

## **APPENDIX 7**

***PHYTOPHTHORA* DIEBACK ASSESSMENT REPORT**  
**(Source: BARK Environmental, 2015)**



## ***Phytophthora* Dieback Assessment and Management for:**

### **Armstrong Reserve, Dunsborough**

A report prepared for: Ray Village Aged Services (Inc.) trading as CapeCare and its proposed development of an aged-care facility within part of Armstrong Reserve, Dunsborough, Western Australia

**January 2015**

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*This report presents the results from field Phytophthora dieback interpretation, supported by field sampling and available desktop information. Field observations made during this interpretation provide site information relevant at the time of survey and natural and seasonal variability may occur, plus the pathogen may spread autonomously or through uncontrolled vectors – this should be considered when assessing this report.*

*The data and advice provided herein relates only to the project study area and proposed activity described herein. It must be reviewed by a competent environmental practitioner before being used for any other purpose. Where reports, searches, any third party information and similar work have been performed and recorded by others, the data is included and used in the form provided by others. The responsibility for the accuracy of such data remains with the issuing authority, not with BARK Environmental Consulting.*

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## I.0 EXECUTIVE SUMMARY

Ray Village Aged Services (Inc.) trading as CapeCare are planning to develop an aged care facility on a 1.28 ha area within part of Armstrong Reserve, Lots 111, 115, 116, 117 and 257 Naturaliste Terrace, Dunsborough. Conditional approval for the project under Ministerial Statement 926 was granted on 21 January 2013. One approval condition is to prepare an Environmental Management Plan (EMP) that includes dieback management measures.

The results of this assessment show that *Phytophthora cinnamomi* (P.c.) dieback is present and extensively distributed across Armstrong Reserve with approximately 74% (or 3.07 ha) of the study area mapped as infested. This assessment is supported by laboratory testing of field samples, field observations and in previous reports by environmental practitioners who observed dieback symptoms within the reserve and proximate upslope Marri Reserve (Elscott, 2003; Webb, 2009; Ecoscape, 2010; and Spencer, 2011).

The remainder of Armstrong Reserve has two separate areas of Uninterpretable vegetation. One has been mapped as protectable along the northern boundary (0.3 ha) on the basis of ensuring it is included in any phosphite treatment planning and because it contributes to visual amenity for adjacent residences. This was discussed with the City of Busselton as an acceptable variation to standard Department of Parks and Wildlife (DPAW) determination of protectable areas on DPAW managed lands. This reserve is managed by the City of Busselton. The other Uninterpretable area has been mapped as unprotectable as it falls within the project clearing envelope (0.28 ha).

Overall, the vegetation community within Armstrong Reserve includes many wetland plant species not known to be susceptible to *Phytophthora* infection. There are some widely scattered dieback indicator plant species, with parts of the reserve regenerating well post-fire on seasonally damp soils. In respect to *Phytophthora* dieback interpretation, these characteristics can "mask" this pathogen's expression and impact, particularly where dieback infestations are very old such as this. However, adequate evidence such as the chronology and distribution of plant deaths was identified to associate the area with P.c..

Vegetation within Armstrong Reserve is exposed to a range of external and internal pressures and vectors for *Phytophthora*. This includes importation of gravel towards the centre of the reserve for a former carpark/Shire depot, a significant internal east-west drainage line emanating from the dieback infested upslope Marri Reserve, and a series of internal track access points that were all assessed and sign-posted as infested in 2011. Evidence of illegal garden and waste dumping was also observed along the perimeters especially along Armstrong Place. An east-west limestone firebreak in the north is gated but remains accessible to pedestrians, cyclists and local residents where their houses back onto the unfenced reserve. This 2015 assessment has also mapped key tracks and the drainage network within the reserve as requested by the City of Busselton Senior NRM/Environment Officer, Mr Will Oldfield.

Despite the extent of areas mapped as Infested within the reserve, it still contains many healthy non-susceptible plants and scattered trees that may offer some scientific, biodiversity, habitat and amenity values. Therefore, some dieback management is still considered relevant within Armstrong Reserve to protect values such as these and to avoid transporting infected soil/plant materials from the reserves infested area to external sites.

As a result of this assessment, the suggested dieback management measures herein are not complex for the proposed project and focus on minimising the spread of *Phytophthora* and weeds within the site and from the site to any external vulnerable areas during project activities. Longer-term recommendations for managing *Phytophthora* dieback within the wider reserve area have also been determined.

The City of Busselton's Senior NRM Environment Officer, Mr Will Oldfield and DPaW Officer Mr Jeremy Chick, Blackwood District were consulted when undertaking this work and determining appropriate *Phytophthora* hygiene management measures specifically for Armstrong Reserve.

This report describes the results from mapping the occurrence (presence and distribution) of *P.c.* within Armstrong Reserve (Figure 1). Assessment was completed in January 2015 by Bruno Rikli who is registered by DPaW in the detection, diagnosis and mapping of *P. cinnamomi*. Best practice dieback hygiene management measures relevant to this site are recommended herein and a management map (Figure 2) has been prepared to guide operational management planning.

## 2.0 INTRODUCTION

*Phytophthora cinnamomi* (P.c.) that causes dieback is listed as a “Key Threatening Process” under the Australian Government’s *Environment Protection and Biodiversity Conservation Act, 1999*. In the south-west region of Western Australia (WA), approximately 40% of all known flora taxa are susceptible to this microscopic soil-borne water mould (DEC, 2009). Dieback can spread through the movement of soil, plant material or water that contains inoculum. Therefore, activities such as clearing bushland, earthworks, vehicle and pedestrian movements all present a risk of spreading the pathogen by transporting infected material. The negative impact of dieback on susceptible vegetation can be significant resulting in long-term reductions in biomass and biodiversity.

BARK Environmental was engaged by Capecare to undertake *Phytophthora cinnamomi* (P.c.) interpretation over the whole of Armstrong Reserve in Dunsborough. The scope was to ascertain whether dieback is present or not, and to recommend management measures to prevent the spread of dieback during and after construction of an aged care facility.

This report describes the results from mapping the occurrence (presence and distribution) of P.c. within Armstrong Reserve (Figure 1). Assessment was completed in January 2015 by Bruno Rikli who is registered by DPaW in the detection, diagnosis and mapping of *P. cinnamomi*. Best practice dieback hygiene management measures relevant to this site are recommended herein and a management map has been prepared to guide operations (Figure 2). This was discussed with the City of Busselton’s Senior Natural Resource Mgmt/Environment Officer, Mr Will Oldfield (January, 2014) who agreed to utilise existing site features where possible instead of excessive demarcation. He also requested that practical management measures be developed including use of phosphite treatment and that fencing the development boundary and reserve could assist in reducing growing pressure on the reserve from illegal activities such as dumping of garden/household waste in bushland. A copy of the draft report was provided to the Department of Parks and Wildlife whose Officer Mr Jeremy Chick inspected the site on 4 March 2015 and replied in email that the proposed hygiene management measures are suitable for the site. He also provided comments on some minor clarification on how the effluent from clean down would be managed. This clarification was subsequently made by Bruno Rikli by telephone on 6/03/2015 and relevant comments added to within this report.

### 2.1 Background Information

Capecare has received conditional Ministerial approval to construct an aged care facility on a 1.28 ha part of Armstrong Reserve. Within Ministerial Statement 926, two conditions are relevant to this study. Condition 5-1 requires the proponent to prepare an Environmental Management Plan (EMP) in consultation with the City of Busselton; and Condition 5-2 includes the need to address dieback as follows:

Ministerial Statement 926 – Condition 5-2 extract:

*The Environmental Management Plan required by condition 5-1 shall be prepared in consultation with the City of Busselton and include: 1. dieback management measures prepared in consultation with the DEC [now DPaW]; 2. measures to ensure Banksia logs and other woody debris from the clearing in the development envelope are relocated to within the area shown as remaining portion of Armstrong Reserve in Figure 1 to enhance fauna habitat values; 3. weed control measures; 4. measures to control vehicle and pedestrian access; and 5. management measures to ensure impacts from the proposal are contained within the development envelope shown in Figure 1. [refer Figure 2 in this report].*

## **2.2 Site Vegetation and Historical Disturbance**

The plant community within Armstrong Reserve is unusual with a combination of upland and wetland flora. It has been described as low open forest of *Corymbia calophylla*, *Melaleuca raphiophylla*, *Banksia littoralis*, *Eucalyptus rudis* and *Agonis flexuosa* over a diverse and dense low shrub and sedge layer on grey sandy loam soils with seasonal subsoil moisture (Webb, 2009). Three vegetation types have been described in the reserve (Ecoscape, 2010) and each includes wetland plant species and/or many plants that are not known as susceptible to *Phytophthora*. The majority of Armstrong Reserve has been recorded as a Priority Ecological Community by DPaW. Evidence of old and recent fire damage (within 4 years) was observed in patches where plants and trees had burnt foliage, stems and bark with reduced leaf matter on the forest floor.

Given some low interpretability areas exist within parts of the reserve due to a dominance of wetland vegetation, it was necessary to consider the wider landscape perspective and any previous evidence of *P.c.* in the broader upslope area of Marri Reserve. *Phytophthora* infestations were easily identified within Marri Reserve such as at MGA Z50 323704 mE / 6279494 mN (BARK observations, January 2014). Potential and suspected infestations have been previously reported in Elscott (2003); Webb (2009); Ecoscape (2010); and Spencer (2011). No previous soil and tissue sampling has been undertaken in Armstrong Reserve according to DPaW and City of Busselton records available at the time of this assessment.

Armstrong Reserve has been exposed to a range of external and internal disturbance activities. Evidence of illegal garden and waste dumping was found during this assessment on perimeters, especially along Armstrong Place. Local residents and cyclists also access the reserves limestone firebreak from adjacent housing that backs on to the reserves unfenced northern boundary.

Importantly, a drainage line previously demarcated as infested within the adjacent and upslope Marri reserve flows east under Naturaliste Terrace through four culverts into an excavated drainage line within Armstrong Reserve. This drainage line continues to form a hook-shape within the centre of Armstrong Reserve where surface water “soaks” with an overflow drainage line continuing eastwards within the reserve. Before this surface water exits the reserve, it is captured by an excavated channel parallel to Gifford Road within the reserve that has two separate culvert points that enter Dunsborough’s drainage network. Overall, the aforementioned drainage line extends from within a known infested area (Marri Reserve) into a



series of unlined drains within Armstrong Reserve and it is a significant vector for spreading disease within both reserves.

In 2011, as part of the City of Busselton's initiatives in dieback management, strategic firebreaks and tracks were assessed by a dieback interpreter so that appropriate hygiene signage could be installed. As part of that assessment four tracks within Armstrong Reserve were sign-posted as infested through observable factors (Spencer, 2011). One of these tracks forms a strategic firebreak and has been cleared and sealed with limestone and it is unknown and unlikely that any hygiene was applied given its infested status at that time. Similarly, gravel from an unknown source has been imported to within the reserve to form a carpark formerly used by the City as a depot. The carpark drains into the reserve at points along its perimeter. Several community structures are present including a Fire brigade shed and Country Women Association building.

## **3.0 METHODOLOGY**

### **3.1 Interpretation and Mapping**

Interpretation was completed over Armstrong Reserve in January 2014 by a DPaW registered interpreter, Bruno Rikli with regard to methodology and procedures described in the document titled: *Phytophthora Dieback Interpreter Procedures for lands managed by the department. Working Draft 2* (DPaW, 01 Jan 2015). Background information was sought from the City of Busselton, DPaW and the client prior to field work. Presence or absence of the pathogen was determined through observable evidence and soil and tissue sample testing. Non-differential, hand-held Global Positioning System (GPS) was used for navigation, recording survey boundaries, waypoints and for capturing data for Geographic Information System (GIS) mapping.

### **3.2 Demarcation**

Demarcation using 25 mm fluoro orange flagging-tape tied to trees with the knots facing into the infestation was installed along one boundary only. This demarcation separates the Infested and Uninterpretable categories within uncleared bushland situated immediately north of the cul-de-sac on Armstrong Place. All other boundaries were adequately defined by existing features, cleared bushland and a limestone firebreak. In this urban locality, this approach was supported by the City of Busselton's Mr Will Oldfield to avoid unnecessary visual clutter where possible.

### **3.3 Soil and Tissue Sampling**

Soil and plant tissue samples associated with dead or dying plants were collected according to standard methods (DPaW, 2015). All samples were kept cool and couriered to the Vegetation Health Service (VHS) laboratory at Kensington, where diagnostic baiting was conducted. The sample results were used as supporting evidence for the presence or absence of dieback within the study area.

## 4.0 RESULTS

### 4.1 Assessment Category Distribution

The assessment category distribution is summarised below and shown spatially with tabulated areas on Figure 1.

- P.c. Infested (total: 3.07 ha) – this is the most extensive category in the study area. This category was rationalised to include the infested drainage network, downslope areas from the disease risk road and internal open-access tracks that have previously been determined and sign-posted as Infested, plus areas less than 100 m width from the infested centre of the reserve, where a positive sample result was obtained and areas considered too small to manage where autonomous spread is likely to occur, if the disease is not already present within them.
- Uninterpretable (total: 0.58 ha) - this category was applied to two separate areas where indicator plants are too few, sparse or fragmented by disturbance or plantings to enable interpretation. One of these areas forms a narrow linear strip of vegetation on the reserve's northern boundary (0.30 ha). Following discussion with the City of Busselton, this area was mapped as protectable on the basis of it remaining prominent on maps that may be used to guide operators during any phosphite treatment as the scattered vulnerable plants remaining contribute to visual amenity for adjacent residences and bushwalkers. The second Uninterpretable area is situated in the southeast corner of the reserve within the approved development clearing envelope making it unprotectable (0.28 ha).
- Excluded (total: 0.48 ha) – this category was applied to existing cleared areas and non-remnant vegetation.

### 4.2 Disease Expression

Across the study area disease expression varied. It was generally obvious on the drier peripheral areas of the reserve where a range of mid-storey and under-storey indicator plants were found dead and dying. Some areas of endemic disease syndrome exist that showed very little current disease activity. In these areas very old dead *Xanthorrhoea preissii* stumps and *Banksia littoralis* stags were observed, and some had recolonised. These sites were located near to, and north of, the central drainage line where reduced biomass is also evident.

### 4.3 Disease Impact

When evaluating disease impact, the vegetation community within the reserve appears to naturally have a lower abundance of susceptible plants present when compared to the drier soils located within the upslope Marri Reserve. Thus the disease impact ranges from subtle to moderate within Armstrong Reserve compared to within Marri Reserve where moderate to high impact areas can be found. The high soil moisture on-site, particularly in the central part

supports wetland plants and some remaining susceptible plants. Longer-term predicted impact within Armstrong Reserve associated with autonomous spread is therefore likely to continue to be subtle in its central part and moderate towards the drier outer perimeter depending on rainfall and soil moisture.

#### 4.4 Soil and Tissue Samples

A total of four soil and plant tissue samples were collected with the strategy focusing on:

- Recovering positive sample results within the Reserve as none have previously.
- Gaining evidence of a very old *Phytophthora* infestation through sampling very old plant deaths where no recent deaths or disease front was present.
- Typical drought and fire damaged plant deaths to rule them out where they were close to infested plants along drier perimeter areas.

Two samples tested positive for *P.c.*. This included sample #2 collected from two recently dead *Xanthorrhoea* spp. situated close to a drainage line. Sample #4 was collected from a very old and burnt dead *X. preissii* located up-slope from the central infested drainage line in the reserve. Together the wide age-of-death difference between these sampled plants indicates that the pathogen has been present for a very long period of time and has moved progressively through the reserve. Two samples tested negative for *P.c.*. This included samples #1 and #3 collected from within areas where significant fire, drought and insect damage was noted. These negative results were expected.

A range of plants were sampled and tested. Soil and tissue samples were collected from both *X. preissii* and *B. grandis* within Sample #1. Sample #2 included material from *X. preissii* and *X. gracilis*. This is not standard sampling procedure but was applied to increase the possibility of returning a positive result amongst plant deaths that appeared to mimic *P.c.* and these plants were situated very close to each other. All sample details are summarised in Appendix A.

#### 4.5 Mapping

Two figures have been prepared as a result of this assessment including:

**Figure 1. *Phytophthora* Occurrence Map** – this shows the spatial distribution, size and shape of assessment categories, mapped internal drainage and track lines and where existing dieback signage has been installed previously at four access points around the reserve.

**Figure 2. *Phytophthora* Management Map** – this map includes the above details plus suggested locations for applying hygiene protocols. It was prepared to guide hygiene management at the project site and can also assist when planning any longer-term dieback management within the reserve.

**Note: Validity of Mapped Data** - DPaW methodology published in 2015 prescribes limitations on *Phytophthora* maps as follows: *Phytophthora* mapping expires after 1 year (January 2016) and can be revalidated (rechecked) annually for up to 3 years after interpretation (January 2018).

## 5.0 CONCLUSION

At a broad-scale, when considering this reserves location within the vulnerable *Phytophthora* zone, its landscape position, annual rainfall, seasonally wet soils, historical disturbances, drainage system and presence of scattered susceptible plants; it has suitable environmental conditions for the pathogen to easily survive.

Armstrong Reserve was assessed for *Phytophthora* occurrence in January 2015 and found to be extensively infested. This reserve has a long history of disturbance within it (i.e. accessible tracks, firebreak and carpark construction, importation of gravel and drainage-line excavations. It is also situated downslope from infestations within Marri Reserve and is connected to its drainage that is an ongoing vector for the pathogen (and weeds) to spread.

The vegetation in this reserve includes many wetland species plus scattered dieback indicator plants some of which are healthy in small patches. Parts have also regenerated well post-fire and the seasonally damp soils support plant growth that can "mask" the occurrence of an old *Phytophthora* infestation (they also support *Phytophthora*). However, observable evidence such as fresh plant deaths in outer areas and old tree and plant deaths towards the centre of the infestation are typical of endemic disease syndrome. Laboratory testing of soil and plant tissue samples collected during this assessment has also proven the presence of *P.c.* within Armstrong Reserve.

Purely from an ecological perspective (even though the area has been determined as largely infested), the plant community still contains scattered patches of healthy susceptible and non-susceptible plant species. The author considers Armstrong Reserve as potentially having some scientific, biodiversity, fauna habitat and amenity value to the local community.

As a result of this assessment, standard precautionary hygiene management measures have been recommended below primarily to minimise the risk of spreading *P.c.* beyond the project site and to minimise potential impacts on the receiving environment. Employing these management measures will compliment weed prevention within the reserve associated with construction and human-vectoring activities.

## 6.0 RECOMMENDATIONS

This report and the recommended management measures below were provided to the Department of Parks and Wildlife prior to finalising this document.

Employing the following recommendations during each phase of the project will assist to reduce the risk of spreading *P.c.* (and weeds) during project activities, particularly from within the reserve to any external vulnerable areas. A *P. cinnamomi* Management Map has been prepared for this project (see Figure 2). These recommendations align with best-practice dieback hygiene and include management measures typically applied to a project of this scale in a largely infested natural area.

To manage hygiene at the interface of the project development footprint and main access roads, two possible Clean on Entry/Exit (COE) locations have been identified on Figure 2. COE1 is located at the cul-de-sac on Armstrong Place and is suitable as a dry-soil clean-down entry/exit point. Its location will minimise traffic risks and management. A second point (COE2) is situated at the site access from Naturaliste Terrace that is bitumen sealed for up to 50 m within the reserve.

If site operations are necessary during wet-soil conditions, an effective wash-down station could be set-up at the [point marked CL1 on Figure 2. This area is cleared from vegetation and any effluent could easily be channelled into the immediately adjacent and infested open drainage line within the reserve. Avoiding the need for a wash-down station and manage its effluent on site altogether could be achieved by ensuring vehicles, machinery, tools and work boots arrives clean to site and operating in dry-soil conditions only. Brushes and hard tools could be used to clean-down the aforementioned items. If however operations occur in wet-soil conditions, to remove mud and sand stuck to vehicles/machinery before they exist the site, it is suggested that stiff brushes and a high-pressure hose is used and that water is not mixed with a sterilant or chlorine solution given that it will drain directly into a bushland reserve area.

Figure 2 should be used in conjunction with the following management measures.

### 6.1 Dieback Hygiene Management Measures

#### **Management Measures for the CapeCare Project Development Site**

1. Where practical, schedule activities in dry-soil conditions to minimise clean-down effort and avoid the need for a wet-clean-down area.
2. If developing a temporary wet-clean-down area during operations at CL1 on Figure 2, ensure it is situated on a hard-stand area and all effluent is contained and directed into the existing open drainage adjacent to CL1. This will avoid water ponding where vehicle movements exit the site. Any drainage modifications in this area should be re-instated post construction or managed as agreed with the City of Busselton.
3. Include relevant dieback management measures in project contractual documentation and site induction materials.
4. Induct site personnel and any service providers on their dieback management obligations prior to their commencement of work on site.

5. Establish Clean-On-Entry/Exit (COE) points with signage for site personnel.
6. All machinery, vehicles, work-boots and equipment should arrive to the site and exit the site cleaned free of mud, soil and plant material. Tools such as stiff bristled brushes, spades and crow-bars are suitable to dislodge dry materials from vehicles and machinery. It is not necessary to remove dust particles on the bodies of vehicles or machinery.
7. Clearly establish and demarcate the limits of clearing to contain all activities within them so surrounding vegetation is not disturbed. Installation of a permanent fence on the perimeter of the project development boundary is suggested.
8. Restrict the movement of machines and other vehicles to within the limits of clearing.
9. Prohibit parking or stockpiling any materials on vegetated areas of the reserve.
10. It is preferable to utilise any cleared vegetation in-situ either for fauna habitat, mulching or re-planting within infested areas only.
11. Any cleared vegetation removed from the site should be transported in a manner to avoid spillage and disposed of at a local government approved facility. It is important to inform the local government that it was sourced from an area with known *Phytophthora* Dieback to prevent it being included in any mulch recycling for public or wider use in natural areas.
12. Monitor the implementation and compliance of these management measures.
13. Contact DPaW or BARK Environmental for further specialist advice on managing this aspect if required.

#### **Longer-term Management Measures for the City of Busselton's Armstrong Reserve**

1. Where practical, schedule activities in dry-soil conditions to minimise clean-down effort.
2. Include relevant dieback management requirements in contractor and service provider documentation when planning work in Armstrong Reserve.
3. Ensure field staff and contractors are aware of this areas dieback occurrence status and the need to apply relevant hygiene and clean-down protocols during their site activities, particularly ensuring clean-down when exiting the reserve to work in another bushland area.
4. Fence the perimeter of the reserve, retain gated strategic tracks and close any unnecessary internal tracks to prevent further illegal rubbish and garden waste dumping.
5. It is recommended that Phosphite be applied within the reserve through stem injection and foliar spray. This has been proven to reduce the impact of *Phytophthora* within an infested plant community.
6. If recommendation 5 is implemented, consider inviting local residents or a bushland-friends-group to participate in stem injecting to encourage stewardship of the reserve and awareness of *Phytophthora* dieback.
7. It is suggested the City of Busselton upload the *Phytophthora* occurrence status of this reserve on the City's GIS system for future reference.

## 7.0 REFERENCES

- Conservation and Land Management (CALM). (2003). *Phytophthora cinnamomi and disease caused by it, Volume I: Management Guidelines*. CALM, Western Australia.
- Department of Environment and Conservation (DEC). 2009. *Phytophthora Dieback – detecting the pathogen*. Information Sheet 8 / 2009. DEC Science Division.
- Dieback Working Group (DWG). 2000. *Managing Phytophthora Dieback: Guidelines for Local Government*. DWG.
- Ecoscape (2010). Armstrong Reserve, Dunsborough. Flora and Vegetation Assessment. Ray Village
- Elscot, S & Green Iguana (2003). *A Management Plan for Marri Reserve (28683) and Armstrong Reserve (25229 and 40445) - Dunsborough (Draft)*, Unpublished report for the Shire of Busselton.
- Spencer (2011). Unpublished report prepared for the City of Busselton for *Phytophthora* dieback assessments over strategic firebreaks. [this reference title should be confirmed with the City of Busselton who were unable to be contacted at the time of this submission].
- Webb, A (2009), Nomination of a Western Australian Ecological Community for Listing as Threatened, Priority, Change of Status or Delisting, Unpublished report for the Department of Environment and Conservation.



**FIGURE 1**

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*Phytophthora cinnamomi*  
Occurrence Map

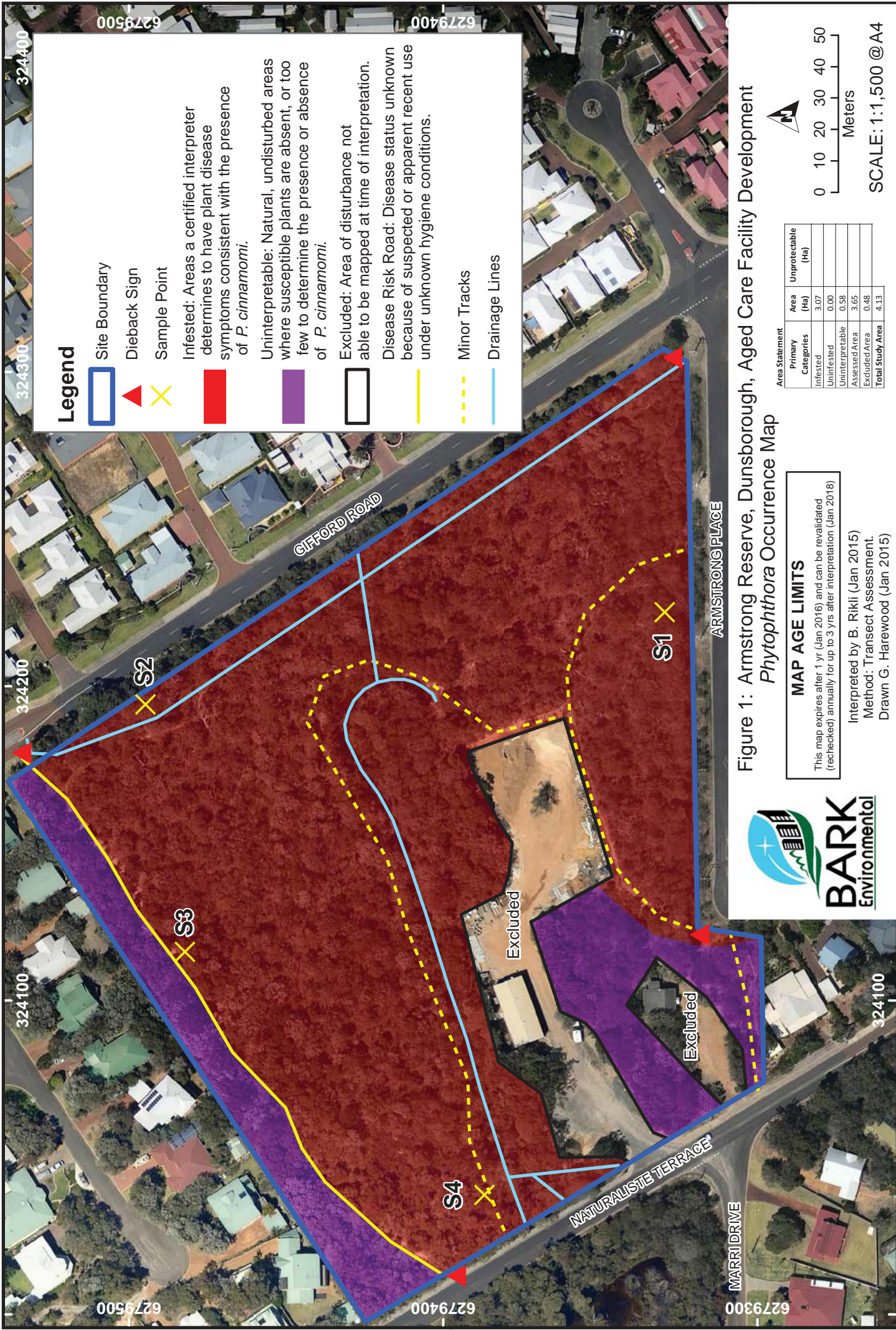


Figure 1: Armstrong Reserve, Dunsborough, Aged Care Facility Development  
Phytophthora Occurrence Map

## FIGURE 2

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*Phytophthora cinnamomi*  
Management Map





### Legend

- Site Boundary
- Proposed Development Footprint
- Existing Dieback Sign
- Sample Point
- Excluded: Area of disturbance not able to be mapped at time of interpretation.
- Infested: Areas a certified interpreter determines to have plant disease symptoms consistent with the presence of *P. cinnamomi*.
- Uninterpretable: Natural, undisturbed areas where susceptible plants are absent, or too few to determine the presence or absence of *P. cinnamomi*.
- Unprotectable: Areas where current *P. cinnamomi* symptoms may spread into autonomously
- COE 1: Clean on Entry & Exit
- CL 1: Clean Down Location
- Disease Risk Road
- Minor Tracks
- Drainage Lines



SCALE: 1:1,500 @A4

Area Statement		
Primary Categories	Area (Ha)	Unprotectable (Ha)
Infested	3.07	
Uninfested	0.00	
Uninterpretable	0.58	0.28
Assessed Area	3.65	
Excluded Area	0.48	
Total Study Area	4.13	

### MAP AGE LIMITS

This map expires after 1 yr (Jan 2016) and can be revalidated (rechecked) annually for up to 3 yrs after interpretation (Jan 2018)

Interpreted by B. Rikli (Jan 2015)  
Method: Transect Assessment.  
Drawn G. Harewood (Jan 2015)



Figure 2: Armstrong Reserve, Dunsborough, Aged Care Facility Development  
Phytophthora Management Map

## APPENDIX A

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### Sample Details and Results



**SEND TO:** Vegetation Health Service, Ecosystem Health Branch – Dept. Parks & Wildlife, 17 Dick Perry Ave, KENSINGTON 6151  
**Phone:** (08) 9334 0317 **Fax:** (08) 9334 0114

**CONTACT DETAILS of sender**

Name **BARK Environmental** Phone No. 0400 208 582  
 Fax No. \_\_\_\_\_  
 DEC Office or Company Name \_\_\_\_\_

**GDA**  
 (1)  
 GDA 94 \_\_\_\_\_

**Job Type (Please indicate)**  
 D.E.C. (C) ☐ Alcoa (A) ☐  
 Recoup (R) ☐ FPC ☐  
 Private (P) ☒ Other \_\_\_\_\_

**VHS USE ONLY**  
 Date received **9.12.14**  
 Date faxed **15.12.14**

VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Give location, eg. Forest Block or Shire, etc. and sample number)	Plant species sampled	Site Impact (2)	Zone 50 or 51	Map Reference (3)	Land Tenure (4)	RESULT s/s root (5)	RESULT bait (5)
VHS31892	4.12.14	S1 – ARMSTRONG RSVE	X. preissii B. grandis	L	50	E 0324223 N 6270330	R		NEG
VHS31893	4.12.14	S2 – ARMSTRONG RSVE	X. preissii X. gracilis	L		E 0324201 N 6279500	R		CIN
VHS31894	4.12.14	S3 – ARMSTRONG RSVE	B. littoralis	L		E 0324115 N 6279482	R		NEG
VHS31895	4.12.14	S4 – ARMSTRONG RSVE	X. preissii	L	↑	E 0324038 N 6279387	R		CIN
						E – – – – – N – – – – –			
						E – – – – – N – – – – –			

**NOTES:**

- Please tick this box if your map references are supplied in the **GDA 94** standard. If not, please specify the datum used.
- Site Impact - Low, Moderate, or High (as in the Dieback Interpreter's Manual).
- An MGA map reference with prefixes **must** be supplied for all samples.
- Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (Other - describe in comments below).
- Result codes used – CIN = *Phytophthora cinnamomi*, MUL = *P. multivora*, CRY = *P. cryptogea*, PI = *P. inundata*, ARE = *P. arenaria*, ELO = *P. elongata*, THE = *P. thermophila*, PM = *P. megasperma*, PN = *P. nicotianae*, CON = *P. constricta*, NEG = negative, SUB = subcultured for further tests

Please Note: a). NEG results cannot be used to represent a total absence of *Phytophthora* in the sampled area. b). Information from your samples will be incorporated into the VHS database.

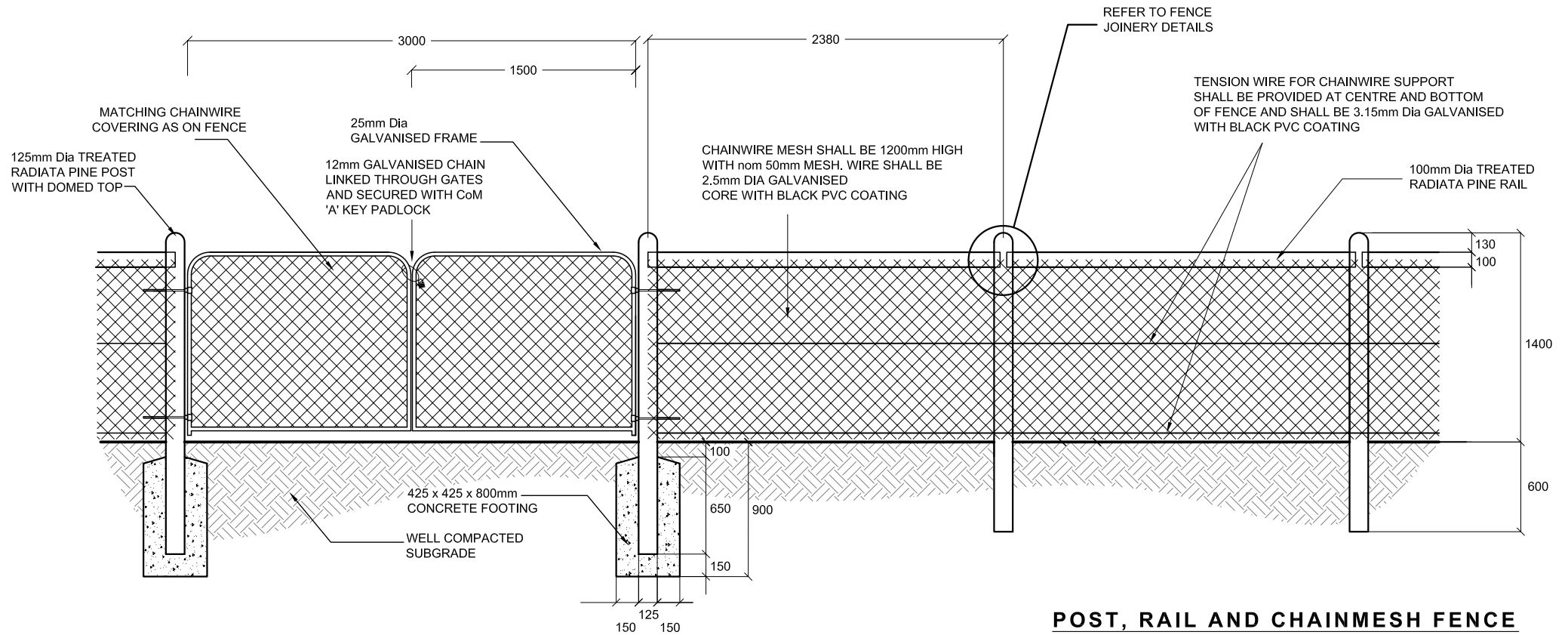
**COMMENTS:**

Please email results to: [barken@barkenvv@gmail.com](mailto:barken@barkenvv@gmail.com)

## **APPENDIX 8**

### **FENCING GUIDELINES**

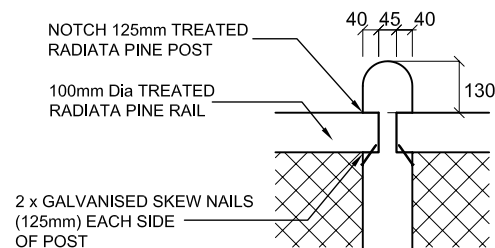
**(Source: City of Mandurah, 2008)**



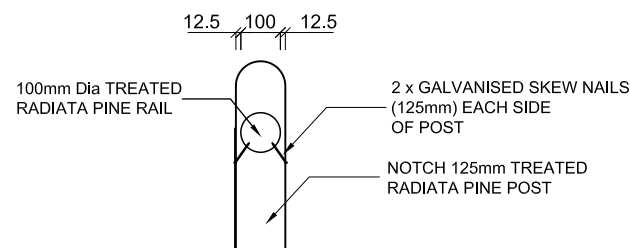
**POST, RAIL AND CHAINMESH FENCE**  
ELEVATION SCALE 1:40

### NOTES


1. ALL PINE TO BE TREATED AND SUITABLE FOR IN GROUND USE
2. POSTS TO BE DOME TOPPED AS SHOWN
3. TIES: CHAINWIRE SHALL BE SECURELY FIXED TO TENSION WIRES AT APPROXIMATELY 450mm cts AND POSTS IN TWO PLACES WITH 1.57mm dia GALVANISED CORE BLACK PVC COATED WIRE
4. TERMINAL AND CORNER POSTS TO HAVE 425mm x 425mm x 600mm CONCRETE FOOTING
5. SECURE MESH TO RAIL WITH GALVANISED STAPLES AT 450mm cts



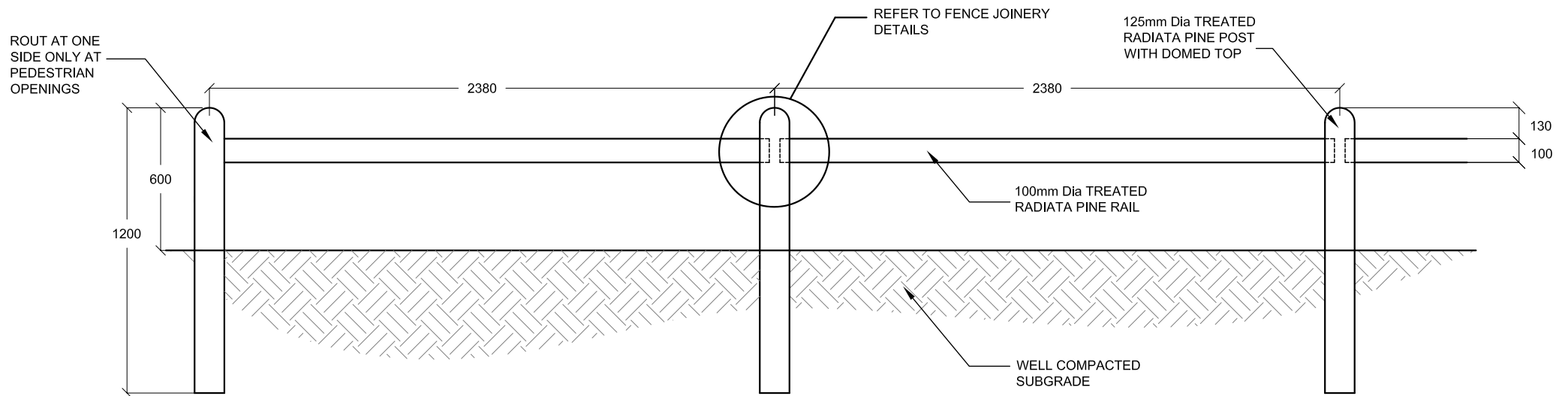
**FENCE JOINERY DETAIL**  
BACK SECTION SCALE 1:20



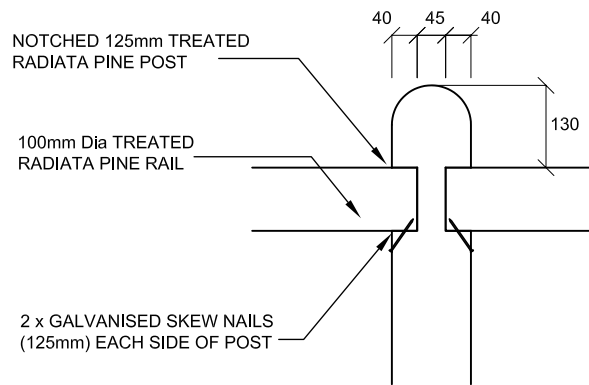
**FENCE JOINERY DETAIL**  
SIDE SECTION SCALE 1:20

REV. No.	DATE	DESCRIPTION	BY	CHKD	APPR	DATE	SIGNED		DATE		TITLE : BUSHLAND RESERVE FENCING TYPE 2				
							DESIGNED : R ROMYN	02/07							
							DRAWN: L PENFOLD	02/07							
							CHECKED : J HARRIS	15/08/08							
							AUTHORISED : J HARRIS	15/08/08							
0	07/08	ORIGINAL ISSUE	RR	JH	JH	15/08/08					FILE PATH : TBA	SCALE : 1:40	PAGE SIZE : A4	REVISION : 0	DRAWING NUMBER : STD LAN16/0

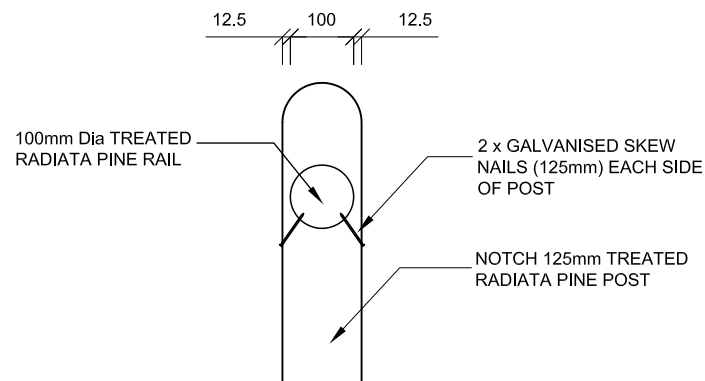




**POST AND RAIL FENCE**  
SCALE 1:25




**FENCE JOINERY DETAIL**  
BACK SECTION SCALE 1:20



**FENCE JOINERY DETAIL**  
SIDE SECTION SCALE 1:20

### NOTES

1. ALL PINE TO BE TREATED AND OF SUITABLE TIMBER CLASSIFICATION (H4) FOR INGROUND USE.
2. POSTS TO BE DOME TOPPED AS SHOWN
3. TERMINAL AND CORNER POSTS TO HAVE 425mm x 425mm x 600mm CONCRETE FOOTING

REV. No.	DATE	DESCRIPTION	BY	CHKD	APPR	DATE	SIGNED	DATE		TITLE : POST AND RAIL FENCE (600mm HIGH)				
							DESIGNED : <u>L PENFOLD</u>	<u>02/07</u>		FILE PATH : TBA	SCALE : 1:25	PAGE SIZE : A4	REVISION : 0	DRAWING NUMBER : STD LAN17/0
							DRAWN : <u>L PENFOLD</u>	<u>02/07</u>						
							CHECKED : <u>J HARRIS</u>	<u>15/08/08</u>						
							AUTHORISED : <u>J HARRIS</u>	<u>15/08/08</u>						
0	07/08	ORIGINAL ISSUE	RR	JH	JH	15/08/08								

## **APPENDIX 9**

### **BUSHFIRE MANAGEMENT PLAN**

**(Source: Bushfire Prone Planning, 2018)**



---

# Bushfire Management Plan

(Development Application)

---

**Cape Care Dunsborough – Armstrong Village**  
Lot 600 Armstrong Place, Dunsborough

---

City of Busselton

Job Number:	170779
Assessment Date:	6 November 2017
Report Date:	31 August 2018

**BPP Group Pty Ltd t/a Bushfire Prone Planning**

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**Disclaimer**

The measures contained in this Bushfire Management Plan are considered to be minimum standards and they do not guarantee that a building will not be damaged in a bushfire, persons injured, or fatalities occur either on the subject site or off the site while evacuating. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions. Additionally, the correct implementation of the required bushfire protection measures (and any associated response/evacuation plan if applicable) will depend, among other things, on the actions of the landowners or occupiers over which Bushfire Prone Planning has no control.

All surveys, forecasts, projections and recommendations made in this report associated with the project are made in good faith based on information available to Bushfire Prone Planning at the time.


All maps included herein are indicative in nature and are not to be used for accurate calculations.


Notwithstanding anything contained therein, Bushfire Prone Planning will not, except as the law may require, be liable for any loss or other consequences whether or not due to the negligence of their consultants, their servants or agents - arising out of the services provided by their consultants.


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## Document Control

Version	Version Details	Date Submitted
1.0	Achievable BAL Report	9-Nov-17
1.1	Bushfire Management Plan	3-Aug-18
1.2	DFES Comments – Plan updated	31-Aug-18

Author	Accreditation	Signature
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Co-author		
Mike Scott	BPAD Level 3 - No. 27795	

Co-author		
Jason Benson	BPAD Level 1 - No. 37893	

### Document Content Compliance Statement

*This Bushfire Management Plan (the Plan) provides the required information to address State Planning Policy No. 3.7: Planning in Bushfire Prone Areas - December 2015 (SPP 3.7), the associated Guidelines for Planning in Bushfire Prone Areas - WAPC 2017 v1.3 (Guidelines), and any additional information as directed by the WA Planning Commission (WA Department of Planning, Lands and Heritage). It is fit for accompanying a planning application.*

Complex DA BMP Template v1.0

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## Executive Summary

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This Bushfire Management Plan (the Plan) has been prepared to accompany the development application for a proposed Aged Care Facility and Apartment Block on Lot 600 Armstrong Place, Dunsborough in the City of Busselton. The Aged Care facility will include 80 Care Beds and the Apartment Block will contain 21 individual Units & a Country Women's Association Hall (Armstrong Village).

The development site of approximately 1.29 Hectares and is within a designated bushfire prone area and the Proposal requires the application of *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7). The assessed bushfire risk is considered to be manageable and will be achieved by the identified stakeholders implementing and maintaining the bushfire risk management measures that are presented in this Plan. Assessment of the location, vegetation and consideration of existing infrastructure indicates that compliance is able to be achieved against all applicable bushfire related legislation, policy, standards and guidelines, including the Bushfire Protection Criteria.

- For Element 1 'Location', the Proposal is able to achieve the acceptable solution (by being subject to BAL-29 or less);
- For Element 2 'Siting and Design' the Proposal is able to achieve the acceptable solution (by installing an Asset Protection Zone (APZ) compliant with a BAL Rating of BAL-29 or less);
- For Element 3 'Vehicular Access', the site is provided with suitable vehicle access and egress;
- For Element 4 'Water', a reticulated water supply is available at the subject site and a hydrant is located adjacent to the subject site on Armstrong Road.

The proposed development can establish Asset Protection Zones within the lot boundary to ensure the potential radiant heat from a bushfire impacting the future buildings does not exceed 29kW/m<sup>2</sup> (BAL - 29).

The proposed development is provided with two-way vehicle access via Armstrong Place and Naturaliste Terrace which will provide safe access and egress to two different destinations. As public roads, they are available to all residents and the public at all times and under all weather conditions.

The proposed Armstrong Village is an aged care facility which is considered a 'vulnerable land use' under State Planning Policy 3.7. An Emergency Evacuation Response Plan is provided as a separate document, with specific consideration to the management of a bushfire emergency.

# 1 The Proposal and Purpose of the Plan

## 1.1 Details

<b>Proponent:</b>	Cape Care Dunsborough
<b>Site Address:</b>	Lot No. 600 Armstrong Place, Dunsborough
<b>Local Government:</b>	City of Busselton
<b>Lot Area:</b>	1.29 Ha
<b>Planning Stage:</b>	Development Application
<b>Development Type:</b>	Construction of Class 2, Class 9b and Class 9c buildings

### Overview of the Proposal:

This Bushfire Management Plan (the Plan) has been prepared to accompany the development application for a proposed Aged Care Facility and Apartment Block at Lot 600 Armstrong Place, Dunsborough. The Aged Care facility will include 80 Care Beds and the apartment block will contain 21 individual Units & a Country Women's Association (CWA) Hall.

<b>Bushfire Prone Planning Commissioned to Produce the Plan by:</b>	Gary Batt Associates & Architects
<b>Purpose of the Plan:</b>	To accompany a Development Application
<b>For Submission to:</b>	City of Busselton/ JDAP









RURAL / FARM

NATIVE BUSHLAND

COASTAL

BEACH

### COURTYARD THEMING

DERIVED FROM CROSS SECTION OF EXISTING LANDSCAPE

01 RURAL / FARM STYLE COURTYARD WITH HERB / VEGETABLE PLANTERS, FRUIT TREES AND SMALL GARDENING SHED OPPORTUNITIES FOR ACTIVE USE

02 BUSHLAND STYLE COURTYARD WITH DENSE NATIVE PLANTING, GRANITE BOULDERS, WATER FEATURE / BIRD BATH OPPORTUNITIES TO SERVE AS A REFLECTIVE SPACE

03 COASTAL STYLE COURTYARD WITH TURF AREA, COASTAL PLANTING AND LOUNGING OPPORTUNITIES TO SERVE AS A RELAXATION ZONE

04 BEACH STYLE COURTYARD WITH WATER FEATURE / DRY CREEK BED, SCULPTURAL ELEMENTS AND COASTAL PLANTING OPPORTUNITIES TO SERVE AS A REFLECTIVE SPACE

COMPACTED GRAVEL

CREEPING PLANT TO CLIMB UP BUILDING FACADE

PASSIVE SPACE WITH TURF AREA, GARDEN BED PLANTING AND SEATING OPPORTUNITIES

Secure parking

workshop/stores

GAIT TRAINING SPACE

ARMSTRONG PLACE

## ARMSTRONG VILLAGE, DUNSBOROUGH

SCHEMATIC DESIGN PREPARED FOR CAPECARE  
JULY 2018

JOB NO. 1709601  
1:250 @ A1

C1.101  
0 2.5 5 10 15 25m  
REV A

COPYRIGHT THIS DOCUMENT IS AND  
SHALL REMAIN THE PROPERTY OF PLAN E



### LANDSCAPE ARCHITECTS

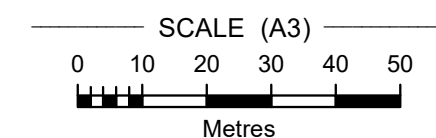
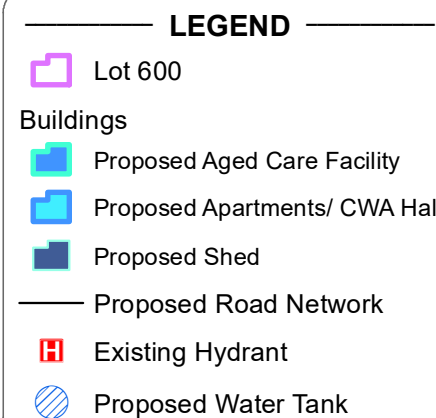
414 ROKEBY RD SUBIACO WA 6008  
T: (08) 9388 9566 E: mail@plane.com.au



Figure 1.2

## Proposed Development

Lot 600 Armstrong Place  
Dunsborough



Aerial Image: Landgate 2018





## 1.2 Existing Documentation Relevant to the Construction of this Plan

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

Relevant Documents		
Existing Document	Copy Provided	Title
Site Plan	Yes	Armstrong Village Site Plan
Landscape Concept Plan	Yes	1709601 Landscape Schematic
Bushfire Risk Assessments	Yes	170779 Lot 600 Armstrong Place, Dunsborough (Ach BAL)_v1.0
Environmental Management Plan	Yes	EMP - Armstrong Reserve, Dunsborough – Urban and Commercial Development – EndPlan Environmental (Oct 2015)

## 1.3 Vulnerable Land Use

### Definition and Application

A 'vulnerable land use' is defined as "a land use where persons may be less able to respond in a bushfire emergency". The Guidelines provide examples of what constitutes a vulnerable land use.

Information, additional to the Bushfire Management Plan, is required to accompany applications involving a vulnerable land use.

### Required Additional Information – Emergency Evacuation

Development applications for a vulnerable land use are to provide actionable information for persons that will occupy or visit that site with respect to their preparedness, awareness and response to a bushfire potentially impacting the property. The development application must:

1. "Include an emergency evacuation plan for proposed occupants";

*(Source: State Planning Policy No. 3.7: Planning in Bushfire Prone Areas - December 2015 (SPP 3.7) s7 and pm6.6 and Guidelines for Planning in Bushfire Prone Areas - WAPC 2017 v1.3 (Guidelines) s5.4 and s5.5.*

### Determination of Vulnerable Land Use - Category Applied

It has been determined that the proposed development is a 'vulnerable land use' based on fitting the following category of land use.

Category 1: Land uses and associated infrastructure that are designed to accommodate groups of people with reduced physical or mental ability.



The Proposed Armstrong Village is an Aged Care Facility which is considered a 'vulnerable land use'

### Required Additional Information and its Location within this BMP

A detailed and site specific Bushfire Response/Evacuation Plan for occupants.

*For any vulnerable land use not identified as a residential-based land use to be treated as minor development.*

Provided

Bushfire Emergency Response Plan to be provided as a separate document

Create a responsibility for the landowner/occupier to inform occupants of the existence and application of either the Bushfire Response/Evacuation Plan or the bushfire response/evacuation advice provided.

Provided

Within Section 5

## 2 Environmental Considerations

### 2.1 Native Vegetation – Modification and Clearing

**‘Guidelines’ s2.3:** “Many bushfire prone areas also have high biodiversity values. SPP 3.7 policy objective 5.4 recognises the need to consider bushfire risk management measures alongside environmental, biodiversity and conservation values.”

**Environmental Protection Act 1986:** “Clearing of native vegetation in Western Australia requires a clearing permit under Part V, Division 2 of the Act unless clearing is for an exempt purpose. Exemptions from requiring a clearing permit are contained in Schedule 6 of the Act or are prescribed in the Environmental Protection Regulations” (‘Guidelines’ s2.3).

**The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act):** This Act administered by the Australian Government Department of Environment, provides a national scheme of environment and heritage protection and biodiversity conservation. Nationally threatened species and ecological communities are a specific matter of significance. Areas of vegetation can be classified as a Threatened Ecological Community (TEC) under the EPBC Act and consequently have removal restrictions imposed.

#### Vegetation Modification and Clearing Assessment

Will on-site clearing of native vegetation be required?	Yes
Does this have the potential to trigger environmental impact/referral requirements under State and Federal environmental legislation?	Yes
For the proposed development site, have any areas of native vegetation been identified as species that might result in the classification of the area as a Threatened Ecological Community (TEC)?	No
Potential TEC species identified:	N/A

The key assumption used to facilitate the determining of Indicative Bushfire Attack Levels for the proposed development is that vegetation **onsite** is under the control of the landowner and therefore can be removed or modified to present a low bushfire threat (Note: any proposed vegetation removal may be subject to local government approval, dependent on the lot’s specific situation with respect to identified environmental protection areas and the lot size). As a result, onsite vegetation (Area 1 Forest) has been excluded from BAL Contour mapping over the Lot as this vegetation is to be removed or modified to a low threat state.

#### Environmental Information (Source – Endplan Environmental)

The project has a Schedule 6 exemption under Clause No. 2 ‘Assessment by Environmental Protection Authority’ as identified on page 10 of the Guide to the Exemptions and Regulations for Clearing Native Vegetation Under Part V of the Environmental Protection Act 1986 (Department of Environmental Regulation, April 2014). There are no Threatened Ecological Communities located on-site. Due to the presence of a Matter of National Environmental Significance under the EPBC Act, namely Western Ringtail Possum: a Threatened Species, the proponent has an Approval under the EPBC Act subject to conditions.

## Development Design Options

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

Minimising the Removal of Native Vegetation		
Design Option	Identified	Adopted
Cluster development	Considered and development location has been modified.	Yes
Modify the development location	Considered and development location has been modified.	Yes

## Impact on Adjoining Land

Is this planning proposal able to implement the required bushfire measures within the boundaries of the land being developed so as not to impact on the bushfire and environmental management of neighbouring reserves, properties or conservation covenants?	Yes
---	-----

## 2.2 Re-vegetation / Retained Vegetation / Landscape Plans

Riparian zones, wetland/foreshore buffers, road verges and public open space may have plans to re-vegetate or retain vegetation as part of the Proposal.

Vegetation corridors may join offsite vegetation and provide a route for fire to enter a development area.

When applicable, any such area will be identified in this Bushfire Management Plan and their impact on the assessment and future management accounted for.

Is re-vegetation of riparian zones and/or wetland or foreshore buffers and/or public open space a part of this Proposal?	No
Is the requirement for ongoing maintenance of existing vegetation in riparian zones and/or wetland or foreshore buffers and/or public open space a part of this Proposal?	No

## 3 Potential Bushfire Impact Assessment

### 3.1 Assessment Input

#### 3.1.1 Fire Danger Index (FDI) Applied

AS 3959-2009 specifies the fire danger index values to apply for different regions as per Table 2.1. The values used in the model calculations are for the Forest Fire Danger Index (FFDI) and for which equivalent representative values of the Grassland Fire Danger Index (GFDI) are applied as per Appendix B. The values can be refined if appropriately justified.

Table 3.1: Applied FDI Value

FDI Value			
Vegetation Area	As per AS 3959 - 2009 Table 2.1	As per DFES for the Location	Value Applied
All vegetation areas	80	80	80

#### 3.1.2 Existing Vegetation Identification, Classification and Effective Slope

Vegetation identification and classification has been conducted in accordance with AS 3959-2009 s2.2.3 and the Visual Guide for Bushfire Risk Assessment in WA (DoP February 2016).

When more than one vegetation type is present, each type is identified separately with the worst-case scenario being applied as the classification. The predominant vegetation is not necessarily the worst-case scenario.

The vegetation structure has been assessed as it will be in its mature state (rather than what might be observed on the day). Areas of modified vegetation are assessed as they will be in their natural unmodified state (unless maintained in a permanently low threat, minimal fuel condition, satisfying AS 3959-2009 s2.2.3.2-f and asset protection zone standards). Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its revegetated mature state.

**Effective Slope:** Is the ground slope under the classified vegetation and is determined for each area of classified vegetation. It is the measured or determined slope which will most significantly influence the bushfire behaviour in that vegetation as it approaches a building or site. Where there is a significant change in effective ground slope under an area of classified vegetation, that will cause a change in fire behaviour, separate vegetation areas will be identified, based on the change in effective slope, to enable the correct assessment.



Table 3.1.2: Vegetation identification and classification

All Vegetation Within 150 metres of the Proposed Development			
Vegetation Area	Identified Types (AS3959) or Description if 'Excluded'	Applied Classification	Effective Slope Under Classified Vegetation (degrees)
1	Low Open Forest (A-04) – ( <i>Onsite</i> )	Class A Forest	0
2	Low Open Forest (A-04)	Class A Forest	0
3	Low Open Forest (A-04)	Class A Forest	0
4	Low Open Forest (A-04)	Class A Forest	0
5	Excluded – Managed Areas (Buildings / Roads / non vegetated areas)	Excluded AS3959-2009 2.2.3.2 (e)(f)	-

Representative photos of each vegetation area, descriptions and classification justification, are presented on the following pages. The areas of classified vegetation are defined, and the photo locations identified on the topography and classified vegetation map, Figure 3.1.

Note<sup>1</sup>: As per AS 3959-2009 Table 2.3 and Figures 2.3 and 2.4 a-g

Note<sup>2</sup>: As per AS 3959-2009 Table 2.3.

### Vegetation Area 1

**Classification Applied:** Class A Forest

**Classification Justification:** Mixed Coastal Eucalypt Species, dense canopy (>70%) with grass and scrub under/middle story (Onsite)



Photo ID: 1a



Photo ID: 1b

### Vegetation Area 2

**Classification Applied:** Class A Forest

**Classification Justification:** Eucalypts & Peppermint, dense canopy with grass and scrub under/middle story (Offsite)



Photo ID: 2a



Photo ID: 2b

### Vegetation Area 3

**Classification Applied:** Class A Forest

**Classification Justification:** Paperbark & Peppermint, dense canopy, scrub under story (Offsite)



Photo ID: 3a



Photo ID: 3b

## Vegetation Area 4

**Classification Applied:** Class A Forest

**Classification Justification:** Coastal Scrub/ Wetland and Forest Area (Forest in Background)



Photo ID: 4a



Photo ID: 4b

## Vegetation Area 5

**Classification Applied:** Excluded AS3959-2009 2.2.3.2 (e)(f)

**Classification Justification:** Excluded – Low threat vegetation and non-vegetated areas (Residential Area)



Photo ID: 5a

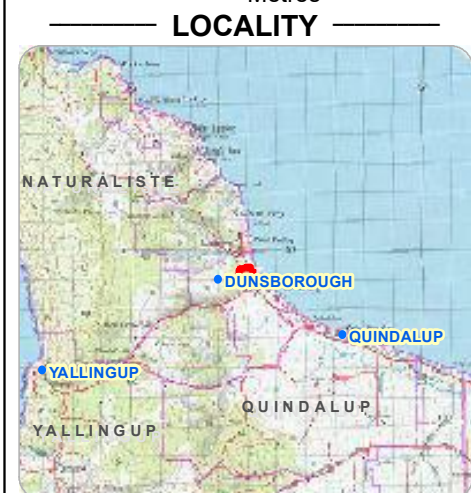
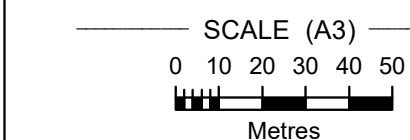
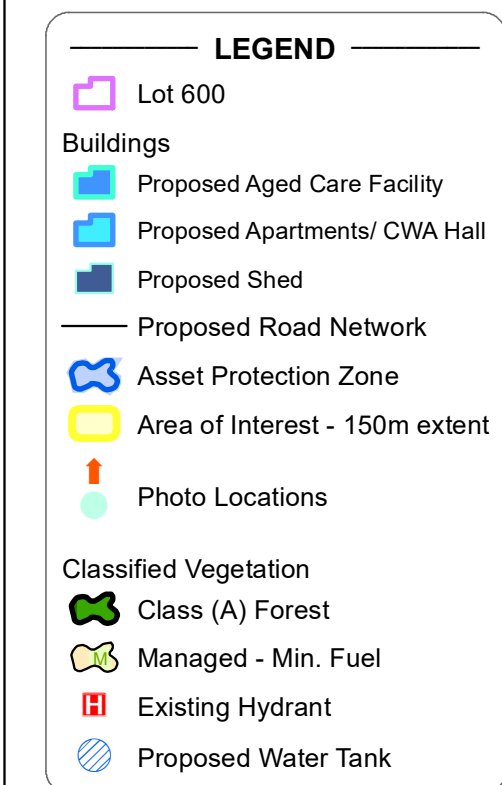


Photo ID: 5b



Figure 3.1  
Topography &  
Classified Vegetation

Lot 600 Armstrong Place  
Dunsborough



Aerial Image: Landgate 2018





### 3.1.3 Vegetation Separation Distance

**Vegetation Separation Distance:** Is the distance from the site or building to the area of classified vegetation and is measured in the horizontal plane.

In determining Bushfire Attack Level's (BAL's), the separation distance is either:

- A measured input variable to apply to calculations as per AS 3959-2009; or
- A range of distances (corresponding to BAL ratings) that is derived from the same calculations.

**Measured Separation Distance (m):** This is an actual measured distance, used as a calculation input to determine a BAL rating. Its use will apply when the actual location of a 'site' (building, envelope or lot) has been defined (refer to the site plan), and the separation distance can be measured. In this situation, a BAL rating for the 'site' can be determined.

**Derived Separation Distance (range in m):** This is a result derived from calculations using all other required inputs. The derived range states the distance away from an area of classified vegetation that corresponds to each BAL rating. Use of this methodology will apply when:

- The actual location of a 'site' (building, envelope or lot) has not been defined and therefore an actual separation distance cannot be measured; or
- The use of a distance range that corresponds to a BAL rating is more appropriate to the assessment of the proposal; or
- The assessment requires the production of a BAL contour map to assess planning viability and provide indicative BAL ratings (and in certain circumstances, determined BAL ratings).

The derived separation distance ranges will be presented in this Section 3.2 'Assessment Output'.

Table 3.1.3: Statement of the determination method applied and location of results.

Vegetation Area	Method Applied for Determination of Separation Distance	Location of Results in this Plan
1-4	Distance Range (m) - Method 1 Default Range	Table 3.2.1 in s3.2.1 'BAL Contour Map'

## 3.2 Assessment Output

### 3.2.1 BAL Contour Map - Bushfire Attack Level (BAL) Results

#### **BAL Contour Map - Interpretation**

The contour map will present different coloured contour intervals constructed around the classified bushfire prone vegetation. These represent the different Bushfire Attack Levels (BAL's) that exist as the distance increases away from the classified vegetation. Each BAL represents a set range of radiant heat flux that can be generated by the bushfire in that vegetation. The width of each shaded contour interval (i.e. the applicable vegetation separation distances corresponding to a BAL rating) will vary and is determined by consideration of variables including vegetation type, fuel structure, ground slope, climatic conditions. They are unique to a site and can vary across a site.

#### **BAL Contour Map - Planning Applications**

BAL contour mapping is primarily a planning tool that is used to provide an overview as to the suitability of a site for development with respect to the extent to which bushfire is a potential threat to future buildings and persons on the subject land.

The mapping considers the development site (i.e. all existing or proposed lots) and does not necessarily consider the bushfire risk at an individual lot level or over different development time frames. Rather it is assessing the situation that will exist when the entire development has been completed, including any vegetation management that would reasonably be expected to take place as part of establishing buildings on the lots. On this basis, it helps decision makers determine the suitability of the proposed development for planning approval.

## Vegetation Separation Distances Applied to Construct the BAL Contours

The dimensions of the BAL Contours are derived as a range of distances (corresponding to BAL ratings) from calculations using AS 3959-2009 Bushfire Attack Level (BAL) assessment methodology.

**Derived Separation Distance (range in m):** This is a result derived from calculations using all other required inputs. The derived range states the distance away from an area of classified vegetation that corresponds to each BAL rating. Use of this methodology will apply when:

- The actual location of a 'site' (building, envelope or lot) has not been defined and therefore an actual separation distance cannot be measured; or
- The use of a distance range that corresponds to a BAL rating is more appropriate to the assessment of the proposal; or
- The assessment requires the production of a BAL contour map to assess planning viability and provide indicative BAL ratings (and in certain circumstances, determined BAL ratings).

The derived separation distance ranges corresponding to each BAL rating for each area of classified vegetation are determined by:

- Method 1 – taken from AS 3959-2009 Table 2.4.3 as determined by the vegetation classification and effective slope (the other required inputs are model defaults); or

Table 3.2.1: Vegetation separation distances applied to construct the BAL contours.

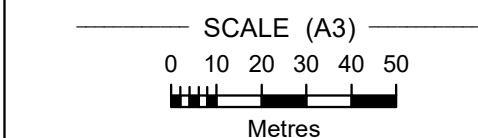
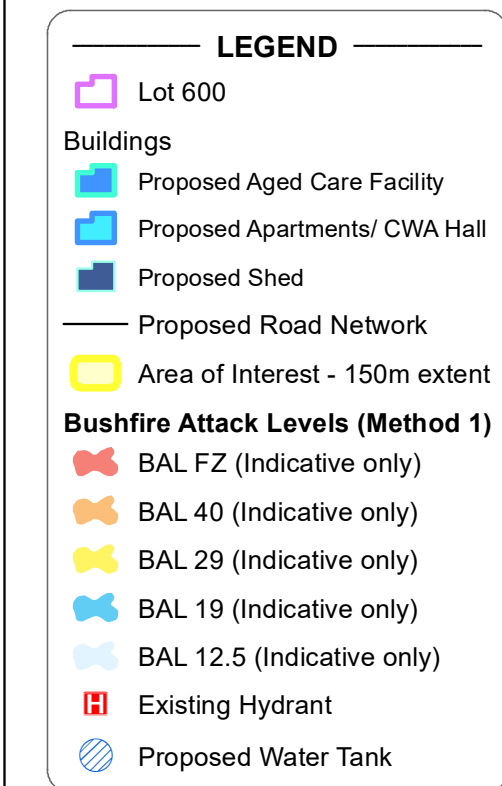
Derived Vegetation Separation Distances								
Vegetation Area	Vegetation Classification	Effective Slope (degrees)	BAL Assessment Method Applied <sup>1</sup>	BAL Rating and Corresponding Separation Distance (metres)				
				BAL-FZ	BAL-40	BAL-29	BAL-19	BAL12.5
1	Class A Forest	0	Method 1	<16	16-<21	21-<31	31-<42	42-<100
2	Class A Forest	0	Method 1	<16	16-<21	21-<31	31-<42	42-<100
3	Class A Forest	0	Method 1	<16	16-<21	21-<31	31-<42	42-<100
4	Class A Forest	0	Method 1	<16	16-<21	21-<31	31-<42	42-<100



Figure 3.2

# Indicative BAL Contour Map

Lot 600 Armstrong Place  
Dunsborough



Aerial Image: Landgate 2018





### 3.2.2 BAL Contour Map - Indicative/Determined Bushfire Attack Levels (BAL's)

#### Deriving BAL Ratings from the BAL Contour Map

**Indicative BAL Ratings:** If the assessed BAL for a lot or building envelope (the 'area') is stated as being 'indicative', it is because that 'area' is impacted by more than one BAL contour interval and/or classifiable vegetation remains on the lot, or on adjacent lots, that can influence a future building's BAL rating (and this vegetation may have been omitted from being contoured for planning purposes e.g. Grassland or when the assumption is made that all onsite vegetation can be removed and/or modified).

In this report, the indicative BAL is presented as either the highest BAL impacting the 'area' or as a range of achievable BAL's within the 'area' – whichever is the most appropriate.

The BAL rating that will apply to any future building within that 'area' will be dependent on:

1. vegetation management onsite; and/or
2. vegetation remaining on adjacent lots; and/or
3. the actual location of the future building within that 'area'.

A BAL Certificate cannot be provided for future buildings within an 'area' with an indicative BAL until the location of any future building has been determined. A report confirming the location and BAL rating will be required and submitted with the BAL certificate.

**Determined BAL Ratings:** If the assessed BAL for a Lot or building envelope (the 'area') or existing building, is stated as being 'determined' it is because that 'area' or building is impacted by a single BAL contour interval. This has been determined by offsite classified vegetation, and no classifiable vegetation currently exists on the lot or on adjacent lots (i.e. it has been cleared to a minimal fuel, low bushfire threat state).

As a result, a determined BAL can be provided in this limited situation because:

1. No classified vegetation is required to be removed or modified to achieve the determined BAL, either within the lot or on adjacent lots (or if vegetation is excluded from classification, it is reasonable to assume it will be maintained in this state into the future); and
2. A future building can be located anywhere within the 'area' and be subject to the determined BAL rating; and
3. The degree of certainty is more than sufficient to allow for any small discrepancy that might occur in the mapping of the BAL contours.

A BAL Certificate (referring to the BAL Contour Map assessment) can be provided for a future building on those 'areas' assessed as having a determined BAL as long as the assessment is still valid and there is no requirement to reassess the vegetation and update the contour map (this is a dependant on the time that has passed since the original assessment). A BAL Certificate will only remain valid for one year.



### 3.2.3 Indicative Bushfire Attack Levels

The indicative Bushfire Attack Levels for the proposed development are stated and if appropriate, the required building setback for a future building to achieve the stated BAL rating is stated (typically determined if the indicative BAL is BAL-40 or BAL-FZ). The building setback is the distance from the lot boundary/s corresponding to the vegetation areas presenting the highest indicative BAL.

Once actual building locations are determined at a later planning stage, the BAL ratings for specific buildings or building envelopes may need to be determined by an onsite visit to confirm the proposed vegetation management has taken place and measure the separation distances as required.

**Table 3.2.3:** Indicative bushfire attack levels for the Proposed Buildings

BAL Results – Summary of Assessment (detail of assessment and determination is presented in the following sections of this report)		
Proposed Building	BAL Status (Indicative or Determined)	Bushfire Attack Level
Proposed Age Care Facility (1)	Indicative Only	BAL-29
Proposed Apartments and CWA Hall (2)	Indicative Only	BAL-29
Proposed Shed (Non-Habitable)	Indicative Only	BAL-FZ

### 3.2.4 Identification of Specific Issues Arising from BAL Contour Map

#### Onsite Vegetation

Vegetation onsite is within the control of the subject site's landowner and therefore can potentially be removed or modified to lower the bushfire risk, subject to any approval being required by a local government.

#### Impact from Vegetation – As It Currently Exists

The key assumption used to facilitate the determining of Indicative Bushfire Attack Levels for the proposed development is that vegetation **onsite** is under the control of the landowner and therefore can be removed or modified to present a low bushfire threat (Note: any proposed vegetation removal may be subject to local government approval, dependent on the lot's specific situation with respect to identified environmental protection areas and the lot size). As a result, onsite vegetation (Area 1 Forest) has been excluded from BAL Contour mapping over the Lot as this vegetation is to be removed or modified to a low threat state.

#### Offsite Vegetation

Vegetation offsite is not within the control of the subject site's landowner and therefore the vegetation cannot be removed or modified by the landowner and as a result the assessed BAL's determined by this vegetation are unable to be reduced.

## 4 Assessment Against the Bushfire Protection Criteria (BPC)

### 4.1 Bushfire Protection Criteria - Assessment Summary

Summarised Outcome of the Assessment Against the Bushfire Protection Criteria (BPC)				
Element	Basis for the Assessment of Achieving the Intent of the Element			
	Achieves compliance with the Element through meeting Acceptable Solutions		Achieves compliance with the Element by application of a Performance Based Solution	Minor or Unavoidable Development
	Meets all relevant acceptable solutions	One or more relevant Acceptable Solutions are not <u>fully</u> met. A <u>variation</u> of the solution is provided and justified.	One or more applicable Acceptable Solutions are not met. A solution is developed with the summary presented in this Plan in Section 5.5. The supporting document presenting Bushfire Prone Planning's detailed methodology is submitted separately to the decision makers.	The required supporting statements are presented in this Plan.
Location	✓			N/A
Siting and Design of Development	✓			
Vehicular Access	✓			
Water	✓			

The subject Proposal has been assessed against:

1. The requirements established in Appendix 4 of the Guidelines for Planning in Bushfire Prone Areas, WAPC 2017 v1.3 (the 'Guidelines'). The detail, including technical construction requirements, are found at <https://www.planning.wa.gov.au/8194.aspx>. A summary of relevant information is provided in the appendices of this Plan; and
2. Any endorsed variations to the Guideline's acceptable solutions and associated technical requirements that have been established by the relevant local government. If known and applicable these have been stated in Section 5.2 of this Plan with the detail included as an appendix if required by the relevant local government.

## 4.2 Bushfire Protection Criteria – Acceptable Solutions Assessment Detail

### 4.2.1 Element 1: Location

<b>Bushfire Protection Criteria Element 1: Location</b> Assessment Statements and Bushfire Protection Measures to be Applied			
<b>Intent:</b> To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.			
<b>Acceptable Solution:</b>	<b>A1.1: Development Location</b>	<b>Method of achieving Element compliance and/or the Intent of the Element:</b>	<b>The acceptable solution will be fully met in the future (at a later planning stage).</b>

The proposed development achieves compliance by:

- Being subject to BAL-29 or lower. This is achieved by implementing the bushfire risk management measures of positioning, design and/or onsite vegetation modification as identified within this Plan; and
- The bushfire risk being additionally managed by the present existence and/or future implementation of bushfire risk management measures that include the requirements for vehicular access, firefighting water and the ongoing maintenance of all measures as identified within this Plan.

### 4.2.2 Element 2: Siting and Design of Development

<b>Bushfire Protection Criteria Element 2: Siting and Design of Development</b> Assessment Statements and Bushfire Protection Measures to be Applied			
<b>Intent:</b> To ensure that the siting and design of development (note: not building/construction design) minimises the level of bushfire impact.			
<b>Acceptable Solution:</b>	<b>A2.1: Asset Protection Zone</b>	<b>Method of achieving Element compliance and/or the Intent of the Element:</b>	<b>The acceptable solution will be fully met in the future (at a later planning stage).</b>

The proposed development achieves compliance by:

- Ensuring future building work and existing buildings on the lot can have established around it an APZ of the required dimensions - to ensure that the potential radiant heat from a bushfire to impact future building/s, does not exceed 29 kW/m<sup>2</sup> (i.e. a BAL rating of BAL-29 or less will apply to determine building construction standards);
- The landowner/s having the responsibility of continuing to manage the required APZ as low threat vegetation in a minimal fuel state by maintaining the APZ to the required specifications by implementing the 'Standards for APZ's' (refer to Appendix 1) and the requirements of the local government's annual firebreak notice.

### 4.2.3 Element 3: Vehicular Access

#### **Bushfire Protection Criteria Element 3: Vehicular Access** Assessment Statements and Bushfire Protection Measures to be Applied

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

<b>Acceptable Solution:</b>	<b>A3.1: Two access routes</b>	<b>Method of achieving Element compliance and/or the Intent of the Element:</b>	<b>The acceptable solution will be fully met in the future (at a later planning stage).</b>
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The proposed development will have access to Armstrong Place and Naturaliste Terrace which will provide safe access and egress to two different destinations. The public roads will be minimum 6m wide roadways with traffic flow in both directions, designed and constructed with the local government road specifications for a public road.

<b>Acceptable Solution:</b>	<b>A3.5: Private Driveways</b>	<b>Method of achieving Element compliance and/or the Intent of the Element:</b>	<b>The acceptable solution will be fully met in the future (at a later planning stage).</b>
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The construction technical requirements established by the Guidelines and/or the local government can and will be complied with. These requirements are set out in Appendix 2.

<b>Acceptable Solution:</b>	<b>A3.8 Firebreak Width</b>	<b>Method of achieving Element compliance and/or the Intent of the Element:</b>	<b>The acceptable solution will be fully met in the future (at a later planning stage).</b>
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The proposed development will comply with the requirements of the local government annual firebreak notice issued under s33 of the Bush Fires Act 1954.

#### 4.2.4 Element 4: Water

##### **Bushfire Protection Criteria Element 4: Water**

Assessment Statements and Bushfire Protection Measures to be Applied

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

<b>Acceptable Solution:</b>	<b>A4.1 Reticulated Areas</b>	<b>Method of achieving Element compliance and/or the Intent of the Element:</b>	<b>The acceptable solution is fully met.</b>
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A reticulated water supply is available to the site. A hydrant is located directly adjacent to the subject site on Armstrong Place. The construction technical requirements established by the Guidelines and/or the local government can and will be complied with. These requirements are set out in Appendix 3. In addition to this, the requirements for fire hydrants are to satisfy the requirements of the approved Environmental Management Plan for the site.

Firefighting infrastructure for the associated Class of buildings shall be in accordance with the requirements of the BCA and relevant Australian Standards and shall include:

- On site water storage tanks with infill from the Water Corporation boundary fire service connection.
- Diesel operated combined hydrant/sprinkler fire pump-set to provide the required flows and pressures to each system.
- Booster and suction assemblies located at the boundary for DFES operational use in connection of their fire appliances in the event of a fire.
- Internal and external fire hydrants to provide the required hose coverage in accordance with AS2419 Fire Hydrant Standard.
- Fire hose reels installed only to the undercover carpark.
- Fire sprinklers to be installed only to the RCF in accordance with AS2118 Fire Sprinkler Standard and the BCA.

## 4.3 Additional Information for Required Bushfire Protection Measures

The purpose of this section of the Plan is:

- As necessary, to provide additional detail (to that provided in the tables of Section 5) regarding the implementation of the acceptable solutions for those persons who will have the responsibility to apply the stated requirements; As necessary, to detail specific onsite vegetation management requirements such as the APZ dimensions, management of Public Open Space or application of landscaping plans for onsite vegetation;

### 4.3.1 Vegetation Management

#### Asset Protection Zone (APZ) Dimensions that are to Apply

The required dimensions of the APZ will vary dependent upon the purpose for which the APZ has been defined. There are effectively three APZ dimensions that can apply:

1. An application for planning approval will be required to show that an APZ can be created which is of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m<sup>2</sup> (BAL-29); and
2. If the assessment has determined a BAL rating for an existing or future building is less than BAL-29, the APZ must be of sufficient size to ensure the potential radiant heat impact of a fire does not exceed the kW/m<sup>2</sup> corresponding to the lower assessed BAL rating; or
3. Complying with the relevant local government's annual firebreak notice may require an APZ of greater size than that defined by the two previous parameters.

The City of Busselton firebreak notice requires an APZ of 25m. However, as this application is for planning approval, the state planning legislative framework only requires an APZ in accordance with a BAL Rating of BAL 29. The dimensions (vegetation separation distances) that are to apply to the APZ for this Proposal are presented in the tables below.

The 'Planning (WAPC) BAL-29' APZ Required Dimensions for the Subject Site				
Requirement Set By		Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.3)		
Relevant Fire Danger Index (AS3959-2009 Table 2.1)				80
BAL Determination Method		Method 1 (as per AS 3959-2009 s2.2.6 and Table 2.4.3)		
Vegetation Area	Applied Vegetation Classification	Effective Slope (degrees)	Maximum Acceptable 'Planning' BAL	Required Separation Distance (metres)
1	Class A Forest	0	BAL-29	21
2	Class A Forest	0		21
3	Class A Forest	0		21
4	Class A Forest	0		21

## 5 Responsibilities for Implementation and Management of the Bushfire Protection Measures

Table 5.1: BMP Implementation responsibilities prior to occupancy or building for the Landowner (Developer).

<b>LANDOWNER (DEVELOPER) - PRIOR TO LOT SALE, OCCUPANCY OR BUILDING</b>	
No.	Implementation Actions
1	<p>The local government may condition a development application approval with a requirement for the landowner/proponent to register a notification onto the certificate of title (it may also need to be included on the deposited plan). This will be done pursuant to Section 70A Transfer of Land Act 1893 as amended ('Factors affecting use and enjoyment of land, notification on title:'). This is to give notice of the bushfire hazard and any restrictions and/or protective measures required to be maintained at the owner's cost.</p> <p>This condition ensures that:</p> <ol style="list-style-type: none"> <li>1. Landowners/proponents are aware their lot is in a designated bushfire prone area and of their obligations to apply the stated bushfire risk management measures; and</li> <li>2. Potential purchasers are alerted to the Bushfire Management Plan so that future landowners/proponents can continue to apply the bushfire risk management measures that have been established in the Plan.</li> </ol>
2	<p>Prior to sale and post planning approval, the entity responsible for having the BMP prepared should ensure that anyone listed as having responsibility under the Plan has endorsed it and is provided with a copy for their information and informed that it contains their responsibilities. This includes the landowners/proponents (including future landowners) local government and any other authorities or referral agencies ('Guidelines' s4.6.3).</p>
3	<p>Prior to development of the subject lot it is to be compliant with the relevant local government's annual firebreak order issued under s33 of the Bushfires Act 1954.</p>
4	<p>Establish the Asset Protection Zone (APZ) on the lot to the dimensions and standard stated in the BMP.</p>
5	<p>Prior to occupancy, install vehicular access within the lot to the required surface condition and clearances as stated in the Guidelines/BMP.</p>
6	<p>Prior to occupancy, a copy of the Bushfire Response/Evacuation Plan must be provided to the landowner/occupier and they are to be informed that it contains responsibilities that must be actioned due to the Proposed land use being defined as 'Vulnerable'. Certain information contained within the Bushfire Response/Evacuation Plan that has accompanied this Bushfire Management Plan, must be displayed in the building – as directed in the Bushfire Response/Evacuation Plan provided as a separate document.</p>
8	<p>Prior to any building work, inform the builder of the existence of this Bushfire Management Plan and the responsibilities it contains, regarding the required construction standards. This will be:</p> <ul style="list-style-type: none"> <li>• The standard corresponding to the determined BAL rating, as per the bushfire provisions of the Building Code of Australia (BCA).</li> </ul>

Table 5.2: Ongoing management responsibilities for the Landowner/Occupier.

<b>LANDOWNER/OCCUPIER - ONGOING</b>	
No.	Ongoing Management Actions
1	Maintain the Asset Protection Zone (APZ) to the dimensions and standard stated in the BMP
2	Comply with the City of Busselton annual Firebreak and Fuel Hazard Reduction Notice issued under s33 of the Bush Fires Act 1954.
3	Maintain vehicular access routes within the lot to the required surface condition and clearances as stated in the BMP.
4	Ensure that any builders (of future structures on the lot) are aware of the existence of this Bushfire Management Plan and the responsibilities it contains regarding the application of construction standards corresponding to a determined BAL rating.
5	Ensure all future buildings the landowner has responsibility for, are designed and constructed in full compliance with: <ol style="list-style-type: none"> <li>1. the requirements of the WA Building Act 2011 and the bushfire provisions of the Building Code of Australia (BCA); and</li> <li>2. with any identified additional requirements established by this BMP or the relevant local government.</li> </ol>
6	Maintain the Bushfire Response/Evacuation Plan and as it directs, the pages containing actionable information must continue to be displayed and available to all occupants. The key persons and all contact information must be checked annually and updated as necessary.

Table 5.3: Ongoing management responsibilities for the Local Government.

<b>LOCAL GOVERNMENT - ONGOING</b>	
No.	Ongoing Management Actions
1	Monitor landowner compliance with the Bushfire Management Plan and the annual Firebreak Order
2	Where control of an area of vegetated land is vested in the control of the local government and that area of land has influenced the assessed BAL rating/s of the subject site/s – and the BAL rating has been correctly assessed - there is an obligation to consider the impact of any changes to future vegetation management and/or revegetation plans with respect to that area.



## Appendix 1 - Onsite Vegetation Management Technical Requirements

It is the responsibility of the landowner to maintain the established bushfire protection measures on their property. Not complying with these responsibilities can result in buildings being subject to a greater potential impact from bushfire than that determined by the assessed BAL rating presented in this Bushfire Management Plan.

For the management of vegetation within a lot (i.e. onsite) the following technical requirements exist:

1. **The APZ:** Installing and maintaining an asset protection zone (APZ) of the required dimensions to the standard established by the Guidelines for Planning in Bushfire Prone Areas (WA Planning Commission, as amended). When, due to the planning stage of the proposal to which this Bushfire Management Plan applies, defined APZ dimensions are known and are to be applied to existing or future buildings – then these dimensions are stated in Section 5.4.1 of this Plan.
2. **The Firebreak/Fuel Load Notice:** Complying with the requirements established by the relevant local government's annual firebreak notice issued under s33 of the Bushfires Act 1954. Note: If an APZ requirement is included in the Notice, the standards and dimensions may differ from the Guideline's APZ Standard – the larger dimension must be complied with.
3. **Changes to Vegetated/Non-Vegetated Areas:**
  - a. If applicable to this Plan, the minimum separation distance from any classified vegetation, that corresponds to the determined BAL for a proposed building, must be maintained as either a non-vegetated area or as low threat vegetation managed to a minimal fuel condition as per AS 3959-2009 s2.2.3.2 (e) and (f). Refer to Part 4 of this Appendix 1.
  - b. Must not alter the composition of onsite areas of classified vegetation (as assessed and presented in Section 3.1.2) to the extent that would require their classification to be changed to a higher bushfire threat classification (as per AS 3959-2009); and
  - c. Must not allow areas within a lot (i.e. onsite) that have been:
    - i. excluded from classification by being low threat vegetation or non-vegetated; and
    - ii. form part of the assessed separation distance that is determining a BAL rating -...to become vegetated to the extent they no longer represent a low threat (refer to Part 4 of Appendix 1). Note: The vegetation classification exclusion specifications as established by AS 3959-2009 s2.2.3.2, are included at A1.4 below for reference.

## 1. Requirements Established by the Guidelines – the Asset Protection Zone (APZ) Standards

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

### Defining the Asset Protection Zone (APZ)

**Description:** An APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (by reducing fuel loads). The width of the required APZ varies with slope and vegetation. For planning applications, the minimum sized acceptable APZ is that which is of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m<sup>2</sup> (BAL-29). It will be site specific.

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

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

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

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

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

### Schedule 1: Standards for APZ

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

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

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

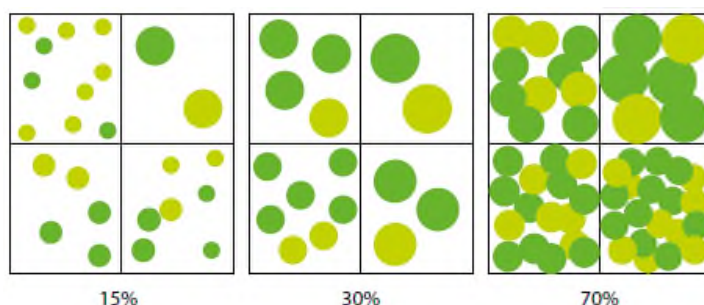
### Example Fine Fuel Load of Two Tonnes per Hectare



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

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

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



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

**Shrubs (0.5 metres to 5 metres in height):** should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m<sup>2</sup> in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

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

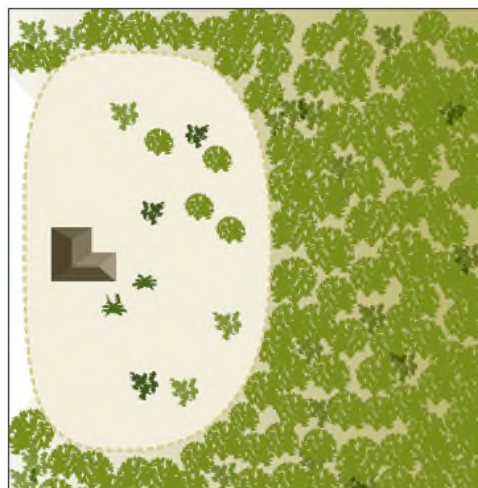
**Grass:** should be managed to maintain a height of 100 mm or less.

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

Hazard on one side  
APZ



Hazard on three sides  
APZ



## 2. Requirements Established by the Local Government – the Firebreak Notice/Order

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

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

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

When, due to the planning stage of the proposal to which this Bushfire Management Plan applies, defined APZ dimensions are known and are to be applied to existing or future buildings – then these dimensions are stated in Section 5.4.1 of this Plan.

## 3. Requirements Recommended by DFES – Property Protection Checklists

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

#### 4. Requirements Established by AS 3959-2009 - Maintaining Areas within your Lot as 'Low Threat'

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

*"Australian Standard - AS 3959-2009 Section 2.2.3.2: Exclusions - Low threat vegetation and non-vegetated areas:*

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

- a) Vegetation of any type that is more than 100m from the site.*
- b) Single areas of vegetation less than 1ha in area and not within 100m of other areas of vegetation being classified.*
- c) Multiple area of vegetation less than 0.25ha in area and not within 20m of the site or each other.*
- d) Strips of vegetation less than 20m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20m of the site or each other, or other areas of vegetation being classified.*
- e) Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.*
- f) Low threat vegetation, including grassland managed in a **minimal fuel condition** (i.e. insufficient fuel available to significantly increase the severity of a bushfire attack – recognisable as short cropped grass to a nominal height of 100mm for example), maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks."*

## Appendix 2 - Vehicular Access Technical Requirements

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

Contact the relevant local government for the requirements that are to apply in addition to the requirements set out as an acceptable solution in the Guidelines. If the relevant local government requires that these are included in the Bushfire Management Plan, they will be included in this appendix and referenced.

### Requirements Established by the Guidelines – The Acceptable Solutions

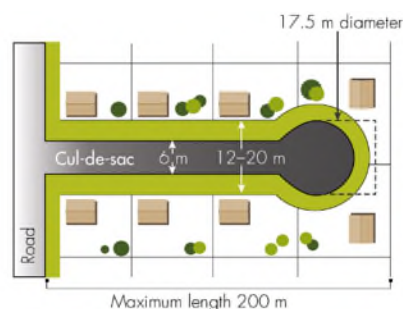
(Source: *Guidelines for Planning in Bushfire Prone Areas WAPC 2017 v1.3, Appendix 4*)

#### Vehicular Access Technical Requirements - Part 1

##### Acceptable Solution 3.3: Cul-de-sacs (including a dead-end road)

Their use in bushfire prone areas should be avoided. Where no alternative exists then the following requirements are to be achieved:

- Maximum length is 200m. If public emergency access is provided between cul-de-sac heads (as a right of way or public access easement in gross), the maximum length can be increased to 600m provided no more than 8 lots are serviced and the emergency access way is less than 600m in length;
- Turnaround area requirements, including a minimum 17.5m diameter head to allow type 3.4 fire appliances to turn around safely;
- The cul-de-sac connects to a public road that allows for travel in two directions; and
- Meet the additional design requirements set out in Part 2 of this appendix.



##### Acceptable Solution 3.4: Battle-axe

Their use in bushfire prone areas should be avoided. Where no alternative exists then the following requirements are to be achieved:

- Maximum length 600m and minimum width 6m; and
- Comply with minimum standards for private driveways.



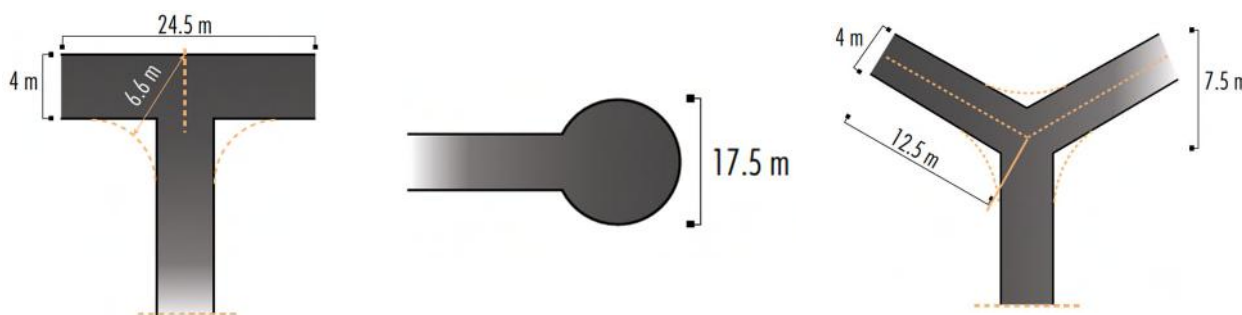
### Acceptable Solution 3.5: Private Driveways

The following requirements are to be achieved:

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

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

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

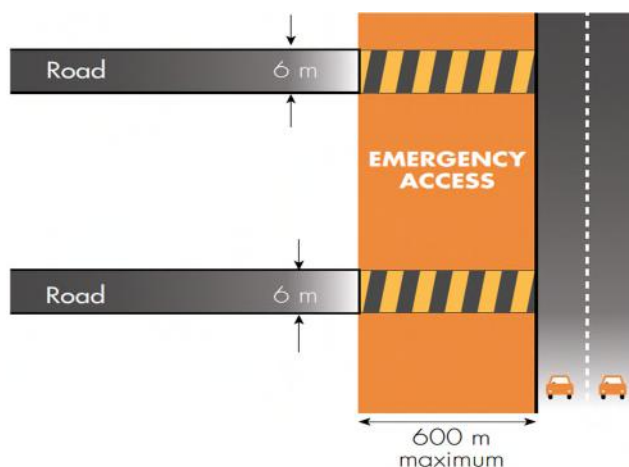


### Acceptable Solution 3.6: Emergency Access Way

An access way that does not provide through access to a public road is to be avoided bushfire prone areas.

Where no alternative exists, an emergency access way is to be provided as an alternative link to a public road during emergencies. The following requirements are to be achieved:

- No further than 600 metres from a public road;
- Must be signposted including where they ajoin public roads;
- Provided as a right of way or public access easement in gross;
- Where gates are used they must not be locked and they must be a minimum width of 3.6 metres with design and construction approved by local government (refer to the example in this appendix); and
- Meet the additional design requirements set out in Part 2 of this appendix.





### Acceptable Solution 3.7: Fire Service Access Routes (Perimeter Roads)

Are to be established to provide access within and around the edge of subdivision and related development and to provide direct access to bushfire prone areas for firefighters and link between public road networks for firefighting purposes. Fire service access is used during bushfire suppression activities but can also be used for fire prevention work. The following requirements are to be achieved:

- No further than 600 metres from a public road (driveways may be used as part of the designated fire service access;
- Dead end roads not permitted;
- Allow for two-way traffic (i.e. two 3.4 fire appliances);
- Provide turn-around areas designed to accommodate 3.4 fire appliances and to enable them to turn around safely every 500m (i.e. kerb to kerb 17.5 metres);
- All weather surface (i.e. compacted gravel, limestone or sealed) and have erosion control measures in place;
- Must be adequately sign posted;
- Where gates are used they must be a minimum width of 3.6 metres with design and construction approved by local government (refer to the example in this appendix) and may be locked (use a common key system);
- Meet the additional design requirements set out in Part 2 of this appendix;
- Provided as right of ways or public access easements in gross; and
- Management and access arrangements to be documented and in place.

### Acceptable Solution 3.8: Firebreak Width

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

#### Vehicular Access Technical Requirements - Part 2

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

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



## Appendix 3 - Water Technical Requirements

### Requirements Established by the Guidelines - Acceptable Solution A4.1: Reticulated Areas

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

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

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

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

- **Residential Standard** – hydrants are to be located so that the maximum distance between the hydrants shall be no more than 200 metres.
- **Commercial Standard** – hydrants are to be located with a maximum of 100 metre spacing in Industrial and Commercial areas.
- **Rural Residential Standard** – where minimum site areas per dwelling is 10,000 m<sup>2</sup> (1ha), hydrants are to be located with a maximum 400m spacing. If the area is further subdivided to land parcels less than 1ha, then the residential standard (200m) is to be applied.

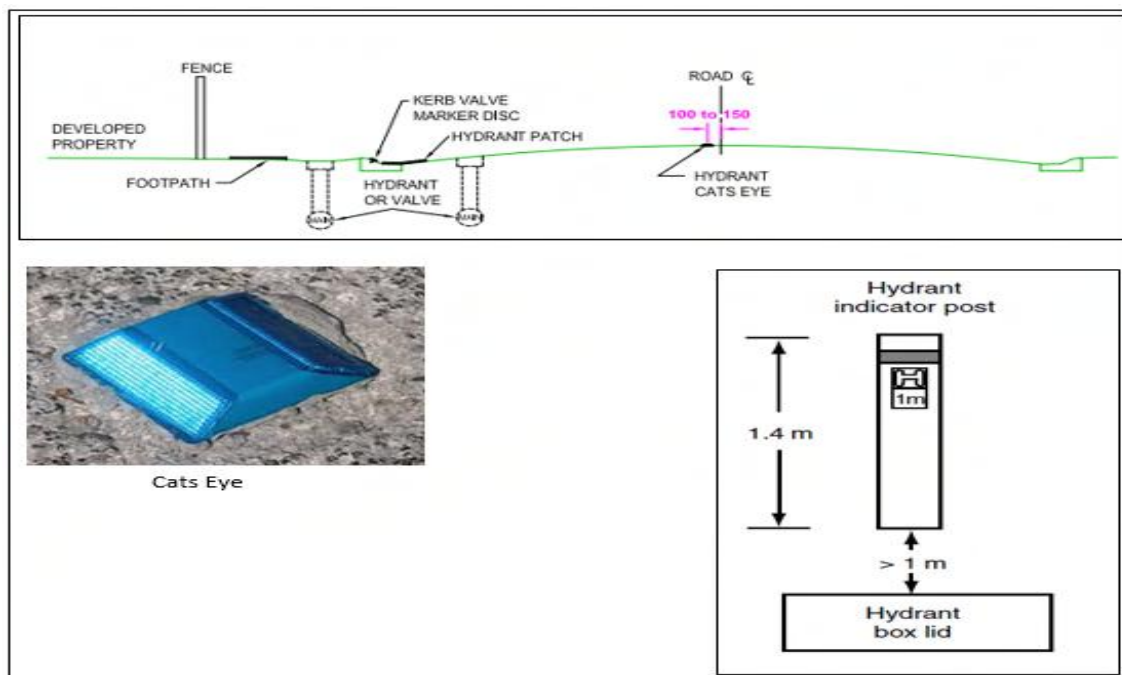


Figure A4.1: Hydrant Location and Identification Specifications

Contact the relevant water supply authority to confirm the technical requirements that are to be applied. They may differ from the minimum requirements of the 'baseline' Water Corporation's No. 63 Water Reticulation Standard.

## **APPENDIX 10**

### **PROCEDURES TO MINIMISE RISK TO WESTERN RINGTAIL POSSUMS DURING VEGETATION CLEARING AND DEMOLITION**

**(Source: Department of Environment and  
Conservation, 2009)**



## **PROCEDURES TO MINIMISE RISK TO WESTERN RINGTAIL POSSUMS DURING VEGETATION CLEARING AND BUILDING DEMOLITION**

**IMPORTANT: Contact DEC Busselton on 9752 5555 prior to clearing commencing.**

These procedures are generally for development activities that occur on smaller lots (<2ha). The clearing of vegetation on larger lots should be discussed with DEC.

### **Identify trees to be retained**

Clearing of native vegetation within the proposed development site should avoid any unnecessary clearing of trees. Trees retained within the development site, proposed Public Open Space and within road verges provide valuable habitat for WRP. Trees to be retained should be marked so that they are clearly recognised by clearing contractors.

### **Suitable expertise on-site**

A suitably experienced zoologist or WRP rehabilitator ('possum spotter') should be onsite when clearing is being undertaken. The 'possum spotter' is to provide advice and direction to contractors undertaking the clearing in relation to WRP matters. The contract manager or supervisor is the person responsible for all work undertaken and the safety of all personnel on site at all times.

It is suggested that the 'possum spotter' attend the site the day before clearing commences to be familiar with the location of any WRP and dreys. A person who is required to handle WRP during a clearing event that is part of development proposal should hold a Regulation 17 (scientific) licence.

### **Advice to clearing contractors**

Prior to clearing, clearing contractors should be properly inducted by the 'possum spotter' about the identification and protection of trees to be retained, trees to be cleared and about the likely presence of WRP among trees and other vegetation that will be cleared.

No dogs should be taken on the site.

### **Tree removal**

The 'possum spotter' with the clearing supervisor is to inspect all trees to be removed and agree on a process and timetable for clearing. Trees that have WRP currently in them may need to be left for a subsequent day when the tree may be vacant. Where possible clearing should be undertaken in a systematic manner that minimises disruption to WRP. If there is suitable habitat adjoining the development site, a clearing pattern that encourages the movement of WRP to this habitat should be adopted.

In moderate or high-density sites, if a machine operator sees a WRP in a tree that is about to be cleared, trees should be bumped or shaken firstly. Following this the machine operator should wait and observe the tree for a short time. If present, the shaking of the tree may cause any WRP and other fauna to move and, hopefully, opportunity to safely evacuate. It would also increase the chance that the machine operator will see the animal/s prior to pushing down the tree.

In the event that a WRP is observed in a tree that is about to be cleared and there is a tree marked for retention near the tree which is to be cleared, then the tree should be gently lowered to the ground to give the animal opportunity to safely evacuate. The animal/s then need to be encouraged to move towards and occupy the trees to be retained.

If there are no trees to be retained within proximity of a tree that has a WRP and needs to be cleared, then the WRP can be removed by the 'possum spotter' using an elevated platform or by lowering the tree to the ground. The WRP is to be relocated to the nearest suitable habitat.



Dreys should be inspected prior to clearing and possibly removed. Dreys that remain in the tree during clearing have to be checked as soon as possible as baby WRP may remain in the drey.

Clearing should be undertaken on a face so as to drive WRP towards suitable habitat.

### **Services**

The proponent will need to identify where underground services are to be installed and to ensure any detrimental impact from these services is minimised.

### **Understorey vegetation**

There will always be a possibility that WRP, Southern Brown Bandicoots, etc, will be found in under and midstorey vegetation. Care needs to be taken when clearing this vegetation with a check to be undertaken by foot prior to machines entering the areas and clearing this vegetation.

### **Injured WRP**

If contractors encounter injured WRP during clearing operations, then the 'possum spotter' needs to be notified immediately so that arrangements can be made for the welfare of the injured animal.

### **Stockpile practices**

Contractors need to be made aware that displaced WRP may shelter within stockpiled vegetation. Therefore, to minimise any accidental injury or death of WRP, personnel involved in the removal or disposal of stockpiles need to be made aware of and be prepared for the potential presence of WRP. If WRP are encountered then the Department needs to be immediately notified. Any dreys in fallen trees are to be removed prior to stockpiling as WRP have been known to return to their dreys/trees.

The preference is that vegetation is not stockpiled but removed on the same day clearing occurs. If vegetation is to be stockpiled on-site, then it is preferable to place it in cleared areas as far as possible from retained remnant vegetation. Chipping of removed debris is to be undertaken away from retained habitat to minimise the noise impacts on WRP.

In large clearing events where chipping will be undertaken over a number of days, it is preferred that the chipper remains in one position and vegetation is brought to the chipper as opposed to the chipper moving through the site. This is to consolidate the noise impacts in one area of the development site.

### **Buildings**

Site workers are to be advised about the potential presence of WRP in derelict buildings and to stage works to minimise potential injuries to WRP during demolition works. Prior to clearing works commencing, the roof and ceilings on derelict buildings should be removed prior to demolition to allow for dispersal of WRP. DEC should be immediately notified of any WRP that may be inadvertently injured during demolition works.

There is a risk to WRP if rat or mouse baiting is undertaken prior to demolition. Appropriate methods of baiting need to be engaged if rats or mice are to be controlled prior to demolition. One method is to place the poison out of WRP reach, inside poly pipe secured to a beam in the roof space. The pipe should be about 1m long and no greater than 50mm in diameter. Another method is to place a plastic ice-cream container upside down over bait poison with small arches cut into the side of the container. The arches should be a maximum height and width of about 50mm and the container secured to a rafter.

### **Post Clearing Reporting**

The proponent is to provide DEC with a report (see Appendix 5) on the impact on WRP during the habitat removal process within 28 days of completion of vegetation clearing or building demolition works.

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