

Appendix 1 Bushfire Management Plans (Strategen)

Bushfire Management Plan Coversheet

This Coversheet and accompanying Bushfire Management Plan has been prepared and issued by a person accredited by Fire Protection Association Australia under the Bushfire Planning and Design (BPAD) Accreditation Scheme.

Bushfire Management Plan and Site Details

Site Address / Plan Reference: Ongoing development stages, Amberton Estate

Suburb: Eglinton

State: WA

P/code: 6034

Local government area: City of Wanneroo

Description of the planning proposal: Subdivision Application

BMP Plan / Reference Number: STO19028_01

Version: R001 Rev 0

Date of Issue: 21/05/2019

Client / Business Name: Stockland

Reason for referral to DFES

	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the BPC elements)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Is the proposal any of the following special development types (see SPP 3.7 for definitions)?		
Unavoidable development (in BAL-40 or BAL-FZ)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Strategic planning proposal (including rezoning applications)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Minor development (in BAL-40 or BAL-FZ)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
High risk land-use	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Vulnerable land-use	<input type="checkbox"/>	<input checked="" type="checkbox"/>

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?
N/A

Note: The decision maker (e.g. local government or the WAPC) should only refer the proposal to DFES for comment if one (or more) of the above answers are ticked "Yes".

BPAD Accredited Practitioner Details and Declaration

Name	Accreditation Level	Accreditation No.	Accreditation Expiry
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Company		Contact No.	
Strategen Environmental		9792 4797	

I declare that the information provided within this bushfire management plan is to the best of my knowledge true and correct

Signature of Practitioner



Date 21/05/2019



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Ongoing development stages, Amberton Estate

Bushfire Management Plan (Subdivision Application)

Prepared for
Stockland
by Strategen

May 2019



Ongoing development stages, Amberton Estate

Bushfire Management Plan (Subdivision Application)

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May 2019

Limitations

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Document control

Client: Stockland

Report Version	Revision No.	Purpose	Strategen author	Strategen reviewer	Submitted to Client	
					Form	Date
Draft Report	Rev A	For review by client	Brodie Mastrangelo (BPAD 45985, Level 1)	Zac Cockerill (BPAD 37803, Level 2)	Electronic (email)	21/05/2019
Final Report	Rev 0	Issued for use: to accompany subdivision application	Brodie Mastrangelo (BPAD 45985, Level 1)	Zac Cockerill (BPAD 37803, Level 2)	Electronic (email)	21/05/2019

Filename: STO19028_01 R001 Rev 0 - 21 May 2019

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1. Proposal details

1.1 Background

Stockland is seeking to progress urban development throughout Amberton Estate, Eglinton in the City of Wanneroo through subdivision application over Stages 7A, 7B, 13A, 20C, 24, 25B, 28, 29A and 29B, as well as the proposed neighbourhood centre and primary school (hereon referred to as the project area). The Subdivision Plans (Figure 1 and Figure 2) identify:

- 153 proposed residential lots
- one commercial lot
- one primary school lot
- two Public Open Space (POS) lots
- two balance lots
- proposed internal road layout.

1.2 Site description

The project area comprises the following existing lots situated throughout two distinct portions of the site, including to the west (Stages 24, 25B, 28, 29A, 29B, neighbourhood centre and primary school) and east (Stages 7A, 7B, 13A and 20C):

- Lot 9024 Lapis Way, Eglinton
- Lot 9510 Celeste Street, Eglinton
- Lots 1564–1569 and 1771–1774 Kombu Lane, Eglinton.

Stages 24, 25B, 28, 29A, 29B, neighbourhood centre and primary school to the west are surrounded by (see Figure 3):

- a combination of cleared land and intact shrubland vegetation with a scattered network of four-wheel drive tracks to the north
- a combination of cleared land, developed land and intact shrubland vegetation with a scattered network of four-wheel drive tracks to the south
- a combination of cleared land, intact shrubland vegetation (foreshore reserve) and developed café precinct to the west
- existing residential built out stages of Amberton Estate to the east.

Stages 7A, 7B, 13A and 20C to the east are surrounded by (see Figure 4):

- a combination of cleared land, developed land and intact shrubland vegetation to the north
- existing residential built out stages of Amberton Estate to the south and west
- Marmion Avenue and intact shrubland vegetation to the east.

A vast proportion of the project area is designated as bushfire prone on the *Map of Bush Fire Prone Areas* (DFES 2019; see Plate 1).

1.3 Purpose

This Bushfire Management Plan (BMP) has been prepared to address requirements under Policy Measure 6.4 of *State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; WAPC 2015) in accordance with *Guidelines for Planning in Bushfire-Prone Areas* (the Guidelines; WAPC 2017).

1.4 Other plans/reports

Other reports that have been prepared for the project area include:

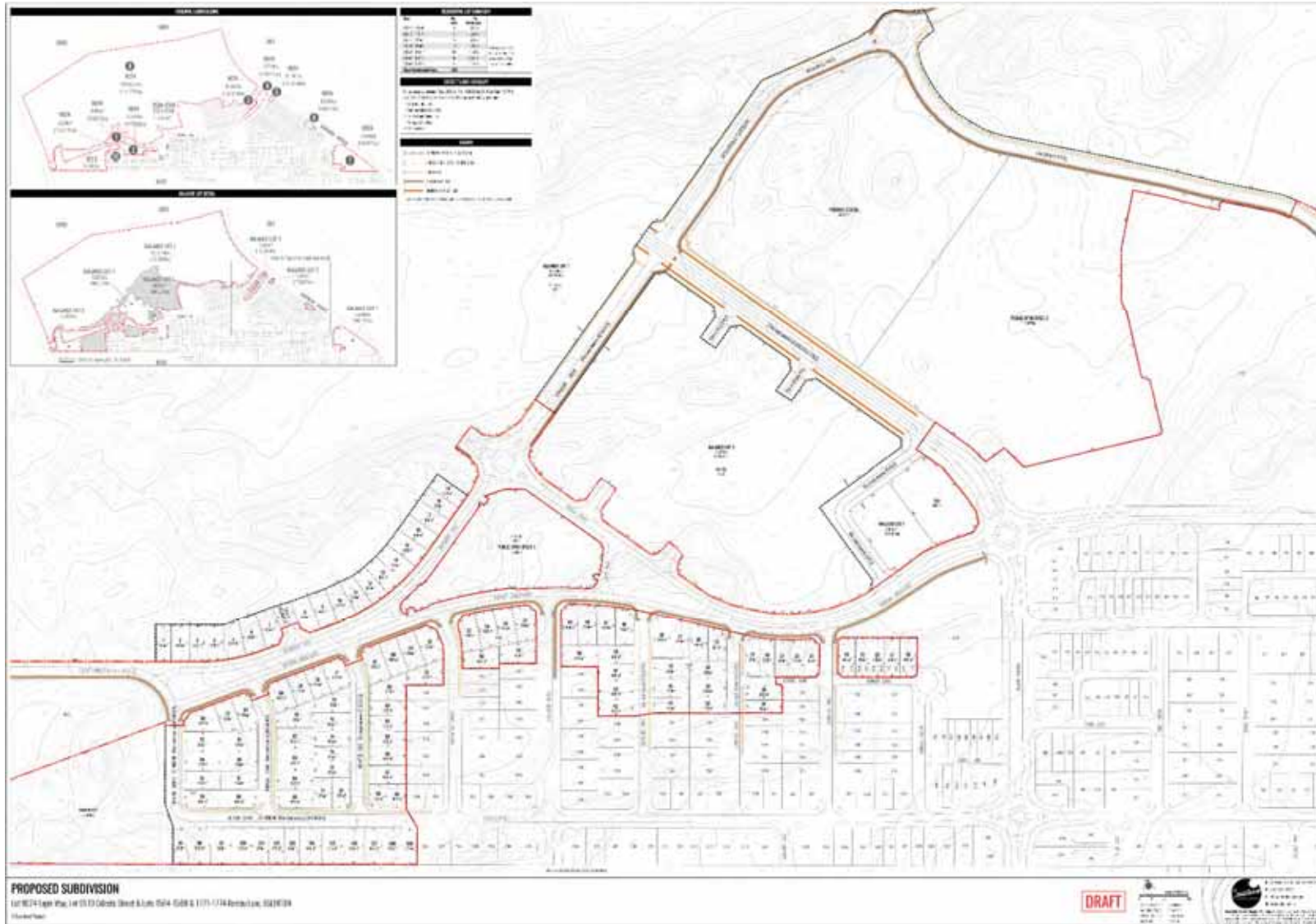
- Amberton Estate Fire Management Plan (Strategen 2016)
- Stages 8 and 9 Amberton Estate Bushfire Management Plan (Strategen 2017)
- Portion Stages 8, 9, 39 and 40 Amberton Estate Bushfire Management Plan (Strategen 2018a)
- Precincts P3N and P4E Amberton Estate Bushfire Management Plan (Strategen 2018b)
- Stages 29–38 Amberton Estate Bushfire Management Plan (Strategen 2019).

Other plans/reports/approvals relating to this development include:

- MRS Amendment 1284/57
- Commonwealth EPBC Approval 2010/5777
- EPBC Approval 2013/7068
- EPBC Approval 2014/7137.



Plate 1: Map of Bush Fire Prone Areas (DFES 2019)



Source: Creative Design and Planning 2019

Figure 1: Subdivision plan (Stages 24, 25B, 28, 29A, 29B, Neighbourhood Centre and Primary School)

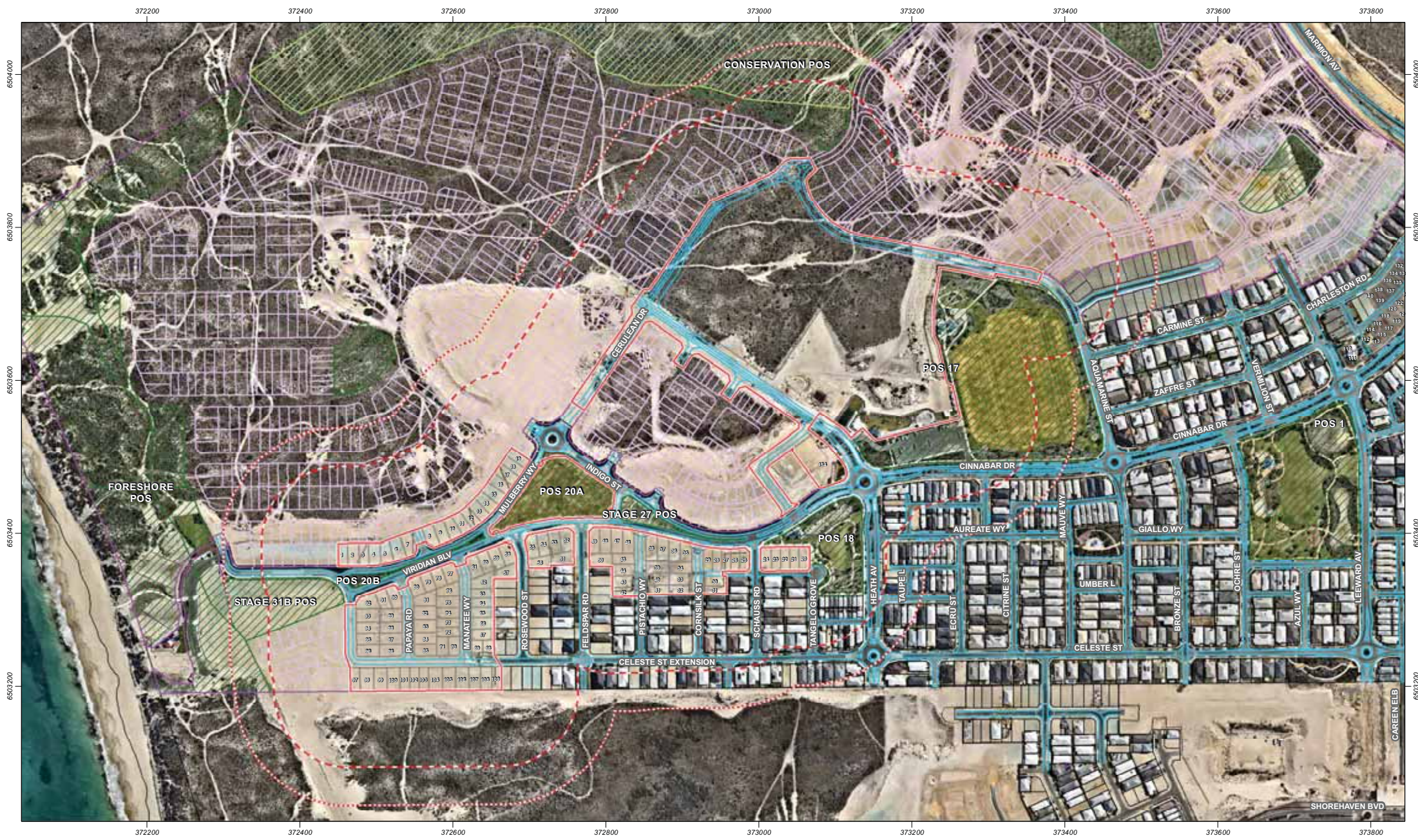

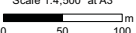












Figure 3: Site overview (Stages 24, 25B, 28, 29A, 29B, Neighbourhood Centre and Primary School)

 Scale 1:4,500 at A3  Coordinate System: GDA 1994 MGA Zone 50 Date: 10/05/2019	Legend		 Conservation POS  Carriageways  POS  Development layout	 Cadastral boundary  Balance lots  Indicative future subdivision layout
	 Project area  100m assessment area  150m assessment area			



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 Data source: Nearmap; Aerial image, flown 03/2019. Stockland. Development layout, 10/05/2019. Created by: jrcute



Figure 4: Site overview (Stages 7A, 7B, 13A and 20C)

Scale 1:2,800 at A3

0 50 100 m

Coordinate System: GDA 1984 MGA Zone 50

Date: 10/05/2019

Legend

- Project area
- 100m assessment area
- 150m assessment area
- Carriageways
- Indicative future subdivision layout
- Balance lots
- POS
- Development layout

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 Data source: Neemap; Aerial image; fwm032019; Landgate; Cadastre; 07/2016; Stockland; Development layout; 10/05/2019; Created by: jrcue

2. Environmental considerations

2.1 Native vegetation – modification and clearing

The proposed development will necessitate clearing of native vegetation within the development stages themselves, as well as adjacent to Stages 24, 25B, 28, 29A, 29B, the Neighbourhood Centre and Primary School as part of a low threat staging buffer to mitigate unnecessary BAL impact from adjacent temporary vegetation. Vegetation will also be modified throughout the majority of POS areas to be excludable under AS3959, as discussed in Section 2.2. Vegetation will be predominantly retained throughout conservation POS to the north and foreshore reserve to the west.

An EPBC Act referral (Ref: 2010/5777) was submitted for the proposed development (including adjacent development areas) in 2010 for potential impacts to Carnaby's Black Cockatoo. Department of Environment and Energy (DoEE) approved the proposed action with conditions including the creation of Carnaby's Black Cockatoo habitat within POS areas throughout the Eglinton LSP area. This process was outlined in Amendment No.1 to Eglinton LSP No.82.

The Eglinton LSP No.82 was approved by the Commonwealth Minister for Environment on 30 April 2013 (modified on 17 July 2013 and 20 October 2015). The south-western section of the Eglinton LSP No.82 area (i.e. Amberton Estate) was referred under the EPBC Act by Stockland in accordance with the following two proposals, both of which were determined as 'Not a Controlled Action':

- Part Lot 9005 Marmion Avenue (EPBC 2013/7068)
- Lot 5000 and Part lot 5001 (EPBC 2014/7137).

Based on the above information, Strategen understands that all relevant environmental approvals have been sought up to this point in time. Subdivision approval will provide a valid clearing exemption to undertake the necessary subdivisional and clearing works required.

A search of publicly available environmental data relating to the project area has been undertaken and is summarised in Table 1.

Table 1: Summary of environmental values

Environmental value	Present within or adjacent to project area	Description
Environmentally Sensitive Area	Within/ adjacent	The project area and adjacent land are mapped as being Environmentally Sensitive Areas. The ESA is likely to be associated with the potential for Banksia Woodland of the Swan Coastal Plain TEC to occur in the area.
Swan Bioplan Regionally Significant Natural Area	N/A	Not identified within or adjacent to the project area.
Wetlands	N/A	No RAMSAR Wetlands or Geomorphic Wetlands of the Swan Coastal Plain are mapped within or adjacent to the project area.
Waterways	N/A	Not identified within or adjacent to the project area.
Threatened Ecological Communities listed under the EPBC Act	Within/ adjacent	Endangered Banksia Woodlands of the Swan Coastal Plain TEC mapped as being likely to occur within project area.
Threatened and priority flora	Within/ adjacent	Priority 4 flora are mapped as occurring adjacent northeast of Stages 24A, 25B, 28, 29A & 29B.
Fauna habitat listed under the EPBC Act	Within/ adjacent	Carnaby's Black Cockatoo habitat in the form of confirmed breeding and roosting areas and Potential Quenda Habitat are mapped within and adjacent to the project area.
Threatened and priority fauna	N/A	Not identified within or adjacent to the project area.
Bush Forever Site	Adjacent	Bush Forever site BF397 is located to the southwest of Stages 24, 25B, 28, 29A & 29B.

Environmental value	Present within or adjacent to project area	Description
DBCA managed lands and lands and waters (includes legislated lands and waters and lands of interest)	N/A	Not identified within or adjacent to the project area.
Conservation covenants	N/A	No active conservation covenants were identified in the locality.

Regional vegetation survey and mapping of the Swan Coastal Plain indicates the project area and adjacent land is contained predominantly within the Quindalup Vegetation Complex. This vegetation complex is described as:

- Quindalup Complex: coastal dune complex consisting mainly of two alliances including the strand and fore dune alliance and the mobile and stable dune alliance (local variations include low closed forest of *Melaleuca lanceolata-Callitris preissii* and closed scrub of *Acacia rostellifera*).

Aside from existing cleared and developed areas, the project area is a combination of low shrubland and open heath (both of the Class C shrubland vegetation classification), consistent with the Quindalup Complex.

The above observations are consistent with detailed vegetation survey undertaken over the Eglinton LSP area by PGV Environmental (2013). The dominant on-site vegetation types were surveyed as:

- *Acacia cyclops* shrubland
- *Melaleuca systema*, *Lomandra maritima* low open heath
- *Acacia rostellifera*, *Melaleuca systema* low open heath.

No Aboriginal Heritage Places were identified within or adjacent to the project area.

2.2 Revegetation / Landscape Plans

The various Landscape Plans (refer to Appendix 1) demonstrate that landscaping throughout all relevant POS areas will result in vegetation exclusions under Clauses 2.2.3.2 (b), (e) and/or (f) of AS 3959, except for:

- conservation POS to the north (retained Class C shrubland vegetation)
- foreshore reserve to the west (retained Class C shrubland vegetation)
- Stage 31B POS to the west (likely introduction of Class C shrubland throughout drainage areas).

Final determination of the applicable exclusion clauses throughout POS will be confirmed as part of detailed landscape design once final size, location, density and species selection are known. Detailed landscape planning and design will need to be consistent with the provisions of this BMP with regards to any exclusions/low threat managed vegetation proposed. Further consideration of the post-development vegetation classifications/exclusions throughout POS areas is documented in Section 3.1.

Based on the landscape information available (as provided in Appendix 1), proposed POS will constitute the following:

- POS 17 (Amberton playing fields and dog exercise area/skate park adjacent to primary school):
 - * car parking
 - * playground area
 - * drainage basins
 - * clubhouse
 - * grove of native trees
 - * paths
 - * cricket nets

- * BBQ/picnic shelter
- * multi-use court
- * AFL/cricket/rugby/soccer/little athletics fields
- * dog exercise area
- * skate area.
- POS 18 (corner of Heath Avenue and Viridian Boulevard):
 - * paths
 - * shelter and play area
 - * turf
 - * mulched areas
 - * drainage basin and planted shrubs.
- POS 20A (bound by Viridian Boulevard, Lapis Way, Indigo street, Sable Way and Mulberry Way):
 - * BBQ area
 - * open and passive turf areas
 - * terraced seating
 - * shade structure and exposed aggregate hardstand
 - * playscape.
- POS 20B ('Cinnabar Greenlink' – Stage 29 median):
 - * swale planting
 - * footpath
 - * mulched areas.
- POS 31B (coastal precinct adjacent to foreshore reserve):
 - * play areas
 - * multi-use sports court
 - * turfing areas
 - * drainage areas
 - * planting of trees and shrubs.
- POS 27 (bound by Lapis Way, Indigo Street and Viridian Boulevard ('Cinnabar Greenlink' - Stage 27 median):
 - * concrete paths
 - * native shrub planting
 - * mulched areas.
- entry POS (corner of Marmion Avenue and Cinnabar Drive):
 - * turfing areas
 - * footpath
 - * managed planted areas.

Other POS and drainage areas adjacent to the project area that were established during previous stages of development are maintained in a low threat state, comprising heavy mulch, manicured lawns, and sparse planting of trees and shrubs.

3. Bushfire assessment results

3.1 Assessment inputs

3.1.1 Vegetation classifications and exclusions

Strategen assessed classified vegetation and exclusions within the project area and surrounding 150 m assessment area through on-ground verification on 25 January 2019 and 1 March 2019 in accordance with AS 3959 and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016).

Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix 2. Vegetation classifications and exclusions are mapped in Figure 5 (for Stages 24, 25B, 28, 29A, 29B, Neighbourhood Centre and Primary School) and Figure 6 (for Stages 7A, 7B, 13A and 20C).

Following vegetation modification in accordance with post-development subdivision conditions, the predominant vegetation extent will consist of:

- Class C shrubland within conservation POS to the north
- Class C shrubland within foreshore reserve to the west
- Class C shrubland within future undeveloped portions of the Amberton Estate site beyond the proposed 100 m wide low threat staging buffer to the north
- Class C shrubland within future undeveloped portions of the Peet Shorehaven site to the south
- future introduction of Class C shrubland within POS 31B drainage basins to the west
- combination of Class C shrubland and Class D scrub within future Eglinton Hills development opposite Marmion Avenue to the east.

All other land throughout the project area and adjacent 150 m wide assessment area is, or will be excluded under Clauses 2.2.3.2 (b), (e) and/or (f) of AS3959 in accordance with post development subdivision conditions. This includes:

- proposed internal development area (combination of Clauses 2.2.3.2 [e] and [f] exclusions)
- proposed 100 m wide low threat staging buffer (Clause 2.2.3.2 [f] exclusion)
- existing and proposed POS, except for conservation POS, foreshore reserve and POS 31B (combination of Clauses 2.2.3.2 [b], [e] and [f] exclusions).

3.1.2 Effective slope

Strategen assessed effective slope under classified vegetation within the project area and surrounding 150 m assessment area through on-ground verification on 25 January 2019 and 1 March 2019 in accordance with AS3959. Results were cross-referenced with DAFWA 2 m contour data and are mapped in Figure 5 (for Stages 24, 25B, 28, 29A, 29B, Neighbourhood Centre and Primary School) and Figure 6 (for Stages 7A, 7B, 13A and 20C).

Effective slope is highly variable due to the nature of the dune systems in which the proposed development is situated. As a result, effective slope under classified vegetation ranged from flat/up-slope (0 degrees) to down-slope >15–20 degrees.

3.1.3 Summary of inputs

A summary of the post-development vegetation classifications/exclusions and effective slope are summarised in Table 2, including the designation of plot numbers. These summary inputs correspond with the information displayed in Figure 5 (for Stages 24, 25B, 28, 29A, 29B, Neighbourhood Centre and Primary School) and Figure 6 (for Stages 7A, 7B, 13A and 20C).

Table 2: Summary of post-development vegetation classifications, exclusions and effective slope

Vegetation plot	Vegetation classification	Effective slope	Description
1	Class D Scrub	Flat/upslope (0°)	East of Marmion Avenue
2	Class D Scrub	Downslope >0–5°	East of Marmion Avenue
3	Class C Shrubland	Flat/upslope (0°)	East of Marmion Avenue and within adjacent stages of Amberton Estate to the north
4	Class C Shrubland	Downslope >10–15°	East of Marmion Avenue
5	Class C Shrubland	Flat/upslope (0°)	South of Stages 24, 25B, 28, 29A and 29B
6	Class C Shrubland	Downslope >0–5°	Southwest of Stages 24, 25B, 28, 29A and 29B
7	Class C Shrubland	Downslope >5–10°	South of Stages 24, 25B, 28, 29A and 29B
8	Class C Shrubland	Downslope >10–15°	South of Stages 24, 25B, 28, 29A and 29B
9	Class C Shrubland	Flat/upslope (0°)	North of Stages 24, 25B, 28, 29A and 29B
10	Class C Shrubland	Downslope >0–5°	North of Stages 24, 25B, 28, 29A and 29B
11	Class C Shrubland	Downslope >5–10°	North of Stages 24, 25B, 28, 29A and 29B
12	Class C Shrubland	Downslope >10–15°	North of Stages 24, 25B, 28, 29A and 29B
13	Class C Shrubland	Downslope >15–20°	North of Stages 24, 25B, 28, 29A and 29B
14	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [b], [e] and [f])	N/A	Area to be modified to a low threat state within project area and 100 m wide low threat staging buffer
15	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [b], [e] and [f])	N/A	All other areas within and adjacent to the project area already excluded as low threat vegetation

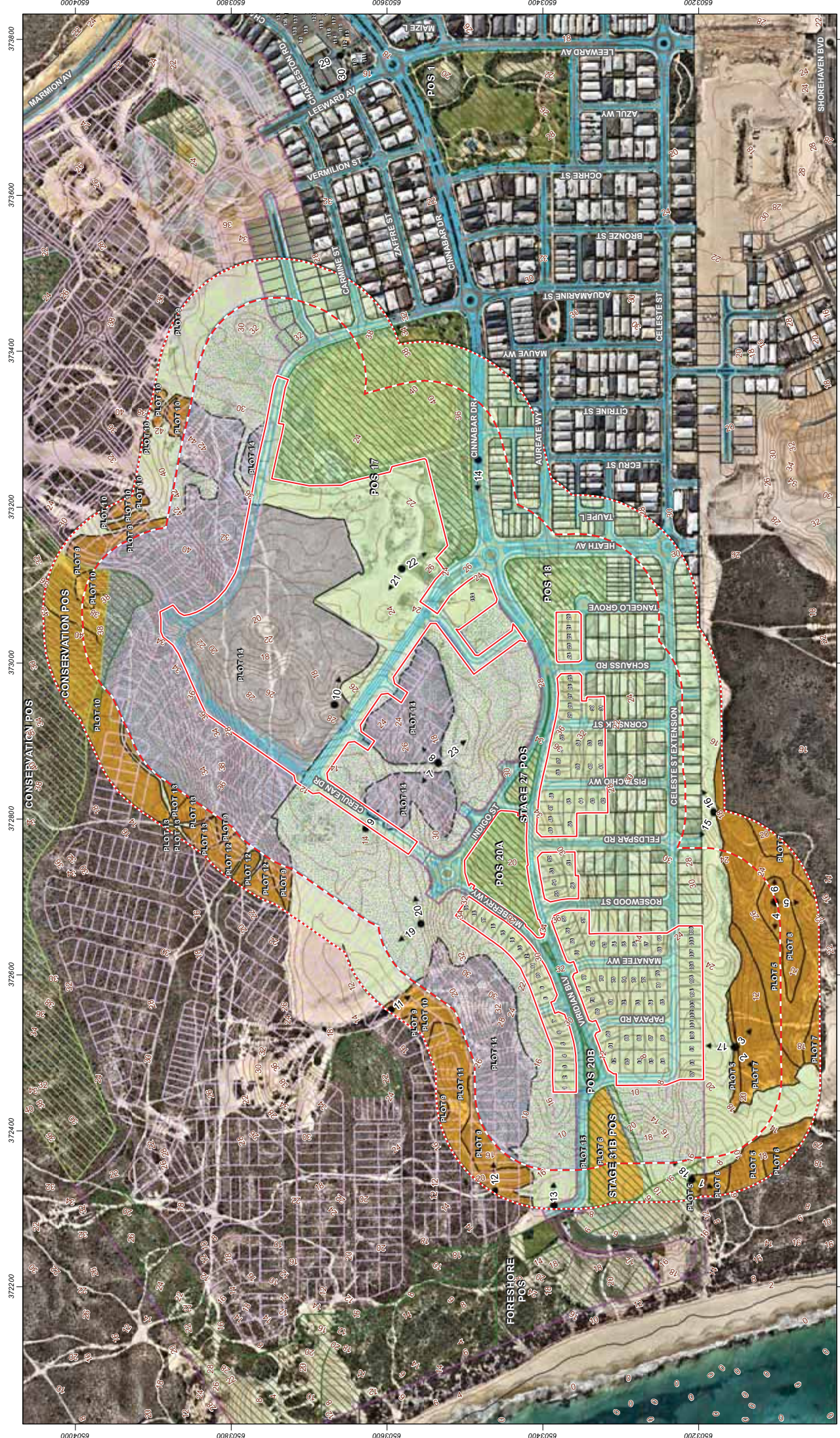


Figure 5: Vegetation classification and effective slope (Stages 24, 25B, 28, 29A, 29B, Neighbourhood Centre and Primary School)

Legend

	Scale 1:4,500 at A3		Project area		Balance lots		Carriageways		Class G Grassland
	100m assessment area		Photo point and direction		POS		100m wide staging buffer		Areal to be modified to low threat state
	150m assessment area		Surface elevation (mAHD)		Development layout		Class C Shrubland		Excluded under Clauses 2.2.3.2. (e) and (f)
	Conservation POS		Conservation POS		Indicative future subdivision layout		Class D Scrub		
	Cadastral boundary								

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 Data source: Neemap; Aerial image; flown 03/2019. Stockland. Development layout, 10052019. Indicative future subdivision layout, 02/2019. Created by jrcd
 Date: 10/05/2019
 Coordinate System: GDA 1994 MGA Zone 50



Figure 6: Vegetation classification and effective slope (Stages 7A, 7B, 13A and 20C)

Scale 1:2,800 at A3

0 50 100 m

Coordinate System: GDA 1984 MGA Zone 50

Date: 10/05/2019

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 Data source: Neemap; Aerial image: flown032019; Stockland; Development layout: 09M42019. Created by: jrcite

Legend

- Project area
- 100m assessment area
- 150m assessment area
- Carriageways
- Photo point and direction
- Photo point and direction
- Cadastre boundary
- Balance lots
- Balance lots
- Development layout
- Indicative future subdivision layout
- POS
- Surface elevation (mAHD)
- Surface elevation (mAHD)
- Carriageways
- Carriageways

Vegetation class

- Class G Grassland
- Class C Shrubland
- Class D Scrub
- Area to be modified to low threat state
- Excluded under Clauses 2.2.3.2. (e) and (f)
- Low threat staging buffer

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3.2 Assessment outputs

3.2.1 Bushfire Attack Level (BAL) contour assessment

Strategen has undertaken a BAL contour assessment in accordance with Method 1 of AS 3959 for the project area and results are depicted in Figure 7 (for Stages 24, 25B, 28, 29A, 29B, Neighbourhood Centre and Primary School) and Figure 8 (for Stages 7A, 7B, 13A and 20C). The Method 1 procedure incorporates the following factors:

- state-adopted FDI 80 rating
- vegetation class
- effective slope
- distance maintained between proposed development areas and the classified vegetation.

The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed habitable development and subsequently informs the standard of building construction and/or setbacks required for proposed habitable development to potentially withstand such impacts.

BAL contours are based on post-development subdivision conditions, including consideration of the proposed clearing/earthworks extent, provision of the 100 m wide low threat staging buffer, existing/proposed landscaped areas and likely reintroduction of vegetation throughout POS 31B. Should there be any changes in development design or classified vegetation extent that results in a modified BAL outcome, then the BAL contours will need to be reassessed.

A summary of BAL contour results are detailed in Table 3. The highest BAL applicable to habitable development is a partial BAL-19 impact for Lot 92 in the far west. All other areas of habitable development were assessed to be either BAL-12.5 or BAL-Low. The proposed neighbourhood centre and primary school were also assessed as being subject to BAL-Low.

Table 3: BAL contour assessment results

Method 1 BAL determination				
Plot	Vegetation classification	Effective slope	BAL contour width	Highest BAL (to lot boundary)
1	Class D Scrub	Flat/upslope (0°)	27-<100 m	BAL-12.5
2	Class D Scrub	Downslope >0-5°	31-<100 m	BAL-12.5
3	Class C Shrubland	Flat/upslope (0°)	19-<100 m	BAL-12.5
4	Class C Shrubland	Downslope >10-15°	28-<100 m	BAL-12.5
5	Class C Shrubland	Flat/upslope (0°)	19-<100 m	BAL-12.5
6	Class C Shrubland	Downslope >0-5°	15-<22 m	BAL-19
7	Class C Shrubland	Downslope >5-10°	25-<100 m	BAL-12.5
8	Class C Shrubland	Downslope >10-15°	28-<100 m	BAL-12.5
9	Class C Shrubland	Flat/upslope (0°)	>100 m	BAL-Low
10	Class C Shrubland	Downslope >0-5°	>100 m	BAL-Low
11	Class C Shrubland	Downslope >5-10°	>100 m	BAL-Low
12	Class C Shrubland	Downslope >10-15°	28-<100 m	BAL-12.5
13	Class C Shrubland	Downslope >15-20°	>100 m	BAL-Low
14	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])	N/A	N/A	N/A
15	Excluded – Non-vegetated & Low threat (Clauses 2.2.3.2 [e] and [f])	N/A	N/A	N/A
Determined highest BAL				BAL-19

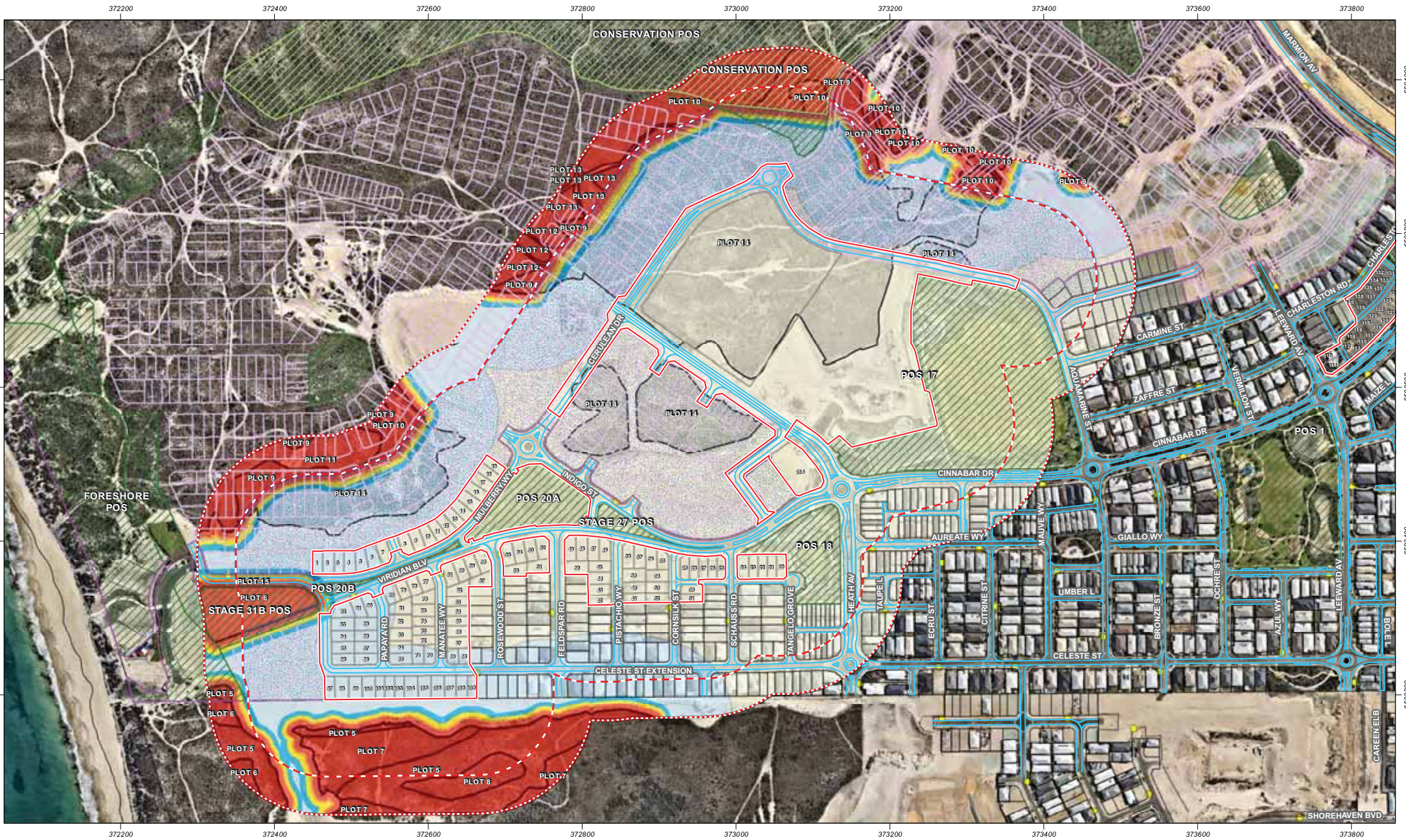


Figure 7: BAL contour map (Stages 24, 25B, 28, 29A, 29B, Neighbourhood Centre and Primary School)

<p>Scale 1:4,500 at A3</p> <p>0 50 100 m</p> <p>Coordinate System: GDA 1994 MGA Zone 50</p> <p>Date: 10/05/2019</p>	Legend		Fire hydrant 100m wide staging buffer Classified vegetation	BAL contours BAL FZ BAL 40 BAL 29 BAL 19 BAL 12.5 BAL Low
	Project area 100m assessment area 150m assessment area Carriageways	Conservation POS Cadastral boundary Balance lots		



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Data source: Nearnap; Aerial image, flown 03/2019; Stockland; Development layout, 10/05/2019; Indicative future subdivision layout: 02/2019; Created by: jrcrute



Figure 8: BAL contour map (Stages 7A, 7B, 13A and 20C)

<p>Scale 1:2,800 at A3</p> <p>Coordinate System: GDA 1994 MGA Zone 50 Date: 10/05/2019</p>	Legend		Fire hydrant Low threat staging buffer Classified vegetation	BAL contours BAL FZ BAL 40 BAL 29 BAL 19 BAL 12.5 BAL Low
	Project area 100m assessment area 150m assessment area	Cadastral boundary Balance lots POS Development layout		



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Data source: Nearmap; Aerial image, flown 03/2019; Stockland; Development layout, 10/05/2019. Created by: jrcute

4. Identification of bushfire hazard issues

4.1 Bushfire context

The project area is surrounded by a combination of existing residential development, remnant vegetation and cleared land. Urban residential development proposed throughout remaining areas of Amberton Estate and Peet Shorehaven to the north and south of the project area respectively, and in a broader sense throughout remaining areas of the approved Eglinton LSP 82 to the north and east is contextually important, as this gradual removal of vegetation will ultimately result in a diminishing level of bushfire risk to the development.

Stages 24, 25B, 28, 29A, 29B, Neighbourhood Centre and Primary School

The greatest bushfire threat to proposed development in Stages 24A, 25B, 28, 29A and 29B is from surrounding shrubland vegetation to the north, south and west of the project area. This vegetation consists of low and sparse shrubland heaths throughout sand dunes and areas disturbed by off-road vehicle use. Ongoing development of future stages of Shorehaven will remove the majority of vegetation to the south. Ongoing development of future stages of Amberton Estate will remove the majority of vegetation to the north; however, some vegetation will still be retained to the north within the band of conservation POS. Vegetation will also be retained within the foreshore reserve to the west, which links with shrubland vegetation proposed to be introduced throughout drainage areas of POS 31B. On this basis, the foreshore reserve/POS 31B to the west and conservation POS to the north will comprise the only permanent bushfire threats to the development.

Stages 7A, 7B, 13A and 20C

Based on the current vegetation extent, worst case bushfire behaviour is likely to be received from the east of the project area opposite the Marmion Avenue road reserve. The fire run is significant and comprises intact shrubland and scrub fuels with a moderate fuel loading and fire behaviour has the potential to escalate over the course of the fire run. However, given the extent of separation provided by Marmion Avenue (50 m wide road reserve), bushfire impacts to development are likely to be limited to ember attack. Importantly, vegetation east of Marmion Avenue is within the future Eglinton Hill development area, so is temporary and likely to be cleared/modified in the short to medium term.

4.2 Bushfire hazard issues

The bushfire risks to proposed development posed by post-development hazards can be managed through standard application of acceptable solutions under the Guidelines, including provision for and implementation of low fuel separation or APZs around proposed lots, bushfire construction standards where relevant, provision of adequate emergency water supply and vehicular access, as well as through a direct bushfire suppression response if required. Bushfire mitigation strategies applicable to the proposed development are addressed in Section 5 of this BMP.

Quinns Rocks Bush Fire Brigade and Fire and Rescue Services stationed at Yanchep and Butler have capacity to provide prompt emergency suppression response should a bushfire threaten development within the project area.

On completion of development within the project area, there will be a significantly reduced bushfire risk to assets as a result of vegetation clearing that will be undertaken to facilitate development. Vegetation clearing throughout development staging will play an important role in managing the bushfire risk posed by on-site temporary vegetation during roll out of individual development stages. If development is staged, vehicular access arrangements will also need to be considered to ensure that all occupiers and visitors are provided with at least two vehicular access routes at all times (from Stage 1 onwards). Potential staging matters are discussed as key management measures in Section 5.

If subdivisional works are to be staged internal to the project area, the following staging provisions will need to be implemented in advance of lot creation within each development stage as required to mitigate any temporary/unnecessary BAL impact and/or access compliance issues imposed by adjacent undeveloped stages:

- 100 m wide low threat staging buffers to the north and west
- provision of temporary compliant cul-de-sacs and turn-around points if staged road construction results in dead ends that are less than 200 m long (these would be extinguished once temporary dead-ends are opened up and roads are extended into adjacent development stages)
- provision of temporary compliant Emergency Access Ways (EAWs) to link access between public roads if staged road construction results in a dead-end between 200–600 m long.

These provisions will not apply in areas of BAL-Low.

Since the proposed primary school was assessed as being subject to BAL-Low, a Bushfire Emergency Evacuation Plan will not be required to support a Development Application (DA) for these land uses under SPP3.7 Policy Measure 6.6, provided the bushfire management measures outlined in this BMP are properly adhered to.

On this basis, Strategen considers the bushfire hazards within and adjacent to project area and the associated bushfire risks are readily manageable through standard application of acceptable solutions under the Guidelines (see Table 4). These responses have been factored in to proposed development as early as possible at all stages of the planning process to ensure a suitable, compliant and effective bushfire management outcome is achieved for protection of future life, property and environmental assets.

5. Assessment against the bushfire protection criteria

5.1 Compliance table

An acceptable solutions assessment against the bushfire protection criteria is provided in Table 4.

Table 4: Compliance with the bushfire protection criteria of the Guidelines

Bushfire protection criteria	Method of compliance		Proposed bushfire management strategies
	Acceptable solutions		
Element 1: Location	A1.1 Development location		The BAL contour assessment (see Figure 7, Figure 8 and Table 3) identifies all lots as having capacity to achieve a rating of BAL-29 or lower. The highest determined BAL under post-development conditions was a partial BAL-19 impact for Lot 92 in the far west. All other lots were determined to be BAL-12.5 or BAL-Low, which meets compliance for Element 1 Location through adoption of acceptable solution A1.1.
Element 2: Siting and design	A2.1 Asset Protection Zone		The BAL contour assessment identifies all habitable development as being capable of achieving BAL-29 or lower (see Figure 7 and Figure 8) through the provision of existing low fuel separation/defendable space in and around the site, proposed non-vegetated roads, low threat POS and the 100 m wide low threat staging buffer. No additional APZ provisions are required for proposed habitable development to achieve BAL-29 or lower. All low fuel areas will need to be established and maintained in accordance with Schedule 1 of the Guidelines (APZ standards, refer to Appendix 3), which will deliver compliance with Element 2 Siting and Design through adoption of acceptable solution A2.1.
Element 3: Vehicular access	A3.1 Two access routes.		A combination of existing perimeter roads and the proposed internal vehicle access network will provide all occupants with the option of travelling to more than two different destinations via multiple connections with Marmon Avenue to the east and multiple connections with the Peet Shorehaven development to the south. This measure adopts acceptable solution A3.1.
	A3.2 Public road		All public roads will be constructed to meet the relevant technical requirements under the Guidelines (see Appendix 4), which will adopt acceptable solution A3.2.
	A3.3 Cul-de-sac (including a dead-end-road)		An existing legacy cul-de-sac services proposed Lots 147–149 Bleu Chase (far east of the site). The cul-de-sac is compliant at 52 m in length with a 17.5 m diameter turnaround head. No additional permanent cul-de-sacs are proposed as part of design; however, if development and vehicular access construction is to be staged, any proposed temporary cul-de-sacs will be less than 200 m in length, will include minimum 17.5 m diameter turn-around heads and will be constructed to meet relevant technical requirements under the Guidelines (see Appendix 4). This measure adopts acceptable solution A3.3.
	A3.4 Battle-axe		An existing legacy battle-axe services Lots 152–153 Verdigris Loop (far east of the site). The battle-axe is compliant at 23 m long and 6 m wide. No addition battle-axes are proposed as part of design.
	A3.5 Private driveway longer than 50 m		N/A – the proposed lots are of size where all future habitable development will be located within 50 m of a public road.
	A3.6 Emergency access way		No permanent emergency access ways (EAW) are proposed as part of design; however, if development and vehicular access construction is to be staged, any proposed temporary EAW is to be constructed to meet the relevant technical requirements under the Guidelines (see Appendix 4). This measure adopts acceptable solution A3.6.
	A3.7 Fire service access routes (perimeter roads)		N/A – No fire service access routes (FSARs) are proposed or required as part of development. Perimeter public roads are either already constructed or proposed as part of development design.
	A3.8 Firebreak width		N/A – given that all lots will be cleared and developed, lot boundary firebreaks will ultimately not be required within the project area. However, any undeveloped lots will be required to maintain 3 m wide internal lot boundary firebreaks until such time that they are developed.

Bushfire protection criteria	Method of compliance	Proposed bushfire management strategies
	Acceptable solutions	
Element 4: Water	A4.1 Reticulated areas	The proposed development will be connected to a reticulated water supply via extension of services from surrounding development in accordance with Water Corporations Design Standard 63 requirements. A network of street hydrants will also be installed to the relevant technical standards. Existing water hydrants are located at 200 m intervals along the surrounding road network (refer to Figure 7 and Figure 8). Relevant technical standards for construction of the proposed reticulated water supply are outlined in Appendix 5. This will deliver compliance with Element 4 Water through adoption of acceptable solution A4.1.
	A4.2 Non-reticulated areas	N/A – the proposed subdivision is located within an existing reticulated area.
	A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)	N/A – the proposed subdivision is located within an existing reticulated area.

5.2 Additional management strategies

Strategen makes the following additional bushfire management recommendations to inform ongoing planning stages of the development and increase the level of bushfire risk mitigation across the site.

5.2.1 On-site low threat staging buffers

If development (and therefore clearing) is to occur on a staged basis, clearing in advance will need to occur to ensure building construction is not inhibited by a temporary vegetation extent located within adjacent development stages yet to be cleared. This can be achieved by ensuring that each approved stage subject to construction is surrounded by a 100 m wide, on-site cleared or low threat buffer to development (not including vegetation proposed to be retained). The location of low threat staging buffers are identified indicatively on Figure 7 and Figure 8. Once the buffers are created, they will need to be maintained on a regular and ongoing basis in accordance with AS 3959 Clause 2.2.3.2 (f) (including the management of grassland at 100 mm in height or lower) and or Schedule 1 of the Guidelines (refer to Appendix 3) to achieve a low threat minimal fuel condition all year round until such time that the buffer area is developed as part of the next development stage. This will assist in managing the current on-site temporary vegetation hazards/temporary BAL impact.

5.2.2 Staging of vehicular access construction

If development (and therefore construction of vehicular access) is to occur on a staged basis, vehicular access arrangements will need to ensure that all occupiers and visitors are provided with at least two vehicular access routes for all stages of development. This can be achieved via:

- construction of through-public access roads in advance of stages
- construction of temporary cul-de-sacs of less than 200 m long and with 17.5 m diameter turnaround heads until through-access is extended onto adjacent stages
- construction of temporary EAWs of less than 600 m long that provide through-access links to public roads until formal public roads access is provided.

5.2.3 Fuel management within cleared vacant lots

Cleared vacant lots are to be managed on a regular and ongoing basis by the developer until sale of lots, after which time landowners will be responsible for ongoing management. Maintenance is to be in accordance with Clause 2.2.3.2 (f) of AS 3959 and/or Schedule 1 of the Guidelines (refer to Appendix 3) and will involve slashing/mowing of grassland and weeds to height of less than 100 mm. This will also meet the relevant standards of the City of Wanneroo annual firebreak notice (refer to Appendix 6).

5.2.4 Road verge fuel management

Surrounding road verges that have been excluded as low threat are to continue to be managed to ensure the understorey and surface fuels remain in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959. Ongoing road verge management is the responsibility of the City.

5.2.5 Notification on title

Notification is to be placed on the Title of proposed lots subject to BAL-12.5 or higher (either through condition of subdivision or other head of power) to ensure landowners/proponents and prospective purchasers are aware that their lot is subject to a BMP and that specific management measures/building construction requirements may apply to their property.

5.2.6 Vulnerable land uses

Vulnerable land uses are those that contain occupants with reduced physical or mental ability, which may pose challenges during a bushfire emergency or response (e.g. primary schools). In order to prevent the triggering of SPP3.7 Policy Measure 6.6 for the proposed primary school at the DA stage, the entire primary school site will need to be demonstrated as being subject to BAL-Low. Strategen has assessed this as being achievable provided the staging provisions (i.e. creation and maintenance of low threat staging buffers) and low threat fuel management on adjacent playing fields is carried out.

5.2.7 Building construction standards

Any proposed Class 1, 2, 3 or associated 10a building subject to BAL—12.5 or higher will be required to comply with the bushfire specific construction requirements of AS 3959.

5.2.8 BMP/BAL compliance report

A BMP/BAL compliance assessment and report will be prepared as a condition of subdivision (prior to lot title) to demonstrate that the relevant measures of the BMP have been implemented as intended and the necessary bushfire compliance has been delivered. This assessment will be undertaken following completion of subdivisional works and the accuracy of the BAL contour assessment contained in the BMP will be validated and updated as required to demonstrate any change in the assessed BAL or other management measures documented in this BMP.

5.2.9 Landscaping plans

The BAL contour assessment relies on all landscaping being implemented and maintained in accordance with the landscaping plans (Appendix 1) in order to establish the various low threat managed areas as identified in Figure 5 and Figure 6. Responsibility for establishment and maintenance of low threat landscaping is discussed in Section 6.

5.2.10 Compliance with annual firebreak notice

The developer/land manager and prospective land purchasers are to comply with the City of Wanneroo annual firebreak notice, as amended (refer to Appendix 6). This specifies the ongoing maintenance requirement of surface fuels and provision of firebreaks for properties based on property size.

6. Responsibilities for implementation and management of the bushfire measures

Implementation of the BMP applies to the developer, prospective landowners and the City to ensure bushfire management measures are adopted and implemented on an ongoing basis. A bushfire responsibilities table is provided in Table 5 to drive implementation of all bushfire management works associated with this BMP.

Table 5: Responsibilities for implementation and management of the bushfire measures

Implementation/management table	
Developer – prior to issue of titles	
No.	Implementation action
1	Construct public roads and reticulated water supply/hydrants to the standards stated in the BMP
2	If lot creation is staged, install temporary compliant cul-de-sacs/emergency access ways as required to the standards stated in the BMP
3	Establish relevant areas of low threat vegetation including landscaped POS, cleared vacant lots/development areas and low threat staging buffers to the standards stated in this BMP
4	Undertake BMP/BAL compliance assessment and report to clear subdivision conditions
Developer – until sale of lots/transfer of land to the City/extension of development onto adjacent stages	
No.	Management action
1	Maintain relevant areas of low threat vegetation including landscaped POS, cleared vacant lots/development areas and low threat staging buffers to the standards stated in this BMP
2	Comply with the City of Wanneroo annual firebreak notice, as amended
Future landowner/occupier – prior to building construction and ongoing thereafter	
No.	Management action
1	Maintain vacant lots in a low threat state in accordance with the City of Wanneroo annual firebreak notice until developed to a permanent low fuel state
2	If required by the City, undertake individual lot BAL assessments to support building permit application process
Local government – ongoing management	
No.	Management action
1	Maintain relevant areas of low threat vegetation including landscaped POS and road verges to the standards stated in this BMP
2	Maintain public roads and reticulated water supply/hydrants to the standards stated in this BMP

7. References

- Department of Fire and Emergency Services (DFES) 2019, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from:
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