
# Jindee Innovation Project

## Conservation Management Plan

Prepared for
Westminster Estates Pty Ltd
by Strategen

December 2016

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# Jindee Innovation Project

## Conservation Management Plan

Strategen is a trading name of
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December 2016

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**Client:** Westminster Estates Pty Ltd

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Declaration of accuracy

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed

Full name (please print) Gareth Wilson

Organisation (please print) Estates Development Company

Date 16/12/16

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# 1. Introduction

Westminster Estates Pty Ltd (Westminster) entered into an agreement in 2007 with the Western Australian Planning Commission (WAPC) and the City of Wanneroo (CoW) to undertake an innovative residential development, known as the Jindee Innovation Project. The Jindee Innovation Project is located approximately 37 km north of Perth, and 14 km west of the Joondalup City Centre, Western Australia, in the CoW (Figure 1). The development will occur on land owned by Westminster or under contract to Westminster, within Lot 8000 Marmion Avenue (Figure 2).

The Project Area covers a total area of 119.5 ha, including 6.9 ha of Parks and Recreation which was developed in consultation with the WAPC and the Environmental Protection Authority (EPA) with an objective to maximise the biodiversity protected on site.

This Conservation Management Plan (CMP) has been prepared in accordance with Condition 10 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2012/6631 for the Jindee Innovation Project (Appendix 1). The purpose of this CMP is to demonstrate how Carnaby's Cockatoo habitat retained within the Parks and Recreation Reserve and Public Open Space (POS)/civic spaces within the Project Area will be managed in order to protect and enhance the available habitat (Figure 3).

## 1.1 Objective

The objective of this CMP is to meet the requirements of condition 10 of EPBC 2012/6631. The CMP has been prepared in accordance with condition 10 as outlined in Table 1.

Table 1 Sub-requirements of condition 10 and corresponding CMP section where each addressed

| Condition No | Condition text | Relevant section |
|---|---|---|
| 10 | To protect and enhance habitat for Carnaby's Black Cockatoo, the approval holder must prepare and submit a *Conservation Management Plan* (the plan) detailing management of habitat for Carnaby's Black Cockatoo that is to be retained on the proposal site, for the Minister's approval. The plan must include | N/A |
| 10(a) | measures to physically delineate areas that will be retained | Section 3.2.1 |
| 10(b) | erosion and dust control measures during construction | Section 3.2.3 |
| 10(c) | the management of weeds, *Phytophthora* dieback, bushfire and feral animals | Sections 3.2.4, 0, 3.2.6 and 3.2.7 |
| 10(d) | identification of any degraded habitat and how those areas will be managed | Section 3.2.2; Figure 5 |
| 10(e) | a monitoring program for Carnaby's Black Cockatoo and their habitat | Section 4 |
| 10(f) | Details of who will be responsible for the long-term management of the retained land, and how the land will be protected in the long term | Section 6.1. |
| 10(g) | a commitment to fund all management actions in the two Parks and Recreation areas within the site boundary marked in green at Attachment B until the management of those areas is handed over to another party, including the amount of funding that will be allocated to these management actions | Section 3.1 |
| 10(h) | performance indicators and corrective actions | Section 5 |
| 10(i) | roles and responsibilities; and | Section 6.2 |
| 10(j) | timeframes for the implementation of the above measures | Section 6.1 |

## 1.2 Land details

The Project Area includes Lots 8000, 8001 and 8002 Marmion Avenue and has approximately 800 m frontage to the Indian Ocean. It is located within proximity to the Brighton District Centre, the proposed Brighton rail station (expected to be operational in 2014) and the Mitchell Freeway extension.

Table 2 Land identification information

| Street address | Suburb | Cadastral information | Title | Zoning | Structure Plan |
|---|---|---|---|---|---|
| 2469 Marmion Avenue | Jindalee | Lot 8000 Marmion Avenue | Lot 8000 on DP 403862 | Urban | LSP 84 |
| 2409K Marmion Avenue | Jindalee | Lot 8001 Marmion Avenue | Lot 8001 on DP 403862 | Parks and Recreation | LSP 84 |
| 2435L Marmion Avenue | Jindalee | Lot 11593 Marmion Avenue | Lot11593 on DP190531 | Parks and Recreation | LSP 84 |
| 1000K Maritime Drive | Jindalee | Lot 8002 Marmion Avenue | Lot 8002 on DP 403862 | Parks and Recreation | LSP 84 |

## 1.3 Statutory and policy context

### 1.3.1 Metropolitan Regional Scheme Amendment

The Project Area includes Lots 8000, 8001, 8002 and 11593 Marmion Avenue. The coastal environment within and adjacent to Lot 8000 includes both limestone cliffs and beaches underpinned by limestone formation, which can support development closer to the coast than contemplated by the former Metropolitan Regional Scheme (MRS) boundary. An MRS amendment application was lodged in 2008 to amend the boundary (1152/41) and was approved by State Parliament in November 2009.

The MRS amendment was referred under the Section 48A of the *Environmental Protection Act 1986* (EP Act) to the EPA in March 2008. The level of assessment was set at 'Scheme Amendment Not Assessed – Advice Given' in May 2008. The EPA supported the scheme amendment on the basis that the two Parks and Recreation reserve were to be provided to offset the area of the foreshore Parks and Recreation Reserve that was proposed to be zoned Urban. As a result a land exchange was completed between the landowner and the WAPC for the reserves that are now Lots 8001, 8002.

### 1.3.2 Environment Protection and Biodiversity Conservation Act 1999

The Jindee Project Area was the subject of EPBC approval 2012/6631, referred to the Department of the Environment (DotE) on 16 November 2012 and approved 18 July 2013. This CMP has been prepared in accordance with proposed condition 10 of this EPBC approval (refer to Table 1).

In accordance with condition 10 of EPBC approval 2012/6631, if the Minister approves the CMP, the approved plan must be implemented.


**Figure 1: Site location**

Scale 1:15,000 at A4

0 100 200 300 400 500 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 5/07/2016
Author: JCrute
Source: Topography: Geoscience Australia 2006. Aerial image: Nearmap 06/2012. Cadastre: Online SLIP Database, Landgate 06/2016.

**Legend**

- Project Area
- Existing cadastre

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## Figure 2: Project Area

Scale 1:15,500 at A4

0 100 200 300 400 500 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 29/06/2016
Author: JCrute
Source: Topography: Geoscience Australia 2006. MRS: DPL 2012.
Cadastre: Online SLIP Database, Landgate 09/2012
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**Legend**

- Project Area boundary

**Metropolitan Region Scheme**

- Urban
- Other Regional Roads
- Parks and Recreation
- Railways
- Waterways

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**Figure 3: Concept plan**

Scale 1:9,430 at A4

0 100 200 300 400 500 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 29/06/2016
Author: JCrute
Source: Aerial image: Nearmap 2012. Concept plan: Client 01/2016.

**Legend**

- Project Area boundary
- Subdivision layout
- POS
- ROS

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# 2. Carnaby's Cockatoo

## 2.1 Species information

Carnaby's Cockatoos (*Calyptorhynchus latirostris)* are endemic to the South West of Western Australia. They mainly occur in uncleared remnant native eucalypt woodlands, especially those that contain Salmon gum, wandoo, and in shrubland or Kwongan heathland dominated by *Hakea, Dryandra, Banksia* and *Grevillea* species (DSEWPaC 2012). Current data on distribution of this species shows that there are numerous records along the Northern Swan Coastal Plain, including records in and around the Project Area.

## 2.2 Habitat within the Project Area

The vegetation within the Project Area is varied, reflecting the topography and soils found on site. Areas of Banksia woodland as well as the *Dryandra sessilis* thickets within the Project Area have the potential to support flora species known to be a food source for Carnaby's Cockatoo (Bamford 2006). The Project Area is not considered to contain breeding habitat for this species as it does not contain trees suitable for breeding purposes (RPS 2012).

The development will result in the removal of approximately 41 ha of potential Carnaby's Cockatoo foraging habitat. Approximately 4.28 ha of good – excellent potential Carnaby's Cockatoo foraging habitat will be retained in two Parks and Recreation Reserves (A and B) and Public Open Spaces (POS)/ civic spaces (Figure 3, Figure 4).

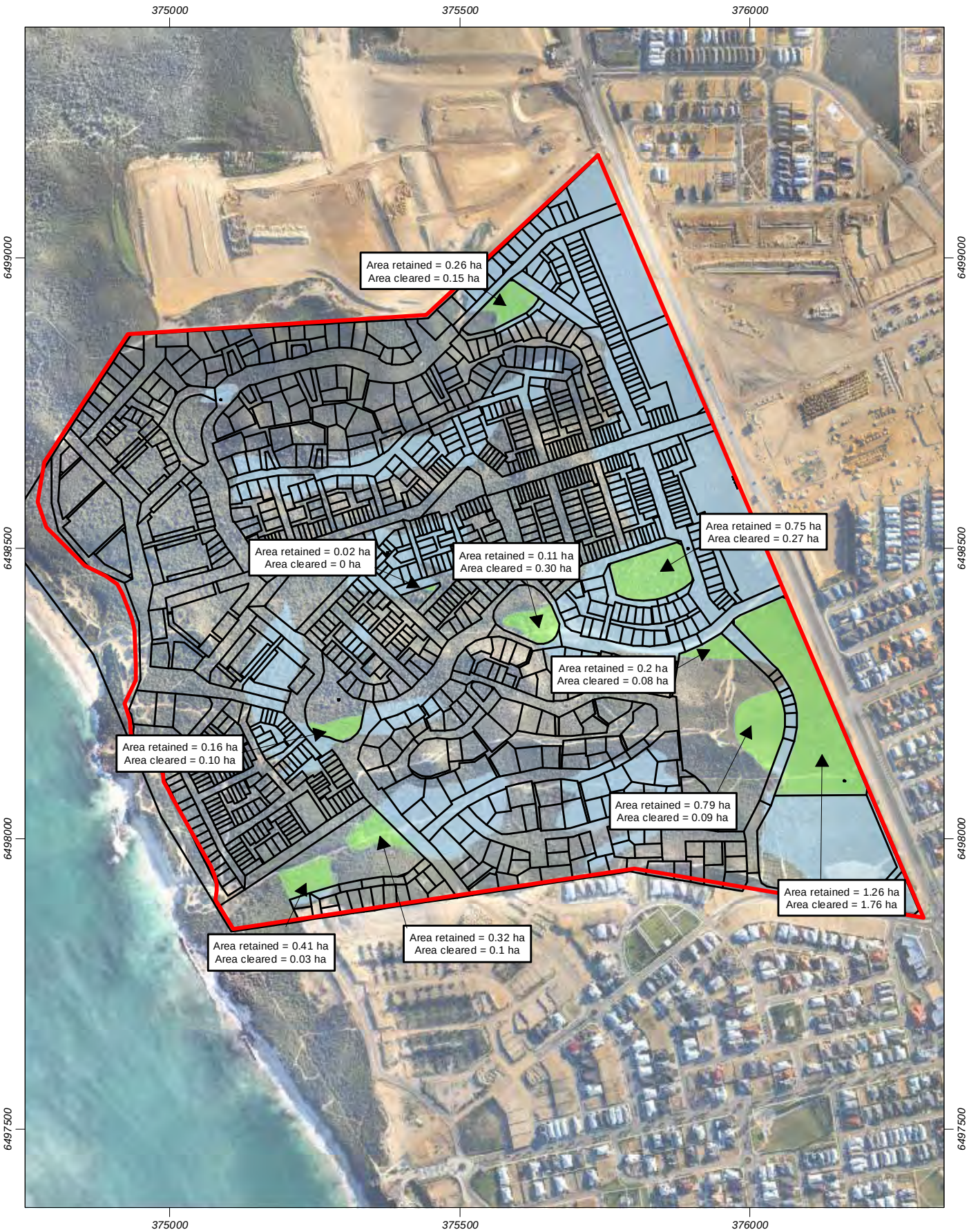


**Figure 4: Carnaby's Black-Cockatoo foraging habitat**

Scale 1:9,000 at A4

0 50 100 150 200 250 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 29/06/2016
Author: DWhite
Source: Aerial image: Nearmap 2012. Concept plan: Client 2014.

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**Legend**

- Project Area boundary
- Subdivision layout
- Potential foraging habitat for Carnaby's Black Cockatoo to be cleared (38.01 ha)
- Potential foraging habitat for Carnaby's Black Cockatoo to be retained and cleared in POS/ROS (minimum total area retained 4.28 ha; maximum total area cleared 2.88 ha)

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# 3. Management measures for Carnaby's Cockatoo and their habitat

## 3.1 Parks and Recreation Reserves

The purpose of this CMP is to demonstrate how Carnaby's Cockatoo habitat retained within the Project Area will be managed in order to protect and enhance the available habitat (Figure 4).

In accordance with conditions 10(g) of EPBC approval 2012/6631, Westminster will implement works funded to the order of $393 000 (excl GST), as agreed by the WAPC to implement all relevant management actions in the two Parks and Recreation Reserves (A and B), until the management of those areas is handed over to another party, which is mostly likely to be the WAPC. The reserves will be handed over within 5 years of substantial commencement of the action, which will occur when land titles are created through the subdivision process administered by the WAPC. These areas are vested as Parks and Recreation Reserve under the Metropolitan Region Scheme (MRS) ensuring it is protected in the long term (see Table 13 for further information). The MRS is the highest order instrument within the WA town planning system and modifications can only occur with the approval of Parliament.

The works to be undertaken by Westminster are outlined in Appendix 2, and will include:

- fire management
- installation of appropriate barriers to prevent pedestrian access such as fencing and access gates to dunes
- installation public amenities (i.e. pathways and observation deck)
- infill planting/seeding and weed control of areas to be revegetated as per the Clearing and Revegetation Management Plan and Table 3.

These management works will therefore be implemented as per Table 3 to protect and enhance the retained Carnaby's Cockatoo habitat within the Parks and Recreation Reserves. Vegetation across the site is predominantly in very good condition (RPS 2012, Appendix 3); however, there are some degraded areas that are in proximity to Carnaby's Black-Cockatoo habitat proposed to be retained where native vegetation has been disturbed and weeds have been introduced by unauthorised access of off-road vehicles within the Parks and Recreation Reserves (Figure 5). Some of these unauthorised tracks are also proposed to be used in the creation of formal access pathways for pedestrians to reduce the clearing requirements in the Parks and Recreation Reserves. All degraded areas not proposed to be used for formal access tracks will be revegetated.

Degraded habitat within the Parks and Recreation Reserves will be managed through revegetation and weed control will be implemented as outlined in the Clearing and Revegetation Management Plan (Strategen 2014).

Table 3 Management measures for the Parks and Recreation reserves

| Action | Timing | Responsibility |
|---|---|---|
| Carnaby's Cockatoo habitat being retained will be delineated by survey along clearing boundaries and protected by the installation of temporary fencing or survey pegs and flagging tape. | Prior to clearing | Construction contractor |
| GPS co-ordinates of areas approved to be cleared and those required to be retained will be provided to the contractor to ensure no unapproved clearing is undertaken. | Prior to clearing | Construction contractor |
| Appropriate barriers to prevent pedestrian access such as fencing will be installed around the perimeter of the Parks and Recreation Reserves. | During construction | Construction contractor |
| Access point in the form of a single gate will be installed at strategic locations in the Parks and Recreation Reserves. | During construction | Construction contractor |

| Action | Timing | Responsibility |
|---|---|---|
| Stabilised gravel path, limestone bollards and an observation desk will be installed within the Parks and Recreation Reserve to ensure controlled public use. | During construction | Construction contractor |
| Gravel fire access tracks will be constructed in accordance with the Fire Management Plan*. | During construction | Construction contractor |
| Firebreak creation, maintenance, removal of dead branches, and general fire prevention activities will be undertaken as recommended in the Fire Management Plan*. Note: Avoid disturbance of any Carnaby's Cockatoo habitat in Parks and Recreation areas for the purpose of firebreak creation. | During construction | Construction contractor, and Westminster |
| Determine appropriate method and timing of weed control in consultation with a suitably qualified specialist, based on monitoring results as described in the CRMP. | As per CRMP | Westminster |
| Implement weed control. | As determined by previous step and CRMP | Westminster |
| Monitor weed control results and implement further control if required as described in the CRMP | As per CRMP | Westminster. |
| All vehicles, machinery and equipment will be free of mud and soil. | When entering Parks and Recreation areas. | Revegetation (weed) contractor |
| Engage a qualified and licensed subcontractor, if necessary to undertake pest fauna control/removal appropriate to the species detected, based on monitoring described in CRMP. | On advice of qualified subcontractor | Westminster |

*A Fire Management Plan will be addressed as part of the planning approvals process and will be finalised in accordance with CoW standard operating procedures.

## 3.2 POS/civic spaces

The purpose of this CMP is to demonstrate how Carnaby's Cockatoo habitat retained within the Project Area will be managed in order to protect and enhance the available habitat (Figure 4). Management of the POS/ civic spaces areas will be undertaken as described below.

Westminster will manage the POS areas and Civic spaces for the developer maintenance period prior to handover to CoW. Handover will occur at the time the POS and Civic space land titles are created. Westminster is unable to confirm when the titles will be finalised as it depends on market conditions and relevant authority's processes; however, creation of the first land titles is expected to be completed by the end of the first stage of development. Subsequent titles are expected to be created as staging progresses. It is noted that prior to subdivision the CoW require Conservation Management Plans (CMP) to be prepared for each of the local POS areas that include designated local conservation areas. These are required to be identified and adequately managed to satisfy CoW Local Planning Policies. The CMPs will ensure the protection of retained habitat in these areas in the long term.

### 3.2.1 Physical delineation of habitat to be retained

Delineation of habitat to be retained is important during the construction phase, as well as post construction. If retained Carnaby's Cockatoo habitat is not adequately delineated, it may become degraded through unapproved clearing, trampling, predation by feral animals/domestic pests and the introduction/spreading of weeds.

Prior to commencement of works within proximity of Carnaby's Cockatoo habitat to be retained within the POS/civic spaces will be delineated by survey and adequately delineated to ensure the areas are not disturbed during clearing or earthworks. Refer to Table 4 for further specific management measures.

Table 4 Management measures for delineating areas to be retained

| Action | Timing | Responsibility |
|---|---|---|
| Carnaby's Cockatoo habitat being retained will be delineated by survey along clearing boundaries and protected by the installation of temporary fencing in areas adjacent to construction activity, or survey pegs and flagging tape where construction activity is not occurring. | Prior to clearing | Construction contractor |
| Temporary signage will be installed in accordance CoW standard signage policy to restrict construction workers from entering Carnaby's Cockatoo habitat being retained. | Prior to clearing | Construction contractor |
| GPS co-ordinates of areas approved to be cleared and those required to be retained will be provided to the contractor to ensure no unapproved clearing is undertaken. | Prior to clearing | Construction contractor |
| Appropriate barriers to prevent pedestrian access such as fencing 'will be installed around the perimeter of POS areas or retained habitat within to CoW specifications designed to prevent public access. | During construction | Construction contractor |
| Access points will be installed at strategic locations in the POS areas to CoW requirements. | During construction | Construction contractor |
| Permanent signage will be installed to encourage public education and awareness on:<br>• the importance of retained bushland<br>• the detrimental effects of rubbish, weeds and pathogens on biodiversity<br>• the importance of keeping to the designated walking tracks<br>• the requirement for dogs to be on a lead in designated areas. | During construction | Construction contractor |

### 3.2.2 Identification and management of degraded habitat being retained

Vegetation across the site is predominantly in very good condition; however, there are some degraded areas in POS areas adjacent to Carnaby's habitat proposed to be cleared where native vegetation has been disturbed and weeds have been introduced by unauthorised access of off-road vehicles (Figure 5). Degraded habitat within the POS/civic spaces and streetscapes will be managed through revegetation and weed control as outlined in the Clearing and Revegetation Management Plan (Strategen 2016).

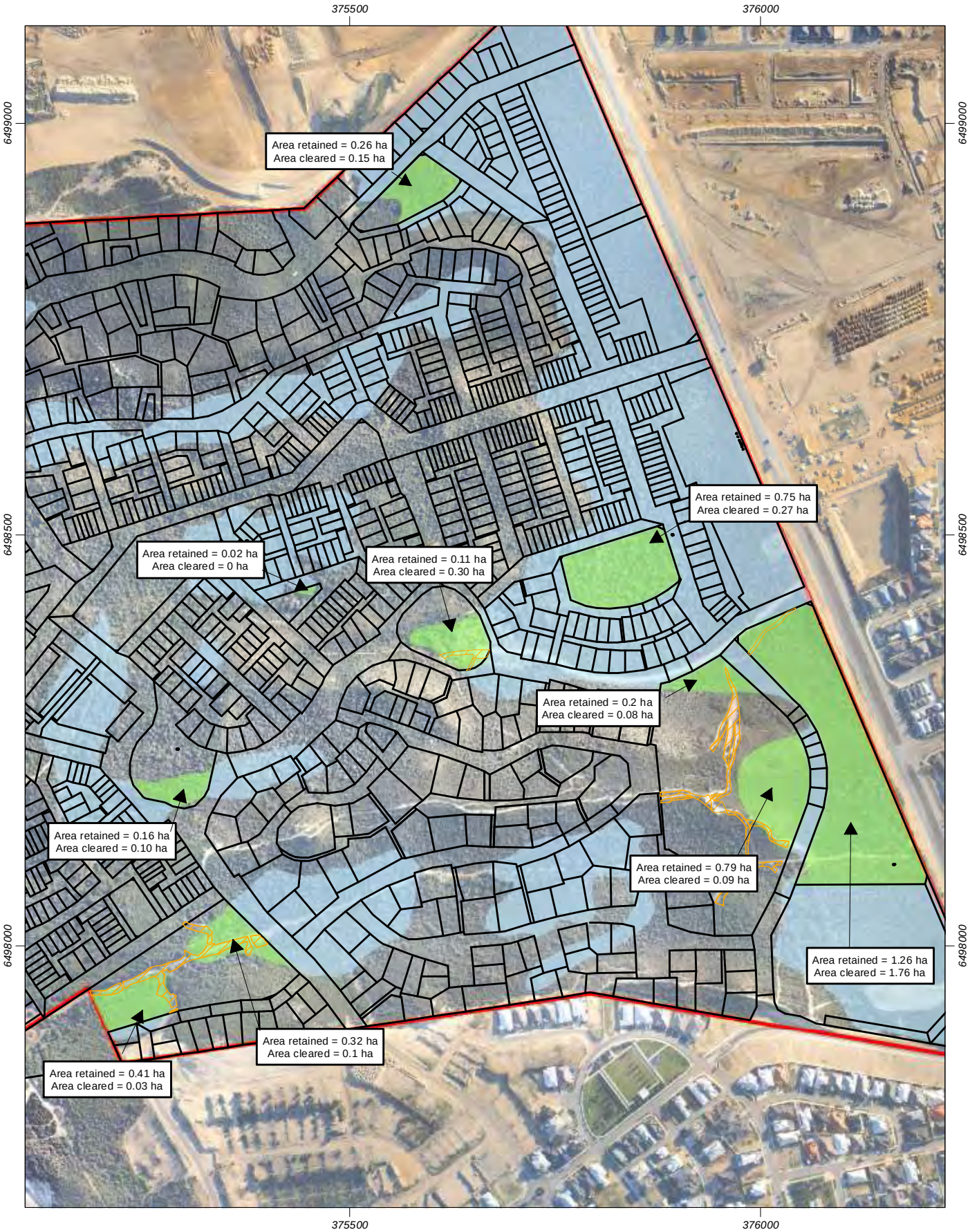


**Figure 5: Degraded Carnaby's Cockatoo habitat in the Project Area**

Scale 1:6,356 at A4

0 50 100 150 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 5/07/2016
Author: DWhite
Source: Aerial image: Nearmap 2012. Concept plan: Client 01/2016.

**Legend**

- Degraded areas in which revegetation will occur
- Subdivision layout
- Potential foraging habitat for Carnaby's Black Cockatoo to be cleared
- Potential foraging habitat for Carnaby's Black Cockatoo in POS/ROS
- Project Area

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### 3.2.3 Erosion and dust control measures for retained habitat

Dust generation within the Project Area has the potential to affect the health of retained Carnaby's Cockatoo habitat and/or cause changes in fauna behaviour in areas with frequently high dust levels.

The following project activities have the potential to generate dust during construction:

- earthworks (i.e. excavation, stockpiling, loading and movement of soil and construction waste, clearing of vegetation)
- vehicle/machinery activity on unsealed surfaces.

Appropriate dust and erosion management measures will be utilised to ensure that impacts to retained Carnaby's Cockatoo habitat areas are minimised. Refer to Table 5 for further specific management measures.

Table 5 Management measures for erosion and dust control measures during construction

| Action | Timing | Responsibility |
|---|---|---|
| Cleared areas and any dry, dust-prone areas or stockpiles will be stabilised to prevent dust generation. Stabilisation methods may include wetting (through use of water trucks), application of hydromulch, use of chemical polymers (if required) or other sealing material. | During construction | Construction contractor |
| Vehicle speeds will be restricted to 40 km/hr to minimise dust generation on designated roads, access tracks and within construction areas. | During construction | Construction contractor |

### 3.2.4 Weed management for retained habitat

A weed assessment has been undertaken of the areas of Carnaby's Cockatoo habitat within the Project Area (Strategen 2014). The purpose of the assessment was to determine the presence and abundance of exotic or weed species, particularly in the habitat to be retained. The weed assessment recorded high numbers and densities of introduced weeds through the majority of the existing Carnaby's Cockatoo habitat (Strategen 2014). A total of 20 weed species were recorded, including ten species listed as having a high ecological impact (DEC 2009).

Appropriate weed management measures will be implemented within POS/Civic areas as soon as vegetation clearing commences adjacent to the POS/Civic areas. Weed management will occur during and after construction works adjacent to POS/Civic areas to minimise further spread of weed within retained Carnaby's Cockatoo habitat.

Weed management will be implemented using several techniques, including:

- spot spraying – where hand-spraying apparatus is applied directly to the target plant
- hand weeding – physical removal of the weeds.

Refer to Table 6 for further specific management measures.

Table 6 Weed management measures

| Action | Timing* | Responsibility |
|---|---|---|
| Identify weeds occurring in retained habitat in POS/Civic areas. | Annually | Westminster until handover |
| Determine appropriate method and timing of weed control in consultation with a suitably qualified specialist. | Annually | Westminster until handover |
| Implement weed control. | As determined by previous step | Westminster until handover |
| Monitor weed control results and implement further control if required, on the advice of CoW (e.g. bushland management personnel) or suitably qualified specialist. | Annually | Westminster until handover |

* Weed control will commence in POS/Civic areas when those POS/Civic areas are directly adjacent or within the current stage of construction. Weed control will continue to be implemented by Westminster until the POS/Civic area is handed over to the City of Wanneroo for management.

### 3.2.5 Pathogen management for retained habitat

A dieback assessment has been undertaken across all Carnaby's Cockatoo habitat contained within the Project Area. The purpose of this assessment was to identify areas at risk of dieback in order to prevent the possible spread of dieback to other areas (Glevan 2013).

No dieback infestations were observed during the assessment; however the survey area was found to be underlain by the calcareous soils of the Quindalup Dune system and these alkaline soils are known to be hostile to the pathogen (Glevan 2013). As a result, dieback does not express on such soils, and the entire study area has been classified as uninterpretable. The pathogen may be present within the study area, but it will subsist as an organism, rather than manifest and proliferate as visible disease symptoms. Due to the uncertainty of whether dieback exists within the areas to be retained, these areas will be managed as if they are dieback infested to minimise potential spread.

Appropriate management measures will therefore be implemented prior to, during and after construction works to minimise potential spread of dieback infestations to retained Carnaby's Cockatoo habitat. Access into these areas will be restricted and the appropriate dieback hygiene procedures will be undertaken for any authorised access to these areas. Refer to Table 7 for further specific management measures.

Table 7 Pathogen management measures

| Action | Timing | Responsibility |
|---|---|---|
| All construction personnel will be inducted in relation to dieback risk, potential impacts and management. | During construction | Construction contractor |
| All vehicles, machinery and equipment will be free of mud and soil. | During construction – when arriving at site | Construction contractor |

### 3.2.6 Bushfire management for retained habitat

Bushfires have the potential to cause serious damage to habitat within the Project Area. A Fire Hazard Assessment was prepared for the Project Area in 2012 by Town Planning Management Engineering Pty (TME 2012; Appendix 5) in accordance with the requirements of the Planning for Bushfire Protection Guidelines (FESA & DPI 2010) to identify the relevant bush fire management issues which need to be addressed in the implementation of the Local Structure Plan, Detailed Area Plans and subdivision design.

A Fire Management Plan will be addressed as part of the planning approvals process and will be finalised in accordance with CoW standard operating procedures.

Refer to Table 8 for further specific management measures in relation to retained habitat.

Table 8 Fire management measures

| Action | Timing | Responsibility |
|---|---|---|
| A Fire Management Plan will be prepared as required in accordance with CoW standard operating procedures. | Pre-construction | Westminster |
| Firebreak creation, maintenance, removal of dead branches, and general fire prevention activities will be undertaken as recommended in the Fire Management Plan. | Ongoing | Westminster until handover |
| A reticulated water supply will be extended throughout the subdivision area to all proposed lots. | During construction | Westminster |

### 3.2.7 Feral animal control for retained habitat

Feral animals have the potential to negatively affect retained Cockatoo habitat through overgrazing, predation, burrowing, and generally providing additional competition for food and shelter. In particular, feral cats, foxes and rabbits have the potential to cause considerable damage to retained habitat if they occur within the Project Area.

Given this project involves the establishment of a residential development, it is anticipated that domestic cats and dogs will also likely pose a threat to native flora and fauna contained within retained Carnaby's Cockatoo habitat. Community education will therefore be required as well as appropriate feral animal controls utilised where required to protect and enhance the Carnaby's Cockatoo habitat being retained (Table 9).

Table 9 Feral animal control measures

| Action | Timing | Responsibility |
|---|---|---|
| Engage a qualified and licensed subcontractor to undertake pest fauna control/removal appropriate to the species detected, based on monitoring results (Table 10). | On advice of qualified subcontractor | Westminster until handover |
| Provide community education signage around conservation areas detailing the potential risk domestic cats and dogs may pose to native flora and fauna within the Estate. | To be placed post-construction | Westminster |

# 4. Monitoring actions

A monitoring program has been developed focusing on monitoring of retained Carnaby's Cockatoo habitat within the site rather than monitoring of individual Carnaby's Cockatoos utilising the site (Table 10). This species is highly mobile in nature and rely on different areas of habitat at different times of the year and between years. It would therefore be difficult to obtain a true representation of the effects of the development on this species through the monitoring of individual Cockatoos. Provision for the recording of opportunistic sightings or evidence of Carnaby's Cockatoo on-site has been included in this CMP.

A detailed monitoring program for revegetation, including weed control and degraded habitat within the two Parks and Recreation Reserves, is provided in the Clearing and Revegetation Management Plan (Strategen 2014).

Fire management will be monitored in accordance with the Fire Management Plan that will be prepared if required as part of the planning approval process and will be developed in accordance with CoW standard operating procedures.

Table 10 Monitoring actions – Parks & Recreation and POS/civic spaces

| Parameter | Frequency | Location | Purpose | Responsibility |
|---|---|---|---|---|
| Delineation of habitat to be retained | | | | |
| Condition of infrastructure delineating Carnaby's Cockatoo habitat (fencing, gates, pathways, signage etc). | Quarterly during construction. | Retained habitat near clearing boundaries. | To ensure infrastructure is in good condition and that there has been no unauthorised clearing beyond the barrier. | Construction contractor |
| Monitoring of revegetation success within degraded habitat | | | | |
| A detailed monitoring program for revegetation of degraded habitat within retained habitat areas is provided in the Clearing and Revegetation Management Plan (Strategen 2014). | | | | |
| Erosion and dust control for retained habitat | | | | |
| Visual observations of dust generation and erosion. | Opportunistically during construction. | Unsealed surfaces prone to dust generation (e.g. roads, stockpiles). | To minimise erosion and dust impacts from construction on retained habitat. | Construction contractor |
| Dust suppression equipment / actions. | Opportunistically during construction. | Where potential dust generation is taking place. | | Construction contractor |
| Visual observation of vegetation health, including dust smothering and erosion. | Monthly during construction. | Retained Carnaby's Cockatoo habitat beyond clearing boundaries. | | Construction contractor |
| Weed management for retained habitat | | | | |
| A detailed monitoring program for revegetation, including weed control, of degraded habitat within the Parks and Recreation Reserves is provided in the Clearing and Revegetation Plan (Strategen 2014). | | | | |
| Pathogen management for retained habitat | | | | |
| Inspection of machinery for construction works. | At first time of entry and opportunistically during construction. | Authorised access points into the site. | To ensure appropriate dieback hygiene are being undertaken. | Construction contractor |
| Bushfire management for retained habitat | | | | |
| In accordance with the Fire Management Plan that will be prepared if required as part of the planning approval process and will be developed in accordance with CoW standard operating procedures. | | | | |

| Parameter | Frequency | Location | Purpose | Responsibility |
|---|---|---|---|---|
| Feral animal control for retained habitat | | | | |
| Presence of pests/feral animals/domestic animals (foxes, rabbits and feral cats). | Annually in spring.<br>Opportunistically. | Retained Carnaby's Cockatoo habitat in POS/Civic areas until handover. | To determine presence of pests/feral animals within the retained habitat, and whether fauna control is required. | Westminster |
| Carnaby's Cockatoo opportunistic monitoring | | | | |
| Presence of Carnaby's Cockatoo (as indicated by sightings, evidence of foraging, etc.). | Opportunistically. | Retained Carnaby's Cockatoo habitat in POS/Civic areas, and in revegetation areas, until handover. | To determine presence of Carnaby's Cockatoo within the retained habitat. | Westminster |

# 5. Performance indicators and corrective actions

## 5.1 Parks and Recreation Reserves

Corrective actions for the Parks and Recreation reserves are to be initiated in the event that the objectives for the protection and management of the retained habitat areas are not, or will not be met (Table 11).

Table 11 Performance indicators and corrective actions

| Parameter | Performance indicator | Trigger | Action | Responsibility |
|---|---|---|---|---|
| Access / delineation of areas that will be retained. | Areas of retained habitat delineated. | Unrestricted or unauthorised access. | 1. Determine how access was gained and, if possible, the likely time of access.<br>2. Implement remedy, which could include:<br>• repair fence/s<br>• erect signs to highlight prohibited access.<br>3. Monitor success of control. | Construction contractor |
| Weed and pathogens. | In accordance with the Clearing and Revegetation Management Plan. | | | |
| Bushfires. | In accordance with the Fire Management Plan that will be prepared if required as part of the planning approval process and will be developed in accordance with CoW standard operating procedures. | | | |

## 5.2 POS/civic spaces

Corrective actions for the POS/civic spaces are to be initiated in the event that the objectives for the protection and management of the retained habitat areas are not, or will not be met (Table 12).

Table 12 Performance indicators and corrective actions

| Parameter | Performance indicator | Trigger | Action | Responsibility |
|---|---|---|---|---|
| Access / delineation of areas that will be retained. | Areas of retained habitat delineated. | Unrestricted or unauthorised access. | 1. Determine how access was gained and, if possible, the likely time of access.<br>2. Implement remedy, which could include:<br>• repair fence/s.<br>• erect signs to highlight prohibited access.<br>3. Monitor success of control. | Construction contractor |
| Erosion and dust. | Cleared areas and any dry, dust-prone areas or stockpiles stabilised. | Excessive dust levels are observed. | 1. Investigate cause.<br>2. Implement additional dust control measures as appropriate.<br>3. Continue monitoring (visual observations) to determine success of implemented management actions. | Construction contractor |
| Weed and pathogens. | In accordance with the Clearing and Revegetation Management Plan. | | | |
| Bushfires. | In accordance with the Fire Management Plan that will be prepared if required as part of the planning approval process and will be developed in accordance with CoW standard operating procedures. | | | |
| Feral animals. | No encounters with Pest/other grazing animal encounters within POS/civic areas. | Pest/other grazing animal (primarily rabbits) encounters within retained habitat. | 1. Investigate cause.<br>2. Undertake intervention or remediation works (including moving bins, implementing a feral animal trapping and baiting program).<br>3. Monitor success. | Westminster |

# 6. Plan implementation

## 6.1 Long-term management and timeframes for implementation

In accordance with condition 10 of EPBC approval 2012/6631 this Conservation Management Plan will be implemented by Westminster as outlined in Table 13.

Table 13 Long-term management and timeframes for implementation

| Type | Responsible for long term management | Legal mechanisms for protection in the future |
|---|---|---|
| Retained habitat in Parks and Recreation Reserves. | Management of the retained habitat will be undertaken by Westminster until the completion of construction adjacent to the reserves and completion of the CRMP commitments.<br>Formal transfer of management responsibility to CoW (in the form a of a revestment order over the lot) will be the responsibility of WAPC (refer to Section 6.2).<br>WAPC will initiate the revestment order once Westminster Estate has completed the works required under 10 (g) of the EPBC approval. | Vested as Parks and Recreation Reserves as part of the MRS amendment. |
| Retained habitat in POS areas and civic spaces. | The CMP will be implemented in POS and civic spaces by Westminster until handed over following the completion of developer maintenance period. Handover will occur at the time the POS and civic space land titles are created. | CoW Local Planning Policy requires Conservation Management Plans to be prepared for each of the local POS areas that include designated local conservation areas. The CMPs will ensure the protection of retained habitat in these POS in the long term. |

## 6.2 Roles and responsibilities

All contractors and staff will be required to operate in accordance with this CMP. Key developer personnel and responsibilities are described in the following sections:

### *Westminster*

The primary responsibilities of Westminster include:

- act as primary liaison between the construction contractor, DotE and the CoW
- ensure all construction contracts contain relevant environmental management provisions
- review quarterly reports provided by the construction contractor
- management of Parks and Recreation Reserves until handover to another party
- report to DotE in accordance with Condition 4 of EPBC Approval 2012/6631.

### *Construction contractor*

The primary responsibilities of the construction contractor include:

- overall accountability to ensure construction activities do not adversely impact Carnaby's Cockatoo habitat being retained
- ensure all site personnel are aware of the requirements of the CMP and related management plans
- provide support to the project manager and DPaW as required during the construction phase.

### *Revegetation contractor*

The primary responsibilities of the revegetation contractor include:

- ensure all revegetation personnel are aware of the requirements of the CMP and related management plans
- provide support to the project manager and CoW as required during the construction phase.

### *Western Australian Planning Commission*

The primary responsibilities of the WAPC include:

- facilitation of formal transfer of management responsibility of the Parks and Recreation Reserves to the long term manager (CoW).
- WAPC will initiate the revestment order once Westminster Estate has completed the works required under 10 (g) of the EPBC approval.
- As provincial landowner, ensure the land is managed consistent with the requirements of EPBC approval 2012/6631.

### *City of Wanneroo*

The primary responsibilities of the CoW include:

- undertake the long term management and protection of retained habitat within the Project Area.

# 7. References

Department of Environment and Conservation (DEC) 2009, *DEC Swan Region Environmental Weed List*, [Online]. Government of Western Australia. Available online: http://www.dec.wa.gov.au/management-and-protection/plants/invasive-plants/invasive-plant-prioritisation-process.html?showall=&start=1 [October 2013].

Department of Environment and Conservation (DEC) 2011, *DEC Nature Conservation Service – Biodiversity: Standard Operating Procedure – Techniques for mapping weed distribution and cover in bushland and vegetation*, prepared for DEC Regional Services and Nature Conservation Divisions, Perth.

Department of Sustainability, Environment, Water, Population & Communities (DSEWPaC) 2012, *Calyptorhynchus latirostris–Carnaby's Black-Cockatoo, short billed black-cockatoo*, (SPRAT), [Online], Available at *http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=59523* [6 August 2013].

Fire and Emergency Services Authority & Department of Planning and Infrastructure (FESA & DPI) 2010, *Planning for Bush Fire Protection*, Perth.

Glevan Consulting (Glevan) 2013, Westminster Estates Pty Ltd Jindee Innovation Project – Phytophthora dieback occurrence assessment, Report prepared for Westminster Estates Pty Ltd, December 2013, Western Australia.

M.J. & A.R. Bamford Consulting Ecologists (Bamford) 2006, *Jindee Fauna Assessment*, prepared for RPS Bowman Bishaw Gorham, Perth.

RPS Environment and Planning Pty Ltd (RPS) 2012, *Environmental Assessment Report, District Planning Scheme Amendment Lot 9036 and Part Lot 3054 Marmion Avenue, Jindalee*, report prepared for Estates Development Company, Nedlands.

Standards Australia (2009) *AS 3959 – Construction of Buildings in Bush Fire Prone Area,* Sydney, Standards Australia International Ltd.

Strategen 2014, *Weed Assessment – Jindee*, prepared for Westminster Estates Pty Ltd, April 2014, Western Australia.

Strategen 2016, *Jindee Innovation Project Clearing and Revegetation Management Plan*, prepared for Westminster Estates Pty Ltd, June 2016.

Town Planning Management Engineering (TME) 2012, Jindee Estate Estates Development Company Fire Hazard Assessment, September 2012.

# Appendix 1
# EPBC approval 2012/6631

Australian Government

Department of the Environment

## CONSOLIDATED APPROVAL NOTICE

### Jindee Innovation Project, Jindalee, WA (EPBC 2012/6631)

The attached notice (Attachment A) is provided to consolidate the approval conditions for the above project, approved on 18 July 2013. The approval conditions were subject to variation on the date of this consolidated notice and on 7 April 2016 and 21 July 2014 during the post approval phase. These decisions are publicly available on the Department's website at http://epbcnotices.environment.gov.au/publicnoticesreferrals/

The publication of this notice does not alter the dates of: effect for the approval; the variations to conditions; the expiry date of the approval; or any other dates mentioned in conditions. The consolidated approval notice is for ease of reference only.

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**Name and position**

S. Gaddes

Shane Gaddes
Assistant Secretary
Compliance and Enforcement Branch

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**Date of Consolidated Approval Notice**

25 / 05 / 2016

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Australian Government

Department of the Environment

## Approval

## Jindee Innovation Project, Jindalee, WA (EPBC 2012/6631)

This decision is made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*.

### Proposed action

| | |
|---|---|
| **person to whom the approval is granted** | Westminster Estates Pty Ltd |
| **proponent's ACN** | ABN: 48 008 675 081 |
| **proposed action** | To clear native vegetation on Lot 9036 and Part Lot 3054 Marmion Avenue, Jindalee, WA, for development of a residential estate [See EPBC Act referral 2012/6631]. |

### Approval decision

| Controlling Provision | Decision |
|---|---|
| Listed threatened species and communities (sections 18 & 18A) | Approved |

### conditions of approval

This approval is subject to the conditions specified below.

### expiry date of approval

This approval has effect until 31 December 2033

### Decision-maker

| | |
|---|---|
| **name and position** | Barbara Jones<br>Assistant Secretary<br>North, West and Offshore Assessment Branch |
| **signature** | **SIGNED** |
| **date of decision** | **18 July 2013** |

**Conditions attached to the approval**

1. Within 30 days after the **commencement** of the action, the approval holder must advise the **Department** in writing of the actual date of **commencement**.

2. The approval holder must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the management plans required by this approval, and make them available upon request to the **Department**. Such records may be subject to audit by the **Department** or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the **Department's** website. The results of audits may also be publicised through the general media.

3. Within three months of every 12 month anniversary of the **commencement** of the action, the approval holder must publish a report on their website addressing compliance with the conditions of approval over the previous 12 months, including implementation of the management plans as specified in the conditions. Documentary evidence providing proof of the date of publication must be provided to the **Department** at the same time the compliance report is published. The approval holder must notify the **Department** in writing of any non-compliance with any conditions of this approval no later than two business days of becoming aware of the non-compliance.

4. Upon the direction of the **Minister**, the approval holder must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the **Minister**. The independent auditor must be approved by the **Minister** prior to the commencement of the audit. Audit criteria must be agreed to by the **Minister** and the audit report must address the criteria to the satisfaction of the **Minister**.

5. The approval holder may choose to revise a management plan approved by the **Minister** under conditions 10 and 12 without submitting it for approval under section 143A of the EPBC Act, if the taking of the action in accordance with the revised plan would not be likely to have a **new or increased impact**. If the approval holder makes this choice they must:

    i. notify the **Department** in writing that the approved plan has been revised and provide the **Department** with an electronic copy of the revised plan;
    ii. implement the revised plan from the date that the plan is submitted to the **Department**; and
    iii. for the life of this approval, maintain a record of the reasons the approval holder considers that taking the action in accordance with the revised plan would not be likely to have a **new or increased impact**.

5A. The approval holder may revoke their choice under condition 5 at any time by notice to the **Department**. If the approval holder revokes the choice to implement a revised plan, without approval under section 143A of the Act, the plan approved by the **Minister** must be implemented.

5B. If the **Minister** gives a notice to the approval holder that the **Minister** is satisfied that the taking of the action in accordance with the revised plan would be likely to have a **new or increased impact**, then:

    i. Condition 5 does not apply, or ceases to apply, in relation to the revised plan; and
    ii. The approval holder must implement the plan approved by the **Minister**.

To avoid any doubt, this condition does not affect any operation of conditions 5 and 5A in the period before the day the notice is given.

At the time of giving the notice the **Minister** may also notify that for a specified period of time that condition 5 does not apply for one or more specified plans required under the approval.

5C. Conditions 5, 5A and 5B are not intended to limit the operation of section 143A of the EPBC Act which allows the approval holder to submit a revised plan to the **Minister** for approval.

6. Note: Condition 6 was revoked on 7 April 2016.

7. Unless otherwise agreed to in writing by the **Minister**, the approval holder must publish the management plans referred to in these conditions of approval on their website. The management plans must be published on the website within 1 month of being approved by the **Minister** or being submitted under condition 5i.

8. If, at any time after five (5) years from the date of this approval, the approval holder has not substantially commenced the action, then the approval holder must not substantially commence this action without the written agreement of the **Minister**.

Note: The date in condition 8 refers to the date of the approval decision (18 July 2013).

9. To mitigate impacts to Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*):

(a) At least 4.28 hectares of Carnaby's Black Cockatoo foraging habitat, must be retained and **clearing** of Carnaby's Black Cockatoo foraging habitat must not exceed 2.88 hectares within the areas shaded in green at Attachment A;

(b) **clearing** of Carnaby's Black Cockatoo habitat from those areas shaded blue at Attachment A, must not exceed 38.01 hectares; and

(c) total combined **clearing** of Carnaby's Black Cockatoo foraging habitat within both blue and green shaded areas at Attachment A must not exceed 40.89 hectares.

10. To protect and enhance habitat for Carnaby's Black Cockatoo, the approval holder must prepare and submit a *Conservation Management Plan* (the plan) detailing management of habitat for Carnaby's Black Cockatoo that is to be retained on the **proposal site,** for the **Minister's** approval. The plan must include:

(a) measures to physically delineate areas that will be retained;

(b) erosion and dust control measures during **construction**;

(c) the management of weeds, *Phytophthora* dieback, bushfire and feral animals;

(d) identification of any degraded habitat and how those areas will be managed;

(e) a monitoring program for Carnaby's Black Cockatoo and their habitat;

(f) details of who will be responsible for the long-term management of the retained land, and how the land will be protected in the long-term;

(g) a commitment to fund all management actions in the two Parks and Recreation areas within the site boundary marked in green at Attachment B until the management of those areas is handed over to another party, including the amount of funding that will be allocated to these management actions;

(h) performance indicators and corrective actions;

(i) roles and responsibilities; and

(j) timeframes for the implementation of the above measures.

If the **Minister** approves the plan, the approved plan must be implemented.

11. Within 5 years of the **substantial commencement** of the action, the approval holder must provide the **Department** with written evidence that the two green areas of Parks and Recreation within the site boundary at Attachment B, have been granted to the City of Wanneroo for the purpose of conservation.

12. To mitigate impacts to Carnaby's Black Cockatoo, the approval holder must prepare and submit a *Clearing and Revegetation Management Plan* for the **Minister's** approval. The plan must include:

    (a) a commitment to the staged collection of native seed prior to **clearing** from the shaded areas as per Attachment A for use in **revegetation**;

    (b) a commitment to store native seed and either use it on-site for **revegetation** or transport it to a seed bank or receiving site(s) where **revegetation** is being undertaken by **WA DPaW** or another receiving party (or parties);

    (c) detailed protocols for staged collection and use of native seed required by conditions 12(a) and 12(b) including:

    i. the optimal methodology for native seed collection from the **proposal site**;
    ii. how clearing will be staged to best harvest utilise the native seed resource for **revegetation**;
    iii. how native seed will be stored and transported; and
    iv. onsite supervision and implementation monitoring mechanisms.

    (d) a commitment for at least 50% of plantings of trees and shrubs on the **proposal site** to consist of plants known to be **primary feeding plants** for Carnaby's Black Cockatoo. Site selection for replanting must take account of any risk of vehicle strike to Carnaby's Black Cockatoos.

    If the **Minister** approves the plan, then the approved plan must be implemented.

13. The approval holder must not undertake any **clearing** of habitat for Carnaby's Black Cockatoo on the **proposal site** unless:

    (a) the *Conservation Management Plan* required under condition 10 has been approved by the **Minister**; and

    (b) the *Clearing and Revegetation Management Plan* required under condition 12 has been approved by the **Minister**.

14. To offset the loss of habitat for Carnaby's Black Cockatoo, prior to the **commencement** of **construction**, the approval holder must provide the **Department** with written evidence of the provision of funds to **WA DPaW** for the acquisition of the **offset property** on Lot 24, Mimegarra Road, Lancelin, WA (Attachment C). The written evidence must be accompanied with the **offset attributes** and **Shapefile**.

15. To offset the additional loss of habitat for Carnaby's Black Cockatoo, the approval holder must provide the **Department** with written evidence of the provision of funds to **WA DPaW** to acquire 34 hectares of Carnaby's Black Cockatoo habitat (the **additional offset**). The written evidence along with the **offset attributes** and **Shapefile** must be provided to the **Department** prior to undertaking the **clearing** of 2.88 hectares mentioned in condition 9(a).

**Definitions:**

**Additional offset** is a property (or part of a property) totalling 34 or more hectares of Carnaby's Black Cockatoo habitat purchased by **WA DPaW** on behalf of the approval holder, which will be maintained for conservation by **WA DPaW**.

**Clearing** is defined as the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of native vegetation.

**Commencement** includes **clearing** and any preparatory works required to be undertaken including clearing vegetation, the erection of any fences, signage or on-site temporary structures and the use of construction or excavation equipment on site for the purpose of breaking the ground for buildings, infrastructure or resource extraction.

**Construction** includes any preparatory works required to be undertaken including clearing vegetation, the erection of any on-site temporary structures and the use of heavy duty equipment for the purpose of breaking the ground for buildings or infrastructure.

**Department** is the Australian Government Department administering the *Environment Protection and Biodiversity Conservation Act 1999.*

**EPBC Act** is the *Environment Protection and Biodiversity Conservation Act 1999.*

**Minister** is the minister administering the *Environment Protection and Biodiversity Conservation Act 1999* and includes a delegate of the **Minister**.

**New or increased impact**: A new or increased impact on any matter protected by the controlling provisions for the action, when compared to the plan that has been approved by the **Minister**.

**Offset attributes** must be in the form of an excel file ('.xls') capturing relevant attributes of the Offset Area, including the EPBC reference ID number, the physical address of the offset site, coordinates of the boundary points in decimal degrees, the EPBC protected matters that the offset compensates for, any additional EPBC protected matters that are benefiting from the offset, and the size of the offset in hectares.

**Offset property** is the property that is no less than 635 ha in size (identified as the 'Carnaby's offset site at Attachment C) that will be purchased by the approval holder and will be maintained for conservation by the **WA DPaW)** on behalf of the approval holder. The offset property is Lot 24 (on Deposited Plan 75789) on Mimegarra Road, 27 kilometres north-east of Lancelin, Western Australia.

**Primary feeding plants** for Carnaby's Black Cockatoo include: any Banksia sp., any plants identified in a search of the WA DER's website using the Plants for Carnaby's Search Tool or other plants approved in writing by the Department.

**Proposal site** is Lot 9036 and Part Lot 3054 Marmion Avenue, shown as the 'site boundary' in Attachment A.

**Revegetation** is the removal of weeds and the long-term establishment of native vegetation.

**Shapefile** means an ESRI Shapefile containing '.shp', '.shx' and '.dbf' files and other files capturing attributes of the Offset Area, including the shape, EPBC reference ID number and EPBC protected matters present at the relevant site. Attributes should also be captured in '.xls' format.

**Substantial commencement** is when 1 hectare of land on the proposal site has been impacted by clearing or construction.

**WA DPaW** is the Western Australian Department of Parks and Wildlife (or equivalent agency).


**Attachment A**

Scale 1:9,000 at A4

0 50 100 150 200 250 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 1/02/2016
Author: DWhite
Source: Aerial image: Nearmap 2012. Concept plan: Client 2014.

**Legend**

- Site boundary
- Subdivision layout
- Potential foraging habitat for Carnaby's Black Cockatoo to be cleared (38.01 ha)
- Potential foraging habitat for Carnaby's Black Cockatoo to be retained and cleared in POS/ROS (minimum total area retained 4.28 ha; maximum total area cleared 2.88 ha)

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www.strategen.com.au


Attachment B

**Legend**

- Site boundary
- Metropolitan Region Scheme
  - Urban
  - Other Regional Roads
  - Parks and Recreation
  - Railways
  - Waterways
- Cadastral boundaries

0 100 200 300 400 500
Metors

N

1:15,000
at A4

Coordinate System: GDA 1994 MGA Zone 50
Date: 19/10/2012
Author: JKuole

Source: Topography: Geoscience Australia 2006. MRS: DPI 2012.
Cadastre: Online SIP Database, Landgate 09/2012.
Note that positional errors may occur in some areas

www.dlgsc.wa.gov.au
www.dlgsc.wa.gov.au

Path: ...GIS\Consult\2012\LDC\LDC12133.01\ArcMap_documents\d001\Rev8\LDC12133_01_R001_Rev8_1005.mxd


**Attachment C - Location of offset site (635 ha within Lot 24)**

Scale 1:30,000 at A4

0 150 300 450 600 750 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 19/06/2014
Author: JCrute
Source: Aerial image: Landgate, flown 27/02/2012, downloaded 02/2013.

**Legend**

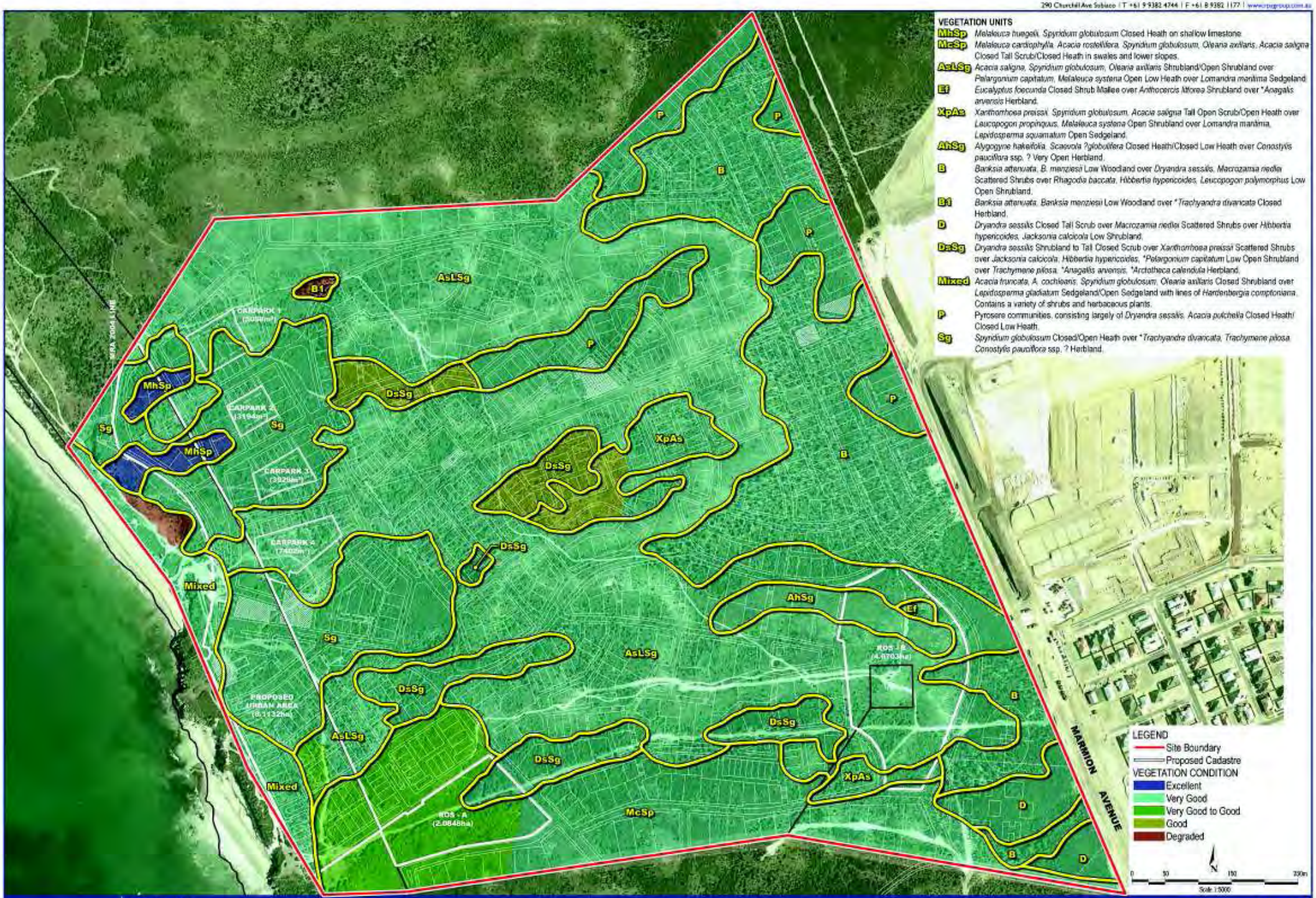
- Carnaby's offset site
- Lot 24 Mimegarra Road (1000 ha)

STRATEGEN
info@strategen.com.au
www.strategen.com.au

Path: Q:\Consult\2012\EDC\EDC12133 01\ArcMap_documents\L015\EDC12133_01_L015_AttachmentC.mxd

# Appendix 2
# Management works for the Parks and Recreation Reserves

290 Churchill Ave Subiaco | T +61 9 9382 4744 | F +61 8 9382 1177 | www.rpsgroup.com.au




RPS

Job Number: L09780
Date: 15.12.09
Revision: A
Scale: 1:5000 @ A3
Drafted by: SC
Source:

**Figure 6**

**Vegetation Condition**

Table A 1 Cost estimate for Parks and Recreation Reserve A

| Description | Unit | Quantity | Cost at 2012 |
|---|---|---|---|
| Preliminaries | | | |
| Preliminaries - 2% | item | 1 | $19,000 |
| Safety Hazard Study | item | 1 | $5,745 |
| **Structures** | | | |
| Appropriate barriers to prevent pedestrian access such as fencing | lin m | 605 | $10,427 |
| Access gate | each | 6 | $1,800 |
| Clearing of fire access track | lin m | 605 | $12,100 |
| Gravel for fire access track | sq m | 1,630 | $16,300 |
| **Hardworks** | | | |
| Stabilized gravel path (100mm thick) | sq m | 992 | $49,012 |
| **Planting** | | | |
| Dune rehabilitation (includes 1 tube/sqm and brush) | sq m | 3,000 | $20,682 |
| **Total (excl GST)** | | | **$135,066** |

Table A 2 Cost estimate for Parks and Recreation Reserve B

| Description | Unit | Quantity | Cost at 2012 |
|---|---|---|---|
| Preliminaries | | | |
| Preliminaries - 2% | item | 1 | $13,000 |
| Safety Hazard Study | item | 1 | $5,745 |
| **Structures** | | | |
| Appropriate barriers to prevent pedestrian access such as fencing | lin m | 555 | $9,565 |
| Access gate | each | 8 | $2,400 |
| Clearing of fire access track | lin m | 910 | $18,200 |
| Gravel for fire access track | sq m | 2,690 | $26,900 |
| Limestone bollards (1.5m spacings) | each | 36 | $7,200 |
| **Hardworks** | | | |
| Stabilized gravel path (100mm thick) | sq m | 1,914 | $94,565 |
| Observation Deck + Obselisk | item | 1 | $28,725 |
| **Planting** | | | |
| Dune rehabilitation (includes 1 tube/sqm and brush) | sq m | 7,500 | $51,705 |
| **Total (excl GST)** | | | **$258,005** |


STRATEGEN

Jindee Innovation Project

Indicative works for Parks and Recreation Reserve A

Source: Blackwell Associates Pty Ltd 2014

Figure 1


STRATEGEN

Jindee Innovation Project

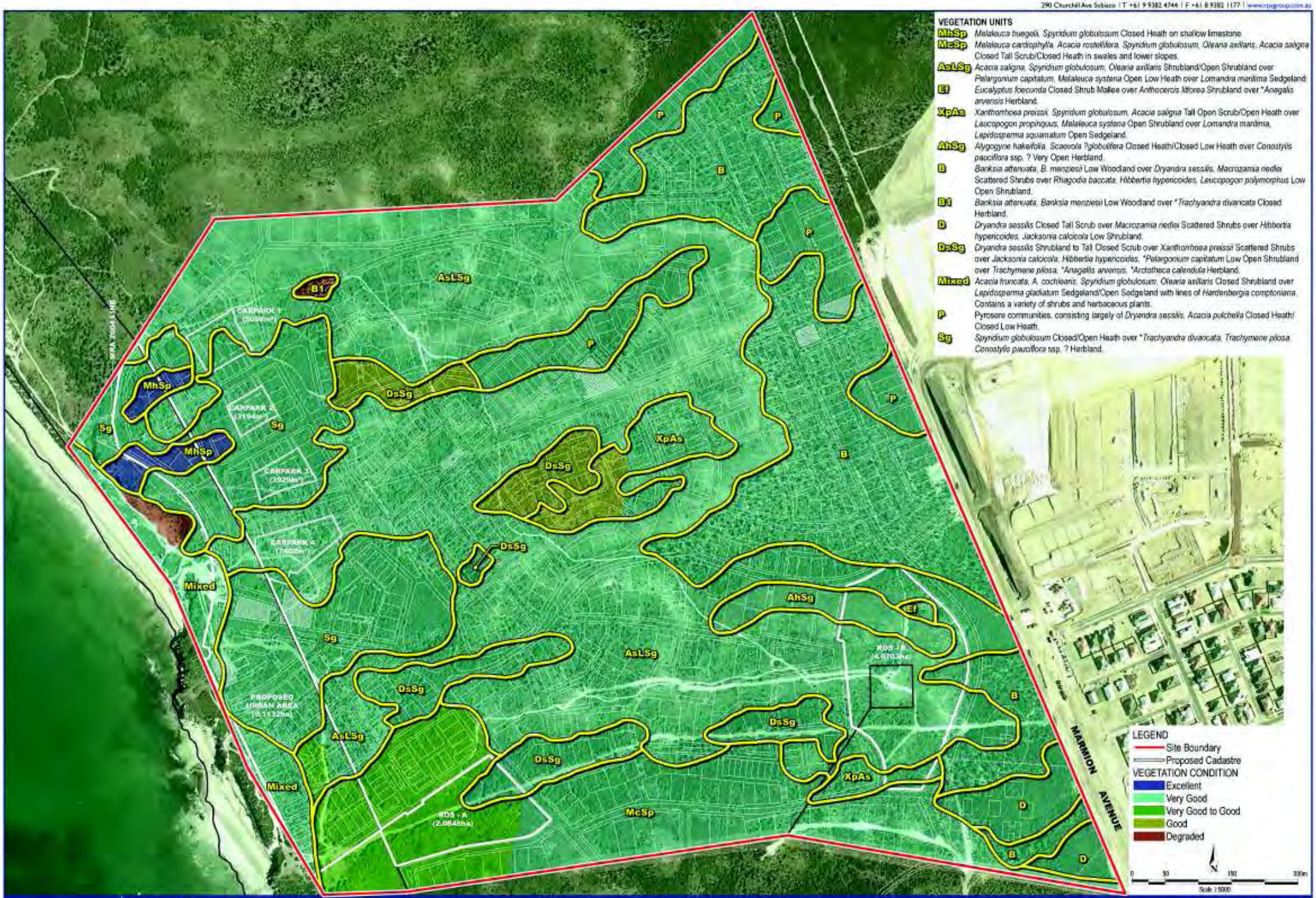
Indicative works for Parks and Recreation Reserve B

Source: Blackwell Associates Pty Ltd 2014

Figure 2

# Appendix 3
# Vegetation condition mapping

290 Churchill Ave Subiaco | T +61 9 9382 4744 | F +61 8 9382 1177 | www.rpsgroup.com.au



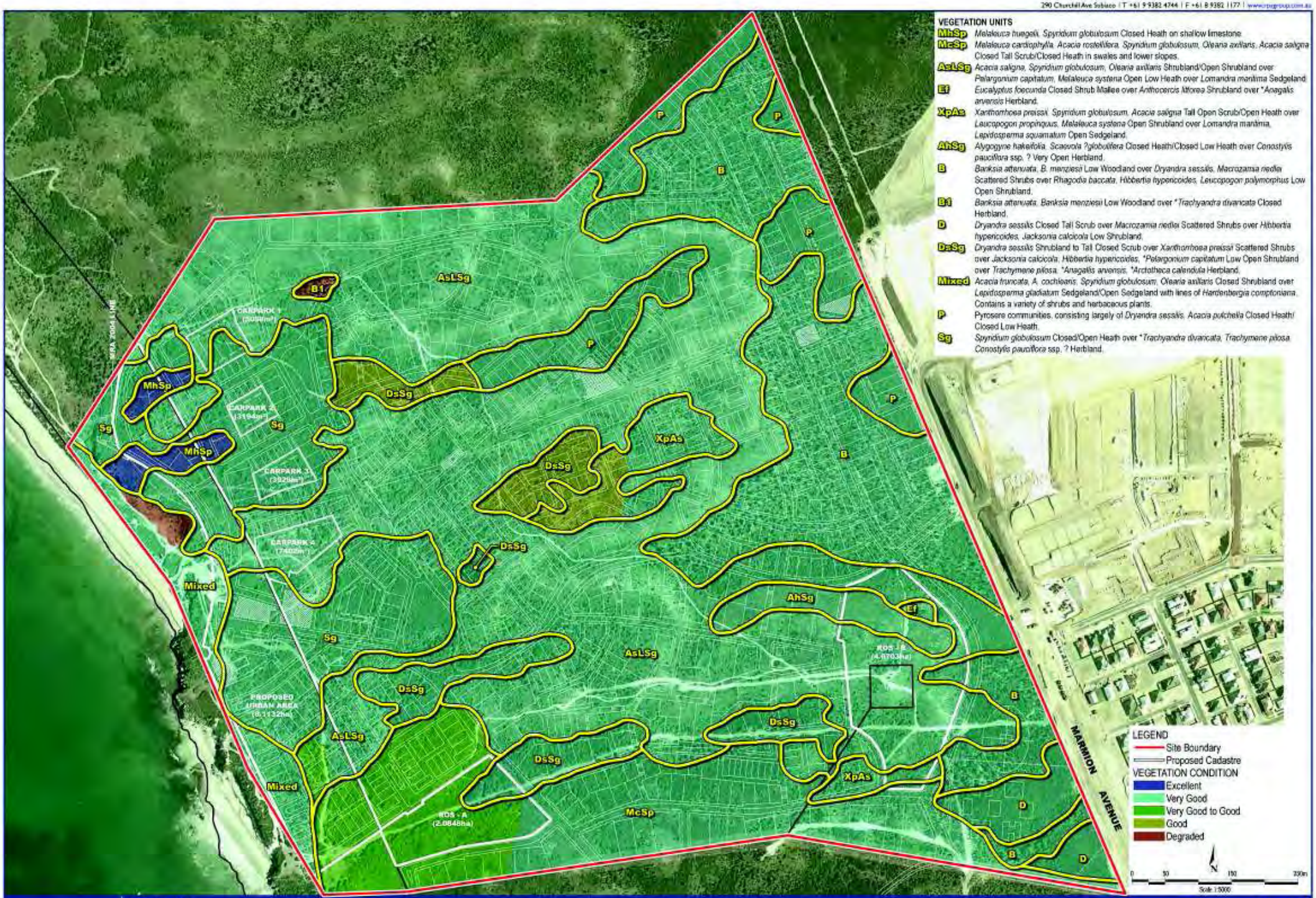

RPS

Job Number: L09780
Date: 15.12.09
Revision: A
Scale: 1:5000 @ A3
Drafted by: SC
Source:

**Figure 6**

**Vegetation Condition**

290 Churchill Ave Subiaco | T +61 9 9382 4744 | F +61 8 9382 1177 | www.rpsgroup.com.au




RPS

Job Number: L09780
Date: 15.12.09
Revision: A
Scale: 1:5000 @ A3
Drafted by: SC
Source:

**Figure 6**

**Vegetation Condition**

# Appendix 4
# Weed assessment

STRATEGEN
environmental consultants

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| | | | |
|---|---|---|---|
| To | James Blitz | Date | 9 April 2014 |
| Company | Estates Development Company | Reference No | EDC12133.01 |
| Fax/Email | james.blitz@estates.com.au | Inquiries | Daniel Panickar/Jeremy Mitchell |

# Weed assessment - Jindee

## *Background*

Westminster Estates Pty Ltd entered into an agreement in 2007 with the Western Australian Planning Commission and the City of Wanneroo (the Jindee Innovation Project Agreement) to undertake an innovative residential development on land owned by Westminster or under contract to Westminster, on Lot 9036 and Part Lot 3054 Marmion Avenue, Jindee (the site).

The Project involves the clearing of approximately 35 ha of potential foraging habitat for Carnaby's Cockatoos (Figure 1). The vegetation across the site is predominantly in good to excellent condition; however, areas are degraded and weeds have been introduced by unauthorised access of off-road vehicles.

Strategen was commissioned to undertake a vegetation assessment within the Project area to identify any exotic or weed species of flora occurring within areas of potential Carnaby's Cockatoo foraging habitat to determine if topsoil in these areas can potentially be used for future revegetation activities.

## *Scope and objectives*

The scope of the vegetation assessment was to determine the potential value, if any, of the topsoil in areas of vegetation deemed to be potential Carnaby's Cockatoo foraging habitat for revegetation purposes in accordance with *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2012/6631.

The objectives of the vegetation assessment were:

- identify the species and density of weeds present in the areas of potential Carnaby's Cockatoo foraging habitat
- analyse results from the survey to determine the likely impact of using topsoil from areas of potential Carnaby's Cockatoo foraging habitat in revegetation works.


**Figure 1 Location and extent of potential Carnaby's Cockatoo foraging habitat**

Scale 1:15,000 at A4

Meters
0 50 100 150 200 250

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 19/12/2013
Author: JCrute
Source: Topography: Geoscience Australia 2011.

**Legend**

Site boundary

*Potential Carnaby's Cockatoo foraging habitat*

STRATEGEN
info@strategen.com.au
www.strategen.com.au

Path: \\Gis-01\gis\Consult\2012\EDC\EDC12133.01\ArcMap_documents\M005\RevA\EDC12133_01_M005_RevA_F001_.mxd

### *Methods*

The vegetation assessment was undertaken by two experienced ecologists from Strategen on 25 October 2013. Seven 10 m x 10 m vegetation quadrats were assessed within areas of potential Carnaby's Cockatoo foraging habitat inside the site. The site was also traversed by foot to determine if weed species distribution and density was consistent throughout the area.

Weed species recorded in the site assessment were evaluated using weed prioritising lists including the Weeds of National Significance (WoNS) and species declared under the *Biosecurity and Agriculture Management Act 2007* (BAM Act), with additional reference to the Swan Region Environmental Weed List (DEC 2009) and *Western Weeds* (Hussey et al. 2007).

### *Results*

Vegetation condition (Keighery 1994) at each of the seven sites ranged from Good to Very Good (Table 1, Plate 1 to Plate 7). Most sites had some semblance of vegetation structure remaining, however all sites had varying densities of weed species present in the understorey (Table 1 and Table 2).

Weed density at each of the seven sites was quite variable (between 1.80% and 84.80% of groundcover vegetation). The most common weed taxa was **Lysimachia arvensis*, which was recorded at six of the seven sites. Weed species were observed to be present within the entirety of the site with areas close to disturbance having generally higher densities of these species than surrounding vegetation. Plate 8 shows that areas of low weed densities are not necessarily free from infestation, as even slight disturbance to native vegetation can lead to an increased prevalence of weed species. This is indicative of the soil within the Proposal Area containing a high density of exotic seeds/propagative material.

Table 1 Summary of vegetation assessment

| Site | GPS Location (GDA 94) | Vegetation Condition | Weed species density (% cover) |
|---|---|---|---|
| 1 | 376218 6497983 | Good | 57.01 |
| 2 | 375932 6498186 | Good | 84.80 |
| 3 | 375310 6498190 | Very Good | 27.10 |
| 4 | 375355 6498363 | Very Good | 1.80 |
| 5 | 375336 6498424 | Good | 30.50 |
| 6 | 375250 6498650 | Good | 12.40 |
| 7 | 375682 6498410 | Good | 17.10 |

A total of 20 weed species were recorded from the seven sites (Table 2). Site 1 recorded the most weed species (a total of 12 taxa) while Site 4, located on the mid slope of a dune, recorded the least (a total of three taxa). Most of the weeds recorded were from the grass (Poaceae) and daisy (Asteraceae) families, which contained 6 species and 5 species of weeds respectively within the seven sites.

Table 2 Weed species recorded by site

| Family | Species | Site | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Asphodelaceae | **Trachyandra divaricata* | | | | | | x | |
| Aizoaceae | **Carpobrotus edulis* | | | | | x | | x |
| Asteraceae | **Hypochaeris glabra* | | | | | x | | x |
| | **Sonchus asper* | | | | | | x | |
| | **Sonchus oleraceus* | x | | x | | | x | |
| | **Ursinia anthemoides* | x | x | | | | | |
| | **Wahlenbergia capensis* | x | | | | | | |
| Brassicaceae | **Brassica tournefortii* | x | | | | | | x |
| Euphorbiaceae | **Euphorbia terracina* | x | x | x | | | | x |
| Fabaceae | **Trifolium arvense* | x | x | | | x | | x |
| Geraniaceae | **Geranium molle* | | | | | | | x |
| | **Pelargonium capitatum* | x | x | x | | | | x |
| Iridaceae | *Gladiolus caryophyllaceus* | x | | | | | | |
| Poaceae | **Aira caryophyllea* | | | | | | | x |
| | **Avena barbata* | x | x | | | | | x |
| | **Briza maxima* | x | | | | | | |
| | **Bromus diandrus* | x | | | x | x | | x |
| | **Ehrharta calycina* | | | x | x | x | x | |
| | **Lagurus ovatus* | | x | | | | | |
| Primulaceae | **Lysimachia arvensis* | x | | x | x | x | x | x |
| **TOTAL WEED SPECIES RECORDED** | | 12 | 6 | 5 | 3 | 6 | 5 | 11 |

The status of weed species recorded during the site assessment under the BAM Act (DAF 2013) the WoNS list (AWC 2013) and using the DEC (2009) ranking is presented in Table 3. The life form and comments on relative invasiveness and control methodology are also included in Table 3. None of the weeds found in the site assessment are listed as Weeds of National Significance.

Plate 1 Site 1

Plate 2 Site 2

Plate 3 Site 3

Plate 4 Site 4

Plate 5 Site 5

Plate 6 Site 6

Plate 7 Site 7

Plate 8 Effect of disturbance – increased density of weed species

Table 3 Weed species life form, status and comment on invasiveness and spread

| Species and common name | Life form | DEC assessment | | | Status (WoNS, BAM Act) | Comment |
|---|---|---|---|---|---|---|
| | | Ecological impact | Invasiveness | Feasibility of control | | |
| **Trachyandra divaricata* (Dune Onion weed) | Perennial herb | Moderate | Rapid | Low | Not listed | Major weed of coastal dunes. Seeds dispersed by wind and water. |
| **Carpobrotus edulis* (Hottentot Fig) | Perennial herb | High | Rapid | Moderate | Not listed | Invasive primarily in coastal habitats. Can have strong negative impacts on germination, growth and reproduction of other species. Capable of directly smothering native flora, suppressing regeneration, outcompeting and/or hybridising with native *Carpobrotus* species. |
| **Hypochaeris glabra* (Smooth Catsear) | Annual or perennial herb | High | Rapid | Low | Not listed | Common wed of lawns, horticultural areas, roadsides and bushland throughout the southwest. |
| **Sonchus asper* (Rough Sowthistle) | Annual or biennial herb | Unknown | Rapid | Low | Not listed | Found on fertile, damp soils in disturbed areas across the southwest. Seeds spread by wind. |
| **Sonchus oleraceus* (Common Sowthistle) | Annual herb | Unknown | Rapid | Low | Not listed | Widespread on roadsides, gardens and wasteland across the State, but most common in the southwest. Seeds spread by wind. |
| **Ursinia anthemoides* (Ursinia) | Annual herb | Unknown | Rapid | Low | Not listed | Common, widespread weed of various habitats throughout the southwest. Seeds spread by wind. |
| **Wahlenbergia capensis* (Cape Bluebell) | Annual herb | Unknown | Rapid | Low | Not listed | Widespread on roadsides, in woodlands and heaths on sandy soils and occasionally in gardens. |
| **Brassica tournefortii* (Mediterranean Turnip) | Annual herb | High | Rapid | Low | Not listed | Aggressive weed of disturbed ground, roadsides, cultivation and seaside. |
| **Euphorbia terracina* (Geraldton Carnation Weed) | Perennial herb | High | Rapid | Moderate | Not listed | Common and serious weed of grazing land, road verges, coastal heath and Tuart woodlands. Produces a very toxic milky sap when cut. |
| **Trifolium arvense* (Haresfoot Clover) | Annual herb | Unknown | Unknown | Low | Not listed | Found in low rainfall areas and is well adapted to low fertility soils. Seed and fruit have no specialised dispersal mechanism. |
| **Geranium molle* (Dove's foot Cranesbill) | Annual or perennial herb | Low | Moderate | Low | Not listed | Common in wasteland, roadsides and occasionally on pastures. |
| **Pelargonium capitatum* (Rose Pelargonium) | Shrub | High | Rapid | Moderate | Not listed | Major weed of *Banksia* woodland and coastal heathland. Seed dispersed by wind or animal movement. |

| Species and common name | Life form | DEC assessment | | | Status (WoNS, BAM Act) | Comment |
|---|---|---|---|---|---|---|
| | | Ecological impact | Invasiveness | Feasibility of control | | |
| **Gladiolus caryophyllaceus* (Wild Gladiolus) | Perennial herb | High | Rapid | Moderate | Not listed | Increasingly common in urban bushland and Banksia woodlands of the Swan Coastal Plain. Spreads through seeds and corms. |
| **Aira caryophyllea* (Silvery Hairgrass) | Annual grass | Unknown | Unknown | Low | Not listed | Very common weed of pastures on poor soils and many types of bushland in southern Western Australia. |
| **Avena barbata* (Bearded Oat) | Annual grass | High | Rapid | High | Not listed | Very common weed of roadsides, wasteland and disturbed bushland across the southwest. Seeds spread by attaching to fur or feet of animals. |
| **Briza maxima* (Blowfly Grass) | Annual grass | Unknown | Rapid | High | Not listed | Widespread, common weed of wasteland, granite rocks, wetlands and woodlands of the southwest. |
| **Bromus diandrus* (Brome Grass) | Annual or perennial grass | High | Rapid | High | Not listed | Widespread and serious weed of wetlands, roadsides, crops, pastures and bushland of the southwest. |
| **Ehrharta calycina* (Perennial Veldt Grass) | Perennial grass | High | Rapid | Moderate | Not listed | Widespread weed of roadsides and bushland on sandy soils in the southwest. One of the most serious bushland weeds of the Swan Coastal Plains and a significant fire hazard. |
| **Lagurus ovatus* (Hare's Tail Grass) | Annual grass | High | Rapid | Low | Not listed | Common weed of sandy soils in the southwest. |
| **Lysimachia arvensis* (Pimpernel) | Annual herb | Unknown | Rapid | Low | Not listed | Occasional wed of horticulture, crops and pastures; widespread in gardens, paddocks and disturbed bushland throughout the southwest. |

Sources: AWC 2013, Hussey et al. 2007, DAF 2013, DEC 2009, DPaW 2013

### *Conclusions*

The high density of weeds within the Project area indicates that soil in this area is likely to contain a significant weed seed load. There is a very high probability that any soil transported from these areas will contain seeds, bulbs or corms of a variety of weed species, including the 20 taxa recorded in this assessment. While weed density was quite variable throughout the Project area, it was observed (as can be seen in Plate 8) that any disturbance to native vegetation will lead to an increase in weed density as a result of opportunistic succession. As the Project area is also frequented by native and introduced animals, particularly Kangaroos and cats, it is feasible to assume that propagative material from weed species will have been distributed throughout the site.

## *References*

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# Appendix 5
# Fire Hazard Assessment

Town Planning Management Engineering

ABN: 78 138 659 668

# JINDEE ESTATE

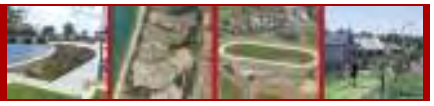
# Estates Development Company

# Fire Hazard Assessment

Research, Design & Delivery of Sustainable Development

12135
SEPTEMBER 2012

Project Management Planning Geotechnical Environmental Engineering



# Town Planning Management Engineering Pty Ltd.

## DOCUMENT CONTROL

Project Number: 12135

Project Name: Jindee Estate Fire Hazard Assessment

Author: Geoffrey Lush

Date Created: 10th September 2012

**Disclaimer**

The measures contained in this report do not guarantee that a dwelling will not be damaged in a bush fire. The ultimate level of protection will be dependent upon the design and construction of the dwelling and the level of fire preparedness under taken by the landowner. The severity of a bush fire will depend upon the vegetation fuel loadings; the prevailing weather conditions and the implementation of appropriate fire management measures.

REVISION TABLE

| Revision | Date | Purpose Issued For |
|---|---|---|
| A | 17 Sept 2012 | First draft |
| B | 25 Sept | Text revisions and plan updates |
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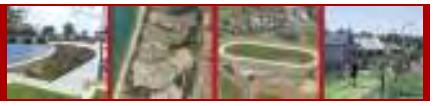


## CONTENTS



## FIGURES

# 1.0 Background

## 1.1 Introduction

TME Town Planning, Management, Engineering Pty Ltd has been engaged by Estates Development Company Pty Ltd to prepare a bush fire hazard assessment for the proposed Jindee Local Structure Plan.

The purpose of this report is to provide a broad hazard assessment of the site and to identify relevant bush fire management issues which need to be addressed in the implementation of the structure plan and subdivision design.

The Jindee Estate is located on Marmion Avenue approximately 37 km north of the Perth Central Business District in the North West Corridor, and 14 km north-west of Joondalup City Centre, as shown in Figure 1.

The subject land has a total area of 112 hectares and is comprised of:

- Lot 9036 DP 70682;
- Part Lot 3054 DP 47953; and
- Reserve 11929.

It has a frontage of approximately 800 metres to the Indian Ocean and 1,412 metres to Marmion Avenue.

The assessment of the bush fire hazard may be undertaken at a number of stages in the planning process including:[1]

a) At the local planning scheme review or structure plan stage over areas in a local planning scheme or structure plan stage where a change to the existing situation is being proposed (eg new development areas);

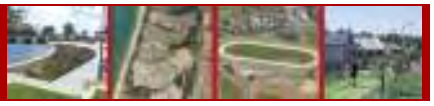
b) At a localised level to support an individual rezoning, subdivision or development application; or

c) At a localised level (at the construction stage) to determine construction standards under AS 3959.

As part of the preparation of the Jindee Local Structure Plan it is necessary to have regard to fire management issues. This will ensure the promotion and integration of fire management as a key element of the subdivision design in balance with environmental, landscape, community and residential objectives.


*Figure 1 Location Plan*

[1] FESA (2010) *Planning for Bush Fire Protection Guidelines* – Page 4



The project has had a long history which is summarised as:

- 1992 Zoning of Jindee- Land to 'Urban';
- 1996 Enquiry by Design Workshop;
- 2002 Jindee Charrette;
- 2004 Jindee Implementation and Design Workshop;
- 2006 Butler-Jindalee District Structure Plan;
- 2007 Jindee Innovation Agreement; and
- 2011 Metropolitan Region Scheme Amendment 1152/41.

## 1.2 EPA Assessment

The EPA advice on the Jindalee (Jindee) Foreshore Rationalisation and associated Region Scheme Amendment in May 2008 states that:

> Remnant vegetation & fauna
> The EPA supports Metropolitan Region Scheme Amendment 11 52/41 on the basis that the two areas of Parks. and Recreation (P&R) reserve are being provided to offset the area of foreshore P&R reserve (Bushforever Site No. 397) proposed to be zoned Urban. The two P&R reserves will be linked with native vegetation retained on private lots. The linkage is to ensure that the ecological function of the eastern portion of P&R is retained. Without the vegetated linkage the EPA does not consider the proposed P&R to be an adequate offset for the reduce foreshore reserve.

The issue of ecological linkage was deferred to ensure that an adequate mechanism is put in place during later stages of planning that will retain and protect the vegetation between the foreshore and inland area of Parks and Recreation. The LSP includes the area that will accommodate this ecological link within the area referred to as the Protected Natural Living Area or southern T2 zone.

Scheme Amendment No. 115 to District Planning Scheme No. 2 introduces provisions for the southern T2 zone to address the EPA's conservation objectives for this ecological link (as set out in MRS Amendment 1152/41). The EPA was satisfied with these provisions and determined that Amendment 115 could proceed to advertising without formal environmental assessment.

The Environmental Assessment report[2] states that the objective for the protection of southern T2 "Protected Natural Living Area" will be:

> To retain a continuous vegetated link through private land between the Trig Point Reserve and the Foreshore Reserve to assist in the maintenance of the ecological function of the Trig Point Reserve.

## 1.3 Potential Legislative Changes

As a result of the 2011 bush fires in Perth, Toodyay, Lake Clifton and Margaret River, the State Government has formed an Implementation Group which is developing a program to consider and implement the recommendations from the Keelty Report.[3]

Of relevance to the project is the potential:

- Formal designation of bush fire prone areas by the Western Australian Planning Commission;
- Giving statutory effect to FESA's Planning for Bush Fire Protection Guidelines;
- Reinforcing the application of State Planning Policy 3.4 Natural Hazards.

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[2] RPS Environment and Planning Pty Ltd (2012) Environmental Assessment Summary Local Structure Plan Lot 9036 and Part Lot 3054 Marmion Avenue, Jindee Page 23.

[3] Keelty M (2011) A Shared Responsibility – The Report of the Perth Hills Bushfire February 2011 Review Government Printer Perth

The designation of bush fire prone areas is required in order to trigger the application of Australian Standard AS3959 (2009) Construction of Buildings in Bushfire Prone Areas through the Building Code of Australia (BCA) and Western Australian Building Regulations 2012.

It is expected that within the next six months that these matters will be formalised and the drafts released for public comment.

# 2.0 Description of the Area

## 2.1 Land Use

The site is vacant with no current active use. It is predominantly covered with remnant vegetation apart from localised areas of clearing associated with tracks and off-road vehicle routes.

Surrounding land uses to the south and east of the site include the residential estates of Quinns Rock, Brighton and Butler. The land to the north is presently being developed for urban purposes as part of the north western metropolitan corridor.

There is a Trig Point in the south east portion of the site on Reserve 11593.

The existing conditions are shown in Figure 2.

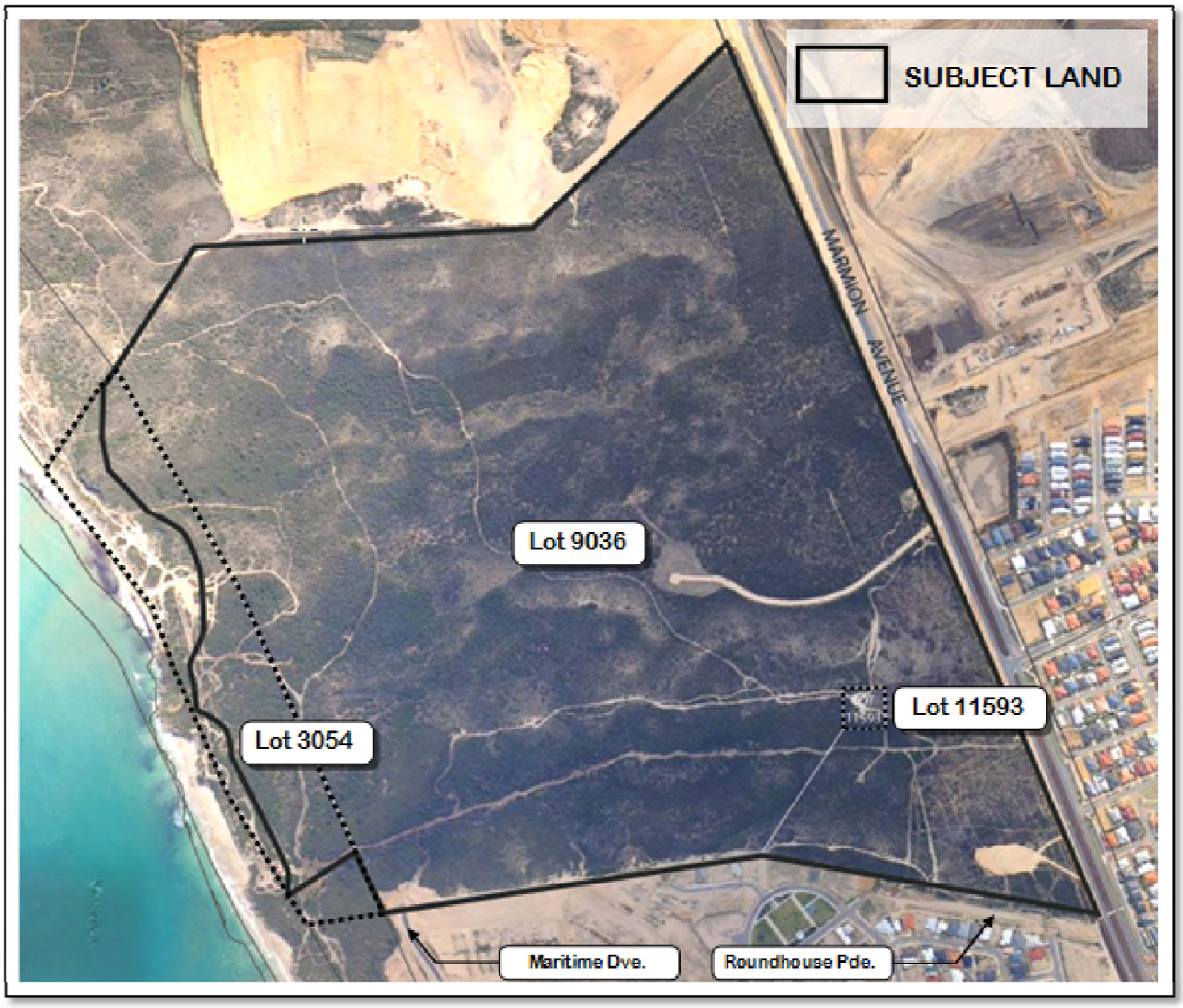



*Figure 2 Existing Conditions*

## 2.2 Climate

The locality has a Mediterranean climate, which is characterised by hot dry summers and mild wet winters. The mean maximum temperature ranges from 18.C in July to 30.4C in February. The mean minimum temperature ranges from 9.7C in July to 18.6C in February.[4] There is an annual average rainfall of 719 mm.

The wind direction at 9:00am is generally from the east and between 20 – 30 kph. At 3:00pm the wind direction is generally from the south west and between 20 – 30 kph.

## 2.3 Topography

The topography of site consists of coastal dunes and undulating limestone ridge terrain. It is dominated by two east west dunal ridges with a central valley between them. The lowest elevation is 13 metres AHD towards the foreshore frontage. The land rises to 56 metres AHD at Trig Point in the south east of the site.

The site's topography is shown in Figure 3.

Slopes on the site are variable and range up to 14 degrees (25 percent).

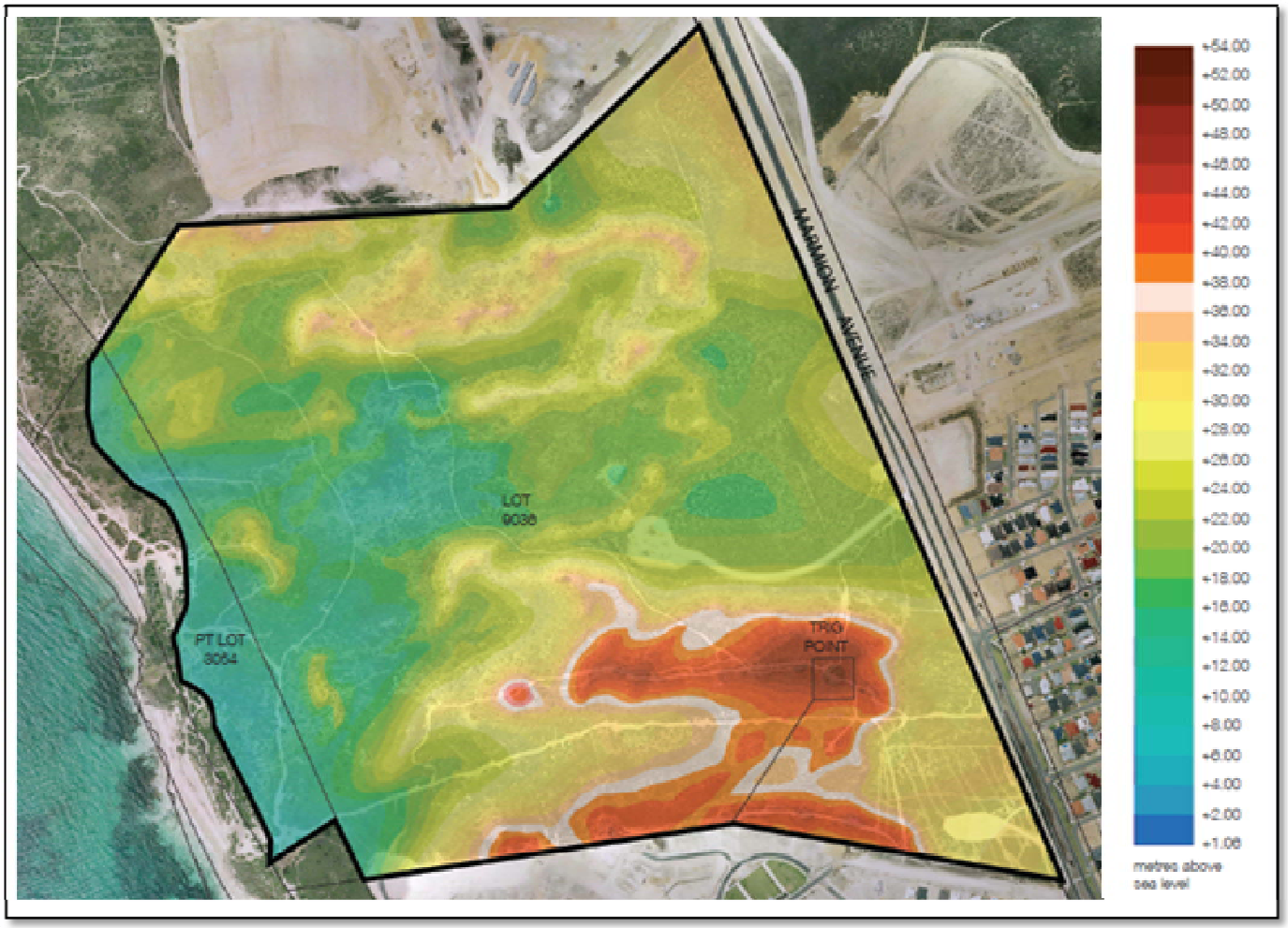
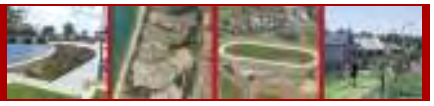



*Figure 3 Topography*

[4] Bureau of Meteorology – Swanbourne Weather Station



## 2.4 Vegetation

RPS Environment and Planning Pty Ltd have undertaken a flora survey of the site[5]. Twelve vegetation units were identified within the site and these are described as follows and shown in Figure 4.

| | |
|---|---|
| MhSp | *Melaleuca huegelii, Spyridium globulosum* Closed Heath on shallow limestone. |
| McSp | *Melaleuca cardiophylla, Acacia rostellifera, Spyridium globulosum, Olearia axillaris,Acacia saligna* Closed Tall Scrub/Closed Heath in swales and lower slopes. |
| AsLSg | *Acacia saligna, Spyridium globulosum, Olearia axillaris* Shrubland/Open Shrubland over *Pelargonium capitatum, Melaleuca systena* Open Low Heath over *Lomandra maritima* Sedgeland. |
| Ef | *Eucalyptus foecunda* Closed Shrub Mallee over *Acacia saligna* Shrubland over *Scaevola ?globulifera* Low Shrubland over *Anagallis arvensis* Herbland. |
| XpAs | *Xanthorrhoea preissii, Spyridium globulosum, Acacia saligna* Tall Open Scrub/Open Heath over *Leucopogon propinquus, Melaleuca systena* Open Shrubland over *Lomandra maritima, Lepidosperma squamatum* Open Sedgeland. |
| AhSg | *Alygogyne hakeifolia, Scaevola globufifera* Closed Heath/Closed Low Heath over *Conostylis paucifora* Very Open Heath. |
| B | *Banksia attenuata, B. menziesii* Low Woodland over *Dryandra sessilis, Macrozamia riedlei* Scattered Shrubs over *Rhagodia baccata, Hibbertia hypericoides, Leucopogon polymorphus* Low Open Shrubland. B1 *Banksia attenuata, Banksia menziesii* Low Woodland over *Trachyandra divaricata* Closed Herbland. |
| D | *Dryandra sessilis* Closed Tall Scrub over *Macrozamia riedlei* Scattered Shrubs over *Hibbertia hypericoides, Jacksonia calcicola* Low Shrubland. |
| DsSg | *Dryandra sessilis* Shrubland to Tall Closed Scrub over *Xanthorrhoea preissii* Scattered Shrubs over *Jacksonia calcicola, Hibbertia hypericoides, *Pelargonium capitatum* Low Open Shrubland over *Trachymene pilosa, *Anagallis arvensis, *Arctotheca calendula* Herbland. |
| Mixed | *Acacia truncata, A. cochlearis, Spyridium globulosum, Olearia axillaris* Closed Shrubland over *Lepidosperma gladiatum* Sedgeland/Open Sedgeland with lianes of *Hardenbergia comptoniana*. Contains a variety of shrubs and herbaceous plants. |
| P | Pyrosere communities, consisting largely of *Dryandra sessilis, Acacia pulchella, Hibbertia hypericoides* Closed Heath/Closed Low Heath. |
| Sg | *Spyridium globulosum* Closed/Open Heath over **Trachyandra divaricata, Trachymene pilosa, Conostylis pauciflora* ssp. Herbland. |

The above vegetation descriptions were defined using the height and estimated foliage cover of dominant species of each stratum based the categories in Table 1.[6]

The vegetation is typical of the coastal environment and it ranges from "Very Open Herbland" to "Closed Tall Scrub" with both native and introduced species. This includes Lomandra sedgeland, Dryandra sessilis (Parrot Bush), Xanthorrhoea preissii (Grass Tree), Melaleuca, Acacia and Banksia.

The vegetation classifications shown in Table 1 are relevant to the assignment of the bush fire hazard rating and also the Bushfire Attack Level.

[5] RPS Bowman Bishaw Gorham (2006) Lot 10 Jindee Vegetation and Flora Survey
[6] Keighery B (1994) *Bushland Plant Survey Wildflower of WA (Inc)* Table 3 Page 35

*Table 1 Vegetation Classification*

| Life form/height class | Canopy Cover (percentage) | | | |
|---|---|---|---|---|
| | 100 – 70% | 70 – 30% | 30 – 10% | 10 – 2 % |
| Trees over 30m | Tall closed forest | Tall open forest | Tall woodland | Tall open woodland |
| Trees 10 – 30m | Closed forest | Open forest | Woodland | Open woodland |
| Trees under 10m | Low closed forest | Low open forest | Low woodland | Low open woodland |
| Tree Mallee | Closed tree Mallee | Tree Mallee | Open tree Mallee | Very open tree Mallee |
| Shrub Mallee | Closed shrub Mallee | Shrub Mallee | Open shrub Mallee | Very open shrub Mallee |
| Shrubs over 2m | Closed tall scrub | Tall open scrub | Tall shrubland | Tall open shrubland |
| Shrubs 1 – 2m | Closed heath | Open heath | Shrubland | Open shrubland |
| Shrubs under 1m | Closed low heath | Open low heath | Low shrubland | Low open shrubland |
| Grasses | Closed grassland | Grassland | Open grassland | Very open grassland |
| Herbs | Closed herbland | Herbland | Open herbland | Very open herbland |
| Sedges | Closed sedgeland | Sedgeland | Open sedgeland | Very open sedgeland |

*Scrub and shrubland vegetation within the site.*

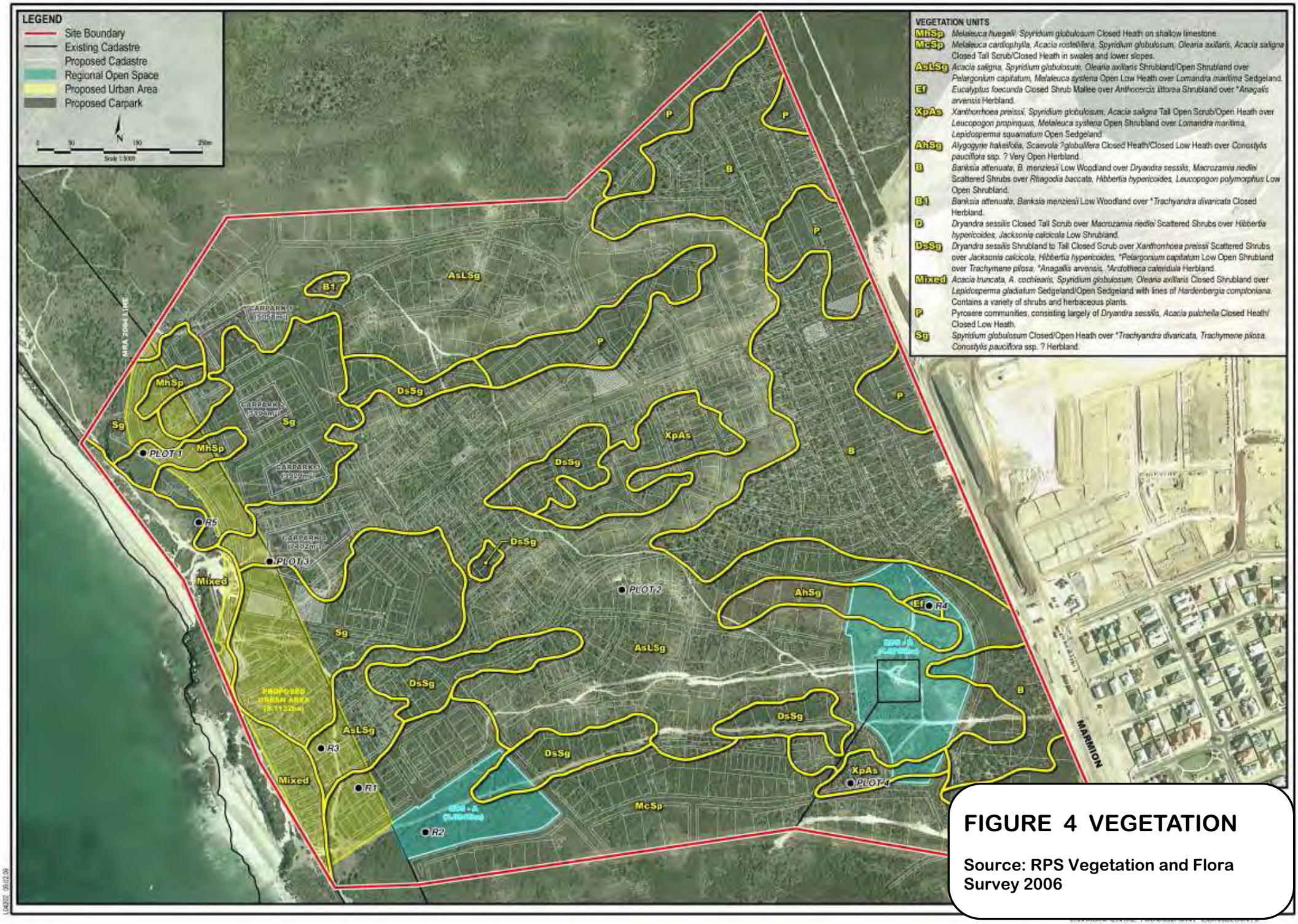



**FIGURE 4 VEGETATION**

**Source: RPS Vegetation and Flora Survey 2006**

## 2.5 Access

The primary access to the site is from Marmion Avenue which is a district main road.

Secondary access to the southern boundary is provided by both Roundhouse Parade and Maritime Drive. These are both local subdivision roads.

There are a number of unconstructed tracks within the site which are used by off road vehicles and to gain access to the beach.

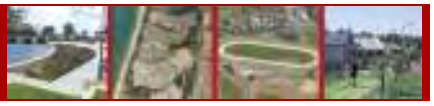
## 2.6 Water Supply

As the site is undeveloped there is no reticulated water supply. A Water Corporation public water supply bore is located within Lot 9036 near Marmion Avenue.

*Access Track*

*Grass Tree*

*Closed Tall Scrub*



# 3.0 Policy Framework

## 3.1 Emergency Management

Emergency management in Western Australia is based upon four principal components prevention, preparedness, response and recovery. The State Emergency Management Plan for Bushfire [7], summaries these as follows:

> Prevention and Mitigation
> Prevention activities eliminate or reduce the probability of occurrence and impact of bushfire.
>
> Preparedness
> Preparedness activities focus on essential emergency response capabilities through the development of plans, procedures, organisation and management of resources, training and public education.
>
> Response
> Response activities combat and contain the effects of the event, provide emergency assistance for casualties, help reduce further damage and help speed recovery operations. The highest priority in any response activity will be given to the preservation and protection of human life.
>
> Recovery
> Recovery activities, support emergency affected communities in reconstruction of the physical infrastructure and restoration of emotional, social, economic and physical wellbeing.

The main elements of the emergency risk management process are to establish the context, identify risks, analyse risks, evaluate risks (including acceptability of residual risk) and treat risks. Underpinning the process is a requirement for communication and consultation, as well as monitoring and review.8 The approaches used to manage risk can include:-

- Risk avoidance by, for example, controlling where development occurs;
- Modifying the risk by, for example, using building design and construction guidelines:
- Spreading the risk by raising community awareness; and
- Managing the environment by, for example, fuel reduction and maintenance programs.

Hence emergency management must address both the physical elements of the subdivision design and the social issues and community preparedness and self reliance.

## 3.2 SPP 3.4 Natural Hazards and Disasters

Statement of Planning Policy 3.4 Natural Hazards and Disasters applies to the fire management of the proposed development. It will be considered by the Western Australian Planning Commission in the assessment of structure plans, amendments to Town Planning Schemes and subdivision applications.

The policy is based upon the principles contained in the report Planning Safer Communities prepared by Emergency Management Australia.[9] It applies the principles of emergency risk management to land use planning. Land use planning can play a key part in reducing current and future community risk. This was also a key finding of the National Inquiry on Bushfire Mitigation and Management[10] which stated that:-

> "The Inquiry supports the view, expressed in Natural Disasters in Australia, that land use planning that takes into account natural hazard risks is the single most important mitigation measure for preventing future disaster losses (including from bushfires) in areas of new development. Planning and development controls must be effective, to ensure that inappropriate developments do not occur."

The main elements of the emergency risk management process are to establish the context, identify risks, analyse risks, evaluate risks (including acceptability of residual risk) and treat risks.

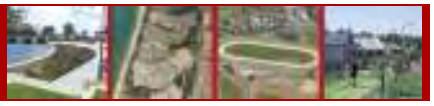
---

7 State Emergency Management Committee (2010) Op.cit- Page 11

8 Emergency Management Australia (2002) Planning Safer Communities – Land Use Planning for Natural Hazards Canberra, Emergency Management Australia Page 16

9 Emergency Management Australia (2002) Op.Cit

10 Ellis, S, Kanowski, P & Whelan,(2004) Op.cit - Page 92.



In relation to Bush Fires the statement of planning policy incorporates by reference the provisions and requirements contained in the Planning for Bush Fire Protection guidelines (2010).

## 3.3 Planning for Bush Fire Protection

Planning for Bush Fire Protection (FESA & WAPC - 2010) is the principal reference document in Western Australia for fire management in subdivisions and related development in rural and in urban/rural communities.

Planning for Bush Fire Protection promotes five key principles which are summarised below:

Principle 1 — Bush fire hazards must be considered in planning decisions at all stages of the planning process to avoid increased fire risk to life and property through inappropriately located or designed land use and development.

Principle 2 — Local governments are to identify bush fire hazard levels in their structure plans, local planning strategies and local planning schemes, based on the bush fire hazard assessment methodology in the guidelines.

Principle 3 — Subdivision and development in areas with an extreme bush fire hazard level or a bush fire attack level between BAL- 40 and BAL- FZ, is to be avoided unless specific fire protection requirements can be implemented to the satisfaction of the WAPC, FESA and/or the local government.

Principle 4 — In areas with an extreme bush fire hazard level where more intensive subdivision/development is considered unavoidable, permanent hazard reduction measures need to be implemented to reduce the hazard level to low or moderate or bush fire attack levels between BAL- Low and BAL- 29.

Principle 5 — Structure plans, subdivision and development in areas with a moderate to extreme bush fire hazard level needs to be supported by an assessment of the bush fire risk and compliance with the performance criteria and acceptable solutions set out in these guidelines.

The guidelines contain a set of performance criteria and acceptable solutions that new subdivision and developments are required to meet in bush fire prone areas. The main elements relate to:

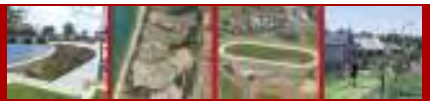
1.0 Location
- Hazard rating

2.0 Vehicular Access
- Two access routes
- Public road design
- Cul-de-sacs
- Battleaxes
- Private driveways
- Emergency accessways
- Fire access routes
- Gates
- Firebreaks
- Signs

3.0 Water Supply
- Reticulated areas
- Non reticulated areas
- Dams

4.0 Siting of Development
- Hazard separation zones
- AS3959 construction standards
- Building protection zones
- Shielding

5.0 Design of Development
- Compliant development
- Non compliant development



## 3.4 Australian Standard AS3959 (2009)

AS3959 Construction of Dwellings in Bush Fire Prone Areas[11] contains the principles used in the formulation of FESA's Planning for Bush Fire Protection. The Standard provides a framework for balancing the risks associated with the ember attack, radiant heat and flame attack with the standard of construction required. The lower the separation from bushfire prone vegetation, the higher the standard required for design and materials.

The revised AS3959 was approved nationally in March 2009 and the Building Code of Australia (BCA) was modified in 2010. In order for the standard to be applied via the BCA it requires the land to be in a designated bushfire prone area.

Designated bushfire prone area means land:

(a) that has been designated under legislation as being subject to bushfires;

(b) that has been identified as being subject to bushfires under a planning scheme or development approval, or

(c) is in an area that the State or Territory administration or municipal council considers may be subject to bushfire attack.

The revised standard provides for:-

- Construction requirements designed to maximize the performance of buildings when subjected to bushfire attack; and
- Requirements for the construction of buildings in bushfire-prone areas in order to improve their performance when they are subjected to burning debris, radiant heat and flame contact.

The construction requirements relate to:-

- Subfloor Supports;
- Floor;
- External Walls;
- External Elements and Doors
- Roofs;
- Verandas, Decks, Steps; and
- Water and gas pipes.

The six categories of Bushfire Attack Levels (BAL) are:

BAL Low The risk is considered to be very low and does not warrant any specific construction requirements.

BAL 12.5 The risk is considered to be low but there is still a risk of ember attack.

BAL 19 The risk is considered to be moderate. There is risk of ember attack and burning debris by wind borne embers and a likelihood of exposure to radiant heat.

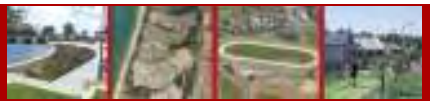
BAL 29 The risk is considered to be high. There is an increased risk of ember attack and burning debris by wind borne embers and a likelihood of exposure to an increased level of radiant heat.

BAL 40 The risk is considered to be very high. There is a much increased risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames.

BAL FZ The risk is considered to be extreme. There is an extremely high risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames.

FESA does not recommend BAL 40 and BAL FZ as being suitable for Western Australia as these allow dwellings to be constructed in very close proximity to the vegetation hazard.

[11] Standards Australia (2009) *AS 3959 – Construction of Buildings in Bush Fire Prone Areas.* Sydney. Standards Australia International Ltd.



## 3.5 City of Wanneroo Fire Break Notice

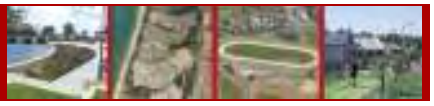
The principal method for implementing fire measures on developed land is through Council's annual Fire Break Notice. This Order is made pursuant to Section 33 of the Bush Fires Act 1954 and it requires the occupiers of all land to undertake fire prevention work as set out in the notice.

Council's annual firebreak notice requires that:

1. Land having an area of 2,000m$^2$ or more
   A firebreak not less than 3 metres wide and 3 metres high immediately inside and around all external boundaries of the land must be cleared.

2. Land having an area of less than 2,000m2
   A firebreak not less than 2 metres wide and 2 metres high immediately inside and around all external boundaries of the land must be cleared

Where it is impractical to comply with these provisions, a landowner can apply to Council for alternative measures to be approved.



# 4.0 Proposed Development

The shared vision for Jindee is to promote the creation of a community lifestyle and village which promotes the surrounding beach and underlying landscape values as an alternative to the conventional subdivision pattern contributing to the urban sprawl prevalent along the Perth coastline.

The project will ultimately yield approximately a minimum of 1,300 dwellings for approximately 2,600 residents. It will include a Coastal Village commercial centre; primary school; 6 hectares of Regional Open Space and 10 hectares of Local Open Space.

There are three inter-related tiers of provisions and controls which will be applied to the development being:

- Jindee related District Planning Scheme provisions;
- Local Structure Plan; and
- Detailed Area Plans.

The draft structure plan is shown in Figure 5 (over page) and the land use categories are described as follows:

T1 Natural Reserve - contains Metropolitan Region Scheme Parks and Recreation reservations.

T2 Natural Living - consists of lots between 600 - 3,000sqm, designed to enable the retention of the natural features such as vegetation or topography. These areas are more 'natural' in character' than 'sub-urban' or 'urban' and will predominantly be detached dwellings.

T3 Sub-Urban - sub-urban in character, consisting of low density residential areas, adjacent to higher zones that contain some mixed use. Medium to larger sized lots accommodating dwellings and landscaped gardens.

T4 General Urban - consists of medium-density residential and a wide range of building types including terraces, detached dwellings and apartments. Has a more formal character including reduced setbacks, raised kerbs and regular planting. Development will be a mixture of building types: including detached dwellings, terraces and mixed use buildings

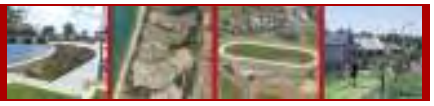
T5 Urban Centre - urban in character, consisting of higher density mixed use buildings set close to wide footpaths and a tight network of streets. Development will be predominantly apartments and mixed use buildings.

T6 Urban Core - consists of the highest density and height, with the greatest variety of uses and civic buildings of regional importance. It has larger blocks and buildings are set close to streets. Development will predominantly be multi story apartments, commercial buildings and mixed used buildings.

The proposed lot sizes are as follows:

| | T2 Natural Living | T3 Sub Urban | T4 General Urban | T5 Urban Centre | T6 Urban Core |
|---|---|---|---|---|---|
| Lot Area | 600m$^2$ min.<br>3,000m$^2$ max. | 180m$^2$ min.<br>1,500m$^2$ max. | 180m$^2$ min.<br>1,200m$^2$ max. | 180m$^2$ min. | 180m$^2$ min. |
| Lot Coverage | Defined building envelopes in DAP | 75% max. | 90% max. | 90% max. | 95% max. |


**FIGURE 5**
**PROPOSED DEVELOPMENT**



The structure plan design provides for a nature reserve at the high point on the site. This will be linked to the coastal parkland by larger residential lots which retain remnant vegetation. This linkage is referred to as the southern T2 Natural Living area and it occupies approximately 12.5 hectares.

The Amendment will introduce Schedule 16 into the Scheme and this schedule contains the smart growth community zone provisions. Clause 1.2 of Schedule 16 states that in order to protect the landform and vegetation within the Protected Natural Living Area, the following environmental requirements shall apply:

(a) The two Metropolitan Region Scheme Parks and Recreation reservations will be linked with native vegetation retained on private land.

(b) Building envelopes and building zones for residential development will be established in the applicable Detailed Areas Plan.

(c) The total area occupied by all building envelopes shall not comprise more than 30% of the total land area of the Protected Natural Living Area. The 'land area' shall be defined as the Protected Natural Living Area less thoroughfare reserves and civic spaces.

(d) No development shall occur in the Protected Natural Living Area unless there is an approved Detailed Area Plan for the area being developed or a Development Approval.

(e) Development can only occur within the agreed building envelopes, building zones, thoroughfares and civic spaces.

(f) For the avoidance of doubt, clearing or disturbance of native vegetation can only occur within the agreed building envelopes, building zones, thoroughfares and civic spaces.

(g) All services and access to the principal building and/or outbuilding will be undertaken within the nominated building zone only and involve minimum native vegetation clearing.

(h) Any areas of native vegetation outside the building zone and building envelope that are damaged during construction will be rehabilitated to the satisfaction of the Council after installation of services or construction as the case may be.

(i) Appropriate fencing will be detailed as part of the applicable Detailed Area Plan and shall allow, as far as practical, a corridor to assist the free passage of reptiles between the two regional reserves.

As provided for in the Part 1 provisions, the fire management plan will be prepared and approved prior to a DAP or subdivision being approved for land abutting the Parks and Recreation reserves or for lots within the southern T2 Natural Living area. It is necessary to defer the preparation of the fire management plan until this time, as bushfire hazard levels will be dependent on the characteristics of vegetation retained within the southern T2 Natural Living area.

# 5.0 Bush Fire Hazard Assessment

## 5.1 Undeveloped Land

The classification of the bush fire hazard in Planning for Bushfire Protection is based upon the existing vegetation in the undeveloped site. It classifies the existing vegetation based on tree height and the percentage of canopy cover.

The characteristics [12] of the different hazard categories are:-

1 Low hazard areas will generally be:

- areas devoid of standing native vegetation (less than 0.25 ha cumulative area);
- areas which due to climatic or vegetation (eg rainforest) conditions, do not experience bush fires;
- inner urban or suburban areas with maintained gardens and very limited native standing vegetation (less than 0.25 ha cumulative area); or
- pasture or cropping areas with very limited native standing vegetation that is a shrubland, woodland or forest.

2 Moderate hazard areas will generally be:

- areas containing pasture or cropping areas with slopes in excess of 10°;
- open woodlands;
- open shrublands;
- low shrubs with slopes of less than 10° or flat land; or
- suburban areas with some native tree cover.

3 Extreme hazard areas will generally be forests; woodlands or tall shrubs.

Figure 6 shows the fire hazard rating for the subject land based upon the above classifications and in summary:

- The cleared areas and existing residential development are classified as having a low fire hazard rating;
- The semi cleared area as having a moderate fire hazard rating; and
- The vegetated areas of the site and surrounding areas are classified as having a moderate to extreme fire hazard rating.

The general principles within the Planning for Bush Fire Protection Guidelines contain a presumption against development in areas with an “extreme” bush fire hazard rating.

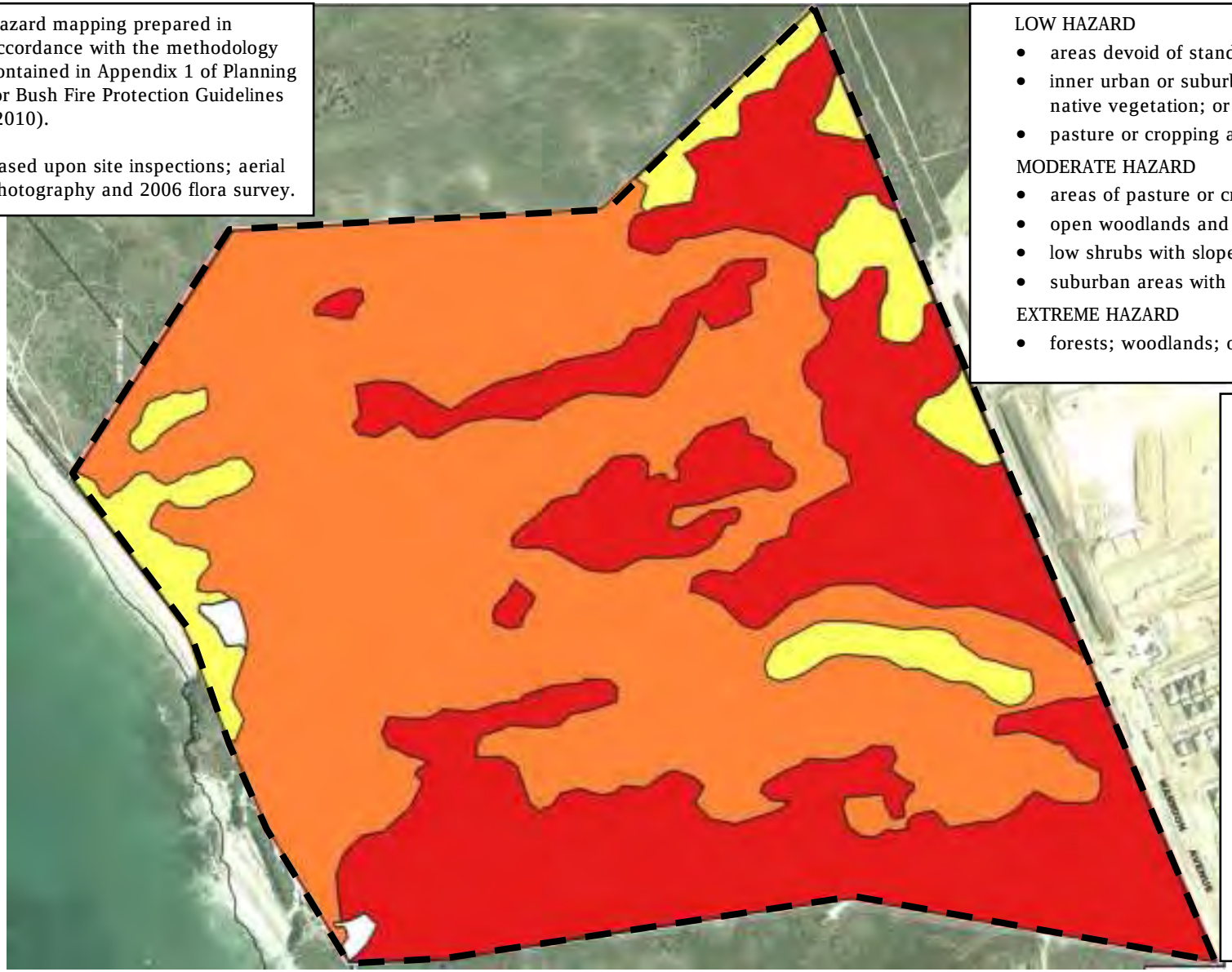
Guidance Statement A3 stipulates that in areas with an extreme bush fire hazard level that developments which are considered unavoidable will only be approved where it can be demonstrated that acceptable, permanent hazard reduction measures can be implemented to reduce the hazard to an acceptable level. This should include appropriate building protection zone, hazard separation zone and construction of dwellings to an appropriate standard as specified in AS3959.

While the hazard assessment relates to the undeveloped land and the final fire management measures must have regard to the proposed development and its relationship to the surrounding location.

[12] FESA (2010) Op.cit. Page 18 *Appendix 1: Methodology for Determining Bush Fire Hazard Level.*

Hazard mapping prepared in accordance with the methodology contained in Appendix 1 of Planning for Bush Fire Protection Guidelines (2010).

Based upon site inspections; aerial photography and 2006 flora survey.



LOW HAZARD

- areas devoid of standing native vegetation;
- inner urban or suburban areas with maintained gardens and limited native vegetation; or
- pasture or cropping areas with very limited native vegetation.

MODERATE HAZARD

- areas of pasture or cropping areas with slopes in excess of 10°;
- open woodlands and open shrublands;
- low shrubs with slopes of less than 10° or flat land;
- suburban areas with some native tree cover.

EXTREME HAZARD

- forests; woodlands; or tall shrubs.

LEGEND

- Subject Land
- Low Hazard
- Moderate Hazard
- Moderate/Extreme Hazard
- Extreme Hazard

The Moderate/Extreme Hazard rating will vary between moderate and extreme based upon the vegetation density and slope of the site.

**FIGURE 6**
**FIRE HAZARD**
**UNDEVELOPED SITE**

THIS PLAN HAS BEEN PREPARED FOR PLANNING PURPOSES
AREAS, CONTOURS AND DIMENSIONS SHOWN ARE SUBJECT TO SURVEY

| REVISION | DESCRIPTION | DRAFTER | DATE |
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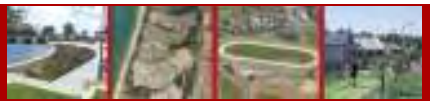

## 5.2 Developed Land

The bush fire hazard in the completed development relates to the existing vegetation and the planting of new vegetation.

The developed site (see Figure 5) will retain areas of remnant vegetation both within the MRS Parks and Recreation reservations and the southern T2 Natural Living area. The local Public open Spaces areas will also be subject to landscaping. The southern T2 Natural Living area will be the subject to the preparation of an Environmental Management Plan.

The vegetation/landscaped areas within a development can be generally classified as follows:

| | |
|---|---|
| 1 Conservation Bushland | This is typically remnant vegetation with potentially high fuel loads and ground litter. There may be little vegetation management and the area can become infested with weeds. There is unlikely to be open spaces and the level of maintenance will vary. |
| 2 Managed Bushland | Remnant bushland with a modified understorey. There may be periodic vegetation management including fuel reduction. The management will mean that there is generally greater public access with some clearings to create passive and active open spaces |
| 3 Exotic Landscape | The native vegetation has been largely cleared and replaced with low flammability or imported species, deciduous trees, lawns and open spaces. |
| 4 Parklands | Highly managed landscape which may contain native plantings. Will contain open spaces, pathways and playgrounds. Understory vegetation is likely to be replaced by other ground treatments including xeriscape techniques or plantings in selected locations. |

Figure 7 shows the indicative hazard rating of the developed land. The key issues arising from this are:

1. The majority of the site will have a low fire hazard as the existing hazard will be permanently removed as the land will is cleared for development;
2. The MRS Parks and Recreation reservations are likely to remain as a moderate to extreme bush fire hazard;
3. Development within 100m of the MRS Parks and Recreation reserves will potentially need to be constructed in accordance with Australian Standard AS3959;
4. The southern T2 southern Natural Living area is likely to a moderate bush fire hazard because of the management of the land and the fragmentation due to roads, driveways, building sites, fences and services;
5. The subdivision design within the southern T2 Natural Living area will have to comply with the provisions of the Planning for Bush Fire Protection Guidelines;
6. Development within southern T2 Natural Living area will need to be constructed in accordance with Australian Standard AS3959; and
7. The major Public Open Space reserves will need to be subject to further assessment of the landscaping design in order to determine if there will be any associated bush fire hazard.

NOTE
The Bushfire Attack Level (BAL) rating required for dwelling construction will assess the vegetation characteristics and slope rather than the generalised bush fire hazard rating shown on the plan.


## LEGEND

SUBJECT LAND

LOW HAZARD
Urban development, cleared lots with associated earthworks.

MANAGED OPEN SPACE
Managed public areas which are predominantly local POS. The hazard rating will depend upon the landscaping characteristics and is to be determined when subdivided.

MODERATE HAZARD
Southern T2 Natural Living Area
Potential moderate rating due to fragmentation from roads, driveways, fence lines etc. Will be subject to a fire management plan as part of the DAP and dwellings will be constructed in accordance with AS3959 construction standards.

EXTREME HAZARD
MRS Parks and Recreation reservations.
The rating in parts of the **reserves may be "moderate"** depending upon the level of revegetation and maintenance which is done.

**FIGURE 7**
**INDICATIVE FIRE HAZARD**
**DEVELOPED SITE**

THIS PLAN HAS BEEN PREPARED FOR PLANNING PURPOSES
AREAS, CONTOURS AND DIMENSIONS SHOWN ARE SUBJECT TO SURVEY

| REVISION | DESCRIPTION | DRAFTER | DATE |
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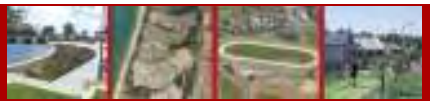


# 6.0 Planning for Bush Fire Protection Guidelines

The Planning for Bush Fire Protection Guidelines require that applications for rezoning, subdivision and related development should reflect the level of risk identified for the area and address the compliance of the proposal with the relevant performance criteria and acceptable solutions, as specified in the guidelines.

The Guidelines state (page 2) that they are not intended to be enforced retrospectively on existing development in established urban areas, existing townsites or existing subdivisions. The subject land is within an existing townsite boundary and will be developed as an urban area as will the surrounding land. As indicated in Section 1.1 the subject land has been zoned for residential development since 1992.

The Guidelines also indicate that there is a duty of care on decision making authorities to have regard to the provisions in the Guidelines recommend in the exercise of statutory planning discretions, on land that has a moderate or extreme bush fire hazard level.

Given the above it can be argued that the Guidelines should not be applied to Jindee as rigorously as they would for rural residential subdivision on the urban fringe. Estates Development Company Pty Ltd is taking a proactive position by ensuring that bush fire management principles are incorporated into the design of the subdivision and subsequent development.

In relation to the main elements of the Guidelines the following comments are provided in respect to the proposed Local Structure Plan.

Element 1: Location
The Acceptable Solution is that the subdivision/development is located on land that is not subject to either an extreme bush fire hazard land classification or requires construction standards to BAL-40 or BAL-FZ. The stated objective is to ensure that development/intensification of land use is located in areas where the bush fire hazard does not present an unreasonable level of risk to life and property.

As the majority of the site is being cleared for the development, the above objective will be complied with.

The southern T2 Natural Living area will still contain vegetation and may be classified as a moderate fire hazard. This classification will have to be determined as part of the preparation of any Detailed Area Plan and Environmental Management Plan prepared for this land.

Element 2: Vehicular Access
The Acceptable Solutions are:-

1. That there are at least two different vehicular access routes, both of which connect to the public road network, are available to all residents/the public at all times;
2. That public roads, cul-de-sacs, battle axe legs, driveways, emergency accessways meet the prescribed standards;
3. That gates and signs be provided for emergency accessways; and
4. That firebreaks be provided on lots greater than 0.5 hectares.

The prescribed standards for roads relate to the width; horizontal and vertical clearances; maximum gradients and minimum curve radius.

Similar standards are also prescribed in the Local Government Subdivisional Guidelines.[13]

The Jindee Design Code is formulating specific standards for thoroughfares. These standards will need to be reviewed particularly in the southern T2 Natural Living area which seek to retain the existing landform.

Element 3: Water Supply
The Acceptable Solution is that the development is provided with a reticulated water supply and fire hydrants as specified. Normally within a residential development these are required every 200 metres.

[13] Institution of Public Works Engineering Australia (WA Division Inc) Subdivisional Guidelines Edition No.2 July 2009

The baseline criteria for development is the approval of the water reticulation design and provisions of hydrants in accordance with the Water Corporation's Water Reticulation Standard No 63.

Element 4: Siting of Development
The Acceptable Solutions are:-

1. In areas with a moderate to extreme hazard rating, buildings are to be sited a minimum of 100m from classified vegetation;
2. In areas with a moderate to low hazard rating buildings are to be sited a minimum of 20m from classified vegetation;
3. That a 20m building protection zone is provided;
4. That a 80m hazard separation zone is provided and
5. That the Bushfire Attack Level can be reduced for a building due to shielding.

The separation distance to classified vegetation can be reduced provided that the building is constructed in accordance with the assigned Bushfire Attack Level under Australian Standard AS3959.

Element 5: Design of Development
The Acceptable Solution states that for development that does not comply with acceptable solutions A4.1, A4.2, A4.3 and A4.4 there is no acceptable solution. All such proposals must be assessed under Performance Criterion P5.

Performance Criterion P5 states that the design of the development is appropriate to the level of bush fire hazard that applies to the development site.

It is submitted that the design of the development is appropriate to the level of bush fire hazard that applies to the development site as:

- The site is being developed predominantly for urban purposes;
- Dwellings within 100m of the MRS Parks and Recreation reservations will be constructed in accordance with the assigned Bushfire Attack Level under Australian Standard AS3959;
- Dwellings in the southern T2 Natural Living area will be constructed in accordance with the assigned Bushfire Attack Level under Australian Standard AS3959; and
- A fire management plan will be prepared for the subdivision which will document specific fire management measures.

# 7.0 Conclusion

FESA's Planning for Bush Fire Protection Guidelines are the principal reference document in Western Australia for fire management in subdivisions and related development in rural and in urban/rural communities. It promotes five key principles including that bush fire hazards must be considered in planning decisions at all stages of the planning process to avoid increased fire risk to life and property through inappropriately located or designed land use and development.

The Guidelines states that development in areas with extreme bush fire hazard levels will only be approved where it can be demonstrated that permanent hazard reduction measures can be implemented to reduce the hazard level to an acceptable level, and that the development can be undertaken in accordance with the general principles and building construction standards that underpin the Guidelines.

The subject land in its undeveloped state generally has a moderate to extreme bush hazard rating.

The development will result in the vast majority of this land being cleared i.e. it will permanently remove the fire hazard. Vegetation will be retained within the existing Regional Open Space reserves and in the southern T2 southern Natural Living area.

This recognises the increasing desire for people to live in closer contact with natural landscape. The integration of vegetation into the urban landscape creates a number of challenges for the design; for the long term maintenance of that vegetation and for community awareness of potential fire issues.

The main bush fire management issues associated with the structure plan are:

1. The treatment of the interface between the development and the MRS Parks and Recreation reservations; and
2. The design of the subdivision and development with the southern T2 Natural Living area.

With the possible exception of the southern T2 Natural Living area, the structure plan design at the broad scale, appears to generally comply with the requirements of a Planning for Bush Fire Protection.

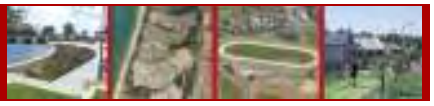
The southern T2 Natural Living area requires further examination through the preparation of the Detailed Area Plan. The Environmental Assessment Report (Page 23) stipulates that in order to support the movement of small reptiles through the vegetated link between the Trig Point Reserve and Coastal Reserve that the following features need to be maintained within the T2 corridor:

- a good density of ground cover for refuge and camouflage;
- minimise the distance of open ground to be traversed, primarily roads;
- rehabilitation of degraded areas;
- retention of vegetation on private lots outside of defined building envelopes; and
- preparation of a vegetation protection plan".

The provisions for maintenance, planting density and type of vegetation in the southern Natural Living area need to be considered as part of the DAP design and will be addressed through an Environmental Management Plan.

It is submitted that the design of the structure plan is appropriate to the level of bush fire hazard that will apply to the developed site as:

i. The site is being developed predominantly for urban purposes;
ii. Dwellings within 100m of the MRS Parks and Recreation reservations can be constructed in accordance with the assigned Bushfire Attack Level under Australian Standard AS3959;
iii. Dwellings in the southern T2 Natural Living area will be constructed in accordance with the assigned Bushfire Attack Level under Australian Standard AS3959; and
iv. A fire management plan will be prepared for the subdivision which will document specific fire management measures.



Recommendations

1 That a fire management plan should be submitted in conjunction with any subdivision application so as to ensure that the design complies with the requirements of the Planning for Bush Fire Protection Guidelines. This plan should also address:

a) The extent of earth working (cut and fill with proposed finished surface levels) and vegetation clearing for that stage;

b) The interface treatment between the development and any classified bush fire hazard;

c) Any interim fire management measures which are required for staging of the subdivision;

d) Where AS3959 construction standards will be required; and

e) A Bushfire Attack Level (BAL) classification plan for those nominated areas.

2 That the preparation of the Environmental Management Plan for the southern T2 Natural Living area should consider:

a) The minimum height of vegetation required;

b) The degree of "openness" of the foliage;

c) The specific density of groundcover;

d) The ability to remove dead material and maintain leaf litter;

e) The need to include appropriate BAL setbacks;

f) How the continuity of the corridor will be affected by three metre wide driveways and any associated earthen shoulders/embankments;

g) How the continuity of the corridor will be affected by boundary firebreaks up to 6m wide i.e. 3m either side of the boundary on lots of more than 2,000sqm.

3 That the preparation of the Detailed Area Plan for the southern T2 Natural Living area should consider:

a) The vegetation rehabilitation and management requirements;

b) The application of AS3959 construction standards including the required BAL setbacks;

c) The management of vegetation within the BAL setbacks;

d) A potential variation of the City of Wanneroo Firebreak Notice to remove the requirement for boundary firebreaks.

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