



Bushfire Management Plan

Neerabup Industrial Area

Flynn Drive Neerabup

City of Wanneroo

Planning Stage: Strategic Proposal - Local Structure/Master Plan

Planning Development Type: Change or Addition to a Land Use

Job Number: 190235

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EXECUTIVE SUMMARY

This Bushfire Management Plan (BMP) will accompany a new structure plan, which will be produced by GHD as part of the planning framework review of the Neerabup Industrial Area. Bushfire Prone Planning's BMP will form a Technical Appendix to that new structure plan document. Its purpose is to demonstrate that bushfire risk has been assessed at a strategic level.

It demonstrates that bushfire risk can be mitigated for the whole development area, rather than for individual lots or stages of that potential development. The Master Plan included as part of this BMP should be considered indicative only – it is included here to demonstrate that it is possible to undertake this development while achieving compliance with the Bushfire Protection Criteria (BPC).

The development area entails a number of environmental issues, which are considered in Section 2 of this BMP. The Master Plan for this proposed site will maintain areas of threatened bushland. The implementation of bushfire protection measures will not adversely affect environmental and biodiversity values.

The development area sits in a broad landscape of bushfire risk, and has been subject to major bushfires in the past. Twelve broad areas of classified vegetation were identified as part of this assessment, using Method 1 of AS3959-2018 *Construction of Buildings in Bushfire Prone Areas*. The results of this assessment are slightly different to those outlined in the previous BMP prepared by Strategen in 2016, and these are largely due to changes in interpretation in regulatory documents including AS3959 and the *Guidelines for Planning In Bushfire Prone Areas*.

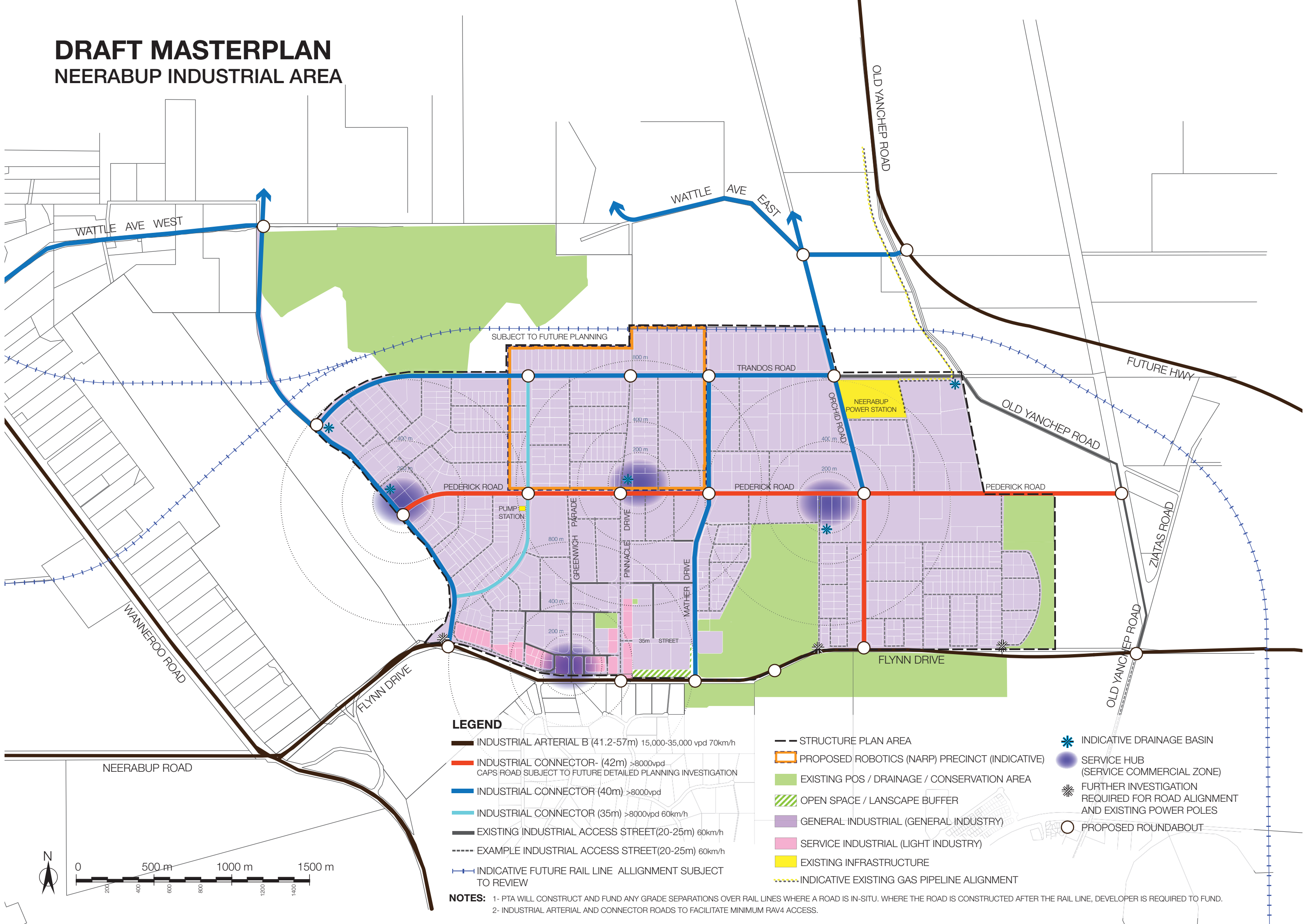
This BMP demonstrates that it is possible to achieve the acceptable solutions of the Bushfire Protection Criteria for the entire development of the Neerabup Industrial Area. Once completed the vast majority of the Industrial Area will be subject to a BAL-LOW bushfire exposure. The implementation of a new road network, and installation of a system of fire hydrants, will significantly increase bushfire safety for the development, and for surrounding areas.

1 PROPOSAL DETAILS

1.1 Description and Associated Plans and Maps

Landowner / Proponent:	City of Wanneroo
Bushfire Prone Planning Commissioned to Produce the Bushfire Management Plan (BMP) By:	GHD – Hide Shigeyoshi
For Submission To:	WA Planning Commission (WAPC)
Purpose of the BMP:	To support a strategic planning assessment
'Development' Site Total Area:	Approximately 828 hectares
No. of Existing/Proposed Lots:	Existing lot(s) = 85 / Proposed lot(s) = approximately 1200. Indicative only, final lot layout not known, may be between 300 and 1500 lots
Description of the Proposed Development/Use:	
<p>This BMP will accompany a new structure plan, which will be produced by GHD as part of the planning framework review of the Neerabup Industrial Area. Bushfire Prone Planning's BMP will form a Technical Appendix to that new structure plan document.</p> <p>The intention of this BMP is to prove that the bushfire risk can be managed for the development.</p>	
Staged Development and Management of Potential Bushfire Hazard Issues	
N/A at this stage	

DRAFT MASTERPLAN NEERABUP INDUSTRIAL AREA



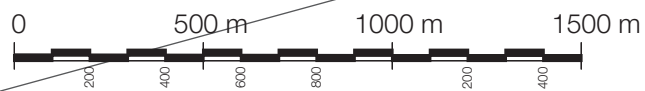
LEGEND

- INDUSTRIAL ARTERIAL B (41.2-57m) 15,000-35,000 vpd 70km/h
- INDUSTRIAL CONNECTOR- (42m) >8000vpd
CAPS ROAD SUBJECT TO FUTURE DETAILED PLANNING INVESTIGATION
- INDUSTRIAL CONNECTOR (40m) >8000vpd
- INDUSTRIAL CONNECTOR (35m) >8000vpd 60km/h
- EXISTING INDUSTRIAL ACCESS STREET(20-25m) 60km/h
- - - EXAMPLE INDUSTRIAL ACCESS STREET(20-25m) 60km/h
- - - INDICATIVE FUTURE RAIL LINE ALIGNMENT SUBJECT TO REVIEW

- STRUCTURE PLAN AREA
- PROPOSED ROBOTICS (NARP) PRECINCT (INDICATIVE)
- EXISTING POS / DRAINAGE / CONSERVATION AREA
- OPEN SPACE / LANDSCAPE BUFFER
- GENERAL INDUSTRIAL (GENERAL INDUSTRY)
- SERVICE INDUSTRIAL (LIGHT INDUSTRY)
- EXISTING INFRASTRUCTURE
- INDICATIVE EXISTING GAS PIPELINE ALIGNMENT

- * INDICATIVE DRAINAGE BASIN
- SERVICE HUB (SERVICE COMMERCIAL ZONE)
- * FURTHER INVESTIGATION REQUIRED FOR ROAD ALIGNMENT AND EXISTING POWER POLES
- PROPOSED ROUNDABOUT

NOTES: 1- PTA WILL CONSTRUCT AND FUND ANY GRADE SEPARATIONS OVER RAIL LINES WHERE A ROAD IS IN-SITU. WHERE THE ROAD IS CONSTRUCTED AFTER THE RAIL LINE, DEVELOPER IS REQUIRED TO FUND.
2- INDUSTRIAL ARTERIAL AND CONNECTOR ROADS TO FACILITATE MINIMUM RAV4 ACCESS.



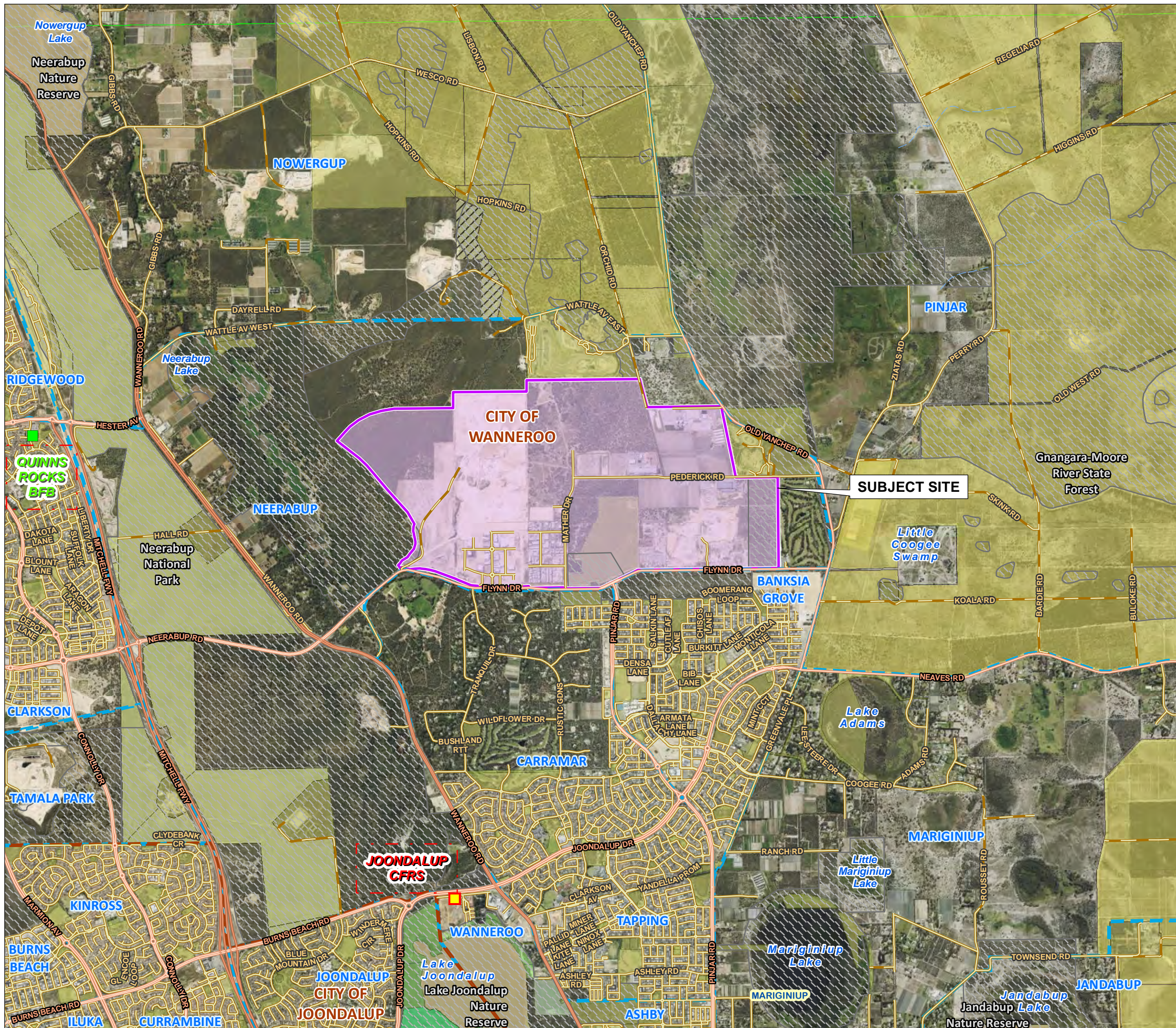


Figure 1.2
Location Plan

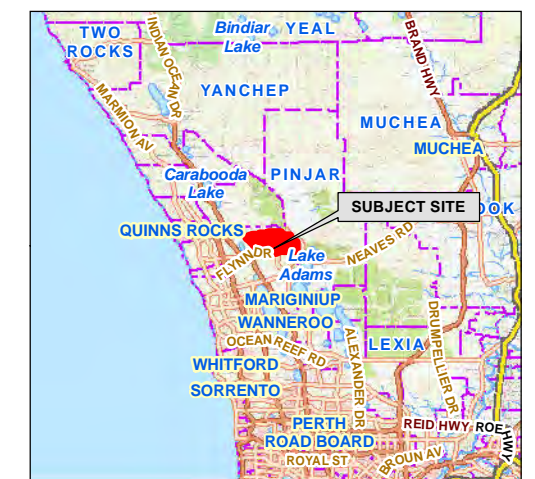
Neerabup Industrial Area
NEERABUP
CITY OF WANNEROO

----- LEGEND -----

- Subject Site
- Local Government Authority
- Locality / Suburb
- Bush Fire Brigade
- Career Fire & Rescue Service
- Reserves
- Legislated Lands and Waters
 - Crown Freehold - DBCA Managed
 - Nature Reserve
 - Conservation Park
 - National Park
 - Section 5(1)(h) Reserve
 - State Forest
- DBCA Lands of Interest
 - UCL - Dept Interest
 - Bush Forever



----- LOCALITY -----



Aerial Imagery : Landgate/SLIP
Image Date : October 2020



Coordinate System : GDA 1994 MGA Zone 50
Projection : Universal Transverse Mercator Units : Metre
Map compiled by : Ian Ross 16/12/2020
Map updated by : Ian Ross 16/12/2020

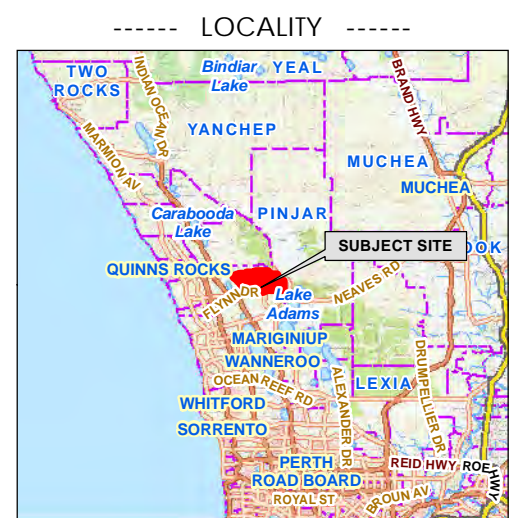
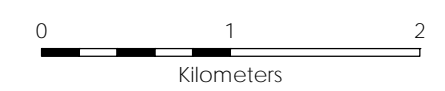
Disclaimer and Limitation: This map has been prepared for bushfire management planning purposes only. All depicted areas, contours and any dimensions shown are subject to survey. Bushfire Prone Planning does not guarantee that this map is without flaw of any kind and disclaims all liability for any errors, loss or other consequence arising from relying on any information depicted.
Map Document Path / Name: K:\Projects\Jobs 2019\190235 - Wanneroo RFO Neerabup Industrial Area - 14 May 2019 due\Mapping\MXD\190235_Fig1-2_LOC_Neerabup Industrial.mxd

Figure 1.3
Bushfire Prone Area

Neerabup Industrial Area
NEERABUP
CITY OF WANNEROO



- LEGEND -----
- Subject Site
 - Local Government Authority
 - Locality / Suburb
 - Industrial Development
 - Bush Fire Brigade
 - Career Fire & Rescue Service
 - Bushfire Prone Areas (2019)



Aerial Imagery : Landgate/SLIP
Image Date : October 2020

Coordinate System : GDA 1994 MGA Zone 50
Projection : Universal Transverse Mercator Units : Metre
Map compiled by : Ian Ross 16/12/2020
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Map Document Path / Name: K:\Projects\Jobs 2019\190235 - Wanneroo RFO Neerabup Industrial Area - 14 May 2019 due\Mapping\MXD\190235_Fig1-3_BPA_Neerabup Industrial.mxd

1.2 Existing Documentation Relevant to the Construction of this Plan

This section acknowledges any known reports or plans that have been prepared for previous planning stages, that refer to the subject area and that may or will impact upon the assessment of bushfire risk and/or the implementation of bushfire protection measures and will be referenced in this Bushfire Management Plan.

Table 1.1: Existing relevant documentation.

RELEVANT EXISTING DOCUMENTS		
Existing Document	Copy Provided by Client	Title
Structure Plan	No	<i>Neerabup Industrial Area Agreed Local Structure Plan No. 17' (ASP 17)</i>
Environmental Report	Yes	<i>City of Wanneroo, Neerabup District Planning Environmental Assessment 2020</i>
Landscaping (Revegetation) Plan	N/A	
Bushfire Risk Assessments	No	<i>Bushfire Management Plan - Neerabup Industrial Area 2016</i>

The land identified for development is the Neerabup Industrial Area is zoned as "General Industrial" land and "Industrial Development" land in the *District Planning Scheme 2*. There are no zone impediments to this development.

This BMP is intended to inform the preparation of a new structure plan, which will supersede ASP 17 as shown in table 1.1.

The Environmental assessment identified a range of environmental issues including Bush Forever sites, and areas with protected flora and fauna (including TEC) in which clearing permits have previously been refused. The development design responds to that by identifying and retaining areas of native vegetation within the Neerabup Industrial Area. The Environmental Assessment states that "the City of Wanneroo is unlikely to require further flora and vegetation studies to proceed with development on its landholdings (where development is permitted)" (pg 24). The bushfire measures outlined in the BMP are not predicated on clearing of native vegetation other than what would be included as part of the development design for the expansion of the Industrial Area.

This BMP supersedes the 2016 one prepared by Strategen and listed above. Vegetation classifications in that document were based on AS3959-2009. This BMP updates vegetation classifications listed in the 2016 document to reflect changes in regulation, and the adoption of AS3959-2018.

2 ENVIRONMENTAL CONSIDERATIONS

2.1 Native Vegetation – Restrictions to Modification and/or Clearing

Many bushfire prone areas also have high biodiversity values. SPP 3.7 policy objective 5.4 recognises the need to consider bushfire risk management measures alongside environmental, biodiversity and conservation values (Guidelines s2.3).

There is a requirement to identify any need for onsite modification and/or clearing of native vegetation and whether this may trigger potential environmental impact/referral requirements under State and Federal environmental legislation. Confirmation that any proposed native vegetation modification and/or clearing is acceptable, should be received from the relevant agencies by the proponent and provided to the bushfire consultant for inclusion in the Bushfire Management Plan if it will influence the required bushfire planning assessments and outcomes. The following table details any potential environmental restrictions of which the author of this report is aware.

Table 2.2: Native vegetation and potential environmental considerations and restrictions.

NATIVE VEGETATION MODIFICATION / CLEARING - POTENTIAL ENVIRONMENTAL RESTRICTIONS IDENTIFIED				
Environmental Considerations / Features	Potential Mapping Data Source (SLIP / Local Planning)	Relevant to Proposed Development	Data Applied	Action Required
Onsite clearing of native vegetation is required.		Yes		
Environmental impact/referral requirements under State and Federal environmental legislation may be triggered.		Yes		
National Park / Nature Reserve	DBCA-011	Yes-Confirmed by Proponent	Evidence Submitted by Proponent	Proponent to Seek Advice
Conservation Covenant	DPIRD-023	No-Confirmed by Proponent	N/A	N/A
Bush Forever Site	DPLH-019	Yes-Confirmed by Proponent	Evidence Submitted by Proponent	None
RAMSAR Wetland	DBCA-010	No-Confirmed by Proponent	Evidence Submitted by Proponent	N/A
Geomorphic and Other Wetland	DBCA-011-019, 040, 043, 044	No-Confirmed by Proponent	Evidence Submitted by Proponent	N/A
Threatened and Priority Ecological Communities (TECs or PECs)	DBCA-038	Yes-Confirmed by Proponent	Evidence Submitted by Proponent	Proponent to Seek Advice
Threatened and Priority Flora including Declared Rare Flora (DRFs)	DBCA-036	Yes-Confirmed by Proponent	Evidence Submitted by Proponent	Proponent to Seek Advice
Statement of how the identified environmental feature(s) is dealt with in this Bushfire Management Plan (and the location of relevant information):				
The assessments and bushfire protection measures detailed the BMP, assume that environmental approval will be achieved or clearing permit exemptions will apply.				
It is advised that the proponent seek further advice from an Environmental Consultant or the WA Department of Biodiversity Conservation and Attractions for further information on the condition and species contained within the proposed development area and the requirement for referral of the proposal.				

Development Design Considerations

Establishing development in bushfire prone areas can adversely affect the retention of native vegetation through clearing associated with the creation of lots and/or asset protection zones. Where loss of vegetation is not acceptable or causes conflict with landscape or environmental objectives, it will be necessary to consider available design options to minimise the removal of native vegetation.

Table 2.3: Development design.

MINIMISE THE REMOVAL OF NATIVE VEGETATION	
Design Option	Assessment / Action
Reduction of lot yield	N/A
Cluster development	N/A
Construct building to a standard corresponding to a higher BAL as per BCA (AS 3959:2018 and/or NASH Standard)	N/A
Modify the development location	Considered and development location has been modified. See comments below.
Protected native vegetation areas within the boundaries of the development have been identified and will be retained. The development design allows for a BAL-29 or less exposure to be achieved for all lots.	
IMPACT ON ADJOINING LAND	
Is this planning proposal able to implement the required bushfire protection measures within the boundaries of the land being developed so as not to impact on the bushfire and environmental management of neighbouring reserves, properties or conservation covenants?	Yes
All bushfire protection measures can be achieved within the bounds of the development without impacting on adjoining land.	

2.2 Retained Vegetation / Re-vegetation / Landscape Plans (including POS)

Riparian zones, wetland/foreshore buffers, road verges and public open space may have plans to re-vegetate or retain vegetation as part of the proposed development. Vegetation corridors may be created between offsite and onsite vegetation and provide a route for fire to enter a development area.

All retained/planned vegetation and its management will be considered in the development of this Bushfire Management Plan.

Is re-vegetation of riparian zones and/or wetland or foreshore buffers and/or public open space a part of this Proposal?	Yes
Is the requirement for ongoing maintenance of existing vegetation in riparian zones and/or wetland or foreshore buffers and/or public open space a part of this Proposal?	Yes

Some areas of native vegetation (see Figure 1.1) will be retained within the greater Industrial area and these will require ongoing management to maintain separation distances.

3 POTENTIAL BUSHFIRE IMPACT ASSESSMENT

3.1 Assessment Input

3.1.1 Fire Danger Index (FDI) Applied

AS 3959:2018 Table 2.1 specifies the fire danger index values to apply for different regions. The values used in the model calculations are for the Forest Fire Danger Index (FFDI) and for which equivalent representative values of the Grassland Fire Danger Index (GFDI) are applied as per Appendix B. The values can be modified if appropriately justified.

Table 3.1: Applied FDI Value

FDI VALUE			
Vegetation Areas	As per AS 3959:2018 Table 2.1	As per DFES for the Location	Value Applied
1-13	80	N/A	80

3.1.2 Vegetation Classification and Effective Slope

Classification: Bushfire prone vegetation identification and classification has been conducted in accordance with AS 3959:2018 s2.2.3 and the Visual Guide for Bushfire Risk Assessment in WA (DoP February 2016).

When more than one vegetation type is present, each type is identified separately, and the applied classification considers the potential bushfire intensity and behaviour from the vegetation types present and ensures the worst case scenario is accounted for – this may not be from the predominant vegetation type.

The vegetation structure has been assessed as it will be in its mature state (rather than what might be observed on the day). Areas of modified vegetation are assessed as they will be in their natural unmodified state (unless maintained in a permanently low threat, minimal fuel condition, satisfying AS 3959:2018 s2.2.3.2(f) and asset protection zone standards). Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its revegetated mature state.

Effective Slope: Refers to the ground slope under each area of classified vegetation and is described in the direction relative to the view from the building or proposed development site. Effective slope is not the same as 'average slope', rather it is the slope which most significantly influences fire behaviour. This slope has a direct and significant influence on a bushfire's rate of spread and intensity.

Where there is a significant change in effective slope under an area of classified vegetation, that will cause a change in fire behaviour, separate vegetation areas will be identified to enable the correct assessment.

When the effective slope, under a given area of bushfire prone vegetation, will be different relative to multiple proposed development sites, then the effective slopes corresponding to the different locations, are separately identified.

Planned Re-vegetation/Landscaping Considerations/Public Open Space Management

The development includes the retention of some areas of native vegetation within its boundaries. These areas will require ongoing management, and the maintenance of any separation distances to support existing BAL ratings for lots and constructed buildings.

Excluded Bushfire Prone Vegetation

The landowner has the ability to manage all onsite vegetation to a minimal fuel, low threat state. Consequently, the potential bushfire impact is determined by bushfire prone vegetation over which the existing/future landowner has no control.

Table 3.2: Vegetation classification and effective slope.

ALL VEGETATION WITHIN 150 METRES OF THE PROPOSED DEVELOPMENT				
Vegetation Area	Identified Vegetation Types ¹ or Description if 'Excluded'	Applied Vegetation Classification ¹	Effective Slope (degrees) ² (AS 3959:2018 Method 1)	
			Assessed	Applied Range
1	Low open forest A-04	Class A Forest	3	downslope >0-5
2	Tussock grassland G-22	Class G Grassland	0	upslope or flat
3	Low open forest A-04	Class A Forest	0	upslope or flat
4	Low open forest A-04	Class A Forest	0	upslope or flat
5	Low open forest A-04	Class A Forest	3	downslope >0-5
6	Woodland B-05	Class B Woodland	0	upslope or flat
7	Low open forest A-04	Class A Forest	0	upslope or flat
8	Low open forest A-04	Class A Forest	0	upslope or flat
9	Low woodland B-07	Class B Woodland	0	upslope or flat
10	Low open forest A-04	Class A Forest	0	upslope or flat
11	Open forest A-03	Class A Forest	0	upslope or flat
12	Low woodland B-07	Class B Woodland	4	upslope or flat
13	N/A	Excluded as per Section 2.2.3.2 (f) Low Threat	N/A	N/A
Representative photos of each vegetation area, descriptions and classification justification, are presented on the following pages. The areas of classified vegetation are defined, and the photo locations identified on Figure 3.1, the vegetation and topography map.				
Note ¹ : Described and classified as per AS 3959:2018 Table 2.3 and Figures 2.3 and 2.4 (A)-(H)				
Note ² : Effective slope measured as per AS 3959:2018 Section 2.2.5 and Appendix B Part B4				

Additional Supporting Information

The subject landform is gently undulating with shallow slopes throughout. Slope determinations as provided in Table 3.2 above are determined based on the possibility of a fire travelling through classified vegetation towards the development site. As such many of the classified areas of vegetation are assessed as being flat or upslope as a fire travelling towards the development boundaries would be travelling downslope, thus retarding fire behaviour.

Vegetation throughout the development area, and surrounding it, generally comprises undeveloped areas of Banksia Woodland (Vegetation Areas 1, 3, 4, 5, 7 and 10), previously cleared areas that have been revegetated with a combination of native species and weed grasses (Vegetation Areas 2, 8, 9 and 12), and rural residential blocks and other land uses (e.g. golf courses and race tracks) that comprise a range of native and introduced vegetation (Vegetation Areas 6 and 11).

There are also large areas of cleared land within and surrounding the boundaries of the development that are used for industrial purposes, market gardens, and high density residential subdivisions. These have been grouped as Area 13, as all meet the definition of Low Threat as per c.2.2.3.2(f) of AS3959-2018.

VEGETATION AREA 1

AS 3959:2018 Vegetation Classification Applied:	Class A Forest
Vegetation Types Present:	Low open forest A-04
Description/Justification:	Typical mixed jarrah banksia woodland, occasional tuart, marri, <i>allocasuarina</i> and acacia throughout. Middle story of <i>xanthorrhoea</i> , immature trees and other woody shrubs. Understory of native and introduced grasses and low shrubs. Clear tiered vegetation structure. Variable canopy and understory density throughout, but contiguous vegetation type across a wide area.
Post Dev. Assumptions:	Parts of Area 1 will be cleared for the development, but the majority will be maintained after development.




Photo ID: 1a





Photo ID: 1b



Photo ID: 1c

VEGETATION AREA 2	
AS 3959:2018 Vegetation Classification Applied:	Class G Grassland
Vegetation Types Present:	Tussock grassland G-22
Description/Justification:	Tussock grassland in a sump and adjacent cleared area. Weed grasses to 75 cm that cure in summer. Occasional low shrubs but <10% foliage cover.
Post Dev. Assumptions:	Will be cleared and subdivided for development.
	
Photo ID: 2a	Photo ID: 2b

VEGETATION AREA 3	
AS 3959:2018 Vegetation Classification Applied:	Class A Forest
Vegetation Types Present:	Low open forest A-04
Description/Justification:	Typical jarrah dominant banksia woodland, occasional tuart, marri, <i>allocasuarina</i> and acacia throughout. Middle story of <i>xanthorrhoea</i> , immature trees and other woody shrubs. Understory of native and introduced grasses and low shrubs. Clear tiered vegetation structure. Variable canopy and understory density throughout, but contiguous vegetation type across a wide area.
Post Dev. Assumptions:	Part of Vegetation Area 3 will be cleared (north and west) but the majority will be maintained as remnant vegetation within the boundaries of the subdivisions.
	
Photo ID: 3a	Photo ID: 3b

VEGETATION AREA 3



Photo ID: 3c

VEGETATION AREA 4



AS 3959:2018 Vegetation Classification Applied:	Class A Forest
Vegetation Types Present:	Low open forest A-04
Description/Justification:	Typical jarrah dominant banksia woodland, occasional tuart, marri, <i>allocasuarina</i> and acacia throughout. Middle story of <i>xanthorrhoea</i> , immature trees and other woody shrubs. Understory of native and introduced grasses and low shrubs. Clear tiered vegetation structure. Variable canopy and understory density throughout, but contiguous vegetation type across a wide area.
Post Dev. Assumptions:	The entire area of Vegetation Area 4 is located outside the development boundaries and will be retained unaltered.






Photo ID: 4a





Photo ID: 4b



VEGETATION AREA 5	
AS 3959:2018 Vegetation Classification Applied:	Class A Forest
Vegetation Types Present:	Low open forest A-04
Description/Justification:	Typical jarrah dominant banksia woodland, occasional tuart, marri, <i>allocasuarina</i> and acacia throughout. Middle story of <i>xanthorrhoea</i> , immature trees and other woody shrubs. Understory of native and introduced grasses and low shrubs. Clear tiered vegetation structure. Variable canopy and understory density throughout, but contiguous vegetation type across a wide area.
Post Dev. Assumptions:	Part of Vegetation Area 5 will be cleared (south west) but the majority will be maintained as remnant vegetation within the boundaries of the subdivisions.
<div style="display: flex; justify-content: space-around;">   </div>	
Photo ID: 5a	Photo ID: 5b



VEGETATION AREA 6	
AS 3959:2018 Vegetation Classification Applied:	Class B Woodland
Vegetation Types Present:	Woodland B-05
Description/Justification:	Golf course with areas of low grass in fairways that approximate Low Threat Vegetation as per 2.2.3.2(f), but significant amounts of native vegetation and unmanaged weed grasses in rough between fairways and throughout. Taken as a whole it approximates Class B Woodland.
Post Dev. Assumptions:	Will be maintained after development.
<div style="display: flex; justify-content: space-around;">   </div>	
Photo ID: 6a	Photo ID: 6b

VEGETATION AREA 7	
AS 3959:2018 Vegetation Classification Applied:	Class A Forest
Vegetation Types Present:	Low open forest A-04
Description/Justification:	Typical jarrah dominant banksia woodland, occasional tuart, marri, <i>allocasuarina</i> and acacia throughout. Middle story of <i>xanthorrhoea</i> , immature trees and other woody shrubs. Understory of native and introduced grasses and low shrubs. Clear tiered vegetation structure. Variable canopy and understory density throughout, but contiguous vegetation type across a wide area.
Post Dev. Assumptions:	Will be maintained after development.
	
Photo ID: 7a	Photo ID: 7b
	
Photo ID: 7c	



VEGETATION AREA 8	
AS 3959:2018 Vegetation Classification Applied:	Class A Forest
Vegetation Types Present:	Low open forest A-04
Description/Justification:	Jarrah dominant banksia woodland, edges heavily infested with weed grasses. Impacted by bushfire in 2015 that has killed or damaged some mature trees, but at maturity will represent Class A Forest.
Post Dev. Assumptions:	Will be maintained as is after completion of the development.
	
Photo ID: 8a	



VEGETATION AREA 9	
AS 3959:2018 Vegetation Classification Applied:	Class B Woodland
Vegetation Types Present:	Low woodland B-07
Description/Justification:	Previously cleared area with regrowth vegetation of some mature trees over weed grasses. Approximately 25% canopy cover throughout. No significant native understorey or middle story.
Post Dev. Assumptions:	This land parcel is owned by the City of Wanneroo in Freehold. The City is investigating possible future uses of this site, including a waste-to-energy facility or solar plant. While it is unlikely that the land will be maintained as is in the long term there is no set time frame for the development of this land area and as such this BMP has assessed this area as comprising a bushfire risk.
	
Photo ID: 9a	Photo ID: 9b

VEGETATION AREA 10	
AS 3959:2018 Vegetation Classification Applied:	Class A Forest
Vegetation Types Present:	Low open forest A-04
Description/Justification:	Typical jarrah dominant banksia woodland, occasional tuart, marri, <i>allocasuarina</i> and acacia throughout. Middle story of <i>xanthorrhoea</i> , immature trees and other woody shrubs. Understory of native and introduced grasses and low shrubs. Clear tiered vegetation structure. Variable canopy and understory density throughout, but contiguous vegetation type across a wide area.
Post Dev. Assumptions:	The majority Vegetation Area 10 will be cleared and subdivided, but an area to the east of Barbagallo Raceway be maintained after the completion of the development.
<div style="display: flex; justify-content: space-around;">   </div>	
Photo ID: 10a	Photo ID: 10b

VEGETATION AREA 11	
AS 3959:2018 Vegetation Classification Applied:	Class A Forest
Vegetation Types Present:	Open forest A-03
Description/Justification:	Subdivided area of large rural-residential wooded blocks, with significant areas of Class A vegetation. The majority of blocks have overstory of tuart and jarrah, with middle story of banksia and xanthorrhoea, and native understory of native shrubs and grasses. Clear tiered vegetation structure. Numerous cleared areas throughout in APZs but for the purpose of this assessment approximates Class A vegetation.
Post Dev. Assumptions:	Will be maintained as is after completion of the development.
<div style="display: flex; justify-content: space-around;">   </div>	

VEGETATION AREA 11	
Photo ID: 11a	Photo ID: 11b

VEGETATION AREA 12	
AS 3959:2018 Vegetation Classification Applied:	Class B Woodland
Vegetation Types Present:	Open woodland B-06
Description/Justification:	Previously cleared area with regrowth vegetation of some mature trees over weed grasses. Approximately 25% canopy cover throughout. No significant native understorey or middle story.
Post Dev. Assumptions:	Will be completely cleared and removed as part of this development.
	
Photo ID: 12a	Photo ID: b

VEGETATION AREA 13	
AS 3959:2018 Vegetation Classification Applied:	Excluded as per Section 2.2.3.2 (f) Low Threat Vegetation
Vegetation Types Present:	N/A
Description/Justification:	Multiple land uses, including industrial, agricultural, residential and recreational, that meet the definition of Low Threat as defined by c.2.2.3.2(f) of AS3959-2018.
Post Dev. Assumptions:	These areas will be maintained in a Low Threat state, or converted to other uses that maintain that state in perpetuity.
	

VEGETATION AREA 13

Photo ID: 13a



Photo ID: 13b



Photo ID: 13c



Photo ID: 13d



Photo ID: 13e



Photo ID: 13f

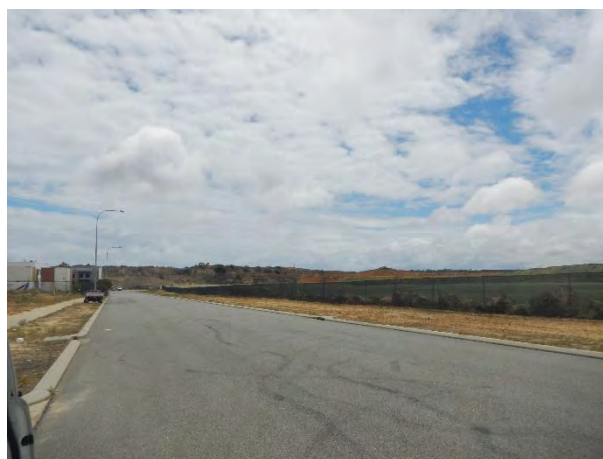


Photo ID: 13g

Photo ID: h

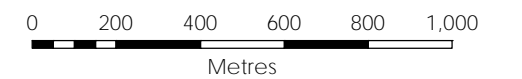
Figure 3.1
Topography &
Classified Vegetation

Neerabup Industrial Area
NEERABUP
CITY OF WANNEROO

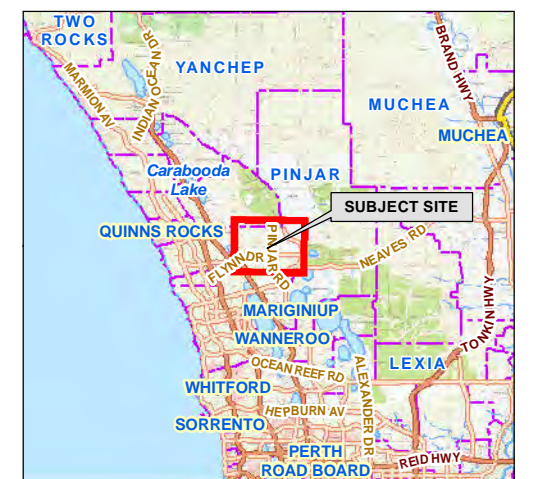


----- LEGEND -----

- Subject Site
- Locality / Suburb
- Photo & Direction
- Industrial Development
- Hydrant
- Vegetation Assessment Area**
- 150m from Subject Site
- Classified Vegetation**
- Class (A) Forest
- Class (B) Woodland
- Class (G) Grassland
- Exclusion 2.2.3.2



----- LOCALITY -----



Aerial Imagery : Landgate/SLIP
Image Date : Aug 2020

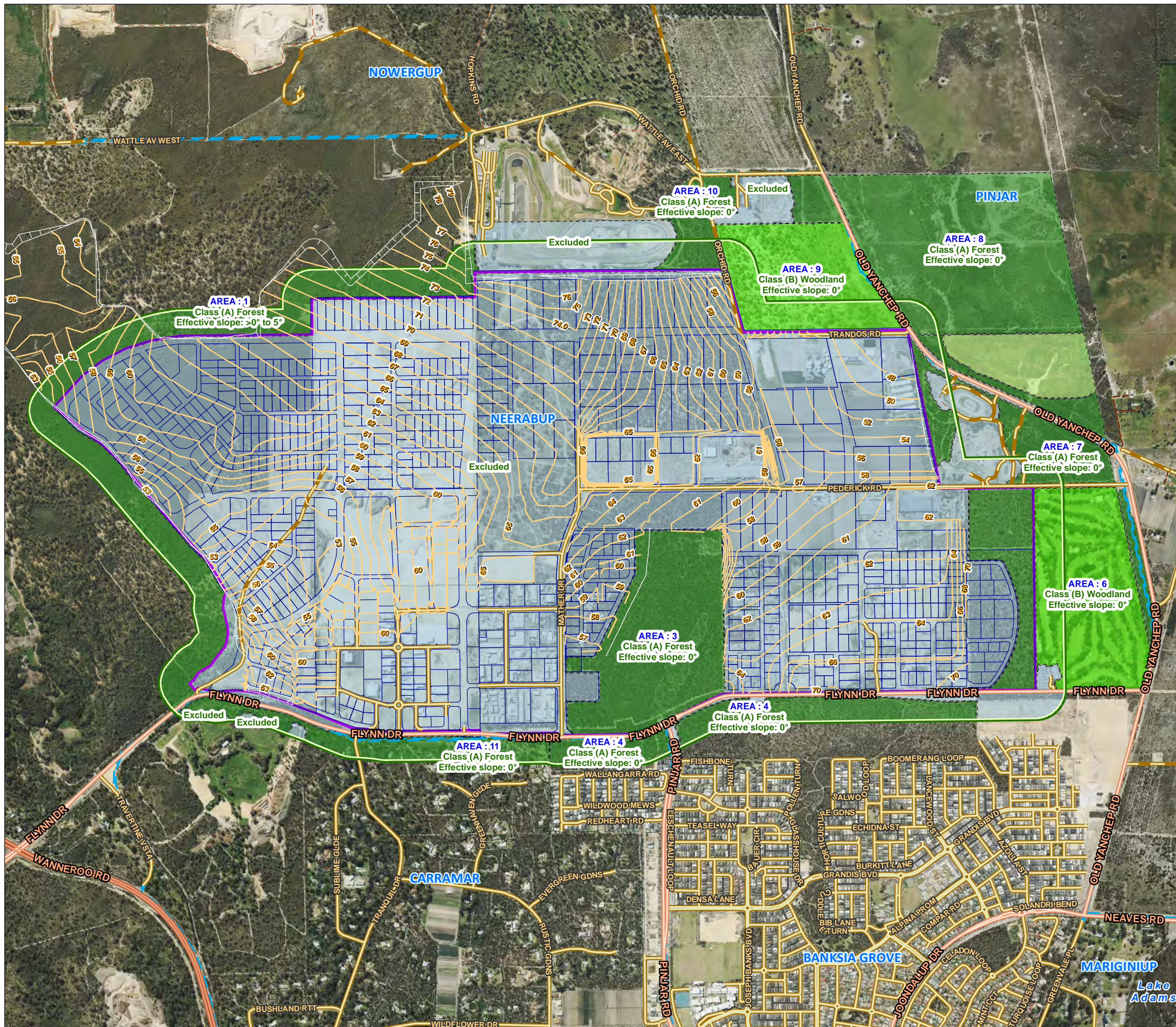


Coordinate System : GDA 1994 MGA Zone 50
Projection : Universal Transverse Mercator Units : Metre
Map compiled by : Ian Ross 17/12/2020
Map updated by : Ian Ross 17/12/2020



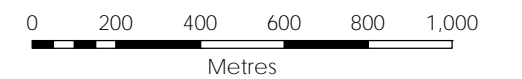
Figure 3.1.1
 Topography & Classified
 Vegetation (Post Development)

Neerabup Industrial Area
 NEERABUP
 CITY OF WANNEROO

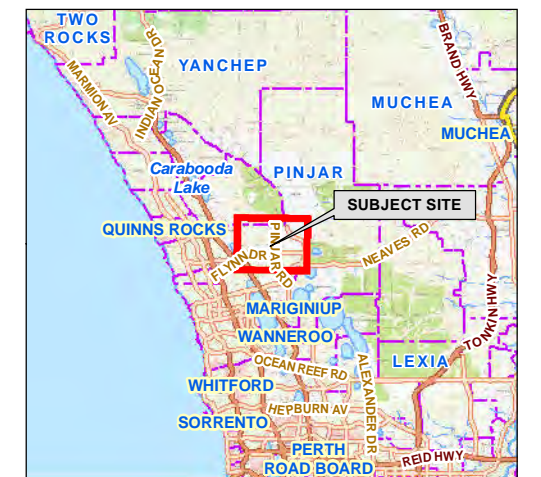


----- LEGEND -----

- Subject Site
- Locality / Suburb
- Industrial Development
- Vegetation Assessment Area
- 150m from Subject Site
- Classified Vegetation
- Class (A) Forest
- Class (B) Woodland
- Class (G) Grassland
- Exclusion 2.2.3.2



----- LOCALITY -----



Aerial Imagery : Landgate/SLIP
 Image Date : Aug 2020



Coordinate System : GDA 1994 MGA Zone 50
 Projection : Universal Transverse Mercator Units : Metre
 Map compiled by : Ian Ross 23/02/2021
 Map updated by : Ian Ross 23/02/2021

3.1.3 Vegetation Separation Distance

The vegetation separation distance is the horizontal distance measured from the relevant parts of an existing building or a future building's planned location (within a lot), to the determined edge of an area of classified vegetation.

This separation distance applied to determining a Bushfire Attack Level (BAL) can be either:

- The measured distance – for which the location of the building relative to the edge of classified vegetation must be known. This will result in single determined BAL that will apply to a building. (The measured distance is a required calculation input); or
- A calculated minimum and maximum distance (range) that will correspond to each individual BAL. The calculated distances provide an indicative (or achievable) BAL for which the determined BAL will be dependent on the known location of the building relative to the edge of classified vegetation.

The calculated range of distances corresponding to each BAL can be presented in different formats (tables or a BAL contour map), dependent on the form of information that is most appropriate for the proposed development/use. These distance ranges corresponding to BAL(s) will be presented in Section 3.2: 'Assessment Output'.

For the proposed development/use, the applicable vegetation separation distances will be presented within the Bushfire Management Plan in this location:

In Section 3.2 'Assessment Output' as a table containing the calculated ranges of distance corresponding to each BAL and illustrated as a BAL Contour Map.

3.2 Assessment Output

UNDERSTANDING THE RESULTS OF THE BUSHFIRE IMPACT ASSESSMENT

Bushfire Attack Levels (BALs) – Their Application in the Building Environment is Different to the Planning Environment

In the building environment, a *determined BAL* is required for the proposed construction at the building application stage. This is to inform approval considerations and establish the bushfire construction standards that are to apply. An indicative BAL is not acceptable for a building application.

In the planning environment, through the application of SPP 3.7 and associated Guidelines, the deemed to satisfy **requirement for a proposed 'development site' or sites (defined by the *Planning and Development (Local Planning Schemes) Regulations 2015*) as "that part of a lot on which a building that is the subject of development stands or is to be constructed")**, is that a BAL-29 or lower rating can be achieved once all works associated with the proposal are completed. For planning approval purposes, an *indicative BAL* can provide the required information.

Determined Bushfire Attack Level

A determined BAL is to apply to an existing building or the 'development site' on which the building is to be constructed and not to a lot or building envelope. Its purpose is to state the potential radiant heat flux to which the building will be exposed, thereby determining the construction standard to be applied.

A determined BAL cannot be given for a future building whose design and position on the lot are unknown or the vegetation separation distance has not been established. It is not until these variables have been fixed that a determined BAL can be stated, and a BAL Certificate can be issued.

The one exception is when a building of any dimension can be positioned anywhere on a proposed lot or within a defined building envelope, and always remain subject to the same BAL, regardless of the retention of any existing classified vegetation either onsite or offsite.

Indicative Bushfire Attack Level

If a BAL is not able to achieve 'determined' status it will be an indicative BAL. It indicates the BAL that can be achieved by the proposed development/use. However, it is conditional upon an assessment variable(s) being confirmed at a later stage (e.g. the building location is established/changed, or vegetation is modified/removed to establish the vegetation separation distance).

A BAL certificate cannot be issued for an indicative BAL – unless that BAL cannot vary (refer to 'Determined BAL' above).

In table form, a single or a range of indicative BAL(s) may be presented. If a single indicative BAL is stated for a defined area (i.e. the lot or building envelope), this will be the highest indicative BAL impacting the defined area.

In BAL contour map form (refer to Section 3.2.1), the illustrated BAL contours visually identify areas of land for which if any part of an existing or proposed building is located on that land and within the BAL contours, then the highest BAL affecting that building (or part of the land on which the building will be constructed), will be the indicative BAL that is to apply.

The BAL can only become a determined BAL once the actual location of that building on the land is known and/or the required minimum vegetation separation distance corresponding to the relevant BAL contour is established (refer to Table 3.3).

3.2.1 Bushfire Attack Level Results - BAL Contour Map Format

INTERPRETATION OF THE BUSHFIRE ATTACK LEVEL (BAL) CONTOUR MAP

The contour map will present different coloured contour intervals extending from the areas of classified bushfire prone vegetation. These represent the different bushfire attack levels that will exist at varying distances away from the classified vegetation in the event of a bushfire in that vegetation.

The areas of classified vegetation to be considered in developing the BAL contours, are those that will remain as the intended end state of the subject development once earthworks, clearing and/or landscaping and re-vegetation have been completed (or each stage completed).

Each bushfire attack level corresponds to a set range of radiant heat flux that is generated by a bushfire. That range is defined by the AS 3959:2018 BAL determination methodology.

The width of each shaded BAL contour is a diagrammatic representation of the separation distances from the classified vegetation that correspond to each BAL for each separately identified area of classified vegetation. They have been calculated by the application of the unique site variables including vegetation types and structure, ground slope and applied fire weather.

(Refer to Section 3.2 'Understanding the Results of the Bushfire Impact Assessment' for the explanation of how BAL(s) for buildings will be assessed from the BAL Contour Map).

Construction of the BAL Contours

VEGETATION AREAS APPLIED TO THE DEVELOPMENT OF THE BAL CONTOUR MAP

All identified areas of classified vegetation have been applied with the following exceptions:

For Figure 3.2, all classified vegetation within the boundaries of the proposed development, except that which will be retained, is excluded and the BAL contours are constructed into the lot from any classified vegetation outside the boundaries of the development.

This approach is applied to indicate the achievable bushfire attack levels within the specified development and the resultant area of developable land (i.e. subject to BAL-29 or less). It is based on the following assumptions:

1. Any classified vegetation within each lot can potentially be managed by the landowner to meet asset protection zone standards and dimensions corresponding to an indicated BAL; and
2. Each lot must be considered independent of what development may or may not take place on the adjoining lot.

Table 3.3 does not include Vegetation Areas 2 and 12, as the assumption is that they will be completely cleared as a part of the development works, and will be maintained as Low Threat in perpetuity. (Refer Figure 3.1.1 Topography & Classified Vegetation - Post Development Map).

VEGETATION SEPARATION DISTANCES APPLIED

The distances that have been applied to illustrating the width of each BAL contour shown in Figure 3.2 are stated in Table 3.3. These correspond to each Bushfire Attack Level and are specific to the proposed development site.

Table 3.3: Vegetation separation distances applied to construct the BAL contours.

BAL CONTOUR MAP – APPLIED VEGETATION SEPARATION DISTANCES								
Derived from the Application of Method 1 BAL Determination Methodology (AS 3959:2018 Section 2, Table 2.5) ¹								
Vegetation Area	Vegetation Classification	Effective Slope (degree range)	BAL and Corresponding Separation Distance (m)					
			BAL-FZ	BAL-40	BAL-29	BAL-19	BAL12.5	BAL-LOW
1	Class A Forest	downslope >0-5	<20	20-<27	27-<37	37-<50	50-<100	>100
3	Class A Forest	upslope or flat	<16	16-<21	21-<31	31-<42	42-<100	>100
4	Class A Forest	upslope or flat	<16	16-<21	21-<31	31-<42	42-<100	>100
5	Class A Forest	downslope >0-5	<20	20-<27	27-<37	37-<50	50-<100	>100
6	Class B Woodland	upslope or flat	<10	10-<13	13-<19	19-<27	27-<100	>100
7	Class A Forest	upslope or flat	<16	16-<21	21-<31	31-<42	42-<100	>100
8	Class A Forest	upslope or flat	<16	16-<21	21-<31	31-<42	42-<100	>100
9	Class B Woodland	upslope or flat	<10	10-<13	13-<19	19-<27	27-<100	>100
10	Class A Forest	upslope or flat	<16	16-<21	21-<31	31-<42	42-<100	>100
11	Class A Forest	upslope or flat	<16	16-<21	21-<31	31-<42	42-<100	>100

3.2.2 Bushfire Attack Level Results - Derived from The BAL Contour Map

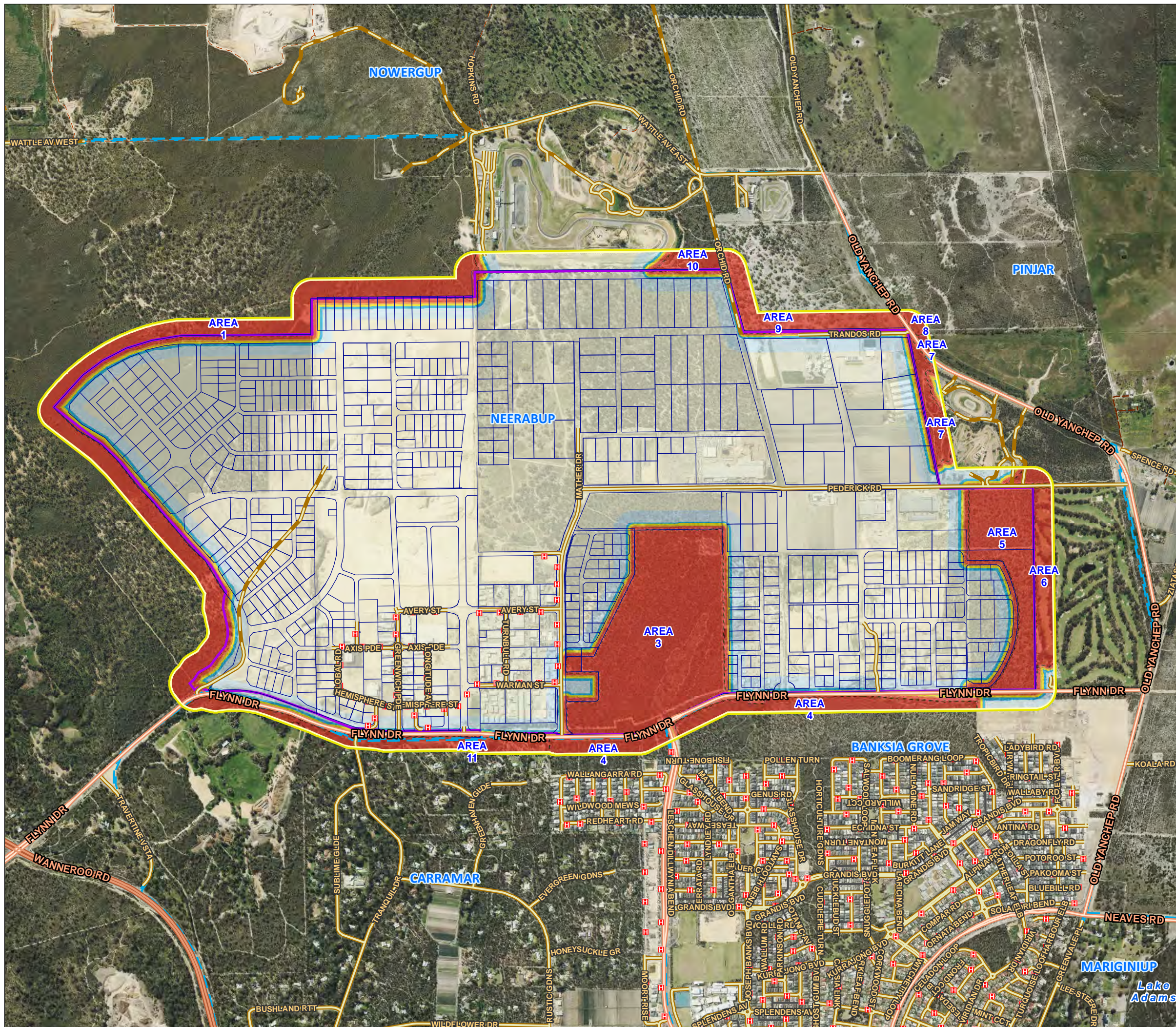
As shown by the contour plan, the vast majority of the subject development area will be subject to a BAL-Low bushfire exposure. The size of the development means that most lots will be greater than 100 m from classified vegetation at the completion of the development. As shown on Figure 3.1 much of the development site has already been cleared and is considered Lot Threat as per c.2.2.3.2(f) of AS3959-2018, and the development process will significantly increase the land excluded from classification as a bushfire threat.

Only lots around the boundaries of the development, and adjacent to the remnant vegetation that will be retained in Vegetation Areas 3 and 5, are subject to bushfire exposure as indicated by a BAL contour. This exposure can be easily mitigated by wide road verges (as in the existing Industrial Area) increasing separation distances, the position of buildings on lots, and the use of APZs.

Every lot within the development can achieve a BAL-29 APZ (or less). There will be no lots with BAL-40 or BAL-FZ exposure.

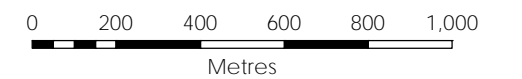
Figure 3.2
BAL Contour Map

Neerabup Industrial Area
NEERABUP
CITY OF WANNEROO

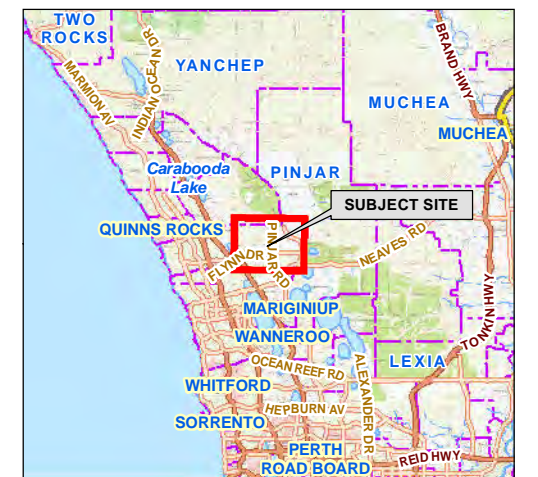


----- LEGEND -----

- Subject Site
- Locality / Suburb
- Industrial Development
- Hydrant
- Vegetation Assessment Area**
- 100m from Subject Site
- Classified Vegetation Boundary
- Indicative Bushfire Attack Levels**
- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW



----- LOCALITY -----



Aerial Imagery : Landgate/SLIP
Image Date : Aug 2020



Coordinate System : GDA 1994 MGA Zone 50
Projection : Universal Transverse Mercator Units : Metre
Map compiled by : Ian Ross 16/12/2020
Map updated by : Ian Ross 16/12/2020

4 IDENTIFICATION OF BUSHFIRE HAZARD ISSUES

In response to the Bushfire Management Plan requirements established by Appendix 5 of the Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.3), the following statements are made to assist in the understanding of whether the proposal is likely to be able to comply with the bushfire protection criteria now or in subsequent planning stages.

Spatial Context - Broader Landscape Considerations	
Wider road network and access constraints	The proposed road network for the development exceeds requirements for access, providing multiple points of access and egress, and an internal road network that allows easy movement throughout. There are no cul-de-sacs or other bottlenecks within the development footprint, and every lot will have front on access to a two-way road.
Proximity of settlements and emergency services	This development is an expansion of the existing Neerabup Industrial Area and sits in a landscape of fairly rapid development through the northern urban corridor. The landscape to the south is largely densely developed residential suburbs. The Industrial Area is located within the Gazetted Fire District, meaning any bushfire will be responded to by Fire and Rescue Service Career Stations from Butler and Joondalup.
Bushfire prone vegetation types and extent (including conserved vegetation)	The Neerabup Industrial Area is located in a landscape of bushfire prone vegetation to the west, north and east. This comprises a mix of banksia woodland zoned as Regional and National Park and unlikely to be developed, agricultural and resources land of varying zoning, and previously cleared but now revegetated areas. The majority of this land classifies as Class A Forest, Class B Woodland, or Class G Grassland.
Topography and fire behaviour interactions.	The topography is gently undulating with much of the land being considered "flat" with some slopes of between zero to five degrees. Bushfire rates of spread can double for every ten degrees of upslope while downslopes will slow the rate of spread. The area has been subject to a number of major bushfires in the past decade, including the Bullsbrook fire of 2015 which was contained to the east, and the Nowergup Fire, also of 2015, which was contained to the north. Both these fires were fast moving and burned on a strong easterly wind.
Potential for extreme fire behaviour and pyro convective events.	Possible but limited likelihood due to the fragmentation of areas of bushfire prone vegetation due to cleared areas, pastured areas, fuel load management by landowners and the availability of emergency services (including being a part of the greater Perth metropolitan area). Fires tend to run from east to west driven by an easterly wind, or from southwest to northeast, driven by the sea breeze. However, other wind directions are possible, and the impact of climate change may affect existing prevailing summer weather patterns.
Environmental Considerations	
Constraints to implementing required and/or additional bushfire protection measures	While environmental considerations exist, the master plan for the site has provided provisions for them (see Section 2).
Provision of Access Within the Subject Site	
Potential constraints	No constraints to establishing the required access will exist.
Potential Bushfire Impacts	
Flame and radiant heat and ability to establish an APZ	At completion of the development the vast majority of lots within its boundaries will be able to achieve BAL-Low. Around the margins of the development the proposed lot sizes will allow a BAL-29 dimensioned APZ to be established within each lot. This will prevent flame contact from the classified vegetation. Application of the BAL-29 bushfire construction standard will mitigate the risks from radiant heat impact to what is considered an acceptable level.

Embers/firebrands, smoke and fire-driven wind	For the vast majority of the development area wind blown embers will be the only bushfire threat. The surrounding vegetation contains high numbers of stringy bark trees (jarrah) which generate high volumes of embers. The appropriate protection measures of building construction and strict management of any APZs will mitigate the risk to what is considered an acceptable level.
Issues to be Considered at Subsequent Planning Stages (additional assessments/documents)	
Specific land uses to be addressed	As an industrial area, there may be numerous High Risk land uses within the boundaries of the development. These should be assessed and considered on a case by case basis as they are proposed. There is no bushfire impediment to the implementation of these land uses for this development.
Additional assessments	Lots with a bushfire exposure as indicated by a BAL contour on Figure 3.2 will require a BAL assessment once lot layout is known, to ensure buildings are positioned in parts of the lot with a bushfire exposure of BAL-29 or less.
Additional documents	This BMP is a strategic level document that indicates that the bushfire risks for this particular development have been mitigated at a strategic level. Further BMPs may be required at a sub-division level, particularly if the development is to be staged.
Discretionary Decision Making and the Precautionary Principle (SPP 3.7 and Guidelines)	
Does the bushfire consultant consider there are issues that need to be addressed in this space?	There is no significant impediment to this development as a result of bushfire risk. All risks are able to be mitigated through the application of the BPC (see Section 5)

5 ASSESSMENT AGAINST THE BUSHFIRE PROTECTION CRITERIA ESTABLISHED BY THE GUIDELINES

For a development application that is not a 'Tourism Land Use' to be considered compliant with SPP 3.7, it must satisfy (achieve) the intent of each of the four elements of the bushfire protection criteria. These criteria are established by the *Guidelines for Planning in Bushfire Prone Areas WAPC 2017 v1.3*). Compliance can be achieved by either:

- Meeting all applicable acceptable solutions corresponding to each element (i.e. the minimum bushfire protection measures that are deemed to satisfy planning requirements); or
- Where an acceptable solution cannot be met, by developing a performance solution that satisfies the established requirements.

5.1 Local Government Variations to Apply

Local governments may add to or modify the acceptable solutions of the Bushfire Protection Criteria (BPC) and/or apply technical requirements that vary from those specified in the *Guidelines for Planning in Bushfire Prone Areas (WAPC)*. In such instances, this Proposal will be assessed against these variations and/or any specific local government technical requirements for emergency access and water. Refer to Appendices 2 and 3 for relevant technical requirements.

Will local or regional variations (endorsed by WAPC / DFES) to the applicable acceptable solutions established by the <i>Guidelines</i> or the <i>Position Statement: Tourism land uses in bushfire prone areas WAPC October 2019</i> , apply to this Proposal?	No
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5.2 Summary of Assessment Against the Bushfire Protection Criteria

SUMMARISED OUTCOME OF THE ASSESSMENT AGAINST THE BUSHFIRE PROTECTION CRITERIA					
Element of the Bushfire Protection Criteria	Basis for the Proposal Achieving Full Compliance with SPP 3.7			The Proposal Cannot Achieve Full Compliance with SPP 3.7	
	Acceptable Solutions Met	Achieves the Intent of the Element		Bushfire planning development type that may not require full compliance is applied	An improvement in bushfire performance compared to the existing development is detailed (refer Note 4)
	All applicable solutions are fully met	All applicable solutions are not fully met. A merit based assessment and/or a bushfire performance comparison of the proposals residual risk with that of the residual risk of the acceptable solution is conducted (refer Note 4)	A performance principle-based solution is applied		
1. Location	✓			N/A	
2. Siting and Design of Development	✓				
3. Vehicular Access	✓				
4. Water	✓				
<p>Note: The development proposal has been assessed:</p> <ol style="list-style-type: none"> Against the requirements established in Appendix 4 of the <i>Guidelines for Planning in Bushfire Prone Areas, WAPC 2017 v1.3 (Guidelines)</i>. The Guidelines are found at https://www.planning.wa.gov.au/8194.aspx; and Applying the interpretation guidance provided in <i>Position Statement: Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design (WAPC Nov 2019)</i>. Applying any endorsed variations to the Guideline's acceptable solutions and associated technical requirements that have been established by the local government. If known and applicable these have been stated in Section 5.1 with the detail included as an appendix if required by the local government. When non-compliant with SPP 3.7 and when appropriate, by utilising additional compliance pathways that include the application of merit based assessment and comparative bushfire performance. The validity of this approach is derived from relevant decisions made by the responsible authorities (refer Appendix 2). 					

5.3 Assessment Detail

Element 1: Location	
Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.	
Compliance: How the proposed development achieves the intent of Element 1:	By fully meeting all applicable acceptable solutions established by the bushfire protection criteria (Guidelines v1.3 WAPC 2017)
ASSESSMENT (COMPLIANCE) STATEMENTS	
For each applicable acceptable solution, the following statements present the results of the assessment of the proposed development/use against the requirements established by the <i>Guidelines (WAPC 2017 v1.3)</i> and apply the interpretation guidance established by the <i>Position Statement: Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design (WAPC Nov 2019)</i> .	
Acceptable Solution: A1.1: Development Location	
ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE GUIDELINES	
The Master Plan development area is able to fully achieve the requirements of Element 1 by ensuring that the development is located in an Area where, upon completion, it will be subject to a maximum Bushfire exposure represented by a rating of BAL-29 or less.	
The vast majority of the development site will achieve a BAL rating of BAL-Low at the future subdivision stages and completion of the development.	
ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE POSITION STATEMENT	
<p>The position statement establishes that:</p> <ul style="list-style-type: none"> • The source of risk (the hazard) to be considered in Element 1 is the "level of bushfire exposure" from the type and extent of bushfire prone vegetation and the topography of the land on which it exists; and • "Consideration should be given to the site context" which includes the land both "within and adjoining the subject site". The "hazards remaining within the site should not be considered in isolation of the hazards adjoining the site, as the potential impact of a bushfire will be dependent on the wider risk context." <p>The position statement also recognises:</p> <ul style="list-style-type: none"> • That the proposed development site and its surrounding land may be part of an area "identified for development or intensification of land use prior to the release of SPP 3.7"; consequently • Consideration by decision-makers "should also be given to improving bushfire management of the site and surrounding area, thereby reducing the vulnerability of people property and infrastructure to bushfire"; and • The application of mitigation measures to lessen the risk to the broader area would include improvements to the local road network (including emergency access ways), improvements/additions to firefighting water supply and increasing separation distance from the hazard. 	
<p>The Hazard Within the Subject Site</p> <p>The majority of the bushfire hazard within the site will be removed as a result of the development and the majority of lots will have a BAL-Low bushfire exposure. Three areas of classified vegetation will be retained due to environmental considerations. The native vegetation in these areas is classified as Class A Forest. The impact of the slopes under the vegetation will be dependent on a bushfire's direction of travel, but slopes in the range of zero to five degrees exist</p>	

Element 1: Location

for within vegetation Area 5 and bushfire travelling upslope will have increased intensity and rate of spread. Significantly intense bushfire behaviour is possible in this area of remnant vegetation, particularly if vegetation within the lot is ignited by bushfire in the adjoining hazard (Vegetation Areas 4 and 6) and they are involved together.

However, the ability to establish a BAL-29 dimensioned APZ within each lot adjacent to these two vegetation areas removes the threat of greater levels of radiant heat or flame contact upon a future dwelling. The BAL-29 APZ will exist over a significant area of each proposed lot. The risk is further mitigated by an appropriate road network, incorporating wide road verges to significantly increase the separation distance and reduce the bushfire exposure.

The primary bushfire threat from bushfire prone vegetation remaining within the site for the majority of lots will be embers. This threat will be mitigated by the application of appropriate building design, bushfire construction standards and the ongoing maintenance of the APZ to ensure the buildings will not be impacted by consequential fire within combustible materials used, stored or accumulated within the APZ.

The Hazard Adjoining the Subject Site

Bushfire prone vegetation within adjacent lands exists as native vegetation classified as Class A Forest, Class B Woodland, and Class G Grassland. There are also large areas of Low Threat vegetation directly adjacent to the development site.

The impact of the slope under the vegetation is negligible for most surrounding vegetation, with the exception of Vegetation Area 1. The impact of a fire in this area will be dependent on a bushfire's direction of travel, but slopes in the range of zero to five degrees downslope from the proposed lots do exist. Bushfire travelling upslope will have increased intensity and rate of spread.

Consequently, the potential exists for intense bushfire behaviour to occur within these areas of bushfire prone vegetation. The potential bushfire impact on persons and property within the majority of proposed lots will be to increase the level of ember attack in the event of a bushfire.

This ember threat will be mitigated by the application of appropriate building design, bushfire construction standards and the ongoing maintenance of the BAL-29 dimensioned APZ, to ensure the buildings will not be impacted by consequential fire within combustible materials used, stored or accumulated within the APZ.

To the south the development site, on the south side of Vegetation Area 4, is an existing high density built out residential area. This limits the ability of a large scale landscape style fire coming from this direction.

The Potential to Reduce Bushfire Risk to Existing Land Use

When considered in the broader context of existing land use within the surrounding area, the proposed subdivision can potentially contribute to reducing the level of risk from bushfire to existing landowners.

This can be achieved in various ways and the following assessment points are made for the proposed subdivision:

- Once developed, the subject site will create a significant zone of low threat land within which industry can operate largely free from bushfire risk other than ember attack;
- This development will benefit residential areas to the south, creating a buffer zone that precludes the impact of a landscape scope fire occurring for those residential sub-divisions. While fires can still occur in Vegetation Area 4, the limited north-south width of this vegetation means a fire will not have the capacity to develop to its full intensity before it impacts on houses to the south or the industrial area to the north;
- The implementation of the road network associated with the development will also increase access and egress options for surrounding areas.

When the potential positive impact on the surrounding area is considered, there is significant merit in the broader impact of the proposed subdivision that it is appropriate to consider.

Element 2: Siting and Design of Development

Intent: To ensure that the siting and design of development (note: not building/construction design) minimises the level of bushfire impact.

Compliance: How the proposed development achieves the intent of Element 2:

By fully meeting all applicable acceptable solutions established by the bushfire protection criteria (Guidelines v1.3 WAPC 2017)

ASSESSMENT (COMPLIANCE) STATEMENTS

For each applicable acceptable solution, the following statements present the results of the assessment of the proposed development/use against the requirements established by the *Guidelines (WAPC 2017 v1.3)* and apply the interpretation guidance established by the *Position Statement: Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design (WAPC Nov 2019)*.

Acceptable Solution: A2.1: Asset Protection Zone

The development is able to achieve a minimum BAL-29 APZ for all lots within the boundary of the development. As shown in Figure 3.2 the vast majority of lots will achieve a rating of BAL-LOW. Only lots adjacent to the external parts of the development will be subject to a BAL rating above BAL-Low. The size of lots allows the siting of buildings to achieve a minimum BAL-29.

The external and internal road network for the development is used to increase separation between classified vegetation and reduce the potential bushfire impact. All lots adjacent to classified vegetation will have a road and wide road verges between them and that vegetation.

THE APZ - DEVELOPMENT SITING AND DESIGN PLANNING REQUIREMENTS

The necessary outcome of bushfire planning for development siting and design, is to ensure that a building can be located within the developable portion of any lot (i.e. outside those parts of the lot that form the required building setbacks, or any other excluded area), and be subject to potential radiant heat from a bushfire not exceeding 29 kW/m² (i.e. a maximum BAL of BAL-29).

This will be achieved when the size of the “low fuel area immediately surrounding a building”, the asset protection zone (APZ), is large enough. This requires a certain separation distance to exist between the building and areas of classified vegetation. These are the BAL-29 APZ dimensions and they will vary dependent on site specific parameters.

The APZ should be contained solely within the boundaries of each lot, except in instances where the neighbouring lot(s) or adjacent public land will be managed in a low-fuel state on an ongoing basis, in perpetuity.

Where possible, planning for siting and design should incorporate elements that include non-vegetated areas (e.g. roads/parking/drainage) and/or formally managed areas of vegetation (public open space/recreation areas/services installed in a common section of land), as either part of the required APZ dimensions or to additionally increase separation distances to provide greater protection. These elements create robust and easier managed asset protection zones.

THE ASSESSMENT

Future buildings on the lot(s) of the proposed subdivision can be surrounded by an APZ that will ensure the potential radiant heat impact of a bushfire does not exceed 29 kW/m² (BAL-29). The required APZ specifications of width, location and management can be achieved.

APZ Width: The required APZ dimensions to ensure buildings are subject to a maximum BAL of BAL-29 (measured from any external wall or supporting post or column to the edge of the classified vegetation), has been determined in Section 3.2 of this BMP and are:

Element 2: Siting and Design of Development

BAL-29 APZ Dimensions		
Separation distance Applicable to Lots adjacent to Classified Vegetation:	Building to Vegetation Area 1	Minimum 27 metres
	Building to Vegetation Area 3	Minimum 21 metres
	Building to Vegetation Area 4	Minimum 21 metres
	Building to Vegetation Area 5	Minimum 27 metres
	Building to Vegetation Area 6	Minimum 13 metres
	Building to Vegetation Area 7	Minimum 21 metres
	Building to Vegetation Area 8	Minimum 21 metres
	Building to Vegetation Area 9	Minimum 13 metres
	Building to Vegetation Area 10	Minimum 21 metres
	Building to Vegetation Area 11	Minimum 21 metres

APZ Location: Asset protection zones of the widths stated above can be contained solely within the boundaries of each lot. Onsite vegetation will be required to be modified/removed, the authority for which will need to be received from the local government.

APZ Management: All vegetation that will require modification/removal and future management is onsite and therefore under the control of the landowner.

Retained vegetation will be managed in accordance with the technical requirements established by the Schedule 1: 'Standards for Asset Protection Zones (Guidelines)'. The APZ specifications are also detailed in Appendix 1.

THE APZ – REQUIRED DIMENSIONS TO SATISFY FUTURE BUILDING (AND ONGOING MANAGEMENT)

It is important for the landowner to be aware that the APZ dimensions that will be required to be physically established and maintained on each lot surrounding relevant future buildings, may be different to those stated above for the BAL-29 APZ - which is the minimum dimension a planning proposal needs to show can be established to comply with SPP 3.7.

The actual APZ dimensions to be physically established and maintained, will be based on which of the following establishes the larger APZ dimension:

- The dimensions corresponding to the determined BAL of a building (refer to Section 3.2 for explanation of the 'planning' versus 'building' requirements and 'indicative' versus 'determined' BAL); or
- The APZ dimensions established by the local government's Firebreak Notice.

Element 3: Vehicular Access

Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.

Compliance: How the proposed development achieves the intent of Element 3:

By fully meeting all applicable acceptable solutions established by the bushfire protection criteria (Guidelines v1.3 WAPC 2017)

ASSESSMENT (COMPLIANCE) STATEMENTS

For each applicable acceptable solution, the following statements present the results of the assessment of the proposed development/use against the requirements established by the *Guidelines* (WAPC 2017 v1.3).

Acceptable Solution: A3.1: Two Access Routes

Multiple roads provide safe access and egress to at least six different destinations via local road networks. The road network for the development will connect to major roads including Old Yanchep Road, Flynn Drive and Pinjar Road. A new connection will be installed in the northwest to connect to Wattle Avenue West. As sealed public roads, these are available to all residents and the public at all times and under all weather conditions.

This will provide the capacity for access and egress options on all sides of the development.

The construction technical requirements established by the Guidelines and/or the local government can and will be complied with.

Acceptable Solution: A3.2: Public Road

A range of new roads, both major and minor, will be constructed as part of the development and will fully meet the acceptable solution. The construction technical requirements established by the Guidelines and/or the local government can and will be complied with.

Acceptable Solution: A3.3: Cul-de-sacs (including a dead-end road)

No cul-de-sacs or dead end roads will be included as part of the development design. A number of existing dead end roads will be extended and connected to other roads reducing the bushfire risk.

Acceptable Solution: A3.4: Battle-axe

No battle axe blocks (Lots) will be included as part of the development design.

Acceptable Solution: A3.5: Private Driveways

The construction technical requirements established by the Guidelines and/or the local government can and will be complied with. These requirements are set out in Appendix 2.

Acceptable Solution: A3.6: Emergency Access Way

No Emergency Access Ways will be included as part of the development design.

Acceptable Solution: A3.7: Fire Service Access Routes

No Fire Service Access Routes will be included as part of the development design.

Acceptable Solution: A3.8: Firebreak Width

The proposed lots will comply with the requirements of the local government annual firebreak notice issued under s33 of the Bush Fires Act 1954. Firebreaks to be installed prior to future subdivision staging clearances.

Element 4: Water

Intent: To ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.

Compliance: How the proposed development achieves the intent of Element 4:

By fully meeting all applicable acceptable solutions established by the bushfire protection criteria (Guidelines v1.3 WAPC 2017)

ASSESSMENT (COMPLIANCE) STATEMENTS

For each applicable acceptable solution, the following statements present the results of the assessment of the proposed development/use against the requirements established by the *Guidelines* (WAPC 2017 v1.3).

Acceptable Solution: A4.1: Reticulated Areas

A reticulated water supply is available to the subject site and a hydrant network will be installed as part of the development. The construction technical requirements established by the Guidelines and/or the local government can and will be complied with.

Acceptable Solution: A4.2: Non-Reticulated Areas

N/A

Acceptable Solution: A4.3: Non-Reticulated Areas – Individual Lots

N/A

6 RESPONSIBILITIES FOR IMPLEMENTATION AND MANAGEMENT OF THE BUSHFIRE PROTECTION MEASURES

6.1: BMP Implementation responsibilities prior to occupancy or building.

Landowner (Developer) - Prior to Development	
No.	Implementation Actions
1	<p>The local government may condition a development application approval with a requirement for the landowner/proponent to register a notification onto the certificate of title and deposited plan.</p> <p>This will be done pursuant to Section 70A <i>Transfer of Land Act 1893 as amended</i> ('Factors affecting use and enjoyment of land, notification on title'). This is to give notice of the bushfire hazard and any restrictions and/or protective measures required to be maintained at the owner's cost.</p> <p>This condition ensures that:</p> <ol style="list-style-type: none"> 1. Landowners/proponents are aware their lot is in a designated bushfire prone area and of their obligations to apply the stated bushfire risk management measures; and 2. Potential purchasers are alerted to the Bushfire Management Plan so that future landowners/proponents can continue to apply the bushfire risk management measures that have been established in the Plan.
2	<p>Prior to sale and post planning approval, BMPs will need to be written for relevant individual sites. The entity responsible for having the BMP prepared should ensure that anyone listed as having responsibility under the Plan has endorsed it and is provided with a copy for their information and informed that it contains their responsibilities. This includes the landowners/proponents (including future landowners where the Plan was prepared as part of a subdivision approval), local government and any other authorities or referral agencies ('Guidelines' s4.6.3).</p>
3	<p>Finalise a sub-division design that ensures that all lots can achieve an APZ meeting the separation distance requirements at least BAL-29 or less.</p>
4	<p>Finalise a sub-division design that meets the access and water provision requirements as set out in Section 5 of this plan.</p>
5	<p>If the sub-division is to be staged ensure that Bushfire Protection measures are included at all stages of the development.</p>
6	<p>Establish the Asset Protection Zone (APZ) surrounding any buildings within 100m of classified vegetation to the largest dimension as determined by either:</p> <ul style="list-style-type: none"> • The dimensions corresponding to the determined BAL of a building (refer to Section 3.2 for explanation of the 'planning' versus 'building' requirements and 'indicative' versus 'determined' BAL); or • The dimensions corresponding to the local government's Firebreak Notice. <p>Establish the APZ to the above dimensions and to the standards established by the Guidelines (refer to Appendix 1) or as varied by the local government through their Firebreak Notice (refer to the following responsibility).</p> <p>This is the responsibility of the developer.</p>
7	<p>Prior to sale of the subject lots, each individual lot is to be compliant with the City of Wanneroo Fire Break Notice issued under s33 of the Bushfires Act 1954.</p> <p>This may include specifications for asset protection zones that differ from the Guideline's APZ Standards, with the intent to better satisfy local conditions. When these are more stringent than those created by the</p>

	Guidelines, or less stringent and endorsed by the WAPC and DFES, they must be complied with. Refer to Appendix 1.
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6.2: Ongoing management responsibilities for the Landowner/Occupier.

6.2 Landowner/Occupier - Ongoing	
No.	Ongoing Management Actions
1	<p>Maintain the Asset Protection Zone (APZ) surrounding any buildings to the largest dimension as determined by either:</p> <ul style="list-style-type: none"> • The dimensions corresponding to the determined BAL of a building (refer to Section 3.2 for explanation of the 'planning' versus 'building' requirements and 'indicative' versus 'determined' BAL); or • The dimensions corresponding to the local government's Firebreak Notice. <p>Maintain the APZ to the above dimensions and to the standards established by the Guidelines (refer to Appendix 1) or as varied by the local government through their Firebreak Notice (refer to the following responsibility).</p>
2	<p>Comply with the City of Wanneroo Fire Break Notice issued under s33 of the Bush Fires Act 1954.</p> <p>This may include specifications for asset protection zones that differ from the Guideline's APZ Standards, with the intent to better satisfy local conditions. When these are more stringent than those created by the Guidelines, or less stringent and endorsed by the WAPC and DFES, they must be complied with. Refer to Appendix 1.</p>
3	<p>Maintain vehicular access routes within the lot to the required surface condition and clearances as stated in the BMP.</p>
4	<p>Ensure that any builders (of future structures on the lot) are aware of the existence of this Bushfire Management Plan and the responsibilities it contains regarding the application of construction standards corresponding to a determined BAL.</p>
5	<p>Ensure all future buildings the landowner has responsibility for, are designed and constructed in full compliance with:</p> <ol style="list-style-type: none"> 1. the requirements of the WA Building Act 2011 and the bushfire provisions of the Building Code of Australia (BCA); and 2. with any identified additional requirements established by this BMP or the local government.

6.3: Ongoing management responsibilities for the Local Government.

6.3 Local Government - Ongoing	
No.	Ongoing Management Actions
1	<p>Monitor landowner compliance with the Bushfire Management Plan and the annual City of Wanneroo Fire Break Notice.</p>
2	<p>Ensure sub-division designs meet the requirements of this BMP prior to development approval being granted.</p>

APPENDIX 1: TECHNICAL REQUIREMENTS FOR ONSITE VEGETATION MANAGEMENT

A1.1 Requirements Established by the Guidelines – Standards for Asset Protection Zones

(Source: *Guidelines for Planning in Bushfire Prone Areas - WAPC 2017 v1.3 Appendix 4, Element 2, Schedule 1 and Explanatory Note E2.1*)

DEFINING THE ASSET PROTECTION ZONE (APZ)

Description: An APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (by reducing fuel loads). The width of the required APZ varies with slope and vegetation and varies corresponding to the BAL rating determined for a building (lower BAL = greater dimensioned APZ).

For planning applications, the minimum sized acceptable APZ is that which is of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29). It will be site specific.

For subdivision planning, design elements and excluded/low threat vegetation adjacent to the lot(s) can be utilised to achieve the required vegetation separation distances and therefore reduce the required dimensions of the APZ within the lot(s).

Defendable Space: The APZ includes a defendable space which is an area adjoining the asset within which firefighting operations can be undertaken to defend the structure. Vegetation within the defendable space should be kept at an absolute minimum and the area should be free from combustible items and obstructions. The width of the defendable space is dependent on the space, which is available on the property, but as a minimum should be 3 metres.

Establishment: The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity.

The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

[Note: Regardless of whether an Asset Protection Zone exists in accordance with the acceptable solutions and is appropriately maintained, fire fighters are not obliged to protect an asset if they think the separation distance between the dwelling and vegetation that can be involved in a bushfire, is unsafe.]

Schedule 1: Standards for APZ

Fences: within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

Objects: within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.

Fine Fuel Load: combustible dead vegetation matter less than 6 mm in thickness reduced to and maintained at an average of two tonnes per hectare (example below).

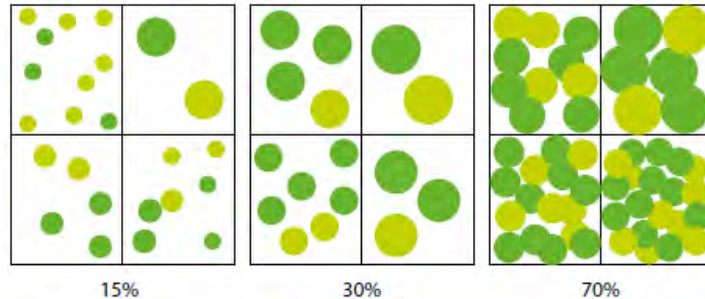


Example: Fine fuel load of 2 t/ha

(Image source: Shire of Augusta Margaret River's Firebreak and Fuel Reduction Hazard Notice)

Trees (> 5 metres in height): trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. Diagram below represents tree canopy cover at maturity.

Tree canopy cover – ranging from 15 to 70 per cent at maturity



(Source: Guidelines for Planning in Bushfire Prone Areas 2017, Appendix 4)

Shrubs (0.5 metres to 5 metres in height): should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m² in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 mm in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: should be managed to maintain a height of 100 mm or less.

The following example diagrams illustrate how the required dimensions of the APZ will be determined by the type and location of the vegetation.



A1.2 Requirements Established by the Local Government – the Firebreak Notice

The local government's current Firebreak Notice is available on their website, at their offices and is distributed as ratepayer's information. It must be complied with.

These requirements are established by the local government's Firebreak Notice created under s33 of the Bushfires Act 1954 and issued annually (potentially with revisions). The Firebreak Notice may include additional components directed at managing fuel loads, accessibility and general property management with respect to limiting potential bushfire impact.

If Asset Protection Zone (APZ) specifications are defined in the Firebreak Notice, these may differ from the Standards established by the Guideline's, with the intent to better satisfy local conditions. When these are more stringent than those created by the Guidelines, or less stringent and endorsed by the WAPC and DFES, they must be complied with.

The APZ dimensions to be physically established and maintained, will be based on which of the following establishes the larger APZ dimension:

- The dimensions corresponding to the determined BAL of a building (refer to Section 3.2 explanation of the 'planning' versus 'building' requirements and 'indicative' versus 'determined' BAL(s)); or
- The APZ dimensions established by the local government's Firebreak Notice.

A1.3 Requirements Recommended by DFES – Property Protection Checklists

Further guidance regarding ongoing/lasting property protection (from potential bushfire impact) is presented in the publication 'DFES – Fire Chat – Your Bushfire Protection Toolkit'. It is available from the Department of Fire and Emergency Services (DFES) website.

A1.4 Requirements Established by AS 3959:2018 – 'Minimal Fuel Condition'

This information is provided for reference purposes. This knowledge will assist the landowner to comply with Management Requirement No. 3 set out in the Guidance Panel at the start of this Appendix. It identifies what is required for an area of land to be excluded from classification as a potential bushfire threat.

"Australian Standard - AS 3959:2018 Section 2.2.3.2: Exclusions - Low threat vegetation and non-vegetated areas:

The Bushfire Attack Level shall be classified BAL-LOW where the vegetation is one or a combination of the following:

- a) Vegetation of any type that is more than 100m from the site.*
- b) Single areas of vegetation less than 1ha in area and not within 100m of other areas of vegetation being classified vegetation.*
- c) Multiple area of vegetation less than 0.25ha in area and not within 20m of the site or each other or other areas of vegetation being classified vegetation.*
- d) Strips of vegetation less than 20m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20m of the site or each other, or other areas of vegetation being classified vegetation.*
- e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.*
- f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, (means insufficient fuel available to significantly increase the severity of a bushfire attack – for example, recognisable as short cropped grass to a nominal height of 100mm), mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks (single row of trees)."*

APPENDIX 2: TECHNICAL REQUIREMENTS FOR VEHICULAR ACCESS

Each local government may have their own standard technical requirements for emergency vehicular access, and they may vary from those stated in the Guidelines.

When required, these are stated in Section 5.1 of this bushfire management plan.

Requirements Established by the Guidelines – The Acceptable Solutions

(Source: Guidelines for Planning in Bushfire Prone Areas WAPC 2017 v1.3, Appendix 4)

VEHICULAR ACCESS TECHNICAL REQUIREMENTS - PART 1

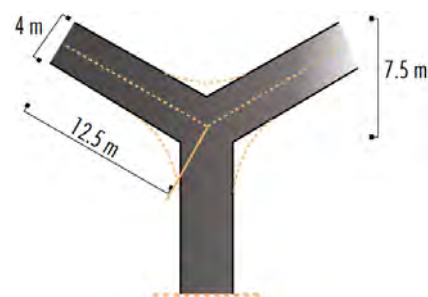
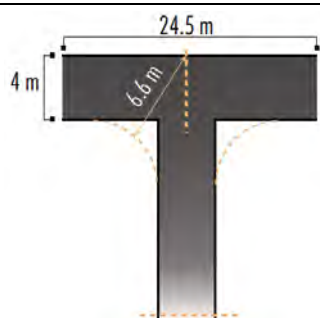
Acceptable Solution 3.5: Private Driveways

The following requirements are to be achieved:

- The design requirements set out in Part 2 of this appendix; and

Where the house site is more than 50 metres from a public road:

- Passing bays every 200 metres with a minimum length of 20 metres and a minimum width of two metres (ie combined width of the passing bay and constructed private driveway to be a minimum six metres);
- Turn-around areas every 500 metres and within 50 metres of a house, designed to accommodate type 3.4 fire appliances to turn around safely (ie kerb to kerb 17.5 metres);
- Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes; and
- All weather surface (i.e. compacted gravel, limestone or sealed).



Acceptable Solution 3.8: Firebreak Width

Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three meters or to the level as prescribed in the local firebreak notice issued by the local government.

VEHICULAR ACCESS TECHNICAL REQUIREMENTS - PART 2

Technical Component	Vehicular Access Types				
	Public Roads	Cul-de-sacs	Private Driveways	Emergency Access Ways	Fire Service Access Routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	4.5	4.5	4.5	4.5
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum cross-fall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5

VEHICULAR ACCESS TECHNICAL REQUIREMENTS - PART 1

* A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metres of paving and one metre of constructed road shoulders. In special circumstances, where 8 lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of ninety metres may be provided subject to the approval of both the local government and DFES.

APPENDIX 3: TECHNICAL REQUIREMENTS FOR FIREFIGHTING WATER

Reticulated Areas

[Source: Guidelines for Planning in Bushfire Prone Areas WAPC 2017 v1.3, Appendix 4, Element 4]

The Water Corporation's 'No 63 Water Reticulation Standard' is deemed to be the baseline criteria for developments and should be applied unless local water supply authority's conditions apply.

The requirement is to supply a reticulated water supply and fire hydrants, in accordance with the technical requirements of the relevant water supply authority and DFES.

Key specifications in the most recent version/revision of the design standard include:

- *Residential Standard* – hydrants are to be located so that the maximum distance between the hydrants shall be no more than 200 metres.
- *Commercial Standard* – hydrants are to be located with a maximum of 100 metre spacing in Industrial and Commercial areas.
- *Rural Residential Standard* – where minimum site areas per dwelling is 10,000 m² (1ha), hydrants are to be located with a maximum 400m spacing. If the area is further subdivided to land parcels less than 1ha, then the residential standard (200m) is to be applied.

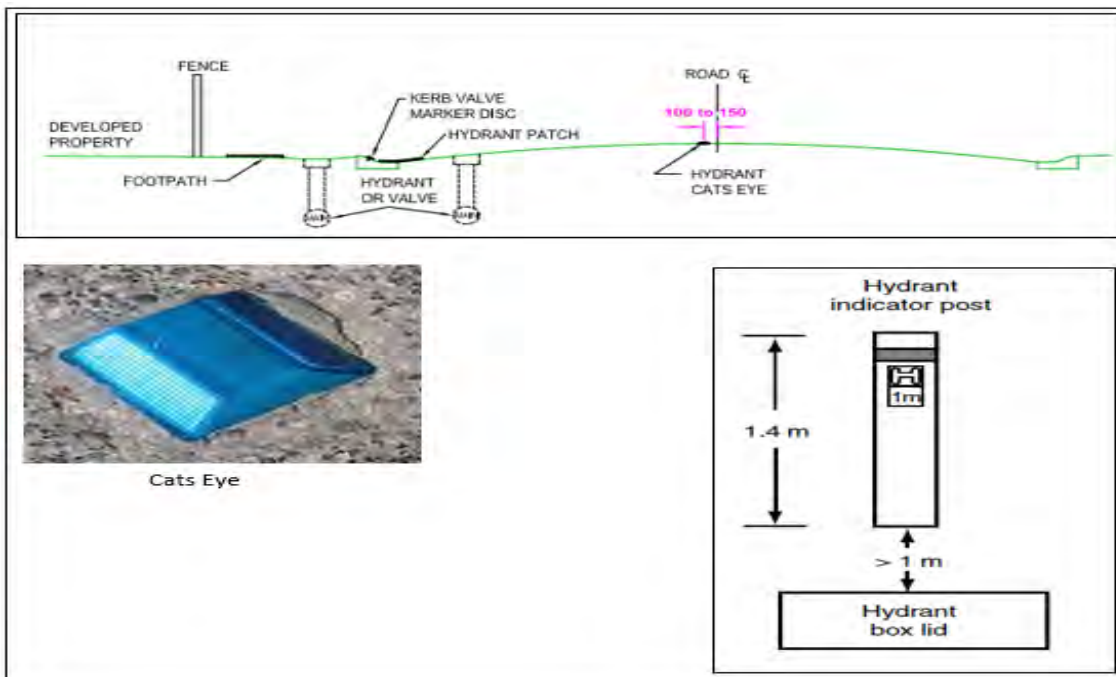


Figure A4.1: Hydrant Location and Identification Specifications