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Cockburn Coast Bushfire Management Plan

Prepared for
Hassell Ltd

September 2012

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Prepared by	Dr Roy Wittkuhn
Approved by	Rod Rose
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Appendix 1

This report should be cited as 'Eco Logical Australia 2012. *Cockburn Coast Bushfire Management Plan.* Prepared for Hassell Limited.'

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Contents

Abbreviations

ABBREVIATION	DESCRIPTION
AS3959	Australian Standard 3959: Construction of Buildings in Bushfire-Prone Areas
BAL	Bushfire Attack Level
BMP	Bushfire Management Plan
BPZ	Building Protection Zone
FDI	Fire Danger Index Local Structure Plan
FESA	Fire and Emergency Services Authority
HSZ	Hazard Separation Zone
LSP	Local Structure Plan
WAPC	Western Australian Planning Commission

1 Introduction

This report deals with two issues of bushfire management around the Cockburn Coast foreshore:

- A bushfire management plan for the Cockburn Coast foreshore reserve
- General guidelines for development of the area adjacent to the foreshore to reduce the risk of bushfire impacts

This Plan describes the strategies and activities for specific bushfire management objectives on the Cockburn Coast foreshore reserve (herein called the reserve; **Map 1**), as per the *Planning for Bushfire Protection Guidelines, Edition 2 (2010)* developed by the Western Australian Planning Commission (WAPC) and the Fire and Emergency Services Authority (FESA).

The *Bushfires Act 1954* imposes obligations on land managers/owners to take all reasonable measures to prevent the occurrence of wildfires on land under their care and control, and to minimise the danger of the spread of bushfires on or from that land.

The application to develop the reserve is currently at Local Structure Plan (LSP) stage. This document constitutes the Bushfire Management Plan (BMP) to support the LSP developed by Hassell Pty Ltd. By undertaking the actions proposed by this Plan, the bushfire risk on this and neighbouring properties can be significantly reduced.

This Plan should be reviewed after five years, or when development design work commences for reserve, whichever is sooner. The City of Cockburn is responsible for ensuring the review is undertaken. Detailed site planning adjoining the proposed development is essential to minimise bushfire risk and maintain the values of the reserve. This detail planning is typically an iterative process involving landscape and building design.

2 Objectives

The objectives of this BMP are to:

- Minimise the bushfire risk to lives, properties and assets
- Preserve conservation values of the foreshore
- Preserve ecological and evolutionary processes

The BMP provides fire management measures to achieve these objectives for the reserve, and general guidelines that provide preliminary input into the design of development on the land adjacent to the reserve, based upon the principles in *Planning for Bushfire Protection Guidelines, Edition 2 (2010)* (PBP) and *Australian Standard 3959 Construction of Buildings in Bushfire-Prone Areas* (AS3959) (Standards Australia 2009).

3 Description of the area

A detailed description of the reserve, including climate, topography, land use, assets and access, is provided in the Foreshore Management Plan (FMP) (Hassell, in prep.).

4 Fire problem

4.1 BUSHFIRE HISTORY

Historical information of fire occurrence has not been collated for the area; however the local FESA representative suggest that fires have been of low frequency over relatively small patches that have not posed risks to homes or infrastructure. Ignition sources have been from road verge fires (likely to be cigarette butts from vehicles) and occasional open ("camp") fires from visitors to the area.

4.2 BUSHFIRE HAZARD (FUELS)

Bushfire fuels in the reserve range from Recreational Sown Grassland and Open Hummock Grassland on the fore dunes to Closed Scrub near the Robb Jetty carpark (**Map 2**). The PBP fire hazard classification for the foreshore area, in its current state, is shown in **Map 3**. Areas of extreme hazard have the potential to burn at a higher intensity than those with lower ratings. The Closed Scrub is classified[1] as an 'extreme' fire hazard, with other more open shrublands a 'moderate' hazard and the Open Hummock Grasslands and Recreational Sown Grassland a 'low' hazard (**Map 3**).

In this instance the classification system overstates the fire hazard as the size of the reserve and the potential length of fire run directly toward development is small. For example, the thin strip of Closed Scrub along the north-eastern boundary of the reserve is classified an 'extreme' hazard, however its narrow width would not enable the full development of bushfire typical of the more expansive areas of Closed Scrub that the PBP classification system is based upon .

Fuels in the Recreational Sown Grassland are not considered a hazard due to their maintained nature and greenness throughout the year. Fuels in the Open Hummock Grassland consist of fine material (principally *Spinifex longifolia* and annual weeds) with large areas of open sand, and are a low fire hazard. The Low Shrubland and Tall Shrubland are a 'moderate' fire hazard with woody fuels interspersed with annual grasses and perennial weeds such as *Pelargonium capitatum*.

The spatial pattern (including extent and continuity) of bushfire fuel within the reserve is considered as important an influence on fire behaviour and bushfire risk as the fuel classification under PBP. In this case, the risk associated with the fuel hazard rating is significantly reduced by the spatial pattern of these fuels.

4.3 BUSHFIRE RISK

The likelihood of bushfires starting on or impacting the foreshore area is relatively low. Currently, the visitation to the area is low and likely to be by locals who are less likely to purposefully set the bush alight. Nonetheless, there is a low risk of arson or accidental ignitions from people using the area or driving along neighbouring roads (via cigarette butts). It is therefore expected that occasional accidental or deliberate fires will continue to pose an infrequent bushfire risk.

[1] *Planning for Bushfire Protection Guidelines, Edition 2 (2010).*

4.4 PROPOSED FORESHORE CONCEPT DESIGN

A concept design for the foreshore has been developed as part of the FMP to complement the proposed 'Cockburn Coast' development to the east. The vision is to balance the conservation of the foreshore's natural elements with the provision of a vibrant and activated community space to cater for the adjacent development.

The concept design includes a number of proposed precincts within the foreshore which allow for facilities such as car parking, community green space, boardwalks and decking, pathways and other community facilities. The implementation of the concept design will alter the existing vegetation and the fire hazard and risk in the reserve. This may include reductions in the fire hazard in the vicinity of proposed precincts; Catherine Point, Green Corridor Connection, Rob Jetty and McTaggart Cove (refer section 5.2 of FMP). Detailed bushfire risk measures should be considered as part of the concept design and prior to construction. It is probable that this will result in a reduction in the fire hazard ratings of the reserve and the final concept design and building construction standards will need to reflect the final bushfire hazard and risk.

As use of the foreshore increases with adjacent development, the fire mitigation strategies to reduce the risk of accidental or intentional lighting of fires (Section 5.2.2 and 5.2.3) become increasingly important.

4.5 SUMMARY

Potential bushfire issues for the reserve are:

- Historically there is a very low risk of fire ignition in the area or nearby
- The fuels in the reserve currently range from low to extreme hazard but this is overstates the bushfire risk due to the spatial pattern of this fuel and it is expected that the hazard and risk will reduce as the reserve concept plan is implemented
- The bushfire risk in the reserve is considered low
- As adjacent development proceeds, fire mitigation strategies may need to increase

5 Fire mitigation strategies

This section is divided into two components:

- Mitigation strategies on the reserve
- Guidelines for development on adjacent properties

5.1 MITIGATION STRATEGIES ON THE RESERVE

5.1.1 Fuel management

Fuel loads in the reserve are to be maintained by chemical and/or mechanical means, such as herbicide spraying for weed species or physical removal of dead branches and weeds. Prescribed burning is not considered as an option for the following reasons:

- Burning is often difficult to organise/achieve and requires specialist skills and equipment
- Weeds respond rapidly in the post-fire environment. They tend to establish quicker than native species in the post-fire environment that has elevated light and nutrient availability
- The smoke from prescribed fire represents a health and visibility concern for nearby residents and users of roads in the vicinity
- Soils are exposed to increased potential for wind erosion due to loss of vegetated cover
- The potential of the reserve to recover post-fire is unknown, and would most likely require supplementary planting due to the currently degraded state of the vegetation. This restorative planting would represent an extra cost associated with the prescribed burning

5.2 WATER SUPPLY

The reserve is currently not serviced by hydrants. Hydrants are located at various locations east of the railway line, at a distance of between 100 and 150 m from the eastern edge of the reserve.

5.2.1 Access and strategic fire breaks

Two access routes connecting to the public road network to provide access/egress for members of the public and fire trucks is important. Currently, McTaggart Cove and Rollinson Road provide two access points to the reserve from Cockburn Road, which is a major public road. These two roads are joined by Robb Road, permitting dual access. Future development should retain two access routes. All public roads within or bounding the reserve are to meet the following requirements:

- Minimum trafficable surface: 6 m (this does not necessarily mean paving width. It could, for example, include 4 m wide paving and 1 m wide constructed road shoulders)
- Horizontal clearance: 6 m
- Vertical clearance: 4 m
- Maximum grades: 1 in 8
- Maximum grade over < 50 m: 1 in 5
- Maximum average grade: 1 in 7
- Minimum weight capacity: 15 tonnes

- Maximum crossfall: 1 in 33
- Curves minimum inner radius: 12 m

Exceptions to these specifications may be feasible but would require specific investigation.

Existing pathways act as strategic fire breaks within the reserve; hence there is no requirement for additional fire breaks to be constructed.

5.2.2 Bushfire ignition management

Management of bushfire ignitions in the reserve is to include:

- Restrictions on the use of machinery and tools that have the potential to ignite fires, such as angle grinders and welders, when the fire danger rating is Very High or above (e.g. during any construction works)
- Requirements to have fire extinguishers on site during operations which are likely to start a fire (such as angle grinders or welders)
- Installation and maintenance of gas barbecues
- Public education/community awareness program highlighting the dangers of lighting fires and the penalties that may apply if caught

5.2.3 Public education and community awareness

Minimal public education and community awareness is required for the reserve. At the location of carparks, signs indicating what to do in the event of a fire should be constructed. Incorporated into these signs should also be a warning of penalties applying to those caught lighting open fires.

5.2.4 Fire safer areas

Fire safer areas for users of the reserve are to be designated on the signs at carparks. These would likely be the grassed oval at McTaggart Cove, and the beach. To remain a fire safer area, the grassed oval would require mowing on a fortnightly basis to remain non-flammable.

5.2.5 Plan review

A minor annual review of this Plan is to occur with a major review every five years. The minor review would assess progress against the mitigation works plan for the previous year; the major review would consider whether the overall intent and management strategies of the Plan are still relevant.

5.2.6 Works program

A works program incorporating the requirements of this Plan is provided in Appendix 2.

5.3 GUIDELINES FOR DEVELOPMENT ON ADJACENT PROPERTIES

Future development of the reserve and adjacent land must take into account bushfire risk and its proximity to bushfire prone land. Five performance criteria listed in *Planning for Bushfire Protection Guidelines* are relevant to any future development of the area. These are: (1) location; (2) siting of development; (3) design of development; (4) water; and (5) vehicular access.

5.3.1 Location

Considerations for the location of the development are to ensure that it is located in areas where the bushfire hazard does not present an unreasonable level of risk to life and property. The eastern half of the reserve is classified as either ‘moderate’ or ‘extreme’ bushfire hazard (**Map 3**). Thus, development close to these areas must take into consideration the threat from bushfire attack. The construction of

any habitable buildings close to those areas classified as moderate or extreme fire hazard must have sufficient setback distances to achieve a bushfire attack level (BAL) of BAL-LOW (equivalent to 100 m set back) or alternatively, construction standards that comply with AS3959. Under AS3959, the 100 m set back distance can be reduced as long as the construction standard is increased commensurate with a BAL assessment.

A BAL assessment has been undertaken to indicate the building standards required at calculated distances from the vegetation classified as bushfire prone. The BAL has been calculated using Method 1 from AS3959 for a Fire Danger Index (FDI) 80 and for Scrub vegetation that has an effective slope beneath it that is downslope > 0–5 degrees. Method 1 provides a simplified procedure that uses a standard set of parameters in the modelling of BALs. Set back distances for BAL ratings calculated using Method 1 are provided in **Table 1**. Users of this information should refer to the construction standards for the relevant BAL detailed in AS3959.

Table 1: Distance of the reserve from the predominant vegetation class according to Bushfire Attack Level (BAL)

SUBJECT LAND AREA VEGETATION AND SLOPE	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
Scrub >0 to 5º downslope	<11 m	11–<15 m	15–<22 m	22–<31 m	31–<100 m

Planning for Bushfire Protection Guidelines, which are based on AS3959, indicate that building in areas that have a classification of BAL-40 or BAL-FZ will generally not be approved. It is possible to reduce the exposure of developments close to bushfire prone areas to BAL-29 by providing for a BPZ of 15 m with the development or as part of a permanent fuel reduction zone within the reserve. This minimum distance of 15 m could be reduced by using Method 2 from AS3959, which allows for the different parameters within the model to be changed to better reflect the existing conditions. In particular, there would be scope to reduce the 'flame width' assumption of 100 m, given that patches of scrub vegetation in the vicinity are not 100 m wide. The result of this would be a reduction in the 15 m minimum width to achieve BAL-29.

5.3.2 Siting of development

Considerations for the siting of development are to ensure that the level of bushfire impact is minimised. There are four acceptable solutions which, if followed, will allow the development to meet the siting of development performance criteria. Where these acceptable solutions represent a constraint on the development, there is allowance for a performance solution to be assessed by a decision making authority, whereby a variety of design responses are developed to address each bushfire hazard management issue.

The four acceptable solutions are:

A4.1 – Hazard separation – moderate to extreme bushfire hazard level. Under this acceptable solution, every building is sited a minimum distance of 100 m from any vegetation classified as representing a moderate or extreme bushfire hazard, or has its construction standard increased to align with the appropriate BAL rating for that location. Under AS3959, the distance between the predominant

vegetation and the building can be reduced but the construction standard must be increased. See Section 5.3.1 for a description of how BAL is determined.

A4.2 – Hazard separation – low bushfire hazard level. Under this acceptable solution, every building near low bushfire hazard areas is sited a minimum distance of 20 m from any vegetation. Under AS3959, the distance between the predominant vegetation and the building can be reduced but the construction standard must be increased.

A4.3 – Building Protection Zone (BPZ). To meet the acceptable solution in *Planning for Bushfire Protection Guidelines*, every building is surrounded by a BPZ that must meet the following requirements:

- Width: 20 m measured from any external wall of the building (mandatory where bushfire hazard is moderate – extreme)
- Locations: within the boundaries of the lot on which the building is situated
- Fuel load: reduced to and maintained at 2 tonnes per hectare (t/ha) (measured using FESA's *Visual Fuel Load Guide for the Scrub Vegetation of the Swan Coastal Plain including Geraldton Sandplains & Leeuwin Ridge Regions of Western Australia*)
- Trees (crowns) are a minimum of 10 m apart
- Trees are low pruned at least to a height of 2 m
- No tall shrub or tree is located within 2 m of a building (including windows)
- There are no tree crowns overhanging the building
- Fences and sheds within the building protection zone are constructed using non-combustible materials (e.g. colourbond 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 m)
- Trees in the BPZ have no dead material within the plant's crown or on the bole

The extent of the BPZ should be depicted on plans drawn up for any development.

The provision of a 20 m BPZ is likely to represent a constraint to some aspects of the foreshore concept design, and therefore a performance solution has been proposed (see Section 5.4).

A4.4 – Hazard Separation Zone (HSZ). Every building and its contiguous BPZ is surrounded by a HSZ that meets the following requirements:

- Minimum width: 80 m for any vegetation classified as moderate or extreme bushfire hazard, measured from the outer edge of the BPZ (although the HSZ can be reduced if construction standards are increased in accordance with AS3959)
- Location: within the boundaries of the lot on which the building is situated or, where this is not possible or desirable, within the boundaries of the overall residential development in which the building is proposed to be located.
- Fuel load: reduced to and maintained at between 12 to 15 t/ha (this is the acceptable solution for mallee heath vegetation, which is the most similar vegetation structure to coastal shrublands)
- Trees (crowns) are a minimum of 10 m apart
- Trees in the HSZ have no dead material in the plant's crown or on the bole

The extent of the HSZ should be depicted on plans drawn up for any development. The HSZ may be reduced if building construction standards are increased in accordance with AS3959.

The provision of an 80 m HSZ is likely to represent a constraint to the foreshore concept design, and therefore a performance solution has been proposed (see Section 5.4).

5.3.3 Design of development

The design of development must be considered to minimise the level of bushfire impact. Where all acceptable solutions from considering the siting of development have been complied with, there is no requirement for special design considerations and this performance criterion does not apply (because the development will occur in an area of BAL-LOW). However, for development that does not comply with acceptable solutions A4.1, A4.2, A4.3 and A4.4, all proposals must be assessed under the performance criterion for design of development. One way for development to meet this performance criterion is to comply with AS3959, such that as the distance from the vegetation to the building reduces, the construction standard must be increased. This performance solution has been described in Section 5.4.

5.3.4 Water

Water availability to enable life and property to be defended in the event of a bushfire is critical to the design of future development. The reserve exists in a reticulated area, meaning that a permanent and secure water supply is available through scheme water. Acceptable solution A3.1 states that the development is provided with a reticulated water supply, together with fire hydrants, in accordance with the specifications of the relevant water supply authority (Water Corporation) and FESA. The *Water Corporation's No. 63 Water Reticulation Standard* is deemed to be the baseline criteria for developments.

5.3.5 Vehicular access

Planning for a development must ensure that the vehicular access serving a subdivision/development is safe in the event of a bushfire occurring. The internal layout, design and construction of public and private vehicular access in the subdivision/development must allow emergency and other vehicles to move through it easily and safely at all times. This is expanded on in the following section.

Future development may need to consider the placement of pathways and/or fire breaks in those areas that are close to buildings or other infrastructure. These pathways/fire breaks may form part of the 15 m wide BPZ.

5.4 SPECIAL CONSIDERATION AREAS

As application of the standard PBP assessment process results in over-ranking of the bushfire hazard, development proposed to adjoin the reserve may not comply with the acceptable solutions in PBP. In these situations it is important that a combination of reserve management and building design be used to minimise the bushfire risk.

The development site adjoining the reserve immediately south of the proposed Rob Jetty beach front urban plaza is bordered by moderate-extreme bushfire hazard along its north, west and southern boundaries (**Map 3**). Under the requirements of PBP, bushfire risk must be reduced to an acceptable level through measures such as Building Protection Zone (BPZ), Hazard Separation Zones (HSZ) and construction to an appropriate standard as specified under AS3959.

An acceptable solution for the development site requires a 100 m wide asset protection zone (BPZ and HSZ) and this is not a realistic risk assessment or a feasible protection measure. It is possible, however, to prepare a performance solution during the detailed planning phase of the development site to create a BPZ and HSZ within the reserve so that the PBP required Bushfire Attack Level (BAL) of 29 kW/m^2 or less is achieved. This BPZ/HSZ can consist of a combination of:

- Restructuring of vegetation (if necessary, this may include removal of more fire-prone species)
- Non-combustible pathways
- Low, non-combustible retaining walls that reduce radiant heat load
- Mounded earth or rock (e.g. berms) in a manner in keeping with the aesthetics of the reserve
- Access roads and/or car parks

The use of the above treatments will reduce the bushfire risk and allow an appropriate mix of building design and 'landscaping' within the reserve so that compliance with the performance criteria within PBP are achieved. The importance of maintaining the development potential of the foreshore reserve is recognised, therefore criteria would be developed during the process of progressing a performance solution to ensure an appropriate combination of reserve management and building design solutions is achieved.

In the absence of these performance solutions the minimum setback between bushfire hazard (vegetation) and a building is 15 m (see Table 1). A performance solution is therefore essential if the current deign is to remain viable. Alternatively, options relating to detailed design within the relevant areas of the adjacent development site would need to be explored. A performance solution is beyond the scope of this plan as it requires considerable design work by architects and landscape designers in conjunction with a bushfire expert. This Plan has 'flagged' this issue and indicates that the landscaping of the reserve within at least 30 m of the proposed development site buildings requires considerable care and design in conjunction with protection measures for the proposed buildings.

6 Bushfire recovery

Following a bushfire in the reserve, a recovery action plan is required. This plan needs to be devised on a case by case basis, depending on where the fire has occurred, the size of the fire, the intensity of fire, assets affected, environmental impacts and whether or not people and/or communities have been affected (i.e. injuries or deaths). Some aspects of bushfire recovery for lands managed by the City of Cockburn are covered in detail in the *Local Emergency Management Arrangements* (City of Cockburn 2011), available at:

http://www.cockburn.wa.gov.au/Your_Council/Acts_and_Information/Public_Documents/2368-lemp-2012-update.pdf.

6.1 REHABILITATING THE ENVIRONMENT

Effective rehabilitation of the environment is crucial for the reserve owing to the high likelihood of weed invasion and wind erosion degrading the reserve. The recovery plan should document a list of species to use for restoration, costs of works for restoration (on a per unit area basis), timing of critical stages in the recovery processes, and roles and responsibilities for under taking the remedial work.

The following steps are required in preparing the specific rehabilitation plan:

- Map the area affected by fire
- Assess the level of mortality
- Reduce the chance of wind erosion through covering bare sand with matting or brush
- Determine the vegetation type affected and the objectives for rehabilitation, such as:
- Desired vegetation community to re-establish
- Density of vegetation to be replanted
- Standards and techniques for weed control
- Undertake site works to prepare for rehabilitation in the appropriate season (usually autumn). This may include soil preparation, weed suppression, fencing
- Plant seedlings for rehabilitation in appropriate season (late autumn/early winter depending on rains)
- Monitor plant establishment and replace with late winter tubestock if required
- Monitor through summer and prepare for supplementary planting in late autumn/early winter in the second year (if required)

7 References

City of Cockburn. 2011. *Local Emergency Management Arrangements.* 3rd February 2011

FESA. 2007. *Visual Fuel Load Guide for the Scrub Vegetation of the Swan Coastal Plain including Geraldton Sandplains & Leeuwin Ridge Regions of Western Australia*. Fire and Emergency Services Authority of Western Australia & Emergency Management Australia.

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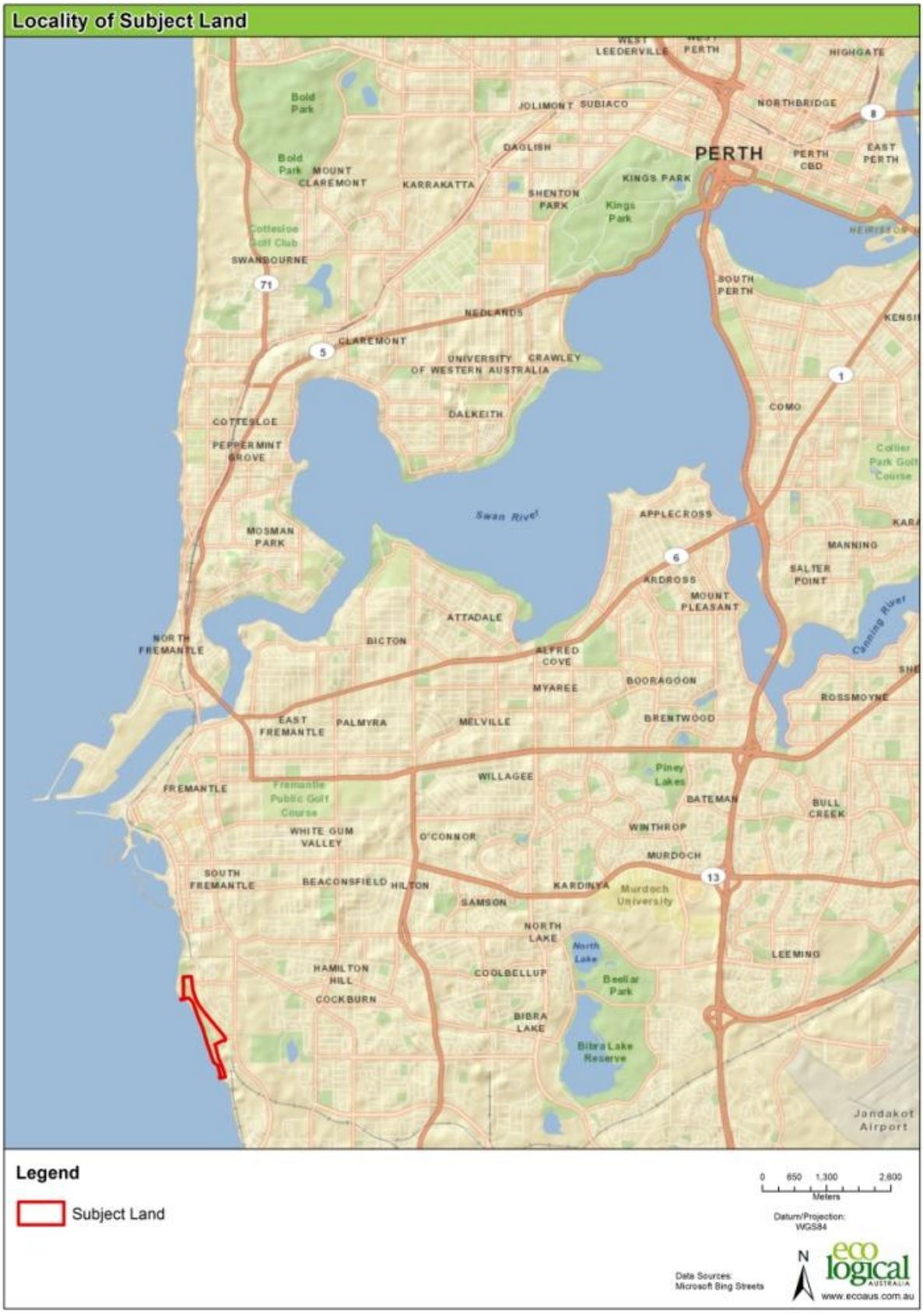
Standards Australia. 2009. *Australian Standard 3959 Construction of Buildings in Bushfire-Prone Areas* (AS-3959).

WAPC/FESA. 2010. *Planning for Bushfire Protection Guidelines edition 2, May 2010*. Western Australian Planning Commission and Fire and Emergency Services Authority of Western Australia.

Appendix A: Maps

Maps begin on the next page

Map 1: Overview of the Cockburn foreshore reserve area



Map 2: Current Vegetation types of the Cockburn foreshore reserve

Map 3: Bushfire hazard ratings based on *Planning for Bushfire Protection Guidelines*

Appendix 2: Works program

CoC = City of Cockburn; FESA = Fire & Emergency Services Authority; WAPC = Western Australian Planning Commission

FIRE MANAGEMENT ACTIVITY	STRATEGY	ORGANISATION RESPONSIBLE	STAGE/DATE BY WHICH ACTIVITY SHOULD BE COMPLETED
Ignition risk management	Design and maintenance of gas barbecues Signposting	CoC	Design phase and then regularly throughout the year
Future development - Location	Location and design to be assessed by suitable bushfire consultant	Developer	Concept plan
Future development – Siting of development	Performance based design	CoC /FESA/WAPC Developer Developer CoC /WAPC	Concept plan Concept plan Concept plan Concept plan
Future development – Design of development (where acceptable solutions for siting of development not compliant)	Increase building construction standards to comply with AS-3959 Ensure compliance with AS-3959	Developer WAPC	Prior to construction
Future development – Water	Incorporate water availability (hydrants) in a manner acceptable to the Shire/FESA and as per *Water Corporation's No. 63 Water Reticulation Standard* Ensure hydrants in working order	Developer CoC/FESA	Concept plan Annually, prior to commencement of fire season
Access and strategic fire breaks	Maintenance of public roads Future development to consider access and egress Maintenance of pathways within foreshore area	CoC /Main Roads Developer CoC	Annually, prior to commencement of fire season Concept plan Annually, prior to commencement of fire season
Public education	Erection and maintenance of signage – public messages near carpark areas Package of information for new residents	CoC Developer, in conjunction with FESA/CoC	Maintenance annually, prior to commencement of fire season Upon purchase of lots/residences
Fire safer areas	Maintenance of grassed areas (lawn mowing and weed control)	CoC	Regularly throughout the fire season
Recovery/restoration after a fire event	Develop a recovery plan	CoC	As soon as possible post-fire
Assessment of fire management strategies	Obtain endorsement of strategies in the fire management plan from FESA	CoC	Annually, prior to commencement of fire season

HEAD OFFICE
Suite 4, Level 1
2-4 Merton Street
Sutherland NSW 2232
T 02 8536 8600
F 02 9542 5622

SYDNEY
Level 6
299 Sussex Street
Sydney NSW 2000
T 02 8536 8650
F 02 9264 0717

ST GEORGES BASIN
8/128 Island Point Road
St Georges Basin NSW 2540
T 02 4443 5555
F 02 4443 6655

CANBERRA
Level 2
11 London Circuit
Canberra ACT 2601
T 02 6103 0145
F 02 6103 0148

NEWCASTLE
Suites 28 & 29, Level 7
19 Bolton Street
Newcastle NSW 2300
T 02 4910 0125
F 02 4910 0126

NAROOMA
5/20 Canty Street
Narooma NSW 2546
T 02 4476 1151
F 02 4476 1161

COFFS HARBOUR
35 Orlando Street
Coffs Harbour Jetty NSW 2450
T 02 6651 5484
F 02 6651 6890

ARMIDALE
92 Taylor Street
Armidale NSW 2350
T 02 8081 2681
F 02 6772 1279

MUDGEE
Unit 1, Level 1
79 Market Street
Mudgee NSW 2850
T 02 4302 1230
F 02 6372 9230

PERTH
Suite 1 & 2
49 Ord Street
West Perth WA 6005
T 08 9227 1070
F 08 9322 1358

WOLLONGONG
Suite 204, Level 2
62 Moore Street
Austinmer NSW 2515
T 02 4201 2200
F 02 4268 4361

GOSFORD
Suite 5, Baker One
1-5 Baker Street
Gosford NSW 2250
T 02 4302 1220
F 02 4322 2897

DARWIN
16/56 Marina Boulevard
Cullen Bay NT 0820
T 08 8989 5601

BRISBANE
PO Box 1422
Fortitude Valley QLD 4006
T 0400 494 366