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# Bushfire Assessment

**St Marys Development Site**
**Regional Detention Basins**
**C and V6**

**Lendlease**

**21 November 2019**

**(Ref: 16133)**


report by
david peterson

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# 1 Introduction

| | | | |
|---|---|---|---|
| **Street address:** | Nagle Street and Delaney Circuit | | |
| **Suburb:** | Jordan Springs | **Postcode:** | 2747 |
| **Lot/DP no:** | Lot 4 and 5 DP 1216994 | | |
| **Council:** | Penrith City Council | | |

## 1.1 Background

Lendlease commissioned Peterson Bushfire to prepare a Bushfire Assessment Report for two regional detention basins at the above site. The proposal is designated development and therefore requires the preparation of an Environmental Impact Statement (EIS). Secretary's Environmental Assessment Requirements (SEARs) for the project were issued on 14th October 2019 and require an assessment of potential bushfire hazards and risk.

This report presents the assessment and recommendations to ensure compliance with the relevant bushfire protection legislation for development proposals on bushfire prone land.

This bushfire assessment has been prepared by a consultant accredited by the Fire Protection Association of Australia's BPAD scheme (Accreditation No. BPD-L3-18882).

## 1.2 Location and land description

As shown in Figure 1, the site of the proposed basins is located adjacent the southern edge of the recently developed Village 6 of the Lendlease Jordan Springs community. Each basin will be constructed within its own lot which is surrounded by Cumberland Plain Woodland within the Wianamatta Regional Park to the west, south and east.

## 1.3 Development proposal

The proposal involves the construction of two detention basins (Basins C and V6) to detain, treat and attenuate stormwater runoff from Village 3 and Village 6; the Jordan Springs development. The basins are located within the north-western extent of the St Marys Development Site and within the Wianamatta Regional Park. Basins C and V6 will be constructed wetlands and act as water quality improvement basins with the provision for active stormwater detention during high flows.

Basin C will have a surface area of approximately 1.8 hectares and a notional depth of 1.7m. Whereas Basin V6 approximately 0.3 hectares and a notional depth of 1.6m

Each basin is designed to contribute to the water quantity and quality management objectives under the *Sydney Regional Environmental Plan No. 30 – St Marys* (SREP 30) and Penrith City Council's (Council) Water Sensitive Urban Design Policy (December 2013). The basins will incorporate the features for both water quality treatment and detention including a drainage inlet

point, low level culvert outlet, spillway with erosion protection and vegetated slopes to provide effective nutrient removal. An access track along the side of each basin with access ramps will be constructed for regular inspection and maintenance access.

### 1.4 Assessment requirements

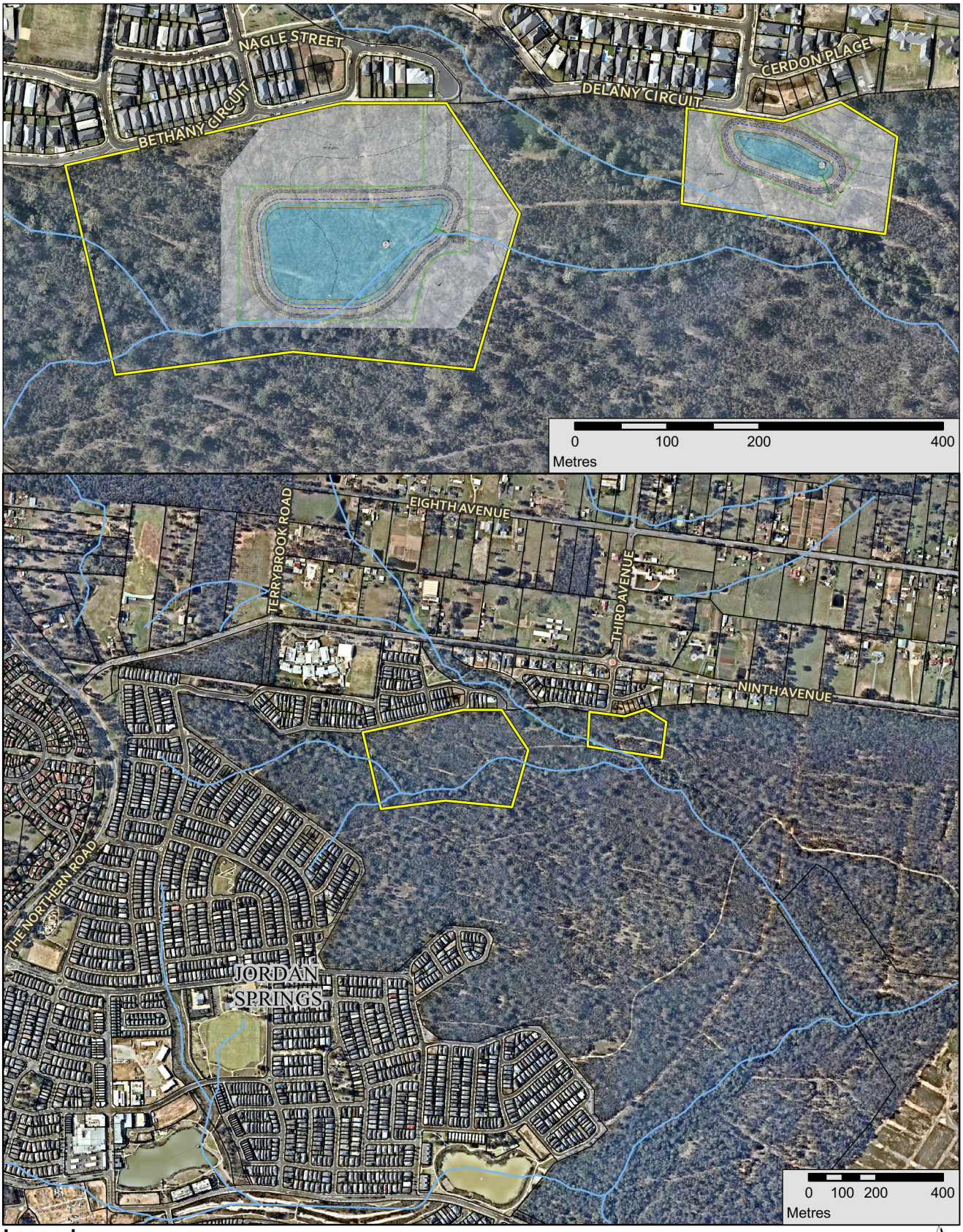
This assessment has been prepared to inform the preparation of an EIS for the proposal. Secretary's Environmental Assessment Requirements (SEARs) have been issued (SEAR Application No. 1360, issued 14 October 2019) listing the "risk of bushfire" as a Key Issue as listed below:

> *Key Issue: Hazards and risk – including: - an assessment of the risk of bushfire, including addressing the requirements of Planning for Bush Fire Protection 2006 (RFS). Any proposed Asset Protection Zones must not adversely affect environmental objectives (e.g. buffers). Provision is to be made for their appropriate management into the future.*

Development proposals on bushfire prone land (refer to Figure 3 for bushfire prone land mapping) are required to be assessed against the NSW Rural Fire Service (RFS) document *Planning for Bush Fire Protection 2006* (NSWRFS 2006), referred to as 'PBP' within this report. As the proposal does not involve habitable dwellings (Class 1, 2 or 3) or Special Fire Protection Purpose (SFPP) development, the proposal is only required to comply with the aim and objectives of PBP where relevant.

As stated within Section 4.3.6.f of PBP, the National Construction Code (NCC) does not provide for any bushfire specific performance requirements for the development type proposed. As such the Asset Protection Zone and building construction requirements (i.e. Bushfire Attack Level – BAL) of PBP and *AS 3959-2009 Construction of buildings in bushfire-prone areas* (AS 3959) do not apply as deemed-to-satisfy provisions for bushfire protection. However, the aim and objectives of PBP still apply in relation to other matters such as access and the provision of water for fire-fighting, if required. Section 3 of this report addresses compliance with PBP.

To address the SEARs, the bushfire assessment is to also assess the bushfire risk in addition to the hazard and requirements of PBP. An accepted bushfire risk assessment process is that that defined by *AS/NZS ISO 31000:2018 Risk management – Guidelines* and recommended by the NSW Bushfire Coordinating Committee (BFCC) Guidelines (2008) and the National Inquiry on Bushfire Mitigation and Management (COAG 2004). Section 4 of this report presents the risk assessment and measures required to treat any risks identified.




**Legend**

- Watercourse
- Subject Land
- Lot

N

DKGIS

Date: 15/11/2019

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

**Figure 1: Location of the Subject Land**

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**Legend**

Subject Land

N

DKGIS

Date: 15/11/2019

0 25 50 100

Metres

**Figure 2: The Proposal**

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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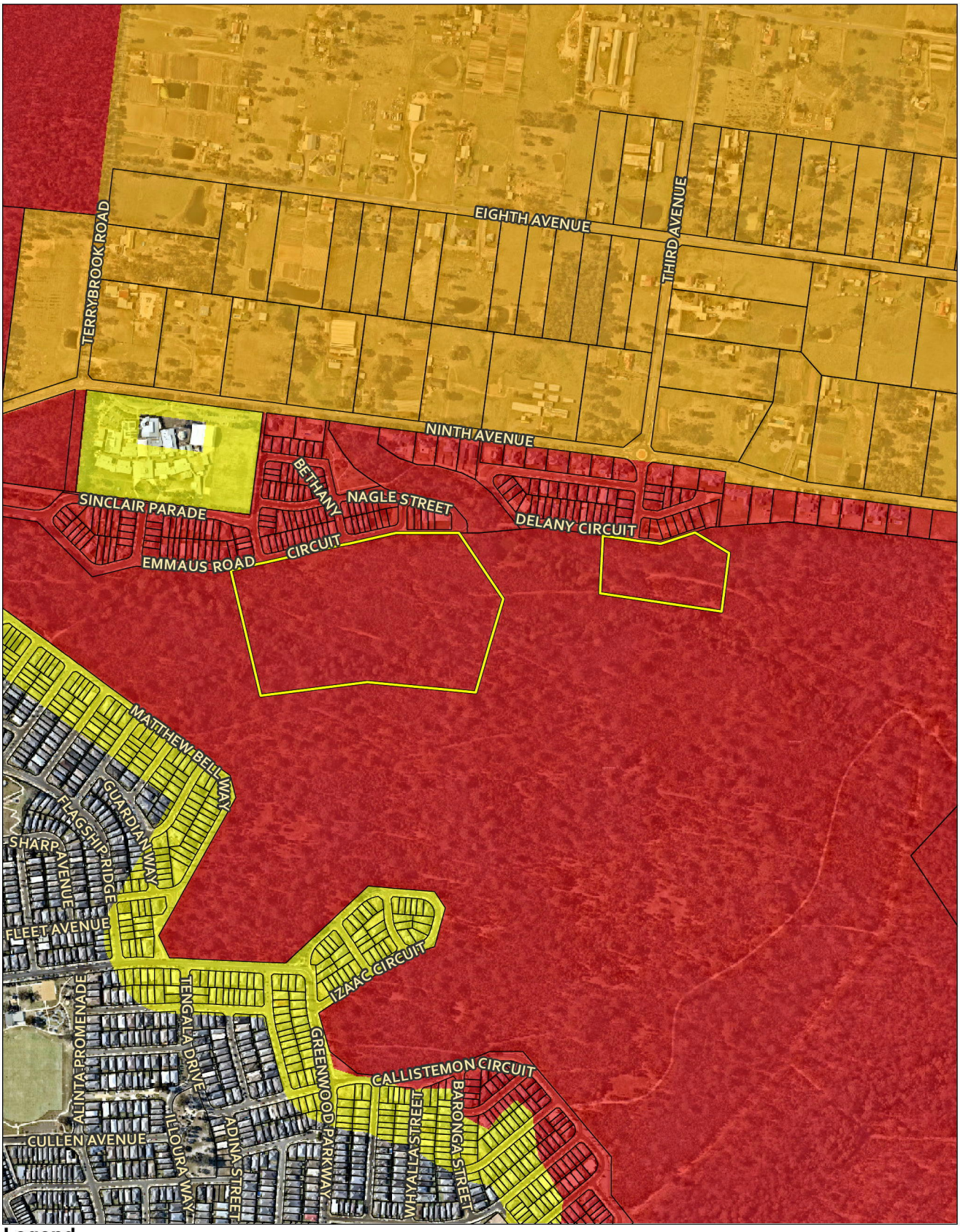


**Legend**

Subject Land
Lot

**Bush Fire Prone Land**

Vegetation Category 1
Vegetation Category 2
Vegetation Category 3
Vegetation Buffer

N

DKGIS

Date: 15/11/2019

0 100 200 400
Metres

**Figure 3: Bushfire Prone Land**

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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# 2 Bushfire hazard

In accordance with PBP, the bushfire hazard has been evaluated through an analysis of a combination of slope and vegetation, as discussed in this section. Site assessment has occurred over multiple visits ranging between 2004 to 2016.

## 2.1 Predominant vegetation

Bushfire fuel is the vegetative material in the landscape that burns during a bushfire. Bushfire behaviour is influenced by fuel load, and the availability of the fuel determined by the fuel arrangement and moisture. Fuel load and availability affects the intensity of a bushfire.

In accordance with PBP the predominant vegetation class has been determined for a distance of at least 140 m out from the development site. Vegetation classification has been determined by inspection and analysis of available vegetation mapping completed by Cumberland Ecology for the St Marys Development Site.

As shown on Figure 4, the bushfire hazard is located on all sides of the basin sites with exception to the north of Basin V6 where the basin partially adjoins Village 6. The vegetation has been mapped as the Shale Plains Woodland vegetation community which forms part of the Coastal Valley Grassy Woodlands structural formation (Keith 2004). This vegetation classification is consistent with the approved St Marys Western Precinct Plan which was guided by the Bushfire Protection Assessment prepared by Bushfire & Environmental Services (2009) and vegetation mapping prepared by Cumberland Ecology (2008). The vegetation classification has also been approved by NSW Rural Fire Service for all previous integrated development applications at Jordan Springs, including Villages 3 and 6.

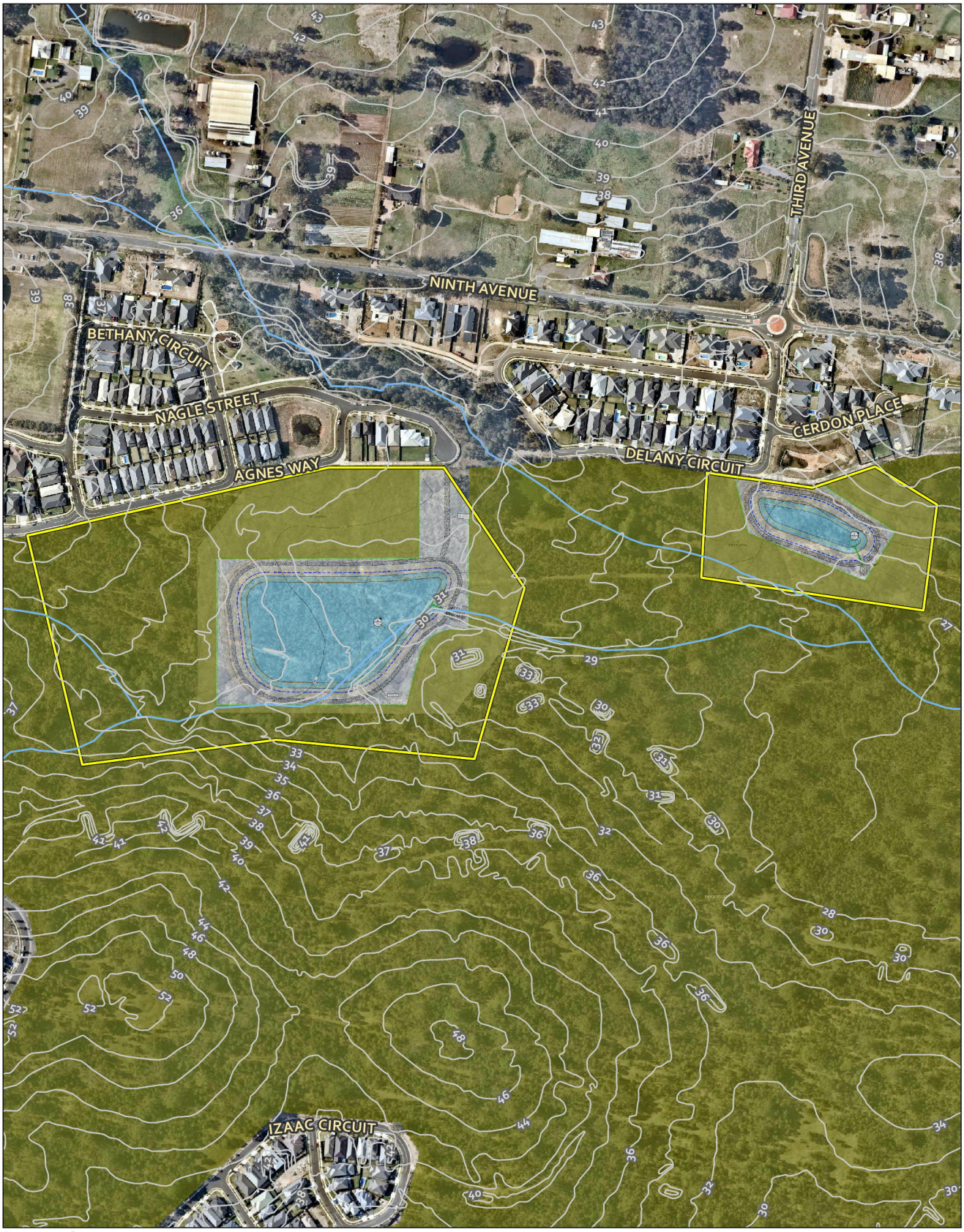
The bushland within the adjoining Wianamatta Regional Park is relatively extensive for a development site on the Cumberland Plain and extends for significant distances.

## 2.2 Effective slope

Steeper slopes can significantly increase the rate of spread of fires, therefore slope is a major factor determining the direction and rate of fire spread.

The ‘effective slope’ influencing fire behaviour has been assessed in accordance with the methodology specified within PBP. This is conducted by measuring the slope that would most significantly influence fire behaviour where the hazard occurs within 100 m of the development site. The slope was determined using a 1 m contour layer as shown on Figure 4.

The gentle gradients underneath the surrounding woodland are defined by the small drainage lines with which the basins interact. The slopes have a low influence on rate of fire spread as oppose to other environments with a higher degree of topographic variation. Variables such as fuel distribution, and wind direction and speed would therefore be the primary factors influencing rate of spread at this site. The effective slope underneath the woodland is indicated on Figure 4.




**Legend**

Contour - 1m
Watercourse
Subject Land

**Vegetation**

Shale Plains Woodland

N

DKGIS

Date: 15/11/2019

0 25 50 100

Metres

**Figure 4: Bushfire Hazard Analysis**

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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# 3 Compliance with PBP

This section addresses the compliance of the development proposal with *Planning for Bush Fire Protection 2006* (PBP). Section 4 details the risk assessment and prescribes measures to treat identified risks that may not be required by PBP.

PBP requires the assessment of a suite of bushfire protection measures that in total provide an adequate level of protection for development proposals on bushfire prone land. The measures required to be assessed for the development types proposed are listed in Table 1 below and are discussed in detail in the remainder of this section.

**Table 1: PBP bushfire protection measures for developments other than dwellings and SFPP**

| Bushfire protection measures | Considerations |
|---|---|
| Defendable space | Providing fire-fighter access between buildings and the hazard. |
| Construction standards | Consideration of ember protection to new building works. |
| Access | Assessment to include access and egress for emergency response, perimeter access and design standards of internal roads. |
| Water supply and other utilities | List requirements for reticulated water supply and hydrant provisions, and any static water supplies for fire-fighting. |

## 3.1 Asset Protection Zone (APZ) and defendable space

For habitable development types such as dwellings, the application of a bushfire hazard building setback (i.e. Asset Protection Zone - APZ) is related to the vulnerability of an asset typically in terms of combustibility of external materials or the nature of the occupants. The resulting APZ dimension would stipulate a building construction standard under Australian Standard *AS 3959-2009 Construction of buildings in bushfire-prone areas* (AS 3959). As the proposal does not include a dwelling or habitable building, PBP does not prescribe an APZ dimension.

A defendable space is the minimum hazard setback required for other buildings or assets that are to be protected from bushfire. A defendable space is an area between an asset and the bushfire hazard that provides an environment in which fire-fighters can undertake property protection after the passage of a bushfire with some level of safety. However, as the proposal does not involve a building, structure or asset that requires protection from the impacts of bushfire, a defendable space is not required by PBP.

Although not required for bushfire protection, access to and around each basin will be provided by way of a 5 m wide access track (4 m wide carriageway with 0.5 m wide shoulder either side) as shown on Figure 2.

### 3.2 Vegetation management

As an APZ or defendable space is not required for the basins, specific vegetation management or landscaping requirements are also not required. The basin construction will result in the removal of woodland vegetation and could therefore lower the bushfire risk to some residences within the adjoining Village 6. PBP does not require specific vegetation management for the type of development proposed.

### 3.3 Bushfire Attack Level – BAL

As introduced in Section 1.4 and 3.1, building construction provisions for bushfire protection specified by the various Bushfire Attack Levels (BAL) in Australian Standard *AS 3959-2009 Construction of buildings in bushfire-prone areas* (AS 3959) do not apply to type of development proposed. There are no proposed buildings or structures that require a BAL or could have a BAL applied.

### 3.4 Access

The assessment of access is to consider the adequacy of public roads and property roads in relation to gaining access to an asset to defend and allow evacuation.

Access roads to cater for fire and emergency services are not required for a detention basin regarding asset protection and evacuation. Therefore, the standards for access roads prescribed by PBP do not apply to the proposal. Notwithstanding, the level of access proposed is designed to allow maintenance crews to access the sites will also be adequate for fire crews if required. The existing public road adjacent has been constructed to comply with the residential subdivision standards prescribed by PBP and is 8 m wide. Each basin will be serviced by a 4 m wide unsealed road within 0.5 m shoulder either side that will form a through road around the perimeter of each basin. Fire appliances will be able to utilise the access roads should they need to.

### 3.5 Water supply and utilities

A water supply for fire-fighting is not required for the type of development proposed. Notwithstanding, hydrants are available along the adjoining public roads and the basins may also hold water that could be utilised for fire suppression.

The installation of electricity and gas do not form part of the proposal.

# 4 Risk assessment

This section presents the bushfire risk assessment and prescribes measures to treat identified risks that may not be mandatory by PBP. Both the risk of fire impacting the development proposal and the risk of fire initiating at the development site and impacting on nearby residences have been considered.

## 4.1 Risk assessment

The definition of bushfire risk is the chance of a bushfire igniting, spreading and causing damage to assets of value. The method of determining bushfire risk follows that used by NSW Rural Fire Service (BFCC 2008) in developing bushfire risk management plans across NSW. The method follows the procedures and considerations of *AS/NZS ISO 31000:2018 Risk management – Guidelines* and provides a risk classification scheme through qualitative scales to assess the likelihood and consequence of fire impact.

The likelihood of bushfire risk is defined as the chance of a bushfire igniting and spreading. There are four possible likelihood ratings: unlikely, possible, likely and almost certain. Table 2 outlines the process for determining likelihood.

**Table 1: Likelihood ratings for assessing bushfire risk (NSW Rural Fire Service 2008)**

| | **Fire are expected to spread and reach assets** | **Fires are not expected to spread and reach assets** |
|---|---|---|
| **Fires occur frequently** | Almost certain | Possible |
| **Fires occur infrequently** | Likely | Unlikely |

Source: *Bush Fire Risk Management Planning Guidelines for Bush Fire Management Committees* (NSW Rural Fire Service 2008).

Consequence is the outcome or impact of a bushfire event. The assessment process for consequence is subjective and includes consideration of threat, vulnerability and other issues such as level of impact and recovery costs. There are four possible consequence ratings: minor, moderate, major and catastrophic. A description of each is provided in Table 3.

The bushfire risk level is assessed by combining the likelihood and consequence to provide low, medium, high, very high or extreme levels of bushfire risk. This matrix is provided in Table 4. Table 5 presents the level of bushfire risk at the site.

**Table 2: Consequence ratings for assessing bushfire risk (NSW Rural Fire Service 2008)**

| Consequence rating | Description |
|---|---|
| Minor | • No fatalities<br>• Some minor injuries with first aid treatment possibly required<br>• No persons are displaced<br>• Little or no personal support (physical, mental, emotional) required<br>• Inconsequential or no damage to an asset<br>• Little or no disruption to community and little to no financial loss |
| Moderate | • Medical treatment required but no fatalities. Some hospitalisation<br>• Localised displacement of persons who return within 24 hours<br>• Personal support satisfied through local arrangements<br>• Localised damage to assets that is rectified by routine arrangements<br>• Community functioning as normal with some inconvenience<br>• Local economy impacted with additional financial support required to recover<br>• Small impact on environment / cultural asset with no long term effects |
| Major | • Possible fatalities<br>• Extensive injuries, significant hospitalisation<br>• Large number of persons displaced (more than 24 hours duration)<br>• Significant damage to assets that requires external resources<br>• Community only partially functioning, some services unavailable<br>• Local or regional economy impacted for a significant period of time with significant financial assistance required<br>• Significant damage to the environment/cultural asset which requires major rehabilitation or recovery works<br>• Localised extinction of native species |
| Catastrophic | • Significant fatalities<br>• Large number of severe injuries<br>• Extended and large number requiring hospitalisation<br>• General and widespread displacement of persons for extended duration<br>• Extensive resources required for personal support<br>• Extensive damage to assets<br>• Community unable to function without significant support<br>• Regional or state economy impacted for an extended period of time<br>• Permanent damage to the environment<br>• Extinction of a native species in nature |

Source: *Bush Fire Risk Management Planning Guidelines for Bush Fire Management Committees* (NSW Rural Fire Service 2008).

**Table 3: Matrix to determine level of bushfire risk (NSW Rural Fire Service 2008)**

| Consequence / Likelihood | Minor | Moderate | Major | Catastrophic |
|---|---|---|---|---|
| **Almost certain** | High | Very High | Extreme | Extreme |
| **Likely** | Medium | High | Very High | Extreme |
| **Possible** | Low | Medium | High | Very High |
| **Unlikely** | Low | Low | Medium | High |

Source: *Bush Fire Risk Management Planning Guidelines for Bush Fire Management Committees* (NSW Rural Fire Service 2008).

**Table 4: Assessment of level of bushfire risk**

| Fire scenario | Impact | Level of risk |
|---|---|---|
| Impact to basins | Likelihood = Likely<br>Consequence = Minor | Medium<br>• Basins surrounded by bushland with minimal hazard separation.<br>• A fire in the Regional Park in the locale would likely impact directly onto the basins.<br>• Emergency response would not be deployed to the basins.<br>• Historic fire-activity subdued since development of Jordan Springs community.<br>• Impact would not damage asset. Asset would remain operational. |
| Impact to Jordan Springs | Likelihood = Unlikely<br>Consequence = Moderate | Low<br>• Historic fire-activity subdued since development of Jordan Springs community.<br>• Jordan Springs is located 'upwind' of the typical problematic fire spread in the region and is in proximity preventing widespread fire front and development period.<br>• Subdivision designed in accordance with PBP therefore compliant APZ, BAL and perimeter road preventing flame contact and radiant heat above acceptable threshold.<br>• Fire control possible along perimeter road.<br>• Rapid emergency response expected to residential area.<br>• Residences could sustain localised damage.<br>• Evacuation secure. |

| Fire scenario | Impact | Level of risk |
|---|---|---|
| Impact to Jordan Springs East | Likelihood = Unlikely<br>Consequence = Major | Medium<br>• Historic fire-activity subdued since development of Jordan Springs community.<br>• Jordan Springs East is located 'downwind' of the typical problematic fire spread in the region and is minimum 1.5 km away allowing widespread fire front and longer development period.<br>• Subdivision designed in accordance with PBP therefore compliant APZ, BAL and perimeter road preventing flame contact and radiant heat above acceptable threshold.<br>• Fire control possible along perimeter road.<br>• Rapid emergency response expected to residential area.<br>• Residential area could sustain damage along a wide perimeter.<br>• Evacuation secure. |

As stated in Table 5 above, the risk of fire impacting the development proposal is 'medium' due to the likelihood of fire impacting the site. However, impact would not damage the asset nor prevent it from operating. The impact of fire initiating at the development site and spreading to the surrounding residential areas has been rated 'low' for Jordan Springs and 'medium' for Jordan Springs East, with the difference in rating due to the longer distance of fire spread 'downwind' possible for Jordan Springs East. The *Cumberland Zone Bush Fire Management Plan* (CZBFMC 2010) states that areas of medium risk and below will be managed by routine procedures and do not require a specific risk treatment.

Although the level of risk is within the acceptable limits, standard risk treatments are recommended (Section 4.2) as precautions designed to minimise ignitions and fire spread.

## 4.2 Risk treatments

This section describes the strategies and works required to treat the risk identified in Table 5. The basins will be benefitted by a public road network and access road that will provide an adequate level of access for fire appliances should it be required. In addition to these elements that will form part of the design, Table 6 on the following page outlines recommended strategies to prevent fire ignition at the development site during basin construction and maintenance.

**Table 6: Recommendations to minimise ignition risk**

| Factors effecting ignition risk | Action to minimise source |
|---|---|
| Cigarette butts | • Correct disposal of cigarette butts where smoking is permitted<br>• On-going toolbox talks conducted |
| Welding and maintenance | • Maintain high level of employee awareness (e.g. toolbox talks)<br>• Ensure adequate buffer zone between activities and fuel source<br>• All hot work activities to have a spotter and a fire extinguisher within work zone<br>• No hot work activities on Extreme or Catastrophic Fire Danger Days or days of Total Fire Ban. |
| Fuel and exhaust fires | • Maintain high level of employee awareness (e.g. toolbox talks)<br>• Ensure adequate buffer zone between activities and fuel source<br>• Ensure all plant or equipment have spark arrestors and are operating without causing backfiring etc |
| Employees and contractors | • Maintain high level of employee/contractor awareness (e.g. toolbox talks)<br>• Consideration of fire in risk assessment prior to commencing works<br>• Availability of fire suppression equipment, where appropriate |
| Clearing ignitions | • Maintain high level of employee awareness (e.g. toolbox talks)<br>• Do not undertake mechanical clearing works on Extreme and Catastrophic fire danger days<br>• Maintain suppression equipment is available at works site with appropriately trained staff |

# 5 Conclusion and recommendations

## 5.1 Conclusion

The proposal consists of two regional detention basins located at the St Marys Development Site adjacent the Jordan Springs community. The basins will be located amongst woodland vegetation of the Wianamatta Regional Park and therefore may be subject to bushfire impact.

*Planning for Bush Fire Protection 2006* does not specify bushfire protection measures for the development type proposed, however a risk analysis of the scenarios of fire spread from the development site to the surrounding residential areas has identified a 'low' to 'medium' risk for the Jordan Springs and Jordan Springs East communities, respectively.

Although at a risk level deemed acceptable by the local bushfire risk management plan, mainly due to the compliant nature of the surrounding subdivisions, measures are recommended to minimise ignitions arising at the development site during construction and maintenance.

This assessment concludes that the development proposal complies with the aim and objectives of *Planning for Bush Fire Protection 2006* and, by adopting the recommendations, will be at an acceptable level of bushfire risk. As such, this assessment demonstrates compliance with the Secretary's Environmental Assessment Requirements (SEARs) Key Issue: *Hazards and risk – including: - an assessment of the risk of bushfire, including addressing the requirements of Planning for Bush Fire Protection 2006 (RFS). Any proposed Asset Protection Zones must not adversely affect environmental objectives (e.g. buffers). Provision is to be made for their appropriate management into the future.*

## 5.2 Recommendations

The recommendations made within this assessment are listed within Section 4.2, Table 6. The recommendations are concerned within ignition prevention during basin construction and maintenance.

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