amendment early in the process.

A final approved Master Plan resolves major issues however allows for future design flexibility during subdivision and individual development applications later in the development process. This BAR uses a conservative approach that demonstrates the Master Plan site can meet the legislative and planning requirements for bushfire risk management as required by legislation and PBP. This conservative approach will also facilitate the adoption of suitable exempt and complying provisions within the final Master plan.

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In a bushfire context, strategic land use planning must ensure that future land uses are in appropriate locations to minimise the risk to life and property from bushfire attack. The broad principles which apply to the strategic planning analysis, are outlined in PBP Section 4.1 (p. 34):

- ensuring land is suitable for development in the context of bushfire risk and broader environmental impacts;
- ensuring new development on BPL will comply with the minimum requirements of PBP;
- minimising reliance on performance-based solutions;
- providing adequate infrastructure associated with emergency evacuation and firefighting operations; and
- facilitating appropriate ongoing land management practices.

As will be discussed below, all threshold issues regarding the suitability of the site for an Enterprise Zone have previously been determined during the rezoning process, and compliance with the remaining PBP requirements will be demonstrated.





5. Strategic Planning for Bushfires

Land use planning is widely recognised as an important measure for limiting future vulnerabilities and bushfire losses in areas of new development and a critical element for building disaster resilient communities.

The physical design and layout of communities and settlements are central to the many functions that sustain the social, economic and environmental support systems for the community. Land use planning provides the opportunity to manage new growth and residual risk resulting from new development by complying with legislation and standards, limiting or modifying the location of new development and influencing its layout. This can limit both the impacts of new development on natural systems, ecosystem services and hazards and the flow on impacts on the existing community, as well as limiting the impacts that natural hazards can have on new development and its users.

The strategic planning system is particularly important in contributing to the creation of resilient, safe and sustainable communities that are in keeping with the policy and intent of government.

The National Strategy for Disaster Resilience (2011)¹ recognises that strategic planning is essential in creating safer and sustainable communities. In keeping with the policy and intent of government at all levels. Priority outcomes of Section 3.6 include:

• All levels of decision making in land use planning and building control systems take into account information on risks to the social, built, economic and natural environments.

This BAR has been completed having regard to the following Commonwealth documents:

- National Strategy for Disaster Resilience (2011)
- Land Use Planning for Disaster Resilient Communities (2020)
- National Disaster Risk Reduction Framework (2018)

Comprehensive consideration of bushfires and risks in the NSW planning system needs sound understanding of the landscape context and risks, as well as clarity on risk management principles and



¹ NSDR <u>https://www.homeaffairs.gov.au/emergency/files/national-strategy-disaster-resilience.pdf</u>



on the approach to strategic planning and development controls that will adequately mitigate identified risks. Where there are competing policy objectives, such as biodiversity conservation and fuel reduction, an agreed methodology or guidance is critical.

As such, planning decisions must be based on the best available evidence and rigorous merits-based assessment to ensure that new development - people, homes and businesses are not exposed to unacceptable risk from bushfire. The framework provided within PBP provides the minimum requirements for new development within bushfire prone areas.

Improved land use planning decisions and building controls for developments in bushfire prone areas are intrinsic to an integrated approach to the fire management in NSW. The application of legislation, policy, and guidelines provides one of the most effective means of bushfire planning to ensure future developments are resilient and capable of protecting life.

The importance of sound land use planning has been recognised in most significant bushfire inquiries, including Natural Disasters in Australia which noted that land use planning that considers natural hazard risks is the single most important mitigation measure in preventing future disaster losses in areas of new development, and that planning, and development controls must be effective, to ensure that inappropriate developments do not occur².

This BAR focuses on disaster resilience which means planners, hazard leaders, emergency managers and other built environment professionals can contribute to:

- understanding and anticipating bushfire risks before they happen and developing more resilient land use and built form tailored to address bushfire risks.
- minimising the increase in risks to people and disruptions to social and economic functions when a disaster strikes by ensuring compliance with state requirements for new development in Bushfire Prone Areas.

This BAR recognises the balanced approach provided within NSW for new development in Bushfire Prone Areas that recognises the need to protect human life, provide safe operating environment for fire and emergency services, while also having due regard to environmental impacts, development potential of land and the need to cater for growing populations is provided in this assessment.



² Ellis, S et al (2004) National Inquiry on Bushfire Mitigation and Management (p.92)



6. Legislative Framework

The landuse planning framework as it relates to landuse planning and bushfire in NSW is embedded in the EP&A Act, the *Rural Fires Act 1997* (RF Act), *Rural Fires Regulation 2013* (RFR) which is articulated through PBP.

Development within the Aerotropolis area is managed under the SEPP PWPC including the Master Plan process. DPHI manages the Master Plan requirements for proponents and requires consideration of PBP in a similar process that the EP&A Act Section 9.1 provides for the Planning Minister to direct consent authorities to apply certain standards (detailed in the Direction) when preparing Planning Proposals for consideration. These Directions cover a range of practice areas and carry legislative weight.

Planning Direction 4.3 *Planning for Bush Fire Protection* (Appendix 3) requires Council to consult with the Commissioner of the NSW Rural Fire Service when preparing a Master Plan and consider any comments made. Importantly, a Master Plan must:

- (a) have regard to Planning for Bush Fire Protection 2019
- (b) introduce controls that avoid placing inappropriate developments in hazardous areas, and
- (c) ensure that bushfire hazard reduction is not prohibited within the APZ.

It is unclear whether the Directions apply when dealing with a Master Plan under the SEPP PWPC, however it is clear that PBP must be considered. As SEPP PWPC Chapter 4 – Western Sydney Aerotropolis specifically allows and encourages exempt and complying development via the Master Plan process it is important that clear compliance with the relevant parts of PBP is demonstrated. Where future development does not fall within the exempt and complying arrangements it will be managed under the development application assessment system.

Development Assessment

Bushfire Prone Land (BPL) is designated in accordance with s.10.3 of the EP&A Act. BPL is land which can support a bushfire or is subject to bushfire attack, that has been identified and mapped by the local council and certified by the Commissioner of the RFS.

Under Section 4.14 of the EP&A Act:

4.14 Consultation and development consent—certain bush fire prone land





- (1) Development consent cannot be granted for the carrying out of development for any purpose (other than a subdivision of land that could lawfully be used for residential or rural residential purposes or development for a special fire protection purpose) on bush fire prone land (being land for the time being recorded as bush fire prone land on a relevant map certified under section 10.3(2)) unless the consent authority —
 - (a) is satisfied that the development conforms to the specifications and requirements of the version (as prescribed by the regulations) of the document entitled Planning for Bush Fire Protection prepared by the NSW Rural Fire Service in co-operation with the Department (or, if another document is prescribed by the regulations for the purposes of this paragraph, that document) that are relevant to the development (the relevant specifications and requirements),

or

(b) has been provided with a certificate by a person who is recognised by the NSW Rural Fire Service as a qualified consultant in bush fire risk assessment stating that the development conforms to the relevant specifications and requirements.

Building work on BPL must comply with the requirements of the National Construction Code (NCC). Under the Deemed to Satisfy provisions of the NCC, building work on BPL must comply with Australian Standard 3959-2018 Construction of buildings in bushfire-prone areas (AS3959) or the National Association of Steel Framed Housing (2014) Steel Framed Construction in Bushfire Areas (NASH Standard).

General Obligations

All owners and land managers (both public and private) have a duty to prevent the occurrence and spread of bushfires on or from their land. This duty is legislated under Section 63 of the *RFA*.

Local risk mitigation is coordinated through Bushfire Risk Management Plans (BRMP). These guide programs to implement specific treatments. Treatments may include such things as hazard reduction burning, establishing and maintaining APZ, grazing, preparing pre-incident plans, establishing and maintaining fire trails and community engagement. These may be applied to public and private landowners and as notified steps carry the legislative weight of Section 63.





7. Planning for Bush Fire Protection 2019

The specific objective of this BAR is to assess the proposed development with the strategic assessment considerations in Chapter 4 and the relevant requirements of Chapter 8 of PBP. The BAR provides the opportunity to assess whether new development is appropriate in the bushfire hazard context at a strategic or landscape scale. It also provides the ability to assess the strategic implications of future development for bushfire mitigation and management. The BAR must first demonstrate the proposal complies with the overall Aim and Objectives of the document.

All new development on bushfire prone land must comply with PBP.

The **aim** of PBP (p. 10) is:

 to provide for the protection of human life and minimise impacts on property from the threat of bushfire, <u>while having due regard to development potential</u>, site characteristics and protection of <u>the environment</u>.

The **objectives** (PBP p. 10) are to:

- Afford buildings and their occupants protection from exposure to a bushfire
- Provide for a defendable space to be located around buildings
- Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings
- Ensure that appropriate operational access and egress for emergency service personnel and occupants is available
- Provide for ongoing management and maintenance of Bushfire Protection Measures; and
- Ensure that utility services are adequate to meet the needs of firefighters

Chapter 4 of PBP articulates the regulatory framework for strategic planning, including Master Plans, in NSW, along with a series of assessment considerations that are required before a determination can be made regarding a Master Plan.

PBP Section 4.2 (in part, p. 34):

A Strategic Bush Fire Study must include, as a minimum, the components in Table 4.2.1.

Once these strategic issues have been addressed, an assessment of whether the proposal can comply with this document should be carried out. If the strategic issues cannot be resolved, then the proposal cannot comply with PBP and will not be supported by the NSW RFS.





Where there are very particular requirements that must be met regarding a Strategic Bushfire Study that supports the rezoning of land, the consideration of these requirements for a Master Plan are less rigid. This is because the original suitability of the site and the strategic Planning Principles (PBP, p.34) have already been considered and applied at the rezoning stage. RFS support will assist the progress of the Master Plan.

Strategic planning generally, and Master Plans particularly, will need to take account of the next level of detail required at development application (DA) stage, or to satisfy the requirements for a complying development certificate, or as exempt development. This needs to be managed before final project plans, or full assessments for each lot or development proposed. This is designed to provide flexibility for later project stages while progressing the Master Plan to permit the new uses.

To achieve compliance with the Master Plan exempt and complying provisions, or at DA stage, "Other Development" proposals must demonstrate they meet the Aim and Objectives of PBP. Other development refers to any type of development that is not covered by Chapters 5 to 7 of PBP. This includes commercial uses, industrial uses, infrastructure, and development which involves large numbers of people.

Chapter 8 outlines the requirements for other development in section 8.1 (p.74):

In order to comply with PBP the following conditions must be met:

- Satisfy the aim and objectives of PBP outlined in Chapter 1;
- Consider any issues listed for the specific purpose for the development set out in this chapter; and
- propose an appropriate combination of bushfire protection measures.

Strategic Planning Compliance

Master Plans in bushfire prone areas require the preparation of a BAR. This BAR has been completed using the acceptable solutions (or 'deemed to satisfy') provisions within PBP. For strategic level assessment, this requirement relies on the application providing complying asset protection zones (APZ) for the proposed development, roads and access provisions and the provision of services (water, electricity, and gas) that are able to meet PBP.

The BAR is a strategic level assessment, requiring a balance between providing sufficient information to determine the suitability of the site, without overly burdening proponents with detail to be managed / finalised at subsequent stages. PBP (p. 19) notes that:





The most important objective for strategic planning is to identify whether new development is appropriate subject to the identified bushfire risk on a landscape scale. An assessment of proposed land uses and potential for development to impact on existing infrastructure is also a key element of the strategic planning process in bushfire prone areas. Land use planning policies can be introduced to limit the number of people exposed to unacceptable risk.

Once development has been assessed as being appropriate in its bush fire prone context, it will need to be capable of complying with PBP. The ability of proposed land uses and associated future developments to comply with PBP will be assessed at the strategic planning stage. The expectation will be that the development will be able to comply with PBP at the DA stage.

By definition of the final and highest use zoning of the land (being ENT Enterprise and ENZ Environment and Recreation) the site has already been considered for suitability on a landscape scale and found acceptable. Figure 6 showing the recent bushfire history demonstrates the veracity of the decision.

The design team has considered and responded to the bushfire requirements within PBP. In a bushfire context, the design team has provided a Master Plan that ensures future development on the site are in appropriate locations to minimise the risk to life and property from bushfire attack. Future development will be able to comply with PBP at the Development Application or Complying Development Certificate stage, and suitable exempt and complying provisions will be compliant.

The existing zoning demonstrates satisfaction of the broad principles PBP (p. 34) for strategic planning into the Master Plan which apply to the risk assessment of an area including:

- ensuring land is suitable for development in the context of bushfire risk
- ensuring new development on BPL will comply with PBP
- minimising reliance on performance-based solutions
- providing adequate infrastructure associated with emergency evacuation and firefighting operations
- facilitating appropriate ongoing land management practices.

The existing zoning demonstrates satisfaction of the exclusion of inappropriate development provisions (p.34) in bushfire prone areas including:

- the development area is exposed to a high bushfire risk and should be avoided
- the development is likely to be difficult to evacuate during a bushfire due to its siting in the landscape, access limitations, fire history and/or size and scale
- the development will adversely effect other bushfire protection strategies or place existing development at increased risk

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- the development is within an area of high bushfire risk where density of existing development may cause evacuation issues for both existing and new occupants
- the development has environmental constraints to the area which cannot be overcome.

PBP requires that a formal Strategic Bushfire Study must include, as a minimum, the components identified in Table 4.2.1 of PBP – Bushfire Strategic Study (p.35) as shown in Figure 6. In the case of this BAR these threshold issues have already been addressed during the rezoning process, and provide an additional checklist to ensure a suitably conservative approach is taken in assessing the Master Plan.

As shown on Figure 7, there is no significant bushfire history impacting this site which is most likely a reflection of the relatively low risk grassland vegetation, the history of active land management for rural purposes in the district, and the presence of 23 local RFS brigades within less than 20km of the site as shown in Figure 5 which is an extract from the NSW Planning Portal Spatial Viewer.



Figure 5: Location of RFS brigades in the rural landscape of the district

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ISSUE	DETAIL	ASSESSMENT CONSIDERATIONS
Bush fire landscape assessment	A bush fire landscape assessment considers the likelihood of a bush fire, its potential severity and intensity and the potential impact on life and property in the context of the broader surrounding landscape.	 The bush fire hazard in the surrounding area, including: Vegetation Topography Weather The potential fire behaviour that might be generated based on the above; Any history of bush fire in the area; Potential fire runs into the site and the intensity of such fire runs; and The difficulty in accessing and suppressing a fire, the continuity of bush fire hazards or the fragmentation of landscape fuels and the complexity of the associated terrain.
Land use assessment	The land use assessment will identify the most appropriate locations within the masterplan area or site layout for the proposed land uses.	 The risk profile of different areas of the development layout based on the above landscape study; The proposed land use zones and permitted uses; The most appropriate siting of different land uses based on risk profiles within the site (i.e. not locating development on ridge tops, SFPP development to be located in lower risk areas of the site); and The impact of the siting of these uses on APZ provision.
Access and egress	A study of the existing and proposed road networks both within and external to the masterplan area or site layout.	 The capacity for the proposed road network to deal with evacuating residents and responding emergency services, based on the existing and proposed community profile; The location of key access routes and direction of travel; and The potential for development to be isolated in the event of a bush fire.
Emergency services	An assessment of the future impact of new development on emergency services.	 Consideration of the increase in demand for emergency services responding to a bush fire emergency including the need for new stations/ brigades; and Impact on the ability of emergency services to carry out fire suppression in a bush fire emergency.
Infrastructure	An assessment of the issues associated with infrastructure and utilities.	 The ability of the reticulated water system to deal with a major bush fire event in terms of pressures, flows, and spacing of hydrants; and Life safety issues associated with fire and proximity to high voltage power lines, natural gas supply lines etc.
Adjoining land	The impact of new development on adjoining landowners and their ability to undertake bush fire management.	Consideration of the implications of a change in land use on adjoining land including increased pressure on BPMs through the implementation of Bush Fire Management Plans.

Figure 6: Requirements of a Bush Fire Strategic Study (PBP p. 35)







Figure 7: Bushfire history

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Sugar



8. Bushfire Prone Land

The study area is identified as being within 'bushfire prone land' (see Figure 8) for the purposes of Section 10.3 of the EPA Act and the legislative requirements for development on BPL are applicable.

Bushfire Prone Land Maps (BPLM) provide a trigger for the development assessment provisions and consideration of sites that are bushfire prone. BPL is land that has been identified by council, which can support a bushfire or is subject to bushfire attack. The BPLM are prepared by local council and certified by the Commissioner of the NSW RFS.

BPLM map vegetation hazards and provide a suitable buffer distance from that vegetation. They are a trigger for development assessment primarily, an indication of potential bushfire attack only, and are not a risk assessment of land.

The Liverpool City Council BPLM shows the site is affected predominantly by Category 3 (Medium Risk) vegetation (Grassland) and the associated 30m buffer. There are small areas of Category 1 vegetation (Woodland) which have an associated 100m buffer. The BPLM should reflect the current potential of land within the site and within the vicinity of the site to carry bushfire. In this case however, the scale and speed of development in the local area means the BPL Map is significantly out of date and inaccurate.

Under the RFS Guide for Bushfire Prone Land Mapping Version 5b (November 2015) at Section 7 (p. 10) there are provisions allowing that certain lands do not need to be mapped as bushfire prone, particularly managed lands, or may be downgraded to Vegetation Category 2 which is Lower Risk. There is to be a high level of ongoing management of the riparian corridors for multiple reasons including water management targets (large permanent basins), shared pathway maintenance and provision of both active and passive recreation areas. The riparian corridors are to be substantially restored and revegetated, using the most appropriate Plant Community Types (PCT) as provided by the project ecologists. These will be discussed further below and are considered as Keith Classification of Forested Wetland.

Given the scale and economic importance of developing both this site and the wider Aerotropolis it is incumbent on DPHI and Council to facilitate the development of the Enterprise Zone. Part of the Master Plan process needs to be formal agreement of whether these restored vegetation corridors with their linear, fragmented nature and their lower risk vegetation should be removed from a future iteration of the BPLM to facilitate the operation of the exempt and complying provisions. Exempt and complying provisions are analysed further below.

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Figure 8: Bushfire Prone Land Map – requires update to account for airport development

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9. Bushfire Hazard Assessment

PBP provides a methodology (PBP Appendix 1) to determine the bushfire threat and commensurate size of any Asset Protection Zone (APZ) that may be required to offset possible bushfire attack. These elements include the potential hazardous landscape that may affect the site and the effective slope within that hazardous vegetation. For new "Other development", APZ requirements are based on providing practical building envelopes on lots that keep radiant heat levels at future buildings below 40kW/m².

The following assessment is prepared in accordance with Section 100B of the RFA, Section 44 of the *Rural Fires Regulation 2013* (RFR) and PBP. This assessment is based on the following resources:

- Planning for Bush Fire Protection (RFS, 2019);
- Liverpool City Council Bush Fire Prone Land Map;
- Aerial mapping; and
- Detailed GIS and Site analysis.

The methodology used in this assessment is in accordance with PBP (p.80) and is outlined in the following sections.

10. Fire Danger Weather District

PBP requires a credible worst case bushfire weather scenario at a 1:50 year bushfire weather event. The Liverpool City Council LGA is in the Greater Sydney Region Fire Weather District, and the appropriate maximum Forest Fire Danger Index (FFDI) to be applied is FFDI 100.

11. Vegetation Assessment

Vegetation is the fundamental physical component of determining the bushfire behaviour. Vegetation, in broad terms provides the available fuel to be consumed by a bushfire. Fuel load and arrangement represents a considerable component in dictating to a large degree the behaviour of fire in terms of intensity, rate of spread and flame height, and typically relates to dead plant material less than 6mm thick, and live plant material thinner than 3mm.

Vegetation type, density and arrangement can further influence fire behaviour and intensity. Vertical and horizontal continuity is also a significant element. Thus, vegetation forms a key consideration within this BAR. The vegetation provides a basis for the determination for bushfire intensity mapping.





The vegetation assessment has been completed in accordance with PBP. The predominant Vegetation is classified by structure or formation using the system adopted by David Keith (2004) and by the general description using PBP. Vegetation types give rise to radiant heat and fire behaviour characteristics. The predominant vegetation has been determined for the site over a distance of at least 140 metres in all directions from the proposed site boundary or key assets on the development site. Where a mix of vegetation types exist, the type providing the greater hazard is said to predominate.

In this proposal the highly degraded and modified riparian corridors must be considered in their final vegetated form (20+ years) when they will be substantially restored and rehabilitated. The project ecologists have provided clear determination of the appropriate vegetation structure that the restoration will take (Figure 9) and the resultant Keith Classification of Forested Wetland will be used for vegetation in the riparian corridors.

РСТ	Vegetation Formation	Vegetation Class		
PCT 4023 Coastal Valleys Swamp Oak Riparian Forest (moderate)	KF_CH9 Forested Wetlands	Coastal Floodplain Wetlands		
PCT 4025 Cumberland Red Gum Riverflat Forest (Low)	KF_CH9 Forested Wetlands	Coastal Floodplain Wetlands		
PCT 4025 4025 Cumberland Red Gum Riverflat Forest (Moderate	KF_CH9 Forested Wetlands	Coastal Floodplain Wetlands		

Figure 9: Vegetation classification per project ecologists (Eco Logical Australia)

As shown earlier in Figure 4, the final landscape plan has been designed to capture and manage stormwater runoff from the increased hard surfaces. Water quantity and quality controls are required as well as the movement of water from various final grades across the site. These drivers of landscape design result in large areas of deep open water, stormwater treatment trains including ponds and riffles, and managed freshwater wetland areas.

The riparian corridors are also active pedestrian and cycling transport routes with formal pathways, and they provide a variety of active and passive recreation areas along the edges of the riparian corridors. The corridors are also narrow and linear, generally 90-120m wide. These corridors will be re-established in accordance with detailed stormwater and landscape design, and large sections of these corridors will be actively managed in perpetuity.

The riparian corridors are classified as "Forested Wetland" for bushfire assessment purposes, with areas of Woodland and Grassland vegetation along the boundaries of the site. Permanent stormwater facilities are treated as managed land. Figures 10-15 provide examples of the proposed landscape design treatments, and Figures 16 & 17 show the vegetation mapped across the site. Main shared paths are 4m wide and suitable for RFS tankers.



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Riparian Corridors - Masterplan



Figure 10: Riparian Corridors (p.34). Large areas of water, recreation nodes, Active Transport paths and maintenance paths all forming part of APZ.





Figure 11: Riparian corridor 1 (p. 50) - cross section showing paths, roads and boundary setbacks forming APZ

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Riparian Corridor 2



Plan 1:5000 @ A3



Lanuscape Architecto

Figure 12: Riparian corridor 2 – plan (p.52).

Design Elements

Riparian Corridor 2 runs along the central spine of the site and provides large areas of amenity and shareway for site users. Similarly to Riparian Corridor 1, the amenity areas are consolidated to key junction points that area easily accessible and sit, where possible, outside the inner 50% of the riparian corridors. These zones will offer varied program including BBQ and outdoor dining facilities, open managed lawn areas for flexible use, multi-use sports courts, a children's playground and viewing decks that interact with wetland ponds and the watercourse. The rest of the corridor will be dedicated to re-vegetating the edges of the existing watercourse and providing storage basins and wetland ponds to treat the storm water runoff.

Legend



IPG Masterplan Bradfield Public Domain Landscape Strategy





Riparian Corridor 2 - Sections



KEY PLAN



Landscape Section A 1:400 @ A3



Landscape Section B 1:400 @ A3



IPG Masterplan Bradfield Public Domain Landscape Strategy



Figure 13: Riparian corridor 2 sections. Note bushfire risk reduced by fragmentation and access provision (p. 58)



Riparian Corridor 3



Design Elements

Riparian Corridor 3 sits at the north west corner of the panhandle of the site. Wianamatta South Creek serves as a culturally significant and sacred space for the local indigenous community and a the importance of riparian restoration and the harmonious coexistence between nature and community drives the design. The amenity node serves as a meeting place, where site

users and the broader community come together to learn, share, and celebrate. The flexible community space in the amenity area could serve as a space where workshops are held to educate people on riparian restoration techniques and the cultural importance of Wianamatta (meaning mother) creek.

Legend

Large Amenity node (large covered BBQ/dining facility, flexible space to facilitate community events/ educational activities)

02 Re-vegetated Areas/ Riparian zones

- 03 Storage Ponds/Wetland Basins
- 04 Wianamatta South Creek
- 05 Riparian Street

Plan 1:4000 @ A3



Figure 14: Riparian corridor 3 (eastern side and northern boundary)







Riparian Corridor 3 - Sections





KEY PLAN

Landscape Section 1:300 @ A3

Design Elements



Large open lawns for gathering/ active recreation

Integration of language and way-

BBQ and seating amenity finding through materials and motifs













Figure 15: Riparian corridor 3 section from top right image – note fragmentation of bushland by water features and recreation uses.

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Figure 16: Vegetation and slope – west







Sec. Sec. Sugar Sec.



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12. Slopes Influencing Bushfire Behavior

PBP requires assessment of slope effecting the site. The slope of the land under the classified vegetation has a direct influence on the rate of fire spread, the intensity of the fire and the ultimate level of radiant heat flux. The effective slope is the slope of the ground under the hazard (vegetation). In identifying the effective slope, it may be found that there are a variety of slopes covering different distances within the vegetation. The effective slope is the slope under the vegetation which will most significantly influence the bushfire behaviour for each transect. This is usually the steepest slope.

Assessment of the slopes have been shown in Figures 16 & 17 for the site. The sites effective slopes range from Upslope to 3.4 degrees downslope, with the downslopes generally only associated with short batters from the lakefronts. The slopes are also very short, generally less than 100m and unable to permit a fire to fully develop in combination with the limited vegetation. The effective slope of these areas is considered in relation to the slope ranges in PBP Table A1.12.3 (p. 90) which provides the minimum APZ distances for residential subdivision as a guideline to aid analysis of the site.

13. Asset Protection Zones

For proposed new development, PBP requires that a minimum separation is provided in the form of APZ. The APZ is a fuel-reduced, physical separation between buildings and bushfire hazards. For "Other "development, APZ requirements are based on the objectives of PBP:

- Provide for a defendable space to be located around buildings, and
- Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings.

For industrial & commercial development APZ requirements are typically based on keeping radiant heat levels at buildings below 40kW/m² (BAL-40) as the maximum exposure on all sides of the building. Taking a conservative approach, the range of APZ required across the Master Plan site are calculated for the much higher residential development standard of below 29kW/m² (BAL-29). This will provide maximum flexibility for future exempt and complying development and meets and exceeds all PBP requirements.

Figure 18 is taken from Appendix 1 Table A.1.12.2 of PBP (p.90) and highlights the relevant vegetation types, slopes and resulting APZ setbacks needed to meet the very conservative - residential development standard. These are mapped standards in Figures 19 & 20.





Table A1.12.2

Minimum distances for APZs - residential development, FFDI 100 areas (<29kW/m², 1090K)

			EFFECTIVE SLOP	E	
KEITH VEGETATION FORMATION	Up slopes and flat	>0°-5°	>5°-10°	>10°-15°	>15°-20°
	Distance	(m) from the as	set to the predomi	nant vegetation f	ormation
Rainforest	11	14	18	23	30
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	24	29	36	45	56
Grassy and Semi-Arid Woodland (including Mallee)	12	16	20	25	32
Forested Wetland (excluding Coastal Swamp Forest)	10	12	16	20	26
Tail Heath	10	18	20	22	25
Short Heath	9	10	12	13	15
Arid-Shrublands (acacia and chenopod)	6	7	8	9	10
Ereshwater Wetlands	5	6	6	7	8
Grassland	10	12	13	15	17

Figure 18: Conservative vegetation assessment using BAL-29 residential standards (mapped)

To meet the very conservative BAL-29 residential subdivision standard the APZ required range from 10-16m wide. The majority of the APZ are associated with 24m wide roads suitable for Enterprise Zone development, although some APZ must be accommodated within the riparian corridor or on a development lot. In the few cases where an APZ may be required to be maintained in perpetuity on a development lot this can be managed via an easement condition.

The standard Table at Figure 18 is very conservative and uses the highest fuel loads for each vegetation formation and uses a slope range of 5 degrees per increment rather than a specific slope. Both lower fuel loads and lesser slopes can alter the calculations significantly. This will be explored in detail in Section 17.

The nature of APZ is they are fuel reduced areas. An APZ may consist of one or more physical characteristics or uses, and may consistent of multiple materials, so long as the fuel reduced nature is maintained ongoing to meet the RFS standards. Ideally, APZ are multi-purpose use areas to reduce the unnecessary alienation of land and typically contain roads, footpaths, managed stormwater infrastructure, parklands, front setbacks, car parking etc. APZ do not need to be a vegetation free area and in particular street trees for shade and amenity are easily accommodated within the RFS standards.

All APZ for the Masterplan area are located extending from the edge of the vegetation forming the hazard. The APZ do not form any part of the riparian corridor natural vegetation. For completeness all APZ are shown on the following figures, and at times these are shown superimposed over areas of open water or recreational spaces. Open water is clearly noncombustible and meets the RFS standards. Parkland to be actively managed for recreational space will be included as there will be an ongoing management regime associated with that





primary use that will meet the RFS standards for fuel reduction. Typically, these recreational areas (e.g. playgrounds, BBQ areas, active open space, managed passive parklands) are removed from the BPL Map in a future iteration as they meet the definition of "managed land" under the RFS document "Guide for Bushfire Prone Land Mapping (2015)". Similarly, where there will be permanent built civil infrastructure such as 4m wide shared pathways or roads these are included as part of the APZ as by their nature those elements will not be vegetated.

There is no ongoing APZ maintenance burden for Council or Sydney Water other than maintaining infrastructure acquired for their primary purposes. The zoning of the APZ is not considered relevant as APZ may be incorporated in any zone, and by their nature may cross over multiple zones and/or tenures in some locations. For instance, if an APZ is wide enough to be included on both public recreation land on one side of a road, includes the road itself, and is partly located within the front boundary setback of private development land it will very likely "straddle" two zones. The potential multiple tenures and zones have been considered and have no impact on Council for ongoing maintenance with relation to the riparian corridor. Where required on development land this can be managed via an easement on title. Any such APZ easement may be retained on title for the affected lots even where RFS and Council determination is to remove the riparian areas from future iterations of the BPL Map, or may be removed by the authority with the power to release or amend the easement (typically Council).

State Environmental Planning Policy (Exempt and Complying Codes) 2008 and WPC SEPP detail the requirements for Exempt & Complying development. This will be discussed further in Section 17 of this report, however the standard approach for Complying Development is to permit this where the development has been assessed as not being in BAL-40 or BAL-FZ. Therefore, all building development outside the BAL-29 APZ will be eligible.

It is further noted that as development proceeds to the north and south of the site the requirement for APZs in those locations will be removed or significantly reduced. The range of APZ requirements are shown in Figures 17 & 18.

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Legend Contour - 2m 10m Grassland DKGIS Subject Land 12m Forested Wetland Cadastre 2024 16m Woodland **Asset Protection Zone** 200 **Vegetation Formation** Vegetation Assessment Metres - 4 Buffer - 140m 6m Coordinate System: GDA 1994 MGA Zone 56 Basin Imagery: © Nearmap

Figure 19: Asset Protection Zones - west

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Figure 20: Asset Protection Zones – east



Bushfire Attack Levels

The Bushfire Attack Levels (BAL) is a means of measuring the ability of a building to withstand attack from bushfire. The form of bushfire attack and the severity will vary according to the conditions (FFDI, vegetation, slope and setback) on the site.

The BAL assesses the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per square metre, which is the basis for establishing the requirements for construction to improve protection of a building from potential attack by a bushfire, as defined in Australian Standard AS 3959-2018 Construction of buildings in bushfire-prone areas (AS 3959).

The BAL ratings are used as the basis for establishing the requirements for construction to improve protection of a (proposed) building from potential bushfire attack. For Enterprise Zone development the standard is taken from the objectives of PBP (p. 10) and are to:

- Provide a defendable space to be located around buildings; and
- Provide appropriate separation between a hazard and buildings which in combination with other measures prevent the likely fire spread to buildings.

Figure 21 is taken from Appendix 1 Table A.1.12.5 of PBP (p.91) and highlights the relevant vegetation types, slopes and resulting APZ setbacks needed to meet BAL-40 standard. As can be seen the setback distances required to meet the BAL-40 standard range from 7-12m. These setbacks remove the building from the Flame Zone and satisfy the relevant PBP objectives.

			BUSH FI	RE ATTACK LEVI	EL (BAL)	
KE	TTH VEGETATION FORMATION	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
		[oistance (m) asse	t to predominan	t vegetation cla	ss
	Rainforest	< 8	8 -< 11	11 -< 16	16 -< 23	23 -< 100
AT LAND	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 18	18 -< 24	24 -< 33	33 -< 45	45 -< 100
F	Grassy and Semi-Arid Woodland (including Mallee)	< 9	9 -< 12	12 -< 18	18 -< 26	26 -< 100
2	Forested Wetland (excluding Coastal Swamp Forest)	< 7	7 -< 10	10 -< 14	14 -< 21	21 -< 100
н	Iall Heath	< 12	12 -< 16	16 -< 23	23 -< 32	32 -< 100
SLO	Short Heath	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
B.	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 6	6 -< 9	9 -< 14	14 -< 100
ALI	Freshwater Wetlands	< 4	4 -< 5	5 -< 7	7 -< 11	11 -< 100
	Grassland	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 50
	Rainforest	< 11	11 -< 14	14 -< 21	21 -< 29	29 -< 100
VNSLOPE	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 22	22 -< 29	29 -< 40	40 -< 54	54 -< 100
٥ ٥	Grassy and Semi-Arid Woodland (including Mallee)	< 12	12 -< 16	16 -< 23	23 -< 32	32 -< 100
S - I	Forested Wetland (excluding Coastal Swamp Forest)	< 9	9 -< 12	12 -< 18	18 -< 26	26 -< 100
RE	Tairricath	< 13	13 -< 18	18 -< 26	26 -< 36	36 -< 100
BG	Short Heath	< 8	8 -< 10	10 -< 15	15 -< 22	22 -< 100
2 C	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 7	7 -< 11	11 -< 16	16 -< 100
0	Ereshwater Wetlands	< 4	4-6	6 -< 8	8 -< 12	12 -< 100
	Grassland	< 9	9 -< 12	12 -< 17	17 -< 25	25 -< 50

Figure 21: Extract from Table A1:12.5 - Determination of BAL in FFDI 100 area (p.91)

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More detailed APZ and BAL mapping is shown in Section 17 of this report to demonstrate that all buildings will be able to fit within the standard Exempt & Complying provisions. This preliminary mapping demonstrates it will be possible to meet and exceed all reasonable standards required by PBP.

As Figures 22-26 demonstrate, the Master Plan provides an outcome where most of the site by area has either no bushfire construction requirements (BAL-Low), or the lowest standard of BAL-12.5 applies. It is expected that as the development process continues on the sites north and south of the IPG site, these constraints will be further lessened.

Finally, each of the development lots will have a range of other non-bushfire development criteria applied including those to meet parking and movement standards, design excellence standards, and basic boundary setbacks. Once finalised these will result in all building footprints being undertaken at BAL-29 or below and therefore eligible for Exempt & Complying provisions. Further, any requirements for the small number of lots requiring an APZ will also be incorporated into these setbacks required for other reasons.

Of the proposed development Lots, the majority will have building requirements of BAL-19 or lower, with only Lot 4 having a very small area along the eastern side adjacent the retained Casuarina stand being affected by BAL-40. Once the final retained vegetation area is formalised this small area may also become entirely BAL-29 or lower, this will be reconsidered at construction stage.

This demonstrates the design team has developed lot layouts and building envelopes suitable for Exempt and Complying development provisions, resulting in the facilitating of development without adding significant additional costs for future individual lot developers.

The development implications will be discussed further below in Section 17 regarding Exempt and Complying Code arrangements.

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Figure 22: Bushfire Attack Level calculations - northwest

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Figure 23: Bushfire Attack Level calculations - north







Figure 24: Bushfire Attack Level calculations - northeast

رین روی و این در این آن ها از مام و کردر میشده رو ماند میگریونینی هوده با میگرومه باری و این میدود و همان به مش این روی باری در این آن ها از مام و کردر میشده رو ماند میگریونینی هوده با میگرومه و برای و این میدود و همان به م

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Figure 25: Bushfire Attack Level calculations - southwest

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Figure 26: Bushfire Attack Level calculations – southeast

ا النازي بالوال الالكان معالكه ومعد كالمحافظ والمحافظ منه معكم المحكوم المحكومة المحكومة المحاولة والمحافظ محافظ من المحافظ من المحافظ المحافظ محافظ محافظ المحافظ ا المحافظ ا

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14. Access and egress

PBP requires that the design of access roads enables safe access and egress for people attempting to leave the area at the same time that emergency service personnel are arriving to undertake firefighting operations. Figure 2 shows the planned transport context.

The road network has been the subject of significant ongoing design negotiation given the key location of arterial roads within the site. Figure 3 shows the overall Master Plan road access including the road widths which are generally 24m wide road reserves at a minimum and designed to take large heavy vehicles. These meet and exceed the access standards of PBP.

This complies with PBP.

15. Water Supply and Utilities

PBP (p. 47) requires that adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.

The site will be connected to the reticulated water supply, and all services will be connected to meet the requirements of PBP.

16. Emergency Management

No specific Emergency Management arrangements are required at Master Plan stage. The site is located in a fast-developing area where the road network is rapidly expanding and provides good access and egress. The civil design work will include all services including reticulated water supply hydrants installed to relevant Australian Standards.

The site is located within a predominantly Low risk grassland area, and in the future will be within an almost fully developed urban landscape. Normal assessment procedures will be undertaken by fire agencies to determine the future emergency services needs across the entire Aerotropolis precinct.

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17. Summary Assessment of PBP Aim and Objectives

All development in Bushfire Prone Areas needs to comply with the aim and objectives of PBP. Table 1 shows the compliance with PBP.

Table 1: Compliance with PBP Aim & Objectives

Aim	Meets Criteria	Comment
The aim of PBP is to use the NSW development assessment system to provide for the protection of human life (including fire fighters) and to minimise impacts on property from the threat of bushfire, while having due regard to development potential, onsite amenity and the protection of the environment.	Yes	Landscaping, defendable space, access and egress, emergency risk management and future construction standards are in accordance with the requirements of PBP and the aim of PBP has been achieved.
Objectives	Meets Criteria	Comment
Afford occupants of any building adequate protection from exposure to a bushfire.	Yes	The development provides opportunity for all future occupants to be shielded from any external bushfire. The majority of the site is more than 100m from bushfire threat and APZs that will meet or exceed typical standards can be accommodated.
Provide for a defendable space to be located around buildings.	Yes	The development provides opportunity for all future occupants to be shielded from any external bushfire. The majority of the site is more than 100m from bushfire threat and APZs that will meet or exceed typical standards can be accommodated.
Provide appropriate separation between a hazard and buildings, which, in combination with other measures, prevent the likely fire spread to buildings.	Yes	The development provides opportunity for all future occupants to be shielded from any external bushfire. The majority of the site is more than 100m from bushfire threat and APZs that will meet or exceed typical standards can be accommodated. The future buildings have been designed to allow adequate separation and building to building fire spread will be managed in future stages as particular uses are proposed.
Ensure that safe operational access and egress for emergency service personnel and occupants is available.	Yes	The site will develop a high quality road network with multiple connections in to the wider public road system. Access and egress for emergency vehicles and evacuation will meet or exceed standards. The development provides for the movement of heavy articulated trucks about the site.
Provide for ongoing management and maintenance of bushfire protection measures.	Yes	The entire site will be managed by future owners to achieve a range of outcomes for water management, aesthetics, pedestrian movement, open space, recreation etc. APZ management will occur through development of roads for the majority of the site, and ongoing Plans of Management or similar will be required for retained riparian corridors and APZ.
Ensure that utility services are adequate to meet the needs of firefighters.	Yes	Utility services can be provided as part of future development to meet the needs of firefighters (and others assisting in bushfire fighting).

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18. Complying Development

State Environmental Planning Policy (Exempt and Complying Codes) 2008 (Codes SEPP) and WPC SEPP detail the requirements for Exempt & Complying development. The standard approach for Complying Development is to permit this where the development has been assessed as being outside the areas calculated as BAL-40 or BAL-FZ. The clear intent is to facilitate efficient development practice by reducing significant bushfire risk and requiring further assessment where that is appropriate in the higher BAL ratings. Further the intent is clearly focused on development that may be at actual risk of bushfire attack such as buildings, structures, and some land uses.

There is no indication that the intent of the SEPP should impact development types that consist of non-combustible materials and are therefore unlikely to be impacted by bushfire, for instance development for bulk earthworks, road building, stormwater infrastructure or the like. For clarity it is recommended that a specific general provision be included in any final Masterplan approval such as:

• "Complying development that consists of civil works using non-combustible materials, or the issue of a subdivision certificate, may be undertaken within areas of land with a bushfire attack level of BAL-40 or BAL-FZ."

Alternately, these non-combustible types of development may be excluded from the complying development requirements, consistent with the operation of the Codes SEPP, which was written primarily to facilitate residential development.

There are significant socio-economic benefits from simplifying the development process across the Aerotropolis, therefore the simplification of the Exempt & Complying provisions as they relate to the Master Plan site need further consideration. Factors to consider include:

- The assessment undertaken by this report demonstrates that each of the lots will be able to provide significant building envelopes that are assessed as lower than BAL-40.
- The overall site is considered very low risk due to the existing and future landscape, with the Nancy Bird Walton Airport on the northwestern side of the site preventing any bushfire from that exposure where the worst bushfire weather comes from. The surrounding area is zoned for urban development with only small areas of bushland.
- The riparian corridors although larger than 1.0 ha in size are very narrow and linear, generally only being 90-120m wide; the vegetation within the corridors will be lower risk Forested Wetland; they are fragmented by stormwater and recreational infrastructure; and they will be permanently managed by Council and/or Sydney Water.





• The current Bushfire Prone Land Map has been overtaken by new development across a wide area of the Liverpool LGA and a significant update to the BPL Map is required. Based on RFS guidelines significant areas of the site are likely to be removed from future iterations of the BPL Map should the Masterplan be approved.

The maps in Figures 22-25 provide detailed assessment of the interaction between the APZ to meet a minimum BAL-29 standard and the outline of the indicative building envelopes as presented in the Master Plan documentation.

The yellow band depicts the width of the required standard APZ drawn from PBP Table A1.12.2 (discussed and shown previously as Figure 18). The mapping on Figures 27-31 uses both the indicative building envelopes from the design exercise, and the very conservative standardised BAL modelling from PBP. These Figures show all proposed Lots can accommodate Complying development under these very conservative assumptions, with the exception of a small part of the eastern section of proposed Lot 4 as seen on Figure 30.

Staging of Development:

To manage Complying Development effectively across the likely decade or more of development onsite, until full development is achieved, a bushfire certificate is to be submitted with any Complying Development Certificate. The bushfire certificate must demonstrate that all APZ provided as part of the development of each stage comply with the requirements of PBP, including any temporary APZ required to satisfy staging. Where temporary APZ are required this will be suitably registered as an easement on title in accordance with standard Council practice and the RFS Practice Note 1/12 Establishment of Easements for the Purpose of Asset Protection Zones (2012).

This bushfire certificate is to be issued by Council or a person who is recognised by the NSW Rural Fire Service as a suitably qualified consultant in bush fire risk assessment determines, in accordance with the methodology specified in *Planning for Bush Fire Protection*, that the land is not in bush fire attack level-40 (BAL-40) or the flame zone (BAL-FZ),

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Figure 27: Complying development eligibility (indicative lots) – northwest

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Sugar Section







Figure 28: Complying development eligibility (indicative lots) - north

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Figure 29: Complying development eligibility (indicative lots) - northeast

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Figure 30: Complying development eligibility (indicative lots) - southwest

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Figure 31: Complying development eligibility (indicative lots) - southeast

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As seen on Figure 30 above, there is a small encroachment of the yellow bar representing the standard solution entering into the indicative building envelope on proposed Lot 4. Whilst the building envelope is indicative only, it is critical to demonstrate in this report and plans that all proposed development Lots will meet the standard for Complying development.

As discussed above, this mapping is very conservative and based on the standard APZ width output table. This gives a requirement of 16m APZ width. Undertaking some more precise modelling using an RFS approved calculator (Delany, 2019) demonstrates clearly that the BAL-29 standard can be met in this area with only 12m setback. This is depicted in Figures 32 & 33 below. It is also noted that Short Fire Run methodology may also be used to reduce APZ widths further, however are not required to demonstrate compliance.



Figure 32: Highlighted extract of Figure 30 with commentary

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Forest/Woodland - FDF & SFR Calculation page:									
Fire run specifics Proposed Lot 4 - IPG site Badgerys Creek									
Common and bushfire behaviour contributor inpute:									
Predominant vegetation Coastal Valley Grassy Woodlands - 10 & 18.07 - Low - 0m - < 0.9m									
Surface & Ele∨ated Fuel Load	10	tph	O∨erall fuel load	18.07	tph				
A∨erage Canopy Height	20	Metres	Fire weather district	100	FDI				
Average elevated fuel height [1.4	Metres	Flame temperature	1090	Kel∨in				
Distance to vegetation	12	Metres	Target elevation of receiver	2	Metres				
ffective slope	1.5	Degrees	Ambient temperature	308	Kel∨in				
Site slope	1	Degrees	SFR fire run length	100	Metres				
)F nominal head width	100	Metres							
Outputs - Fully Developed F	Fire (FDF)		Outputs - Developing Fire F	lun (DFR)					
Wind Speed	45	kph	Wind speed	30	kph				
Default elevation of receiver	5.409	Metres	Default elevation of receiver	4.289	Metres				
FDF Flame Angle	60	Degrees	SFR Flame Angle	65	Degrees				
FDF Flame Length	10.82	Metres	SFR Flame Height	8.579	Metres				
FDF Intensity	12425	kW/m	SFR Intensity	6876	kW/m				
FDF FROS	1.3309	kph	SFR FROS	1.3309	kph				
FDF Flame transmissi∨ity	0.8666	kW/m	SFR Flame transmissi∨ity	0.8633	kW/m				
FDF View Factor	0.4158		SFR View Factor	0.3236					
			Calculated SFR Head Width	36.604	Metres				
			SFR fire run length	100	Metres				
			Approx. SFR tra∨el time	3:08	min/sec				
FDF Radiant Heat	27.40	kW/m ²	SFR Radiant Heat	21.24	kW/m²				
Input cells									
Locked output	t cells								

Figure 33: Detailed calculation demonstrating BAL-29 standard met on entirety of Lot 4

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It is critical that Complying Development can be used to undertake a range of preparatory site and construction works. This includes the construction of roads, stormwater infrastructure, recreation and movement spaces and the like. These works will be undertaken largely using non-combustible materials including concrete, aggregate and the like. The use of non-combustible materials (typically as defined in the NCC and AS 3959) should not preclude the use of Complying Development for these works.

Finally, it is also critical that landscaping works undertaken in the areas within the BAL-FZ or BAL-40 mapped areas can also be undertaken as Complying Development. This can be undertaken where the landscaping works in these areas meet the standards for Asset Protection Zones as detailed in Appendix 4 of PBP.

These will be matters checked at each development stage by suitable certifying authorities to ensure compliance.

All proposed Lots can achieve the Complying Development threshold with indicative building envelopes shown.

Appendix 4 of this report provides a site-specific set of Complying Development Bushfire Controls to apply to the site. This will facilitate the development of both infrastructure development and future buildings; recognises the importance of maintaining the APZ developed for the site as part of the Master Plan process; and facilitates the ongoing maintenance of the APZ in perpetuity without requiring further vegetation management approvals.

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19. Conclusion

This Bushfire Assessment Report considers the suitability of the Master Plan with respect to bushfire risk. This has considered the Aim and Objectives of PBP, Section 2.3 Strategic Planning, and specifically addressed the requirements of Chapter 4 – Strategic Planning and Chapter 8 – Other Development.

Overall, the Master Plan provides a well-considered design that has responded to the bushfire risk affecting the site and provides for the protection of life and the minimisation of impact on property, whilst having due regard to development potential, site characteristics and protection of the environment. All proposed lots are capable of meeting a minimum standard of BAL-29 construction for the indicated building envelopes on each proposed Lot, and the most suitable approach to facilitate the use of Exempt & Complying Codes should be undertaken to include all development lots.

In the authors professional opinion, the Master Plan demonstrates a suitable future development pattern with respect to bushfire risk and should be supported.

David Land

David Lemcke | Senior Planner & Bushfire Specialist Blackash Bushfire Consulting B.A., Grad. Dip. Urban & Regional Planning; Master of Environmental Planning;

Adv. Dip. Of Public Safety (Emergency Management); Dip. Management



Lew Short | Principal Blackash Bushfire Consulting B.A., Grad. Dip. (Design for Bushfires); Grad. Cert. of Management (Macq); Grad. Cert. (Applied Management); Fire Protection Association of Australia BPAD Level 3 BPD-PA 16373





Appendix 1 References

Australasian Fire and Emergency Service Authorities Council (2012) Bushfires and Community Safety

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Keith, David (2004) – Ocean Shores to Desert Dunes – The Native Vegetation of New South Wales and the ACT. The Department of Environment and Climate Change

NSW Rural Fire Service (2015) Guide for Bush Fire Prone Land Mapping

NSW Rural Fire Service (2019). Planning for Bush Fire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners.

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NSW Government (1979) Environmental Planning and Assessment Act 1979. NSW Government Printer.

Standards Australia (2017) Fire hydrant installations - System design, installation and commissioning, AS 2419.1, SAI Global, Sydney.

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Standards Australia (2014) The storage and handling of LP Gas, AS/NZS 1596:2014. SAI Global, Sydney.







Curriculum Vitae

Lew Shor

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Director BlackAsh Bushfire Consulting T: 0419 203 853 E: lew.short@blackash.com.au

Summary

Lew is an experienced leader in the government and emergency sector. He has an intimate knowledge of the workings of government and how emergency service organisations operate. He is not only a technical expert but a practitioner who has deep industry knowledge.

Lew has extensive experience providing national leadership in building community resilience representing AFAC and the FPAA. Lew's technical expertise is in bushfire consequence management, risk assessment and mitigation, specifically the planning and design of new developments in high bushfire risk areas to comply with legislative and planning requirements.

Lew has worked with some of Australia's leading organisations including NSW Rural Fire Service, Country Fire Authority, Emergency Management Victoria, Lend Lease, Mirvac, Victorian State and Local Governments, Sydney Water Corporation, Great Lakes and Warringah Councils. Lew has completed numerous industrial development assessments and assessments of new development in rural areas NSW.

Lew has a deep operational understanding of how fire works in the Australian landscape. He has multifaceted insight into how governments respond to this threat. Lew provides unique strategies to comply with regulatory requirements and safety outcomes.

Lew established and led the Community Resilience Group for the New South Wales Rural Fire Service (RFS). His areas of responsibility included land use planning, community engagement, education, vulnerable communities, bunkers, Neighbourhood Safer Places, business systems and projects, social media, integrated risk management and environmental management. He was responsible for the establishment, management and leadership of the development assessment function for the RFS at a State level where he was responsible for the assessment of over 80,000 development applications in Bush Fire Prone Areas.

Areas of Expertise

- Rezoning and strategic studies
- Industrial development assessment
- Landuse planning & consequence management
- Legal strategy, Land & Environment Court and Expert Witness
- Bushfire planning, design & construction requirements in accordance with National Standards
- Bushfire Prone Mapping, hazard mapping and risk assessments
 Australian Standard AS3959 Construction of Buildings in Bushfire

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- Prone Areas
- Bushfire Management Plans
- Alternative & performance based solutions
- Evacuation planning and implementation
- Technical and Strategic advice



Qualifications / Accreditation

BPAD Level 3 Accredited Practitioner Fire Protection Association of Australia

Graduate Diploma of Bush Fire Design

University of Western Sydney, 2006

Graduate Certificate of

Applied Management Australian Institute of Police Management, 2005

Graduate Certificate of

Management Macquarie Graduate School of Management Macquarie University, 2001

Bachelor of Arts, Resource and Environmental Management

Macquarie University, 1994

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Curriculum Vitae

David Lemcke

Senior Planner & Bushfire Specialist BlackAsh Bushfire Consulting T: 0439 220 464 E: <u>david.lemcke@blackash.com.au</u>

Summary

David is an experienced bushfire, planning and land management professional with over 20 years in local government and 3 years as a private sector bushfire consultant. He has undertaken a wide range of development assessment and strategic planning projects in both regulatory and proponent roles. He was Central Coast Council's bushfire subject matter expert for over 15 years, including representation in the Land & Environment Court and numerous working groups. He has a deep understanding of contemporary, practical bushfire management from a range of perspectives due to decades of experience as a public land manager and a Rural Fire Service (RFS) volunteer, and now applies this expertise with a range of clients across the private and public sectors.

David has served as Council's staff representative on the Wyong and Central Coast Bushfire Management Committees since 2007 and was instrumental in developing and contributing to emergency management planning including preparation of Bush Fire Risk Management Plans, Fire Access & Fire Trail Plan, developing local policy and pre-incident planning, and delivering community engagement.

From 2010 he was the program manager for the Wyong Shire Council and then Central Coast Council (CCC) bushfire program. These programs won several awards, sponsored research and were renowned for innovation and improvement of local government bushfire management. The CCC program included management of over 220 fire trails, management of 275 mechanical Asset Protection Zones, Hazard Reduction burning, access management, environmental protection and community engagement using both contractors and internal staff teams.

David has been active in policy development at State level, being the Local Government NSW representative on numerous RFS policy committees including the Review of the Bushfire Environmental Assessment Code and delivering numerous conference presentations.

David is an active senior RFS volunteer, with over 20 years in the service, having been a field officer for 15 years.

Areas of Expertise

- Rezoning and strategic bushfire studies
- Residential, commercial and industrial development assessment
- Infrastructure vulnerability and consequence management
- Bushfire planning, design & construction requirements in accordance with National Standards
- Bushfire Management Plans for large and small scale holdings

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- Evacuation planning and implementation
- Technical and strategic advice

Qualifications

Graduate Diploma of Bush

Fire Planning & Design Western Sydney University, 2022 – current

Advanced Diploma of Public Safety (Emergency Management)

Australian Emergency Management Institute, 2015

Diploma of Management

Management Consultancy International, 2012

Master of Environmental

Planning Macquarie University, 2005

Graduate Diploma Urban &

Regional Planning University of New England, 2000

Certificate 2 Bush

Regeneration Blue Mountains TAFE, 2000

Bachelor of Arts (Geography)

University of New England, 1998

Rural Fire Service

Various foundational, technical, specialist and incident management qualifications 2002 - current

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Appendix 3 EP&A Act 1979 – Section 9.1 Ministerial Direction

4.3 Planning for Bushfire Protection

Objectives

The objectives of this direction are to:

- (a) protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and
- (b) encourage sound management of bush fire prone areas.

Application

This direction applies to all local government areas when a relevant planning authority prepares a planning proposal that will affect, or is in proximity to, land mapped as bushfire prone land.

This applies where the relevant planning authority is required to prepare a bush fire prone land map under section 10.3 of the EP&A Act, or, until such a map has been certified by the Commissioner of the NSW Rural Fire Service, a map referred to in Schedule 6 of that Act.

Direction 4.3

- (1) In the preparation of a planning proposal the relevant planning authority must consult with the Commissioner of the NSW Rural Fire Service following receipt of a gateway determination under section 3.34 of the Act, and prior to undertaking community consultation in satisfaction of clause 4, Schedule 1 to the EP&A Act, and take into account any comments so made.
- (2) A planning proposal must:
 - (a) have regard to Planning for Bushfire Protection 2019,
 - (b) introduce controls that avoid placing inappropriate developments in hazardous areas, and
 - (c) ensure that bushfire hazard reduction is not prohibited within the Asset Protection Zone (APZ).
- (3) A planning proposal must, where development is proposed, comply with the following provisions, as appropriate:
 - (a) provide an Asset Protection Zone (APZ) incorporating at a minimum:
 - an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and
 - ii. an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road,
 - (b) for infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the planning proposal permit Special Fire Protection Purposes (as defined under section 100B of the *Rural Fires Act 1997*), the APZ provisions must be complied with,
 - (c) contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,
 - (d) contain provisions for adequate water supply for firefighting purposes,
 - (e) minimise the perimeter of the area of land interfacing the hazard which may be developed,
 - (f) introduce controls on the placement of combustible materials in the Inner Protection Area.

Consistency

A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Planning Secretary (or an officer of the Department nominated by the Secretary) that the council has obtained written advice from the Commissioner of the NSW Rural Fire Service to the effect that, notwithstanding the non- compliance, the NSW Rural Fire Service does not object to the progression of the planning proposal.

Issued to commence 1 March 2022 (replaces previous Direction 4.4)

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Appendix 4 – Proposed Complying Development Code Bushfire Controls

(1) To be complying development specified for this Policy:

- (a) The development must not be carried out on land in bush fire attack level-40 (BAL 40) or the flame zone (BAL-FZ), and
- (2) This clause does not apply to the following development:
 - (a) Non-habitable detached development that is more than 6m from any dwelling house.
 - (b) Landscaped areas,
 - (c) Non-combustible structures or development including:
 - (i) Fences
 - (ii) Stormwater works and basins
 - (iii) Earthworks
 - (iv) Roads and road infrastructure
 - (v) Retaining walls and subdivision works
 - (d) Swimming pools.
- (3) For the purposes of this clause, land is not in bushfire attack level-40 (BAL-40) or the flame zone (BAL-FZ) if:
 - (a) The council or a person who is recognised by the NSW Rural Fire Service as a suitably qualified consultant in bush fire risk assessment determines, in accordance with the methodology specified in *Planning for Bush Fire Protection*, that the land is not in bush fire attack level-40 (BAL-40) or the flame zone (BAL-FZ), or
 - (b) In the case of development carried out on grasslands—the development conforms to the specifications and requirements of Table 7.9a of *Planning for Bush Fire Protection* that are relevant to the development.
- (4) Nothing in this clause prevents complying development being carried out on part of a lot that is not land referred to in this clause even if other parts of the lot are such land.
- (5) In his clause, grasslands has the same meaning as in Planning for Bush Fire Protection)
- (6) Compliance with Planning for Bushfire Protection must be demonstrated with all Asset Protection Zones provided as part of the development of each stage, including any temporary Asset Protection Zones to satisfy requirements related to staging.

Note—

- (i) More information about the categories of bushfire attack, including the flame zone, can be found in Table A1.7 of Planning for Bush Fire Protection.
- (ii) Maps containing the relevant of categories of bushfire attack, including the flame zone at this site that are relevant to this Code are contained within the Bushire Assessment Report for the site (prepared by Blackash Bushfire Consulting - May 2024) and replicated at Appendix B of this Report.

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