Lots 21 and 22 Entrance Road Coogee, WA

Bushfire Management Plan





09/02/2015 Kathryn Kinnear Bio Diverse Solutions

DOCUMENT CONTROL

<u>TITLE</u>

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DISCLAIMER

The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959 – Building in Bushfire prone Areas, DFES's planning for Bushfire Protection and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.



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1. Introduction

D & J Barham, S Deceglie, I Deceglie, G. Derobertis, T Derobertis and G Deceglie ("the Clients") commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a fire hazard assessment and prepare a Bushfire Management Plan to guide all future fire management for a proposed Structure Plan (and subsequent subdivision) of Lots 21 and 22 Entrance Road, Coogee.

The basic requirements of any Bushfire Management Plan (BMP) is to identify potential issues or problems relating to environmental fire threats and recommend specific actions by certain persons, agencies, authorities and developers to ensure, as much as practical, that the lives and assets of the location are not put at undue threat from any unplanned fire event. A BMP takes into account various physical attributes of the land, including topographical and vegetation properties, local climatic impacts, biodiversity, past and current land use, past fire history and management practices, local authority fire management obligations, road access, water supplies, adjacent property and tenure, and future obligations by various parties should the subdivision application be successful.

Such planning takes into consideration standards and requirements specified in various documents such as Australian Standard (AS) 3959-2009, WA Planning for Bushfire Protection Edition 2 (2010) and due regard to the Draft "Planning for Bushfire Risk Management Guidelines (WAPC, 2014). These plans have developed to ensure uniformity to bushfire management with interpretation of onsite vegetation types, site design, and building standards.

The subject area is described as Lots 21 and 22 Entrance Road, Coogee and is shown in Location Mapping Appendix A and Subdivision Guide Plan Appendix B.

1.1. Statutory Conditions

This BMP has been prepared for Lots 21 and 22 Entrance Road, Coogee to address fire management issues associated with the proposed Structure Plan, consistent with State and Local Government planning instruments, in particular the Department of Fire and Emergency Services (DFES) and Western Australia Planning Commission (WAPC) Planning for Bushfire Protection (2010) The Plan aims to resolve any conflicts and provide planning information and guidance for the City of Cockburn, DFES, present and future owners.

This document and the recommendations contained are aligned to the following policy and guidelines:

- AS 3959-2009 "Construction of Buildings in Bushfire Prone Areas";
- "Planning for Bushfire Protection Edition 2" WAPC (2010);
- Draft "Planning for Bushfire Risk Management Guidelines (WAPC, 2014);
- Bushfires Act 1954; and
- City of Cockburn current Fire Break Notice.

1.2. Suitably Qualified Bushfire Consultant

This BMP has been prepared by Kathryn Kinnear (nee White), who has 10 years operational fire experience with the DEC (1995-2005) and has the following accreditation in Fire Management:

- Incident Control Systems;
- Operations Officer;
- Prescribed Burning Operations;
- Fire and Incident Operations;
- Wildfire Suppression 1, 2 & 3;
- Structural Modules Hydrants and hoses, Introduction to Structural Fires, and Fire extinguishers; and
- Ground Controller.



Kathryn Kinnear currently has the following Tertiary Qualifications:

- BAS Technology Studies & Environmental Management;
- Diploma Business Studies; and
- Progression towards Masters of Environmental Management (current).

Kathryn Kinnear is presently a member of Fire Protection Australia Association and a committee member of the Bushfire Subcommittee Western Australia. Kathryn is a suitably qualified Bushfire Consultant to prepare this Bushfire Management Plan.



2. Aims of this Plan

The aim of this BMP is to reduce the occurrence of, and minimise the impact of bushfires, thereby reducing the threat to life, property and the environment. The BMP has been prepared by Bio Diverse Solutions (Bushfire Consultants) for the Clients with the "Subject site" being Lots 21 and 22 Entrance Road, Coogee.

2.1. Planning Context

The BMP has been prepared to support a Structure Plan proposal (and subsequent subdivision proposal) of Lots 21 and 22 Entrance Road, Coogee and to seek endorsement for the development of the land.

2.2. Site inspection

To ensure that every aspect of the proposed subdivision meets the planning requirements as set in Planning for Bushfire Protection Ed. 2 (2010), a site inspection was undertaken on the 18th July 2014 by Kathryn Kinnear (Bushfire Consultant, Bio Diverse Solutions) to assess the vegetation and the site conditions.

The site was assessed as having a **"Moderate"** bush fire hazard rating due to the presence of adjacent Shrubland vegetation. The "Elements" which are to be met either through the objectives of the "Performance Principle" or "Acceptable Solutions" (WAPC, 2014) for the subject site include:

- Element 1 Location;
- Element 2 Siting and design of development.
- Element 3 Vehicular access; and
- Element 4 Water.

2.3. Objectives

The objectives of this BMP are:

- Achieve consistency with objectives and policy measures of SPP 3.7, AS3959-2009 (current and endorsed standards), the Planning for Bushfire Protection Guidelines (WAPC 2010, current and endorsed guidelines) and due regard to the Draft "Planning for Bushfire Risk Management Guidelines (WAPC, 2014);
- Understand and document the extent of the bushfire risk to the subject site
- Prepare bushfire risk management measures for bushfire management of all land within the subject area with due regard to people, property, infrastructure and the environment;
- Nominate individuals and organisations responsible for fire management and associated works within the subject area; and
- Aligned to the recommended assessment procedure which evaluates the effectiveness and impact of proposed, as well as existing, bushfire risk management measures and strategies.

The BMP applies to the proposed subdivision at Lots 21 and 22 Entrance Road Coogee.

3. Description of the area

3.1. Location

The subject site is located 6.5km from Fremantle and is situated north of Ocean Road along Cross Road (western boundary) and Entrance Road (northern boundary), in the northern extent of Coogee locality and the western extent of Spearwood within the municipality of the City of Cockburn. The subject site is a 1.4ha made up of 2 existing lots which have been used for historical annual horticulture and have existing residential housing. Please refer to Figure 1 below - Locality Map, and Site Location Mapping Appendix A.



Figure 1 – Subject site locality

3.2. Development proposal

The applicant is seeking to subdivide the subject area from Development to R30 and R40 Residential areas. The BMP has been prepared during WAPC assessment for Structure Plan, to verify the hazard rating, document control mechanisms to reduce the risk of fire to residences and give recommendations to the current and future owners and the developer of the site.

The development proposal includes the creation of 25 residential lots and POS. Please refer to the Draft Subdivision Guide Plan as provided by Whelans (16/9/2014), Appendix B.

4. Desktop Assessment – Regional Setting

4.1. Current site land use

The site is currently 2 rural lots of predominantly cleared paddocks with grasslands and existing residential housing facing onto Entrance Road. Historically the subject area has been used for annual horticultural pursuits. Please refer to Photographs 1 and 2 below.



Photograph 1 – View of Entrance Road and existing housing infrastructure.



Photograph 2 – View of paddocks where horticultural pursuits occurred historically.

4.2. Surrounding Land uses

To the north of Entrance Road is a subdivision development currently being cleared for construction by George Western Foods. To the east there is existing residential/rural dwellings with small paddock areas. To the south is a proposed subdivision development (Lots 14, 15, 16 and 17 Ocean Road) which is proposed for construction in 2014 (construction underway at time of writing). Adjacent to the site to the west is City of Cockburn (CoC) Reserve 9903. Cross Road and a CoC managed firebreak boarders the reserve and provides a 20m+ separation distance from the proposed subdivision. Refer to photographs 3 to 6 below and over the page.



Photograph 3 – View of subdivision construction north of Entrance Road.



Photograph 4 – View of adjacent dwelling to the east.





Photograph 5 – View of CoC Reserve 9903 to the north west of the subject site.



Photograph 6 – View of adjacent properties to the south which are presently under preparation for subdivision construction works

4.3. Climate

Perth experiences a Mediterranean climate, characterised by hot, dry summers and mild, wet winters. These seasons extend into the autumn and spring months, which are transitional periods between the main seasons (BoM, 2014).

The climate of the region is strongly influenced by the position of the axis of the band of high pressure known as the sub-tropical ridge, and in the warmer months by the development in the easterlies to the north of the ridge of a trough of low pressure near the West Coast. For much of the year the ridge is located to the south allowing the east or southeasterly winds to prevail. During the cooler months the ridge periodically moves to the north allowing cold fronts to pass over the west coast and deliver much of the annual rainfall. Sometimes these fronts interact with tropical cloud bands from the northwest and this can enhance the amount of rainfall produced.

4.3.1. Rainfall

Long term climate statistics from Jandakot Bureau of Meteorology (BOM) station indicates an annual mean rainfall of 825.9 mm (BOM, 2014), which occurs on 84 rain days, approximately 80% usually falls between May and September. Rain occurs on four days out of every seven on average during winter. Flooding is rare to the region, however heavy rain may be produced by strong winter cold fronts or, less frequently, by summer storms or, more rarely, by decaying tropical cyclones. The highest mean monthly rainfall is 178.3mm recorded in July, with the driest month being January with 14mm mean rainfall. It is not unusual for there to be extended dry periods during the warmer months. Please refer to Jandakot Aero Station (10km away from subject site) Annual Rainfall graph over the page (Figure 2).





Figure 2 – BoM Rainfall for Jandakot Aero Station (#009172)



4.3.2. Temperature

Mean monthly air temperatures range from 31.7°C in February to 17.9°C in July (BoM , 2014). Summer maximum temperatures are strongly dependent upon the arrival time of the reliable sea breezes. On some days the difference between the maximum temperatures on the coast and the eastern suburbs may exceed 10°C. Heatwaves are associated with strong easterly winds and the late arrival or absence of the sea breeze. The highest temperature ever recorded is 46.2°C, however, the temperature exceeds 40°C on only three days per year on average. The average minimum temperature ranges from just 6.7°C in July to 17.1°C in February. Please refer to average temperatures over the page for Jandakot Aero Station (10km away), Figure 3 and Figure 4 below.



4.3.3. Wind

Winds are mainly easterly but varied in the warmer months by reliable afternoon sea breezes from the south west and in the cooler months by the westerlies that are associated with the bulk of the annual rainfall. Despite the occurrence of strong winds or gales, average wind speeds in winter are considerably lighter than in summer (BoM, 2014). Please refer to Figure 5 and 6 below.



(BoM, 2014)

4.4. Prevalent Fire Weather

Fire weather is characterised by mid-level disturbances across the south west of Western Australia, bringing unstable atmospheric conditions (thunder and lightning) from the north or northwest wind directions. This is characteristic of "Extreme" Fire Weather conditions to the area with hot dry conditions prior to storm events. Risk of lightning strikes, spark ignition, arson and other causes of fire give rise to wild fires under these conditions.

Prevalent winds which most wildfire events occur in the region are from the north-west, east and north-east direction. Conditions tend to be dry with low relative humidity. High winds and excess fuels can lead to hazardous conditions for residents. Strong westerly and south westerly winds exist at the subject site during dry summer periods (Figure 5). These circumstances place residential housing under the most risk from wildfire events.

4.4.1. Climate Change

Climate change is expected to impact on the future rainfall pattern of the area. It is recognised that the average rainfall has already declined by 20%-30% over the past few decades and that the long term impact of climate change may lead to a shift in rainfall, as well as dryer climatic conditions for the region. The long term changes are predicted to impact on the flora, fauna and water availability for the region. (Climate Commission 2010)

The Climate Commission (Climate Commission 2010) estimates that

"...Rainfall patterns in Western Australia have changed over the last 40 years. There is significant evidence that climate change has contributed to the marked drying trend in the southwest of the state."

The construction of the proposed development is not predicted to be affected by sea-level rise, however could be affected from increased intensity rainfall events or extended drying periods. Increased extreme weather from climate change could affect fire frequency and behaviour in Western Australia (DEC, 2012), this Bushfire Management Plan has been prepared to reduce the risk of fire on the proposed residential dwellings in the newly created subdivision.

4.5. Topography

The subject site is located on a northerly facing slope in an undulating landscape on the Swan Coastal Plain with the average "Effective Slope" (AS3959-2009) for the site as 5.6 ° (assessed as an average over 4 slopes/100m and ranges between 2.7 and 8.0° (western slopes). Please refer to slope analysis on the Vegetation Mapping Appendix C.

4.6. Bushfire fuels – Vegetation

The subject lies within the Swan IBRA bioregion. This bioregion is comprised of "low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils." The area is located within the SWA1- Dandaragan Plateau. The plateau is bordered by Derby and Dandaragan Faults. Cretaceous marine sediments are mantled by sands and laterites. Characterised by Banksia low woodland, Jarrah - Marri woodland, Marri woodland, and by scrubheaths on laterite pavement and on gravelly sandplains. (Hearn et al., 2002).

The majority of the vegetation across the subject site is predominantly weed infested and in a "Completely Degraded" vegetation condition with little to no native vegetation cover present (pers obs K.Kinnear 2014). The vegetation on site was noted as remnants of maket gardening activity, being weeds such as dill, cape lilac, bamboo, olive trees, cactus, ornamental plants, paddock grasses and fruit trees. Please refer to Photographs 7 and 8 below, and Vegetation Mapping Appendix C.



Photograph 7 – View of predominant vegetation types, isolated introduced trees, weeds and grasslands. Grasslands Type G.



Photograph 8 – View of bamboo growing on Lot 21 Entrance Road. Predominantly Grasslands Type G.

Adjacent to the site to the west is City of Cockburn (CoC) Reserve 9903. Cross Road and a CoC managed firebreak borders the reserve to the west and north-west and provides a 20m+ separation distance from the proposed subdivision. The majority of the vegetation adjacent to the subject site in this area is predominantly weed infested and in a "Completely Degraded" vegetation condition with shrubs of *Acacia cyclops* and *Leptospermum laevigatum*, (Coastal Tea Tree)



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(Environmental Weeds (DEC, 1999), a number of paddock grasses forming the dominant understorey. Please refer to Photographs 9 and 10 below, and Vegetation Mapping Appendix C.



predominant vegetation in CoC Reserve 9903 to the west of the subdivision.

Road to the CoC Reserve, this is upslope of the subdivision. Shrublands Type E.

Adjacent to the subdivision to the north and east (and downslope) of the subject site is land owned by George Weston Foods which is currently cleared and being constructed for residential dwellings. Refer to Photographs 11 and 12.



Photograph 11 – View of George Western Foods development to the north of the subject site. Low Threat Vegetation and on-vegetated areas.



Photograph 12 – View from Cross Road/Entrance Road to the CoC Reserve in the north west, this is upslope of the subdivision. Shrublands Type E.

The Vegetation type for the subject site (internal) has been classified as per AS3959-2009 as:

Grassland (unmanaged) (Type G) – All forms, including situations with shrubs and trees, if the overtorey foliage is less than 10% (AS3959-2009).

The Vegetation type adjacent to the subject site has been classified as per AS3959-2009 as:

Shrubland (Type E) – Tall Shrubland: Vegetation is dominated by shrubs (especially eucalypts and acacias) with a multi-stemmed habit, usually greater than 2 metres in height <30% foliage cover. Understorey of widespread to dense low shrubs (Acacia) or sparse grasses (AS3959-2009); predominantly to the west of the site in CoC reserve.

> 13 DIVERSE OLUTIONS

- Grassland (unmanaged) (Type G) All forms, including situations with shrubs and trees, if the overtorey foliage is less than 10% (AS3959-2009), located internal and adjacent to the subject site (to the west in CoC reserve, to the south in proposed subdivision and to the east in existing rural residential areas).
- Low threat vegetation and non-vegetated areas (AS3959-2009) Non- Vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops; and Low threat vegetation including managed grassland, maintained lawns, golf courses, maintained public reserves and parklands, botanical gardens, vineyards, orchards, cultivated ornamental gardens, commercial nurseries, nature strips and wind breaks (AS3959-2009). Located internal and adjacent to the site along road reserves and within the developed lot.

These assessments are based on dominant tree heights and vegetaton structure according to Table 2.3 AS3959-2009. Please refer to Photographs 7 to 12 showing vegetation types classified as per above and shown in Vegetation Mapping Appendix C.

4.7. Assets

The subject site is predominantly cleared of remnant vegetation, the site is valued for its proximity to the expanding residential areas of Spearwood and Coogee. Once developed, the values which will be potentially affected by fire include:

- *Human lives:* It is likely that more than 65 people could be resident at the newly created subdivision;
- Assets: The development will contain dwellings and valuable infrastructure; and
- *Environmental Conservation Values:* Internal POS areas and adjacent to the site in the City of Cockburn Reserve area to the west.

4.8. Access

Vehicle access to the subject site is from Ocean Road (south) onto Cross Road (West) and from the north along Entrance Road.

4.9. Fire Breaks

There are existing firebreaks around the property.

4.10. Water Supply

Water supply is presently from on site bore sources.



5. Potential Bushfire Issues and Bushfire Hazards

The bushfire hazard assessment provides a measure of the fire intensity and likelihood of bushfire attack measures on a dwelling, subdivision or residential area (Planning for Bushfire Protection, Edition 2 2010). This measure can provide an assessment of the land for suitability for residential construction and takes into account:

- 1. Vegetation Assessment type and class in each direction;
- 2. Distance between the predominant vegetation class and proposed building;
- 3. Topography and slope with reference to accessibility; and
- 4. Land use surrounding and internal to the proposal.

(Refer to Planning for Bushfire Protection, Edition 2, 2010)

The Vegetation type for the subject site has been classified as per AS3959-2009 as Shrubland (Type E), Grassland (Type G) and Low threat Vegetation (AS3959-2009). The Fire Hazard ratings have been assessed as per the methodology as outlined in Planning for Bushfire Risk Management Guidelines (Draft May, 2014). Please refer to Table 1 below.

Tahlo 1 _	Rushfire	Hazard	امىرم ا	Categories
	Dusille	nazaru	Level	Calegones

CATEGORY	CHARACTERISTICS
Low	 Areas devoid of standing native vegetation (less than 0.25ha cumulative area) Areas which, due to climatic or vegetation (eg. rainforest) conditions, do not experience bushfires
	 Inner urban or suburban areas with maintained gardens and very limited native standing vegetation (less than 0.25 ha cumulative area)
	 Pasture or cropping areas with very limited native standing vegetation that is a shrubland, woodland or forest
	 Generally areas with slopes of less than 10 degrees
Moderate	 Areas containing pasture or cropping areas with slopes in excess of 10 degrees Open woodlands Open shrublands
	• Low shrubs with slopes of less than 10 degrees or flat land
	Suburban areas with some native tree cover
Extreme	 Forests Woodlands
	Idli shrubs Any area not otherwise categorised as low or moderate
	Any died not offerwise calegorised as low of modelale

(WAPC, 2014)

Internal Bushfire Risks

The subject site has sustained vegetation clearing and is a cleared landscape. Internal fire risks are low, with the proposed built form (residences) presenting a low internal risk of fire. The Proposed POS area in the south is to be landscaped lawns and and stormwater drainage areas.

The Bushfire Hazard within the proposed subdivision has low threat vegetation or non-vegetated areas with slopes <10°, or suburban areas with some native tree cover. The majority of the subdivision would be rated as <u>"Low"</u> (as per WAPC Guidelines, Table 1) as there are substantial areas of low grassland and urban housing.

The overall rating of the internal fire risks as per WAPC guidelines (Table 1) is defined as an **"Low"** fire hazard rating due to the absence of internal vegetation and low slopes across the site.

External Bushfire Risks

Surrounding the subject site to the west there is remnant bushland with cleared areas. The predominant fire risk associated with the site is the adjacent Shrublands (Type E) to the north west and south west in the Coc Reserve.

The Bushfire Hazard adjacent to the proposed subdivision to the west is dominated by introduced vegetation such as *Leptospermum laevigatum*, (Coastal Tea Tree) (Environmental Weeds, DEC 1999). The fire risk of the shrubland vegetation to the west is upslope of the development and has isolated patches of grassland interspersing Shrubs 1.5-3m. Cross Road forms a 20m road reserve giving separation from this hazard. The intensity of a fire downslope is largely reduced in wildfire conditions.

The south and north areas are predominantly housing or proposed housing development with landscaped POS areas. To the east is existing rural residentil dwellings wihtin minimal vegetation, these areas pose a <u>"Low"</u> threat of fire (as per WAPC Guidelines, Table 1).

The adjacent vegetated CoC shrubland reserve areas are <u>Moderate Risks</u>, which with slope and under hot conditions, can give rise to hot and intense fires in north (Summer mid-level disturbances) and south eastern (prevailing summer) wind conditions.

Refer to Bushfire Hazard mapping Appendix D.

Proposed Subdivision Fire Risk Rating

The fire risk for this subdivision has been rated at <u>Moderate risk</u> due to the site being predominantly a cleared landscape with the presence of adjacent external patches of Shrubland areas. The overall slope for the residential areas are low, however setback distances of over 100m can not be achieved in most instances. Where 100m cannot be achieved, Planning for Bushfire Protection 2010 states that building to Bushfire Attack Levels (BAL) and AS3959-2009 will apply.

Refer to Bushfire Risk Mapping Appendix D.

The proposal will be required to meet the minimum "Performance Principle" and "Acceptable Solutions" as per Planning for Bushfire Protection Edition 2, 2010 and Draft "Planning for Bushfire Risk Management Guidelines (WAPC, 2014). These are outlined in **Section 6 – Bushfire Management/Mitigation Plan.**



6. Bushfire Management Plan

The management issues (Elements) which relate to this proposal include:

- Location
- Siting and Design of Development
- Vehicle Access; and '
- Water

(WAPC, 2014)

The Development is required to meet the "Performance Principles" and "Acceptable Solutions" of each "Element". The site has been classified as a **Moderate** Bushfire Risk. The design allows for an appropriate level of bushfire risk with mitigation measures applied to the level of risk. These include:

- Meeting "Performance Principles" for location (Element);
- Meeting Acceptable Solutions for Siting of the development (Element);
- Meeting Performance Principles for Vehicles; and;
- Meeting Performance Principles for and Water (Elements).

The following sections outline the bushfire mitigation procedures and how the design meets either a Performance Principle or Acceptable Solution as per the sections of the Planning for Bushfire Protection Edition 2, 2010 and Draft "Planning for Bushfire Risk Management Guidelines (WAPC, 2014).

(Note sections are aligned to the Draft "Planning for Bushfire Risk Management Guidelines (WAPC, 2014) as per recent DoP advice).

6.1. Element 1: Location

Intent: To ensure that the subdivision, development or land use is located in areas with the least possible risk of bushfire, to help minimise risk to people, property and infrastructure.

Performance Principle: The subdivision, development or land use is located in an area where the bushfire hazard assessment classification is or will be moderate or low, and the risk can be managed.

The subdivision is located on land that will not require construction standards to greater than BAL 12.5. The subdivision has a **Moderate** rating due to the presence of adjacent remnant Shrubland areas. The bushfire hazard level is manageable and adequate setbacks can be achieved, after construction development of dwellings, internal to the subject site is deemed to have a Low fire risk. Adjacent areas are predominantly cleared areas with shrubs to 3m in the west and proposed landscaping areas to the south.

6.2. Element 2: Siting and design of development

Intent: To ensure that the siting of development minimises the level of bushfire impact.

Performance criteria - The siting and design of the subdivision, development or land use (including paths and landscaping) is appropriate to the level of bushfire risk that applies to the site and minimises the bushfire risk to people, property and infrastructure.

The site has been classified as a "**Moderate**" Bushfire Risk (Table 1, WAPC 2014). The design of the development allows for an appropriate level of bushfire risk with mitigation measures applied to the level of risk. These include:

- Roads along the external areas to assist achieving Hazard Separation Zones;
- Meeting Performance Principles for Vehicles and Water Elements; and



• Meeting Acceptable Solutions for Siting of the development (Element).

As the subject site has minimal (future) internal hazards with adjacent bushfire hazards to the west of the subject site, the site has been classified as having BAL (Bushfire Attack Level) applied to at the interface of the adjacent remnant vegetation. It is recommended that buildings are built to BAL and AS3959-2009 construction standards are implemented.

The Subject site has a "**Moderate**" Bushfire risk rating (Refer to Bushfire Risk Mapping Appendix D), the Acceptable Solutions which will apply to this development include:

- Building Protection Zones;
- Hazard Separation Zones; and
- Building to BAL 29 and AS3959-2009.

The development is able to meet the Acceptable Solutions as outlined in the proceeding sections.

6.2.1. Dwelling construction (A2.1)

A HSZ of 100m cannot be achieved from the Bushfire Hazards for all Class 1 dwellings as outlined in the Bushfire Hazard Mapping Appendix D. Proposed dwellings which cannot meet >100m HSZ from Shrubland vegetation require a Bushfire Attack Level (BAL) and building to AS3959-2009 to apply to the lot (dwelling).

BAL is the determination of the construction requirements for a building site, with the threat or risk of bushfire attack assessed by an accredited Bushfire Consultant. BAL rating determinations are of 6 levels BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40, BAL FZ. Building is generally not recommended in BAL-40 or BAL-FZ areas. The BAL rating is determined by the distance of the building to vegetation, slope and vegetation type adjacent to the dwelling.

The proposed development will require the Class 1 buildings (residences) to be built to BAL, therefore construction to AS3959-2009 will apply. Minimum setbacks (inclusive of BPZ) will be required from vegetative areas >0.25 ha. The standards outlined in AS 3959-2009 provide reference to specific items of building and it is recommended that the developer discuss these in detail with the builder. Table 2 outlines some of the construction consideration to AS3959-2009 when building in bushfire prone areas. Construction standards are to be approved by the CoC prior to construction.

Construction requirement AS3959-2009
Flooring systems
Supporting posts, columns, stumps, piers and poles
External Walls
Windows
External Doors
Vents and weep holes
Roof
Eaves
Fascia's
Gutters and downpipes
Veranda and decks
Service Pipes (water and gas)

(Note: Table 2 refers to general construction and the relevant sections of AS3959-2009 should be consulted for further detail).

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The construction standard that shall apply to the dwellings adjacent to the remnant vegetation is shown in Table 3 – Minimum Setback Distances and Construction Standards.

A minimum of 20m BPZ must apply to all dwellings and recommended around infrastructure buildings. AS3959-2009 only applies to Class 1 buildings (BCA, 2010) and Class 10a building or deck associated with a Class 1 building, whereby an additional HSZ is required and dictates the BAL construction (and AS3959-2009) standard depending on the distance as shown in Table 3 and shown on the Bushfire Management Plan Appendix E.

Table 3 – Minimum Setback Distances and Construction Standards Class 1 Building

Distance to Vegetation	Vegetation Type	BAL Rating	Construction
17-<100 metres	Shrubland Type E	BAL 12.5	AS3959-2009 to apply
Vegetation is upslope and flat land (0°),			
No BAL Rating Required	All Vegetation	>100 metres	No construction standards required

(as per AS3959-2009)

Notes on BAL Assessment:

- Sites will be subject to detailed feature survey and the mapping depicted in the Bushfire Management Plan Appendix E is a guide, with accuracy to within 5m.
- If dwellings cannot achieve >100m from the adjacent vegetation then BAL Construction will apply as outlined in Table 3.
- Any lots where two BAL allocations intercept across the lot, the higher BAL is to apply. Where the lot is predominantly clear of a BAL rating, there may be no BAL rating subject to house placement.
- BAL setback distances are measured from the edge of existing vegetation at time of feature survey and building construction approvals stages.
- Detailed assessment for BAL Construction as described in this document can be undertaken at construction stage by an accredited Bushfire Consultant with approval from the City of Cockburn.

The developer will be responsible for the implementation of a notification on title pursuant to Section 165 of the Planning and Development Act 2005.

The WAPC recommends the following wording to accompany Structure Plans:

"Regardless of whether this land has been designated as bushfire prone, any buildings to be erected pursuant to this structure plan shall comply with the requirements of Australian Standard 3959 under the Building Code of Australia."

(WAPC Planning Bulletin 111/2013)

It is recommended the above wording accompanies the proposed Structure Plan for Lots 21 and 22 Entrance Road Coogee.

The developer will be responsible for the implementation of a notification on title under Section 70A of the Transfer of Land Act 1983 to read:

'Registered proprietors and prospective purchasers of the land described above are notified that the use of the land is subject to an approved Bushfire Management Plan'.

BAL construction is not retrospective to existing dwellings.

6.2.2. Building Protection Zones (A2.2)

The aim of the Building Protection Zone (BPZ) is to reduce bush fire intensity close to dwellings and to minimise the likelihood of flame contact with buildings (Planning for Bushfire Protection Edition 2, 2010). BPZ will minimise the risk of the building igniting, (thus protecting the occupants), and with the reduced fuel quantities, allow safer and more effective conditions for fire-fighters to contain wildfires. Roads, pathways, lawns, and other low hazard items should be placed within this zone to improve the effectiveness of the zone.

It is recommended that a 20 metre wide BPZ as the minimum width to be constructed around all buildings.

Activity within the BPZ (as per DFES recommendations) must include:

- Width: 20 metres measured from any external wall of the building or asset;
- Location: within the boundaries of the lot on which the building is situated;
- Fuel load: reduced to and maintained at 2 tonnes per hectare;
- All grasses to maintained to a maximum height of 50mm;
- Trees (crowns) are a minimum of 5 metres apart;
- Trees are low pruned at least to a height of 2 metres;
- No tall shrub or tree is located within 2 metres of a building (including windows);
- There are no tree crowns overhanging the building;
- Fences and sheds within the BPZ are constructed using non-combustible materials (e.g. colour bond iron, brick, limestone);
- Shrubs in the BPZ have no dead material within the plant;
- Tall shrubs in the BPZ are not planted in clumps close to the building i.e. within 3 metres;
- Trees in the building protection zone have no dead material within the plant's crown or on the bole;
- Gas cylinders should be isolated from the flame zone and stored in an area clear of flammable material;
- Firewood storage at least 20m from the building;
- Roof gutters should be free of leaves and other combustible material; and
- Roof mounted evaporative air coolers should be fitted with ember proof screens to the filter media to reduce the possibility of bushfire embers getting in the air cooler.

An example of BPZ from the "Planning for Bushfire Protection Edition 2" (WAPC, 2010) is shown in Figure 7.



The majority of the buildings utilise the Low Fuel Areas (as classified by AS3959-2009 and shown on mapping Appendix E) to achieve a 20m BPZ, either through the maintained lawn areas, carparks, driveways, or road reserves. Information on long term maintenance of BPZ as recommended by DFES is provided in Appendix F.



6.2.3. Hazard Separation Zones (A2.3)

Hazard Separation Zones (HSZ) are defined (as per Planning for Bushfire Protection Edition 2, 2010) as the area surrounding a building which is maintained in a fuel reduced state. This can be achieved at subdivision stage during the construction of roads by clearing for formation of roads, grazing of stock and slashing of understorey species. The internal road network, gardens, carparks etc. can assist to achieve HSZ.



An example of achieving 100m HSZ is shown below in Figure 8.

All new Class 1 dwellings developed for residential use at the interface of the remnant vegetation will be required to meet Hazard Separation Zones (HSZ) as per the Planning for Bushfire Protection Edition 2 (2010) and have a Bushfire Attack Level (BAL). BAL and AS3959-2009 does not apply retrospectively to existing buildings.

A Hazard Separation Zone of 80 metres (100m combined with Building Protection Zone (BPZ)) is recommended in all areas where housing is sited adjacent to vegetated areas, measured from the <u>outer</u> edge of the BPZ. Where hazard separation cannot be achieved to 80m (100m combined with BPZ) adjacent to vegetation areas, the site will require building requirements of BAL with AS3959-2009 to be implemented by the owner of the property and approved by the CoC. Please refer to more detail in Table 4 and BMP Appendix E. Information on long term maintenance of HSZ for the homeowner, as recommended by DFES is provided in Appendix F.



6.3. Element 3: Vehicle Access - Performance Criteria

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

Performance Principle: The internal layout, design and construction of public and private vehicular access in the subdivision allows emergency and other vehicles to move through it easily and safely at all times.

The internal layout of the Subdivision's public roads and private access allows vehicles and other emergency vehicles to move through the subdivision at all times, meeting the Performance Principle.

Vehicle access technical standards as outlined in Table 4 (below) shall apply to this development; these standards are the minimum requirements from Planning for Bushfire Protection Edition 2 (2010) and Draft "Planning for Bushfire Risk Management Guidelines (WAPC, 2014). These standards shall be included in the engineering design of the subdivision. Refer to Table 4.

Technical requirements	Public	Cul-	Battle	Private	Emergency	Fire Service
	Roads	de-	Axes	Drivewavs	Access Wavs	Routes
		sacs				
Minimum trafficable surface	6	6	6	4	6	6
(m)						
Horizontal clearance (m)	6	6	6	6	6	6
Vertical clearance (m)	4	N/a	4	4	4	4
Maximum grades	1 in 8	1 in 8	1 in 8	1 in 8	1 in 8	1 in 8
Maximum grades >50m	1 in 5	1 in 5	1 in 5	1 in 5	1 in 5	1 in 5
Maximum average grade	1 in 7	1 in 7	1 in 7	1 in 7	1 in 7	1 in 7
Minimum weight capacity(t)	15	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner	12	12	12	12	12	12
radius(m)						
Signs					N/a unless	N/a unless
					temporary	temporary
					access	access
					implemented	implemented
Gates					N/a unless	N/a unless
					temporary	temporary
					access	access
					implemented	implemented

Table 4 – Vehicular Access Technical Standards

(WAPC, 2014)

6.3.1. Two access routes (A3.1)

The subdivision meets the Performance Principle, with the design allowing for two way traffic and safe egress from the subdivision via newly established road networks linking from Entrance Road to Cross Road with 13.5m internal road reserves. Please refer to the Subdivision Guide Plan (SGP) Appendix B.

6.3.2. Public roads (A3.2)

All internal public roads shall be constructed with 13.5m road reserves meeting Performance Principle. The Vehicular Access Standards (Refer to Table 4 – Column 1) and relevant technical information shall be detailed in Civil Engineering Designs.

6.3.3. Cul de Sacs (A3.3)

Cul-de-sacs do not apply to this development.

6.3.4. Battle Axes (A3.4)

Battle Axes do not apply to this development.

6.3.5. Private Driveways (A3.5)

Private driveways will conform to the minimum technical standards as outlined in Table 4 – Column 4.

6.3.6. Emergency Access Ways (A3.6)

Emergency Access Ways will be along the established internal roads, with a separate dedicated Emergency Access Way not required, meeting the Performance Principle. The proposed development is small (25 lots in total). If staged construction is proposed, the Emergency Access Ways will be along the established road reserves of Cross Road and Entrance Road.

6.3.7. Fire Service Access Routes (A3.7)

Fire Service Access Routes are proposed along the internal roads, with a separate dedicated Fire Service Access Route not required, meeting the Performance Principle. At the completion of the internal proposed road reserves through the subdivision, light unit fire appliance and heavy unit (truck appliances) will have suitable access in an emergency throughout the subdivision along public roads.

The proposed development is small (25 lots in total). If staged construction is proposed, the Fire Service Access Routes will be along the established road reserves of Cross Road and Entrance Road.

6.3.8. Gates (A3.8)

Gates are not proposed for this development.

6.3.9. Signage (A3.9)

Fire Service Access Ways and Emergency Access Ways are along the internal road network and therefore do not require further signage to demarcate the access ways.

6.3.10. Individual Fire breaks

Internal fire breaks are not required in an urban landscape. As the subdivision is staged it will be the responsibility of the developer to maintain firebreaks until the site is developed or changes ownership. Please refer to the CoC Annual Fire Break order, this is updated annually and the current versions should be obtained from the City of Cockburn website:

http://www.cockburn.wa.gov.au

6.4. Element 4 Water – Performance Criteria

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

Performance Principle: The development is provided with a permanent and secure water supply that is sufficient for fire fighting purposes.

Scheme water will be provided to the subdivision meeting the Performance Principle. Fire hydrants outlets must be installed to Water Corporation standards installed in accordance with the *Water Corporation's No 63 Water Reticulation Standard* and are to be identified by standard pole and/or road markings and installed by the Developer.



Fire Hydrants are to be installed by the developer every 200m in the road reserve, these must be to the following standards:

- Hydrants shall be screw-down hydrant with built-in isolation valve and installed only on DN100 or larger pipes. Hydrants shall be located: so that the maximum distance between a hydrant and the rear of a building envelope, (or in the absence of a building envelope the rear of the lot) shall be 120m and the hydrants shall be no more than 200m apart;
- Centrally along the frontage of a lot to avoid being under driveways;
- Where appropriate at the truncation of road junctions or intersections so that they can serve more than one street and can be readily located;
- On both sides of the major roads at staggered intervals where there are mains on both sides of the road;
- At major intersections on dual multi-lane roads, where two hydrants are to be sited on diagonally opposite corners;
- Hydrants should be located at least 20m from traffic calming devices i.e. median slow points or chokers, chicanes, mini traffic circles, and intersection 'pop-outs' to ensure traffic is not impeded;
- In a position not less than 10m from any high voltage main electrical distribution equipment such as transformers and distribution boards. AS 2419.1-2005
- Hydrants with washout bends shall be used only in cul-de-sac situations; and
- Australian Standards approved underground fire hydrants are required.

The location of the hydrants for the subject site will be detailed in the technical engineering drawings at time of subdivision.

6.5. Other Fire Mitigation measures

6.5.1. Shielding

Some houses/dwellings within the subdivision will be setback from 'Shrubland Vegetation' (>100m) and are able to be constructed <u>without</u> building to AS3959-2009. Further dwellings could be individually assessed as being "Shielded", this would need to be assessed by an accredited Bushfire Consultant on a case by case basis at building approval stage with approval required from the CoC. "Shielding" can be achieved for intensive residential areas (i.e. R40 areas) through careful design and placement of roads, infrastructure (pools, tennis courts, fences) to give separation or barriers to fire.

6.5.2. Landscaping/Streetscaping Areas

Landscaping and Streetscaping areas subject to similar standards that apply to the HSZ and the following minimum standards shall apply:

- Trees (crowns) a minimum of 5m apart (no continuous crowns);
- Trees should have no dead material within the plant's crown or on the bole;
- Fuel reduced to <8t/ha; and
- Shrubs should be no higher than 0.5 m.

6.5.3. Staging

If the subdivision is staged, then the staged development will incorporate the following:

- Reduction of bushfire fuels to 100m from adjacent housing or in HSZ areas as specified in Table 3;
- Implementation of 20m BPZ to any adjacent dwellings for each stage of construction of the subdivision and during maintenance periods (where appropriate);
- Maintenance of fire protection measures in public areas (gates, access, landscaped areas etc) until the developer has relinquished construction/maintenance responsibility of public use areas to the CoC; and
- Slashing of grasslands should occur to maintain low fuel areas (i.e. HSZ) around housing and dwellings.



7. City of Cockburn Fire Protection Plan

The City of Cockburn has the assistance of the Fire and Rescue Services which is made up of emergency trained personnel. It has fire fighting units and incident support teams. Training and induction courses are held regularly and land owners are encouraged to attend these. For more information refer to the City of Cockburn and DFES website:

http://www.dfes.wa.gov.au

http://www.cockburn.wa.gov.au/

7.1. Fire Fighting Facilities

The subject area is in the City of Cockburn. DFES has helicopters for fire fighting purposes based at Perth Airport. The response time for these aircraft to the subject site is approximately 10-15 minutes, but can vary depending on commitments of the aircraft across the metropolitan area.

Response times can vary depending on commitments of volunteers, fire events current at time and priority of the fire services in the south west of Western Australia during summer periods. DFES recommend that homeowners take care to prepare their individual dwellings for fire season and take precautions against fire as per the "**Bushfire Preparedness – Prepare. Act. Survive.**"

It is generally acknowledged that during large wildfire events, local resources may not be able to respond to every dwelling due to strategic deployments of services, priorities within the area or state and/or present commitments of volunteers and resources.

The Fire Services in the area have 3.4 and 2.4 heavy duty tankers (3000L and 2000L) and light tankers (fast attack 400L capacity). These are typical of units for fire fighting services within Western Australia.

Fire and Rescue Services provide local fire services and have:

- Fire stations;
- Volunteer members;
- A communications and call out system;
- Protective clothing issue to volunteers; and
- DFES approved fire appliances.

7.2. Homeowner Protection

It is the responsibility of homeowners to protect their property from bushfire. DFES have readily available information online which can assist homeowners in their preparedness during fire season (October to May). The DFES website "**Bushfire Preparedness – Prepare. Act. Survive.**" should be accessed by all owners in bushfire prone areas. A hard copy of the A4 book "Prepare. Act. Survive" can be found at local City of Cockburn Offices or DFES offices, or downloaded off the above web address:

http://www.dfes.wa.gov.au

7.3. Bushfire Plan

Residents should prepare their own individual fire plans, as they need to make a commitment to develop a bushfire survival plan detailing preparations and actions to take if a bushfire threatens.

When developing a bushfire survival plan, the following should be considered:

If you plan to leave for a safer place - where will you go and how will you get there? Your safer place could be with friends and family, and may not be far away. Know where you will go and never 'wait and see'. Relocating at the last minute can be deadly



- Does your household include elderly relatives, young children, people with disabilities or illness? When, where and how will they be relocated? Who will care for them?
- What will you do with your pets and livestock?
- Can your home be defended? Is it in a location that makes it difficult or dangerous to actively defend? (refer to DFES's Homeowners Bushfire Survival Manual PDF)
- Will your home provide shelter if you have to or decide to stay?
- Are you capable of defending your home without the support of fire fighters?
- Do you have the skills, knowledge and capacity to check for and put out spot fires for up to ten hours after the fire front has passed?
- Do you have the right equipment and resources to actively defend? (e.g. sufficient independent water supply of at least 20,000 litres and a petrol, diesel or generator powered pump capable of pumping 400 litres per minute)
- Will you cope with the noise and stress of a bushfire if you decide to actively defend? Being in a bushfire may be the most traumatic experience of your life.

(from DFES website, 2013)

Information is also available on the ABC Radio website to guide homeowners in the event of a fire emergency, such information includes:

Planning for an Emergency Bushfire:

- Survival Kit
- Fire Emergency Services
- Before a Bushfire
- During a Bushfire
- After a Bushfire

Refer to the following link for more information on how to prepare a bushfire plan:

http://www.abc.net.au/news/emergency/?ref=front-page-slider-v2--emergencies

"Before summer starts you need to decide what you will do if a bushfire threatens. If you live or work in a bushland area you need to **prepare** your home, family or business and have a plan so you can **act** to make sure you **survive**." (DFES 2010)



8. Summary

8.1. Overall Fire Threat

D & J Barham, S Deceglie, I Deceglie, G. Derobertis, T Derobertis and G Deceglie commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a bushfire hazard assessment and prepare a BMP to guide all future fire management for the proposed subdivision development of Lot 21 and 22 Entrance Road Coogee. The proposed Subdivision Guide Plan (SGP) involves the creation of future lots in the density range of R30 to R40 and a Public Open Space (POS)/stormwater management area.

The subject site is Cleared paddock areas (Type G) with adjacent Shrubland (Type E) remnant vegetation patches to the west, north west and south west. There is proposed urban infrastructure to the north, east and south. The urban areas and rural residential adjacent to the subject site are classified as a low fire risk with areas of *"Low Threat Vegetation and Non Vegetated Areas"* (AS3959-2009).

The majority of the site will be cleared for the subdivision with internal POS areas proposed to be landscaped and low fuel areas. The subdivision has been rated as having a <u>Moderate</u> Bushfire Hazard as defined by the hazard assessment procedure defined in Planning for Bushfire Protection Edition 2, 2010 and the Draft Planning for Bushfire Risk Management Guidelines (WAPC, 2014) due to adjacent Shrubland bushfire risks. This requires "Performance Principle" and "Acceptable Solutions" to be met.

The Elements which are met either through the objectives of the "Performance Principle" or "Acceptable Solutions" for the Subject site include:

- Element 1 Location;
- Element 2 Siting and design of development.
- Element 3 Vehicular access; and
- Element 4 Water.

This Plan has identified a number of ways fire risk can be mitigated and managed across the lots to ensure there is protection to life and property and biodiversity assets. To mitigate fire risks and meet the Performance Principles this report outlines:

- Element 1 Location: The subdivisions are located in an appropriate landscape with a Moderate Bushfire Hazard Rating. No building greater than BAL 12.5, HSZ and building to BAL and AS3959-2009 as outlined in Table 3.
- Element 2 Siting and design of development: The design of the subdivision allows for bushfire hazard mitigation measures to be incorporated to reduce threat to people, property and infrastructure.
- Element 3 Vehicular access: The presence of linking road 2-way road network which has 16-20m road reserves and meets technical standards as outlines in Table 4; and
- Element 4 Water: Reticulated water to subdivision and water hydrants to Water Corporation WA standards.

This BMP report provides details of the fire management strategies proposed to be implemented across the site as it is subdivided and developed to ensure adequate protection of life, property and biodiversity assets. To ensure the mitigation measures are implemented responsibilities are outlined in the following sections for the Future Lot Owner, Developer and CoC. A works program is also provided to guide the developer in Appendix G.

8.2. Owners Responsibility

It is recommended the Future Property Owners shall be responsible for the following:

- To take measures to protect their own assets on their property;
- Implement this document, BMP of Lot 21 and 22 Entrance Road Coogee as it applies to their individual property;



- Ensure that BPZ's are maintained to a minimum of 20 metres around all buildings to DFES standards (see Appendix F).
- Ensure that HSZ's are maintained from the vegetation (fire) risks (See Appendix F);
- Ensure that their property is built to BAL AS3959-2009 Building Standards (if it applies to their property);
- Each property owner is to be made aware of:
 - Fire Management Plan,
 - A hard copy of the A4 book "Prepare. Act. Survive",
 - Fire Control Information supplied by the City of Cockburn; and
- It is the responsibility of the individual property owner to maintain in good order and condition BPZ, HSZ and driveway standards. Future modifications other than requirements as set out in this BMP can only be done with written agreement from the City of Cockburn.

8.3. Developers Responsibility

Prior to development being given final approval by the City of Cockburn, the Developer shall be required to carry out works that include the following but in respect to individual stages of development. Subsequent to the issue of final approval, the Developer shall have no further responsibilities to the provision of fire fighting facilities and fire management on individual lots that pass from their ownership.

It is recommended that the Property Developer shall be responsible for the following:

- Implement this document, Bushfire Management Plan of Lots 21 and 22 Entrance Road Coogee;
- Comply with standards as outlined by the City of Cockburn and WAPC conditions of subdivision;
- Ensure that potential property owners are aware of this BMP;
- Comply with minimum construction standards as outlined by this BMP;
- Maintain fire protection measures in public areas (access, landscaped areas etc.) until the Developer has relinquished construction/maintenance responsibility of public use areas to the City of Cockburn;
- Provide advice to contractors/ landscapers, etc of hydrant location on that land should one be present and responsibilities to ensure that they remain uncovered and unobstructed at all times;
- Maintain firebreaks in accordance with the City of Cockburn Annual Fire Break Order;
- Ensure HSZ and BPZ is maintained as per required standards if the subdivision is staged;
- Construct access to the following standards as outlined in Table (4).

Technical requirements	Public	Cul-	Battle	Private	Emergency	Fire
	Roads	de-	Axes	Driveways	Access Ways	Service
		sacs				Routes
Minimum trafficable surface (m)	6	6	6	4	6	6
Horizontal clearance (m)	6	6	6	6	6	6
Vertical clearance (m)	4	N/a	4	4	4	4
Maximum grades	1 in 8	1 in 8	1 in 8	1 in 8	1 in 8	1 in 8
Maximum grades >50m	1 in 5	1 in 5	1 in 5	1 in 5	1 in 5	1 in 5
Maximum average grade	1 in 7	1 in 7	1 in 7	1 in 7	1 in 7	1 in 7
Minimum weight capacity(t)	15	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius(m)	12	12	12	12	12	12

Table 4 – Vehicular Access Technical Standards

(WAPC, 2014)

Implement wording to accompany Structure Plan:

"Regardless of whether this land has been designated as bushfire prone, any buildings to be erected pursuant to this structure plan shall comply with the requirements of Australian Standard 3959 under the Building Code of Australia."



- Implementing fire protection measures during staged development as per Section 6.5.3 of this BMP;
- Maintaining the subject site to minimise bushfire fuels and mitigate the risk of bushfire in accordance with the CoC Fire Control Order (yearly advise brochure updated annually);
- Provide the City of Cockburn prior to each subdivision stage with a map showing the BAL ratings for lots requiring increased construction standard for dwellings in accordance with AS3959-2009 Construction of Buildings in Bushfire Prone Areas (current and endorsed standards);
- At subdivision stage implement a notification on title pursuant to section 70A of Land Act 1893 of lots affected by an increase in construction standards consistent with BAL rating alerting owners of the lot and successors in title of the Bushfire Management Plan; and
 - Provide each prospective owner with:
 - Bushfire Management Plan,
 - A hard copy of the A4 book "Prepare. Act. Survive"; and
 - Fire Control Information supplied by the City of Cockburn (Yearly advice Brochure updated annually).

A works program has been developed to guide the Developer outlining responsibilities, completion times and standards. Please refer to Appendix G.

8.4. City of Cockburn Responsibility

At approval and endorsement of this Bushfire Management Plan, the City of Cockburn has statutory control and responsibility to ensure that aspects of the Plan and community fire safety are maintained.

It is recommended the City of Cockburn be responsible for the following:

- Provide advice on standards and methods to achieve community fire protection to owners/occupiers of land through issue and enforcement of the current CoC Fire control Order (yearly advice brochure updated annually);
- Ensuring compliance with this Bushfire Management Plan with regard to any related conditions of subdivision approval;
- Enforcing AS3959-2009 Construction of buildings in bushfire prone areas (current and endorsed standards) for all dwellings affected by a BAL rating;
- Ensure individual Property Owners maintain in good order and condition Emergency Access/Fire Access Ways, Building Protection Zones, Hazard Reduction Zone and driveway standards.
- Developing and maintaining District Fire Fighting Facilities and related infrastructure;
- Maintaining roads and access consistent with the standards this Bushfire Management Plan an in the Planning for Bushfire Protection Guidelines (WAPC, 2010 current and endorsed guidelines) and due regard to the Draft Planning for Bushfire Risk Management Guidelines, (WAPC, 2014);
- Maintaining the public open space (after the handover from the developer) in a manner that will minimise bushfire fuels and mitigate the risk of fire; and
- Periodical review of the Fire Management Plan (recommended every 3 years).

9. Conclusions

This Bushfire Management Plan has been developed to meet "Performance Principles" and the "Acceptable Solutions" as outlined in Planning for Bushfire Edition 2 (WAPC 2010) (current and endorsed guidelines) and Draft Planning for Bushfire Risk Management Guidelines, (WAPC, 2014) with specific recommendations for:

- The layout of the subdivision and the facilities proposed have been designed to reduce the fire threat to persons and property within the development (i.e. Internal road design, access in alternative directions; low fuel POS areas);
- Accessible "Fire Service Access" and "Emergency Access Ways" along road reserves in opposing directions through the subdivision for access and egress in fire events along the proposed and existing road reserves.
- Building to **BAL 12.5** and AS3959-2009 where setbacks of 100m from external remnant vegetation areas cannot be achieved.

A copy of DFES's Compliance Checklist for "Performance Principles" and "Acceptable Solutions" is provided in Appendix H.

In summary it is recommended to the Developers that in building the proposed subdivision at Lots 21 and 22 Entrance Road Coogee, the Developer:

- Implements the fire protection standards as outlined in this document;
- Adhere to subdivision conditions;
- If any changes to detailed designs occur, that this Bushfire Management Plan is updated to reflect these changes, with approval from the City of Cockburn and DFES; and
- Implement this document, Bushfire Management Plan Lots 21 and 22 Entrance Road Coogee, standards of construction and recommendations.



10. References

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Appendices

- Appendix A Location Mapping
- Appendix B Local Structure Plans
 - Appendix C Vegetation Mapping
 - Appendix D Fire Hazard Rating
- Appendix E Bushfire Management Plan
 - Appendix F DFE S Information
 - Appendix G Works Program
 - Appendix H DFES Checklist



Appendix A

Location Mapping







Appendix B

Subdivision Guide Plan







Appendix C

Vegetation Mapping





Appendix D

Bushfire Hazard Rating





Appendix E

Bushfire Management Plan



383900



Meters

BAL 12.5

6447400

6447300



6447400

FINAL

TER005

16/09/2014

Appendix F

DFES Information





November 2013 Version 4

What is a Building Protection Zone?

Key Points

⇒ Fuel loads influence bushfire intensity.

DFES

- ⇒ The lower the fire's intensity the less impact on the building.
- ⇒ Creating a minimum 20 metre reduced fuel load area (building protection zone) will increase the protection of the building.
- ⇒ Ember protection is important to protect the building.

Definitions

- ⇒ Scrub crown is the green, leaf material on the scrub plants.
- ⇒ Surface fire is the fire burning the leaves and scrub on the top of the ground.
- ⇒ Mineral earth firebreak is a firebreak without vegetation.
- ⇒ Ember attack is where the bark and fine vegetation material is set alight and carried forward

Managing and reducing fuel loads for a minimum of 20 metres around a building will increase its likely survival from a bushfire.

Known as the Building Protection Zone (BPZ), the aim of this area is to ensure that there will be no direct flame contact on the building from a bushfire. By utilising fuel management options it will also be possible to reduce the potential radiant heat impact on the building.

If there is little or nothing to burn then the fire's impact will be reduced. This can be achieved by:

- ⇒ Maintaining a minimum 2-metre gap between trees and the building. Make sure that no trees overhang the house.
- Shrubs should be planted at a distance of at least three times their height at maturity from buildings.
- ⇒ Do not clump shrubs or trees, ensure that there is a gap.
- ⇒ Keeping the grass short and prune the scrub so that it is not dense, nor does it have fine, dead aerated material in the crown of the scrub.
- ⇒ Raking up leaf litter and twigs under trees and remove trailing bark.
- ⇒ Pruning lower branches (up to 2 metres off the ground) to stop a surface fire spreading to the canopy of the trees.
- ⇒ Creating a mineral earth firebreak.
- ⇒ Having your paths adjacent to the building and have your driveway placed so that it maximises the protection to the house.
- ⇒ Storing firewood away from the building
- ⇒ Ensuring fences of combustible material will not burn down and break the integrity of the building by breaking windows allowing fire to enter.
- ⇒ Keeping your gutters free of leaves and other combustible material
- Ensuring gas bottles are secured and positioned so that they will vent away from the building if subject to flame contact or radiant heat.

Most homes that are unattended during a bushfire are lost to ember attack from the bushfire. These burning embers get into gaps within the building, such as into the roof cavity, and ignite the material within the cavity. It can take a number of hours before the burning can be observed and by that time the building may not be able to be saved. It is recommended that all homes that may be affected by embers be made ember proof. If a bush fire occurs in the general area then the roof cavity and other crevices should be inspected to ensure that no embers have caused a fire. Be aware that there are electricity cables in the roof area and the introduction of water will be a safety issue.

For more information contact the Environmental Protection Branch on 9395 9300, email: environment@dfes.wa.gov.au of visit www.dfes.wa.gov.au



What is a building protection zone?



A well prepared Building Protection Zone with reduced fuel.







A home destroyed by bushfire, note the tree branches overhanging the house.

For more information contact the Environmental Protection Branch on 9395 9300, email: environment@dfes.wa.gov.au or visit www.dfes.wa.gov.au

Page 2



Information Note

19/5/08- Version Control 1

Why do we need to manage fuel loads in the urban/forest interface zone?

FESA

Here & Emergency Services Authority of Western Assemil

Key Points	By managing and reducing fuel loads fire-fighters are able to put bush
⇒ Fuel loads influence bush fire intensity.	fires out more quickly. This also reduces the impact a fire has on property and lives of the owners and surrounding neighbours.
⇒ The lower the intensity the more options are available	With the correct weather conditions and planning, property owners can undertake their own prescribed burning during winter months to reduce the risk of bush fires.
to firefighters to suppress a fire.	This will reduce the impact a bush fire may have on the owner's property and assist fire fighters in suppressing a fire.
⇒ Managing the fuel load will assist firefighters to	High fuel loads in a bush fire which will burn quicker and hotter and destroy more bush.
suppress bush fires that may threaten homes.	As the intensity of the fire increases, it is harder for fire-fighters to put the fire out as their options become increasingly diminished. This can be seen from the head fire behaviour classes table over the page.
⇒ A destructive fire does not need extreme weather conditions.	For example a fire which starts in the Perth hills which has 20 tonne per hectare of fuel and travels at 200 metres per hour will have a fire intensity of approximately 2,000 kilowatts per metre. The table over the page shows fire-fighters can put the fire out using fire appliances and
Definitions	machinery to cut fire breaks.
⇒ Bush fire intensity is	A destructive fire doesn't need extreme weather conditions.
rate of spread of the fire, the fuel consumed and the heat yield of the burning vegetation.	A fire of 2,000 kilowatts per metre in the Perth hills which has 20 tonnes per hectare of fuel only needs a temperature of 30 degrees, relative humidity of 55 percent and a wind speed of 16 kilometres per hour before it directly exceeds the capability of fire-fighters to directly attack the bush fire.
⇒ Fire intensity is calculated by	The only way to stop this from occurring and to decrease fire intensity is by reducing and managing the amount of fuel available.
Rate of spread x fuel burnt / 2	People undertake prescribed burning because it is the least intrusive option compared with slashing or using herbicides.

For more information contact the Bush Fire and Environmental Protection Branch on 9323 9300 or visit www.fesa.wa.gov.au

Why do we need to manage fuel loads in the urban/forest interface zone?

The table below shows the options available to firefighters when suppressing a fire at different levels of intensity and rate of spread (ROS).

HEADFIRE BEHAVIOUR CLASSES
1 Readily suppressed.
Intensity < 800 kW/m and/or ROS < 60 m/hr in all fuels
2 Hand tool attack possible
Intensity < 800 kW/m and/or ROS < 140 m/hr) in forest/woodland and shrubland
Intensity < 800 kW/m and/or ROS < 300 m/hr in grassland
3 Direct machine and tanker attack possible
Intensity < 2000 kW/m and/or ROS < 400 m/hr in forest/woodland
Intensity < 2000* kW/m and/or ROS < 1000 m/hr in shrubland
Intensity < 5000 kW/m and/or ROS < 6500 m/hr in grassland
4 Direct attack not possible/unlikely to succeed.
Intensity > 2000 kW/m and/or ROS > 400 m/hr in forest/woodland
Intensity > 2000* kW/m and/or ROS > 1000 m/hr in shrubland
Intensity > 5000 kW/m and/or ROS > 6500 m/hr in grassland
5 Indirect attack likely to fail
Intensity > 4000 kW/m and/or ROS > 800 m/hr in forest/woodland
Intensity > 8000 kW/m_and/or ROS 2000 m/hr in shrubland ROS > 10000 m/hr in grassland

Table from C Muller, 2008, "Bush Fire Threat Analysis" Chris Muller

Key kW/m Kilowatts per metre m/h Metres per hour ROS Rate of spread

Description of fuels

Forest occurs where the tall trees and dense canopies grow in the higher rainfall areas such as the jarrah forest between Mundaring and the karri forest near Walpole.

Woodland is an area covered in trees ranging between the higher rainfall areas to the arid interior of the State or on the Swan Coastal Plain. As the trees are spaced further apart than in a forest there is little leaf litter. These areas can also be very floristically diverse.

Shrubland is dominated by small woody shrubs such as in mallee and mulga areas and are primarily in the low rainfall interior. These areas can also be very floristically diverse.

Grassland is an area dominated by grasses, with varying levels of over storey.

For more information contact the Bush Fire and Environmental Protection Branch on 9323 9300 or visit www.fesa.wa.gov.au



Appendix G

Works Program



Lots 21 and 22 Entrance Road Coogee - Site Development							
Item	Standard required/Task Description	To be completed by	Person Responsible	Further information			
Internal Roads	16m-20m internal road reserves, standards as per Table 1	Prior to construction	Developer	As outlined in Bushfire Management Plan			
Emergency Access Ways & Fire Service Access	To Standards in Table 4 access along internal road network and existing roads.	Prior to construction	Developer	As outlined in Bushfire Management Plan			
Building Protection Zones	To City of Cockburn Standard 20m	Prior to construction	Developer	As outlined in Bushfire Management Plan			
Hazard Protection Zones	To Planning for Bushfire Protection standard	Prior to construction	Developer	As outlined in Bushfire Management Plan			
Water	Australian Standards approved underground fire hydrants are required every 400m. Fire hydrants outlets must be installed to Water Corporation standards installed in accordance with the Water Corporation's No 63 Water Reticulation Standard and are to be identified by standard pole and/or road markings by the Developer.	Prior to construction	Developer	As outlined in Bushfire Management Plan			
Firebreaks	If the subdivision is staged it will be the responsibility of the developer to maintain firebreaks until the site is developed or changes ownership.	Prior to construction	Developer	As outlined in Bushfire Management Plan and City of Cockburn Fire break order.			
Landscaping	Low fuel areas, to BPZ standards.	Ongoing	Adjacent Developer	As outlined in Bushfire Management Plan			



Lots 21 and 22 Entrance Road Coogee - Fire Mitigation Works Plan – Ongoing (Post Lot Sale)							
Item	Standard required/Task Description	To be completed by	Person Responsible	Further information			
Internal Roads	As outlined in Table 4	City of Cockburn deadlines	Developer	Civil Engineers			
Emergency Access Ways & Fire Service Access	As outlined in Table 4	City of Cockburn deadlines	Developer	If staged work with the City to ensure access and egress location and standards are agreed upon			
Building Protection Zones	City of Cockburn& DFES standard	City of Cockburn deadlines	Lot owner	DFES and City of Cockburn			
Hazard Protection Zones	To Planning for Bushfire Protection standard	City of Cockburn deadlines	Lot owner	DFES and City of Cockburn			
Building to AS3959-2009	To Australian standard as it applies to individual properties and approved at building construction stages.	Lot owner, City of Cockburn	Lot owner	Australian Standard 3959-2009			
Water	DFES and Water Corporation WA Standard hydrants	Annually	Developer	Civil Engineers			
Firebreaks	City of Cockburn firebreak order	Annually	Developer until all land urban	As outlined in Bushfire Management Plan and City of Cockburn Fire break order.			
Landscaping	City of Cockburn standards	Annually	Developer	As outlined in Bushfire Management Plan and City of Cockburn landscaping guidelines.			



Appendix G

DFES Checklist



Appendix G Bushfire Management Plan– Compliance Checklist

Element 1: Location
Does the proposal comply with the performance criteria by applying acceptable solution A1.1?
Yes 🔽 No 🗌
Not in an area where the bushfire hazard does not present an unreasonable level of risk to life and property. Requires construction standards to BAL Construction and AS3959-2009 where 100m HSZ cannot be achieved.
Element 2: Siting and Design of Development
Does the proposal comply with the performance criteria by applying acceptable solution A2.1?
Yes 🕂 No 🗌
HSZ achieved, where 100m cannot be achieved to be built to BAL and AS3959-2009. BAL 12.5 to apply.
Does the proposal comply with the performance criteria by applying acceptable solution A2.2?
Yes 🔨 No 🗌
Every building sited >20m from vegetation, meeting 20m BPZ requirement.
Does the proposal comply with the performance criteria by applying acceptable solution A2.3?
Yes 🗹 No 📉
HSZ to DFES and City of Cockburn standards, HSZ achieved, where 100m cannot be achieved to be built to BAL construction.
Element 3: Vehicular access
Does the proposal comply with the performance criteria by applying acceptable solution A3.1?
Yes √ No 🗆
Two different vehicular access points via newly created internal road network to the north east and south.
Does the proposal comply with the performance criteria by applying acceptable solution A3.2?
Yes √ No 🗌
Public Roads proposed to meet minimum grades.
Does the proposal comply with the performance criteria by applying acceptable solution A3.3?
Yes √ No 🗌
Cul de sacs not proposed



Does the proposal comply with the performance criteria by applying acceptable solution A3.4?
Yes 🔨 No 🗌
Battle axes not proposed
Does the proposal comply with the performance criteria by applying acceptable solution A3.5?
Yes √ No
Private driveways will be constructed to DFES standards.
Does the proposal comply with the performance criteria by applying acceptable solution A3.6?
Yes Mo
Emergency Access Ways along internal road network.
Does the proposal comply with the performance criteria by applying acceptable solution A3 72
No \square
Fire Service Access along internal road network
Does the proposal comply with the performance criteria by applying acceptable solution A3.8?
Yes $$ No \square
Gates not required.
Does the proposal comply with the performance criteria by applying acceptable solution A2.9?
Yes 🕅 No
Signs not required .
Element 4: Water
Does the proposal comply with the performance criteria by applying acceptable solution A4.1 ?
Yes reticulated scheme water.



Application Declaration

I declare that the information provided is true and correct to the best of my knowledge.

Full name:	Daw	, BARMAN	~	
Agency/Corporation:	D \$J	BACHAM	PTY	LD
Applicant signature:)lega			
Date: 3/1	6/14			

