Lot 1512 Lake Street and Lot 500 Fisher Street, Rockingham

Bushfire Management Plan

Prepared for
Defence Housing Australia

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Executive summary

Eco Logical Australia (ELA) were commissioned by Defence Housing Australia to revise the Bushfire Management Plan (BMP) supporting a Structure Plan for Lot 1512 Lake Street and Lot 500 Fisher Street, Rockingham. The City of Rockingham and Western Australian Planning Commission provided comments on the original BMP , prepared by Strategen in August 2017 that were required to be addressed prior to approval of the Structure Plan. ELA has reproduced the original BMP, with the following changes made to address the comments provided:

- A section of rehabilitated vegetation within Lake Richmond Reserve, south of the Project area, was reclassified from Class B Woodland to Class A Forest to reflect the mature state of the vegetation, at the request of the City of Rockingham;
- Vegetation within the Fisher Street road reserve adjacent to the south eastern boundary of the Project area has reclassified from Class B Woodland to excluded under clause 2.2.3.2 (f). This area no longer requires removal of any trees as the current density is sufficient to satisfy APZ requirements (trimming of some shrubs and maintenance of grass may be required);
- Vegetation east of the Project area within the Rockingham Beach Primary School oval, at Photo Point 13, has been reclassified from Class B Woodland to excluded under 2.2.3.2 (f) as this area is maintained lawn (as per Photo Point 13); and
- As per the City of Rockingham's request, a 3m wide firebreak, west of the subject site, has been included in the Asset Protection Zone for future buildings.

1 Introduction

1.1 Background

Defence Housing Australia (DHA) is proposing to develop Lot 1512 Lake Street and Lot 5000 Fisher Street, Rockingham (herein referred to as the project area) for residential purposes. A Structure Plan (as depicted in **Figure 1**) is proposed to facilitate development of residential buildings of up to five stories in height, along with additional areas of commercial land, landscaping/gardens and parking.

Due to the current extent of adjacent vegetation, a portion of the project area is designated as bushfire prone, as outlined on the WA Map of Bush Fire Prone Areas (DFES 2017). As a result, Eco Logical Australia (ELA) has prepared this Bushfire Management Plan (BMP) to inform strategic planning and fulfil the following key objective:

1. Accompany the proposed Structure Plan submission to Western Australian Planning Commission (WAPC) in order to meet planning requirements triggered under *State Planning Policy 3.7 planning in Bushfire-Prone Areas* (SPP 3.7; WAPC 2015).

The following information is required to accompany the Structure Plan as required under SPP 3.7 Policy Measure 6.3:

- results of a Bushfire Hazard Level assessment determining the applicable hazard level(s) across the project area in accordance with methodology set out in Guidelines for Planning in Bushfire-Prone Areas (the Guidelines; WAPC 2017) – refer to **Section 2.3** and **Appendix A**.
- where lot layout of the proposal is known, a Bushfire Attack Level (BAL) contour map to determine the indicative acceptable BAL ratings across the project area, in accordance with the Guidelines – refer to **Section 2.5** and **Figure 4**
- identification of any bushfire hazard issues arising from the relevant assessments – refer to **Section 2.4**
- clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages – refer to **Section 4** and **Table 3**.

This BMP has been prepared in accordance with the Guidelines and addresses all the above information requirements to satisfy SPP 3.7.

This BMP provides a compliant bushfire management response for proposed development based on the indicative design and the proposed post-development state of the on-site and surrounding fire environment.

1.2 Purpose and application of the plan

The purpose of this BMP is to provide guidance on how to plan for and manage the bushfire risk to future assets of the project area through implementation of a range of bushfire management measures. The BMP outlines how future on-site assets can be protected during the summer months when the threat from bushfire is at its peak. This is particularly relevant when existing fire appliances in the area may be unable to offer an immediate emergency suppression response; therefore, development planning and design should aim to provide mitigation strategies that protect future life and property from bushfire as a priority.

Source: Roberts Day 2016

Figure 1: Local Structure Plan

2 Spatial consideration of bushfire threat

2.1 Existing site characteristics

2.1.1 Location

The project area comprises approximately 3.75 ha consisting of Lot 1512 Lake Street and Lot 5000 Fisher Street, Rockingham in the City of Rockingham (**Figure 2**).

The project area is bound by:

- Lake Street and residential development to the north
- Water Corporation reserve and access (R 42518) and vegetated City of Rockingham reserve (R 9458) to the south
- Residential development, partially vegetated local Public Open Space (POS) (R 44041) and a primary school/ playing field to the east
- Water Corporation facility (R 42518), firebreak, slashed buffer and vegetated City of Rockingham reserve (R 35176) including Lake Richmond to the West.

2.1.2 Zoning and land use

The project area has been rezoned from 'Special Use' to 'Development' under provisions of the City of Rockingham Local Planning Scheme No 2 to facilitate residential development. Past land use consisted of accommodation infrastructure associated with former operations as the Palm Beach Caravan Park. The site is predominantly cleared, with some scattered trees.

Land to the east opposite Fisher Street is zoned a combination of 'Residential', 'Public Purposes (Primary School)', 'Development' and 'Public Open Space'. The land is predominantly cleared and utilised in line with the current zoning classifications. Land to the south is zoned regional 'Parks and Recreation' and is a combination of a Water Corporation reserve and access road (R 42518) and vegetated City of Rockingham managed reserve (R 9458). Land to the west is zoned a combination of regional 'Parks and Recreation' and regional 'Public Purposes (Water Authority of WA)'. The land consists of a predominantly vegetated City of Rockingham managed reserve (R 35176) and Water Corporation facility (R 42518). The City managed reserve to the west also contains a firebreak at the interface of the project area. Lake Richmond and associated periphery wetland vegetation is located approximately 100 m west of the project area. The land is zoned regional 'Parks and Recreation' and is a conservation category wetland.

2.1.3 Assets

The project area is predominantly cleared awaiting development. Some overstorey trees have been retained within the project area for visual amenity purposes. The proposed residential development will increase the life and property assets of the across the site.

2.1.4 Access

The project area is currently accessed informally via Lake Street to the north and Fisher Street to the east. The adjacent south bushland reserves contain public access tracks and gated emergency fire access. The Water Corporation access road situated adjacent south of the project area is also gated and sealed.

2.1.5 Water and power supply

Reticulated water and underground power supply infrastructure and services are available to the project area.

Figure 2: Site overview

2.2 Existing fire environment

2.2.1 Vegetation class

The project area is currently in a cleared and managed state with some minor overstorey tree retention. Land adjacent to the project area has been subject to various levels of vegetation disturbance through clearing for development and includes:

- North: the vegetation extent has been cleared for urban residential land use.
- South: the northern verge of the Water Corporation restricted access road (R 42518) contains some individual Tuart trees over grass. City of Rockingham reserve (R 9458) further to the south is predominantly vegetated with minor areas of disturbance from clearing and bushfire occurrence. The predominant vegetation is dominated by Tuart and WA peppermint.
- East: vegetation is predominantly cleared for POS and community purposes. A small remnant dominated by acacia scrub with some overstorey eucalypts is contained within POS (R 44041). The western verge of Fisher Street contains some individual Tuart trees over grass. Some of these trees may be cleared as part of development and areas of remaining grass will be subject to ongoing management by the City.
- West: City of Rockingham reserve (R 35176) contains vegetation dominated by Tuart and WA Peppermint. A cleared firebreak has been implemented at the interface with the project area. The firebreak is constructed to mineral earth (i.e. fully cleared) and is well maintained. Other minor areas of vegetation occur to the west and southwest of the project area in the form of:
    - acacia scrub vegetation adjacent to the Water Corporation facility (R 42518)
    - acacia scrub vegetation on the outskirts of the Lake Richmond wetland
    - low sedges within the Lake Richmond wetland.

Strategen and ELA have assessed vegetation class in accordance with AS 3969-2009 Construction of Buildings in Bushfire-prone Areas (AS 3969-2009, SA 2009) within the project area and adjacent 150 m through on-ground verification. The following provides a summary of on-site conditions viewed at time of assessment post the removal of the past caravan park land use. The vegetation classes assessed are depicted in **Figure 3**, along with Photo Points to demonstrate the location and direction of each photo:

- all vegetation on-site has been cleared and now consists of managed lawn (**Plate 1**), resulting in the land being excluded from classification under Clause 2.2.3.2 (e) and (f) of AS 3969-2009-2009
- adjacent vegetation is a combination of:
    - forest (Class A) throughout areas of intact tuart overstorey and WA peppermint midstorey to the south within R 42518 and R 9458 (**Plate 2**), the areas of rehabilitated vegetation to the south within R 9458 (**Plate 7**) and to the west within R 35176 (**Plate 3, Plate 4** and **Plate 5**)
    - woodland (Class B) to the south within R 42518 (**Plate 6**) and R 9458 and to the east within POS R 44041 (**Plate 8**) and Rosewood/Fisher Street road reserves
    - shrubland (Class C) to the southwest associated with Lake Richmond within R 9458 (**Plate 9**)
    - scrub (Class D) to the southwest within R 9458 (**Plate 10**), to the west within R 42518 (**Plate 11**) and to the east within a portion of POS R 44041
    - low threat vegetation and areas to the south (**Plate 12**), east (**Plate 13**), southeast (**Plate 14**) and north (**Plate 15**) excluded from classification under Clause 2.2.3.2 (e) and (f) of AS 3969-2009 on the basis that they are either non-vegetated or managed as low threat vegetation.

This information has been used to inform the BAL contour assessment (refer to **Section 2.5**).

DHA will be undertaking negotiations with Water Corporation in relation to the long term management of the area of woodland (Class B) within R 42518 (Plate 6) to the south of the project area and north of the Water Corporation access road. Should DHA take on long term management of this area with the aim of managing bushfire fuels in this area to a low fuel state, a revised BAL assessment would need to be undertaken accounting for this reduction in bushfire risk for submission at future planning stages.

2.2.2 Site topography and effective slope

Strategen and ELA have assessed site topography and effective slope under classified vegetation within the project area and adjacent 100 m through on-ground verification in accordance with AS 3969-2009 methodology (**Figure 3**).

The project area is located on the western side of the Swan Coastal Plain, which is a low lying coastal plain dominated by woodlands of banksia and tuart on sandy soils, sheoak on outwash plains and paperbark in swampy areas (McKenzie et al. 2003).

The project area and adjacent vegetated land is situated on flat ground, with elevation and ground levels ranging sporadically from 2–3 m AHD (Australian Height Datum). As such, there is no vegetation subject to slope located within 100 m of the project area and the proposed development will not be situated upslope of the surrounding vegetation extent. The minor rises and falls of 1 m elevation occur irregularly across the site and adjacent land and will not have a significant impact on potential bushfire behaviour or the BAL for the site.

The effective slope under classified vegetation described above has been used to inform the BAL contour assessment (refer to Section 2.5).

Plate 1: On-site cleared and actively manage low bushfire fuel within Lots and adjacent

Plate 2: Off-site Class A forest south of project area (within R42518 and R9458)

Plate 3: Off-site Class A forest vegetation west of the project area (within R 35176)

Plate 4: Off-site Class A forest vegetation west of project area (within R 35176)

Plate 5: Off-site Class A forest vegetation and cleared firebreak west of project area (within R 35176)

Plate 6: Off-site Class B woodland vegetation (right of photo) south of project area (within R 42518)

Plate 7: Off-site Class B woodland vegetation south of project area (within R 9458)

Plate 8: Off-site Class B woodland vegetation southeast of project area (within R 44041)

Plate 9: Off-site Class C shrubland vegetation southwest of project area (within R 9458)

Plate 10: Class D scrub vegetation (left of photo) and Class A forest vegetation (right of photo) southwest of project area (within R 9458)

Plate 11: Off-site Class D scrub vegetation (left of photo) and Class A forest (right of photo) west of project area and near pump station (within R 42518)

Plate 12: Excluded Clause 2.2.3.2 (e) and (f) south of project area (access road and turnaround areas within R 42518)

Plate 13: Excluded Clause 2.2.3.2 (e) and (f) areas east of project area (within primary school/playing fields)

Plate 14: Excluded Clause 2.2.3.2 (e) and (f) areas southeast of project area (within managed POS and residential development along Properjohn Drive)

Plate 15: Excluded Clause 2.2.3.2 (e) and (f) north of project area (along Lake Street)

Figure 3: Vegetation class and effective slope

2.3 Bushfire hazard level assessment

A bushfire hazard level assessment for the project area and adjacent 100 m, undertaken by Strategen in May 2015 (**Appendix A**), was endorsed as part of the recent rezoning of the site to 'Development' under provisions of the City of Rockingham Local Planning Scheme No 2.

The bushfire hazard level assessment identified the project area as being subject to a 'Low' bushfire hazard level due to on-site vegetation consisting of scattered trees over managed lawn. The post-development bushfire hazard level will also be low.

2.4 Identification of any bushfire hazard issues

There is no landscape scale bushfire risk to the project area that involves long fire runs through dense vegetation on steep terrain. There will be no bushfire risk or possible fire run internal to the site post development due to the proposed clearing extent and built form. The bulk of land directly adjacent to the project area to the north and east is cleared or developed for residential land uses.

Strategen and ELA consider a fire front approaching the project area from the south, west or southwest to be the worst case bushfire scenario due to the presence of permanent forest vegetation within R 9458 and R 35176 and the likely afternoon summer prevailing winds from the southwest (BoM 2016). However, the potential bushfire run is limited to less than 250 m due to the presence of Lake Richmond and associated wetland vegetation.

Strategen and ELA consider the bushfire risks to proposed development posed by post development hazards can be managed through standard application of acceptable solutions under the Guidelines, including provision for and implementation of Asset Protection Zones (APZs), relevant bushfire construction standards, provision of adequate emergency water supply and vehicular access (particularly at the southern and western interfaces), as well as through a direct bushfire suppression response if required.

On this basis, Strategen and ELA consider the bushfire risk to future assets of the project area is readily manageable through standard management responses outlined in the Guidelines and AS 3959-2009. These responses will be factored in to proposed development early in the planning process to ensure a suitable, compliant and effective bushfire management outcome is achieved for protection of future life and property assets.

2.5 BAL contour assessment

Any proposed development that cannot achieve 100 m separation to post development classified vegetation will require application of AS 3959-2009 via implementation of increased building construction standards in response to the assessed BAL.

ELA has undertaken a BAL contour assessment in accordance with Method 1 of AS 3959-2009 for proposed development. The BAL contour assessment is based on post-development conditions and the maintenance of on-site low fuel hazards. The Method 1 procedure for calculating the BAL (as outlined in AS 3969-2009) incorporates the following factors:

- State-adopted FDI rating
- Vegetation class
- Effective slope
- Distance maintained between proposed development areas and the classified vegetation.

Based on the specified BALs, building construction/separation requirements for proposed buildings can then be assigned. The BAL assessment may need to be revalidated at future planning stages if there is any change in proposed building location/design, separation distance or vegetation class extent. A Method 1 BAL calculation for proposed development is outlined in the following subsections.

2.5.1 Fire Danger Index

A blanket rating of FDI 80 is adopted for Western Australian environments, as outlined in AS 3969-2009 and endorsed by Australasian Fire and Emergency Service Authorities Council.

2.5.2 Classified vegetation as per AS 3969-2009

Vegetation class is described in **Section 2.2.1** and depicted in **Figure 3** and consists of forest (Class A), woodland (Class B), shrubland (Class C) and scrub (Class D). The vegetation class used to determine the BAL rating for proposed development is that which is located within 100 m of the proposed buildings and results in the highest (worst case) BAL rating (refer to Table 1).

2.5.3 Effective slope

Effective slope under classified vegetation is described in **Section 2.2.2** and consists of flat land (0 degrees).

2.5.4 Distance between proposed development areas and the classified vegetation

A 20 m wide Asset Protection Zone will be implemented within the proposed development site at the southern and western vegetation interfaces. This distance, combined with the existing separation distances imposed by adjacent firebreaks and road access, will ensure that a rating of BAL–29 or less can be achieved for proposed development.

2.5.5 Method 1 BAL calculation

A Method 1 BAL calculation has been completed for proposed development in accordance with AS 3969-2009 methodology (**Table 1**). The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed buildings and subsequently informs the standard of building construction required to increase building tolerance to potentially withstand such impacts in line with the assessed BAL.

The assessed BAL ratings for the project area are depicted as BAL contours in **Figure 4**. All land situated 100 m or greater from classified vegetation are BAL–Low, where there is insufficient risk to warrant specific building construction requirements.

Table 1: Method 1 BAL calculation

Vegetation class	Effective slope	BAL Contour width	BAL rating	Comment
Class A forest	All up-slopes and flat land (0 degrees)	<16 m	BAL-FZ	No development is proposed in this area
		16 - <21 m	BAL-40	No development is proposed in this area
		21 - <31 m	BAL-29	Development may occur in this area
		31 - <42 m	BAL-19	Development is likely to occur in this area
		42 - <100 m	BAL-12.5	Development will occur in this area
Class B woodland	All up-slopes and flat land (0 degrees)	<10 m	BAL-FZ	No development is proposed in this area
		10 - <14 m	BAL-40	No development is proposed in this area
		14 - <20 m	BAL-29	No development is proposed in this area
		20 - <29 m	BAL-19	Development will occur in this area
		29 – 100 m	BAL-12.5	Development will occur in this area
Class C shrubland	All up-slopes and flat land (0 degrees)	<7 m	BAL-FZ	No development is proposed in this area
		7 - <9 m	BAL-40	No development is proposed in this area
		9 - <13 m	BAL-29	No development is proposed in this area
		13 - <19 m	BAL-19	No development is proposed in this area
		19 - <100 m	BAL-12.5	Development will occur in this area
Class D scrub	All up-slopes and flat land (0 degrees)	<10 m	BAL-FZ	No development is proposed in this area
		10 – <13 m	BAL-40	No development is proposed in this area
		13 - <19 m	BAL-29	No development is proposed in this area
		19 - <27 m	BAL-19	Development is likely to occur in this area
		27 - <100m	BAL-12.5	Development will occur in this area

The above BAL contours are based on the vegetation class and effective slope assessed at the time of inspection and take into consideration the proposed clearing extent, resultant vegetation exclusions and separation distances achieved in line with the Structure Plan. Should there be any changes in development design or vegetation/hazard extent that requires a modified bushfire management response, then the above BAL contours will need to be reassessed for the affected areas to accompany a future planning/building application.

3 Bushfire management measures

ELA has identified a range of bushfire management measures that on implementation will enable all proposed areas to be developed with a manageable level of bushfire risk whilst maintaining full compliance with the Guidelines and AS 3969-2009. The bushfire management measures are discussed in the following subsections and depicted in **Figure 4** (where applicable).

3.1 Separation distances and fuel management

3.1.1 Asset Protection Zones (APZs)

APZs will be implemented at the interface between all proposed development areas and the classified vegetation extent. The width of the APZ will be a minimum of 20 m and will be accommodated within the proposed development site at the southern and western interfaces (**Figure 4**). There will be an additional 3 m of separation between classified vegetation and future buildings on the western interface from the existing firebreak managed by the City of Rockingham, as per the City's firebreak notice (**Appendix B**).

APZs are required to be maintained on a regular and ongoing basis at a fuel load less than 2 t/ha to achieve a low threat minimal fuel condition all year round. This may include regular slashing of road verges and grassland fuels where applicable, as well as regular maintenance of POS areas. Trees can be retained within the APZ provided the understorey is managed through regular slashing to achieve a low threat vegetation minimal fuel condition and separation distances from buildings (i.e. 6 m from trunks at maturity).

It is noted that the *Standards for Asset Protection Zones* in the Guidelines suggest that tree canopies in APZs should be separated by a minimum of 5 m. It is important to note that these standards provide guidance only and provide for flexibility on a site-by-site basis. ELA has considered this guidance in relation to the proposed tree retention plan (**Appendix C**) and are confident that whilst the plan includes trees that will result in less than 5 m separation between canopies, the separation of canopy fuels from ground fuels (i.e. trees over managed grass) will meet the definition of an APZ. In addition, the NSW RFS Publication *Standards for Asset Protection Zones* notes that rows of trees can provide a wind break to trap embers and flying debris that could otherwise reach the house or asset. The trees proposed for retention will likely result in this benefit for the proposed development.

Alignment and width of the APZs may be reassessed at a later planning/building stage in response to any modifications to development layout or changes to the vegetation extent currently affecting the site.

3.1.2 Landscaping within POS

All landscaping proposed within the project area will consist of low bushfire fuel gardens subject to ongoing management to a low fuel state. The required works may include slashing of understorey grasses and weeds on a regular and ongoing basis to maintain fuel loads at less than 2 t/ha and achieve a low threat minimal fuel condition all year round.

Trees proposed to be retained within the project area will need to meet the above APZ specifications, including the requirement for tree trunks to be located a minimum distance of 6 m from all building elevations. The building and landscape plans, to be submitted at development application stage, will need to provide details in relation to proposed tree retention in accordance with APZ requirements.

3.2 Increased building construction standards

ELA has assigned BAL contours across the project area as depicted in **Figure 4**. BAL contours have been assigned in accordance with AS 3969-2009 on the basis of the parameters assessed at time of inspection and indicative development design (refer to the Method 1 BAL calculation outlined in **Section 2.5**). The BAL contour assessment indicates that all proposed development can achieve a BAL-29 rating or lower, on the basis of implementation of APZs. No development is proposed within areas of BAL–FZ or BAL–40.

A BMP revision, addendum or BAL assessment may be prepared at a later date to demonstrate any change in the assessed BAL or other management measure documented in this BMP which may occur as a result of a change in the separation distance between proposed development and classified vegetation (i.e. as a result of specified location of proposed buildings at the building permit application stage or changes to vegetation extent).

Identification of building elevations that will be exposed to classified vegetation (i.e. the source of bushfire attack), subsequent potential for shielding provisions and final BAL construction ratings and requirements will be determined at the development application/building permit stage.

3.3 Vehicular access

As the proposed development directly fronts Lake Street to the north and Fisher Street to the east, the existing road network and proposed internal access ways will provide at least two different points of vehicular access for all development stages at all times.

No public roads are proposed to be constructed as part of the development. Internal access ways will comply with technical requirements of the Guidelines for private driveways, as outlined in **Table 2**, and will provide through access along the western and southern interfaces. This will provide accessible areas of defendable space and emergency access to the bushland interfaces if required.

Table 2: Vehicular access technical requirements (WAPC 2017)

Technical requirements	Private driveways
Minimum trafficable surface (m)	4
Horizontal distance (m)	6
Vertical clearance (m)	4.5
Maximum grade <50 m	1 in 10
Minimum weight capacity (t)	15
Maximum crossfall	1 in 33
Curves minimum inner radius	8.5

Following development, internal lot boundary firebreaks will not be required on the basis that the current City of Rockingham annual firebreak notice (**Appendix B**) only requires boundary firebreaks on urban land greater than 2000 m² if the land is vacant.

3.4 Reticulated water supply

All proposed development areas will be provided a reticulated water supply. The reticulated system will ensure an all year round supply of water is provided to meet minimum domestic and emergency water supply requirements.

A network of hydrants will also be provided along the internal road network at locations which meet relevant water supply authority and DFES requirements, in particular the Water Corporation Design Standard DS 63 'Water Reticulation Standard Design and Construction Requirements for Water Reticulation Systems up to DN250'. This standard will guide construction of the internal reticulated water supply system and fire hydrant network, including spacing and positioning of fire hydrants so that the maximum distance between a hydrant and the rear of a building envelope (or in the absence of a building envelope, the rear of the lot) shall be 120 m and the hydrants shall be no more than 200 m apart.

3.5 Additional measures

ELA makes the following additional recommendations to inform ongoing stages of development:

1. Notification on Title: should subdivision of the site occur, notification is to be placed on the Title of all proposed lots (either through condition of subdivision or other head of power) to ensure all landowners/proponents and prospective purchasers are aware that the lot is currently in a designated bushfire prone area and that increased building construction standards may apply to future buildings as determined by this BMP. The notification on title is also to include that the site is subject to a BMP.
2. BMP addendum: this BMP and the BAL contour assessment contained within are considered sufficient to inform future planning and development stages such as subdivision application, development application and building construction. However, a BMP addendum or BAL assessment may need to be prepared at a later date to demonstrate reassessment of the management measures documented in this BMP (such as the APZ and/or BALs) in response to further details or modifications to the building layout or changes to the vegetation extent currently affecting the site. Any addendum to this BMP or future BAL assessment should be prepared to accompany the relevant planning or building permit application to the City.
3. Compliance with current City of Rockingham annual firebreak notice: the developer/land manager and prospective land purchasers are to comply with the current City of Rockingham annual firebreak notice (**Appendix B**), which specifies the following for Urban land (vacant):
    - where the area of land is less than 2023 m^2, all flammable materials (except for living trees) on the entire property shall be cleared and maintained to a height of no more than 4 cm
    - where the area of land is 2000 m^2 or more in size, a 4 m wide firebreak (with 4.2 m vertical clearance) shall be installed and maintained immediately inside all external boundaries of the land and also immediately surrounding all buildings situated on the land.

Figure 4: Bushfire Management Plan: Lot 512 Lake St and Lot 5000 Fisher St, Rockingham

4 Proposal compliance and justification

Proposed development within the project area is required to comply with SPP 3.7 under the following policy measures:

6.2 Strategic planning proposals, subdivision and development applications

a) Strategic planning proposals, subdivision and development applications within designated bushfire prone areas relating to land that has or will have a Bushfire Hazard Level (BHL) above low and/or where a Bushfire Attack Level (BAL) rating above BAL-LOW apply, are to comply with these policy measures.
b) Any strategic planning proposal, subdivision or development application in an area to which policy measure 6.2 a) applies, that has or will, on completion, have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, may be considered for approval where it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.
c) This policy also applies where an area is not yet designated as a bushfire prone area but is proposed to be developed in a way that introduces a bushfire hazard, as outlined in the Guidelines.

6.3 Information to accompany strategic planning proposals

Any strategic planning proposal to which policy measure 6.2 applies is to be accompanied by the following information prepared in accordance with the Guidelines:

a) **(i)** the results of a BHL assessment determining the applicable hazard level(s) across the subject land, in accordance with the methodology set out in the Guidelines. BHL assessments should be prepared by an accredited Bushfire Planning Practitioner; or
(ii) where the lot layout of the proposal is known, a BAL Contour Map to determine the indicative acceptable BAL ratings across the project area, in accordance with the Guidelines. The BAL Contour Map should be prepared by an accredited Bushfire Planning Practitioner; and
b) the identification of any bushfire hazard issues arising from the relevant assessment; and
c) clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages.

This information can be provided in the form of a Bushfire Management Plan or an amended Bushfire Management Plan where one has been previously endorsed.

Implementation of this BMP is expected to meet the following objectives of SPP 3.7:

- **5.1**: Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.
- **5.2**: Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process.
- **5.3**: Ensure that higher order strategic planning documents, strategic planning proposals, subdivision and development applications take into account bushfire protection requirements and include specified bushfire protection measures.
- **5.4**: Achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity, with consideration of the potential impacts of climate change.

In response to the above requirements of SPP 3.7, the bushfire management measures, as outlined in **Section 3**, have been devised for the proposed development in accordance with acceptable solutions of the Guidelines to meet compliance with bushfire protection criteria. An 'acceptable solutions' assessment is provided in Table 3 to assess the proposed bushfire management measures against each bushfire protection criteria in accordance with the Guidelines and demonstrate that the measures proposed meet the intent of each element of the bushfire protection criteria.

Table 3: Acceptable solutions assessment against bushfire protection criteria

Bushfire protection criteria	Intent	Acceptable solutions	Proposed bushfire management measures	Compliance statement
Element 1: Location	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	A1.1 Development location The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL–29 or below.	Refer to **Section 3.2**, which demonstrates that development will only occur in areas of BAL–29 or lower. No development will occur in areas of BAL–FZ or BAL–40.	The measures proposed are considered to comply and meet the intent of Element 1 Location.
Element 2: Siting and design of development	To ensure that the siting and design of development minimises the level of bushfire impact	A2.1 Asset Protection Zone Every building is surrounded by an APZ, depicted on submitted plans, which meets detailed requirements (refer to the Guidelines for detailed APZ requirements).	Refer to **Section 3.1**, which demonstrates that minimum 20 m wide APZs will be provided at all interfaces with classified vegetation	The measures proposed are considered to comply and meet the intent of Element 2 Siting and design of development
Element 3: Vehicular access	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event	A3.1 Two access routes Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.	Refer to **Section 3.3**, which demonstrates that a minimum of two different vehicular access routes will be provided for the proposed development at all times via the surrounding road network and internal access ways.	The measures proposed are considered to comply and meet the intent of Element 3

		A3.2 Public road A public road is to meet the requirements in Table 4 Column 1 of the Guidelines.	N/A No public roads are proposed as part of the development	Vehicular access
		A3.3 Cul-de-sac (including a dead-end-road) A cul-de-sac and/or a dead end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent), detailed requirements will need to be achieved as per Table 4 Column 2 of the Guidelines.	N/A No cul-de-sacs are proposed as part of the development.	
		A3.4 Battle-axe Battle-axe access legs should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) detailed requirements will need to be achieved as per Table 4 Column 3 of the Guidelines.	N/A No battle-axe lots are proposed as part of the development.	
		A3.5 Private driveway longer than 50 m A private driveway is to meet detailed requirements as per Table 4 Column 3 of the Guidelines.	Refer to **Section 3.3**, which demonstrates that internal access ways will meet minimum requirements for private driveways outlined in **Table 2** and the Guidelines.	
		A3.6 Emergency access way An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet detailed requirements as per Table 4 Column 4 of the Guidelines.	N/A No emergency access ways are required as part of the development.	

		A3.7 Fire service access routes (perimeter roads) Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire fighters and link between public road networks for fire fighting purposes. Fire service access routes are to meet detailed requirements as per Table 4 Column 5 of the Guidelines.	N/A No fire service access routes are required as part of the development.	
		A3.8 Firebreak width Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level as prescribed in the local firebreak notice issued by the local government	Refer to **Section 3.3**, which demonstrates that internal lot firebreaks will not be required under the City of Rockingham annual firebreak notice.	
Element 4: Water	To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.	A4.1 Reticulated areas The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.	Refer to **Section 3.4**, which demonstrates that all proposed lots will be provided a reticulated water supply and network of hydrants in accordance with local water authority, City and DFES requirements.	The measures proposed are considered to comply and meet the intent of Element 4 Water
		A4.2 Non-reticulated areas Water tanks for fire fighting purposes with a hydrant or standpipe are provided and meet detailed requirements (refer to the Guidelines for detailed requirements for non-reticulated areas)	N/A The proposed development will not occur within a non-reticulated area.	
		A4.3 Individual lots within non-reticulated areas (only for use if creating 1 additional lot and cannot be applied cumulatively) Single lots above 500 square metres need a dedicated static water supply on the lot that has the effective capacity of 10 000 litres.	N/A The proposed development will not occur within a non-reticulated area.	

5 Implementation and enforcement

Implementation of the BMP applies to the developer, prospective landowners and the relevant land authority/manager (such as the City or future land purchasers) to ensure bushfire management measures are adopted and implemented on an ongoing basis. A works program and summary of the bushfire management measures described in **Section 3** is provided in **Table 4**. These measures will be implemented to ensure the ongoing protection of proposed life and property assets is achieved. Timing and responsibilities are also defined to assist with implementation of each measure.

Table 4: Proposed works program

Bushfire management measure	Timing of application	Responsibility
Creation and ongoing maintenance of APZs and POS as per **Section 3.1.1** and **3.1.2**	APZs are to be created prior to development and maintained as required to ensure they are kept in a low threat minimal fuel condition on a regular and ongoing basis. All areas of POS are to be maintained in a low threat managed state following creation.	Developer during development, relevant land authority/manager where required thereafter
Building construction to the recommended BAL ratings for residential buildings as per **Section 3.2**	At the building construction stage	Prospective landowner, builder
Construction of internal access ways as per **Section 3.3**	Prior to building construction	Developer
Provision of reticulated water supply and network of hydrants as per **Section 3.4**	Prior to building construction	Developer
Notification on Title as per **Section 3.5**	Following subdivision approval (if required)	Developer
BMP addendum or future BAL assessment as per **Section 3.5**	As required to accompany future planning or building application to demonstrate reassessment of the management measures documented in this BMP (such as the APZ and/or BALs) in response to any modifications to development design or changes to the vegetation extent currently affecting the site	Developer or prospective landowner depending on the applicant
Compliance with current City of Rockingham annual firebreak notice as per **Section 3.5**	All year round as specified in the current firebreak notice	Developer, prospective landowner, relevant land authority/manager

5.1 Document review

This BMP will be updated as necessary following the data of approval to ensure:

1. Implementation is assessed and corrective actions are applied in cases of non-compliance.
2. The effectiveness and impact of fire prevention work is evaluated and significant changes in development design or the surrounding environment are reassessed in a BMP addendum.

DHA will be responsible for updating and revising the BMP as required until such time that the development is complete.

5.2 Stakeholder consultation

ELA has undertaken consultation with the developer, planner and City to ensure aims and objectives of the BMP are in accordance with stakeholder expectations and the BMP maintains compliance with the Guidelines.

6 References

Bureau of Meteorology (BoM) 2016, Climate statistics for Australian locations: Monthly climate statistics for Medina Research Centre, [Online], Commonwealth of Australia, available from: http://www.bom.gov.au/climate/averages/tables/cw_009194.shtml, [4/10/2016].

Department of Fire and Emergency Services (DFES) 2017, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: *http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx*, [10/08/2017].

McKenzie NL, May JE and McKenna S 2003, *Bioregional Summary of the 2002 Biodiversity Audit of Western Australia,* Department of Conservation and Land Management, Perth.

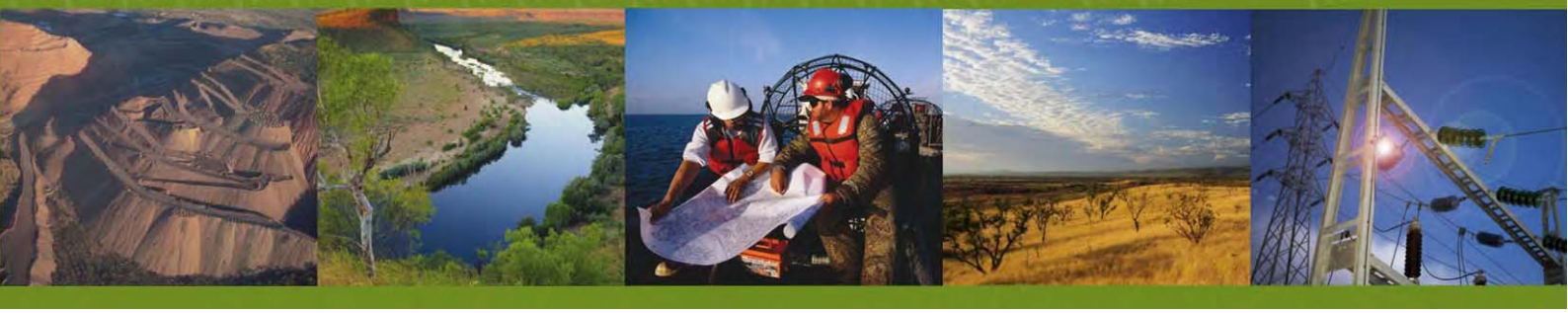
Standards Australia (SA) 2009, *Australian Standard AS 3959–2009 Construction of Buildings in Bushfireprone Areas*, Standards Australia, Sydney.

Strategen Environmental Consultants Pty Ltd 2017, *Bushfire Management Plan, Lot 1512 Lake St and Lot 5000 Fisher St, Rockingham*. Prepared for Defence Housing Australia

Western Australian Planning Commission (WAPC) 2015, *State Planning Policy 3.7 Planning in Bushfire-Prone Areas*, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) 2017, *Guidelines for Planning in Bushfire-Prone Areas*, Version 1.3 December 2017, Western Australian Planning Commission, Perth.

Appendix A Bushfire Hazard Assessment: Lot 1512 Lake St and Lot 5000 Fisher St, Rockingham (Strategen May 2015)



Bushfire Hazard Assessment

Lot 1512 Lake Street & Lot 5000 Fisher Street, Rockingham

Prepared for
Defence Housing Australia
by Strategen

May 2015

STRATEGEN
environmental consultants

Bushfire Hazard Assessment

Lot 1512 Lake Street & Lot 5000 Fisher Street, Rockingham

Strategen is a trading name of
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Level 2, 322 Hay Street Subiaco WA
ACN: 056 190 419

May 2015

Limitations

Scope of services

This report ("the report") has been prepared by Strategen Environmental Consulting Pty Ltd (Strategen) in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen has also not attempted to determine whether any material matter has been omitted from the data. Strategen will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen. The making of any assumption does not imply that Strategen has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

Client: Defence Housing Australia

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Draft Report	Rev A	For review by client	Z Cockerill / R Banks	Electronic (email)	2/04/2015
Final Report	Rev 0	Issued for use: for formal lodgement with TPS Amendment	Z Cockerill	Electronic (email)	10/04/2015
Final Report	Rev 1	Issued for use: for update of information based on CoR comments	Z Cockerill	Electronic (email)	25/05/2015
Final Report	Rev 2	Issued for use: for update of information based on CoR comments (Figure 4)	Z Cockerill	Electronic (email)	27/05/2015
Final Report	Rev 3	Issued for use: for update of information based on CoR comments (BPZ)	Z Cockerill	Electronic (email)	28/05/2015
Final Report	**Rev 4**	**Issued for use: for update of information based on CoR comments (BPZ)**	**Z Cockerill**	**Electronic (email)**	**28/05/2015**

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1. Introduction

1.1 Background

Defence Housing Australia (DHA) is proposing to develop Lot 1512 Lake Street and Lot 5000 Fisher Street, Rockingham (the project area) for residential purposes. The proposed development requires amendment under the City of Rockingham Town Planning Scheme (TPS No. 2) to rezone the site from the current Special Use classification for 'Caravan Park and Ancillary Uses' to the 'Development Zone'.

City of Rockingham (CoR) and Department of Planning (DoP) have requested that a bushfire hazard assessment be undertaken to support the proposed TPS amendment due to the bushfire risk posed by surrounding reserve land, particularly to the south and west. DHA has commissioned Strategen to undertake this work.

Early fire management advice was provided for the proposed development by York Gum Services (2012), the findings of which have been taken into consideration as part of this assessment and report. The York Gum Services (2012) report is contained in Appendix 1.

1.2 Scope of this report

Strategen has prepared this bushfire hazard assessment report to guide early planning and development of the project area and support the proposed TPS amendment. The assessment aims to classify the predominant vegetation both on and within 100 m of the project area, assess the slope under classified vegetation and identify the bushfire hazard levels accordingly.

The bushfire hazard assessment outlined in this report has been undertaken in accordance with the following methodology:

- *Planning for Bush Fire Protection Guidelines Edition 2* (PFBFP Guidelines; WAPC et al. 2010)
- *Australian Standard AS 3959–2009 Construction of Buildings in Bushfire-prone Areas* (AS 3959–2009; SA 2009).

The assessment and report also takes into consideration *Draft State Planning Policy 3.7 Planning for Bushfire Risk Management* (DoP & WAPC 2014) and associated revised guidelines.

This report is for submission to CoR and DoP in support of the proposed TPS amendment.

2. Site details and assessment

2.1 Site overview

The project area currently forms the Palm Beach Caravan Park and comprises Lot 1512 Lake Street and Lot 5000 Fisher Street, located in the City of Rockingham. The project area is bound by the following, as depicted in Figure 1:

- Lake Street and residential development to the north
- Fisher Street, residential development, partially vegetated Public Open Space (R 44041) and primary school grounds to the east
- Water Corporation reserve and access (R 42518) and vegetated CoR reserve (R 9458) to the south
- Water Corporation facility (R 42518), firebreak, vegetated CoR reserve (R 35176) and Lake Richmond to the west.

CoR reserve (R 9458) to the south contains well-maintained crushed limestone public and emergency access ways, with public vehicular access throughout these areas controlled by locked gates. There is evidence of recent bushfire occurrence within this reserve. CoR reserve (R 35176) to the west contains a 5 m wide mineral earth firebreak adjacent to the site. Both R 9458 and R 35176 are otherwise vegetated.

Water Corporation reserve (R 42518) to the south is predominantly cleared and contains a bitumen access road with locked gates at either end. The bitumen road within this reserve is a Water Corporation easement and will remain as such into perpetuity. This road can also be accessed by emergency service vehicles.

2.2 Site topography

The project area and adjacent vegetated land is predominantly flat with an elevation of 2–3 mAHD (Australian Height Datum) (Figure 2). However, CoR has reviewed topographical mapping within 100 m of the site and established that the ground slopes down to less than 1 mAHD (Australian Height Datum) to the southwest. CoR has advised that the project area is therefore situated up-slope of vegetation at >0–5 degrees.

Figure 1: Site overview

Scale 1:2,500 at A4

0 20 40 60 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 25/05/2015
Author: JCrute
Source: Aerial image and subdivision plan: Client 2015.

Legend

- Access gates
- Project area boundary
- Firebreaks/emergency access
- Existing cadastre

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Figure 2: Site topography

Scale 1:2,500 at A4

0 20 40 60 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 1/04/2015
Author: JCrute
Source: Aerial image and subdivision plan: Client 2015.

Legend

- Surface elevation (mAHD)
- Existing cadastre
- 100m wide assessment area
- Project area boundary

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2.3 Vegetation

Classified vegetation located on and within 100 m of the project area has been assessed by both Strategen and CoR. CoR's assessment of the vegetation has been adopted where interpretation and results differed between the two assessments. The resulting classified vegetation extent is depicted in Figure 3 and is discussed in the following subsections.

2.3.1 On-site vegetation extent

Strategen understands the on-site vegetation extent will be cleared as part of the proposed development; however, since there is currently no detailed structure planning over the site to depict the proposed clearing extent, the on-site vegetation has been classified as part of this assessment. Should any vegetation on or within 100 m of the project area be modified from its current status prior to development, then the vegetation class should be reassessed to align with the on-ground vegetation type and condition at the time.

The on-site vegetation extent consists of sparsely populated individual overstorey trees, including *Eucalyptus gomphocephala* (Tuart) and *Agonis flexuosa* (WA Peppermint), plus numerous other non-native species (Plate 1). The trees are nestled around individual residential allotments and paved areas of the caravan park. Overstorey canopy cover is around 20–30% throughout the site. The overstorey is therefore consistent with open woodland; however, overstoreys of open woodland should be classified to the vegetation type on the basis of their understoreys (SA 2009). The understorey consists of regularly managed, mown green lawns; therefore, the on-site vegetation is consistent with grassland (managed in a minimal fuel condition).

Plate 1: Open woodland overstorey within the project area (classified as grassland vegetation on the basis of the understorey in accordance with AS 3959–2009)

2.3.2 Adjacent vegetation extent

East

Predominant vegetation to the east consists of a small remnant contained within Public Open Space (R 44041). CoR has assessed this vegetation as woodland (Plate 2).

The western Fisher Street road verge contains some individual overstorey trees contained within a 10 m wide slashed road verge (Plate 3). CoR has assessed this vegetation as woodland. The eastern Fisher Street road verge consists of grassland (lack of overstorey) managed in a minimal fuel condition.

The primary school ground to the east of the project area contains regularly managed, mown green lawn surrounded to the north, west and south by a line of overstorey trees (Plate 4). The overstorey is therefore consistent with open woodland; however, overstoreys of open woodland should be classified to the vegetation type on the basis of their understoreys (SA 2009). The understorey consists of regularly managed, mown green lawn; therefore, the on-site vegetation is consistent with grassland (managed in a minimal fuel condition).

Plate 2: Woodland (as per CoR assessment) to the east within Public Open Space (R 44041)

Plate 3: Woodland (as per CoR assessment) to the east within western Fisher Street road verge

Plate 4: Grassland managed in a minimal fuel condition to the east within eastern Fisher Street Road verge and primary school grounds

South

The northern road verge of the Water Corporation restricted access road (R 42518), which abuts the southern boundary of the project area, contains some individual overstorey Tuart trees and slashed understorey grasses (Plate 5). CoR has assessed this vegetation as woodland.

Aside from cleared areas and three cleared truck turnaround points, the southern road verge of the Water Corporation restricted access road (R 42518) contains intact forest vegetation, which is an extension of the forest vegetation contained within CoR reserve (R 9458), as described below.

CoR reserve (R 9458) to the south is predominantly vegetated with minor areas of disturbance from clearing and uncontrolled bushfire. The predominant vegetation is forest consisting of a Tuart overstorey and a mixed mid and understorey of WA peppermint, Rottnest Island Pine, acacia species, melaleuca species, *Xanthorrhoea preissii* (Grass trees) and low shrubs, grasses and weeds (Plate 6). The small degraded and burnt areas of the reserve have been assessed by CoR as woodland vegetation (Plate 7 and Plate 8).

Plate 5: Woodland (as per CoR assessment) to the south within northern Water Corporation road verge (R 42518)

Plate 6: Forest to the south within southern Water Corporation road verge (R 42518) and CoR reserve (R 9458)

Plate 7: Woodland (as per CoR assessment) to the south within degraded areas of CoR reserve (R 9458)

Plate 8: Woodland (as per CoR assessment) to the south within burnt areas of CoR reserve (R 9458)

West

CoR reserve (R 35176) occurs to the west of the project area and contains the following:

1. A 5 m wide mineral earth firebreak directly adjoining the western boundary of the project area. There is no vegetation within the firebreak (Plate 9).
2. A fuel modified area to the west of the firebreak. This area is expected to have once occupied intact forest vegetation but has since been modified to reflect a reduced proportion of Tuart trees, Grass trees, shrubs and grasses (Plate 10). CoR has assessed this area as woodland vegetation.
3. Dense forest vegetation to the west of the fuel modified area. The vegetation consists of a low Tuart overstorey and a mixed mid and understorey of WA peppermint, Rottnest Island Pine, acacia species, melaleuca species, Grass trees and low shrubs, grasses and weeds (Plate 11).

Other minor areas of vegetation occur to the west of the project area in the form of:

- scrub vegetation adjacent to the Water Corporation facility (R 42518) (Plate 12)
- scrub vegetation on the outskirts of the Lake Richmond wetland (Plate 13)
- shrubland vegetation within the Lake Richmond wetland (Plate 14).

North

The Lake Street Road verges consist predominantly of regularly managed mown lawns, which equates to grassland vegetation managed in a minimal fuel condition. Land to the north is otherwise occupied by urban residential development.

Plate 9: 5 m wide mineral earth firebreak to the west (cleared, no vegetation)

Plate 10: Woodland (as per CoR assessment) within fuel modified area to the west

Plate 11: Forest to the west within CoR reserve (R 35176)

Plate 12: Scrub to the west adjacent to the Water Corporation facility (R 42518) (beyond locked gate, left of photo)

Plate 13: Scrub vegetation to the west on the outskirts of the Lake Richmond wetland

Plate 14: Shrubland within the Lake Richmond wetland

Figure 3: Vegetation class map

Scale 1:2,500 at A4

0 20 40 60 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 25/05/2015
Author: JCrute
Source: Aerial image and subdivision plan: Client 2015.

Legend

- Existing cadastre
- 100m wide assessment area
- Project area boundary

Vegetation class

- Forest
- Grassland (managed in a minimal fuel condition)
- Scrub
- Shrubland
- Woodland

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2.4 Bushfire hazards

The bushfire hazard level located on and within 100 m of the project area has been assessed by both Strategen and CoR. CoR's assessment of the bushfire hazard level has been adopted where interpretation and results differed between the two assessments. The resulting bushfire hazard levels are displayed in Figure 4 and are discussed in the following subsections.

Depicting the bushfire hazard through assessment of the classified vegetation and slope is a key to the initial determination of site suitability for development. This also leads to determination of the potential level of construction standard by the application of AS 3959–2009. According to PFBFP Guidelines, land with an assessed 'Moderate' or 'Extreme' bushfire hazard level is classified as bushfire prone land[1], which triggers implementation of AS 3959–2009 and increased building construction standards for any proposed development that cannot achieve the required 100 m separation distance to the assessed bushfire prone areas.

2.4.1 On-site bushfire hazard level

Strategen understands the project area is to be fully cleared as part of the proposed development; however, since there is currently no detailed structure planning over the site to depict the proposed clearing extent, the on-site bushfire hazard level has been classified as part of this assessment. Should any vegetation on or within 100 m of the project area be modified from its current status prior to development, then the vegetation class and bushfire hazard level should be reassessed to align with the on-ground vegetation type and condition at the time.

Due to the ongoing managed status of the grassland vegetation within the site, the on-site bushfire hazard level has been classified as 'Low'. This is consistent with AS 3959–2009, which states that grassland managed in a minimal fuel condition is regarded as low threat vegetation (SA 2009). This is also supported by the York Gum Services (2012) report, which states that the site is unlikely to carry a running fire.

2.4.2 Adjacent bushfire hazard level

The bushfire hazard level on adjacent land located within 100 m of the project area is a combination of:

- 'Low' within shrubland areas of the Lake Richmond wetland to the west; as well as managed grassland areas within road verges and the primary school grounds
- 'Moderate' within scrub areas to the west and woodland areas within road verges
- 'Extreme' within forest and woodland areas to the south, west and east.

A large proportion of the project area cannot achieve a 100 m separation distance to adjoining bushland areas assessed as having a 'Moderate' or 'Extreme' bushfire hazard level (i.e. bushfire prone areas). This is indicated in Figure 4 by designation of the 100 m wide BAL (Bushfire Attack Level) application area measured from the edge of the bushfire prone extent. The current separation distance between the bushfire prone extent and project area boundary is also indicated in Figure 4 through detailed measurements.

PFBFP Guidelines and AS 3959–2009 state that for any development areas that cannot achieve the full 100 m separation distance to bushfire prone land, then the BAL rating and corresponding building construction standard must be increased in accordance with AS 3959–2009 to provide an acceptable level of building protection against potential radiant heat and/or ember attack. The BAL application area depicted in Figure 4 indicates those areas of the development that may be subject to increased building construction requirements based on Strategen and CoR assessments of the current on-ground vegetation extent. This will need to be confirmed and potentially modified as part of ongoing fire management planning for the proposed development.

[1] Clause 2.2.3.2 of AS 3959–2009 outlines exclusions for low threat vegetation and non-vegetated areas that will need to be taken into consideration as part of detailed fire management planning for the proposed development

Figure 4: Bushfire hazard assessment map

Scale 1:2,500 at A4

0 20 40 60 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 28/05/2015
Author: JCrute
Source: Aerial image and subdivision plan: Client 2015.

Legend

- Existing cadastre
- Project area boundary
- 100m wide assessment area
- 100m wide BAL assessment area
- 20m wide BPZ (BPZ may be reviewed at LSP stage subject to detailed assessment)
- 11m — Distance between project area boundary and bushfire hazard

Bushfire hazard level

- Extreme
- Moderate
- Low

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3. Summary and recommendations

Strategen has undertaken a bushfire hazard assessment of the project area and adjacent land to guide early planning and development of the site and support the proposed TPS amendment. CoR has also undertaken an assessment of the vegetation class and bushfire hazard level. CoR's assessment of the vegetation and bushfire hazard level has been adopted where interpretation and results differed between the two assessments.

Results are depicted in Figure 4 and indicate the bushfire prone area extent (i.e. 'Moderate' and 'Extreme' bushfire hazard areas). The 100 m wide BAL application area has been established on this basis, which indicates those areas of the development that may be subject to increased building construction requirements. This will need to be confirmed and potentially modified as part of ongoing fire management planning for the proposed development. A 20 m wide Building Protection Zone (BPZ) has also been depicted in Figure 4, which may be reviewed at the LSP stage subject to detailed assessment.

Strategen determined that a large proportion of the project area cannot currently achieve the required 100 m wide separation distance to adjoining bushfire prone areas to the east, south and west; therefore, AS 3959–2009 may be triggered in these areas and increased building construction standards may apply.

Strategen makes the following recommendations and comments on the basis of the bushfire hazard assessment:

1. A Fire Management Plan is to be prepared in accordance with PFBFP Guidelines to inform the structure planning or subdivision stage of the proposed development, which will need to take into consideration the following:
    (a) reassessment of the vegetation class and bushfire hazard level to accurately capture the proposed clearing extent within the site and any proposed management/modification of the surrounding road verges/reserves (this may result in modification to the 100 m wide BAL application area, BAL requirements and BPZ alignment)
    (b) an accurate BAL assessment to confirm the necessary application of AS 3959–2009 for each individual lot (i.e. the BAL rating and necessary BPZ provisions)
    (c) compliance with development location, vehicular access, water supply, siting of development and design of development.
2. The project area can be developed and the development can be made compliant with PFBFP Guidelines and AS 3959–2009 provided BPZs and BAL ratings are implemented correctly and reflect the future long term vegetation and bushfire hazard extent. Following implementation of these measures, BAL FZ and BAL 40 ratings can be avoided for the development.

4. References

Department of Planning and Western Australian Planning Commission (DoP & WAPC) 2014, *Draft State Planning Policy 3.7 Planning for Bushfire Risk Management*, Western Australian Planning Commission, Perth.

Standards Australia (SA) 2009, *Australian Standard AS 3959–2009 Construction of Buildings in Bushfire-prone Areas*, Standards Australia, Sydney.

Western Australian Planning Commission, Department of Planning and Fire and Emergency Services Authority (WAPC et al.) 2010, *Planning for Bush Fire Protection Guidelines (Edition 2)*, Western Australian Planning Commission and Fire and Emergency Services Authority, Perth.

York Gum Services 2012, *Untitled memorandum of advice*, report prepared for Roberts Day Planning, June 2012.

Appendix 1
Fire management advice (York Gum Services 2012)

York Gum Services

Specialists in forest, bushfire and land management

7 Palin Street, Palmyra, Western Australia 6157
Phone (08) 93394055 or 0429 339405
Email: yorkgum@westnet.com.aus

Ross Duckham
Senior Urban Planner
Roberts Day

Dear Ross,

Park Beach Caravan Park, Rockingham

In response to your request I have inspected the site of the caravan park on which a residential development is proposed, and the surrounding land. The purpose was to assess potential bushfire issues that might need to be considered in planning a new development on the site.

1. Overall observations

1. The site itself has no remnant bushland, and will presumably be fully cleared to make way for residential development. It is not likely that the site will ever carry a running bushfire.

2. On its northern and eastern boundaries, the site is adjoined by wide bitumen roads with grass verges; there is a well-established suburb to the north, and a school and grass playing fields and a small urban park to the east. Using the methodology set out in *Planning for Bushfire Protection Guidelines*, I assess these areas as having a Nil bushfire hazard.

3. However, the site adjoins bushland on its south and west boundaries. Using the same methodology, I assess this bushland as having an Extreme bushfire hazard.

4. All of the houses in the new development will be close enough to the adjoining bushland to be potentially subject to airborne embers in the event of a fierce bushfire.

5. Dwellings on all of the lots on the western and southern boundaries will adjoin bushland and will be potentially subject to radiant heat or flames in the event of a fierce bushfire.

2. The Bushland

Bushland on the reserve adjoining the caravan park comprises dense stands of tuart, peppermint, wattle, Melaleuca, Rottnest Island Pine, grass trees and understorey shrubs. Trees in this area appear to have been planted, and in many places are extremely dense. Mostly the trees are immature and have not reached their potential height (>25 metres). The presence of Rottnest Island Pine (*Callitris preissii)* makes fire management of this bushland very difficult, as this species is vulnerable to even mild-intensity fire.

None of the bushland appears to have been burnt for many years, and is carrying heavy bushfire fuels.

3. The Fire Threat

The bushland adjoining the site is dense and flammable. It is interspersed with walking tracks, which are also used (presumably illegally) by motorcycles. There is a risk of bushfire ignition from accident or arson. If a fire was lit on the western edge on a hot summer day at the time of the south-westerly seabreeze, it could

generate a severe fire within minutes and this would impact on the proposed development. This impact would be in the form of direct flame or radiant heat at the boundary or airborne embers falling on roof tops.

The area is within a few minutes travel time from the Rockingham Fire Station, and it could be expected that first attack would be rapid (although difficult in the dense bush). The principal risk would be in the event of more than one fire in the district at the same time, so that when a fire occurred at this site, the firefighters were committed elsewhere.

4. Existing fire breaks

There is a bitumen road along the southern boundary (behind a locked gate) providing access to the Water Corporation facility at the south-west corner of the site. This has a wide road verge adjoining the fence behind which the caravans are parked. I was unable to determine whether this verge was inside the reserve, or inside the property. If the road is retained and the verge properly managed (weed control), there would be a 30 metre gap between the bush and the edge of the southern lots.

There is a three metre-wide sandy firebreak along the edge of the reserve around the Water Corporation facility and the western boundary of the caravan park. A section of the bushland adjoining this firebreak has recently been roughly "parkland cleared" by thinning out the trees and tall shrubs. However, the grass trees remain and this area still carries a very high fuel load. Until this area is burned, it cannot be regarded as effectively reducing bushfire intensity at the property boundary.

5. Conclusions

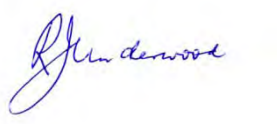
The residential development proposed for this site is not inherently hazardous, but will be at risk from bushfire damage because it adjoins bushland with an Extreme bushfire hazard. Although it can be expected that the authority responsible for the reserve will maintain firebreaks, they will be unlikely to undertake fuel reduction, so when a fire does occur it will probably be of high intensity.

Depending on lot sizes and orientation, and the calculated Bushfire Attack Level, dwellings on lots on the southern and western boundaries may need to be set back from the rear of the lots, and may need to meet specified construction standards. It may also be necessary for the developer to construct a barrier (a high masonry or brick wall) along the backs of the lots on the southern and western boundaries.

All dwellings on the site could be subjected to ember attack from an intense bushfire in the bushland to the west and south. It would be prudent to ensure that all houses meet minimum requirements for sealing roof spaces from embers.

I conclude that the bushfire risk in the proposed site itself is low, but the threat posed by the adjoining bushland is high. Therefore it would be sensible to ensure that appropriate measures are taken later in the planning process, i.e., dealing with (i) fire barrier; (ii) calculation of BAL for lots adjoining the bushland and consequent review of setbacks and housing construction standard; and (iii) protection of all dwellings from entry of embers to roof spaces.

Yours sincerely



Roger Underwood
Principal Consultant
June 19th 2012

Appendix B City of Rockingham firebreak notice

Fire Control Notice

NOTICE TO OWNERS AND/OR OCCUPIERS OF LAND IN THE CITY OF ROCKINGHAM

As a landowner or occupier you have a legal requirement under Section 33 of the Bush Fires Act 1954 to carry out fire prevention works on your property in accordance with the provisions of this Fire Control Notice.

You are required on or before 30 November 2016, to remove all flammable material or to install three (3) metre wide mineral earth firebreaks (mineral earth in definition being land totally clear of all vegetation living or dead) and any overhanging trees or other vegetation to a clearance height of four (4) metres. These fire prevention works must be maintained up to and including 31 May 2017.

Inspection of properties will be carried out in all areas for compliance with this Notice after 30 November 2016. Persons who fail to comply with the requirements of this Notice will be issued with an infringement notice ($250).

It is the property owner's responsibility to ensure the standard of prevention work is undertaken and maintained as per this Notice.

Correct Rural Firebreak

Urban Slashed Property

Rural Land

On or before 30 November 2016 and thereafter up to and including 31 May 2017:

Have firebreaks not less than three (3) metres wide immediately inside and along all boundaries, with all overhanging tree branches, tree limbs etc. to be trimmed back clear of the firebreak to a clearance height of four (4) metres.

Maintained and living lawns are acceptable in conjunction with or in lieu of mineral earth firebreaks, provided that the same minimum width and height requirements for a firebreak are maintained.

Buildings/Sheds and Haystacks

Have firebreaks not less than five (5) metres wide so far as to surround all buildings, sheds and haystacks, with all overhanging branches, trees, limbs etc. to be trimmed back clear of the firebreak to a clearance height of four (4) metres.

Urban Areas (Vacant Land)

On or before 30 November 2016 and thereafter up to and including 31 May 2017:

Land less than 2000 m²

Have the entire vacant land clear of all flammable material by slashing, mowing or other means to a height no greater than 50 mm.

Land more than 2000 m²

Have firebreaks not less than three (3) metres wide immediately inside and along all boundaries of the vacant land with all overhanging tree branches, trees, limbs etc. to be trimmed back clear of the firebreak area to a clearance height of four (4) metres.

Or

Maintained and living lawns are acceptable in conjunction with or in lieu of mineral earth firebreaks, provided that the same minimum width and height requirements for a firebreak are maintained.

Fire Management Plans

All properties within subdivisions/developments in the City of Rockingham shall comply with the Fire Management Plans for their estate to the satisfaction of the City or its duly Authorised Officer.

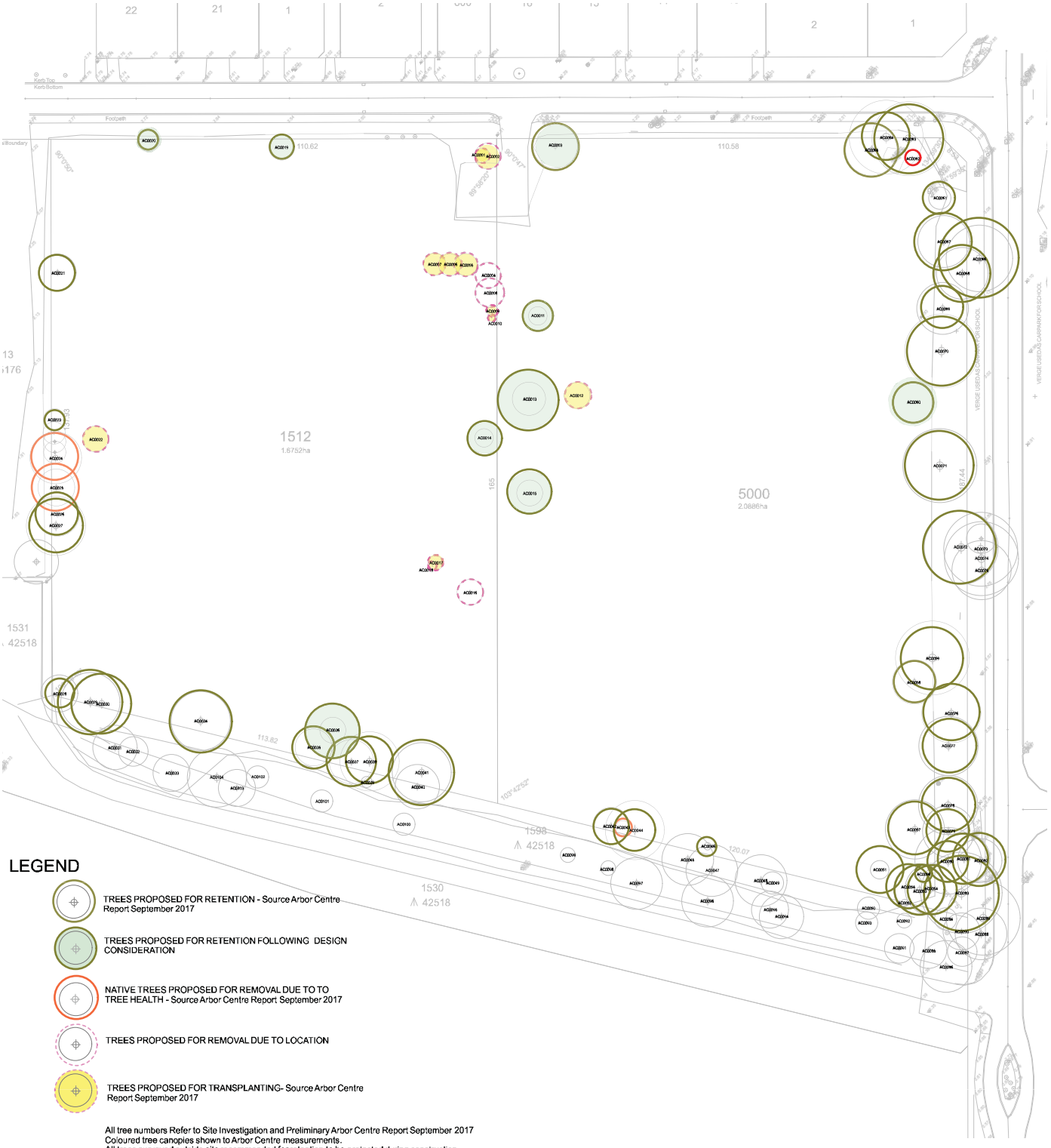
Alternative Situations

Variation applications must be lodged in writing to the City of Rockingham by 16 October 2016. All previously submitted and accepted variations remain valid and do not require a new application each year. An application to Vary Location and Type of Firebreaks can be downloaded from the City's website or is available from the Emergency Services Administration Officer on 9527 0732.

Fire Control Enquiries

8.30am - 4.30pm Monday to Friday **Phone:** 9527 0732 **Email:** firecontrol@rockingham.wa.gov.au

Appendix C Tree retention plan



LEGEND

- TREES PROPOSED FOR RETENTION - Source Arbor Centre Report September 2017
- TREES PROPOSED FOR RETENTION FOLLOWING DESIGN CONSIDERATION
- NATIVE TREES PROPOSED FOR REMOVAL DUE TO TO TREE HEALTH - Source Arbor Centre Report September 2017
- TREES PROPOSED FOR REMOVAL DUE TO LOCATION
- TREES PROPOSED FOR TRANSPLANTING- Source Arbor Centre Report September 2017

All tree numbers Refer to Site Investigation and Preliminary Arbor Centre Report September 2017
Coloured tree canopies shown to Arbor Centre measurements.
All trees surveyed outside site recommended for retention to be protected during construction.

TABLE OF TREES PROPOSED FOR REMOVAL - Source Arbor Centre Report September 2017

Tree Number	Species	Common Name	Tree Height (M)	Canopy Spread (M)	Trunk Diameter (DBH) (M)	Tree Health	Tree Structure	Age	Useful Life Expectancy	TPZ Radius (M)	SRZ Radius (M)	Recommended Works	Observations & Comments
HEALTHY NATIVE TREES PROPOSED TO BE REMOVED													
AC0004	Agonis flexuosa	WA Peppermint	12	10	0.85	Good	Acceptable	Mature	40+ Years	10.2	5.09	Retain; Develop tree retention specifications	Tree on low to northern; main stems and limbs bifurcate at 3m, 4m, 6m from ground level , swelling noted; minor lagged stems present throughout canopy; canopy suppression noted from adjacent palm and Agonis; minor surface root damage noted
AC0008	Agonis flexuosa	WA Peppermint	12	13	1.10	Acceptable	Good	Mature	40+ Years	13.56	5.68	Retain; Develop tree retention specifications	Reasonable specimen; rubbing crossing stems and deadwood present throughout canopy; canopy slightly sparse; canopy suppression noted
AC0016	Agonis flexuosa	WA Peppermint	10	10	1.0	Acceptable	Acceptable	Mature	10-40 Years	15	6.25	Retain; Develop tree retention specifications	Multi-stemmed form; mechanical damage noted; canopy slightly sparse
AC0018	Melaleuca bracteata	Black Tea-tree	5	5	0.2	Acceptable	Acceptable	Mature	5-10 Years	2.4	1.68	Retain; Develop tree retention specifications	Main stem bifurcates at 1m from ground level; canopy suppression noted; canopy slightly sparse
AC0019	Agonis flexuosa	WA Peppermint	10	10	0.8	Good	Acceptable	Mature	40+ Years	9.6	5.01	Retain; Develop tree retention specifications	Good mature specimen
AC0020	Eucalyptus gomphocephala	Tuart	15	15	1.5	Good	Questionable	Mature	40+ Years	18	9.38	Retain; Develop tree retention specifications; Develop tree retention specifications regarding remediation of questionable canopy structure	Good mature specimen; previously lopped at 10m from ground level; main stem bifurcates at 2m from ground level
AC0021	Eucalyptus gomphocephala	Tuart	16	16	1.15	Acceptable	Questionable	Mature	10-40 Years	15.32	9.38	Retain; Seek further arboricultural advice regarding remediation of questionable canopy structure; Develop tree retention specifications	Main stem bifurcates at 1.6m from ground level; canopy previous lopped; deadwood present throughout canopy
UNHEALTHY NATIVE TREES PROPOSED TO BE REMOVED													
AC0024	Eucalyptus camaldulensis var. obtusa	Northern River Red Gum	12	11	0.45	Questionable	Questionable	Mature	5-10 Years	7.8	2.75	Consider for removal and replacement due to problematic health/ structural issues	Canopy chlorotic and indicative; decline; lopped stems and previous branch failures present throughout canopy; terminal decline noted; health and structure considered problematic for long term retention
AC0025	Eucalyptus camaldulensis var. obtusa	Northern River Red Gum	12	11	0.45	Questionable	Questionable	Mature	5-10 Years	7.8	2.75	Consider for removal and replacement due to problematic health/ structural issues	Canopy chlorotic and indicative; decline; lopped stems and previous branch failures present throughout canopy; terminal decline noted; health and structure considered problematic for long term retention
AC0029	Eucalyptus species	Gum Tree	9	6	0.2	Dead	Questionable	Mature	0	2.4	1.68	Consider for removal and replacement due to problematic health/ structural issues	Dead Tree
AC0100	Casuarina lignosa	Swamp Sheoak	7	5	0.6	Questionable	Questionable	Mature	5-10 Years	9.6	3.92	Consider for removal and replacement due to problematic health/ structural issues	Multi-stemmed form (6 main stems); canopy indicates decline; Health/structure considered problematic for long term retention
HEALTHY EXOTIC TREES PROPOSED TO BE REMOVED- All capable of transplanting													
AC0001	Howea forsteriana	Kentia Palm	5	4	0.18	Good	Good	Mature	30-40 Years	4		Retain; Develop tree retention specifications	Reasonable specimen
AC0002	Archontophoenix cunninghamiana	Illawarra Piccabeen/Christmas Tree	10	6	0.4	Good	Acceptable	Mature	40+ Years	6		Retain; Develop tree retention specifications	Reasonable specimen; basal bifurcates at 300mm from ground level
AC0003	Phoenix canariensis	Canary Island Date Palm	10	8	0.45	Good	Good	Mature	40+ Years	5		Retain; Develop tree retention specifications	Reasonable specimen; basal suckers noted
AC0006	Phoenix canariensis	Canary Island Date Palm	7	8	0.45	Good	Good	Mature	40+ Years	5		Retain; Develop tree retention specifications	Reasonable specimen; basal suckers noted
AC0007	Phoenix canariensis	Canary Island Date Palm	7	7	0.45	Good	Good	Mature	40+ Years	5		Retain; Develop tree retention specifications	Reasonable specimen; basal suckers noted
AC0009	Livistona chinensis	Chinese Fan Palm	11	6	0.38	Good	Acceptable	Mature	40+ Years	5		Retain; Develop tree retention specifications	Reasonable specimen; canopy suppression noted
AC0011	Archontophoenix cunninghamiana	Illawarra Piccabeen	8	6	0.35	Acceptable	Acceptable	Mature	40+ Years	4.2		Retain; Develop tree retention specifications	Reasonable specimen; rubbing crossing stems leading to indicative decline; canopy suppression noted
AC0012	Metrosideros excelsa	New Zealand Christmas Tree	6	6	0.55	Acceptable	Acceptable	Mature	40+ Years	6.6	2.57	Retain; Develop tree retention specifications	Reasonable specimen; main stem bifurcates at ground level; deadwood present throughout canopy; surface roots and root damage noted
AC0017	Jacaranda mimosifolia	Jacaranda	9	7	0.6	Acceptable	Questionable	Mature	40+ Years	6.8	2.29	Retain; Seek further arboricultural advice regarding root damage remediation considerations; Develop tree retention specifications	Significant root damage noted; canopy suppression noted; previous branch failures noted throughout canopy
AC0022	Phoenix canariensis	Canary Island Date Palm	9	8	0.7	Good	Good	Mature	40+ Years	5		Retain; Develop tree retention specifications	Good specimen

C	3/10/18	Trees outside site boundary not highlighted additional trees proposed for retention
B	29/9/17	Updated Tree Removal/Retention
A	23/8/17	For issue to Defence Housing Authority

ISSUE	DATE	REVISION	
PROJECT	Palm Beach		PROJECT# WD1709
CLIENT	Defence Housing Authority	DATE# 13-09-17	DWG# 1709-01
DWG	TREE SURVEY OVERLAY	SCALE @ A1 1:500	
		DRAWN PW	
		CHKD -	REVISION C

woodward design pty ltd 3/22 Pakenham Street Fremantle
PO Box 306 Claremont Australia T: 0437 33 88 33 E: pete@woodwarddesign.com.au

ecological AUSTRALIA

ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management

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F 02 9542 5622

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Canberra ACT 2601
T 02 6103 2314
F 02 9542 5622

COFFS HARBOUR
22 Ray McCarthy Drive
Coffs Harbour NSW 2450
T 02 6651 5484
F 02 6651 6890

PERTH
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235 St Georges Terrace
Perth WA 6000
T 08 6218 2200
F 02 9542 5622

MELBOURNE
Level 1, 436 Johnston St
Abbotsford, VIC 3076
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F 02 9542 5622

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Sydney NSW 2000
T 02 9259 3729
F 02 9542 5622

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Newcastle NSW 2300
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F 02 9542 5622

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Armidale NSW 2350
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F 02 9542 5622

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