# AMENDMENT NO.1
# EGLINTON LSP NO.82

September 2016

Eglinton Estates

Creative
DESIGN+PLANNING

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# EGLINTON LSP NO.82

## SEPTEMBER 2016

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Appendix 8 Proposed Amended Master Plan

# ABBREVIATIONS

| | |
|---|---|
| AHD | Australian Height Datum |
| DAA | Department of Aboriginal Affairs |
| DER | Department of Environment Regulation |
| DoW | Department of Water |
| DoP | Department of Planning |
| DpaW | Department of Parks and Wildlife |
| DPS2 | City of Wanneroo District Planning Scheme No.2 |
| EPA | [Western Australian] Environmental Protection Authority |
| EPA Act 1986 | Environmental Protection Act 1986 |
| EBPC Act 1999 | Environment Protection and Biodiversity Conservation Act 1999 |
| Eglinton LSP No.82 | Eglinton Local Structure Plan No.82 |
| LWMS | Local Water Management Strategy |
| MRS | Metropolitan Region Scheme |
| RMD | Residential Medium Density Codes |
| ROS | Regional Open Space |
| SPP | Statement of Planning Policy |
| WAPC | Western Australian Planning Commission |

# 1 INTRODUCTION

The *Eglinton Local Structure Plan No.82* (Eglinton LSP No.82) was formally adopted by the City of Wanneroo in November 2012 and subsequently endorsed by the Western Australian Planning Commission (WAPC) in February 2013.

The Eglinton LSP No.82 area is located approximately 15km north of Joondalup and 45 km north west of the Perth CBD (refer **Figure 1**). The Eglinton LSP No.82 covers an area of approximately 637 ha, of which 325 ha is owned by Eglinton Estates and of that landholding 198 ha is currently being developed in partnership with Stockland WA Development Pty Ltd.

Branded the Amberton Estate, approximately 34 ha of residential land has been developed and ~900 lots have been created in accordance with the Eglinton LSP No.82.

Since endorsement of the Eglinton LSP No.82 there have been a number of significant changes to the planning and environmental framework which applies to the Eglinton LSP No.82. These changes have triggered this amendment to the Eglinton LSP No.82 in order to provide a consolidated document to guide future subdivision and development. This proposed amendment to the Eglinton LSP No.82 will implement these changes and can be summarised under three (3) key headings, as follows:

1. **Environmental Approvals/Metropolitan Region Scheme Amendment:** updates in accordance with approvals granted under the *Environmental Protection Act 1986* and the *Environmental Protection and Biodiversity Conservation Act 1999*; and gazettal of an amendment to the *Metropolitan Region Scheme*;
2. **Subdivision Approvals and Surrounding Development:** amendments to reflect Conditional Subdivision Approvals granted by the WAPC for the Amberton Estate between 2013 and June 2016, and revisions to achieve an integrated design outcome with recent planning progress of surrounding developments; and
3. **Changes to Planning Legislation, Policies and Guidelines:** amendments, as necessary, to address the requirements of the *Planning and Development (Local Planning Schemes) Regulations 2015, Structure Plan Framework, State Planning Policy 3.7 – Planning in Bushfire Prone Areas, Guidelines for Planning in Bushfire Prone Areas* and *Planning Bulletin Medium-density single house development standards – Development Zones.*

Prior to lodgement of this proposed amendment to the Eglinton LSP No.82, Creative Design+Planning met with Planning Officers from the Department of Planning and the City of Wanneroo. The purpose of this meeting was to determine the most appropriate manner in which to amend the Eglinton LSP No.82 to address each of the key changes outlined above. It was agreed with both the WAPC and the City of Wanneroo to progress this amendment as a standalone Addendum Report to the existing Eglinton LSP No.82. This approach was agreed to assist the assessment process and to avoid unnecessary review of sections of the Eglinton LSP No.82 which are not the subject of this amendment.

In accordance with the above, this proposed Addendum Report is broken down into the following sections:

- **Section 1** – Introduction;
- **Section 2** – Proposed Amendments; and
- **Section 3** – Amended Sections of the Eglinton LSP No.82.

Section 2 provides a summary of the proposed amendments to the Eglinton LSP No.82 as outlined in items 1 – 3 above. Section 3 contains the relevant updated sections of the Eglinton LSP No.82 to address the changes outlined in Section 2. Section 3 has been prepared in a manner and form in which each section can be substituted into the final Eglinton LSP No.82 document, should this be required once the amendment has been finalised and/or approved. The sections of the Eglinton LSP No.82 which have been amended in this Addendum will supersede the respective sections in the approved Eglinton LSP No.82.

This proposed amendment to the Eglinton LSP No.82 is supported by an Environmental Assessment Addendum, a Traffic and Transport Addendum, and a Bushfire Management Plan. All other technical appendices of the approved Eglinton LSP No.82 are still valid.

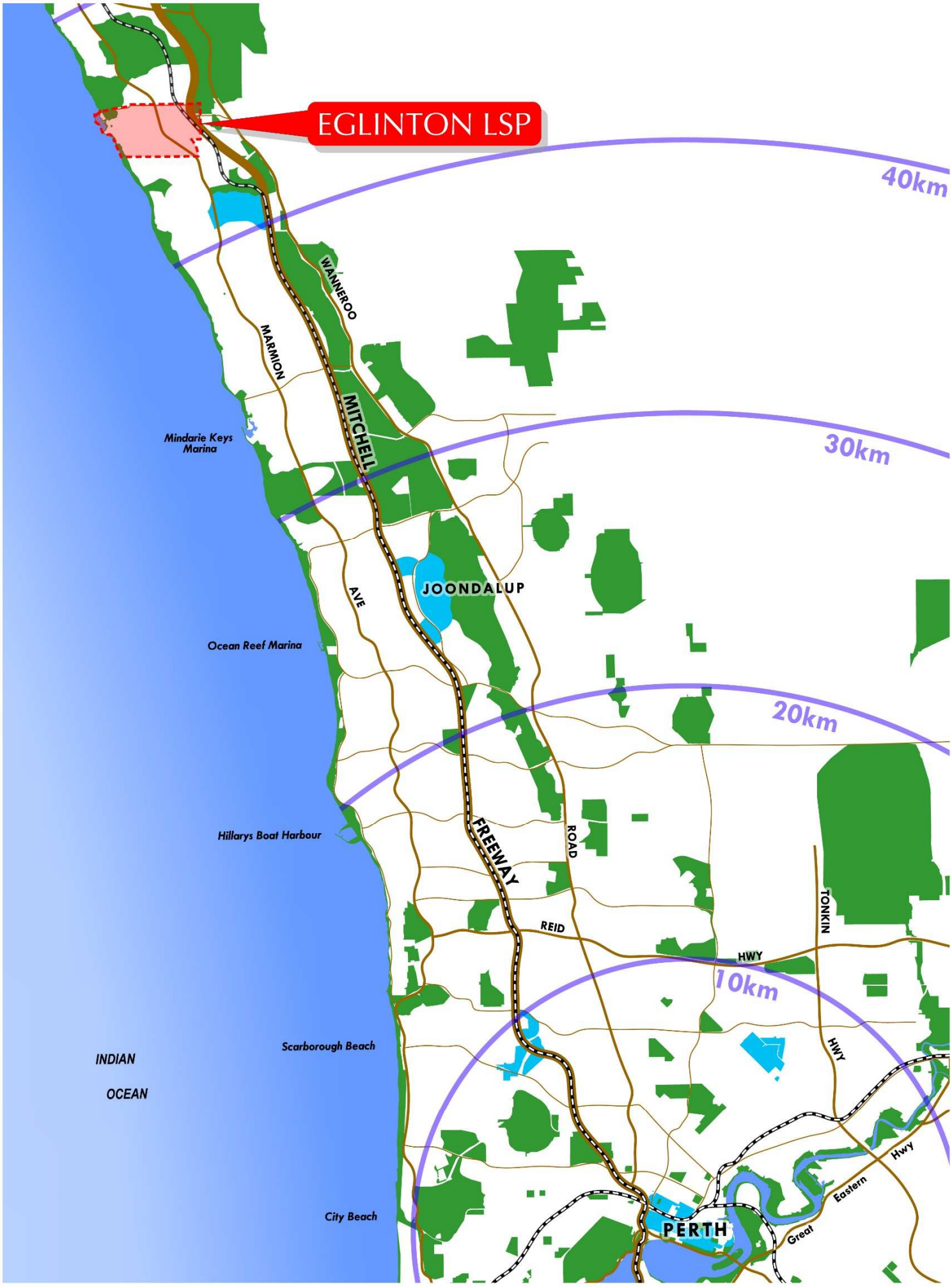



FIGURE 1: LOCATION PLAN

# 2 PROPOSED AMENDMENTS

This section provides a summary of the proposed amendments to the Eglinton LSP No.82. A copy of the proposed Amended Eglinton LSP No.82 is enclosed as **Appendix 1**.

## 2.1 Environmental Approvals/Metropolitan Region Scheme Amendment

The Eglinton LSP No.82 was approved by the WAPC with specific notations for areas that were subject to further environmental approvals. Clause 6.1 of the Eglinton LSP No.82 states that *"no subdivision and/or development can occur within the area identified on Plan 1 until such time that the environmental approval under the EP Act and MRS Amendments are finalised"*.

Development of the eastern half of the Eglinton LSP No.82 area was assessed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to the impact of clearing on Carnaby's Black Cockatoo foraging habitat. The determination on the referral was deemed a 'Controlled Action' and a formal assessment (EPBC 2010/5777) was undertaken. The Eglinton LSP No.82 was approved by the Commonwealth Minister for Environment on 30 April 2013, modified on 17 July 2013 and 20 October 2015. The western section of the Eglinton LSP No.82 area was referred under two separate proposals both of which were determined as 'Not a Controlled Action'.

The environmental approval process under the *Environmental Protection Act 1986* (EP Act) and associated *Metropolitan Region Scheme* (MRS) amendment have been finalised and the extent of conservation areas established. In addition to the conservation areas established under the EP Act, EPBC 2010/5777 identifies three (3) additional conservation areas to be retained within the Eglinton LSP No.82 area.

This proposed amendment will update the Eglinton LSP No.82 to reflect the outcomes of the approvals under the EPBC Act, the EP Act and the MRS Amendment. The history behind, and a summary of these approvals is provided below, and a plan showing the approved conservation and Regional Open Space (ROS) areas is provided as **Figure 2**. The Environmental Assessment Addendum 1 prepared by PGV Environmental is enclosed as **Appendix 1** and provides further detail regarding the environmental approvals.

### 2.1.1 Historic State Environmental Approvals

#### 2.1.1.1 PUBLIC ENVIRONMENTAL REVIEW

The Eglinton landholding has an extensive history of environmental and planning studies and approvals that commenced in the 1980s with the Eglinton Beach Resort (EBR) proposal by Ocean Dunes Pty Ltd (now known as Eglinton Estates Pty Ltd) to build a marina, golf course, resort and residential land west of the then proposed Marmion Avenue alignment. The proposal was assessed (EPA Bulletin 500) by the Environmental Protection Authority (EPA) as a Public Environmental Review (PER) in 1991 and subsequently approved by the Minister for the Environment in Statement 150 on 8 July 1991.

Ocean Dunes Pty Ltd submitted a revised concept design plan for EBR Proposal as requested under Ministerial Statement 150. This concept design plan detailed the foreshore reserve, environmentally significant areas to be transferred from private lands to the Crown, access ways to the foreshore reserve and a plan to protect the dune system during development. The concept design plan was submitted to the EPA and the Minister for the Environment who subsequently cleared conditions 3, 4-1, 5-1 and 6-1 of Ministerial Statement 150.

An amendment to the Perth MRS 932/33 rezoned the land from 'Rural', 'Waterways Reservation', and 'Parks and Recreation' to 'Urban' and 'Recreation'.

#### 2.1.1.2 ENVIRONMENTAL REVIEW

In 2005, the EPA assessed the Alkimos-Eglinton MRS Amendment 1029/33 (Bulletin 1207 refers) which included the EBR proposal and the remaining portion of the Eglinton landholding east of the original proposed Marmion Avenue alignment. ATA Environmental (2005) conducted additional flora and fauna surveys which were largely carried out on the eastern portion of the Eglinton landholding as a part of the Environmental Review under the EP Act. The MRS Amendment was approved by the Minister for the Environment (Ministerial Statement 722) and the Minister for Planning on 24 April 2006.

Following the gazettal of the Alkimos-Eglinton MRS Amendment, the *Alkimos-Eglinton District Structure Plan* (DSP) was initiated. The DSP included the entire Eglinton landholding and was approved in June 2010. The environmental conditions from Ministerial Statement 722 were reflected in the DSP approval.


FIGURE 2: REGIONAL, CONSERVATION AND PUBLIC OPEN SPACE

### 2.1.2 Recent Environmental Approvals

#### 2.1.2.1 SECTION 45C

The original EBR proposal was to include a links style golf course and resort. A formal environmental assessment process under the EP Act was required to remove the golf course and resort and replace it with residential development and re-configure the conservation areas.

In September 2011, a Section 45C under the EP Act was initiated and submitted to the EPA for assessment. During this process, significant consultation was undertaken with the Department of Parks and Wildlife (DPaW), Department of Planning (DoP) and the OEPA. The areas proposed for conservation would become 'ROS' ('Parks and Recreation Reserve' under the MRS and the *City of Wanneroo Town Planning Scheme No. 2*.

The Section 45C submission (PGV, Environmental 2011) was approved by the Chair of the EPA under delegated authority on 12 February 2014.

The section 45C approval under the EP Act resulted in the modification and exchange of conservation areas previously shown in the Eglinton LSP No.82. The location of the conservation areas approved through the Section 45C process are shown in Attachment 1 of **Appendix 2** and described below:

- Adjacent to Pipidinny Road and west of Marmion Avenue (ROS A on **Figure 2**);
- To the south of Pipidinny Road and west of Marmion Avenue (ROS B on **Figure 2**);
- To the west of Marmion Avenue (POS 9 and 21 on **Figure 2**); and
- To the west of Marmion Avenue (POS 10, 11 and 22 on **Figure 2**).

#### 2.1.2.2 SECTION 46

Changes under Section 45C of the EP Act may be made to the proposal description only, not to the conditions of the Ministerial Statement, changes to the proposal implementation conditions are considered under Section 46 of the EP Act.

An outcome of the Section 45C approval was that the Ministerial Statement 150 environmental conditions needed to be changed. The conditions relating to the golf course and resort were no longer valid and needed to be deleted from Ministerial Statement 150. The remaining environmental conditions were contemporised as part of the Section 46 process.

The Section 46 submission (PGV, Environmental, 2013) was assessed by the OEPA (Assessment 1975) and the EPA Report 1526 and recommendations were provided to the Minister for Environment for consideration. The Section 46 was approved by the Minister for Environment and a new Ministerial Statement 992 was issued on the 5 January 2015 (refer Attachment 2 of **Appendix 2**) to replace Ministerial Statement 150.

#### 2.1.2.3 METRPOLITAN REGION SCHEME AMENDMENT 1284/57

An amendment to the *Metropolitan Region Scheme* (MRS) was required to formalise the change in 'Parks and Recreation' reserve alignment approved through the Section 45C. Amendment 1284/57 was initiated directly after the Section 45C approval to formally rezone the original 'Parks and Recreation' reserve to 'Urban' and reflect the revised alignment of 'Parks and Recreation' reserve (ROS A and B). MRS Amendment 1284/57 was prepared in accordance with the EPA's guide *Referral of a Scheme to the Environmental Protection Authority*. The WAPC referred the Amendment to the EPA under Section 48 of the EP Act.

The EPA decision under Section 48A (1) (a) of the EP Act was determined that the proposed scheme should not be assessed under Part IV Division 3 of the EP Act.

The MRS Amendment was gazetted by the Minister for Planning on the 12th February 2016 (refer Attachment 3 of **Appendix 2**). During the amendment process the City of Wanneroo requested that the WAPC concurrently amend *District Planning Scheme No.2* to include the land zoned 'Urban' under MRS Amendment 1284/57 within the 'Urban Development' zone.

#### 2.1.2.4 COMMONWEALTH EPBC APPROVAL 2010/5777

The eastern portion of the Eglinton LSP No.82 area was referred under the EPBC Act to the Department of Environment in December 2010. The referral decision under Section 75 and Section 87 of the EPBC Act was deemed to be 'Controlled Action' on the 27 January 2011 and a formal assessment was required. EPBC Referral 2010/577 was approved subject to environmental conditions by the Commonwealth Environment Minister on 30 April 2013, modified on 17 July 2013 and modified on 20 October 2015.

The EPBC 2010/5777 approval resulted in three areas of Black Cockatoo foraging being retained in the LSP. The location of the conservation areas are shown in Attachment 4 of **Appendix 2** and are:

- East of Marmion Avenue in the Eglinton Hill area of the landholding (POS 46);
- East of Marmion Avenue in the south east corner of the landholding (POS 48); and
- To the south of Pipidinny Road and west of Marmion Avenue (POS 14).

These conservation areas will be formally recognised in this proposed amendment as 'Strategic Open Spaces' for conservation. The Eglinton LSP No.82 currently shows an 'Integrator Arterial A' road connection traversing through the EPBC Approved POS 'AG'. This road alignment is consistent with the Alkimos-Eglinton District Structure Plan and provides access between the Eglinton District Centre to the north and the 'Service Commercial' land to the south. This amendment to the Eglinton LSP No.82 proposes to shift the alignment of the 'Integrator Arterial A' to the west, subject to a Section 143 under the EPBC Act. The realignment of this road will minimise the impact on the Carnaby Cockatoo habitat, whilst still facilitating a connection to the landholdings to the south.

As part of the EPBC Approval 2010/5777, in addition to the above conservation areas there is a requirement to establish 1.9ha of Carnaby's Black Cockatoo habitat across the POS areas shown in **Appendix 2**. These POS areas are reflected in the updated Public Open Space Schedule and Master Plan forming part of this proposed amendment.

#### 2.1.2.5 EPBC APPROVAL 2013/7068

The south western portion (Part Lot 9005) of the Eglinton LSP No.82 area known as Amberton Estate was referred under the EPBC Act by Stockland WA Development Pty Ltd. The referral decision under Section 75 of the EPBC Act was deemed to be 'Not a Controlled Action' (refer Attachment 5 of **Appendix 2**).

#### 2.1.2.6 EPBC APPROVAL 2014/7137

The north western portion of the Eglinton LSP No.82 area (Lot 5000 and Part Lot 5001) known as Eglinton Beach was referred under the EPBC Act by Eglinton Estates Pty Ltd. The referral decision under Section 75 of the EPBC Act was deemed to be 'Not a Controlled Action' (refer Attachment 5 of **Appendix 2**).

### 2.1.3 Summary of Environmental Approvals/MRS Amendment

The environmental approvals and MRS Amendment described in the sections above have resulted in a number of amendments to the Eglinton LSP No.82, as summarised in the table below and shown in **Figure 2**:

<table>
<tr><th>Environmental/Planning Approval</th><th>Proposed Eglinton LSP No.82 Amendment</th></tr>
<tr><td>Section 45C, Section 46 under the EPA Act, Ministerial Statement 992 and MRS Amendment 1284/57</td><td>• Updates to configuration of Strategic Open Spaces 'A' and 'B' and change to 'Parks and Recreation' reserve (Regional Open Space).<br>• Remove Clause 6.1 from Part One.<br>• Remove 'hatching' from Plan 1 and notation "Area Subject to Environmental approval in accordance with Clause 6.1 of the Local Structure Plan".<br>• Remove 'hatching' from Plan 1 and notation "Land subject to MRS amendment (to rezone from Parks and Recreation to Urban) & land exchange for notated open space areas A & B."<br>• Updates to configuration of Strategic Open Spaces 'C' and 'D'.</td></tr>
<tr><td>EPBC Approval 2010/5777</td><td>• Include three (3) additional Strategic Public Open Spaces for conservation areas 14, 46 and 48.<br>• Provide Public Open Space in areas to retain 1.9 ha of Carnaby's Black Cockatoo Habitat, as follows:
<table>
<tr><th>POS Reference</th><th>Total Area of POS (ha)</th><th>Area of Carnaby's Black Cockatoo habitat retained in POS (ha)</th></tr>
<tr><td>38</td><td>1.24</td><td>0.30</td></tr>
</table></td></tr>
</table>

| | | |
|---|---|---|
| **42** | 0.94 | 0.53 |
| **43** | 0.37 | 0.35 |
| **44** | 2.01 | 0.52 |
| **47** | 1.07 | 1.07 |
| **Total:** | **5.63 ha** | **2.77 ha*** |

**Note: The proposed LSP design retains a larger area of Carnaby's Cockatoo Habitat to that required under EPBC 2010/5777, noting this area may be reduced as a result of detailed engineering and landscaping design.*

The environmental assessment of the additional conservation areas has been undertaken as part of the State and Commonwealth assessment processes under the EP Act and EPBC Act, respectively. Incorporation of the conservation areas in the Eglinton LSP No.82 is a legal requirement of the Ministerial Statement 992 and EPBC Approval 2010/5777.

As a result of the above environmental approvals and the changes to the location and configuration of both 'Strategic Open Space' and Public Open Space, the following key elements of the Eglinton LSP No.82 have been updated:

- Structure Plan Map;
- Indicative Master Plan; and
- Land Use Budget and Public Open Space Schedule.

Importantly, these updates have been undertaken in a manner which is consistent with the broader design intent and objectives of the Eglinton LSP No.82. The amendments to the configuration of open spaces will not impact on the detailed drainage requirements of the approved Local Water Management Strategy, all areas appropriately sized to accommodate the existing drainage requirements.

## 2.2 Subdivision Approvals

This proposed amendment to the Eglinton LSP No.82 includes updates resulting from detailed subdivision design and approvals which have been granted by the Western Australian Planning Commission for Amberton Estate. The table below provides a summary of the relevant subdivision approvals and the updates being undertaken as part of this amendment to the Eglinton LSP N0.82.

| WAPC Subdivision Approval Reference Number | Proposed Eglinton LSP No.82 Amendment |
|---|---|
| WAPC 150243 | • Update POS Schedule and Plan based on approved 'POS 38' design.<br>• Adjust location of 'Neighbourhood Connector' based on approved alignment and intersection with Marmion Avenue. |
| WAPC 149734 | • Update POS Schedule and Plan based on approved 'POS 37' design. |
| WAPC 147444 | • Update POS Schedule and Plan based on approved 'POS 32' design. |
| WAPC 147187 | • Update POS Schedule and Plan based on approved 'POS 39' design. |
| WAPC 143436 | • Update POS Schedule and Plan based on approved 'POS 30' design. |
| WAPC 147364 | • Update POS Schedule and Plan based on approved 'POS 29' design. |
| WAPC 149819 | • Update POS Schedule and Plan based on approved 'POS 28' design.<br>• Change the 'Light Controlled Intersection' at the intersection of Cinnabar Drive and Heath Avenue to a roundabout. This amendment is supported by detailed traffic advice from Arup which demonstrates there will be no adverse impact on the movement network. Refer **Appendix 3**. |
| WAPC 151750 | • Update POS Schedule and Plan based on approved 'POS 16' and 'POS 24' design. |

| | |
|---|---|
| | • Adjust alignment of the 'Neighbourhood Connector' connecting to Shorehaven to the south to be consistent with approved subdivision design. Refer Reference 5 on **Figure 3**. This amendment is supported by detailed traffic advice from Arup which demonstrates there will be no adverse impact on the movement network. Refer **Appendix 3**.<br>• Minor adjustment to the alignment of the 'Social/Pedestrian/Cyclist Linkages' to be consistent with approved subdivision design.<br>• Amend 'Centre' zoning for the Neighbourhood Centre at the corner of Cinnabar Drive and Heath Avenue as per approved subdivision layout. |
| WAPC 151646 | • Update POS Schedule and Plan based on approved 'Strategic POS 27'. |

## 2.3 Surrounding Development

### 2.3.1 Eglinton West LSP (LandCorp)

The Eglinton LSP No.82 area is bordered to the north by LandCorp's future Eglinton West LSP area. At the time of approval of the Eglinton LSP No.82, LandCorp had not yet progressed detailed planning of the Eglinton West LSP area. Detailed design of the Eglinton West LSP area has now been progressed and a draft copy of the LSP has been provided to Eglinton Estates for the purposes of achieving suitable interface and connections. Based on a review of the Eglinton West LSP and to achieve an integrated development outcome, this proposed amendment involves minor adjustments to the location of key road connections to 'tie into' the Eglinton West LSP area.

These amendments and the interface with the Eglinton West LSP area have been agreed with LandCorp and a copy of their formal 'sign off' is enclosed as part of this amendment (refer **Appendix 4**).

### 2.3.2 Lot 6 Taronga Place, Carabooda (Spiers Landholding)

The Eglinton LSP No.82 areas is bordered to the south east by Lot 6 Taronga Place, Carabooda (Spiers Landholding). Consultation with the landowner was undertaken in preparation of this amendment and a letter of no objection has been provided (refer **Appendix 4**).

### 2.3.3 Traffic and Transport Addendum

As a result of the various environmental approvals and consideration of the interface to surrounding landholdings, this proposed LSP Amendment involves a number of changes to the road network. These changes to the road and movement network have prompted the need to revisit the traffic and transport network for the LSP area. GTA Consultants was commissioned by Eglinton Estates to prepare an addendum to the Transport and Access Report prepared by SKM/Arup in May 2012 (Appendix 3 to the Eglinton LSP).

The purpose of this addendum is to address the specific revisions to the road network and to assess the impact of the proposed local road hierarchy and movement network as a result of the proposed LSP Amendment. A copy of the addendum is enclosed as **Appendix 5** The key changes to the road network are summarised below and identified in **Figure 3**:

1. Addition of a fourth access to a currently proposed 3-way roundabout on Pipidinny Road;
2. Realignment of the main north-south Neighbourhood Connector past the Primary School and to link with the proposed north-south Neighbourhood Connector through the Eglinton West LSP area;
3. Realignment of roads to address reconfiguration of Strategic Public Open Space;
4. Realignment of the Neighbourhood Connector within the Employment Precinct to minimise impact on Strategic Public Open Space 48.It is noted, the ultimate creation of this road will be subject to approval under Section 143 of the EPBC Act.

GTA Consultants met with the City of Wanneroo to discuss the above changes prior to lodgement of this amendment. At this meeting it was agreed with the City that GTA would only be required to analyse the traffic impact for items 1 – 3 outlined above, given these are localised to one discrete area; being the 'Marina Hinterland Precinct 2'. Item 4 above, would not require full analysis as it relates to a realignment only.

The assessment undertaken by GTA Consultants found the proposed changes to the 'Marina Hinterland Precinct 2' are estimated to generate less vehicles than the approved LSP and will therefore not have a detrimental impact on the road network or intersection capacity. Road hierarchies and road cross sections are not required to change to accommodate the change in traffic volumes.

### 2.3.4 Connolly Drive Road Reserve

There is an agreement in place between the WAPC and Eglinton Estates for the Connolly Drive road reserve adjoining and traversing the eastern portion of the LSP area to be acquired. This portion of the Connolly Drive road reserve has therefore been included within the Eglinton LSP No.82 area. The total Eglinton LSP No.82 area has increased from approximately 633 ha to approximately 638 ha as a result. All plans and land use budgets/Public Open Space schedules have been updated to reflect the increase in the Eglinton LSP No.82 area.


## LEGEND

- PRIMARY DISTRIBUTOR
- INTEGRATOR ARTERIAL A
- INTEGRATOR ARTERIAL B
- NEIGHBOURHOOD CONNECTOR

FIGURE 3: PROPOSED ROAD NETWORK CHANGES

## 2.4 Changes to the Planning Framework

### 2.4.1 Planning and Development (Local Planning Schemes) Regulations 2015 and Structure Plan Framework

The *Planning and Development (Local Planning Schemes) Regulations 2015* (Regulations) were gazetted on the 25 August 2015 and took effect on the 19 October 2015. The Regulations replace *Town Planning Regulations 1967* and associated Model Scheme Text and form a major part of WA's planning reform agenda. The Regulations set out the procedures for the preparation and content of Structure Plans, including amendments to Structure Plans.

The accompanying *Structure Plan Framework* (Framework) has been released for six months trial and review. It constitutes the manner and form in which a structure plan is to be prepared pursuant to *Section 2, Part 4, clause 16 and Section 2, Part 5, clause 32* of the Regulations.

Pursuant to clause 17.5 of the Framework, Structure Plans approved prior to the Regulations coming into effect will generally not be required to be updated to the manner and form contained in the Framework. The Structure Plan will only need to be updated to the extent needed to undertake the amendment proposed and to remove any reference to statutory provisions and having the force and effect of the scheme.

This proposed amendment to the Structure Plan has therefore been prepared in accordance with clause 17.5 of the Framework. Part 1 – Statutory Section has been updated to remove any reference to the Eglinton LSP No.82 having the force and effect of the Scheme.

As agreed with the Department of Planning and the City of Wanneroo, the amendments to the Eglinton LSP No.82 which relate to the environmental and subdivision approvals, have been documented in this separate report which will form an addendum to the Eglinton LSP No.82. The amendments have been undertaken in a manner in which the updated sections of the Eglinton LSP No.82, as outlined in Section 3 can be incorporated into the full Eglinton LSP No.82 report when the amendment is approved, if deemed necessary by the Department of Planning. The purpose of the standalone addendum report is to clearly represent the proposed amendments and to simplify the assessment.

### 2.4.2 Planning and Development (Local Planning Schemes) Amendment Regulations, State Planning Policy 3.7 – Planning in Bushfire Prone Areas and Guidelines for Planning in Bushfire Prone Areas

On 7 December 2015 the *Planning and Development (Local Planning Schemes) Amendment Regulations 2015* (LPS Amendment Regulations) amended Schedule 2 of the Planning and Development (Local Planning Schemes) Regulations 2015 to introduce 'Part 10A – Bushfire risk management' which establishes deemed provisions relating to bushfire risk management.

The deemed provisions apply to all local planning schemes prepared under the *Planning and Development Act 2005* to ensure that bushfire risk is appropriately managed in new development. The deemed provisions relating to bushfire risk management work with *State Planning Policy 3.7 – Planning in Bushfire Prone Areas* (SPP 3.7) and *Guidelines for Planning in Bushfire Prone Areas (Guidelines)* and *Map of Bushfire Prone Areas*.

The Eglinton LSP No.82 area is designated as 'bushfire prone' in the *Map of Bushfire Prone Areas* (DFES 2016). Consequently, Strategen has prepared a Bushfire Management Plan (BMP) to accompany submission of this proposed amendment and to meet the requirements triggered under SPP 3.7 (refer **Appendix 6**). The BMP has been prepared in accordance with the Guidelines and provides guidance on how to plan for and manage the bushfire risk to future assets of the Eglinton LSP No.82 area. We note, at the time the Eglinton LSP No.82 was prepared and approved, there was no Bushfire Management Plan in place, or indeed required under the Planning Framework of the time.

The BMP prepared by Strategen excludes the Amberton Estate which is already covered by an approved Fire Management Plan (Strategen Feb 2016). The approved FMP for the Amberton Estate is enclosed as **Appendix 7**, for reference purposes only and does not form part of the assessment of this amendment.

Strategen has mapped the pre-development bushfire hazard levels on and within 100m of the Eglinton LSP No.82 area. The BMP demonstrates that the bushfire threat and hazard will be restricted to the vegetation to be retained within conservation areas and the foreshore reserve, given the ultimate development will result in clearing of a significant proportion of the existing vegetation extent.

The post-development vegetation extent will result in lower hazard levels than those currently depicted within the Eglinton LSP No.82 area. Vegetation to be retained within conservation areas will result in 'Moderate' bushfire hazard level being retained post-development. All vegetation in the foreshore reserve has a bushfire hazard level of 'Low'. Proposed Public Open Space areas will be subject to low fuel management and landscaped gardens, which will result in a 'Low' bushfire hazard level.

Strategen has identified a range of bushfire management measures to address compliance with the Guidelines, including:

- Asset Protection Zones – will be identified at future planning stages on the basis of compliance with minimum separation distances to achieve a maximum BAL – 29 rating under Australian Standard 3959-2009.
- On-site staging buffers – clearing on a staged basis to ensure development is not inhibited by temporary vegetation.
- Increased building construction standards – a 'Bushfire Attack Level' assessment will need to be undertaken at future planning stages for development within 100m of 'Classified Post-Development Vegetation'.
- Vehicular access – the proposed vehicle access network will ensure all residents are provided with at least two vehicular access routes connecting to the surrounding public road network.
- Firebreaks – provision of fire breaks inside all external boundaries for any land less than 2,000m$^2$ and 3m wide inside all external boundaries for any lots greater than 3,000m$^2$.
- Water Supply – provision of reticulated water supply to all residences.
- Fuel management within Public Open Space – vegetation to be retained within conservation POS and Regional Open Space will be managed as conservation reserves and all POS areas will be subject to low fuel management and landscaped gardens.

Overall, the BMP demonstrates that the bushfire risk over the Eglinton LSP No.82 area can be managed in accordance with SPP 3.7 and the Guidelines.

### 2.4.3 Planning Bulletin 112/2016 Medium-density single house development standards – Development Zones

*Planning Bulletin 112/2016 Medium-density single house development standards – Development Zones* identifies the mechanism for implementation of the R-MD Codes. The City of Wanneroo has confirmed a local planning policy will be adopted that varies the deemed-to-comply requirements of the R-Codes, and can be applied in development zones. The policy will apply where the approved structure plan identifies that the RM-D Codes local planning policy applies.

This proposed amendment to the Eglinton LSP No.82 therefore incorporates provisions under Part 1 to allow for the implementation of the RM-D Codes via the City of Wanneroo's imminent local planning policy.

# 3 PROPOSED AMENDMENTS

The information contained in this section supersedes the relevant sections in the endorsed Eglinton LSP No.82. Each section has been updated based on the information presented in Section 2 of this report. Upon approval of this amendment, the following sections can be incorporated into the overall Eglinton LSP No.82 document if deemed necessary by the WAPC and City of Wanneroo. With the exception of any renumbering associated with amendments to various sections of Part One or Part Two, any section of the Eglinton LSP No.82 not referred to below does not form part of this amendment.

## PART ONE - IMPLEMENTATION

### 2 STRUCTURE PLAN AREA

This Structure Plan comprises the following sections:

a) Implementation (Part 1);

b) Explanatory Section (Part 2); and

c) Appendices (Part 3).

### 3 RELATIONSHIP TO THE SCHEME, INTERPRETATIONS AND USE CLASS PERMISSIBLITY

The Structure Plan (Plan 1) identifies zones and reserves to guide subdivision within the Structure Plan area. Part 2 and all appendices under Part 3 are to be used as a reference only to clarify and guide interpretation and implementation of Part 1.

### 4 OPERATION

This Structure Plan comes into effect on the date it is approved by the Western Australian Planning Commission.

### Delete Current Section 5 and renumber following sections accordingly.

### 5 LAND USE AND SUBDIVISION

The Structure Plan (Plan 1) identifies zones and reserves to guide the land use permissibility, standards, requirements and prerequisites for subdivision and development within the Structure Plan area.

### Delete Clause 6.1

### 5.5 PUBLIC OPEN SPACE

The provision of a minimum of 10% public open space being provided in accordance with the WAPC's Liveable Neighbourhoods. Public open space is to be provided generally in accordance with Plan 1 and Table 2, with an updated public open space schedule to be provided at the time of subdivision for determination by the WAPC, upon the advice of the City of Wanneroo.

**Table 2: Strategic Public Open Space Provision**

| Strategic POS Site | Size (Approximate) (HA) |
|---|---|
| A | 9.11 |
| B | 7.30 |
| C | 25.42 |
| D | 4.31 |
| E | 8.83 |
| F | 2.01 |
| G | 7.31 |
| H | 4.40 |
| I | 4.80 |

## 7.2 RM-D Codes

The City of Wanneroo's 'Variation to deemed-to-comply provisions of the R-codes – Medium-density single house development standards' Local Planning Policy (R-MD Codes LPP) sets out acceptable variations to the deemed-to-comply provision of the R-Codes for lots coded R25 – R60. The variations set out in the R-MD Codes LPP apply to this Local Structure Plan and thereby constitute Acceptable Development within the Structure Plan area.


## NOTES

1) An easement of up to 32 metres may be required for the proposed 132kV overhead transmission line. This may have implications on adjacent land uses. Final width of the easement and the location of the substation will need to be confirmed as part of the future structure planning of Centre Zones.

2) Location of the proposed Water Corporation Groundwater Bore Sites and associated 300 metre Well Head Protection Zones is indicative only, to be confirmed at subdivision stage.

## LEGEND

**ZONES**
- Residential
- Centre
- Commercial
- Mixed Use

**RESERVES**
- Parks & Recreation
- Railway

**MOVEMENT**
- Railway Station
- Primary Distributor
- Integrator Arterial (A)
- Integrator Arterial (B)
- Neighbourhood Connector
- Coastal Road
- Light Controlled Intersection
- Special Transit System/ Indicative Bus Stops
- Principal Shared Path
- Shared Path
- Regional Foreshore Shared Path
- Social/Pedestrian/Cyclist Linkages

**OTHER**
- Eglinton Local Structure Plan Boundary
- Proposed 132kV Transmission Line
- Proposed Zone Substation
- Primary School
- Possible Private School
- Inclusive School - Kindergarten to year 12
- Centre 1 - Eglinton Marina Centre
- Centre 2 - Neighbourhood Centre
- Centre 3 - Neighbourhood Centre
- Centre 4 - District Activity Centre
- Indicative Strategic Open Spaces
- Regional Road Drainage
- Possible Beachside Restaurant/ Cafe/Corner Store
- Proposed Water Corporation Groundwater Bore Sites
- 300 metre Well Head Protection Zones
- Possible Foreshore Recreation Development Node
- Walkable Catchment (400m - 5 min walk)
- Walkable Catchment (800m - 10 min walk)
- R-Code Boundary

NORTH

0 100 500m

Plan No: EGLEG191h • Date: 30/06/2016 • Not to Scale@A3

Note: All areas and dimensions subject to detail survey.

# Part Two – Explanatory Section

## 3.1 MRS ZONING

The current Metropolitan Region Scheme (MRS) zonings and reservations (resulting from Amendments 1029/33 and 1284/57) for the structure Plan area are shown in **Figure 3**.

The subject area is predominantly zoned 'Urban' under the MRS, with the coastal foreshore, conservation dunal landform and land east of the Mitchell Freeway reserved for 'Parks and Recreation'.

Marmion Avenue traverses the site north-south, centrally within the Structure Plan area and is reserved as 'Other Regional Roads'. A 'Railways' reservation traverses the eastern portion of the site.

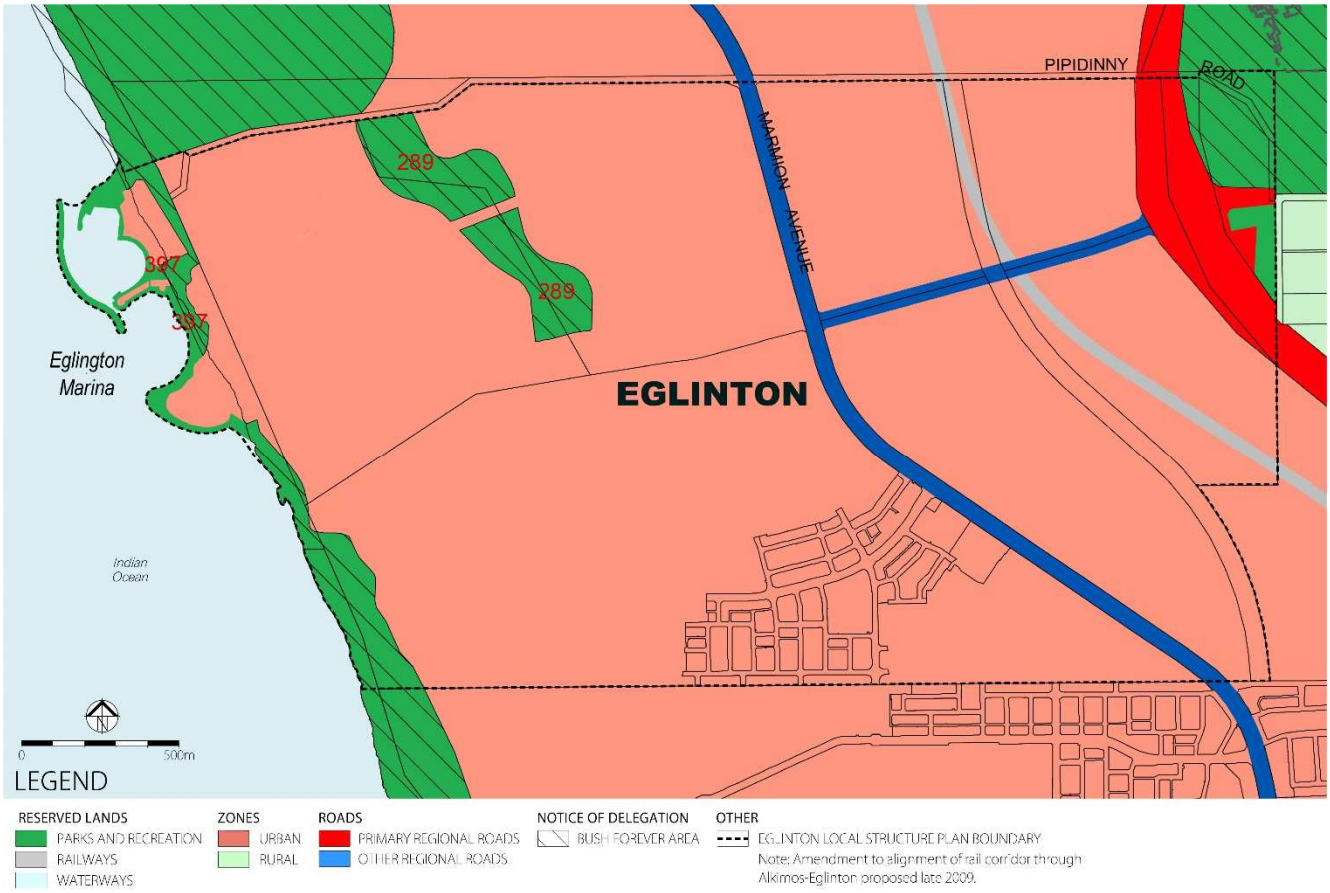



**Figure 3: Current Zoning and MRS Reservations**

## 3.3 DISTRICT PLANNING SCHEME NO.2 ZONING

The City of Wanneroo District Planning Scheme No.2 (DPS2) mirrors the reservations that have been adopted over the land via MRS Amendments 1029/33 and 1284/57.

Pursuant to the City of Wanneroo DPS2, the majority of the land is zoned 'Urban Development'.

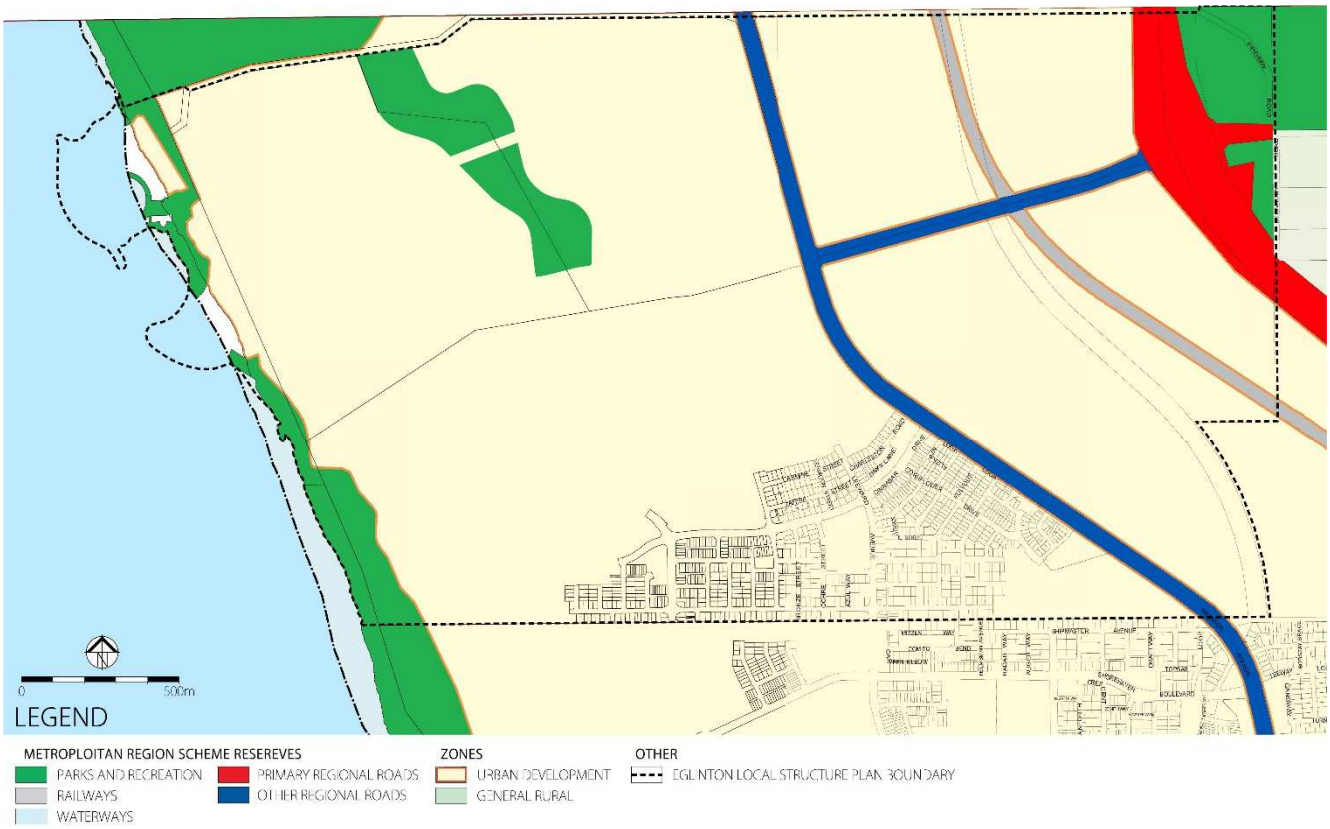



**Figure 4: City of Wanneroo DPS No.2 Zoning**

## 3.6 APPROVED EGLINTON BEACH RESORT PROPOSAL

Following a Public Environmental Review in February 1991 the Environment Protection Authority (EPA) Bulletin 500 granted environmental approvals to the Eglinton Beach Resort Proposal which incorporated:

- An 18 hole dunal links golf course;
- Marina incorporating approximately 200 boat moorings, yacht club, boat trailer, and public parking, retail and tourism development, approximately 300 Marina residential units and other Marina associated uses;
- Beach Resort; and
- Residential estate framed around the Golf Course and Marina.

In July 1991 the Minister for Environment approved the proposal subject to environmental conditions. This approval is still current, with the Marina reflects in the Metropolitan Region Scheme.

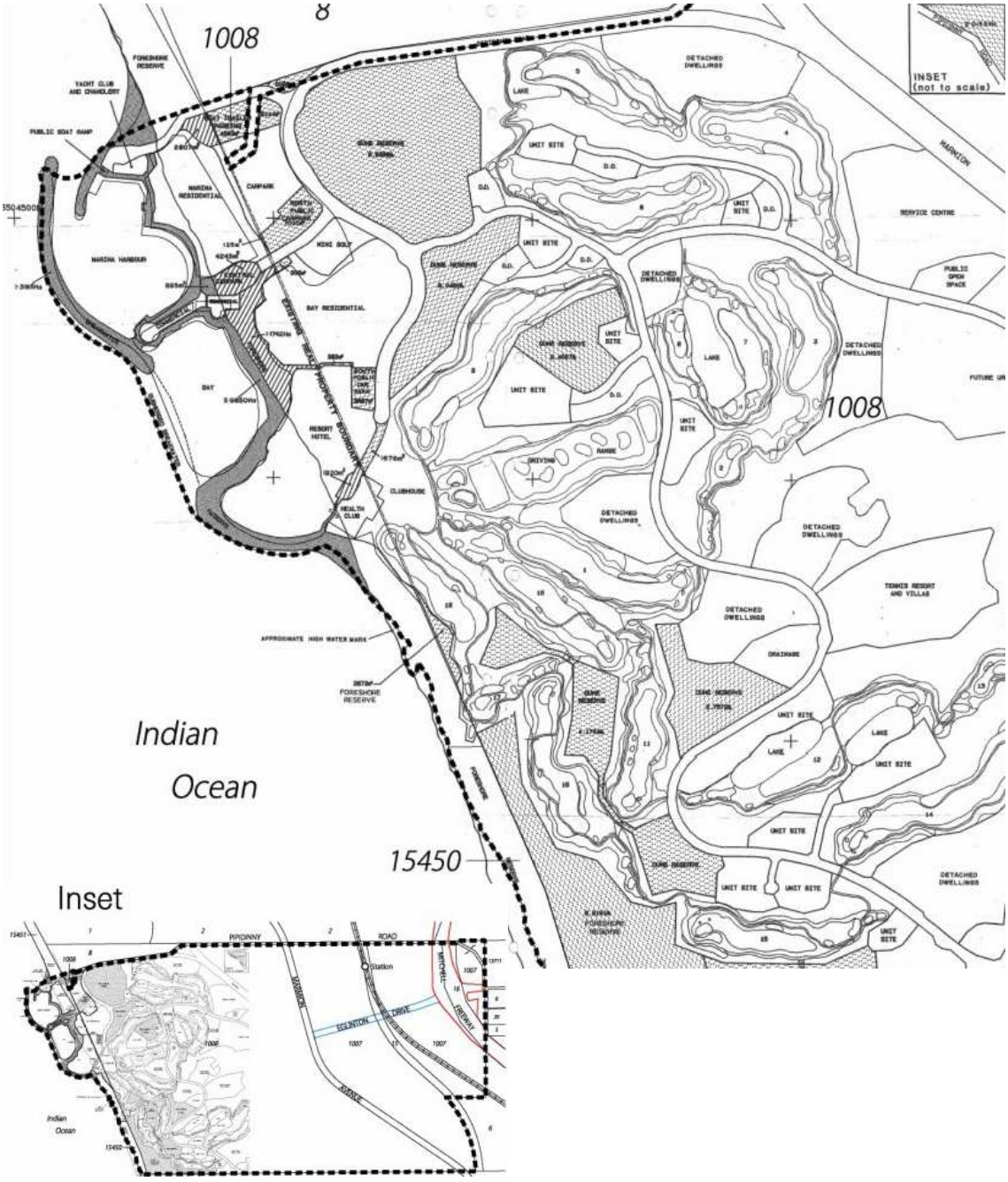



**Figure 6: Approved Eglinton Marina and Golf Course Project**

As part of the district planning process for the Alkimos Eglinton area the desirability of developing an 18 hole Golf Course was revisited (primarily from a sustainability aspect) and a decision made to delete it from the Eglinton project, in preference to the more sustainable outcome of making the land available for residential development.

The landowners consulted the EPA on this decision in 2009 and an understanding was reached supporting the deletion of the golf course. It was requested by the EPA that any revised plans for the area should include retention of some of the dunal landform within the project area (of similar environmental value to that included in the Ocean Dunes Proposal).

In addressing the EPA advice on dunal retention, a detailed site analysis was undertaken, incorporating studies on:

- Vegetation complexes, vegetation quality and environmental significance; and
- Dunal landform and quality.

A central dominant portion of high environmental quality parabolic Quindalup dune system was selected for retention and proposed to the Department of Environment and Conservation (now Department of Environment Regulation) to deliver improved environmental outcomes over and above the area proposed for retention in the approved Ocean Dunes plan as sought by the EPA.

Following detailed assessment (including detailed surveys by DEC botanists) it was agreed that this dunal retention area delivered a better environmental outcome, however Eglinton Estates was asked to consider providing a north-south green linkage connecting this dune system to the extensive Regional Open Space (ROS) area north of Pipidinny Road.

As part of this consideration it was agreed that as the dunal landform area reserved as ROS adjacent to the Marina was totally degraded and had little environmental value, it should be considered to form part of an exchange for the requested north-south linkage.

An amendment to the MRS was recently gazetted (MRS Amendment 1284/57) to implement this strategy, however reflecting a slightly different configuration to those originally proposed. The final exchange areas are illustrated in **Figure 7**.


**Figure 7: Final exchange areas**

## 3.7 ENVIRONMENTAL APPROVALS

### *3.7.1 Environmental Protection Act* 1986

The LSP area is subject to two Ministerial Statements.

**Ministerial Statement 150/992**

The Eglinton Beach Resort proposal was approved by the Minister for the Environment on the 8 July 1991 and is relevant to the land west of the old Marmion Avenue alignment. It is the proponent's responsibility to ensure that the environmental conditions contained in Statement 150 are satisfied in the implementation of the Eglinton Beach Resort proposal. Any proposed changes to the legal description or the approved design require a formal Section 45C application to the EPA. Similarly, any changes to Statement 150 conditions will require a Section 46 formal application to the EPA.

A Section 45C was submitted to remove the golf course and resort from the original concept design, replacing them with urban development and conservation POS and 'Parks and Recreation' reserve. The Section 45C was approved by the EPA in February 2014.

The Section 45C triggered a change to the conditions in Ministerial Statement 150 as the conditions relating to the golf course are no longer relevant. A Section 46 was approved by the Minister for the Environment on the 5th January 2015 and a new Ministerial Statement 992 was issued to replace the existing Ministerial Statement 150.

The LSP area is now subject to implementation in accordance with Ministerial Statement 992.

**Ministerial Statement 722**

Amendment 1029/33 to the MRS was approved by the Minister for Environment was gazetted on 23 June 2006 and is relevant to the land east of the old Marmion Avenue alignment.

It is the responsibility of the WAPC to ensure that the environmental conditions contained in the Minister for the Environment's Statement 722 are satisfied in the implementation of the assessed MRS Amendment.

Proposals to subdivide the eastern portion can be referred to the EPA under Section 48A of the Environmental Protection Act 1986 is any party considers that EPA assessment is necessary.

The conditions of approval set by the Minister for Environment require that prior to the Local Authority or the WAPC issuing relevant approval for some of the elements of the District Structure Plan, an Environmental Management Plan will need to be prepared and implemented to achieve the objective of managing the potential impacts of the proposed subdivision, including development of infrastructure on the land.

Under the EP act, clearing of native vegetation requires a permit from DER unless there is an exemption under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. Proposals that have approval by means of a Ministerial Statement and which are implemented in accordance with that Statement are exempt from requiring a clearing permit to clear native vegetation. In addition, clearing in accordance with an approved subdivision is also exempt.

### 3.7.2 Environment Protection and Biodiversity Conservation Act 1999 (EPBC)

The Commonwealth EPBC Act sets out the way in which the Commonwealth Government is involved in the environmental impact assessment of certain projects.

The EPBC Act applies to 'actions' which:

- have a 'significant impact' on 'matters of national environmental significance';
- are undertaken by Commonwealth government agencies and have a significant impact on the environment anywhere in the world; or
- are undertaken by any person and have a significant impact on Commonwealth land (even if the activity is not actually carried out on the Commonwealth land).

If a project fits one of these descriptions, it will be required to be referred to the Commonwealth Department of Environment, Water, Heritage and the arts (DEWHA). If the project is not consistent with any of the above descriptions, the environmental impact assessment provisions of the EPBC Act will not apply and there is no need to obtain the approval of the Commonwealth Minister for the Environment.

The Eglinton Beach Resort proposal area is not subject to the EPBC Act as State environmental approval (Statement 150) was granted prior to the enactment of the EPBC Act in August 2000. The remainder of the Eglinton LSP area is not exempt from the EPBC Act. Clearing of Carnaby's Cockatoo habitat is likely to require referral under the EPBC Act.

Approval to clear any vegetation in the LSP area that is considered likely habitat for Carnaby's Cockatoo has been obtained by referring the portion of the LSP area that is not exempt from the EPBC Act, i.e. east of the old Marmion Avenue alignment, to the Commonwealth Department of Environment, Heritage, Water and the Arts for assessment.

The Referral under the EPBC Act was lodged with the Department of Environment Regulation on the 24th February 2014. The Referral area contains 1.87 ha of Carnaby's Black Cockatoo habitat. The decision of the assessment was approved on the 25th of March 2014 as 'Not a Controlled Action' and no further approval is required under the EPBC Act.

The LSP area has retained approximately 2.77 ha of Banksia Woodland habitat in Public Open Space to provide foraging opportunities for Carnaby's Black Cockatoo which are listed as Endangered under the EPBC Act. The proposed LSP retains a larger area than that required under EPBC 2010/5777, noting the final area may be reduced as a result of detailed engineering and landscape design. Management of the POS will be guided by a Vegetation Management Plan as required under Ministerial Statement 722 and it is anticipated that this area will continue to provide foraging resources for Carnaby's Black Cockatoo passing through the area. In addition, POS and streetscapes will be planted with species suitable for Carnaby's Black Cockatoo foraging and roosting.

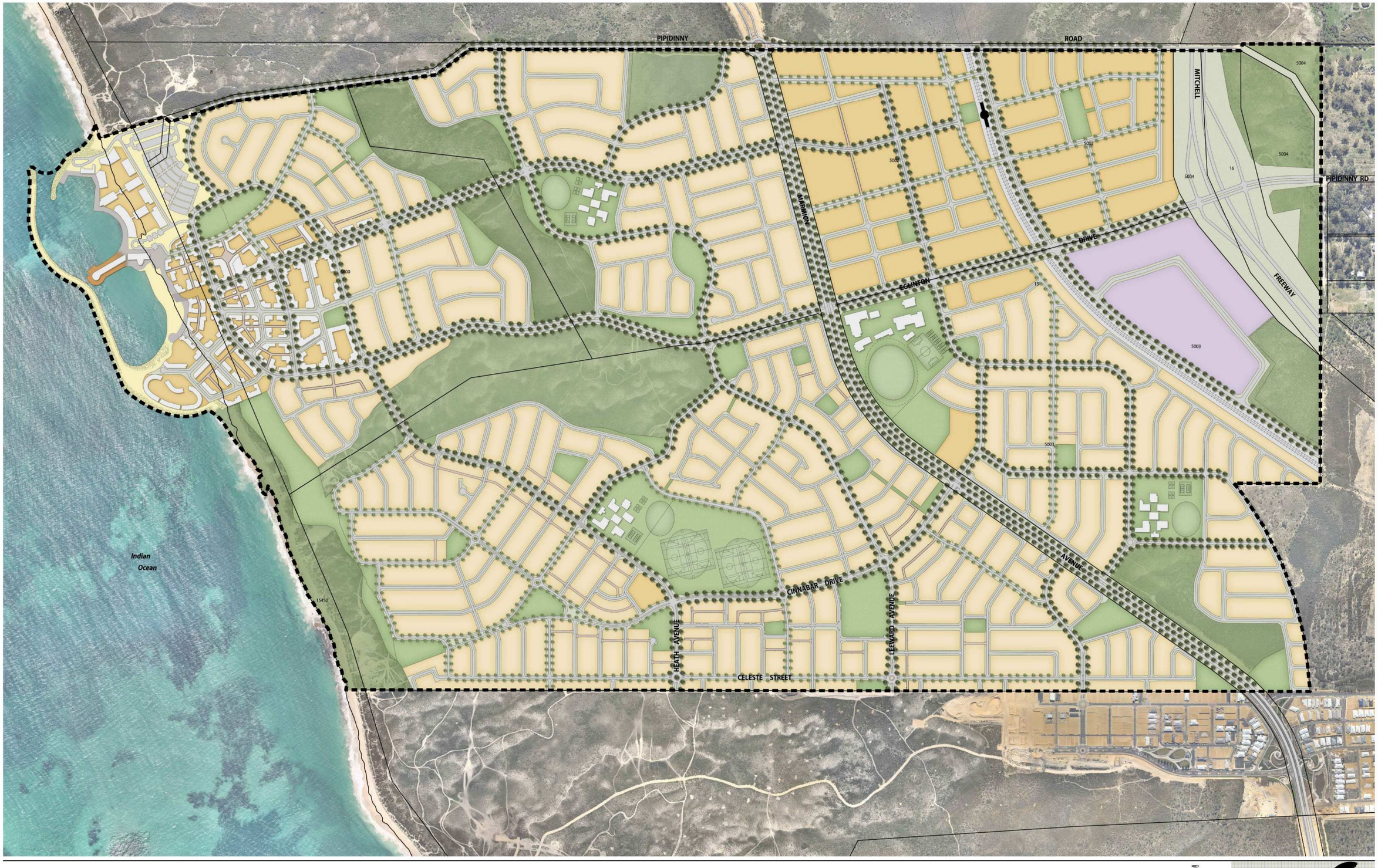



**Figure 26: Indicative Master Plan – All public open space sites, especially those less than 5000 metres are subject to assessment by the City of Wanneroo in accordance with the City of Wanneroo's Local Planning Policy 4.3 Public Open Space, at the detailed area plan and/or subdivision stage**

## 5.5 MOVEMENT NETWORK AND TRANSPORT

The primary features of the proposed internal street network include:

- Marmion Avenue (Integrator Arterial (A) and "Other Regional Road" reserved in the Metropolitan Region Scheme);
- Eglinton Drive (Integrator Arterial (A) and "Other Regional Road" reserved in the Metropolitan Region Scheme to the east of Marmion Avenue);
- Western North-South Connector/STS Route (Integrator Arterial (B) south of Eglinton Drive and Neighbourhood Connector (A) further northward/eastward);
- Central North-South Connector (Neighbourhood Connector (A));
- Eastern North-South Connector (Integrator Arterial (B)); and
- East-West Connector (Integrator Arterial (B)).


**Figure 30: Proposed Road Hierarchy**

## 6.1 LAND USE COMPOSITION

The LSP defines the land use composition of Eglinton. The broad land use categories defined are:

- residential;
- open space and Regional Open Space;
- activity centres;
- employment lands;
- school sites; and
- roads and railway reserves.

The areas allocated for each of these uses are detailed in Table 5.


**Figure 35: Local Structure Plan**

**Table 5: Land Use Budget**

The following table defines the various land use elements comprising the LSP.

| Land Uses | Area (hectares) | Percentage |
|---|---|---|
| Residential Land Uses | **339.41** | **53.33%** |
| **Non Residential Land Uses** | | |
| Primary School | 8.03 | 1.26% |
| High School | 11.52 | 1.81% |
| Neighbourhood/Local Shopping Centre | 4.16 | 0.65% |
| Business (Employment Land) | 24.89 | 3.90% |
| Centre Zone (District Activity Centre) | 66.03 | 10.35% |
| Regional Open Space | 47.62 | 7.47% |
| Regional Road (Mitchell Freeway) | 18.97 | 2.97% |
| Regional Road (Marmion Avenue) | 13.59 | 2.13% |
| Regional Road (Eglinton Drive) | 5.84 | 0.92% |
| Pipidinny Road | 1.03 | 0.16% |
| Railway Reserve | 5.60 | 0.88% |
| Drainage 1:1 | 2.69 | 0.42% |
| Marina Waterbody | 9.90 | 1.55% |
| POS Recreational | 35.06 | 5.50% |
| POS Conservation | 41.93 | 6.57% |
| POS Restricted | 1.49 | 0.23% |
| **Area contained within Eglinton LSP Boundary** | **637.76** | **100%** |

## 6.4 PUBLIC OPEN SPACE PROVISION

The LSP provides a hierarchy of Public Open Space (POS) dispersed throughout the site to ensure the majority of the residents are within a walkable catchment of an open space area. POS provision will accord with WAPC policies


**Figure 36: Public Open Space Provision**

**Table 7: Indicative Public Open Space Schedule**

| Eglinton LSP Land Use Budget | | Total |
|---|---|---|
| **Area** | | **637.76** |
| **Deductions** | | |
| Health and Community | | 1.38 |
| Civic and Enterntainment | | 2.00 |
| Personal and others | | 0.27 |
| Cultural and Recreation | | 1.35 |
| High School | | 8.03 |
| Primary School | | 11.52 |
| Neighbourhood Shopping Centre | | 3.31 |
| Local Shopping Centre | | 0.85 |
| District Activity Centre | | 10.00 |
| Café and Restaurants | | 1.85 |
| Office | | 0.90 |
| Employment | | 15.30 |
| Bulky Goods | | 3.00 |
| Regional Open Space | | 32.54 |
| Regional Open Space (Foreshore) | | 7.97 |
| Regional Open Space (Unallocated Crown Land) | | 7.11 |
| Marina Waterbody | | 9.90 |
| Uncredited Conservation POS (Surplus Restricted POS over 2%) | | 34.65 |
| Drainage 1:1 | | 2.69 |
| Railway Reserve | | 5.60 |
| Mitchell Freeway | | 18.97 |
| Marmion Avenue | | 13.59 |
| Eglinton Drive | | 5.84 |
| Pipidinny Road | | 1.03 |
| **Total Deductions** | | **199.66** |
| **Gross Subdivisible Area** | | **438.10** |
| | | |
| **POS Required** | | |
| Restricted Open Space (2%) | | 8.76 |
| Unrestricted Open Space (8%) | | 35.05 |
| **10% POS Requirement** | | **43.81** |
| | | |
| **POS Provided** | | |
| Credited Restricted (1:1 - 1:5 Storage + Conservation) | 2.0% | 8.76 |
| Credited Unrestricted | 8.0% | 35.06 |
| **Total Creditable POS** | **10.0%** | **43.82** |
| Surplus Restricted over 2% | 7.9% | 34.66 |
| Uncredited Drainage 1:1 | 0.6% | 2.69 |
| **Total Green Space** | **18.5%** | **81.17** |
| | | |
| **Open Space Type City of Wanneroo (Green Space)** | | |
| Conservation (Credited and Uncredited Area) | 9.6% | 41.93 |
| Active | 8.0% | 35.06 |
| Drainage (1:1 - 1:5 Storage) | 0.3% | 1.49 |
| **Total** | **17.9%** | **78.48** |

**Table 8: Indicative Public Open Space Provision**

| | | | Drainage Provisions | | | | Restricted Open Space | Unrestricted Open Space | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *POS Ref* | Gross Area | 1 in 100 (inclusive) | 1 in 5 (inclusive) | 1:1 Year Event (100% deduction) (inclusive) | >1:5 Year Event | Drainage (1:1 - 1:5 Year Event) | Active Open Space | Conservation | Total Credited POS |
| Marina Village | *1* | 0.28 | | | | | | | | 0.28 |
| | *2* | 1.54 | 0.91 | 0.28 | 0.18 | 0.63 | 0.10 | 1.26 | | 1.36 |
| | *3* | 0.74 | 0.63 | 0.15 | 0.10 | 0.48 | 0.05 | 0.59 | | 0.64 |
| | *4* | 0.40 | | | | | | 0.40 | | 0.40 |
| | *5* | 0.17 | 0.34 | 0.09 | 0.06 | 0.25 | 0.03 | 0.08 | | 0.11 |
| | *6* | 0.91 | 0.52 | 0.15 | 0.10 | 0.37 | 0.05 | 0.76 | | 0.81 |
| | *7* | 0.34 | | | | | | 0.34 | | 0.34 |
| | *8* | 2.62 | 0.24 | 0.06 | 0.04 | 0.18 | 0.02 | 2.56 | | 2.58 |
| | *9* | 1.18 | | | | | | | 1.18 | 1.18 |
| | *10* | 6.83 | | | | | | | 6.83 | 6.83 |
| Marina Hinterland | *11* | 1.59 | | | | | | | 1.59 | 1.59 |
| | *12* | 0.61 | 0.32 | 0.08 | 0.06 | 0.24 | 0.02 | 0.53 | | 0.55 |
| | *13* | 0.43 | 0.38 | 0.11 | 0.07 | 0.27 | 0.04 | 0.32 | | 0.36 |
| | *14* | 4.40 | | | | | | | 4.40 | 4.40 |
| | *15* | 2.41 | 2.10 | 0.64 | 0.42 | 1.46 | 0.22 | 1.77 | | 1.99 |
| Coastal Village | *16* | 0.88 | 0.38 | 0.22 | 0.17 | 0.16 | 0.05 | 0.66 | | 0.71 |
| | *17* | 0.78 | | | | | | 0.78 | | 0.78 |
| | *18* | 0.28 | 0.32 | 0.16 | 0.12 | 0.16 | 0.04 | 0.12 | | 0.16 |
| | *19* | 0.17 | | | | | | 0.17 | | 0.17 |
| | *20* | 1.69 | | | | | | 1.69 | | 1.69 |
| | *21* | 1.54 | | | | | | | 1.54 | 1.54 |
| | *22* | 14.28 | | | | | | | 14.28 | 14.28 |
| | *23* | 0.42 | | | | | | 0.42 | | 0.42 |
| | *24* | 0.93 | | | | | | 0.93 | | 0.93 |
| | *25* | 0.63 | 0.36 | 0.10 | 0.06 | 0.26 | 0.04 | 0.53 | | 0.57 |
| | *26* | 0.51 | | | | | | 0.51 | | 0.51 |
| | *27* | 8.83 | 0.25 | 0.07 | 0.04 | 0.18 | 0.03 | 8.76 | | 8.79 |
| | *28* | 0.87 | 0.34 | 0.25 | 0.12 | 0.09 | 0.13 | 0.62 | | 0.75 |
| | *29* | 0.23 | | | | | | 0.23 | | 0.23 |
| | *30* | 2.63 | 0.95 | 0.37 | 0.26 | 0.58 | 0.11 | 2.26 | | 2.37 |
| | *31* | 0.29 | 0.12 | 0.04 | 0.02 | 0.08 | 0.02 | 0.25 | | 0.27 |
| | *32* | 0.96 | 0.95 | 0.28 | 0.15 | 0.67 | 0.13 | 0.68 | | 0.81 |
| | *33* | 0.25 | | | | | | 0.25 | | 0.25 |
| | *34* | 0.24 | | | | | | 0.24 | | 0.24 |
| | *35* | 0.59 | 0.87 | 0.29 | 0.19 | 0.58 | 0.10 | 0.30 | | 0.40 |
| | *36* | 0.26 | | | | | | 0.26 | | 0.26 |
| | *37* | 0.25 | | | | | | 0.25 | | 0.25 |
| | *38* | 1.24 | | | | | | 1.24 | | 1.24 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ***39*** | 0.65 | 0.15 | 0.05 | 0.02 | 0.10 | 0.03 | 0.60 | | 0.63 |
| **DAC** | ***40*** | 0.35 | | | | | | 0.35 | | 0.35 |
| | ***41*** | 0.29 | | | | | | 0.29 | | 0.29 |
| | ***42*** | 0.94 | | | | | | 0.94 | | 0.94 |
| **Eginton Hill** | ***43*** | 0.37 | | | | | | 0.37 | | 0.37 |
| | ***44*** | 2.01 | 1.93 | 0.63 | 0.41 | 1.30 | 0.22 | 1.38 | | 1.60 |
| | ***45*** | 0.45 | | | | | | 0.45 | | 0.45 |
| | ***46*** | 7.31 | | | | | | | 7.31 | 7.31 |
| | ***47*** | 1.07 | 0.54 | 0.16 | 0.10 | 0.38 | 0.06 | 0.91 | | 0.97 |
| **Employment** | ***48*** | 4.80 | | | | | | | 4.80 | 4.80 |
| ***TOTAL*** | | **81.45** | **12.60** | **4.18** | **2.69** | **8.42** | **1.49** | **35.06** | **41.93** | **78.76** |

*City of Wanneroo Local Planning Policy 4.3 – Public Open Space*

The open space calculations have been undertaken in accordance with the WAPC's Liveable Neighbourhoods, and also having due regard to Council Policy. Council's Policy required that 3% of the open space to be provided within the project area be allocated for conservation purposes. Council policy requires any areas identified for conservation to undertake a matrix assessment in accordance with Schedule 5 of this Policy, and only be credited where a minimum score of 14 is achieved.

Five (5) public open space areas are proposed to retain remnant vegetation, and hence calculations on these areas were undertaken (refer table below). Public Open Space areas 10/11/22, 14 and 48 all exceed Council's required score of 14, and have a combined total land area of 31.9 ha. The 10% open space requirement for the Structure Plan is 43.81 ha as detailed in Table 7. Councils requirement for 3% of this area to be for conservation, results in an area of 13.14 ha needing to be provided. Based on the three areas that achieve the score of 14, the minimum requirement of conservation open space is exceeded by 18.76 ha; this also excluding Regional Open Space Areas 'A' and 'B' which have not been included in this assessment. The proposed open space is therefore deemed to comply with this Policy.

| Schedule 5 | POS 9/21 | POS 10/11/22 | POS 14 | POS 46 | POS 48 |
|---|---|---|---|---|---|
| **Size** | 2 | 5 | 3 | 3 | 3 |
| **Shape** | 3 | 3.5 | 3.5 | 2.5 | 3 |
| **Perimeter to Area Ratio** | 2 | 3 | 3 | 2 | 2 |
| **Vegetation Condition** | 0 | 6 | 4 | 0 | 6 |
| **Connectivity** | 5 | 4.5 | 2 | 1.5 | 1.5 |
| **Total** | **12** | **22** | **15.5** | **9** | **15.5** |

Table 8 details the Public Open Space schedule for the LSP. It is indicative only at this stage and will be further refined during the detailed design phase.

The POS areas have been located to create continuous north-south and east-west green corridors, linking major elements such as the railway station, District Activity Centre, the Marina, Neighbourhood Activity Centre and the local beach.

POS areas have been located with regards to the following:

- creation of continuous north-south and east-west linkages connecting elements such as District Activity Centres, local beach and the train station;
- relationship to amenities and District Activity Centres;
- relationship to site features such as Eglinton Hill and the dunal heath area;
- potential climatic impacts (such as wind and sun);
- relationship to other open spaces; and
- consideration of environmental features and conservation of Banksia Woodland and coastal heath (for Carnaby's Black Cockatoo).

The configuration of the remaining ROS and POS (conservation) has been designed in consideration of the following environmental features:

- Conservation of a significant portion of parabolic dunes and swales;
- Provision of an ecological link to ROS situated to the south and north of the LSP area for the dispersal of fauna and flora;
- Conservation of high quality Banksia Woodland to provide foraging for Carnaby's Black Cockatoo post development;
- Protection of the regionally significant Eglinton hill environment;
- The natural landform/topography considered in the design of future urban areas;
- Protection of sensitive coastal heath;
- Location of sensitive land uses adjacent to proposed conservation POS and ROS; and
- Provision of passive recreation/education opportunities in the design of the ROS and POS.

The intent is that public open spaces are connected through linear parks providing pedestrian and cycle connection between the open spaces. Each open space will have its own function that feeds into the overall functionality of the POS network.

Eglinton open space will be 'places for people' responding to the varying needs of a diverse community, comprising all ages and demographics. A balance of active and passive recreational areas will be provided.

Where possible, universal access will be provided, with the design of pedestrian paths coupling with the Australian Standard 1428. Given the site's topography and landform, universal access may not be able to be provided to all facilities.

Co-location of facilities, where appropriate, will be promoted to energise and activate neighbourhoods and assist with future maintenance.

The hierarchy and typologies of POS areas are as follows:

- Neighbourhood Public Open Space; and
- Local Public Open Space.

These are described in the following sections.

All Public Open Spaces, particularly those less than 5,000m$^2$, are subject to assessment by the City of Wanneroo in accordance with *Local Planning Policy 4.3 – Public Open Space*, at the subdivision stage.

## 6.5.2 Open Space – Typologies

Facilities requiring high degrees of maintenance are to be located together, for example the playground, barbeque and grassed areas located in close proximity of each other in well lit locations.

The open spaces have been identified according to their primary typology:

- Local and Neighbourhood Parks (including co-located facility);
- Social/Pedestrian/Cycle Linkages;
- Conservation Areas; and
- Urban Parks.


**Figure 37: Open Space - Typologies**

## Delete Section 8.2 Metropolitan Region Scheme and City of Wanneroo District Planning Scheme Amendments, including Figures 39 and 40

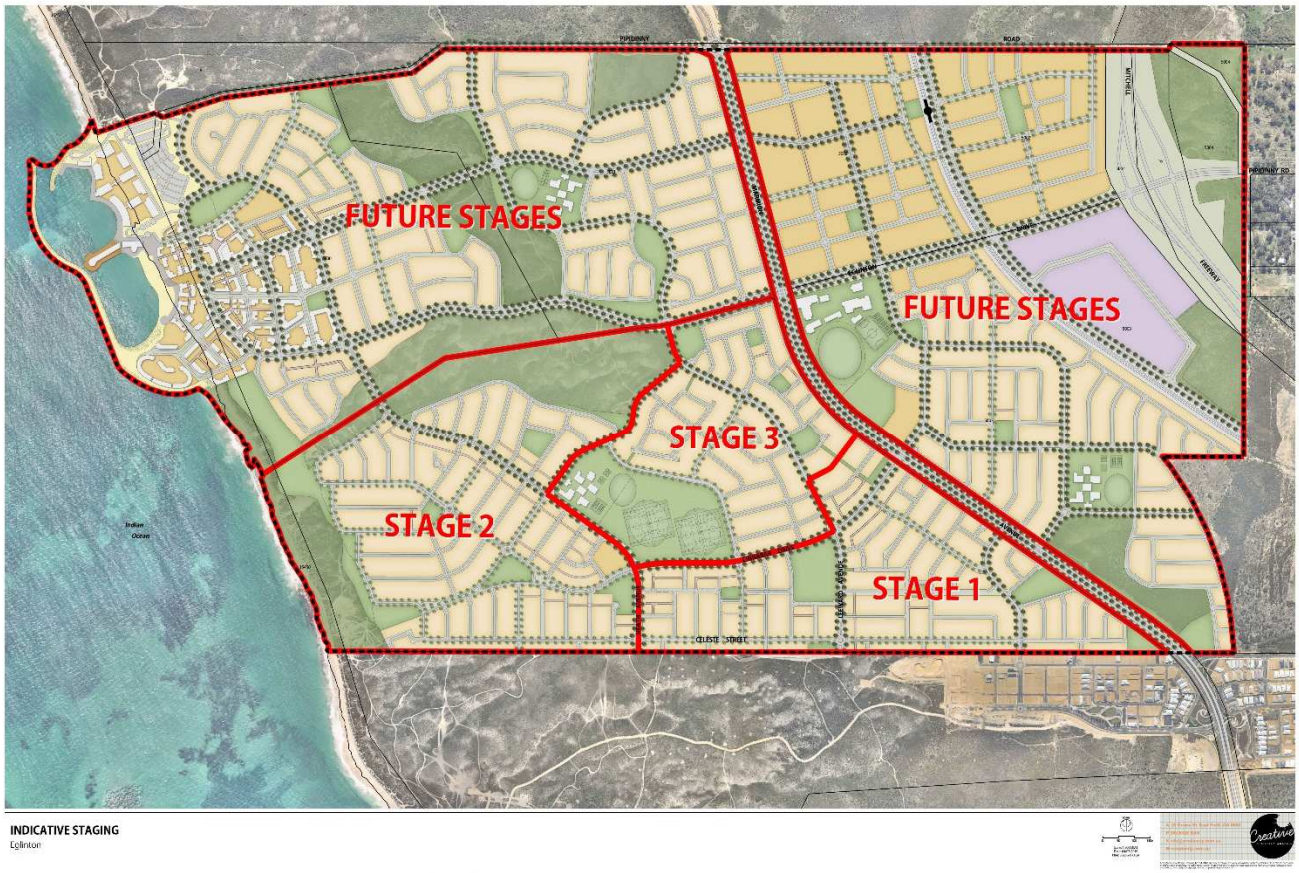
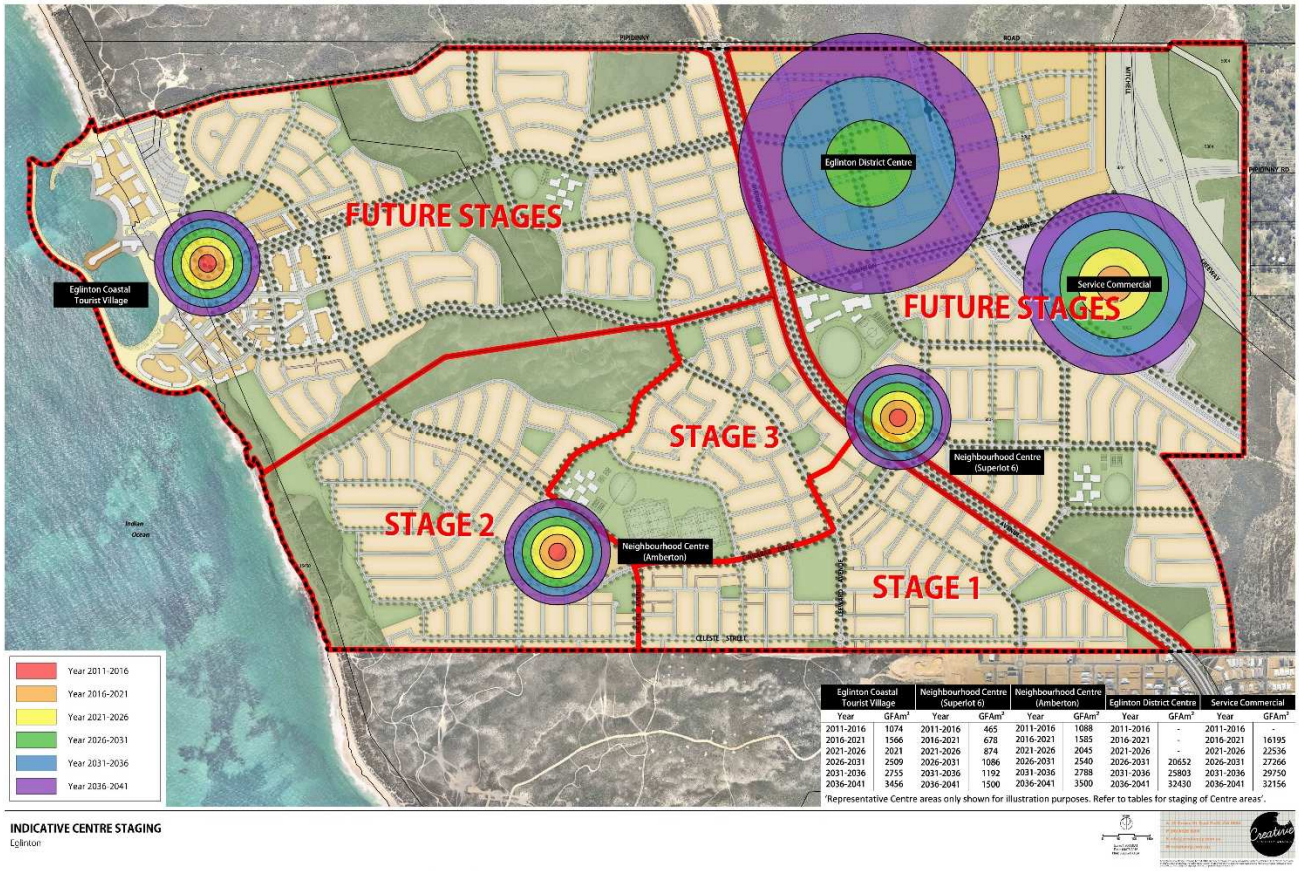


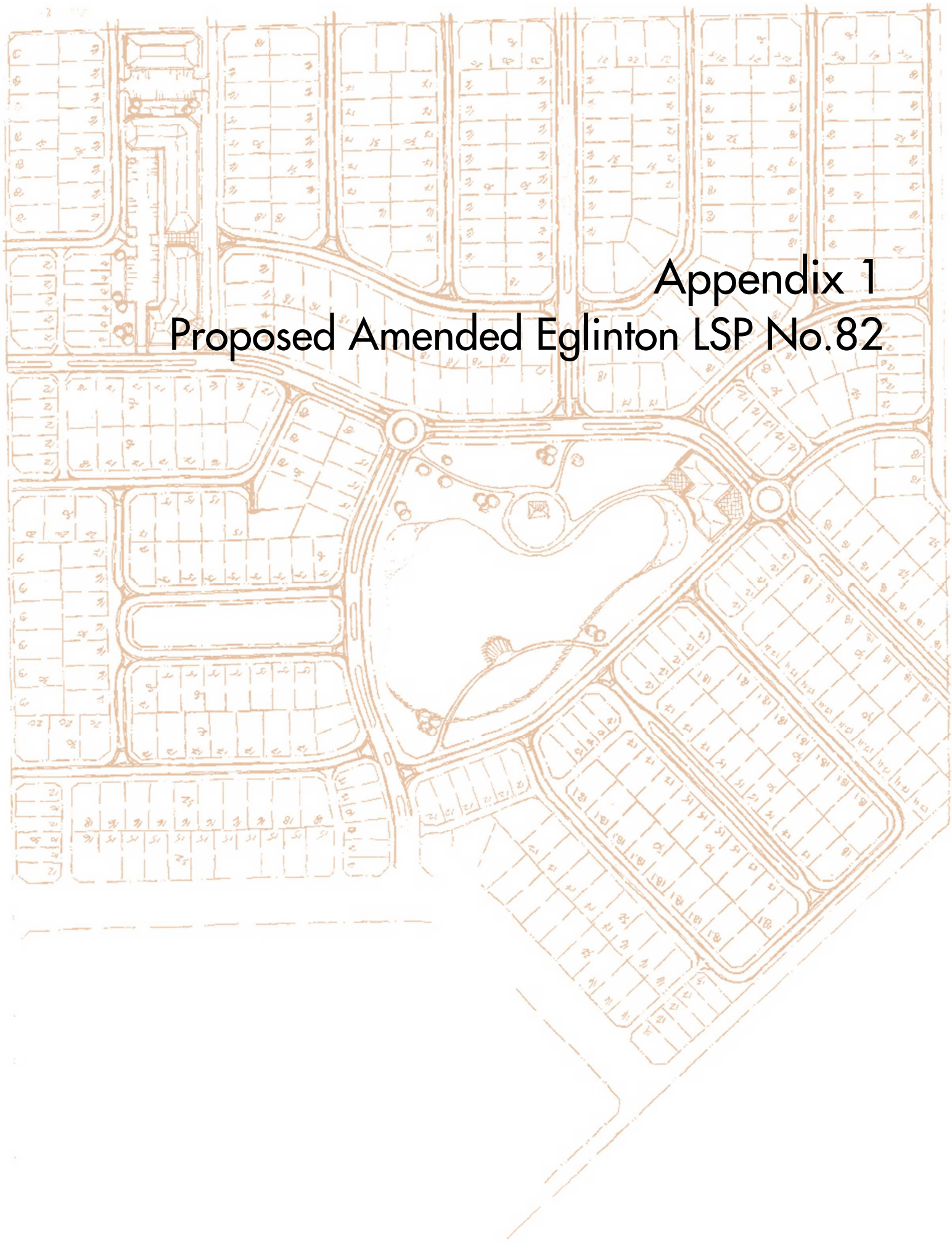

**Figure 39: Indicative Staging for Eglinton LSP Area**




| Eglinton Coastal Tourist Village | | Neighbourhood Centre (Superlot 6) | | Neighbourhood Centre (Amberton) | | Eglinton District Centre | | Service Commercial | |
|---|---|---|---|---|---|---|---|---|---|
| Year | GFAm² | Year | GFAm² | Year | GFAm² | Year | GFAm² | Year | GFAm² |
| 2011-2016 | 1074 | 2011-2016 | 465 | 2011-2016 | 1088 | 2011-2016 | - | 2011-2016 | - |
| 2016-2021 | 1566 | 2016-2021 | 678 | 2016-2021 | 1585 | 2016-2021 | - | 2016-2021 | 16195 |
| 2021-2026 | 2021 | 2021-2026 | 874 | 2021-2026 | 2045 | 2021-2026 | - | 2021-2026 | 22536 |
| 2026-2031 | 2509 | 2026-2031 | 1086 | 2026-2031 | 2540 | 2026-2031 | 20652 | 2026-2031 | 27266 |
| 2031-2036 | 2755 | 2031-2036 | 1192 | 2031-2036 | 2788 | 2031-2036 | 25803 | 2031-2036 | 29750 |
| 2036-2041 | 3456 | 2036-2041 | 1500 | 2036-2041 | 3500 | 2036-2041 | 32430 | 2036-2041 | 32156 |

**Figure 40: Indicative Centre Staging**

# APPENDICES



# Appendix 1
# Proposed Amended Eglinton LSP No.82


## NOTES

1) An easement of up to 32 metres may be required for the proposed 132kV overhead transmission line. This may have implications on adjacent land uses. Final width of the easement and the location of the substation will need to be confirmed as part of the future structure planning of Centre Zones.

2) Location of the proposed Water Corporation Groundwater Bore Sites and associated 300 metre Well Head Protection Zones is indicative only, to be confirmed at subdivision stage.

## LEGEND

**ZONES**
- Residential
- Centre
- Commercial
- Mixed Use

**RESERVES**
- Parks & Recreation
- Railway

**MOVEMENT**
- Railway Station
- Primary Distributor
- Integrator Arterial (A)
- Integrator Arterial (B)
- Neighbourhood Connector
- Coastal Road
- Light Controlled Intersection
- Special Transit System/ Indicative Bus Stops
- Principal Shared Path
- Shared Path
- Regional Foreshore Shared Path
- Social/Pedestrian/Cyclist Linkages

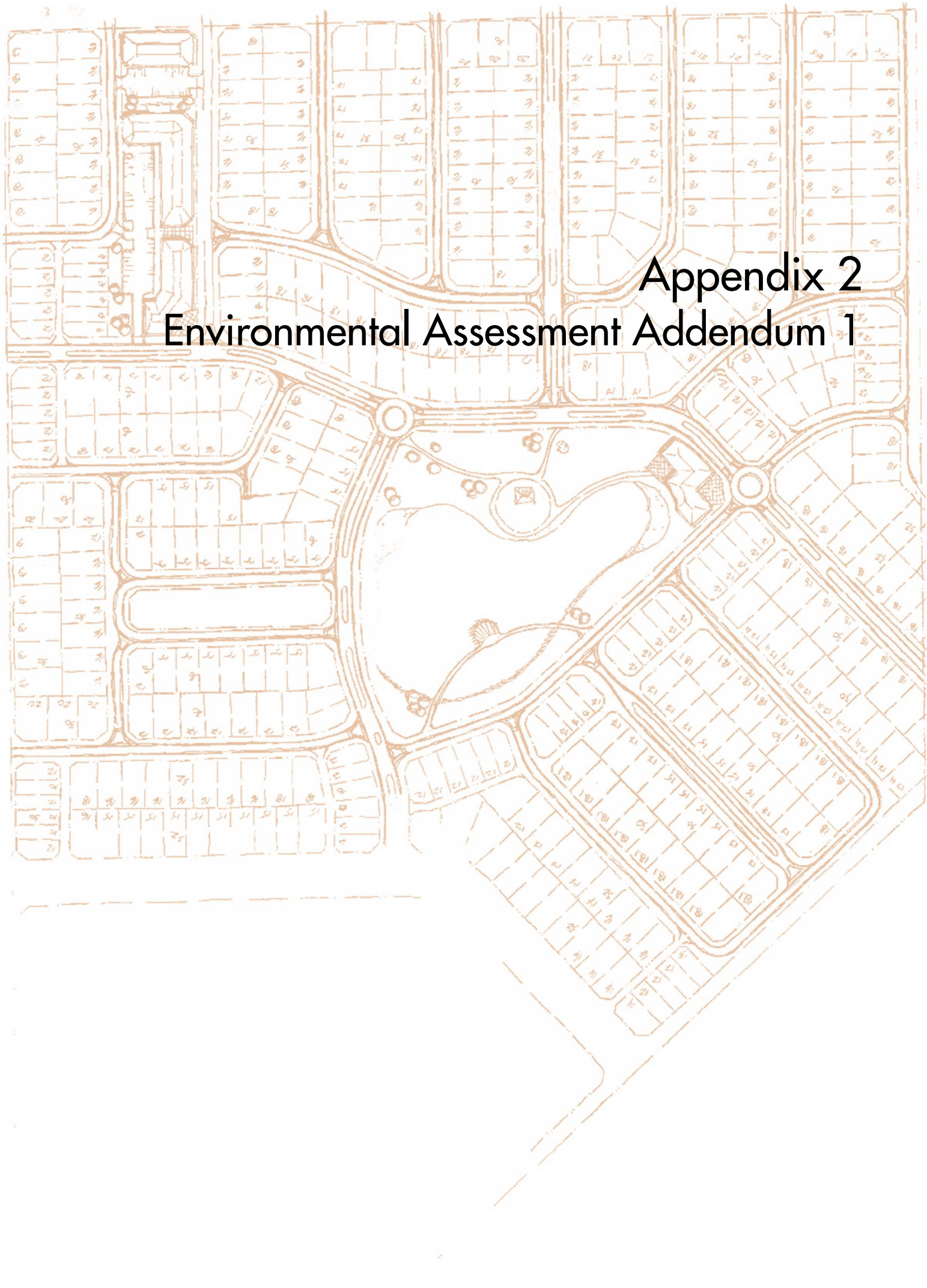
**OTHER**
- Eglinton Local Structure Plan Boundary
- Proposed 132kV Transmission Line
- Proposed Zone Substation
- Primary School
- Possible Private School
- Inclusive School - Kindergarten to year 12
- Centre 1 - Eglinton Marina Centre
- Centre 2 - Neighbourhood Centre
- Centre 3 - Neighbourhood Centre
- Centre 4 - District Activity Centre
- Indicative Strategic Open Spaces
- Regional Road Drainage
- Possible Beachside Restaurant/ Cafe/Corner Store
- Proposed Water Corporation Groundwater Bore Sites
- 300 metre Well Head Protection Zones
- Possible Foreshore Recreation Development Node
- Walkable Catchment (400m - 5 min walk)
- Walkable Catchment (800m - 10 min walk)
- R-Code Boundary

NORTH

0 100 500m

Plan No: EGLEG191h • Date: 30/06/2016 • Not to Scale@A3

Note: All areas and dimensions subject to detail survey.



# Appendix 2
# Environmental Assessment Addendum 1

# EGLINTON LOCAL STRUCTURE PLAN NO. 82 AMENDMENT

## ENVIRONMENTAL ASSESSMENT ADDENDUM 1

| | |
|---|---|
| Prepared for: | Eglinton Estates Pty Ltd |
| Report Date: | 5 July 2016 |
| Version: | 2 |
| Report No. | 2016-257 |

pgv ENVIRONMENTAL

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Table 2: Vegetation Types in Regional Open Space A

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Table 8: Vegetation Types in Conservation Public Open Space AH


**Figures**


Figure 1: Site Location

Figure 2: Eglinton Local Structure Plan No. 82

Figure 3: Conservation Areas


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Attachment 1: Section 45C Approval

Attachment 2: Ministerial Statement 992

Attachment 3: MRS Amendment – EPA Decision on Assessment

Attachment 4: EPBC Approval 2010/5777

Attachment 5: EPBC Decisions on Assessment for Amberton and Eglinton Beach

Attachment 6: Proposed Eglinton Local Structure Plan Amendment

# 1 INTRODUCTION

## 1.1 Background

The Eglinton Estates Pty Ltd (Eglinton Estates) landholding is located 15km to the north of Joondalup and 45km north-west of the Perth Central Business District (Figure 1). The landholding is approximately 600ha of which around 200ha is being developed by Stockland WA Development Pty Ltd (Stockland).

In 2010, the Eglinton Local Structure Plan No. 82 (LSP) was prepared and submitted to the Western Australian Planning Commission (WAPC) and the City of Wanneroo. The landholding is being developed in accordance with the approved LSP for residential and commercial purposes and includes urban development, the Eglinton District Centre, schools, playing fields, the Eglinton Marina and conservation open space. The LSP showed the proposed configuration for Regional Open Space (ROS) and conservation Public Open Space (collectively referred to as conservation areas for the remainder of this document) (Figure 3).

The LSP was approved by the WAPC with specific notations for the areas that were subject to further environmental approvals (Part 1 plan). In addition, clause 6.1 states that *"no subdivision and/or development can occur within the area identified on Plan 1 until such time that the environmental approval under the EP Act and MRS Amendments are finalised"*.

Development of the eastern half of the LSP area was assessed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to the impact of clearing on Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) foraging habitat. The determination on the referral was deemed a 'Controlled Action' and a formal assessment (EPBC 2010/5777) was undertaken. The proposed development was approved by the Commonwealth Environment Minister on 30 April 2013, modified on 17 July 2013 and 20 October 2015. The western section of the LSP was referred under two separate proposals both of which were determined as 'Not a Controlled Action'.

The environmental approval processes under the *Environmental Protection Act 1986* (EP Act) and Metropolitan Region Scheme (MRS) Amendment referred to in the LSP approval (Part 1) have been finalised and the location and extent of the conservation areas has been established. Additionally, the EPBC approval 2010/5777 requires that three additional conservation areas are retained in the LSP. An amendment to the LSP is required to reflect the approved configuration of the conservation areas.

Stockland have commenced development in the southern sector known as Amberton in accordance with the LSP. To date approximately 34ha have been developed and approximately 900 lots have been created.

## 1.2 Purpose and Scope

The purpose of this Addendum to the Eglinton LSP Environmental Assessment Report is to support the LSP Amendment being prepared by Creative Design and Planning (CDP) on behalf of Eglinton Estates and Stockland. The LSP amendment is required to address a number of planning and environmental modifications to the LSP.

Specifically, this Addendum addresses the modifications that are required to the existing strategic open space (conservation areas) identified in the LSP in accordance with recent environmental approvals under the EP Act and the EPBC Act. This Addendum outlines the following:

- Provides an overview of the historical environmental approvals under the EP Act prior to the WAPC gazettal of the Eglinton LSP No. 82;
- Provides a review of the recent (2013-2016) environmental approvals under the EP Act and the EPBC Act;
- Identifies the impact of the recent environmental approvals on the LSP;
- Outlines the management of the conservation areas; and
- Details the monitoring and reporting requirements for the conservation areas in accordance with the environmental approvals under the EP Act and EPBC Act.

# 2 ENVIRONMENTAL APPROVALS

## 2.1 Historic State Environmental Approvals

### 2.1.1 Public Environmental Review

The Eglinton land has an extensive history of environmental and planning studies and approvals that commenced in the 1980s with the Eglinton Beach Resort (EBR) proposal by Ocean Dunes Pty Ltd (now known as Eglinton Estates Pty Ltd) to build a marina, golf course, resort and residential land west of the then proposed Marmion Avenue alignment. The proposal was assessed (EPA Bulletin 500) by the Environmental Protection Authority (EPA) as a Public Environmental Review (PER) in 1991 and subsequently approved by the Minister for the Environment in Statement 150 on 8 July 1991.

Ocean Dunes Pty Ltd submitted a revised concept design plan for EBR Proposal as requested under Ministerial Statement 150. This concept design plan detailed the foreshore reserve, environmentally significant areas to be transferred from private lands to the Crown, access ways to the foreshore reserve and a plan to protect the dune system during development. The concept design plan was submitted to the EPA and the Minister for the Environment who subsequently cleared conditions 3, 4-1, 5-1 and 6-1 of Ministerial Statement 150.

An amendment to the Perth MRS 932/33 rezoned the land from 'Rural', 'Waterways Reservation', and 'Parks and Recreation' to 'Urban' and 'Recreation'.

### 2.1.2 Environmental Review

In 2005, the EPA assessed the Alkimos-Eglinton MRS Amendment 1029/33 (Bulletin 1207) which included the EBR proposal and the remaining portion of the Eglinton landholding east of the original proposed Marmion Avenue alignment. ATA Environmental (2005) conducted additional flora and fauna surveys which were largely carried out on the eastern portion of the Eglinton landholding as a part of the Environmental Review under the EP Act. The MRS Amendment was approved by the Minister for the Environment (Ministerial Statement 722) and the Minister for Planning on 24 April 2006).

Following the gazettal of the Alkimos-Eglinton MRS Amendment, the Alkimos-Eglinton District Structure Plan (DSP) was initiated. The DSP included the entire Eglinton landholding and was approved in June 2010. The environmental conditions from Ministerial Statement 722 were reflected in the DSP approval.

## 2.2 Recent Environmental Approvals

### 2.2.1 Section 45C

The original EBR proposal was to include a links style golf course and resort. A formal environmental assessment process under the EP Act was required to remove the golf course and resort and replace it with residential development and re-configure the conservation areas.

In September 2011, a section 45C under the EP Act was initiated and submitted to the EPA for assessment. During this process, significant consultation was undertaken with the Department of Parks and Wildlife (DPaW), Department of Planning (DoP) and the OEPA. The areas proposed for

conservation would become ROS under the Perth MRS and conservation POS under the City of Wanneroo Town Planning Scheme No. 2.

The section 45C submission (PGV, Environmental 2011) was approved by the Chair of the EPA under delegated authority on 12 February 2014 (Attachment 1).

The section 45C approval under the EP Act resulted in the modification and exchange of conservation areas previously shown in the LSP. The location of the conservation areas approved through the section 45C process are shown in Figure 3 and described below:

- Adjacent to Pipidinny Road and west of Marmion Avenue (ROS A);
- To the south of Pipidinny Road and west of Marmion Avenue (ROS B);
- To the west of Marmion Avenue (POS C); and
- To the west of Marmion Avenue (POS D).

### 2.2.2 Section 46

Changes under section 45C of the EP Act may be made to the proposal description only, not the conditions of the Ministerial Statement, changes to the proposal implementation conditions are considered under section 46 of the EP Act.

An outcome of the section 45C approval was that the Ministerial Statement 150 environmental conditions needed to be changed. The conditions relating to the golf course and resort were no longer valid and needed to be deleted from Ministerial Statement 150. The remaining environmental conditions were contemporised as part of the section 46 process.

The section 46 submission (PGV, Environmental, 2013) was assessed by the OEPA (Assessment 1975) and the EPA Report 1526 and recommendations were provided to the Minister for Environment for consideration. The section 46 was approved by the Minister for Environment and a new Ministerial Statement 992 was issued on the 5 January 2015 (Attachment 2) to replace Ministerial Statement 150.

### 2.2.3 Metropolitan Region Scheme Amendment 1284/57

An amendment to the Metropolitan Region Scheme was required to formalise the change in ROS alignment approved through the section 45C. Amendment 1284/57 was initiated directly after the section 45C approval to formally rezone the original ROS to 'Urban' and the new ROS from 'Urban' to 'Parks and Recreation'. The Amendment was prepared in accordance with the EPA's guide *Referral of a Scheme to the Environmental Protection Authority*. The WAPC referred the scheme amendment to the EPA under section 48 of the EP Act.

The EPA decision under section 48A (1) (a) of the EP Act was determined that the proposed scheme should not be assessed under Part IV Division 3 of the EP Act.

The MRS Amendment was gazetted by the WAPC on 12 February 2016.

### 2.2.4 Commonwealth EPBC Approval 2010/5777

The eastern portion of the LSP was referred under the EPBC Act to the Department of Environment in December 2010. The referral decision under Section 75 and section 87 of the EPBC Act was deemed to be 'Controlled Action' on the 27 January 2011 and a formal assessment was required. EPBC Referral 2010/577 was approved subject to environmental conditions by the Commonwealth Environment

Minister on 30 April 2013, modified on 17 July 2013 and modified on 20 October 2015 (Attachment 4).

The EPBC 2010/5777 approval resulted in three areas of Black Cockatoo foraging being retained in the LSP. The location of the conservation areas are shown in Figure 3 and are:

- East of Marmion Avenue in the Eglinton Hill area of the landholding (POS AE);
- East of Marmion Avenue in the south east corner of the landholding (POS AG); and
- To the south of Pipidinny Road and west of Marmion Avenue (POS AH).

These conservation areas will be formally recognised in the proposed LSP amendment.

As part of the EPBC Approval 2010/5777, in addition to the above conservation areas there is a requirement to establish 1.9ha of Carnaby's Black Cockatoo habitat across the POS areas shown in yellow on Figure 3.

### 2.2.5 EPBC Approval 2013/7068

The south western portion (Part Lot 9005) of the LSP area known as Amberton was referred under the EPBC Act by Stockland WA Development Pty Ltd. The referral decision under Section 75 of the EPBC Act was deemed to be 'Not a Controlled Action' (Attachment 5).

### 2.2.6 EPBC Approval 2014/7137

The north western portion of the LSP area (Lot 5000 and Part Lot 5001) known as Eglinton Beach was referred under the EPBC Act by Eglinton Estates Pty Ltd. The referral decision under Section 75 of the EPBC Act was deemed to be 'Not a Controlled Action' (Attachment 5).

# 3 EXISTING ENVIRONMENT

## 3.1 Topography and Landform

The LSP area comprises a north-west to south-east trending undulating dune landscape overlaid by well-defined vegetated dunes. A one-kilometre wide belt of discontinuous dunes is located along the coastal frontage and have elevations of up to 30 m AHD. Further inland, the dunes are less concentrated. Approximately 2.5 km from the coast, there is a long ridge running generally parallel with the coast, with peak elevations of about 50-60 m AHD. This inland ridge is overlaid in places by further sand dunes extending from the coast in an easterly direction. Eglinton Hill located near the south-east corner of the site is the highest point at 60 m AHD.

There are two land systems represented in the conservation areas, the Quindalup Dunes and the Spearwood Dunes. The Quindalup consists of calcareous sand, generally unconsolidated with individual dunes showing a gentle windward and steep lee slope due to the prevailing south-westerly winds which seldom reach more than 1.5 km inland. The Spearwood Dunes have a core of Tamala Limestone overlain by sand, and are partially overlaid by the newer Quindalup Dunes. In many places the surface soils have been removed by wind action, exposing the underlying limestone. The Spearwood Dunes are older, more weathered and have less undulation than the Quindalup Dunes. The soil profile of the Spearwood dunes is more developed, supporting Banksia, Tuart and Dryandra vegetation.

The Quindalup Dune System occurs in ROS A and B and in conservation POS C, D and to a lesser degree in AE, AG and AH. The Spearwood Dune System is predominant in conservation POS AE, AG and AH.

## 3.2 Vegetation

The following vegetation and flora surveys have been conducted over the Eglinton landholding:

- Armstrong (1996) for Lots 8 and 11 (as part of the EBR PER);
- Bennett (2004) reported in ATA Environmental (2005) for the areas included in the MRS Amendment (1029/33) east of the area approved under the original EBR PER;
- RPS (2008) who conducted supplementary work (on the proposed conservation exchange areas;
- Coffey (2010) who conducted specific studies of *Lomandra maritima* and *Banksia* Woodland density studies for the Eglinton LSP area; and
- PGV Environmental (2014) Level 2 Spring Survey of the three EPBC conservation POS areas.

A Level 2 Spring survey specific to ROS A and B and conservation POS C and D is scheduled for spring 2016. This survey will refine the broad scale mapping of Armstrong (1996) and ATA Environmental (2005).

The condition of the vegetation in the conservation areas has been rated based on the vegetation condition scale provided by Keighery in Bush Forever (2000) (Table 1).

**Table 1: Vegetation Condition Rating Scale**

| Condition | Description |
|---|---|
| Pristine | Pristine or nearly so, no obvious signs of disturbance. |
| Excellent | Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. |
| Very Good | Vegetation structure altered, obvious signs of disturbance.<br>For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing. |
| Good | Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it.<br>For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing. |
| Degraded | Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.<br>For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing. |
| Completely Degraded | The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs. |

Source: Government of Western Australia, 2000

### 3.2.1 Regional Open Space A

Regional Open Space A is located in the northern sector of the Eglinton landholding and runs in north to south orientation, adjacent to Pipidinny Road (Figure 3). It provides a connection to the Bush Forever Site No. 289 to the north. One land system occurs in this area, the Quindalup Dunes which are characterised by the vegetation of Q1, Q2, and Q3 Age Quindalup Dunes. The vegetation types mapped in ROS A are listed in Table 2 (Armstrong, 1996; ATA Environmental, 2005).

The condition of the vegetation ROS A is largely Very Good.

**Table 2: Vegetation Types in Regional Open Space A**

| ROS A | Vegetation Type | | Location |
|---|---|---|---|
| 9.11ha | MsLm | *Melaleuca systena*, *Lomandra maritima* Low Open Heath | Dune ridge |
| | ArMs | *Acacia rostellifera, Melaleuca systena* Low Open Heath | Lower slopes |
| | Xp | *Xanthorrhoea preissii* Shrubland | Swales |

### 3.2.2 Regional Open Space B

Regional Open Space B is located in the northern sector of the Eglinton landholding and runs in north to south orientation, south of ROS Area A. One land system occurs in this area, the Quindalup Dunes which are characterised by the vegetation of Q1, Q2, and Q3 Age Quindalup Dunes. The vegetation types mapped in ROS B are listed in Table 3 (Armstrong, 1996; ATA Environmental, 2005).

The condition of the vegetation ROS B is largely Very Good.

**Table 3: Vegetation Types of Regional Open Space B**

| ROS B | Vegetation Type | | Location |
|---|---|---|---|
| 7.30ha | MsLm | *Melaleuca systena*, *Lomandra maritima* Low Open Heath | Dune ridge |
| | ArMs | *Acacia rostellifera, Melaleuca systena* Low Open Heath | Lower slopes |
| | Xp | *Xanthorrhoea preissii* Shrubland | Swales |

### 3.2.3 Conservation Public Open Space C

Public Open Space C is located adjacent to the coast and has an east-west orientation. One land system occurs in this area, the Quindalup Dunes which are characterised by the vegetation of Q1, Q2, and Q3 Age Quindalup Dunes. The vegetation types mapped in POS C are listed in Table 4 (Armstrong, 1996; ATA Environmental, 2005).

The condition of the vegetation POS C is Completely Degraded to Degraded.

**Table 4: Vegetation Types of Conservation Public Open Space C**

| POS C | Vegetation Type | | Location |
|---|---|---|---|
| 2.72ha | MsLm | *Melaleuca systena*, *Lomandra maritima* Low Open Heath | Dune ridge |
| | ArMs | *Acacia rostellifera, Melaleuca systena* Low Open Heath | Lower slopes |
| | Xp | *Xanthorrhoea preissii* Shrubland | Swales |

### 3.2.4 Conservation Public Open Space D

Conservation Public Open Space D is located to the east of POS C and south of ROS B and has an east-west orientation. One land system occurs in this area, the Quindalup Dunes which are characterised by the vegetation of Q1, Q2, and Q3 Age Quindalup Dunes. The vegetation types mapped in POS Area D are listed in Table 5 (Armstrong, 1996; Bennett, ATA Environmental, 2005).

The condition of the vegetation POS D is largely Very Good.

**Table 5: Vegetation Types of Conservation Public Open Space D**

| POS D | Vegetation Type | | Location |
|---|---|---|---|
| 22.71ha | MsLm | *Melaleuca systena*, *Lomandra maritima* Low Open Heath | Dune ridge |
| | ArMs | *Acacia rostellifera, Melaleuca systena* Low Open Heath | Lower slopes |
| | Acyc | *Acacia cyclops* Shrubland | Mid slopes |

## 3.3 Commonwealth

As a result of the assessment under the EPBC Act and approval of EPBC 2010/5777, three areas that contained Carnaby's Black Cockatoo foraging habitat in very good condition were identified for retention in the LSP for conservation POS. The location of the conservation POS within the Eglinton landholding are shown in Figure 3 and are:

- POS AE located to the east of Marmion Avenue in the southern part of the landholding;
- POS AG located in the south eastern corner of the landholding adjacent to the future Mitchell Freeway extension; and
- POS AH located south of Pipidinny Road and west of Marmion Avenue in the western part of the landholding.

### 3.3.1 Conservation Public Open Space AE

The vegetation types in POS AE are outlined in Table 6 (PGV, Environmental, 2014). Two land systems occur in the POS, the Spearwood Dune soils in the southern two-thirds of the area and a portion of a Quindalup parabolic dune ridge in the northern part.

**Table 6: Vegetation Types in Conservation Public Open Space AE**

| POS Area | Vegetation Type | | Carnaby's Foraging Habitat (Y/N) |
|---|---|---|---|
| 7.31ha | CqDs | *Calothamnus quadrifidus, Dryandra sessilis (now Banksia sessilis)* Open Heath to Closed Heath | Y |
| | MsLm | *Melaleuca systena*, *Lomandra maritima* Low Open Heath | N |
| | BaBm | *Banksia attenuata, Banksia menziesii* Low Woodland | Y |
| | AsJf | *Acacia saligna* and *Jacksonia furcellata* Open Scrub | N |
| | Ds | *Dryandra sessilis (now Banksia sessilis)* Open to Closed Heath | Y |

Overall the Carnaby's Cockatoo foraging vegetation in the POS is in Very Good Condition with sections in Excellent condition while the Quindalup dune vegetation is mostly in Good Condition in the northern part. A strip running along the western boundary is cleared and has a sandy track running along the edge that is mapped as being Completely Degraded.

### 3.3.2 Conservation Public Open Space AG

The vegetation types as mapped by in POS AG are described in Table 7 (PGV Environmental, 2014). Two land systems occur on the site, the Spearwood Dune soils in the south-eastern part of the area and a narrow portion of a Quindalup parabolic dune ridge along the north-western boundary.

**Table 7: Vegetation Types in Conservation Public Open Space AG**

| POS Area | Vegetation Type | | Carnaby's Foraging Habitat(Y/N) |
|---|---|---|---|
| 4.74ha | BaBmDs | *Banksia attenuata, Banksia menziesii* Low Woodland over *Dryandra sessilis (now Banksia sessilis)* | Y |
| | Ds | *Dryandra sessilis (now Banksia sessilis) Open to Closed Heath* | Y |
| | MsLm | *Melaleuca systena*, *Lomandra maritima* Low Open Heath | N |
| | BaBmJf | *Banksia attenuata, Banksia menziesii* Low Woodland over *Jacksonia furcellata* | Y |
| | AsSgOa | *Acacia saligna, Spyridium globulosum, Olearia axillaris Heath* | N |

The Ds vegetation unit in the south-eastern corner of the site also contains a small stand of *Eucalyptus decipiens* trees. The vegetation Condition in this POS is mapped as Very Good over most of the POS with an area along the western boundary mapped as Very Good to Good. Portions of the vegetation are in Excellent condition.

### 3.3.3 Conservation Public Open Space AH

The vegetation types are outlined in Table 8. Two land systems occur on the site, the Spearwood Dune soils the Quindalup Dune soils in a mixed configuration.

**Table 8: Vegetation Types in Conservation Public Open Space AH**

| POS Area | Vegetation Type | | Carnaby's Foraging Habitat (Y/N) |
|---|---|---|---|
| 4.40ha | Ds | *Dryandra sessilis (now Banksia sessilis)* Open to Closed Heath | Y |
| | BaBm | *Banksia attenuata, Banksia menziesii* Low Woodland | Y |
| | MsLm | *Melaleuca systena, Lomandra maritima* Low Open | N |
| | Sa | *Santalum acuminatum* Heath | N |

The vegetation condition in this POS is more variable than the other two POS areas with Very Good condition vegetation in the eastern and western parts of the POS and an area in the centre that is described as Good to Degraded. There is also a small area of Good to Degraded vegetation in the southern western part of the POS.

# 4 CONSERVATION AREA MANAGEMENT

## 4.1 Management

The management of the conservation areas is guided by the two management plans that have been approved by the OEPA and Department of Environment respectively:

- Eglinton Beach Conservation Area Management Plan (CAMP); and
- Eglinton Conservation Maangment Plan (CMP).

### 4.1.1 Eglinton Beach Conservation Area Management Plan

In accordance with Condition 5 of Ministerial Statement 992, Eglinton Estates Pty Ltd is required to conserve the flora, vegetation and dune systems within the ROS A and B and conservation POS C and D shown in Figure 1 of the Ministerial Statement and included in this Addendum as Figure 3. Condition 5 of the Ministerial Statement states the following:

> *5 Terrestrial Flora and Vegetation (Conservation Areas)*
>
> *5-1 The proponent shall conserve the flora, vegetation and dune systems within the Conservation areas shown in Figure 1 of Schedule 1.*
>
> *5-2 By 01 September 2015, unless agreed by the CEO, the proponent shall prepare in consultation with the Department of Parks and Wildlife and to the satisfaction of the CEO, a Conservation Area Management Plan for the Conservation areas (A, B, C & D) shown in Figure 1 of Schedule 1, and spatially defined in Schedule 3.*
>
> *5-3 The proponent shall cede the Conservation areas identified in Figure 1 of Schedule 1 to a management authority approved by the CEO within 10 years of approval of the plan required in Condition 5-2.*
>
> *5-4 The Conservation Area Management Plan required by Condition 5-2 shall include but is not limited to the following details:*
>
> *(1) Fencing, access and signage;*
>
> *(2) Rehabilitation and revegetation;*
>
> *(3) Measures to control vehicle and pedestrian access;*
>
> *(4) Limited passive recreation;*
>
> *(5) Weed control;*
>
> *(6) Bushfire management;*
>
> *(7) Feral animal control;*
>
> *(8) Completion criteria for handover to a management authority; and*
>
> *(9) Management measures to ensure impacts from the proposal are contained within the development envelope shown in Figure 1 of Schedule 1 of Ministerial Statement 992.*

*5-5 The proponent shall implement the approved Conservation Area Management Plan for 10 years from the date of approval of the plan or until such time as the land is ceded to a management authority approved by the CEO, whichever is sooner.*

*Condition 5-2 requires the Conservation Area Management Plan (CAMP) to be prepared in consultation with the Department of Parks and Wildlife (DPaW).*

The CAMP has been prepared and submitted to the OEPA on 28 August 2015, the OEPA provided comments on 25 November 2015 and the revised CAMP was re-submitted on 22 December 2015. The final approval is pending.

The objective of the CAMP is to conserve the vegetation, flora and dune systems within the conservation areas. The conservation areas will also provide passive recreational and educational opportunities for the local residents.

The key management strategies include the following:

- Vegetation retention and protection;
- Construction management;
- Public access management;
- Vegetation and Fauna management;
- Bushfire management; and
- Monitoring and Reporting.

### 4.1.2 Eglinton Conservation Management Plan

In accordance with Condition 9 of the EPBC Approval 2010/5777, Eglinton is required to retain the vegetation within the POS conservation areas as shown in Figure 3.

Condition 10(a) of EPBC Approval 2010/5777 required Eglinton to prepare a management plan for the three areas of conservation POS Areas AE, AG and AH as defined in Attachment 1 of the approval and as Figure 3 in this Report. The specific intent of the Eglinton CMP is to protect, enhance and manage the Carnaby's Black Cockatoo habitat retained in the conservation POS areas. The CMP includes:

i. Measures to physically delineate (through fencing or other means) areas that will be retained;

ii. Erosion and dust control measures during construction;

iii. The management of weeds, phytophthora dieback, bushfire and feral animals;

iv. Identification of any degraded habitat for listed threatened species and revegetation of those areas;

v. A monitoring program for listed threatened species and their habitat;

vi. Performance indicators and corrective actions;

vii. Roles and responsibilities;

viii. Time frames for the implementation of the above measures; and

ix. How condition 10(b) will be implemented, including who will be responsible for the long-term management of the retained land, and how the land will protected in the long-term.

Condition 10(b) requires Eglinton to provide evidence that the POS conservation areas has been transferred to the City of Wanneroo for the purposes of conservation within five years of substantial commencement of the action (4 November 2018).

The Eglinton CMP (PGV Environmental, 2014) was submitted to the Department of Environment on 2 May 2014 and approved for implementation on the 23 July 2014. The key management strategies include:

- Habitat retention and protection;
- Habitat rehabilitation;
- Construction management; and
- Monitoring and Reporting.

## 4.2 Monitoring and Compliance Reporting

The monitoring and compliance reporting requirements for the conservation areas are governed by conditions set out in Ministerial Statement 992 and EPBC Approval 2010/5777.

### 4.2.1 Eglinton Beach Compliance Assessment Report

The Eglinton Beach Compliance Assessment Report (CAR) has been prepared for the purpose of meeting the requirements of Condition 3 of Ministerial Statement 992 and is in accordance with the Compliance Assessment Plan approved by the OEPA in July 2015.

The Eglinton Beach CAMP implementation status is reported annually in the CAR.

### 4.2.2 Eglinton Estates Compliance Report EPBC 2010/5777

A Compliance Report is prepared annually to satisfy Condition 3 of the EPBC 2010/5777 approval. The purpose of this report is provide an update on the progress of the project actions including conditions that have been fulfilled and conditions that remain ongoing. This includes reporting on the Implementation status for the management plans required under the approval conditions.

The Eglinton CMP requires that an annual survey of the vegetation in the conservation POS AE, AG and AH is undertaken annually in spring. This survey is required to determine if the condition of the vegetation is being maintained/improved. The monitoring results from the annual vegetation survey of the conservation POS are reported annually to the Department of Environment in the Compliance Report.

# 5 CONCLUSION

The environmental assessment of these conservation areas has been undertaken as part of the State and Commonwealth assessment processes under the EP Act and EPBC Act respectively. Incorporation of the conservation areas in the Eglinton LSP No.82 is a legal requirement of the Ministerial Statement 992 and EPBC Approval 2010/5777.

The amendment to the Eglinton LSP will change the extent and location of the existing strategic open space to reflect the conservation POS C, D, AE, AG and AH and ROS A and B as described in this Addendum to be in accordance with Ministerial Statement 992 and EPBC Approval 2010/5777.

# 6 REFERENCES


Armstrong, P (1996). *Vegetation Condition and Conservation Values for Lots 8 and 11 Eglinton, City of Waneroo.* Unpublished report for Landcorp and Alan Tingay and Associates.

ATA Environmental (2005) *Metropolitan Region Scheme Amendment 1029/33 Alkimos-Eglinton Flora, Vegetation and Fauna Baseline Information.* Report No. 2004/253.

Environmental Protection Authority (1991). *Eglinton Beach Resort (Assessment 229).* Report and Recommendations of the Environmental Protection Authority, Bulletin 500.

Environmental Protection Authority (2005). *Alkimos –Eglinton Metropolitan Region Scheme Amendment No. 1029/33*. Report and Recommendations of the Environmental Protection Authority, Bulletin 1207

Environmental Protection Authority (EPA) (2008) *Environmental Guidance for Planning and Development – Guidance Statement No. 33.* Perth Western Australia.

Environmental Protection Authority (2014). *Eglinton Beach proposal - inquiry under s46 of the Environmental Protection Act 1986 to amend Ministerial Statement 150*. Report and Recommendations of the Environmental Protection Authority, Report 1526

Government of Western Australia (2000*), Bush Forever Volume 2: Directory of Bush Forever Sites*. Department of Environmental Protection, Perth, Western Australia

PGV Environmental (2011) *Eglinton Beach Resort – Section 45C Application*. Submitted to the OEPA on 29 September 2011.

PGV Environmental (2013) *Eglinton Beach Resort – Section 45C Addendum 1.* Submitted to the OEPA on 20 December 2013.

PGV Environmental (2014) *Eglinton Estates Conservation Management Plan*. Submitted to the Department of Environment 29 April 2014.

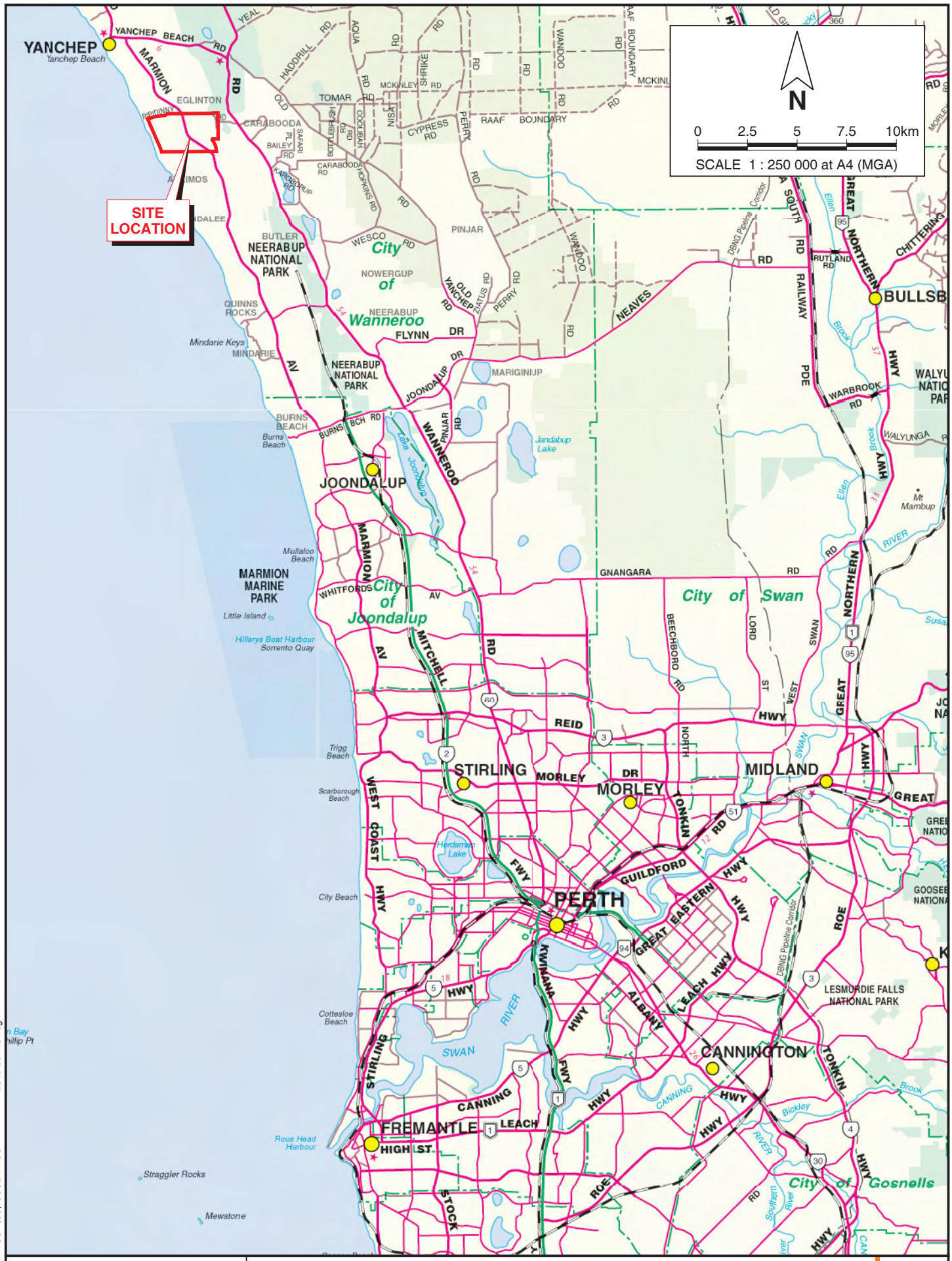
PGV Environmental (2015a*). Eglinton Estates Compliance Assessment Plan*. Submitted to the OEPA 22 June 2015.

PGV Environmental (2015b) *Eglinton Beach Conservation Area Management Plan*. Submitted to the OEPA 22 December 2015.

PGV Environmental (2015c) *Eglinton Beach Proposal Ministerial Implementation Statement No. 992 Compliance Assessment Report*. Submitted to the OEPA 17 December 2015.

RPS (2008) *Draft Spring Flora and Vegetation Survey Lot 11 Eglinton Estates*

# FIGURES




pgv ENVIRONMENTAL

Eglinton Estates Pty Ltd
EGLINTON LOCAL STRUCTURE PLAN NO 82 AMENDMENT
ENVIRONMENTAL ASSESSMENT ADDENDUM 1

| | |
|---|---|
| Drawn: B. Heath | Date: 18 Apr 2016 |
| Job: 10007 Rpt: 2016-257 | Revision: A |

## SITE LOCATION

Figure 1

PINPOINT CARTOGRAPHICS (08) 9562 7136 2016-257-f01.dgn

Land subject to MRS amendment (to rezone from Parks and Recreation to Urban) & land exchange for notated open space areas A & B.

The part of the Local Structure Plan (LSP) area shown extending beyond the existing Local Government Boundary (conforming with the MRS) will only become subject to this LSP once a proposed western extension to that boundary has been effected.

Physical Processes Setback Line

Area Subject to Environmental approval in accordance with Clause 6.1 of the Local Structure Plan

Indian Ocean

PIPIDINNY ROAD

MARMION AVENUE

EGLINTON DRIVE

MITCHELL FREEWAY

R25 - R40

R40 - R60

R25 - R60

R60 - R100

R160

R100 - R60

R100

R20 - R60

Alternative STS Route & Stop

A

B

C

D

E

F

G

PS

S K-12

1 Centre 1 - Eglinton Marina Centre

2 Centre 2 - Neighbourhood Centre

3 Centre 3 - Neighbourhood Centre

4 Centre 4 - District Activity Centre

15451 1 8 1008 2 2 1007 13711 6 20 3 1 15 1007 1007 6 1005 1006 15450

## LEGEND

**ZONES**
- Residential
- Centre
- Commercial
- Mixed Use

**RESERVES**
- Parks & Recreation
- Railway

**MOVEMENT**
- Railway Station
- Primary Distributor
- Integrator Arterial (A)
- Integrator Arterial (B)
- Neighbourhood Connector
- Coastal Road
- Light Controlled Intersection
- Special Transit System/ Indicative Bus Stops
- Principal Shared Path
- Shared Path
- Regional Foreshore Shared Path
- Social/Pedestrian/Cyclist Linkages

**OTHER**
- Eglinton Local Structure Plan Boundary
- Proposed 132kV Transmission Line
- Proposed Zone Substation
- Primary School
- Inclusive School - Kindergarten to year 12
- Centre 1 - Eglinton Marina Centre
- Centre 2 - Neighbourhood Centre
- Centre 3 - Neighbourhood Centre
- Centre 4 - District Activity Centre
- Indicative Strategic Open Spaces
- Land to be subject to MRS Amendment
- Regional Road Drainage
- Possible Beachside Restaurant/ Cafe/Corner Store
- Proposed Water Corporation Groundwater Bore Sites
- 300 metre Well Head Protection Zones
- Possible Foreshore Recreation Development Node
- Walkable Catchment (400m - 5 min walk)
- Walkable Catchment (800m - 10 min walk)

**NOTES**

1) Areas identified as being of National Environmental Significance under the Environmental Protection and Biodiversity Conservation Act 1999 may be subject to assessment by the Federal Department of Sustainability, Environment, Water, Population and Communities, in accordance with this Act. The outcome of any such assessment may require either a modification to the LSP or minor variations from the LSP at the subdivision or development stage.

2) The taking of individual Graceful Sun Moths, as a result of the clearing of habitat such as Lomandra Hermaphrodita and Maritima, requires the permission of the Minister for Environment, or their delegate, pursuant to the Wildlife Conservation Act 1950.

3) An easement of up to 32 metres may be required for the proposed 132kV overhead transmission line. This may have implications on adjacent land uses. Final - width of the easement and the location of the substation will need to be confirmed as part of the future structure planning of Centre Zones.

4) Location of the proposed Water Corporation Groundwater Bore Sites and associated 300 metre Well Head Protection Zones is indicative only, to be confirmed at subdivision stage.

SOURCE: Plan No. EGLEG191d, 10-05-2012.

N

0 100 200 300 400 500m

SCALE 1 : 12 500 at A3 (MGA)

pgv ENVIRONMENTAL

Eglinton Estates Pty Ltd
EGLINTON LOCAL STRUCTURE PLAN NO 82 AMENDMENT
ENVIRONMENTAL ASSESSMENT ADDENDUM 1

Drawn: B. Heath | Date: 18 Apr 2016
Job: 10007 Rpt: 2016-257 | Revision: A

# EGLINTON LOCAL STRUCTURE PLAN

Figure 2

2016-257-102.dgn
PINPOINT CARTOGRAPHICS (08) 9562 7136

N

0 100 200 300 400 500m

SCALE 1 : 10 000 at A3 (MGA)

372 000mE 373 000mE 374 000mE

6 505 000mN

6 504 000mN

6:503:000mN

MARMION AVENUE

FUTURE FREEWAY

Future Railway

1 8 9004 5000 5001 5002 5003 5004 9017 6

A B C D AH T AC AD AE AF AG AA

| CONSERVATION TABLE | | |
|---|---|---|
| **POS Ref** | **AREA** | **FUNCTION** |
| AG | 4.74ha | POS Conservation |
| AH | 4.40ha | POS Conservation |
| AE | 7.31ha | POS Conservation |
| **Sub Total** | **16.45ha** | |
| A | 9.11ha | ROS |
| B | 7.30ha | ROS |
| C | 2.72ha | POS Conservation |
| D | 22.71ha | POS Conservation |
| **Sub Total** | **44.84ha** | |
| **TOTAL AREA** | **58.29ha** | |

NOTE: A total of 1.9ha of Carnaby's Black Cockatoo foraging habitat will be created across POS AA, AC, AD, AF and T

**Legend**

- District Structure Plan Boundary
- Boundary of Eglinton Estates Landholding
- Cadastral Boundary
- Easement Boundary
- Potential Batters
- Drainage/Active/Conservation (POS)
- Conservation Area (ROS)
- Conservation Area (POS)
- Parks & Recreation Reserve (ROS)
- EPBC Conservation Area

CADASTRAL SOURCE: Landgate, April 2016.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown April 2016.

pgv ENVIRONMENTAL

Eglinton Estates Pty Ltd
EGLINTON LOCAL STRUCTURE PLAN NO 82 AMENDMENT
ENVIRONMENTAL ASSESSMENT ADDENDUM 1

Drawn: B. Heath | Date: 18 Apr 2016
Job: 10007 Rpt: 2016-257 | Revision: A

# CONSERVATION AREAS

Figure 3

2016-257-f03.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136

# ATTACHMENT 1

## Section 45C Approval

GOVERNMENT OF
WESTERN AUSTRALIA

**Environmental Protection Authority**

Mr Damian Molony
Director
Eglinton Estates Pty Ltd
PO Box 899
**WEST PERTH WA 6872**

*Our Ref:* *ST13-2013-0002*
*Enquiries:* *Amy Sgherza, 6145 0818*
*Email:* *amy.sgherza@epa.wa.gov.au*

Dear Mr Molony

**EGLINTON BEACH RESORT (MINISTERIAL STATEMENT 150) - SECTION 45C APPLICATION**

Thank you for your letter of 30 September 2011 requesting approval of a change to the above proposal under section 45C of the *Environmental Protection Act 1986* (the EP Act).

Under section 45C of the EP Act I am able to approve a change or changes to a proposal without a revised proposal being submitted to the Environmental Protection Authority.

I consider that the changes described in Attachment 2 to Ministerial Statement 150 will not result in a significant, detrimental, environmental effect in addition to, or different from, the effect of the original proposal.

Approval of the changes to the proposal is therefore granted under section 45C of the EP Act. You are reminded that this approval shall be implemented in accordance with the implementation conditions in Ministerial Statement 150, and, also, that this approval does not replace any responsibilities you may have for seeking approvals from other government agencies to implement the change.

The Atrium Level 8, 168 St Georges Terrace, Perth, Western Australia 6000.
Postal Address: Locked Bag 10, East Perth, Western Australia 6892.

Telephone: (08) 6145 0800 | Facsimile: (08) 6145 0895 | Email: info@epa.wa.gov.au
Website: www.epa.wa.gov.au

As you are aware your request for changes to environmental conditions under section 46 of the EP Act application has been initiated by the Minister for Environment to ensure that the Ministerial Conditions are consistent with the changed proposal.

Yours sincerely

**Dr Paul Vogel**
CHAIRMAN

12 February 2014

Encl.

cc: Belinda Heath
PGV Environmental
Unit 1/ 61 Guthrie Street
**OSBORNE PARK WA 6017**

Attachment 2 to Ministerial Statement 150

Change to Proposal under section 45C of the
*Environmental Protection Act 1986*

---

**Proposal:** **Eglinton Beach Proposal**

**Proponent:** **Eglinton Estates Pty Ltd**

---

**Changes:** 1) Removal of golf course and associated recreational resort complex and replacement with urban development.

2) Increase in and change to location of areas to be set aside for Conservation through Foreshore reserves, Regional Open Space and Public Open Space.

**Key Characteristics Table:**

| Element | Description of authorised proposal | Description of approved change to proposal | Location |
|---|---|---|---|
| Clearing and Disturbance for:<br>• Urban/Commercial development<br>• Drainage<br>• Active Public Open Space | 106.8 hectares (ha) | **Clearing no more than 234.8 ha within development envelope** | Figure 1 in Terrestrial Development Envelope |
| Areas to be set aside for Conservation through:<br>• Foreshore reserves<br>• Regional Open Space<br>• Public Open Space | 33.1 ha | **47 ha** | Figure 1 in areas A, B, C, D, and FR2 |
| Golf Course | 86.1 ha | **0 ha** | N/A |

Note: Text in **bold** in the Key Characteristics Table, indicates change/s to the proposal.

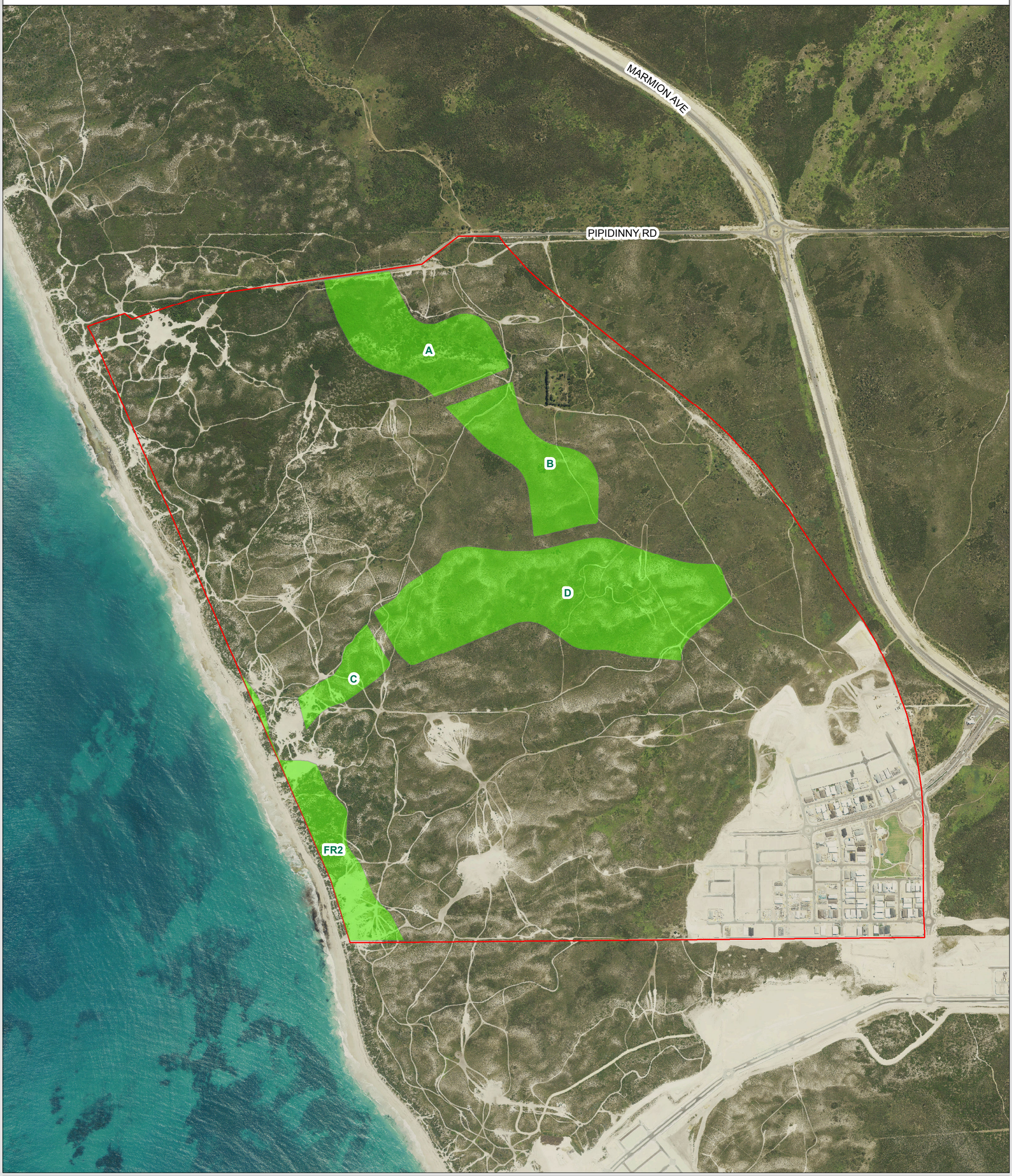
**List of Figures:** Figure 1: Terrestrial Development envelope and Conservation Areas

**Dr Paul Vogel**
CHAIRMAN
Environmental Protection Authority
under delegated authority

Approval date: 12 February 2014

# Figure 1: Terrestrial Development Envelope and Conservation Areas

Map Version: 1.12
Date: 07/02/2014
OEPA GIS Section




**LEGEND**

- Conservation Areas
- Terrestrial Development Envelope

SOURCE DATA
PGV: Site Boundary, Conservation Areas, Regional Open Space
Aerial: Metro North Sept 2013 Mosaic

File No: ST13-2013-0002
Location Path: I:\Projects\epasu\minor_projects\gis\20140129_Eglinton Beach Resort

SIM Ref. Pt. (Decimal Degrees):
115.65, -31.59

Disclaimer:
This map is intended as a generalised interpretation of environmental issues. The information contained on this map is to be considered indicative only and in no event shall the Environmental Protection Authority be liable for any incident or consequential damages resulting from use of the material.



GOVERNMENT OF WESTERN AUSTRALIA
Office of the EPA

N

0 150 300 600
Meters

Projection: Map Grid of Australia Zone 50
Datum: Geocentric Datum of Australia, 1994
Scale: 1:10,000 at A3

LOCALITY MAP

# ATTACHMENT 2

# MINISTERIAL STATEMENT 992

Published on: 5 January 2015 Statement No: 992

# STATEMENT TO AMEND CONDITIONS APPLYING TO A PROPOSAL (PURSUANT TO THE PROVISIONS OF SECTION 46 OF THE *ENVIRONMENTAL PROTECTION ACT 1986*)

EGLINTON BEACH PROPOSAL

**Proposal:** The proposal is for the development of residential, commercial and public open space land uses, a single entrance marina and the management of conservation areas on Lot 5000 and Part Lot 5001 Pipidinny Road and Part Lot 9005 Marmion Ave, Eglinton.

**Proponent:** Eglinton Estates Pty Ltd

Australian Company Number: 009 460 397

**Proponent Address:** Suite 5

20 Altona St., West Perth WA 6005

**Assessment Number:** 1975

**Previous Assessment Number:** 229

**Report of the Environmental Protection Authority:** 1526

**Previous Report of the Environmental Protection Authority:** 500

**Previous Ministerial Statement Number:** 150

This Statement authorises the implementation of the proposal described and documented in Table 2 of Schedule 1. The implementation of the proposal is subject to the following implementation conditions and procedures which replace and supersede all previous conditions and procedures of Statement 150 and Table 4 in Schedule 1 details definitions of terms and phrases used in the implementation conditions and procedures.

Published on:

## 1 Implementation

1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Table 2 in Schedule 1, unless amendments to the proposal and the authorised extent of the proposal have been approved under the EP Act.

## 2 Contact Details

2-1 The proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within 28 days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

## 3 Compliance Reporting

3-1 The proponent shall prepare, submit and maintain a Compliance Assessment Plan to the CEO at least six (6) months prior to the first Compliance Assessment Report required by Condition 3-6.

3-2 The Compliance Assessment Plan shall indicate:

(1) the frequency of compliance reporting;

(2) the approach and timing of compliance assessments;

(3) the retention of compliance assessments;

(4) the method of reporting of potential non-compliances and corrective actions taken;

(5) the table of contents of compliance assessment reports; and

(6) public availability of compliance assessment reports.

3-3 The proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by Condition 3-1.

3-4 The proponent shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by Condition 3-1 and shall make those reports available when requested by the CEO.

3-5 The proponent shall advise the CEO of any potential non-compliance within 7 days of that non-compliance being known.

3-6 The proponent shall submit a compliance assessment report annually from the date of issue of this Statement addressing the previous twelve month period or other period as accepted by the CEO. The compliance assessment report shall:

(1) be endorsed by the proponent's CEO or a person delegated to sign on the CEO's behalf;

(2) include a statement as to whether the proponent has complied with the conditions;

(3) identify all potential non-compliances and describe corrective and preventative actions taken;

(4) be made publicly available in accordance with the approved Compliance Assessment Plan; and

(5) indicate any proposed changes to the Compliance Assessment Plan required by Condition 3-1.

## 4 Public Availability of Data

4-1 Subject to Condition 4-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)) relevant to the assessment of this proposal and implementation of this Statement.

4-2 If any data referred to in Condition 4-1 contains particulars of:

(1) a secret formula or process; or

(2) confidential commercially sensitive information;

the proponent may submit a request for approval from the CEO to not make these data publically available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publically available.

## 5 Terrestrial Flora and Vegetation (Conservation Areas)

5-1 The proponent shall conserve the flora, vegetation and dune systems within the Conservation areas shown in Figure 1 of Schedule 1.

5-2 By 01 September 2015, unless agreed by the CEO, the proponent shall prepare in consultation with the Department of Parks and Wildlife and to the satisfaction of the CEO, a Conservation Area Management Plan for the Conservation areas (A, B, C & D) shown in Figure 1 of Schedule 1, and spatially defined in Schedule 3.

5-3 The proponent shall cede the Conservation areas identified in Figure 1 of Schedule 1 to a management authority approved by the CEO within 10 years of approval of the plan required in Condition 5-2.

5-4 The Conservation Area Management Plan required by Condition 5-2 shall include but is not limited to the following details:

(1) fencing, access and signage;

(2) rehabilitation and revegetation;

(3) measures to control vehicle and pedestrian access;

(4) limited passive recreation;

(5) weed control;

(6) bushfire management;

(7) feral animal control;

(8) completion criteria for handover to a management authority; and

(9) management measures to ensure impacts from the proposal are contained within the development envelope shown in Figure 1.

5-5 The proponent shall implement the approved Conservation Area Management Plan for 10 years from the date of approval of the plan or until such time as the land is ceded to a management authority approved by the CEO, whichever is sooner.

## 6 Coastal Processes

6-1 The proponent shall manage activities associated with the marine elements of the proposal during construction and operation to ensure impacts as a result of the accumulation of seagrass wrack and the erosion or accumulation of sediment are minimised through the implementation of Conditions 6-2 to 6-7.

6-2 At least 6 months prior to construction of the marina, unless otherwise approved by the CEO, the proponent shall prepare and submit a Coastal Management Plan on advice from the Department of Transport.

6-3 The Coastal Management Plan shall:

(1) specify management actions that will be implemented to ensure the management objective in Condition 6-1 is achieved;

(2) provide protocols or procedures for the review of the Coastal Management Plan to ensure that the Coastal Management Plan is meeting the objective specified in Condition 6-1;

(3) detail measures to monitor and manage seagrass wrack accumulation within the marina and on the beaches immediately adjacent to the development as shown in Schedule 1, Figure 1; and

(4) detail measures to monitor and manage sediment accumulation or erosion on the beaches adjacent to the development as shown in Schedule 1, Figure 1.

6-4 After receiving notice in writing from the CEO that the Coastal Management Plan satisfies the requirements of Condition 6-3, the proponent shall:

(1) implement the management actions and monitor in accordance with the requirements of the Coastal Management Plan; and

(2) continue to implement the management actions and monitor in accordance with the requirements of the Coastal Management Plan until the CEO has confirmed by notice in writing that it has been demonstrated that the objective in Condition 6-1 is being and will continue to be met and therefore the implementation of the management actions and monitoring is no longer required.

6-5 The proponent may review and revise the Coastal Management Plan and submit it to the CEO for approval at any time.

6-6 The proponent shall review and revise the Coastal Management Plan as and when directed by the CEO.

6-7 The proponent shall implement the latest approved version of the Coastal Management Plan.

## 7 Marine Environmental Quality

7-1 During the operation of the proposal, the proponent shall manage activities associated with the marine elements to meet the environmental quality objectives and levels of ecological protection as outlined in Schedule 2 and spatially defined in Figure 1, through the implementation of Conditions 7-2 to 7-7.

7-2 At least 6 months prior to the commencement of the construction of the marine elements, unless otherwise approved by the CEO, the proponent shall prepare a Marine Environmental Quality Management Plan to the satisfaction of the CEO.

The objective of the Marine Environmental Quality Management Plan is to ensure that the requirements of Condition 7-1 are met.

7-3 The Marine Environmental Quality Management Plan shall include:

(1) a threat assessment to determine key cause-effect pathways and indicators to be monitored;

(2) baseline sediment, biota (marine benthic communities) and water quality data for indicators relevant to identified threats, collected over an annual cycle prior to the commencement of construction of the marine elements in Schedule1;

(3) the location of impact and reference monitoring sites;

(4) environmental quality indicators relevant to the identified threats and associated 'trigger' levels (i.e. environmental quality guidelines and environmental quality standards) based on the guidelines and recommended approaches in the *Environmental Quality Criteria Reference Document for Cockburn Sound (2003-2004),* as amended or replaced from time to time, for assessing performance against the environmental quality objectives and associated levels of ecological protection set out in Schedule 2;

(5) protocols and procedures for monitoring and evaluating the quality of sediment, biota (marine benthic communities) and marine waters, in the area specified in Schedule 1 consistent with the *Manual of Standard Operating Procedures for Environmental Monitoring against the Cockburn Sound Environmental Quality Criteria (2003-2004)* and *Environmental Quality Criteria Reference Document for Cockburn Sound (2003-2004)*, as amended or replaced from time to time;

(6) the reporting procedures, including the format, timing and frequency for the assessment of monitoring data against the relevant trigger levels and environmental quality objectives; and

(7) a framework for development of management and contingency actions to be implemented in the event that any trigger levels referred to in Condition 7-3(4) are not met.

7-4 In the event that monitoring required in Condition 7-3 indicates that the trigger levels in Condition 7-3(4), are exceeded, or likely to be exceeded, the proponent shall:

(1) report such findings to the CEO within two days of the exceedance being identified;

(2) investigate and submit a report to the CEO within seven days of the exceedance being reported on the likely cause(s)of the trigger levels being exceeded;

(3) if determined by the CEO to be a result of activities undertaken in implementing the proposal, the proponent shall submit actions to be taken to address the exceedance within 21 days of the determination being made to the CEO; and

(4) implement the actions to address the exceedance and shall continue to do so until such time the CEO determines that the actions may cease.

7-5 The proponent may review and revise the Marine Environmental Quality Management Plan and submit it to the CEO for approval at any time.

7-6 The proponent shall review and revise the Marine Environmental Quality Management Plan as and when directed by the CEO.

7-7 The proponent shall implement the latest approved version of the Marine Environmental Quality Management Plan.

[Signed 5 January 2015]

**HON ALBERT JACOB MLA**
**MINISTER FOR ENVIRONMENT; HERITAGE**

**Schedule 1**

**Table 1: Summary of the Proposal**

| | |
|---|---|
| **Proposal Title** | Eglinton Beach Proposal |
| **Short Description** | The proposal is for the development of residential, commercial and public open space land uses, a single entrance marina and the management of conservation areas on Lot 5000 and Part Lot 5001 Pipidinny Road and Part Lot 9005 Marmion Ave, Eglinton. |

**Table 2: Location and authorised extent of physical and operational elements**

| Column 1 | Column 2 | Column 3 |
|---|---|---|
| **Element** | **Location** | **Authorised Extent** |
| **Terrestrial Elements:**<br><br>Clearing and disturbance for:<br>• Urban/Commercial development;<br>• Drainage; and<br>• Public Open Space. | Refer Figure 1 | Clearing of not more than 246.8 ha within the development envelope. |
| Conservation Areas to be set aside and managed for Conservation through:<br>• Regional Open Space; and<br>• Public Open Space. | Refer Figure 1 (Conservation Areas) | Area of not less than 42 ha to be set aside for Conservation. |
| **Marine Elements:**<br><br>Construction and operation of:<br>• Marina; and<br>• Breakwaters. | Refer Figure 1 | Marina waterbody area of not more than 9.9 ha.<br><br>Reclaimed land and coastal area of not more than 20.3 ha. |

**Table 3: Abbreviations**

| Abbreviation | Term |
|---|---|
| ha | Hectares |

**Figures (attached)**

Figure 1 Eglinton Beach Proposal

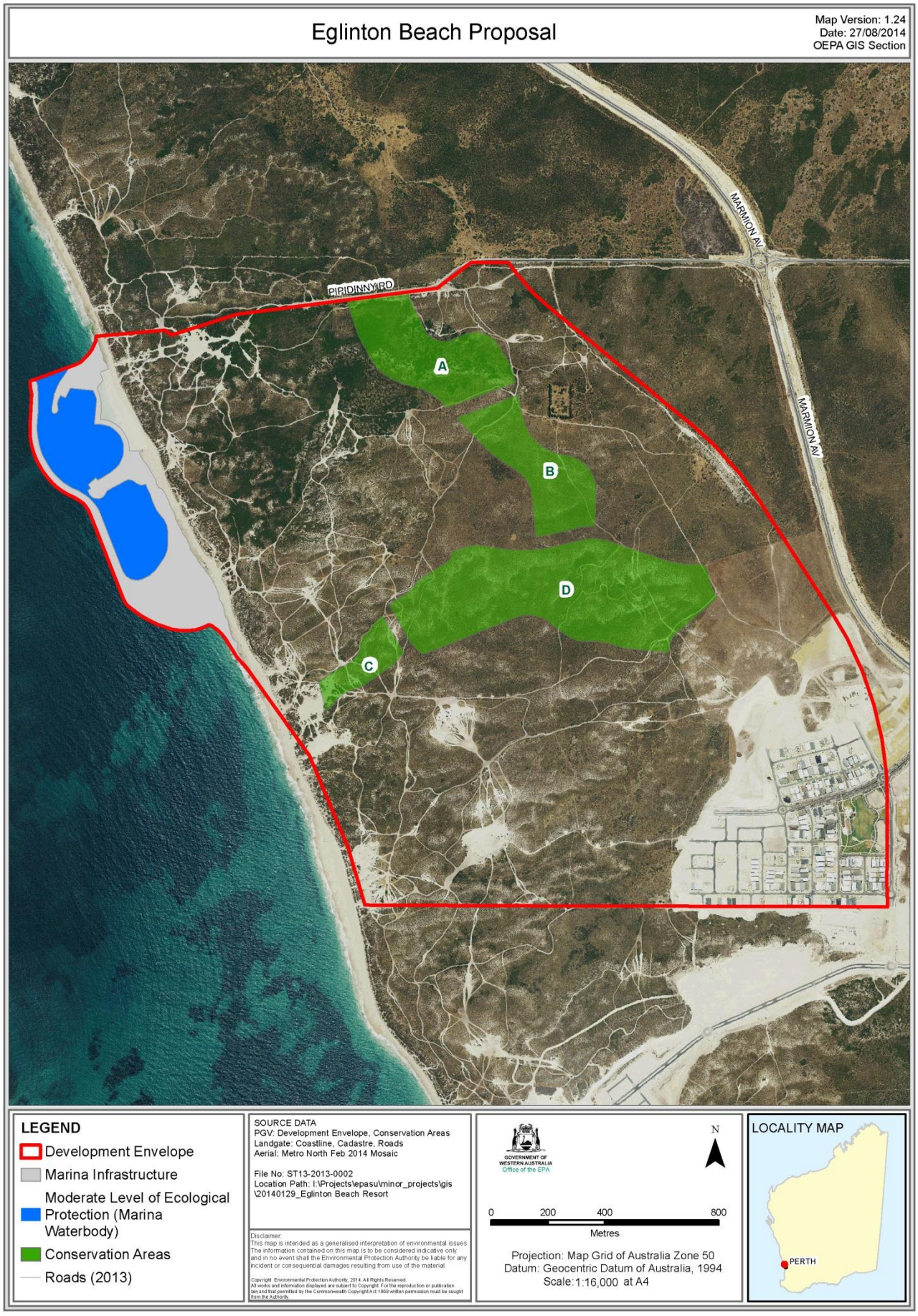



**Figure 1 Eglinton Beach Proposal**

**Table 4: Definitions**

| Term or Phrase | Definition |
|---|---|
| CEO | The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the *Environmental Protection Act 1986*, or delegate. |
| EPA | Environmental Protection Authority |
| EP Act | *Environmental Protection Act 1986* |

**Schedule 2**

**The Environmental Quality Objectives and level of Ecological Protection to be achieved in marine waters for the Proposal (Condition 7)**

| Area | Environmental Quality Objectives | Level of Ecological Protection for Maintenance of Ecosystem Integrity |
|---|---|---|
| Marine waters within marina waterbody | • Maintenance of ecosystem integrity.<br>• Maintenance of seafood for human consumption.<br>• Maintenance of primary contact recreation.<br>• Maintenance of secondary contact recreation.<br>• Maintenance of aesthetic values. | **Moderate** – To allow moderate changes in the quality of water, sediment and biota (i.e. moderate changes in contaminant concentrations that could cause small changes, beyond natural variation in ecosystem processes and abundance/biomass of marine life, but no detectable changes from the natural diversity of species and biological communities).<br>For this protection level the criteria for a Moderate Level of Ecological Protection as specified in *Environmental Quality Criteria Reference Document for Cockburn Sound (2003-2004)* as amended or replaced from time to time, shall apply. |
| Marine waters directly outside of marina waterbody | • Maintenance of ecosystem integrity.<br>• Maintenance of aquatic life for human consumption.<br>• Maintenance of primary contact recreation values.<br>• Maintenance of secondary contact recreation values.<br>• Maintenance of aesthetic values. | **High –** To allow small changes in the quality of water, sediment and biota (e.g. small changes in contaminant concentrations with no resultant detectable changes beyond natural variation in the diversity of species and biological communities, ecosystem processes and abundance/biomass of marine life).<br>For this protection level the criteria for a High Level of Ecological Protection as specified in *Environmental Quality Criteria Reference Document for Cockburn Sound (2003-2004)* as amended or replaced from time to time, shall apply. |

**Schedule 3**

## Eglinton Beach Proposal

### *Coordinates that define Conservation Areas (A, B, C, and D)*

All coordinates are listed in Map Grid of Australia Zone 50 (MGA Zone 50), datum of Geodetic Datum of Australia 1994 (GDA94). This dataset is held by the Office of the EPA and is dated 25 March 2014.

| Conservation Area ID | Easting | Northing |
|---|---|---|
| A | 372425.43 | 6504695.96 |
| A | 372417.73 | 6504703.16 |
| A | 372409.55 | 6504709.81 |
| A | 372400.93 | 6504715.86 |
| A | 372391.90 | 6504721.30 |
| A | 372382.51 | 6504726.09 |
| A | 372372.80 | 6504730.20 |
| A | 372362.84 | 6504733.63 |
| A | 372361.15 | 6504734.13 |
| A | 372301.77 | 6504751.47 |
| A | 372291.68 | 6504754.81 |
| A | 372281.85 | 6504758.85 |
| A | 372272.34 | 6504763.58 |
| A | 372263.18 | 6504768.97 |
| A | 372254.43 | 6504774.99 |
| A | 372246.13 | 6504781.62 |
| A | 372238.31 | 6504788.82 |
| A | 372231.03 | 6504796.56 |
| A | 372224.31 | 6504804.79 |
| A | 372218.19 | 6504813.48 |
| A | 372212.70 | 6504822.58 |
| A | 372192.31 | 6504859.27 |
| A | 372177.68 | 6504885.58 |
| A | 372147.17 | 6504967.20 |
| A | 372141.35 | 6504996.61 |
| A | 372146.58 | 6504997.36 |
| A | 372174.90 | 6505001.39 |
| A | 372321.39 | 6505022.28 |
| A | 372372.92 | 6504914.29 |
| A | 372376.31 | 6504908.08 |
| A | 372380.35 | 6504902.28 |
| A | 372385.00 | 6504896.95 |
| A | 372390.21 | 6504892.16 |
| A | 372395.90 | 6504887.96 |
| A | 372402.01 | 6504884.40 |
| A | 372408.48 | 6504881.53 |

| Conservation Area ID | Easting | Northing |
|---|---|---|
| A | 372415.22 | 6504879.38 |
| A | 372422.15 | 6504877.97 |
| A | 372429.20 | 6504877.33 |
| A | 372436.27 | 6504877.45 |
| A | 372443.29 | 6504878.35 |
| A | 372450.16 | 6504880.00 |
| A | 372456.82 | 6504882.38 |
| A | 372497.63 | 6504899.58 |
| A | 372504.79 | 6504902.20 |
| A | 372512.18 | 6504904.13 |
| A | 372519.71 | 6504905.35 |
| A | 372527.32 | 6504905.84 |
| A | 372534.95 | 6504905.61 |
| A | 372542.52 | 6504904.65 |
| A | 372549.96 | 6504902.98 |
| A | 372557.21 | 6504900.60 |
| A | 372564.20 | 6504897.54 |
| A | 372570.87 | 6504893.83 |
| A | 372577.16 | 6504889.50 |
| A | 372583.00 | 6504884.60 |
| A | 372588.35 | 6504879.16 |
| A | 372593.16 | 6504873.23 |
| A | 372597.38 | 6504866.87 |
| A | 372613.21 | 6504840.37 |
| A | 372631.62 | 6504809.54 |
| A | 372635.30 | 6504802.79 |
| A | 372638.46 | 6504795.78 |
| A | 372641.07 | 6504788.55 |
| A | 372643.11 | 6504781.14 |
| A | 372649.01 | 6504756.04 |
| A | 372584.17 | 6504731.07 |
| A | 372547.15 | 6504716.81 |
| A | 372450.64 | 6504679.63 |
| A | 372444.16 | 6504677.14 |
| A | 372425.43 | 6504695.96 |

| Conservation Area ID | Easting | Northing |
|---|---|---|
| B | 372843.05 | 6504325.04 |
| B | 372839.65 | 6504324.22 |
| B | 372833.03 | 6504322.55 |
| B | 372823.33 | 6504320.11 |
| B | 372814.41 | 6504317.87 |
| B | 372803.93 | 6504315.24 |
| B | 372794.23 | 6504312.81 |
| B | 372787.43 | 6504311.10 |
| B | 372784.53 | 6504310.37 |
| B | 372774.83 | 6504307.93 |
| B | 372765.14 | 6504305.50 |
| B | 372762.44 | 6504304.82 |
| B | 372748.66 | 6504301.63 |
| B | 372734.77 | 6504298.95 |
| B | 372724.64 | 6504297.33 |
| B | 372714.47 | 6504295.98 |
| B | 372713.43 | 6504304.77 |
| B | 372710.20 | 6504331.97 |
| B | 372703.67 | 6504386.85 |
| B | 372699.59 | 6504421.15 |
| B | 372698.30 | 6504429.19 |
| B | 372696.36 | 6504437.10 |
| B | 372693.79 | 6504444.82 |
| B | 372690.59 | 6504452.31 |
| B | 372686.79 | 6504459.52 |
| B | 372682.42 | 6504466.39 |
| B | 372677.51 | 6504472.88 |
| B | 372672.08 | 6504478.96 |
| B | 372666.18 | 6504484.57 |
| B | 372659.84 | 6504489.68 |
| B | 372653.11 | 6504494.26 |
| B | 372602.13 | 6504525.96 |
| B | 372592.48 | 6504532.35 |
| B | 372583.23 | 6504539.29 |
| B | 372574.39 | 6504546.75 |
| B | 372565.99 | 6504554.71 |
| B | 372517.96 | 6504602.98 |
| B | 372471.91 | 6504649.25 |
| B | 372628.76 | 6504709.66 |
| B | 372657.32 | 6504720.66 |
| B | 372673.87 | 6504650.19 |

| Conservation Area ID | Easting | Northing |
|---|---|---|
| B | 372676.54 | 6504640.45 |
| B | 372679.90 | 6504630.92 |
| B | 372683.94 | 6504621.66 |
| B | 372688.63 | 6504612.71 |
| B | 372693.96 | 6504604.13 |
| B | 372699.89 | 6504595.95 |
| B | 372706.40 | 6504588.22 |
| B | 372713.45 | 6504580.98 |
| B | 372721.01 | 6504574.27 |
| B | 372729.02 | 6504568.12 |
| B | 372737.46 | 6504562.57 |
| B | 372746.28 | 6504557.64 |
| B | 372755.43 | 6504553.35 |
| B | 372764.87 | 6504549.74 |
| B | 372774.54 | 6504546.82 |
| B | 372784.40 | 6504544.60 |
| B | 372808.75 | 6504540.04 |
| B | 372817.59 | 6504537.98 |
| B | 372826.23 | 6504535.15 |
| B | 372834.58 | 6504531.57 |
| B | 372842.58 | 6504527.27 |
| B | 372850.18 | 6504522.29 |
| B | 372857.30 | 6504516.65 |
| B | 372863.91 | 6504510.42 |
| B | 372869.94 | 6504503.62 |
| B | 372875.36 | 6504496.33 |
| B | 372880.11 | 6504488.58 |
| B | 372884.16 | 6504480.45 |
| B | 372887.48 | 6504471.99 |
| B | 372890.05 | 6504463.28 |
| B | 372891.84 | 6504454.37 |
| B | 372892.84 | 6504445.34 |
| B | 372893.05 | 6504436.26 |
| B | 372893.05 | 6504436.26 |
| B | 372890.91 | 6504335.99 |
| B | 372884.78 | 6504330.02 |
| B | 372874.26 | 6504329.63 |
| B | 372863.78 | 6504328.67 |
| B | 372853.36 | 6504327.13 |
| B | 372843.05 | 6504325.04 |

| Conservation Area ID | Easting | Northing |
|---|---|---|
| C | 372288.64 | 6503906.82 |
| C | 372282.00 | 6503902.05 |
| C | 372260.77 | 6503886.78 |
| C | 372224.20 | 6503860.50 |
| C | 372197.52 | 6503842.48 |
| C | 372189.15 | 6503839.01 |
| C | 372180.64 | 6503835.91 |
| C | 372169.11 | 6503832.01 |
| C | 372167.57 | 6503831.49 |
| C | 372160.33 | 6503828.73 |
| C | 372153.33 | 6503825.41 |
| C | 372146.60 | 6503821.56 |
| C | 372140.19 | 6503817.19 |
| C | 372134.14 | 6503812.35 |
| C | 372128.48 | 6503807.05 |
| C | 372123.25 | 6503801.33 |
| C | 372103.54 | 6503778.02 |
| C | 372093.07 | 6503765.64 |
| C | 372075.71 | 6503833.18 |
| C | 372069.79 | 6503856.26 |
| C | 372110.47 | 6503887.28 |
| C | 372167.70 | 6503917.53 |
| C | 372188.61 | 6503948.24 |
| C | 372189.34 | 6503952.93 |
| C | 372193.62 | 6503980.25 |
| C | 372201.37 | 6503996.41 |
| C | 372218.96 | 6504009.99 |
| C | 372233.50 | 6504033.36 |
| C | 372250.79 | 6504052.12 |
| C | 372259.58 | 6504057.23 |
| C | 372307.81 | 6503974.20 |
| C | 372312.66 | 6503966.36 |
| C | 372317.93 | 6503958.81 |
| C | 372323.62 | 6503951.57 |
| C | 372323.38 | 6503942.69 |
| C | 372295.42 | 6503913.54 |
| C | 372288.64 | 6503906.82 |
| D | 372334.79 | 6503989.87 |
| D | 372277.23 | 6504088.97 |
| D | 372335.32 | 6504128.79 |
| D | 372359.46 | 6504158.23 |
| D | 372371.37 | 6504168.16 |
| D | 372456.03 | 6504223.41 |
| D | 372469.10 | 6504252.12 |
| D | 372469.14 | 6504252.10 |
| D | 372470.49 | 6504252.62 |

| Conservation Area ID | Easting | Northing |
|---|---|---|
| D | 372489.18 | 6504259.73 |
| D | 372492.95 | 6504261.16 |
| D | 372497.90 | 6504262.94 |
| D | 372507.56 | 6504265.77 |
| D | 372517.42 | 6504267.87 |
| D | 372527.40 | 6504269.20 |
| D | 372537.46 | 6504269.78 |
| D | 372547.53 | 6504269.58 |
| D | 372557.56 | 6504268.61 |
| D | 372613.47 | 6504261.07 |
| D | 372618.53 | 6504260.42 |
| D | 372635.53 | 6504258.68 |
| D | 372652.59 | 6504257.65 |
| D | 372669.68 | 6504257.31 |
| D | 372686.77 | 6504257.67 |
| D | 372703.83 | 6504258.73 |
| D | 372720.83 | 6504260.49 |
| D | 372737.75 | 6504262.94 |
| D | 372754.55 | 6504266.08 |
| D | 372771.21 | 6504269.90 |
| D | 372848.42 | 6504289.30 |
| D | 372859.15 | 6504291.60 |
| D | 372870.00 | 6504293.14 |
| D | 372880.94 | 6504293.93 |
| D | 372891.91 | 6504293.94 |
| D | 372902.85 | 6504293.19 |
| D | 372913.71 | 6504291.68 |
| D | 372924.44 | 6504289.42 |
| D | 372934.98 | 6504286.41 |
| D | 373095.25 | 6504234.60 |
| D | 373109.33 | 6504230.45 |
| D | 373123.60 | 6504227.03 |
| D | 373138.03 | 6504224.36 |
| D | 373152.58 | 6504222.44 |
| D | 373167.21 | 6504221.28 |
| D | 373181.88 | 6504220.88 |
| D | 373196.55 | 6504221.23 |
| D | 373200.79 | 6504221.45 |
| D | 373211.83 | 6504220.74 |
| D | 373221.41 | 6504216.42 |
| D | 373227.72 | 6504207.72 |
| D | 373231.72 | 6504197.89 |
| D | 373241.33 | 6504162.83 |
| D | 373243.72 | 6504155.20 |
| D | 373246.65 | 6504147.77 |
| D | 373250.12 | 6504140.57 |

| Conservation Area ID | Easting | Northing |
|---|---|---|
| D | 373254.10 | 6504133.64 |
| D | 373258.57 | 6504127.02 |
| D | 373257.71 | 6504118.33 |
| D | 373142.00 | 6504017.47 |
| D | 373137.32 | 6504012.98 |
| D | 373133.10 | 6504008.06 |
| D | 373129.36 | 6504002.75 |
| D | 373126.15 | 6503997.11 |
| D | 373123.50 | 6503991.19 |
| D | 373121.43 | 6503985.04 |
| D | 373119.96 | 6503978.73 |
| D | 373119.10 | 6503972.30 |
| D | 373117.67 | 6503955.44 |
| D | 372980.09 | 6503967.63 |
| D | 372947.75 | 6503978.32 |
| D | 372938.56 | 6503981.04 |
| D | 372929.22 | 6503983.16 |
| D | 372919.77 | 6503984.68 |
| D | 372691.01 | 6504062.21 |
| D | 372682.56 | 6504061.42 |
| D | 372674.20 | 6504059.91 |
| D | 372666.01 | 6504057.70 |
| D | 372658.03 | 6504054.81 |
| D | 372387.50 | 6503943.43 |
| D | 372378.61 | 6503944.14 |
| D | 372371.09 | 6503949.32 |
| D | 372363.94 | 6503954.99 |
| D | 372357.19 | 6503961.14 |
| D | 372350.87 | 6503967.73 |
| D | 372345.01 | 6503974.74 |
| D | 372339.65 | 6503982.13 |
| D | 372334.79 | 6503989.87 |

| Conservation Area ID | Easting | Northing |
|---|---|---|
| D | 372900.66 | 6503985.90 |
| D | 372866.32 | 6503985.90 |
| D | 372858.47 | 6503986.21 |
| D | 372850.68 | 6503987.13 |
| D | 372842.98 | 6503988.67 |
| D | 372835.42 | 6503990.80 |
| D | 372828.06 | 6503993.51 |
| D | 372820.93 | 6503996.80 |
| D | 372814.08 | 6504000.63 |
| D | 372807.55 | 6504004.99 |
| D | 372754.87 | 6504043.25 |
| D | 372747.79 | 6504047.94 |
| D | 372740.35 | 6504052.02 |
| D | 372732.59 | 6504055.45 |
| D | 372724.56 | 6504058.21 |
| D | 372716.33 | 6504060.27 |
| D | 372707.95 | 6504061.64 |
| D | 372699.49 | 6504062.28 |

Coordinates that define the Development Envelope and Marina Infrastructure as shown in Figure 1 of the Ministerial Statement are held by the Office of the EPA, dated 25 August 2014.

## Notes

The following notes are provided for information and do not form a part of the implementation conditions of the Statement:

- The proponent for the time being nominated by the Minister for Environment under section 38(6) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal unless and until that nomination has been revoked and another person is nominated.
- If the person nominated by the Minister, ceases to have responsibility for the proposal, that person is required to provide written notice to the Environmental Protection Authority of its intention to relinquish responsibility for the proposal and the name of the person to whom responsibility for the proposal will pass or has passed. The Minister for Environment may revoke a nomination made under section 38(6) of the *Environmental Protection Act 1986* and nominate another person.
- To initiate a change of proponent, the nominated proponent and proposed proponent are required to complete and submit *Post Assessment Form 1 – Application to Change Nominated Proponent*.
- The General Manager of the Office of the Environmental Protection Authority was the Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the *Environmental Protection Act 1986* at the time the Statement was signed by the Minister for Environment.

Attachment 1 to Ministerial Statement 992

Change to proposal approved under section 45C of the *Environmental Protection Act 1986*

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This Attachment replaces Schedule 1 of Ministerial Statement 992

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**Proposal: Eglinton Beach Proposal**

**Proponent: Eglinton Estates Pty Ltd**

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**Changes:**

- Reduce the area to be set for conservation from 42 ha to 41.8 ha.

**Table 1: Summary of the Proposal**

| | |
|---|---|
| Proposal Title | Eglinton Beach Proposal |
| Short Description | The proposal is for the development of residential, commercial and public open space land uses, a single entrance marina and the management of conservation areas on Lot 5000 and Part Lot 5001 Pipidinny Road and Part Lot 9005 Marmion Ave, Eglinton. |

**Table 2: Location and authorised extent of physical and operational elements**

| Element | Location | Previously Authorised Extent | Authorised Extent |
|---|---|---|---|
| Terrestrial Elements: Clearing and disturbance for:<br>• Urban/Commercial development;<br>• Drainage; and<br>• Public Open Space. | Refer Figure 1 | Clearing of not more than 246.8 ha within the development envelope. | Clearing of not more than 246.8 ha within the development envelope. |
| Conservation areas to be set aside and managed for Conservation through:<br>• Regional Open Space; and<br>• Public Open Space. | Refer Figure 1 (Conservation Areas) | Area of not less than 42 ha to be set aside for Conservation. | **Area of not less than 41.8 ha to be set aside for Conservation.** |
| Marine Elements: Construction and Operation of:<br>• Marina; and<br>• Breakwaters. | Refer Figure 1 | Marina waterbody area of not more than 9.9 ha.<br>Reclaimed land and coastal area of not more than 20.3 ha. | Marina waterbody area of not more than 9.9 ha.<br>Reclaimed land and coastal area of not more than 20.3 ha. |

Note: Text in **bold** in Table 2 indicates a change to the proposal.

**Table 3: Abbreviations**

| Abbreviation | Term |
|---|---|
| ha | hectare |

**Figures (attached)**

Figure 1 Eglinton Beach Proposal.

[Signed 9 February 2015]

---

**Dr Paul Vogel**
CHAIRMAN
Environmental Protection Authority
under delegated authority


**Figure 1 Eglinton Beach Proposal**

Attachment 1 to Ministerial Statement 992

Change to proposal approved under section 45C of the *Environmental Protection Act 1986*

---

This Attachment replaces Schedule 1 of Ministerial Statement 992

---

**Proposal: Eglinton Beach Proposal**

**Proponent: Eglinton Estates Pty Ltd**

---

**Changes:**

- Reduce the area to be set for conservation from 42 ha to 41.8 ha.

**Table 1: Summary of the Proposal**

| | |
|---|---|
| Proposal Title | Eglinton Beach Proposal |
| Short Description | The proposal is for the development of residential, commercial and public open space land uses, a single entrance marina and the management of conservation areas on Lot 5000 and Part Lot 5001 Pipidinny Road and Part Lot 9005 Marmion Ave, Eglinton. |

**Table 2: Location and authorised extent of physical and operational elements**

| Element | Location | Previously Authorised Extent | Authorised Extent |
|---|---|---|---|
| Terrestrial Elements: Clearing and disturbance for:<br>• Urban/Commercial development;<br>• Drainage; and<br>• Public Open Space. | Refer Figure 1 | Clearing of not more than 246.8 ha within the development envelope. | Clearing of not more than 246.8 ha within the development envelope. |
| Conservation areas to be set aside and managed for Conservation through:<br>• Regional Open Space; and<br>• Public Open Space. | Refer Figure 1 (Conservation Areas) | Area of not less than 42 ha to be set aside for Conservation. | **Area of not less than 41.8 ha to be set aside for Conservation.** |
| Marine Elements: Construction and Operation of:<br>• Marina; and<br>• Breakwaters. | Refer Figure 1 | Marina waterbody area of not more than 9.9 ha.<br>Reclaimed land and coastal area of not more than 20.3 ha. | Marina waterbody area of not more than 9.9 ha.<br>Reclaimed land and coastal area of not more than 20.3 ha. |

Note: Text in **bold** in Table 2 indicates a change to the proposal.

**Table 3: Abbreviations**

| Abbreviation | Term |
|---|---|
| ha | hectare |

**Figures (attached)**

Figure 1 Eglinton Beach Proposal.

[Signed 9 February 2015]

---

**Dr Paul Vogel**
CHAIRMAN
Environmental Protection Authority
under delegated authority


**Figure 1 Eglinton Beach Proposal**

# ATTACHMENT 3

# MRS AMENDMENT – EPA DECISION ON ASSESSMENT

Office of the
**Environmental Protection Authority**

**S48A Referrals**

| | | | |
|---|---|---|---|
| **Scheme Title:** | Metropolitan Region Scheme Amendment 1284-57 | | **Determination:** Scheme Not Assessed: No Advice Given (no appeals) |
| **Location:** | Lots 5000 and 5001 Pipidinny Road Eglinton | | |
| **Ref ID:** | CMS14157 | | |
| **Date Received:** | 21-01-2015 | **Date Sufficient Information Received:** | |
| **Referror:** | | | |
| **Responsible Authority:** | Western Australian Planning Commission | | **Procedure:** |
| **Contact:** | Mr Tim Hillyard | | |
| **Telephone:** | 65519000 | | |
| **Environmental Factors:** | Flora and Vegetation | | **Chairman's Initials:** |
| **Potential Significant Effects:** | Loss of flora, vegetation and dune systems through clearing for development. | | |
| **Management:** | Flora, vegetation and dune systems are to be managed under the approved Conservation Area Management Plan as required by Ministerial Statement No. 992. | | **Date Signed:** 11-2-15 |

# ATTACHMENT 4

# EPBC APPROVAL 2010/5777

Australian Government

Department of Sustainability, Environment, Water, Population and Communities

**Approval**

**Eglinton Estates Residential Development, Lot 1007 & Part Lot 1008, Pipidinny Road, Eglinton, WA (EPBC 2010/5777)**

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** | Eglinton Estates Pty Ltd |
| **proponent's ACN (if applicable)** | ABN: 48 009 460 397 |
| **proposed action** | The clearing of approximately 298 ha of native vegetation for the urban development of Lot 1007 and the eastern portion of Lot 1008, Pipidinny Road, Eglinton, WA, [See EPBC Act referral 2010/5777], within the footprint shown as a blue dotted line in Attachment A. |

**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 28 February 2038.

**Decision-maker**

| | |
|---|---|
| **name and position** | Barbara Jones<br>Assistant Secretary<br>North, West and Offshore Assessment Branch |
| **signature** | |
| **date of decision** | 30/4/ 2013 |

## Conditions attached to the approval

1. Within 30 days after the **commencement** of the action, the person taking the action must advise the **department** in writing of the actual date of **commencement**.

2. The person taking the action 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 person taking the action must publish a report on their website addressing compliance with the conditions of this approval over the previous 12 months, including implementation of any management plans as specified in the conditions. Non-compliance with any of the conditions of this approval must be reported to the **department** at the same time as the compliance report is published.

4. Upon the direction of the **Minister**, the person taking the action 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. If the person taking the action wishes to carry out any activity otherwise than in accordance with the management plans as specified in the conditions, the person taking the action must submit to the **department** for the **Minister's** written approval a revised version of that management plan. The varied activity shall not commence until the **Minister** has approved the varied management plan in writing. The **Minister** will not approve a varied management plan unless the revised management plan would result in an equivalent or improved environmental outcome over time. If the **Minister** approves the revised management plan, the revised management plan must be implemented in place of the management plan originally approved.

6. If the **Minister** believes that it is necessary or convenient for the better protection of listed threatened species to do so, the **Minister** may request that the person taking the action make specified revisions to the management plan/s specified in the conditions and submit the revised management plan/s for the **Minister's** written approval. The person taking the action must comply with any such request. The revised approved management plan/s must be implemented. Unless the **Minister** has approved the revised management plan/s, then the person taking the action must continue to implement the management plan/s originally approved, as specified in the conditions.

7. If, at any time after 5 years from the date of this approval, the person taking the action has not **substantially commenced** the action, then the person taking the action must not **substantially commence** the action without the written agreement of the **Minister**.

8. Unless otherwise agreed to in writing by the **Minister**, the person taking the action must publish all management plans referred to in these conditions of approval on their website. Each management plan must be published on the website within 1 month of being approved.

9. To mitigate impacts to Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*), the person taking the action must not **clear** any land that is proposed to be **retained** that is also habitat for Carnaby's Black Cockatoo, (as shown in Attachment B).

10. To protect and enhance habitat for **listed threatened species** that is **retained** on the proposal site, the person taking the action must:

    (a) prepare and submit, within 12 months of the date of this approval, a *Conservation Management Plan* detailing management of habitat for **listed threatened species** that is **retained** on the **proposal site** for the **Minister**'s approval. The plan must include:

        i. measures to physically delineate (through fencing or other means) areas that will be **retained**;

        ii. erosion and dust control measures during construction;

        iii. the management of weeds, *Phytophthora* dieback, bushfire and feral animals;

        iv. identification of any degraded habitat for **listed threatened species** and **revegetation** of those areas;

        v. a monitoring program for **listed threatened species** and their habitat;

        vi. performance indicators and corrective actions;

        vii. roles and responsibilities;

        viii. time frames for the implementation of the above measures; and

        ix. how condition 10(b) will be implemented, including who will be responsible for the long-term management of the **retained** land, and how the land will protected in the long-term.

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

    (b) within 5 years of the **substantial commencement** of the action, the person taking the action must provide the **department** with written evidence, including certificates of title, that the 'POS Conservation' areas (marked in green in Attachment A) has been transferred to the City of Wanneroo for the purpose of conservation.

11. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must fully implement the **revegetation** of at least 12.7 ha of native vegetation (including **primary feeding plants** for Carnaby's Black Cockatoo) in the Yellagonga Regional Park (in consultation with the **DEC**) using seed and topsoil collected in accordance with the *Clearing and Revegetation Management Plan* required under condition 12.

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

    (a) a commitment to the staged collection of native seed prior to **clearing**, and collection of topsoil following clearing, from within Carnaby's Black Cockatoo foraging habitat as shown in Attachment B (checked in black, but excluding those areas shaded green in Attachment B), for use in **revegetation**;

    (b) a commitment to store native seed and topsoil, and transport it to a receiving site(s) where **revegetation** is being undertaken by the **DEC** or another receiving party (or parties), and at least 50% of the collected seed and topsoil must be used within 20 km of the **proposal site**;

(c) detailed protocols for staged collection and use of native seed and topsoil required by conditions 12(a) and 12(b) to be developed in consultation with an **independent revegetation expert** (approved in writing by the department) and the **DEC** or other receiving party (or parties) including:

i. the optimal methodology for native seed and topsoil collection from the **proposal site**;

ii. how clearing will be staged to best harvest utilise the native seed and topsoil resource for **revegetation**;

iii. how native seed and topsoil will be stored and transported,

iv. measures to manage any topsoil from the site that contains invasive weeds (at a level that makes that soil not suitable for use in **revegetation**) or soil infestations such as *Phytophora*; and

v. onsite supervision and implementation monitoring mechanisms.

(d) a commitment to **revegetate** at least 1.9 ha of native vegetation within Public Open Space on the **proposal site**;

(e) methodology for **revegetation**, both on-site, and in Yellagonga Regional Park (as required under condition 11), using native seed and topsoil collected in accordance with the protocols required by condition 12(c), along with:

i. survival targets proposed for plantings;

ii. performance indicators and corrective measures;

iii. roles and responsibilities; and

iv. timeframes for the implementation and management of the above measures.

(f) a commitment for at least 50% of plantings for trees and shrubs in street-scaping to consist of plants known to be **primary feeding plants** for Carnaby's Black Cockatoo. Site selection for street-scaping 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. To offset the loss of habitat for Carnaby's Black Cockatoo, within 12 months of the date of this approval, the person taking the action must:

(a) provide monies to the **DEC** to fully fund the acquisition of:

i. an offset property that contains at least 850 ha of good quality foraging habitat for Carnaby's Black Cockatoo, that is within the 'Regans Ford' locality according to Landgate's WA Atlas; or

ii. another parcel of land approved in writing by the **department**; and

(b) provide the **department** with a textual description and map clearly defining the location and boundaries of the offset property described in condition 13(a), which must be accompanied with the **offset attributes** and a **shapefile**.

14. The person taking the action must not undertake any **clearing** of habitat for Carnaby's Black Cockatoo (as shown in Attachment B hatched in black) apart from of the area outlined in yellow in Attachment D, unless:

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

(b) for each proposed clearing stage, the **department** has been provided written evidence that the **DEC** or other receiving party (or parties) agree(s) to utilise the seed and soil for the purposes of **revegetation** in accordance with the protocols developed under condition 12(c).

15. To mitigate impacts to the Graceful Sun Moth (*Synemon gratiosa*) and offset the loss of habitat for that species, the person taking the action must:

    (a) not **clear** any land that is proposed to be **retained** that is also habitat for the Graceful Sun Moth (as shown in Attachment C);

    (b) provide monies to the **DEC** to maintain and improve the quality of at least 180 ha of Graceful Sun Moth habitat within the Wilbinga Conservation Park. This funding must be adequate to fully fund, for a period of 20 years, all management actions deemed necessary by the **DEC** to mitigate known threats to Graceful Sun Moths and their habitat; and improve habitat quality through **revegetation** or restoration. All funding must be provided within 12 months of the date of this approval; and

    (c) prepare and submit, within 6 months of the date of this approval, a *Wilbinga Conservation Park Graceful Sun Moth Habitat Management Funding Plan* (the plan) detailing how condition 15(b) will be satisfied, for the **Minister**'s approval. The plan must include:

        i. what management actions are likely to be funded;

        ii. the amount of funding that will be provided;

        iii. written evidence that the **DEC** agree that the funding is adequate for them to undertake the management actions.

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

**Definitions**

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

Construction includes any preparatory works required to be undertaken including the erection of any onsite temporary structures and the use of heavy duty equipment for the purpose of breaking the ground for buildings or infrastructure.

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

DEC is the Western Australian Government's Department of Environment and Conservation (or equivalent agency).

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*.

Independent revegetation expert. A scientist with relevant qualifications and expertise in best-practise **revegetation** (including the use of native seed and topsoil in **revegetation**), who is not affiliated with the person taking the action.

Listed Threatened Species are species listed under the EPBC Act including Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and the Graceful Sun Moth (*Synemon gratiosa*).

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

Offset attributes means an '.xls' file 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.

Primary feeding plants for Carnaby's Black Cockatoo include: any *Banksia*; any plants identified in a relevant search of the **DEC**'s Plants for Carnaby's Search Tool (at http://www.dec.wa.gov.au/management-and-protection/threatened-species/5983-plants-for-carnabys-search-tool.html; or other plants approved in writing by the **Department**.

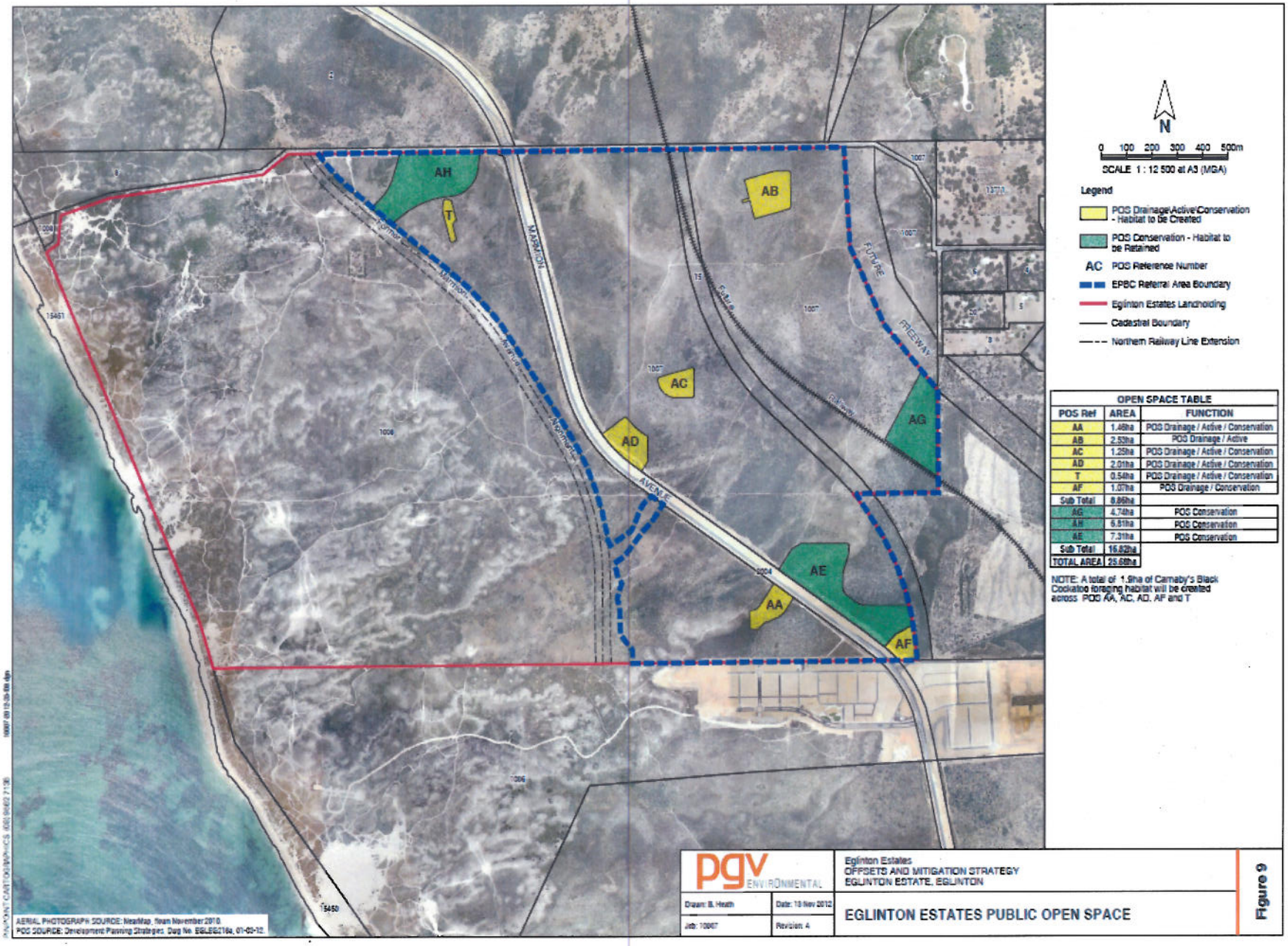
Proposal site is the area shown at Attachment A as EPBC Referral Area Boundary.

Retained land means: the 'POS Conservation' areas marked in green 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.

# Attachment A




| OPEN SPACE TABLE | | |
|---|---|---|
| POS Ref | AREA | FUNCTION |
| AA | 1.46ha | POS Drainage / Active / Conservation |
| AB | 2.52ha | POS Drainage / Active |
| AC | 1.25ha | POS Drainage / Active / Conservation |
| AD | 2.01ha | POS Drainage / Active / Conservation |
| T | 0.54ha | POS Drainage / Active / Conservation |
| AF | 1.07ha | POS Drainage / Conservation |
| Sub Total | 8.86ha | |
| AG | 4.74ha | POS Conservation |
| AH | 6.81ha | POS Conservation |
| AE | 7.31ha | POS Conservation |
| Sub Total | 16.82ha | |
| TOTAL AREA | 25.68ha | |

NOTE: A total of 1.9ha of Carnaby's Black Cockatoo foraging habitat will be created across POS AA, AC, AD, AF and T

AERIAL PHOTOGRAPH SOURCE: Nearmap, from November 2010.
POS SOURCE: Development Planning Strategies. Dwg No. EGLEG216a, 01-03-12.

pgv ENVIRONMENTAL

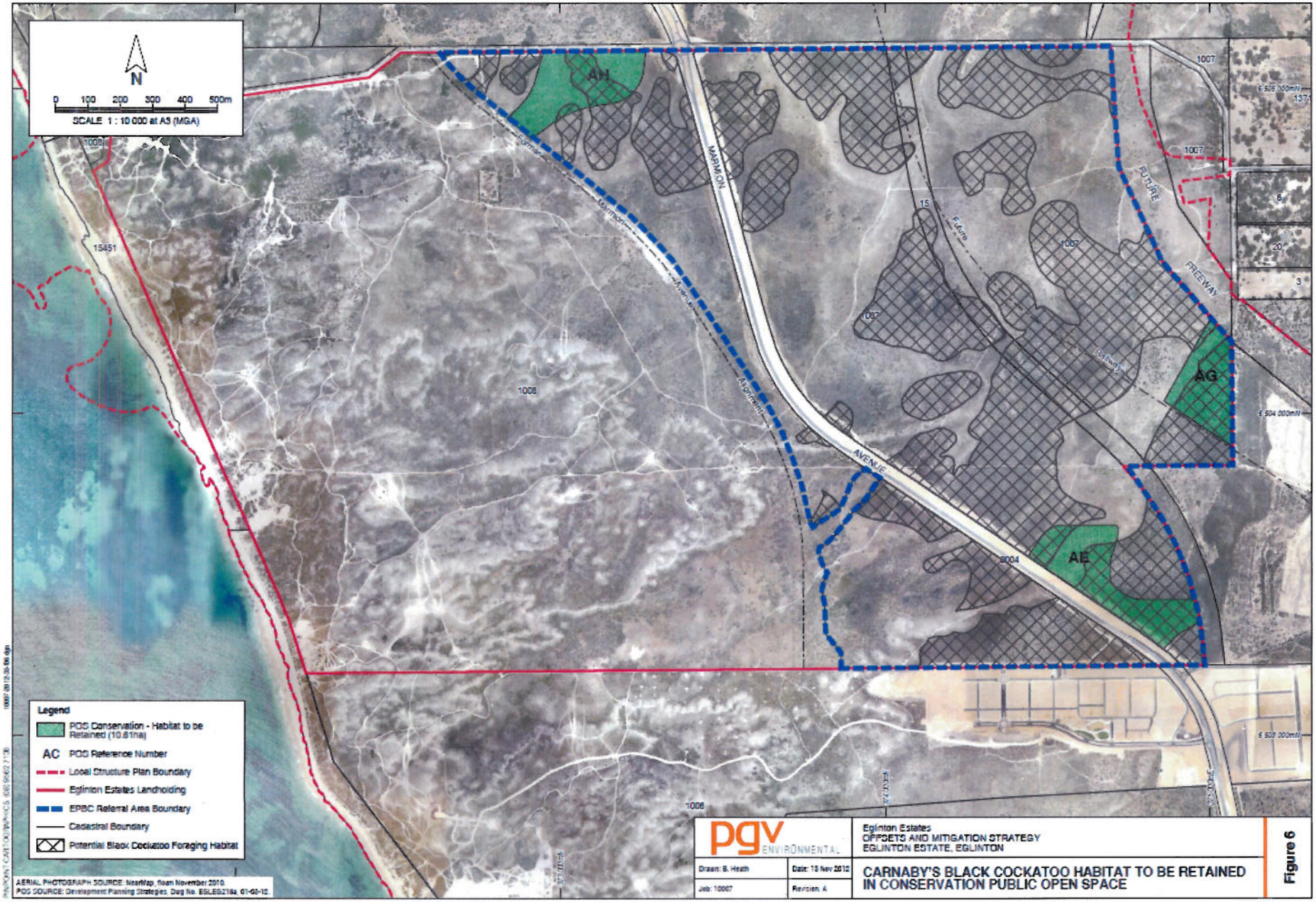
Drawn: B. Heath | Date: 19 Nov 2012
Job: 10907 | Revision: 4

Eglinton Estates
OFFSETS AND MITIGATION STRATEGY
EGLINTON ESTATE, EGLINTON

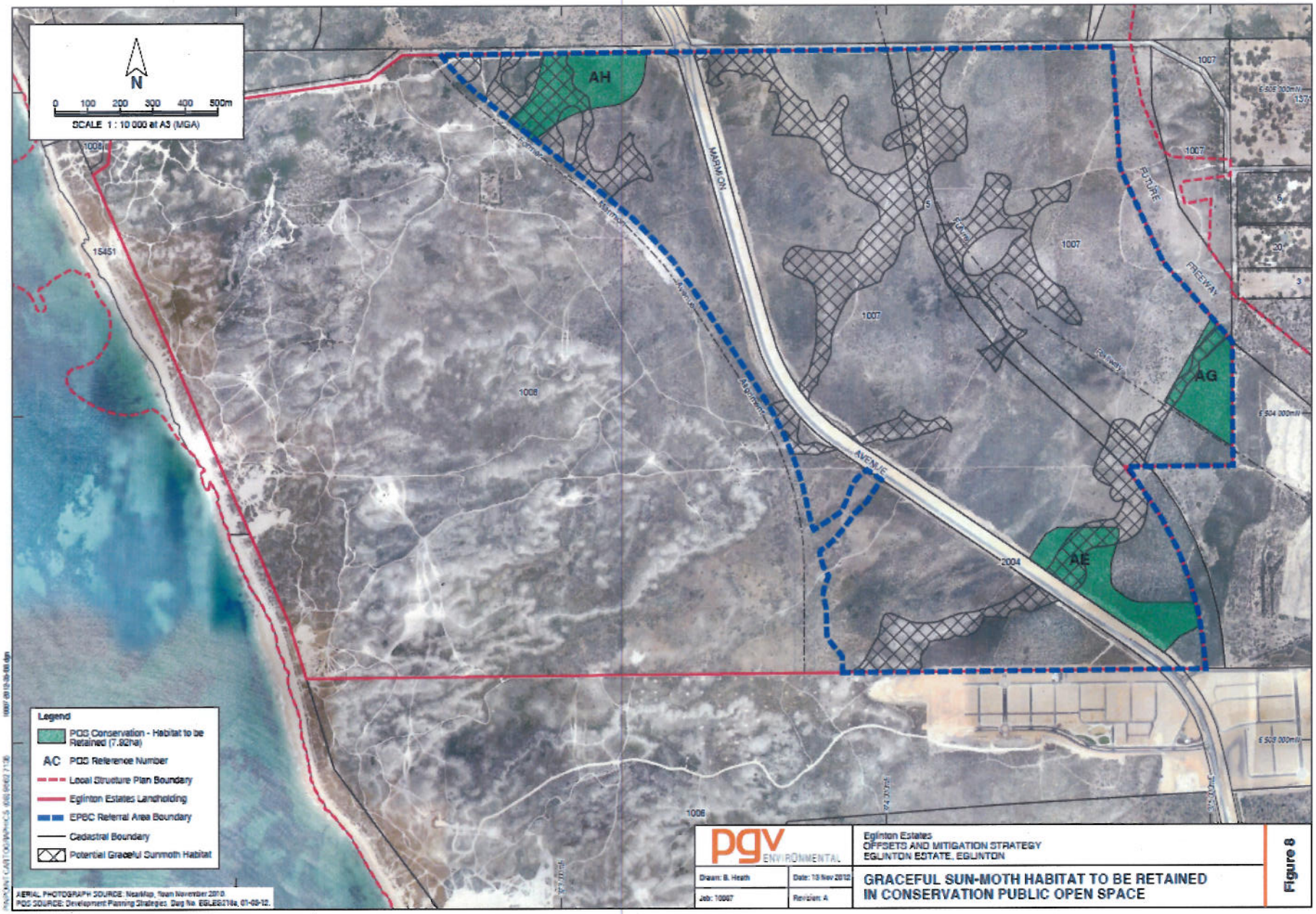
EGLINTON ESTATES PUBLIC OPEN SPACE

Figure 9

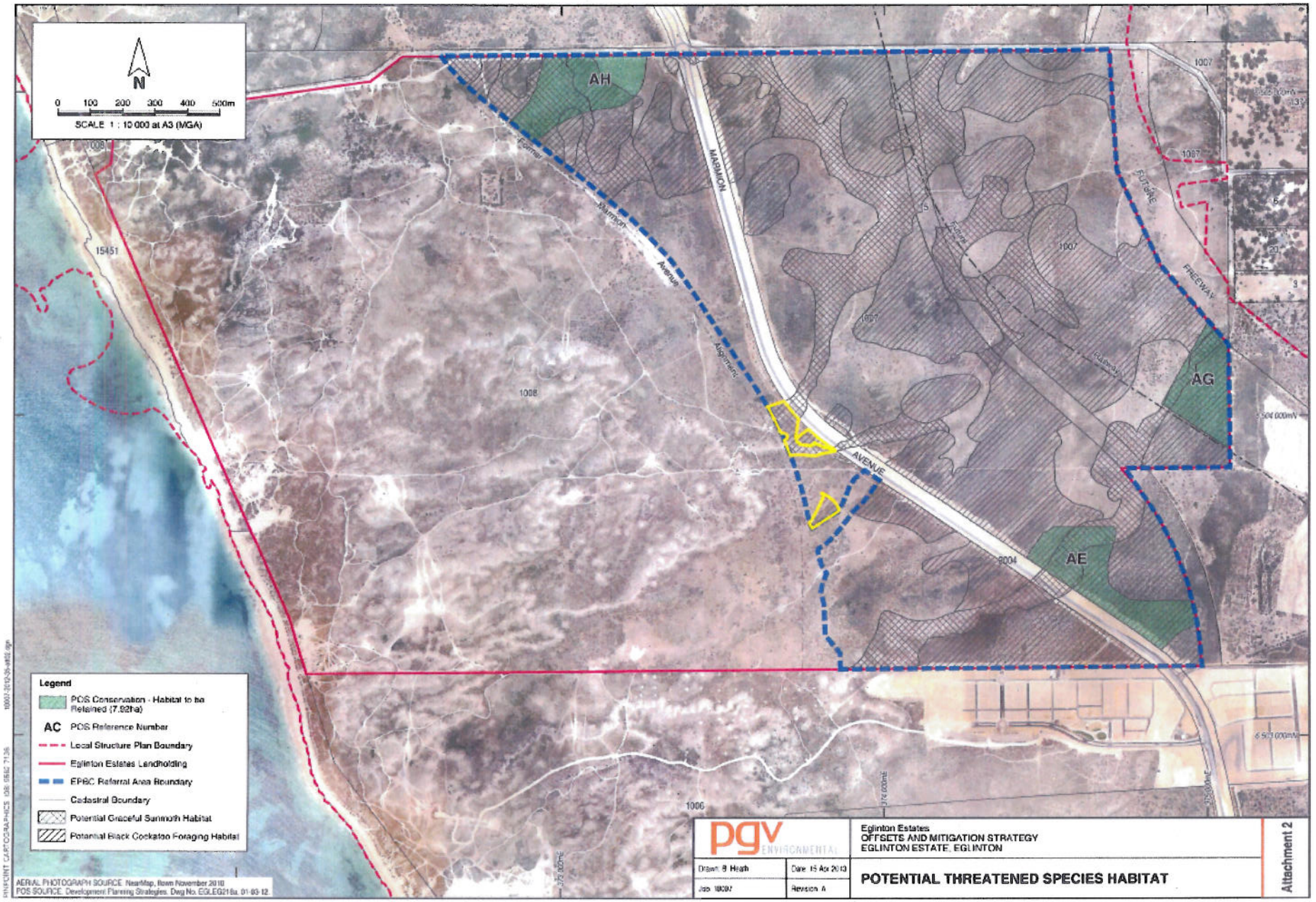
# Attachment B



# Attachment C



# Attachment D



# ATTACHMENT 5

# EPBC DECISION ON ASSESSMENT FOR AMBERTON AND EGLINTON BEACH

Australian Government
Department of the Environment

**Notification of**

**REFERRAL DECISION – not controlled action**
**Amberton West Urban Development, Part Lot 9005, Marmion Ave, Eglinton, WA (EPBC 2013/7068)**

This decision is made under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

**Proposed action**

| | |
|---|---|
| **person named in the referral** | Stockland WA Development Pty Ltd<br>ABN: 16 000 097 825 |
| **proposed action** | To clear native vegetation for the urban development of Part Lot 9005, Marmion Ave, Eglinton, WA; as described in the referral received by the Department on 25 November 2013 [See EPBC Act referral 2013/7068]. |

**Referral decision: not a controlled action**

| | |
|---|---|
| **status of proposed action** | The proposed action is not a controlled action. |

**Person authorised to make decision**

| | |
|---|---|
| **name and position** | Victoria Press<br>A/g Assistant Secretary<br>North, West and Offshore Assessment Branch |
| **signature** | Victoria Press |
| **date of decision** | 19 December 2013 |

Australian Government
Department of the Environment

**Notification of**

## REFERRAL DECISION – not controlled action

**Residential development, Lot 5000 & part Lot 5001, Pipidinny Road, Eglinton West, Western Australia (EPBC 2014/7137)**

This decision is made under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

**Proposed action**

| | |
|---|---|
| **person named in the referral** | Eglinton Estates Pty Ltd<br>ABN: 48 009 460 397 |
| **proposed action** | To undertake a residential development on Lot 5000 & part Lot 5001, Pipidinny Road, Eglinton West, Western Australia; as described in the referral received by the Department on 24 February 2014 [See EPBC Act referral 2014/7137]. |

**Referral decision: not a controlled action**

| | |
|---|---|
| **status of proposed action** | The proposed action is not a controlled action. |

**Person authorised to make decision**

| | |
|---|---|
| **name and position** | Dr Simon Banks<br>Assistant Secretary<br>West Assessment Branch |
| **signature** | Simon Banks |
| **date of decision** | 25 March 2014 |

# ATTACHMENT 6

# PROPOSED EGLINTON LOCAL STRUCTURE PLAN AMENDMENT


## NOTES

1) An easement of up to 32 metres may be required for the proposed 132kV overhead transmission line. This may have implications on adjacent land uses. Final width of the easement and the location of the substation will need to be confirmed as part of the future structure planning of Centre Zones.

2) Location of the proposed Water Corporation Groundwater Bore Sites and associated 300 metre Well Head Protection Zones is indicative only, to be confirmed at subdivision stage.

## LEGEND

**ZONES**
- Residential
- Centre
- Commercial
- Mixed Use

**RESERVES**
- Parks & Recreation
- Railway

**MOVEMENT**
- Railway Station
- Primary Distributor
- Integrator Arterial (A)
- Integrator Arterial (B)
- Neighbourhood Connector
- Coastal Road
- Light Controlled Intersection
- Special Transit System/ Indicative Bus Stops
- Principal Shared Path
- Shared Path
- Regional Foreshore Shared Path
- Social/Pedestrian/Cyclist Linkages

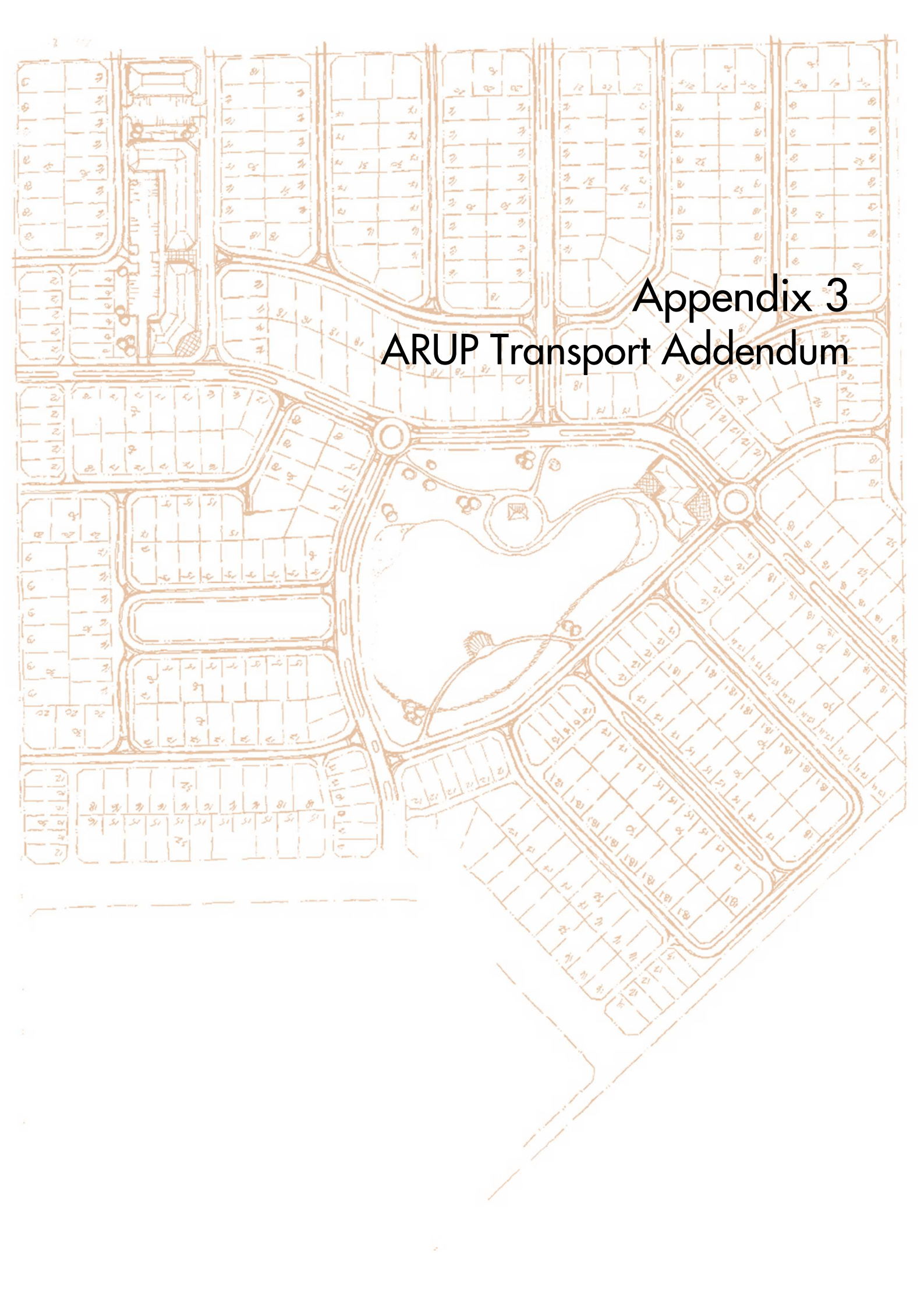
**OTHER**
- Eglinton Local Structure Plan Boundary
- Proposed 132kV Transmission Line
- Proposed Zone Substation
- Primary School
- Possible Private School
- Inclusive School - Kindergarten to year 12
- Centre 1 - Eglinton Marina Centre
- Centre 2 - Neighbourhood Centre
- Centre 3 - Neighbourhood Centre
- Centre 4 - District Activity Centre
- Indicative Strategic Open Spaces
- Regional Road Drainage
- Possible Beachside Restaurant/ Cafe/Corner Store
- Proposed Water Corporation Groundwater Bore Sites
- 300 metre Well Head Protection Zones
- Possible Foreshore Recreation Development Node
- Walkable Catchment (400m - 5 min walk)
- Walkable Catchment (800m - 10 min walk)
- R-Code Boundary

NORTH

0 100 500m

Plan No: EGLEG191h • Date: 30/06/2016 • Not to Scale@A3

Note: All areas and dimensions subject to detail survey.



# Appendix 3
# ARUP Transport Addendum

# Technical Note

ARUP

Level 7 Wellington Central
836 Wellington Street
West Perth 6005
Australia
www.arup.com

**t** +61 8 9327 8300
**f** +61 8 9481 1334

| | | | |
|---|---|---|---|
| Project title | Amberton Traffic Analysis | Job number | 236727-00 |
| cc | Tom Barry, Stockland<br>Luke Coyle, Cossill & Webley | File reference | RF |
| Prepared by | Ryan Falconer | Date | 11 May 2015 |
| Subject | Analysis of intersection of Heath Av and Cinnabar Dr: addition of fourth leg and review of control treatment | | |

# 1 Introduction

Stockland commissioned Arup to assess the impacts of addition of a fourth leg to the intersection of Heath Avenue and Cinnabar Drive in Amberton, and recommend ultimate (year 2031) intersection geometry and control. Previous transport assessments for Amberton (e.g. as part of structure planning and for the first subdivision) analysed the subject intersection as a three-way with Cinnabar Drive (east-west) terminating at Heath Avenue (north-south). It was assumed that there could be a fourth leg to this intersection at some point in the future but if this was to be constructed, it would be a lower order access street.

In particular, Arup's brief was to assess whether a single-lane roundabout would operate satisfactorily. On 15 April, Arup received correspondence from Main Roads WA specifying that:

*"Main Roads* [sic] *latest advice is that in order to install traffic signals, proof is required that other intersection controls such as a roundabout or simple give way control, will not work. This has to be proved with SIRDA* [sic] *models comparing the different types of control. If the SIRDA* [sic] *showed that a roundabout and signals would operate with a similar Level of Service, then the roundabout would be deemed suitable. It would have to be proved that the roundabout would not work.*

*Additionally, the warrants for signal installation must be met at the time of commissioning, not for when the development is complete. If it is considered that the signals will be warranted in several years, then the developer should take this into consideration. At the planning stage, it is advisable to include the appropriate road reserve for roundabouts."*

The current Technical Note reports on the three-step process applied by Arup to account for the addition of the fourth leg, facilitate updated intersection analysis and form relevant recommendations. The process included:

- Revision to the Emme strategic daily traffic model developed originally for the Alkimos-Eglinton District Structure Plan (DSP) and refined since for the Eglinton Local Structure Plan (LSP). The revision included changes to the network modelled

- Generation of daily traffic demands at the subject intersection and estimates of peak hour demands
- Application of these metrics in SIDRA software to forecast intersection performance.

The remainder of the Technical Note is structured as follows:

Section 2 – Background

Section 3 – Strategic Model Updates

Section 4 – Revised Movement Network

Section 5 – Intersection Analysis

Section 6 – Findings and Recommendations

# 2 Background

In 2008, the Alkimos-Eglinton DSP was approved by the City of Wanneroo and subsequently in 2010 by the Western Australian Planning Commission. Sinclair Knight Merz (SKM) (now Jacobs) was commissioned to provide transport consultancy and modelling services as part of preparation of the DSP and the scope of work included development of an Emme daily traffic model.

The Emme is strategic and contains a 'gravity' model for trip distribution that then assigns demands on a prescribed network according to the characteristics of that network, traffic demands forecast in association with internal land use, external origins and destinations, and assumed through-traffic. The original DSP work applied a coarse movement network (generally planned Neighbourhood Connectors and higher-order roads), befitting the macroscopic focus of a DSP.

In 2009 and 2010, the Emme model was refined to assist with preparation of the Eglinton LSP. The refinement included making finer-grained network assumptions and updating input demographics (to specify internal trip generation and attraction). SKM made some manual changes to forecast demand flows on the basis that the model was considered to be assigning some volumes illogically. The adjusted flows where then used to estimate peak hour traffic volumes at some key intersections. These intersections were not analysed in detail using the industry-recognised SIDRA software package; rather, basic capacity analysis calculations were performed manually. In November 2012 the LSP was approved by the City of Wanneroo and in February 2013 by the Western Australian Planning Commission.

In late 2010, Arup was engaged to provide transport consultancy services assisting Stockland with preparation of the first subdivision in Amberton (formerly Eglinton). Arup applied the same daily-to-peak estimation method to generate demand flows for intersection analysis associated with the subdivision. One of the intersections analysed was Heath Avenue (formerly the Secondary Transit System or STS Route) and Cinnabar Drive (formerly the East-West Connector). Analysis assumed that it would be a three-way intersection with Cinnabar Drive (east-west) terminating at Heath Avenue (north-south) (**Figure 1**). It was assumed that a fourth leg could be constructed at some future point but it would be a lower order access street.

Arup's analysis – using SIDRA - during subdivision planning focused on the AM peak hour. The AM peak hour was considered critical because of tidal traffic movements, particularly right turning movements from Cinnabar Drive on to nearby Marmion Avenue. The same intersection control treatment – traffic signals – was adopted as in the approved structure plan.

Movement summary data is shown in **Table 1**. Aside from intersection Level of Service (LoS), which is a discrete measure (LoS A or free-flow to LoS F or severe delays), SIDRA forecasts Degree of Saturation (DoS), which is a measure of the volume of traffic making a turning movement at the intersection divided by the capacity assigned to that movement (e.g. number of stand-up lanes). The operational capacity of an intersection is often considered to be DoS 0.85-0.9. Intersections can still operate within capacity with a DoS value of up to 1 (100%); however, queuing and delays tend to increase significantly above the practical threshold.

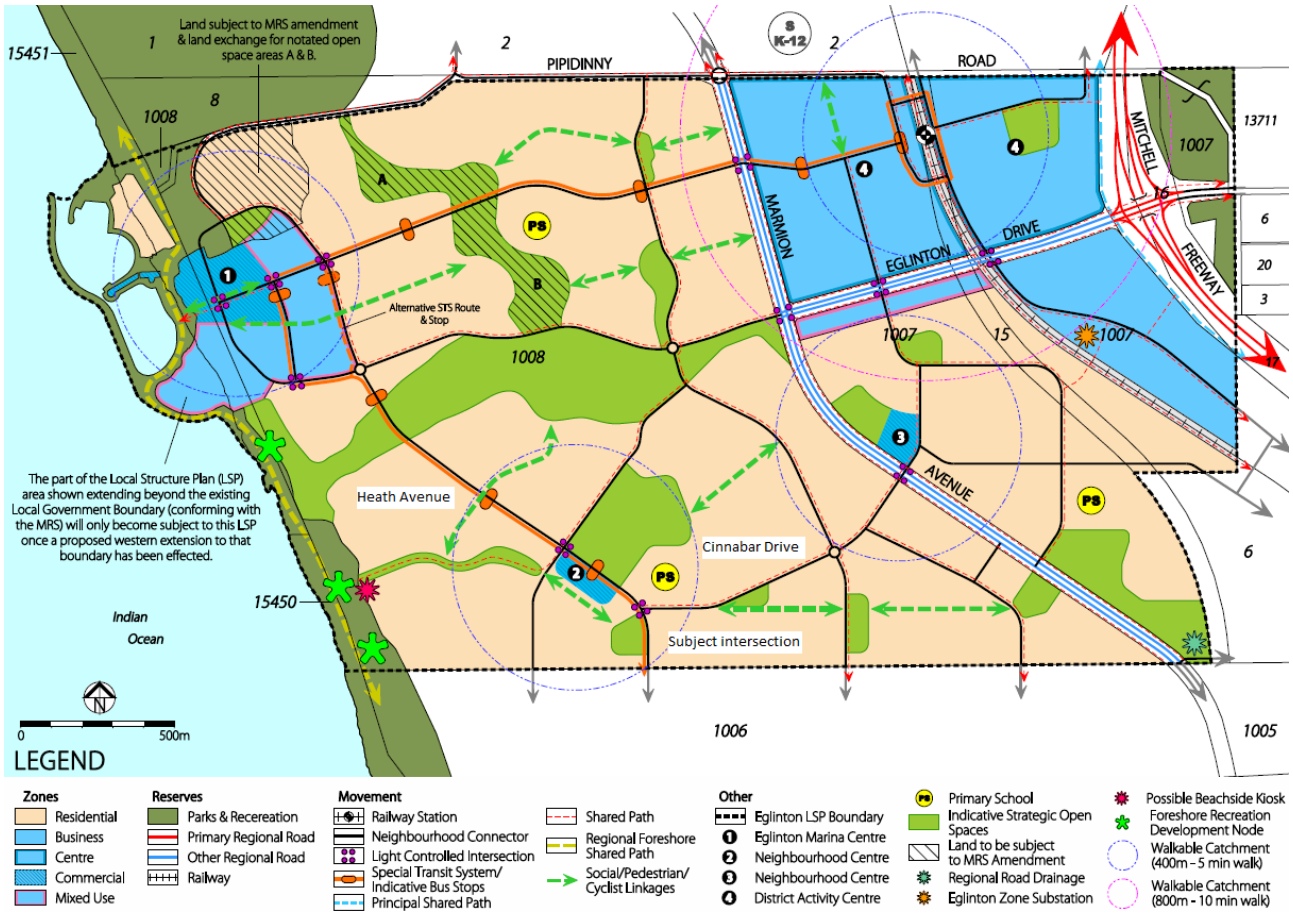



**Figure 1 – Subject intersection location (from LSP)**

(Source: DPS, July 2010)

**Table 1 – Movement summary data, intersection of Heath Avenue and Cinnabar Drive, T junction, traffic signal control, AM peak, year 2031**

| Approach | Level of Service | Degree of Saturation | 95th Percentile Back-of-Queue (m) |
|---|---|---|---|
| STS Route (Heath Av) South | C | 0.84 | 9.4 |
| STS Route (Heath Av) North | B | 0.70 | 118.1 |
| East/West Connector (Cinnabar Dr) | C | 0.64 | 100.2 |

The results demonstrated that a three-way traffic signal-controlled intersection with two stand-up lanes on each approach would suffice.

# 3 Revised Movement Network

Since 2011, there have been changes to the movement network and urban cells proposed in Amberton. In particular, changes are proposed west of Heath Avenue. **Figures 2** and **3** compare the zonal system used in the original Emme model with adjusted zone boundaries based on network changes. The figures show little material change to the quantum of land use in each zone given relatively uniform land use intensity spatially.

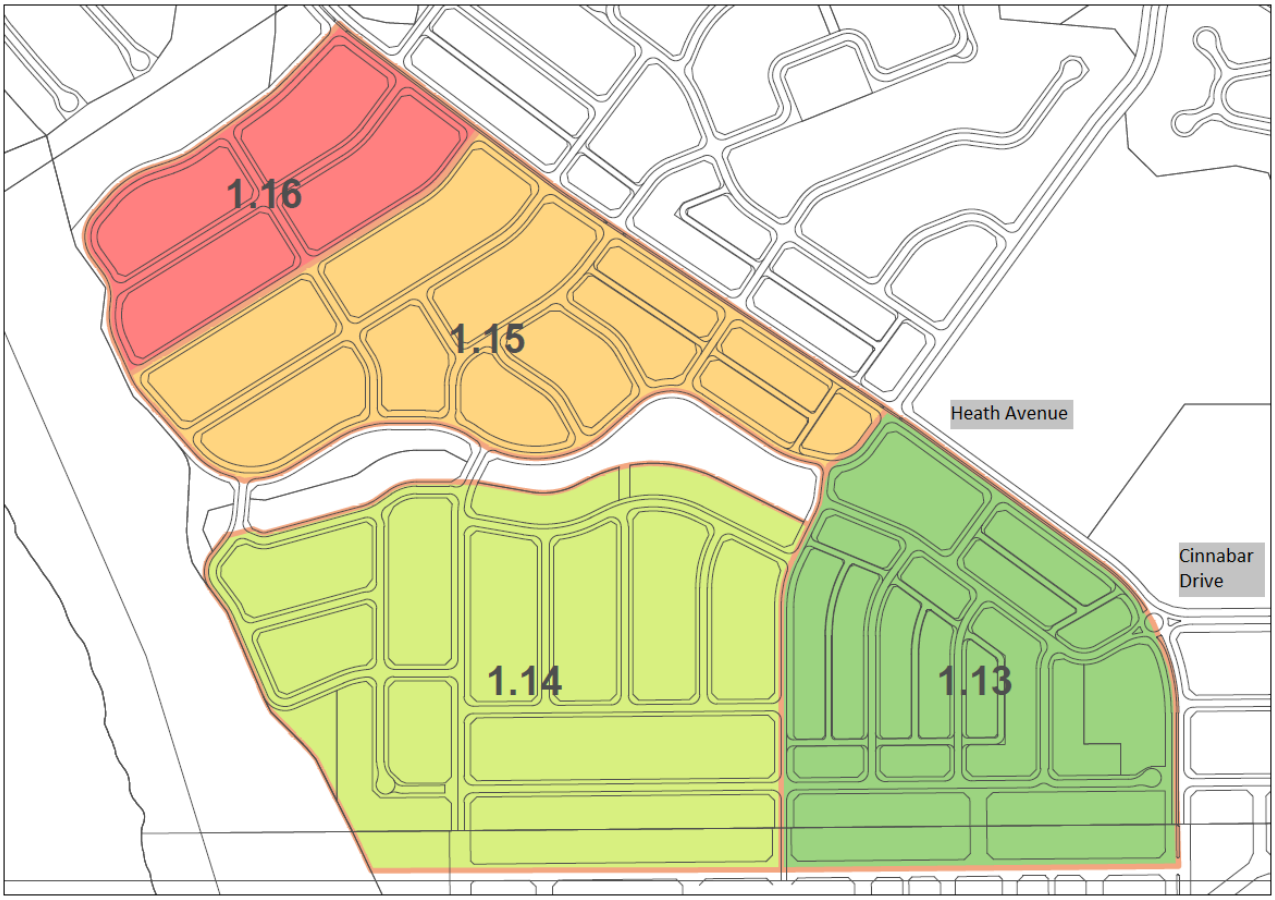



**Figure 3 – Original Emme zonal system**

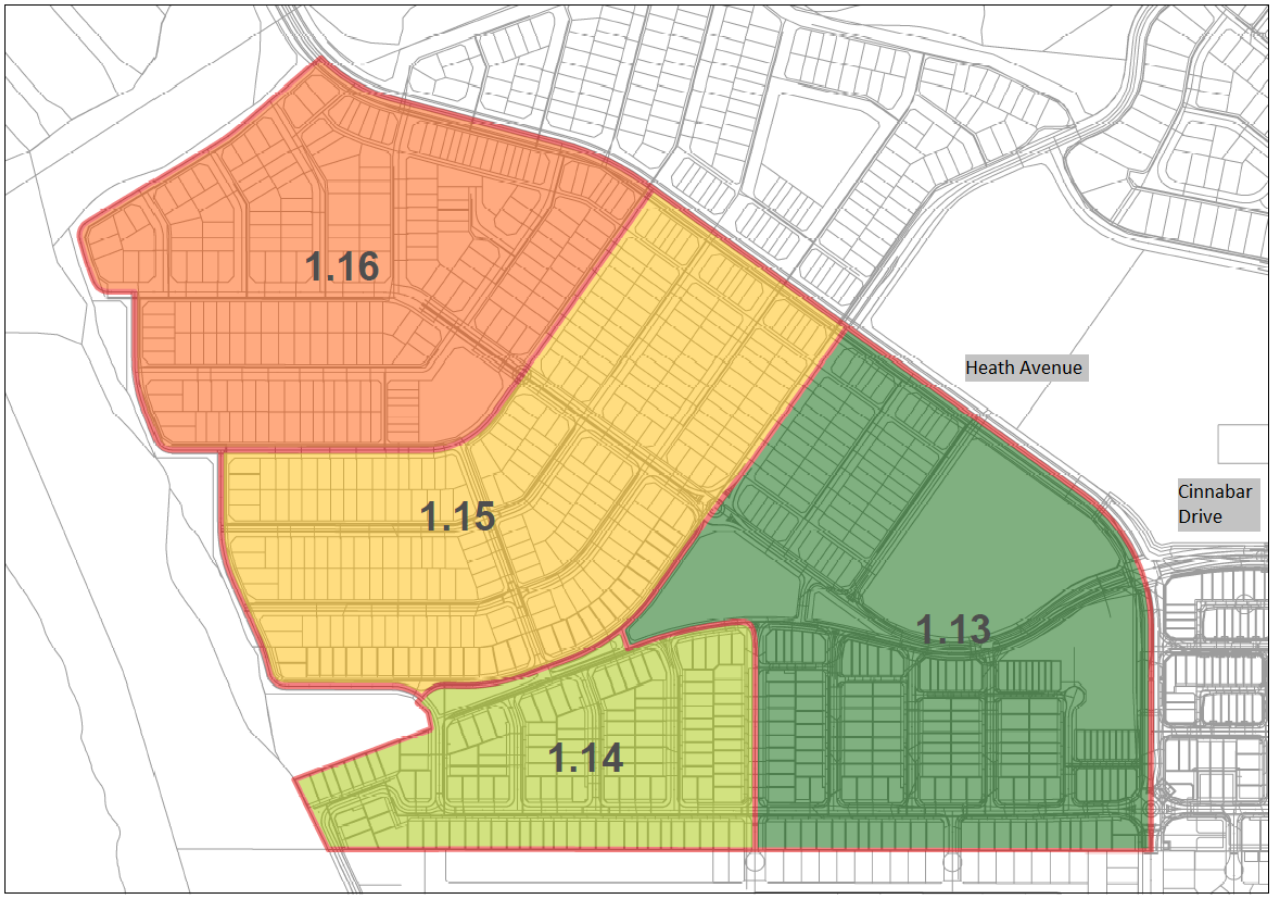



**Figure 4 – Revised Emme zonal system**

## 4 Strategic Model Updates

Arup updated the LSP Emme model by modifying centroid connectors in the zones west of Heath Avenue (**Figure 4**). Previously, there was no western connection at node 5059 (refer to **Figure 5**). The new connection to model zones 1.13 and 1.14 reflect these being where traffic is most likely to travel to and from via the western leg at the subject intersection.

Creative Design + Planning (providing planning advice to Stockland for Amberton) advised that land use forecast for zones 1.13 and 1.14 have changed in accordance with **Table 2**. The data show a reduction in residential but an increase in non-residential land use. Translated into peak hour vehicle trips, a small *reduction* in traffic could be anticipated: 125 fewer dwellings could reduce peak hour trips by about 100 while ~470 square metres of added retail could generate about 70-90 additional trips. Given the mesoscopic nature of the model and general consistency of land use data with LSP assumptions, traffic demands were not changed as part of Arup's model revision for the purposes of analysing the subject intersection.

The model revision therefore reassigns demands, only. Significantly, the centre planned west of Heath Avenue is in zone 1.13 in both the base and revision scenarios meaning centre traffic will travel through node 5059. This is important given the centre is proposed adjacent to the subject intersection whereas it was proposed further north in the LSP.

The updated Emme model was run to produce daily demands at the subject intersection. The process of estimating peak hour flows and their subsequent application in SIDRA is described in the following section.

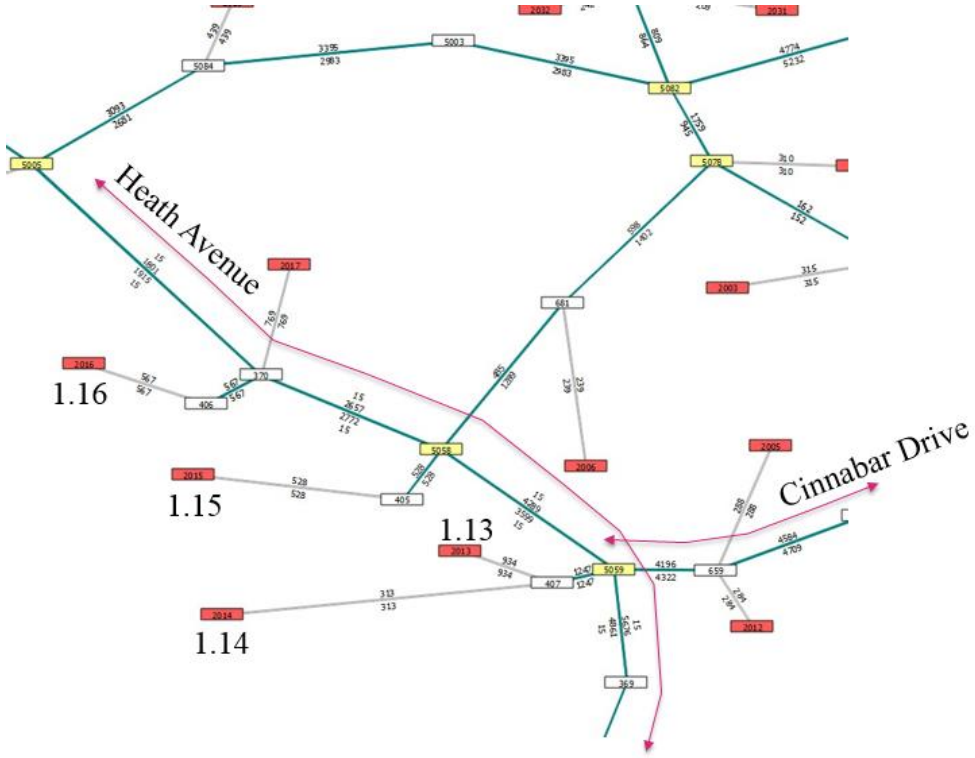



**Figure 4 – Updated Emme model zone and connector system**

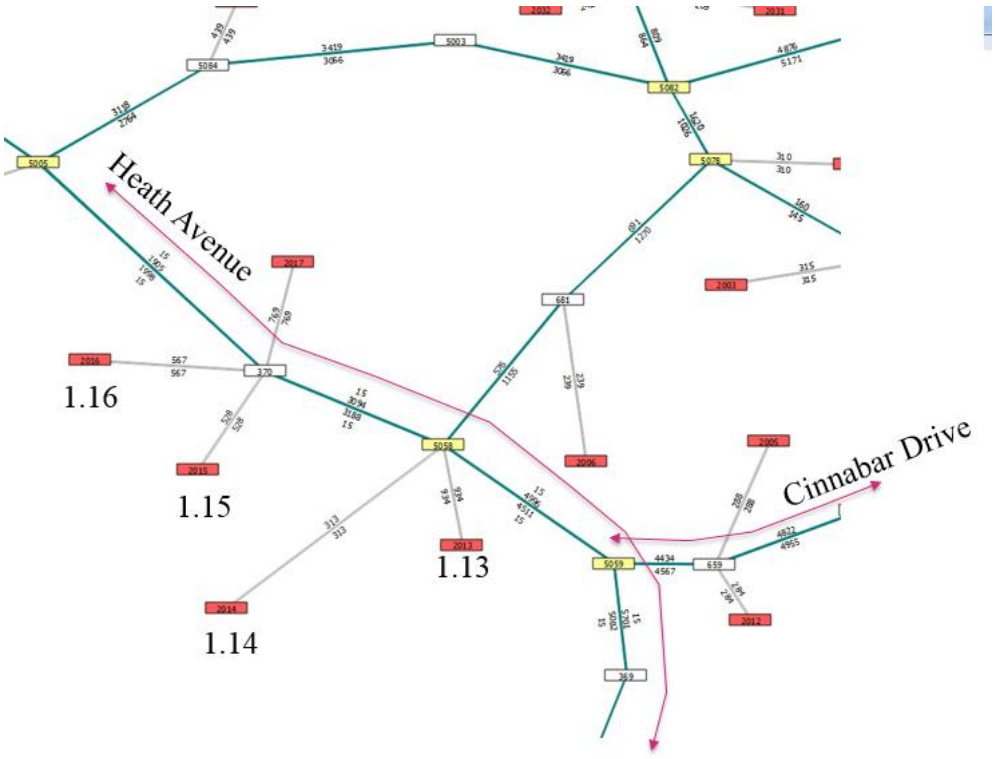



**Figure 5 – Original Emme model zone and connector system**

**Table 2 – Land use changes assumed in zones 1.13 and 1.14 (approved LSP compared to current planning)**

| Land use | Approved LSP | Current planning | Percentage change |
|---|---|---|---|
| **Residential units** | **456** | **331** | **-27%** |
| Core retail Gross Floor Area (GFA) | 1,313 | 1,730 | +32% |
| Health and community purpose (GFA) | - | 290 | -100% |
| Cafes and restaurants GFA | 168 | - | - |
| Other non-residential | 72 | - | - |
| **Total non-residential gross floor area** | **1,553** | **2,020** | **+30%** |

# 5 Intersection Analysis

Daily demand flows associated with the subject intersection were extracted from Emme. Morning and afternoon peak hour factors were then applied to forecast turning movements as per previous analytical methodology. These factors included an assumption of 9% of daily traffic using the network during peak hour and in the morning peak hour, a directional split of 2:1 southbound compared to northbound, and eastbound compared to westbound. The 2:1 split was assumed to reverse in the afternoon peak.

Additional directional split assumptions were applied to traffic using the new western leg given it provides access to a limited catchment bounded by the coastline. A 2:1 outbound versus inbound directional split was assumed in the morning and 1:4 in the afternoon. This was estimated in reflection of the mix of land uses in zones 1.13 and 1.14.

The subject intersection was analysed in SIDRA as a single-lane roundabout. The AM and PM peak hour performance metrics are summarised in **Tables 3** and **4**.

The analysis is considered robust: the quantum of traffic forecast on the western leg accords generally with what may be expected on an Access Street A or Neighbourhood Connector (B) (e.g. up to about 3,000 vehicles per day).

**Table 3 – Movement summary data, intersection of Heath Avenue and Cinnabar Drive, four-way junction, single-lane roundabout control, AM peak, year 2031**

## MOVEMENT SUMMARY

**Site: AMHeath_Cinnabar_1-lane_base**

New Site
Roundabout

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Heath south | | | | | | | | | | | |
| 1 | L2 | 5 | 2.0 | 0.409 | 4.8 | LOS A | 3.1 | 22.0 | 0.65 | 0.66 | 44.9 |
| 2 | T1 | 147 | 2.0 | 0.409 | 4.8 | LOS A | 3.1 | 22.0 | 0.65 | 0.66 | 45.9 |
| 3 | R2 | 263 | 2.0 | 0.409 | 9.3 | LOS A | 3.1 | 22.0 | 0.65 | 0.66 | 46.1 |
| Approach | | 416 | 2.0 | 0.409 | 7.6 | LOS A | 3.1 | 22.0 | 0.65 | 0.66 | 46.0 |
| East: Cinnabar east | | | | | | | | | | | |
| 4 | L2 | 358 | 2.0 | 0.765 | 12.5 | LOS B | 10.7 | 76.5 | 0.99 | 1.11 | 42.0 |
| 5 | T1 | 66 | 2.0 | 0.765 | 12.4 | LOS B | 10.7 | 76.5 | 0.99 | 1.11 | 42.9 |
| 6 | R2 | 231 | 2.0 | 0.765 | 16.9 | LOS B | 10.7 | 76.5 | 0.99 | 1.11 | 43.1 |
| Approach | | 655 | 2.0 | 0.765 | 14.0 | LOS B | 10.7 | 76.5 | 0.99 | 1.11 | 42.5 |
| North: Heath north | | | | | | | | | | | |
| 7 | L2 | 180 | 2.0 | 0.652 | 8.0 | LOS A | 6.9 | 49.2 | 0.82 | 0.85 | 45.1 |
| 8 | T1 | 453 | 2.0 | 0.652 | 8.0 | LOS A | 6.9 | 49.2 | 0.82 | 0.85 | 46.1 |
| 9 | R2 | 7 | 2.0 | 0.652 | 12.5 | LOS B | 6.9 | 49.2 | 0.82 | 0.85 | 46.3 |
| Approach | | 640 | 2.0 | 0.652 | 8.1 | LOS A | 6.9 | 49.2 | 0.82 | 0.85 | 45.8 |
| West: Cinnabar west | | | | | | | | | | | |
| 10 | L2 | 13 | 2.0 | 0.200 | 6.7 | LOS A | 1.2 | 8.8 | 0.71 | 0.73 | 45.1 |
| 11 | T1 | 104 | 2.0 | 0.200 | 6.7 | LOS A | 1.2 | 8.8 | 0.71 | 0.73 | 46.1 |
| 12 | R2 | 41 | 2.0 | 0.200 | 11.2 | LOS B | 1.2 | 8.8 | 0.71 | 0.73 | 46.3 |
| Approach | | 158 | 2.0 | 0.200 | 7.9 | LOS A | 1.2 | 8.8 | 0.71 | 0.73 | 46.1 |
| All Vehicles | | 1868 | 2.0 | 0.765 | 10.0 | LOS B | 10.7 | 76.5 | 0.83 | 0.89 | 44.7 |

**Table 4 – Movement summary data, intersection of Heath Avenue and Cinnabar Drive, four-way junction, single-lane roundabout control, PM peak, year 2031**

## MOVEMENT SUMMARY

**Site: PMHeath_Cinnabar_1-lane_base**

New Site
Roundabout

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Heath south | | | | | | | | | | | |
| 1 | L2 | 27 | 2.0 | 0.746 | 9.2 | LOS A | 10.1 | 71.6 | 0.90 | 0.94 | 43.4 |
| 2 | T1 | 351 | 2.0 | 0.746 | 9.2 | LOS A | 10.1 | 71.6 | 0.90 | 0.94 | 44.3 |
| 3 | R2 | 379 | 2.0 | 0.746 | 13.7 | LOS B | 10.1 | 71.6 | 0.90 | 0.94 | 44.5 |
| Approach | | 757 | 2.0 | 0.746 | 11.4 | LOS B | 10.1 | 71.6 | 0.90 | 0.94 | 44.4 |
| East: Cinnabar east | | | | | | | | | | | |
| 4 | L2 | 248 | 2.0 | 0.512 | 4.4 | LOS A | 4.3 | 30.6 | 0.60 | 0.59 | 45.7 |
| 5 | T1 | 145 | 2.0 | 0.512 | 4.3 | LOS A | 4.3 | 30.6 | 0.60 | 0.59 | 46.8 |
| 6 | R2 | 206 | 2.0 | 0.512 | 8.9 | LOS A | 4.3 | 30.6 | 0.60 | 0.59 | 46.9 |
| Approach | | 600 | 2.0 | 0.512 | 5.9 | LOS A | 4.3 | 30.6 | 0.60 | 0.59 | 46.4 |
| North: Heath north | | | | | | | | | | | |
| 7 | L2 | 201 | 2.0 | 0.446 | 5.7 | LOS A | 3.3 | 23.8 | 0.74 | 0.69 | 45.8 |
| 8 | T1 | 191 | 2.0 | 0.446 | 5.7 | LOS A | 3.3 | 23.8 | 0.74 | 0.69 | 46.9 |
| 9 | R2 | 17 | 2.0 | 0.446 | 10.2 | LOS B | 3.3 | 23.8 | 0.74 | 0.69 | 47.1 |
| Approach | | 408 | 2.0 | 0.446 | 5.9 | LOS A | 3.3 | 23.8 | 0.74 | 0.69 | 46.4 |
| West: Cinnabar west | | | | | | | | | | | |
| 10 | L2 | 4 | 2.0 | 0.093 | 9.5 | LOS A | 0.6 | 4.5 | 0.88 | 0.79 | 44.0 |
| 11 | T1 | 37 | 2.0 | 0.093 | 9.5 | LOS A | 0.6 | 4.5 | 0.88 | 0.79 | 45.0 |
| 12 | R2 | 6 | 2.0 | 0.093 | 14.0 | LOS B | 0.6 | 4.5 | 0.88 | 0.79 | 45.2 |
| Approach | | 47 | 2.0 | 0.093 | 10.1 | LOS B | 0.6 | 4.5 | 0.88 | 0.79 | 44.9 |
| All Vehicles | | 1813 | 2.0 | 0.746 | 8.3 | LOS A | 10.1 | 71.6 | 0.77 | 0.76 | 45.5 |

## 6 Findings and Recommendations

Analysis shows that a single-lane roundabout could operate satisfactorily in peak hours in 2031. Performance metrics are satisfactory with overall LoS forecast to be good. There is also good residual capacity meaning that if actual traffic loads on the western leg are higher – even by 50% - a single-lane roundabout would remain appropriate.

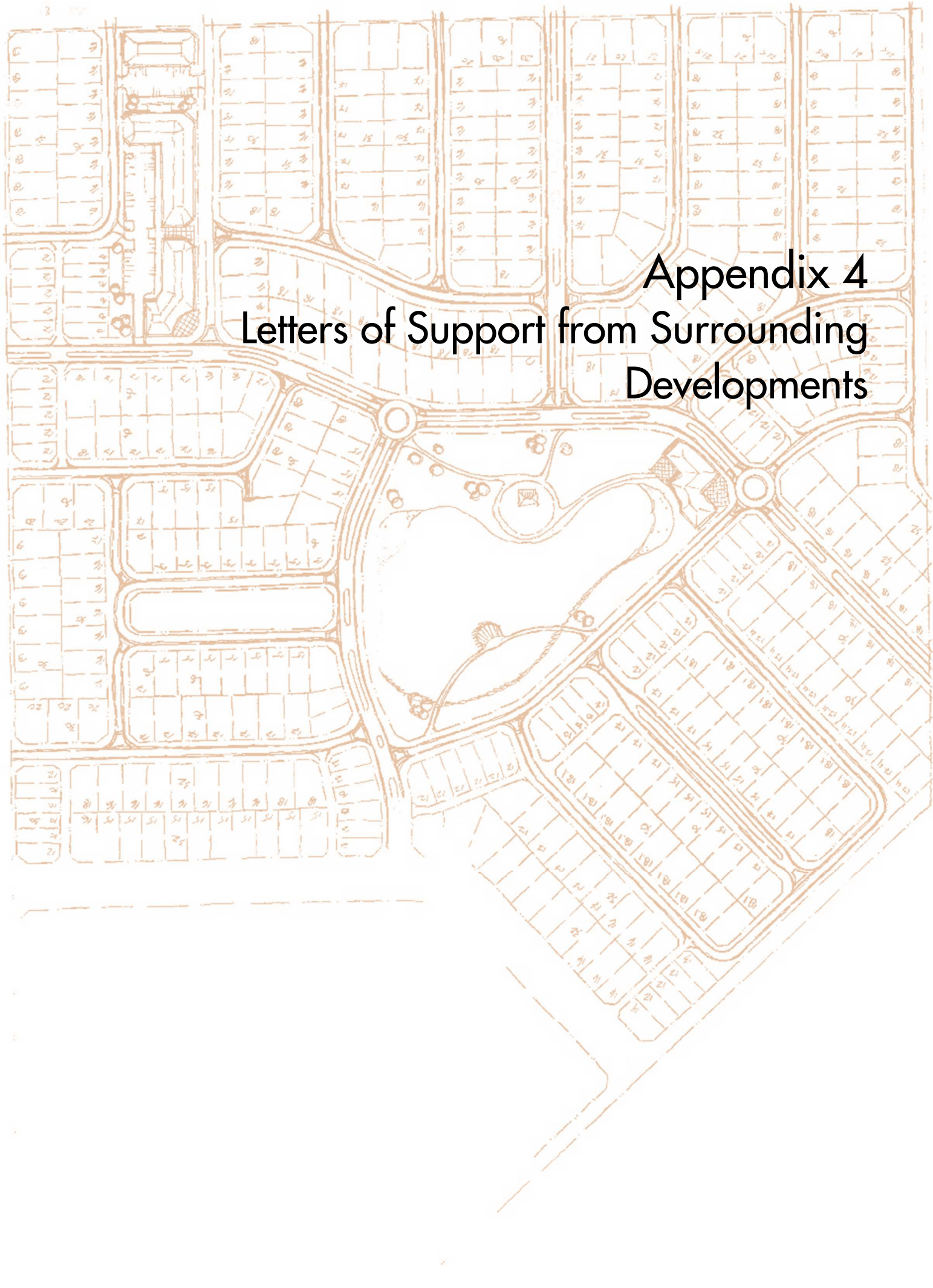
Significantly, the test year reflects build-out of Amberton and the cellular nature of the broader LSP area means that there is unlikely to be growth in background traffic beyond this build-out horizon. Furthermore, even with refinements, the Emme model represents fairly conservative traffic conditions because a relatively coarse network is modelled: e.g. many access streets are not in the model and these would carry some of the forecast traffic load in this area.

More locally, the zonal system and centroid connectors mean that traffic generated by and attracted to zones 1.13 and 1.14 use Cinnabar Drive exclusively rather than other routes that may be available in practice. Traffic could be generated by and attracted to zones other than 1.13 and 1.14, and still use Cinnabar Drive West. This traffic is not accounted for; however, the applicable volumes are not anticipated to be significant because of broader network design and route choice. For example, traffic associated with zones 1.15 and 1.16, and zones further south is unlikely generally to use Cinnabar Drive in favour of other, more direct east-west connections to the arterial road network.

Overall, the analysis demonstrates that a single-lane roundabout would e suitable, from a network performance perspective, in year 2031.

**DOCUMENT CHECKING**

| | Prepared by | Checked by | Approved by |
|---|---|---|---|
| Name | Ryan Falconer | Darryl Patterson | Darryl Patterson |
| Signature |  |  |  |



# Appendix 4
# Letters of Support from Surrounding Developments

LANDCORP

**Enquiries:** Glenn Biss 9482 7572.
**Date:** 15 June 2016

Tasio Cokis
Woodsome Management Pty ltd
10/280 Hay St
SUBIACO WA 6008

Dear Mr Cokis,

**EGLINTON ESTATES AND EGLINTON WEST LOCAL STRUCTURE PLAN INTERFACE**

Thank you for providing LandCorp and our consultants a plan of your updated local structure plan for your site fronting Pipidinny Road. LandCorp's consultants have now reviewed the layout against our recently prepared local structure plan for Eglinton West, which lies north of Pipidinny Road.

We appreciate the opportunity to work together to ensure there are no interface issues between the two land parcels. As such LandCorp confirm we have no objections to your updated local structure plan as they relate to our site and draft planning for Eglinton West.

Should you have any questions, please call me directly on 9482 7572

Yours sincerely
Glenn Biss
**Development Manager**

P. O. Box 376 Nedlands
Western Australia 6909
Tel: +61 8 9386 8753
Facs: +61 8 9386 8958
Email: gailspiers@iinet.net.au

1 August 2016

Mr Tasio Cokis
Woodsome Management Pty Ltd
10/280 Hay St
Subiaco WA 6008

Dear Mr Cokis,

EGLINTON ESTATES UPDATED LOCAL STRUCTURE PLAN

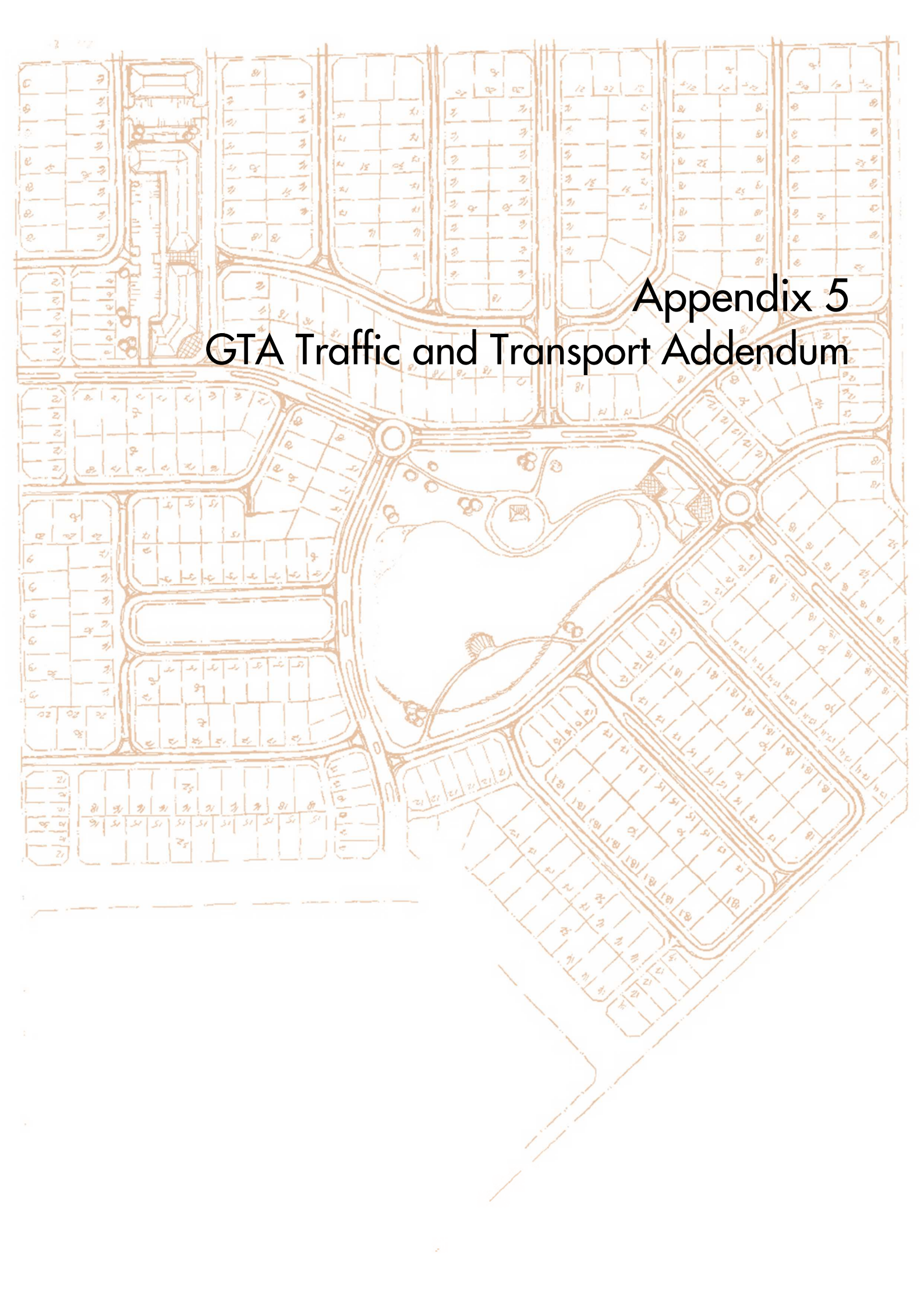
Thank you for providing me as Executor of the Estate of Lindsay William Spiers with the updated local structure plan for your site fronting the Estate's land located at 19 Taronga Place, Eglinton.

I can confirm that I have no objections to your updated local structure plan as it relates to the Estate's site.

Yours sincerely,

Gail Spiers

Gail Spiers



# Appendix 5
# GTA Traffic and Transport Addendum

Reference: #16P1072000

24 June 2016

Woodsome Management Pty Ltd
10/280 Hay Street
SUBIACO WA 6008

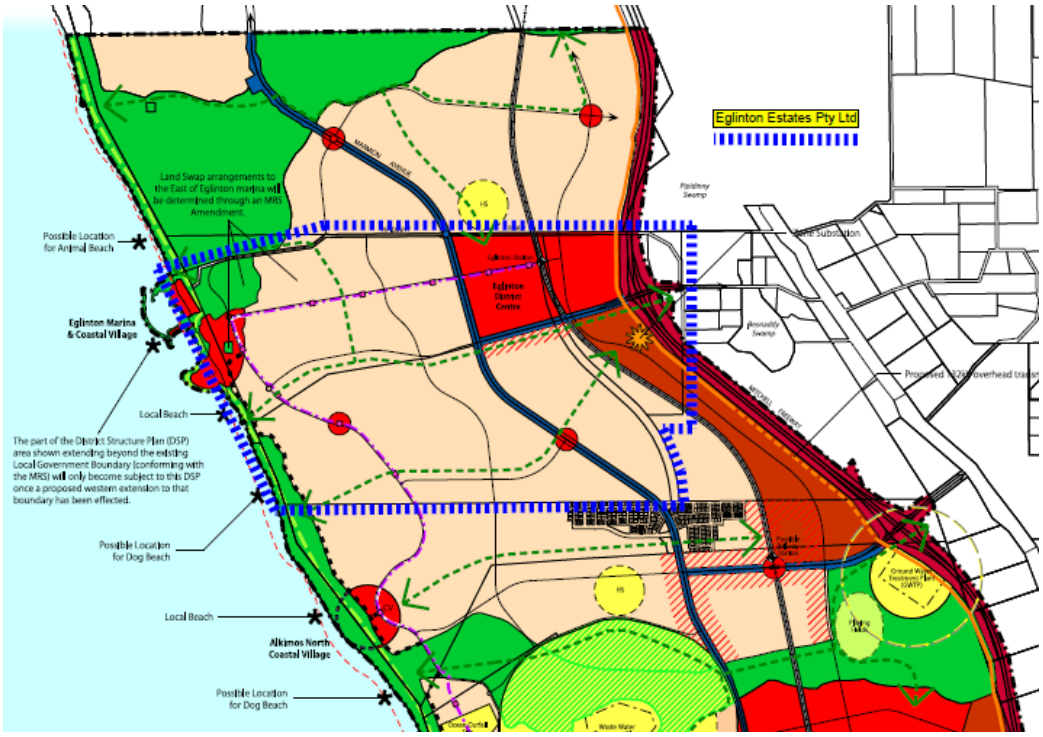
**Attention: Mr. Tasio Cokis (Director)**

Dear Tasio

## EGLINTON ESTATES LOCAL STRUCTURE PLAN
## ADDENDUM TO TRAFFIC AND TRANSPORT ENGINEERING REPORT

A Local Structure Plan (LSP) has been prepared for land known as Eglinton Estates located in the City of Wanneroo. Eglinton Estates is shown relative to the Alkimos Eglinton District Structure Plan in Figure 1. As part of the initial works completed with the LSP preparation, a traffic report was prepared by Sinclair Knight Merz and Arup joint venture in May 2012 (Final Report, Revision A), referred herein as the 'SKM Report'.

**Figure 1: Eglinton Estate LSP Boundary (in blue)**




Map Source: Alkimos Eglinton District Structure Plan Report, SKM, January 2008.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# Background

Since the completion of the SKM Report, Department of Parks and Wildlife (DPaW) and Environment Protection and Biodiversity Conservation (EPBC) requests have resulted in changes to the LSP whereby specific points of the road network have been revised, also resulting in a change in land use yield. The blue areas in Figure 2 illustrate the DPaW requested conservation public open areas within the LSP. The red areas illustrate the EPBC requested conservation areas.

**Figure 2: Amended Nett Developable Areas**


Map Source: Creative Design and Planning, June 2016

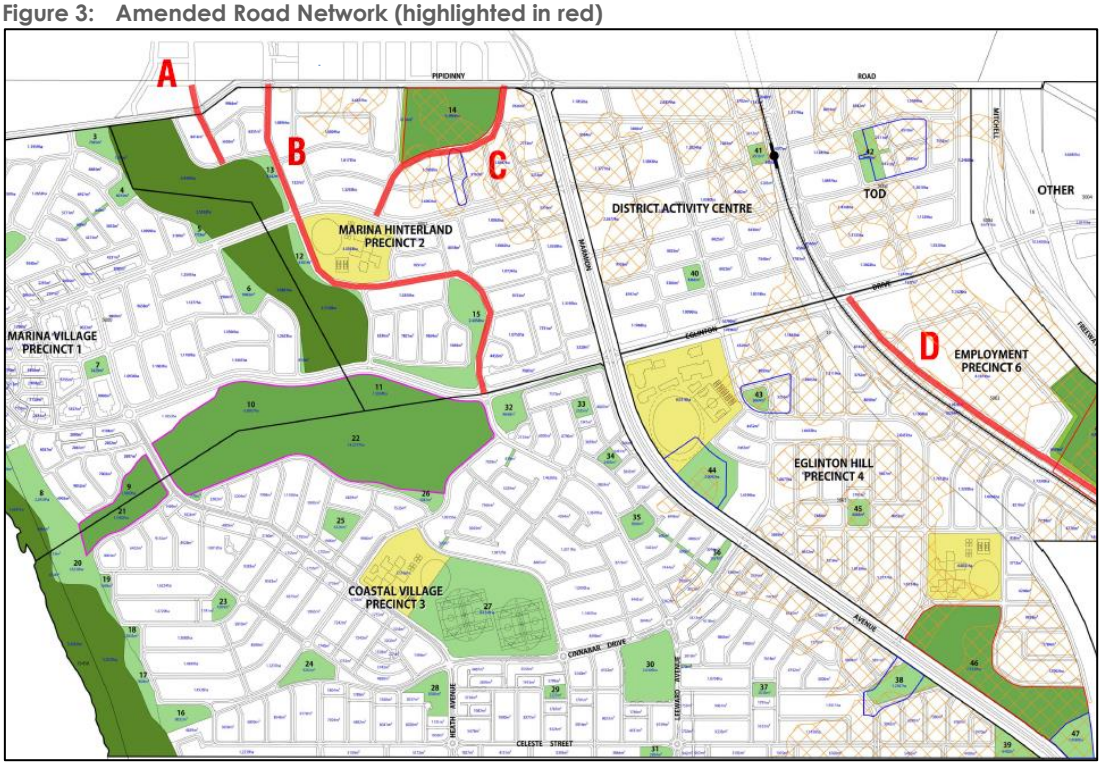
Accordingly, GTA Consultants (GTA) has been engaged by Woodsome Management to prepare an addendum to the SKM Report to address the specific revisions (which result in a reduction in Nett Developable Areas (NDA) within the LSP) and in particular, define any impacts to the proposed local road hierarchy and movement network.

A scoping meeting was held with the City of Wanneroo to present the proposed changes and confirm the requirements of the addendum. This meeting also confirmed the content of the SKM Report which remains relevant for re-use and has therefore informed the content and the extent of work undertaken as part of the addendum.

# Proposed Changes

The road network changes resultant of the DPaW and EPBC requests are illustrated in Figure 3.

**Figure 3: Amended Road Network (highlighted in red)**




Map Source: Creative Design and Planning, June 2016

The road network changes are denoted A, B, C and D for ease of reference. A summary of each of the changes are provided below:

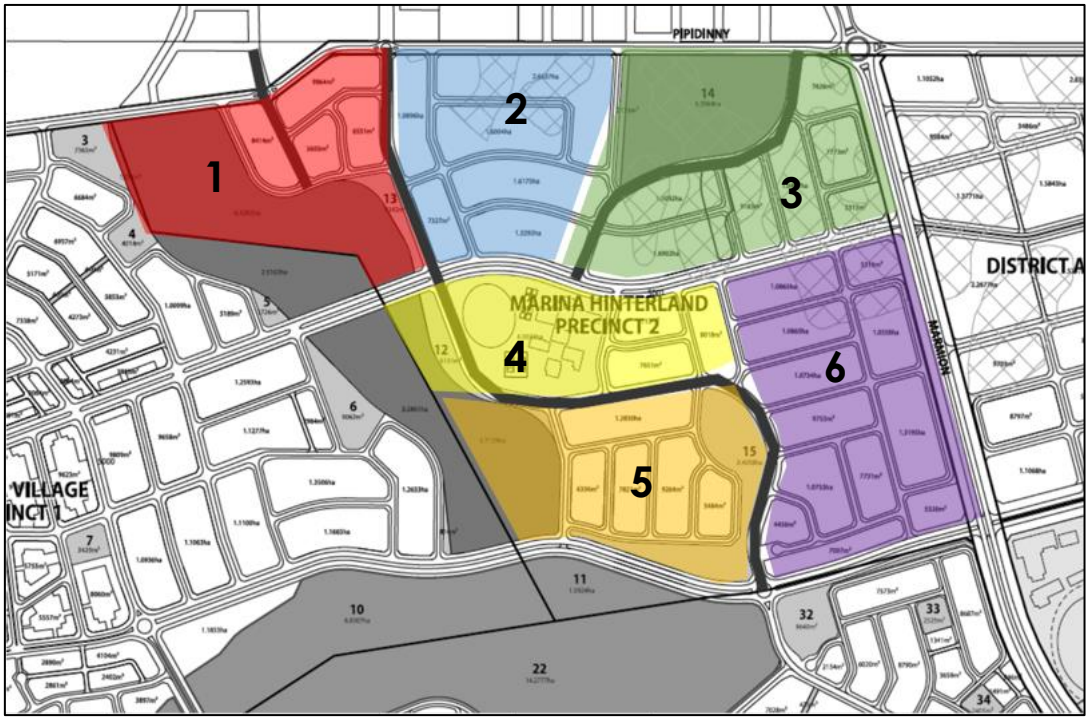
A. Addition of a fourth arm to a currently proposed 3-arm roundabout on Pipidinny Road (as part of Eglinton West LSP, north of Pipidinny Road) servicing only local access streets within the LSP.
B. The previously approved main north-south Neighbourhood Connector has been cut-off from Pipidinny Road by the inclusion of the new POS Conservation (14 on plan). As such, this neighbourhood connector has been re-aligned to meander past the primary school and link up with the main north-south neighbourhood connector through the Eglinton West LSP (via a 4-arm roundabout).
C. Re-aligned road to respect boundary of new POS Conservation (14 on plan). This is proposed as a full intersection to Pipidinny Road.
D. Re-aligned road to avoid cutting straight through new POS Conservation (48 on plan). Minimises impact on Carnaby Cockatoo Habitat (orange hatch).

Given A, B and C are localised to one discrete area of the LSP, it was agreed by the City of Wanneroo in the scoping meeting that it would be appropriate and adequate to review this particular area (known as "Marina Hinterland Precinct 2") to define any impacts to the proposed local road hierarchy and movement network.

Road D is purely a re-alignment and as such does not result in any change to the traffic generation and distribution in that area. As agreed with City of Wanneroo, it is not necessary to analyse any impacts of this from a traffic perspective.

GTA has therefore focussed the remainder of this addendum on the Marina Hinterland Precinct 2 in detail. To inform the analysis, GTA has broken down this area into six (6) smaller zones, as shown in Figure 4.

**Figure 4: Zone Map**




Map Source: Creative Design and Planning, June 2016

# Marina Hinterland Precinct 2

## Revised Land Use Schedule

The anticipated land use yields have changed since the SKM Report was prepared in May 2012. In order to estimate traffic generation associated with the amended NDA, the estimated residential dwelling yields have been compared for the approved and revised layout of Marina Precinct 2[1].

Table 1 indicates that the revised land uses in this area represent a reduction in overall residential dwelling numbers, in comparison to the previously approved LSP.

[1] An average lot/dwelling size of 380 sq.m has been adopted to inform these comparisons.

**Table 1: Changes in Land Use Yields from SKM Report to Revised subdivision**

| Zone | Approved yield (residential dwellings) | Revised yield (residential dwellings) | Difference |
|---|---|---|---|
| Zone 1 | 153 | 80 | -73 |
| Zone 2 | 216 | 238 | +22 |
| Zone 3 | 274 | 180 | -94 |
| Zone 4* | 217 | 58 | -49 |
| Zone 5 | | 11 | |
| Zone 6 | 290 | 281 | -9 |
| **TOTAL** | **1150** | **947** | **-203** |

**Zone 4 includes a Primary School. Given its size and location has not changed and it will attract trips internal to the LSP, it has not been considered as a change as part of this analysis.*

**The revised LSP represents a decrease of 203 residential dwelling numbers in comparison to the original approved LSP.**

# Traffic Forecast

## Trip Generation Rates

It is noted that no traffic generation rates for residential trips were quoted within the SKM report. As such, to inform this addendum, trip generation estimates have been produced using conventional methods and standard trip generation rates. The sources include:

- WAPC's Transport Assessment Guidelines for Developments
- Director General South Australia – Land Use Traffic Generation Guidelines.

Since the lot yields have been produced using an average dwelling size, the trip generation rate should be representative of many lot sizes and also considered an average. In this respect, an adopted rate of 8 trips per dwelling (as per WAPC Guidelines) is expected to provide a conservative estimate of demand associated with the development.

## Traffic Generation Comparison

Based on the information presented in Table 1 the traffic generation associated with each 'zone' from the approved LSP and revised LSP has been compared. This information is detailed in Table 2.

**Table 2: Change in Traffic Generation from each zone**

| Zone | Vehicle trips per day (approved yield) | Vehicle trips per day (revised yield) | Difference |
|---|---|---|---|
| Zone 1 | 1,225 | 643 | -582 |
| Zone 2 | 1,725 | 1,902 | +177 |
| Zone 3 | 2,195 | 1,439 | -755 |
| Zone 4* | 1,735 | 463 | -393 |
| Zone 5 | | 879 | |
| Zone 6 | 2,323 | 2,249 | -74 |
| **TOTAL** | **9,201** | **7,574** | **-1628** |

Table 2 indicates that the Marina Hinterland Precinct 2 is expected to generate in the order of 1600 less vehicle movements over a typical day, in comparison to the same area within the approved LSP. It is noted that the changes in traffic generation vary considerably by zone,

with zones 1, 3, 4, 5 and 6 generating a decreased volume of traffic from the previous layout, while zone 2 generates a higher volume of traffic when compared against the previous layout.

**The revised LSP represents a decrease of around 1600 vehicle trips per day in the Marina Hinterland Precinct 2 area in comparison to the original approved LSP.**

## Internal Trips

The WAPC Guidelines notes that the proportion of trips internal to a development varies, as the trip distribution is shaped by a number of factors such as the presence of schools. While the Guidelines do not provide firm direction on what proportion of trips should be assumed to be internal to the area, reference to the *NSW RTA Guide to Traffic Generating Developments* suggests that up to 25% of trips within subdivisions are internal. As per the WAPC Guidelines, the RTA Guide also notes that this figure may require adjustment based upon the composition of internal land uses likely to generate internal trips within the subdivision.

On this basis, the following points are noted:

- the Marina Hinterland Precinct 2 includes a primary school
- recreational / open space areas are provided within the area
- the overall LSP has been generally designed in accordance with *Liveable Neighbourhoods* principles.

Based on the above, it could be reasonably expected that the proposed mix of land uses within the area would generate a proportion of internal trips. However, a reduction to the residential land use trip generation has not been applied in this respect, to provide for a conservative traffic assessment of the internal road hierarchy and impact on the external road network.

## Traffic Distribution

Traffic distribution adopted in the SKM Report was determined from a detailed EMME2 modelling exercise. During the scoping meeting with City of Wanneroo, it was agreed that it was not necessary to re-run this modelling exercise for Marina Hinterland Precinct 2, and instead a manual distribution exercise is appropriate.

In order to determine this distribution each zone (as per Figure 4) was considered in relation to their location with respect to strategic road access, access points to the main routes in the LSP area and the overall assumption in the SKM Report that "*a directional split of 2:1 southbound compared to northbound and eastbound compared to westbound*" is expected. On this basis, the trips generated in Table 2 were manually assigned to the revised road network in order to quantify the daily volume and any potential impacts to the road hierarchy adopted in the original LSP.

The distribution adopted considers that the Mitchell Freeway extension will be completed prior to the full build-out of the LSP, as per test scenario 1 in the SKM Report. It is assumed that in any case, the distribution and impact of the revised proposal will be the same if the freeway is extended or not.

As previously highlighted, to provide a conservative traffic impact assessment it is assumed there are no internal trips associated with Marina Hinterland Precinct 2 and so all trips have been distributed to the external road network.

## Traffic Impact

Given the reduction in vehicle trips between the approved and revised yields for Marina Hinterland Precinct 2, it is appropriate to assume the low-order road network within Marina Hinterland Precinct 2 will not be subject to increased impacts, with the majority of roads expected to carry minimal amounts of residential traffic.

The focus of this addendum therefore is on the strategic Neighbourhood Connector roads which run north-south through the precinct and any resultant increases in traffic on the strategic east-west routes running through the LSP namely: Pipidinny Road, STS Route and Eglinton Drive.

Given the overall reduction in vehicle trips, it is reasonable to assume that there will be no detrimental impacts associated with the change from a traffic impact and capacity perspective. The resultant road network volumes will therefore decrease from the approved LSP. The decrease is not enough to warrant a reduction in the status of any road within the LSP, and so the road hierarchy presented within the SKM Report remains applicable.

**The proposed changes to Marina Hinterland Precinct 2 is estimated to generate less vehicles than the approved LSP and so will not have a detrimental impact to road network and intersection capacity.**

The following sections considers the other elements of the approved LSP which may be impacted as a result of the proposed changes within Marina Hinterland Precinct 2.

## Intersections

The intersection controls as presented in the SKM Report are not proposed to be amended within the LSP area, and do not merit any change as a result of the revisions to Marina Hinterland Precinct 2. The slight changes to the location of the intersection on Pipidinny Road closest to Marmion Avenue, does not merit the need to change form of a proposed full-movement intersection since it is located approximately 100m from the intersection.

The Eglinton West LSP to the north of Pipidinny Road has recently progressed. The development of the road network for the Eglinton West LSP proposes a roundabout on Pipidinny Road, to provide a connection north-south through both LSP's. This roundabout connects to the redirected north-south Neighbourhood Connector route through Marina Hinterland Precinct 2. This is the only change to the intersection proposals within the SKM Report. It is suggested that this change will be of benefit to both LSP's and presents opportunity for clear connections between both areas.

## Road Hierarchy

Based on the revised yields and road network layout, it has been determined that the road classifications within Marina Hinterland Precinct 2 are not proposed to change, rather the main north-south neighbourhood connector road has just been redirected. The remaining roads are all classed as Access Roads, as per the SKM Report and in accordance with Liveable Neighbourhoods.

## Street Cross-Sections

The street cross-sections presented within the SKM Report remain relevant for each of the road types proposed. The revisions to Marina Hinterland Precinct 2 do not merit any change to these.

## Public Transport

The intended public transport routes (including the STS route) presented within the SKM report are not compromised as a result of the changes to Marina Hinterland Precinct 2. Similarly, public transport catchments are not impacted.

# Conclusion

Based on the findings presented within this addendum, the following conclusions are made:

i It is proposed to make four amendments to the previously approved Eglinton LSP.
   - The proposed change to the routing of a road connection in the south east area of the LSP has no impact.

ii The remaining three amendments were considered on a precinct-wide basis, which concluded:
   - The revisions to land uses within Marina Hinterland Precinct 2 represents a decrease of around 200 residential dwellings and 1600 daily vehicle trips.
   - Estimated future traffic volumes on individual road links within the precinct are expected to decrease and so the wider traffic volume impacts would be largely consistent with the outcomes determined in the previous modelling work concluded within the SKM Report.
   - Road hierarchies and road cross-sections are not determined to merit any change.
   - It is proposed to include a roundabout on Pipidinny Road which provides a continuous link between the subject and neighbouring LSP areas. This will improve access and circulation.
   - No impact is expected on public transport routes or catchments.

iii The revisions proposed to the LSP do not compromise the previously proposed internal road network with respect to accessibility and circulation for all modes.

Naturally, should you have any questions or require any further information, please do not hesitate to contact Mark Fowler or myself in our Perth office on (08) 6316 4634.

Yours sincerely

**GTA CONSULTANTS**

**Tanya Moran**
**Director**

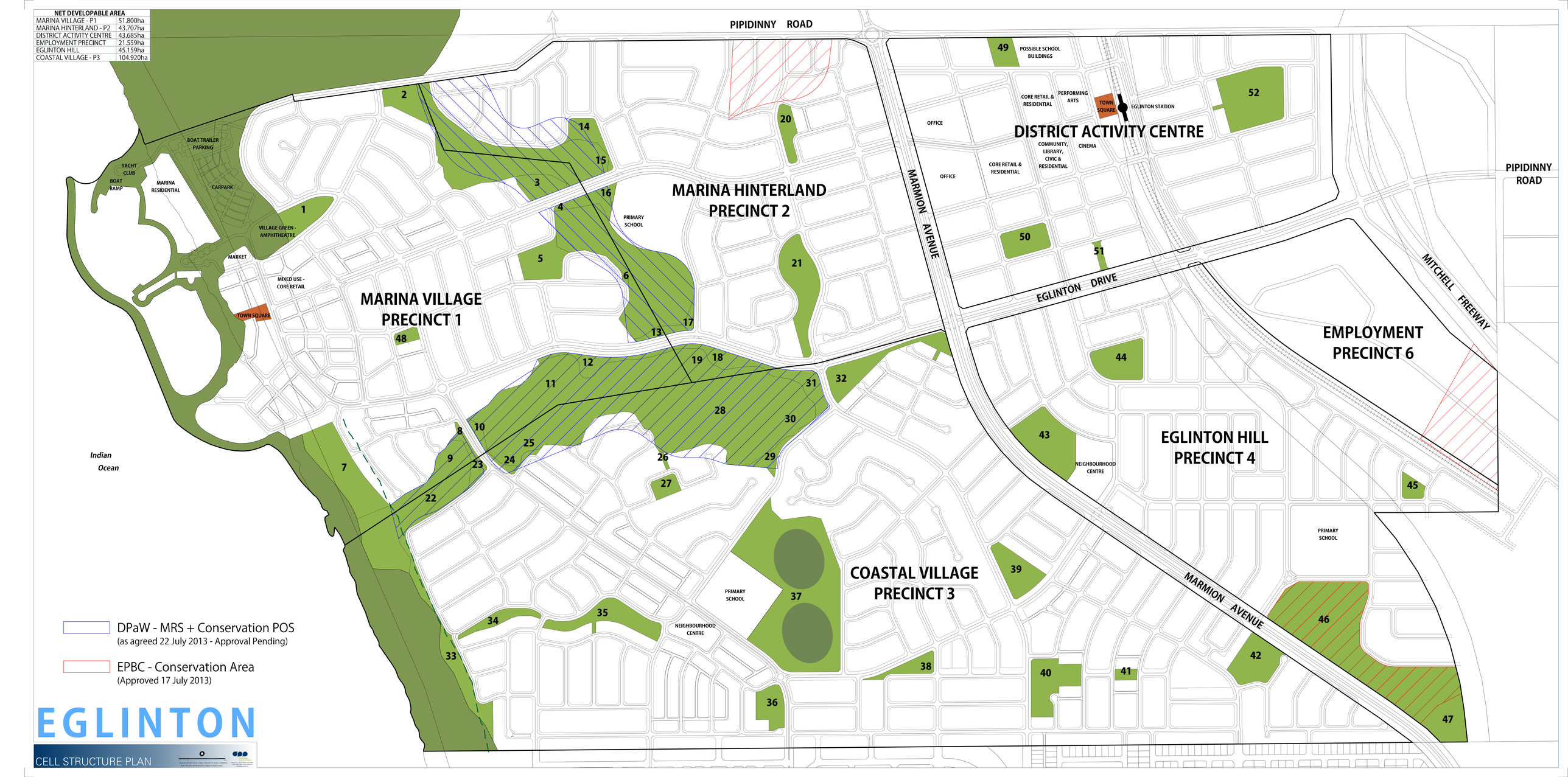
encl.

Attachment 1 – Approved Eglinton Estates LSP Layout (May 2012)

Attachment 2 – Proposed Eglinton Estates LSP Layout (June 2016)

# Attachment 1

## Approved Eglinton Estates LSP Layout (May 2012)


NET DEVELOPABLE AREA
MARINA VILLAGE - P1 51.800ha
MARINA HINTERLAND - P2 43.707ha
DISTRICT ACTIVITY CENTRE 43.685ha
EMPLOYMENT PRECINCT 21.559ha
EGLINTON HILL 45.159ha
COASTAL VILLAGE - P3 104.920ha
PIPIDINNY ROAD
BOAT TRAILER PARKING
YACHT CLUB
BOAT RAMP
MARINA RESIDENTIAL
CARPARK
VILLAGE GREEN - AMPHITHEATRE
MARKET
MIXED USE - CORE RETAIL
TOWN SQUARE
MARINA VILLAGE PRECINCT 1
MARINA HINTERLAND PRECINCT 2
PRIMARY SCHOOL
MARMION AVENUE
POSSIBLE SCHOOL BUILDINGS
CORE RETAIL & RESIDENTIAL
PERFORMING ARTS
TOWN SQUARE
EGLINTON STATION
OFFICE
DISTRICT ACTIVITY CENTRE
COMMUNITY, LIBRARY, CIVIC & RESIDENTIAL
CINEMA
CORE RETAIL & RESIDENTIAL
OFFICE
PIPIDINNY ROAD
EGLINTON DRIVE
MITCHELL FREEWAY
EMPLOYMENT PRECINCT 6
EGLINTON HILL PRECINCT 4
NEIGHBOURHOOD CENTRE
PRIMARY SCHOOL
MARMION AVENUE
COASTAL VILLAGE PRECINCT 3
PRIMARY SCHOOL
NEIGHBOURHOOD CENTRE
Indian Ocean
DPaW - MRS + Conservation POS
(as agreed 22 July 2013 - Approval Pending)
EPBC - Conservation Area
(Approved 17 July 2013)
EGLINTON
CELL STRUCTURE PLAN

# Attachment 2

Proposed Eglinton Estates LSP Layout (June 2016)

| NET DEVELOPABLE AREA | |
|---|---|
| MARINA VILLAGE - P1 | 52.465ha |
| MARINA HINTERLAND - P2 | 35.975ha |
| DISTRICT ACTIVITY CENTRE | 27.460ha |
| TOD | 18.287ha |
| EMPLOYMENT PRECINCT | 15.266ha |
| EGLINTON HILL | 38.879ha |
| COASTAL VILLAGE - P3 | 97.381ha |

# CELL STRUCTURE PLAN

Eglinton

DRAFT

Scale: 1:5000@A1
Date: 24/05/2016
Plan: EGLEG-1-026a

A: 28 Brown St, East Perth WA 6004
P: (08) 9325 0200
E: info@creativedp.com.au
W: creativedp.com.au

# Appendix 6
# Bushfire Management Plan

intelligent outcomes | respected experience

# Bushfire Management Plan

## Eglinton Estates

Prepared for
Eglinton Estates Pty Ltd
by Strategen

June 2016

strategen
ENVIRONMENTAL

# Bushfire Management Plan

## Eglinton Estates

Strategen is a trading name of
Strategen Environmental Consultants Pty Ltd
Level 1, 50 Subiaco Square Road Subiaco WA 6008
ACN: 056 190 419

June 2016

## *Limitations*

**Scope of services**

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

**Reliance on data**

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

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

**Environmental conclusions**

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

**Client: Eglinton Estates Pty Ltd**

| Report Version | Revision No. | Purpose | Strategen author/reviewer | Submitted to Client | |
|---|---|---|---|---|---|
| | | | | Form | Date |
| Draft Report | A | For review by client | A Ennis / R Banks BPAD 36857 | Electronic (email) | 24/06/2016 |
| Final Report | 0 | Issued for use: to accompany LSP amendment | A Ennis / R Banks BPAD 36857 | Electronic (email) | 29/06/2016 |

Filename: WMA16269_01 R001 Rev 0 - 28 June 2016

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# 1. Introduction

## 1.1 Background

Woodsome Management Pty Ltd, on behalf of Eglinton Estates Pty Ltd, is progressing planning for future development of Eglinton Estates (the project area), located at Eglinton in the City of Wanneroo. The project area is subject to the approved Eglinton Local Structure Plan (LSP) No 82. A LSP amendment is now proposed to facilitate development as outlined in the cell structure plan at Figure 1.

Due to the current extent of on-site and adjacent vegetation, the project area is designated as bushfire prone, as outlined on the Western Australian *Map of Bush Fire Prone Areas* (DFES 2016). Consequently, Strategen has prepared this Bushfire Management Plan (BMP) to accompany submission of the LSP amendment to City of Wanneroo (the City) and Western Australian Planning Commission in order to meet requirements triggered under *State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; WAPC 2015a). This BMP has been prepared in accordance with *Guidelines for Planning in Bushfire-Prone Areas* (the Guidelines; WAPC 2015b).

## 1.2 Purpose and application of the plan

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

| NET DEVELOPABLE AREA | |
|---|---|
| MARINA VILLAGE - P1 | 52.465ha |
| MARINA HINTERLAND - P2 | 35.975ha |
| DISTRICT ACTIVITY CENTRE | 45.747ha |
| EMPLOYMENT PRECINCT | 15.266ha |
| EGLINTON HILL | 38.879ha |
| COASTAL VILLAGE - P3 | 97.381ha |


Source: Creative Design + Planning 2016

Figure 1: Proposed Cell Structure Plan

# 2. Spatial consideration of bushfire threat

## 2.1 Existing site characteristics

### 2.1.1 Location

Eglinton Estates comprises approximately 562.2 ha and includes Precincts 1, 2, 4 and 6 and the District Activity Centre of the overall Eglinton LSP, located at Eglinton in the City of Wanneroo (Figure 1). Eglinton Estates is situated approximately 19 km northwest of Joondalup and 44 km northwest of the Perth CBD.

The project area is undeveloped (Figure 2) and is bound by the following:

- North: current and future stages of the North Eglinton LSP (Allara) residential development east of Marmion Avenue and undeveloped land zoned 'Regional Parks and Recreation' west of Marmion Avenue
- East: Mitchell Freeway and rural land
- West: Indian Ocean
- South: current and future stages of the Amberton Estate residential development

### 2.1.2 Zoning and land use

The project area is currently zoned 'Urban Development' and 'Regional Parks and Recreation' under provisions of the City of Wanneroo Local Planning Scheme No 2 and 'Parks and Recreation' and 'Urban' under the Metropolitan Region Scheme.

### 2.1.3 Assets

The project area is currently undeveloped and contains limited property assets. Proposed urban development will significantly increase these critical assets in that the number of residents, visitors and built assets will be intensified across the subject land.

The project area contains environmental assets in the form of native shrubland, scrub and woodland vegetation of the Cottesloe Central and South and Quindalup vegetation complexes as mapped by Heddle et al. (1980). Site investigations undertaken by Strategen identified vegetation condition as relatively good throughout majority of the vegetation within the project area, with the exception of cleared informal access tracks throughout the site.

### 2.1.4 Access

The project area is currently accessed via Marmion Avenue from the north and south and Pipidinny Road from the north.

### 2.1.5 Water and power supply

The project area is currently un-serviced.

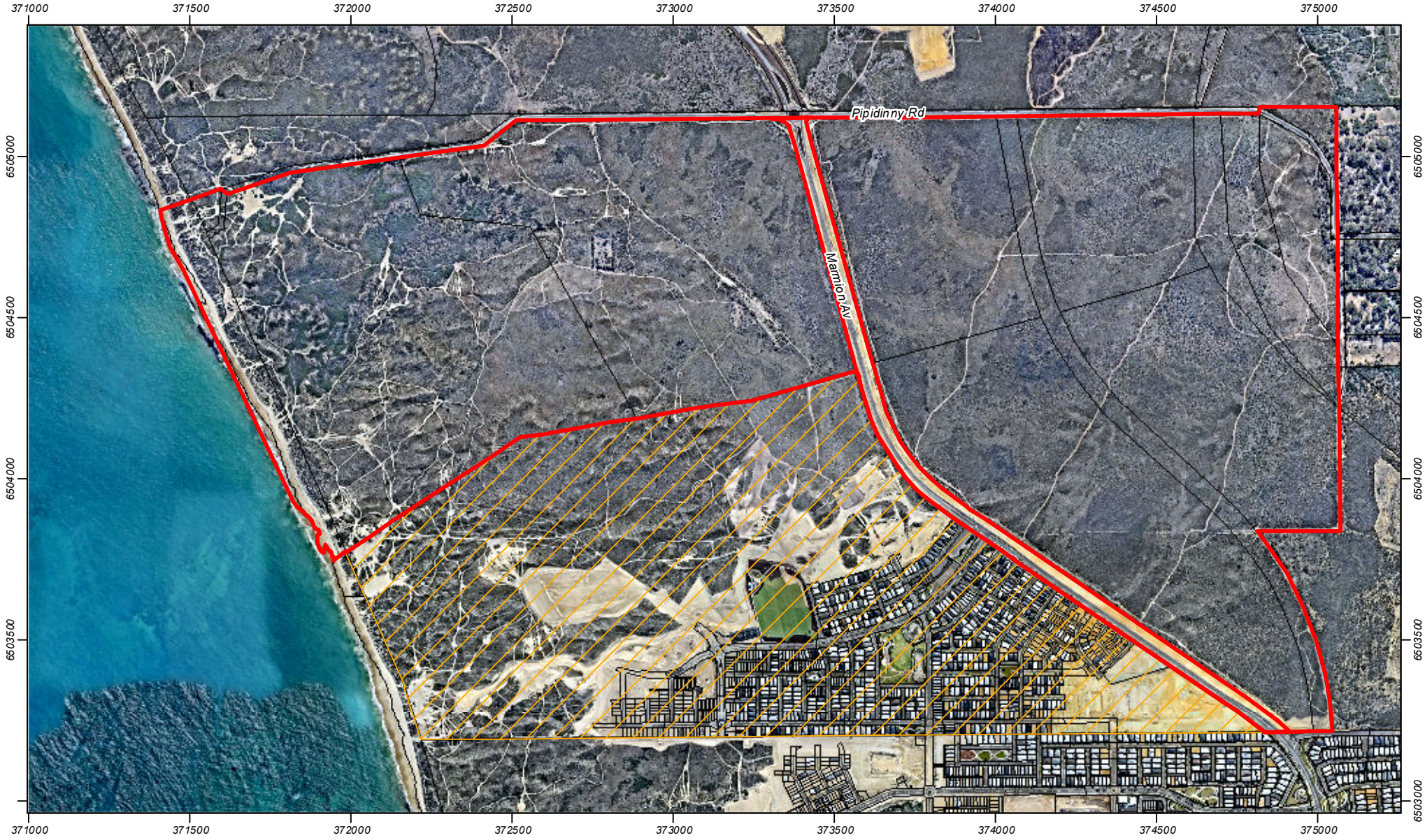


**Figure 2 Site overview**

Scale 1:16,414 at A4

0 100 200 300 400 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 24/06/2016
Author: JCrute
Source: Aerial image, structure plan & topography: Client 06/2016. Existing cadastre: SLIP, Landgate 2016.
Path: Q:\Consult2016\WMA\WMA16269\ArcMap_documents\R001\RevA\WMA16269_01_R001_RevA_F002.mxd

**Legend**

- Project area
- Existing cadastre
- Amberton Estate (already subject to approved FMP)

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www.strategen.com.au

## 2.2 Existing fire environment

### 2.2.1 Vegetation

Based on site surveys undertaken by Armstrong (1996), Trudgen and Keighery (1990) and ATA Environmental (2005) the western portion of the project area comprises vegetation representative of the Quindalup Complex and the eastern portion of the project area supports vegetation of the Cottesloe Central and South Complex on the Spearwood Dunes.

The Quindalup Dunes support Spinifex Grassland at the strand, backed by younger dunes comprised of an open to closed heath or shrubland of *Scaevola crassifolia, Olearia axillaris, Hemiandra pungens* and *Acacia rostellifera*. Further inland on the older Quindalup dunes and plains, heaths and low shrublands predominate with areas of localised herblands. The dominant species in the vegetation types include *Acacia rostellifera* and *Melaleuca systena* in the open to closed heaths and shrublands with *Lomandra maritima* and *Melaleuca systena* in the low open heaths.

The Spearwood Dunes vary floristically depending on the presence of limestone, sands derived from limestone and the topography of the inland area. In general, the limestone outcrops in the project area support open to closed low heaths dominated by *Banksia sessilis, Hakea trifurcata, Calothamnus quadrifidus, Scaevola nitida and Acacia truncata*. Occasional shrublands of *Xanthorrhoea preissii* occur within the heath.

On the deeper soils of the Spearwood Dune System, generally in the eastern portion of the project area, *Banksia attenuata, Banksia menziesii* open to closed shrubland occur. A small stand of planted *Eucalyptus gomphocephala* (Tuart) is found in the north east corner of the project area.

Strategen has assessed vegetation across and within 100 m of the project area for the purposes of identifying bushfire hazard levels across the site. Vegetation classifications were identified as a combination of low shrubland on and near the coastline and on exposed dunes, open and closed heath, closed scrub and areas of low banksia woodland. A small area of eucalyptus woodland was identified within the northeast corner of the project and within 100 m of the project area.

Further assessment and identification of vegetation classes in accordance with *AS 3959–2009 Construction of buildings in bushfire-prone areas* (AS 3959; SA 2009) will need to undertaken within the project area at future planning stages, to inform Bushfire Attack Level (BAL) building construction requirements.

### 2.2.2 Site topography and effective slope

The project area and adjacent land contains undulating to steep topography with numerous coastal dunes that vary in elevation and orientation. The majority of vegetation within and adjacent to the project area is proposed to be cleared as part of ongoing development at Eglinton. As a result, slope will only be a factor contributing to the bushfire hazard and potential BAL, to be determined at future planning stages, in those areas where the current vegetation extent is proposed to be retained (i.e. within proposed conservation reserves and Regional Open Space).

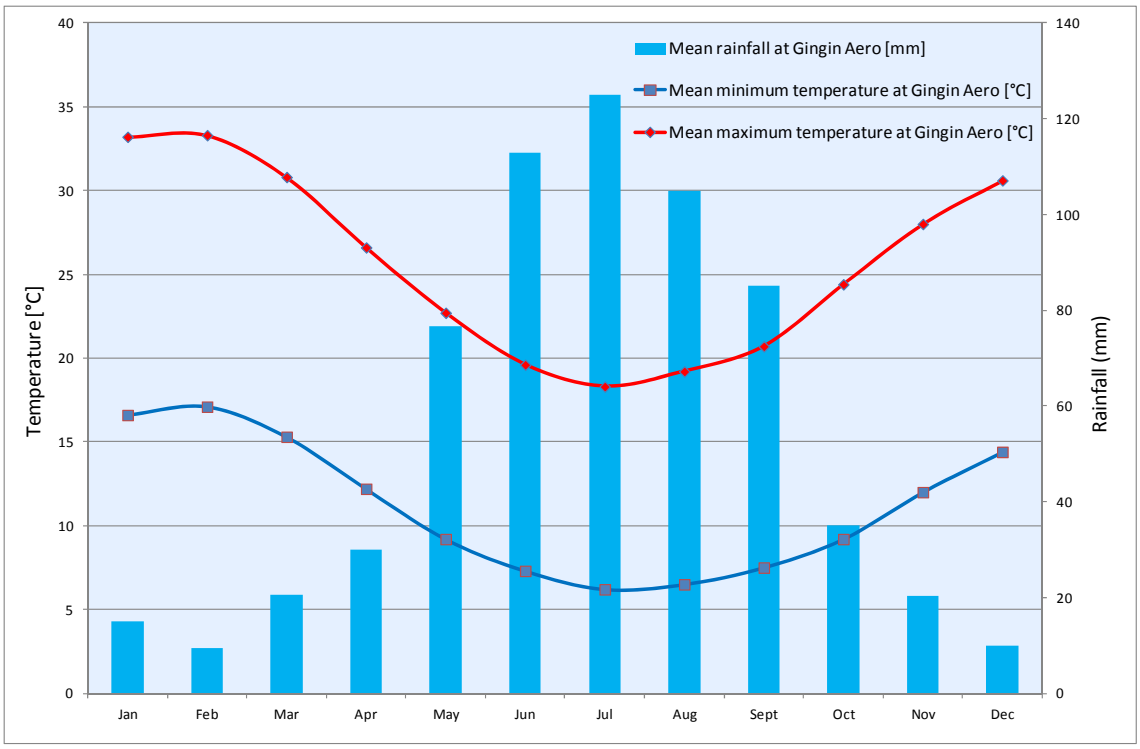
Topographic elevation on site ranges from approximately 1 mAHD (Australian Height Datum) at the shore line and 51 mAHD at the highest dune points. Effective slope under classified vegetation ranges from flat land on dune tops and in depressions to over 10 degrees on dune-sides.

### 2.2.3 Bushfire weather conditions

#### *Climate statistics*

Eglinton experiences a Mediterranean climate characterised by mild, wet winters and warm to hot, dry summers. The nearest Bureau of Meteorology (BoM) weather station that provides the full range of relevant bushfire weather statistics is located at Gingin Aero (Station No. 9178), approximately 22.4 km northeast of the project area (Figure 3).

Mean annual rainfall recorded at Gingin Aero is 620.2 mm (BoM 2016). Rainfall may occur at any time of year; however, most occurs in winter in association with cold fronts from the southwest. Highest temperatures occur from December to March, with mean monthly maximums ranging from 30.6°C in December to 33.3°C in February (BoM 2016). Lowest temperatures occur from June to September, with mean monthly minimums ranging from 6.2°C in July to 7.5°C in September (BoM 2016).




Source: BoM 2016

Figure 3: Mean monthly climate statistics for Gingin Aero (Station No. 9178)

#### *Worst case bushfire weather conditions*

Southwest Western Australia generally experiences a cool to mild growing season in the months of August through to November of each year, followed by four months of summer drought conditions, which is when the potential for bushfire occurrence is at its peak.

Worst case (adverse) bushfire weather conditions can occur during this dry period when a low pressure trough forms off the west coast and strong winds develop from the north or northeast. These conditions are sometimes associated with 'Extreme' or 'Catastrophic' fire dangers, which are consistent with very high temperatures, low relative humidity and very strong winds. Based on the predominant summer climatic conditions of the local area, 'Extreme' and 'Catastrophic' fire dangers normally occur less than 5% of the time during the designated bushfire season, which equates to around six days between December and March (McCaw & Hanstrum 2003).

### *Predominant bushfire weather conditions*

Predominant bushfire weather conditions are those that occur 95% of the time during the designated bushfire season. For Eglinton, these generally correlate with average January climatic conditions.

Mean January 9:00 am and 3:00 pm wind profiles for Gingin Aero are contained in Appendix 1. These illustrate that the predominant winds during the designated bushfire season are from the east and southeast in the morning averaging around 20.9 km/h and from the southwest in the afternoon averaging around 25.5 km/h (BoM 2016).

Mean January 9:00 am and 3:00 pm relative humidity for Gingin Aero is approximately 48% and 33% respectively, with the January mean maximum temperature peaking at around 33.2°C (BoM 2016).

The predominant bushfire weather conditions discussed above correlate with an average Fire Danger Index (FDI) rating of 'High', as determined using the Commonwealth Science and Industrial Research Organisation (CSIRO) Fire Danger and Fire Spread Calculator (CSIRO 1999).

### 2.2.4 Bushfire history, fuel age, risk of ignition and potential ignition source

Bushfire history in the project area is infrequent and there is a lack of recent fire evidence over the site. This is supported by the dominance of low shrubland vegetation and relatively low level of visitor presence, which has resulted in a low risk of ignition to on-site vegetated areas.

Since most bushfires are ignited by humans, the current ignition risk is moderate due to the moderate levels of residency, public access and visitation throughout the site and surrounding rural landholdings. However, Strategen considers that the ignition risk, particularly within the project area, may increase following development intensification and increased levels of public access and resident occupancy at the bushland interface.

The potential sources of ignition in the area are expected to be from:

- deliberately lit fire (i.e. arson)
- lightning strike
- accidental causes, such as vehicle accidents and sparks from vehicle exhausts/machinery
- escapes from fuel hazard reduction burning
- pole-top fires
- incorrect disposal of cigarettes.

### 2.2.5 Potential bushfire scenarios

A bushfire within the project area from the foreshore reserve in the west is considered unlikely to significantly impact future assets of the proposed development since the on-ground fire environment, environmental characteristics and potential fire conditions are not conducive to intense bushfire occurrence in this area. The low available fuel loads and broken up nature of the low shrubland vegetation, as well as the small fire run and predominant winds are not expected to be capable of supporting a bushfire with significant fire intensity and ember attack characteristics.

The BMP (Strategen 2016) for Amberton Estate to the south of the project area identifies the majority of vegetation to the south as low shrubland with a 'Low' bushfire hazard level. The proposed conservation reserve (areas No 9-11, 21 and 22 on Figure 4) within the southern portion of the project area is identified as a combination of low shrubland and open heath, with areas of heath and shrubland on flat land having a 'Low' bushfire hazard level and areas of shrubland and heath on steep slopes having a 'Moderate' bushfire hazard level. With the exception of the conservation reserve and foreshore reserve, land to the south of the project area will be cleared as part of future development stages of Amberton Estate.

Vegetation will also be retained within the proposed conservation reserve (area No. 46 on Figure 4) in the southeast corner of the project area. This area consists of scrub and low woodland vegetation with a 'Moderate' bushfire hazard level.

Consequently, a bushfire approaching the project area from the south would be limited to the above two proposed conservation reserves. Under standard afternoon weather conditions in summer, the likely prevailing winds from the southeast and southwest may be capable of directing a bushfire towards the site and the resulting fire behaviour is likely to escalate over this time and contribute significantly elevated levels of radiant heat and ember attack on the proposed development.

The bushfire run to the north of the project area, based on current vegetation extent, is relatively long and continuous through shrubland and scrub vegetation within parks and recreation and undeveloped urban land. A portion of the bushfire run to the north (i.e. east of Marmion Ave) will be reduced following urban development in accordance with the North Eglinton LSP (Allara). Although less likely to occur, should a fire approach the site from the north under adverse fire weather conditions fuelled by strong northerly or north-easterly winds, a successful fire suppression response would be significantly inhibited and future assets of the proposed development could be impacted.

Vegetation within the eastern portion of the project area (east of Marmion Avenue) consists of low shrubland, which is similar to the vegetation contained on site, and grades to low woodland with increasing distance to the east. Proposed development within the project area will result in the clearing of the majority of this vegetation, with exception of a small conservation reserve on the eastern boundary (area No 48 on Figure 4). The bushfire run to the east of the project area is also broken up by existing rural land use.

### 2.2.6 Bushfire suppression response capability

Local Bush Fire Brigades stationed at Wanneroo, Quinns Rock and Two Rocks are expected to provide a best case emergency suppression response time of 30 minutes should a bushfire threaten lives or homes on or adjacent to the project area.

## 2.3 Bushfire hazard level assessment

Strategen has mapped the pre-development bushfire hazard levels on and within 100 m of the project area (Figure 4). The bushfire hazard levels have been assessed on the basis of the vegetation discussed in Section 2.2.1 and the current pre-development extent of vegetation within the site.

Low shrubland vegetation (Plate 1 and Plate 2), which is dominant through the coastal strip and on exposed dunes and consists of very low shrubs at less than 40 cm in height and less than 30% ground cover, is considered to be low threat from a bushfire hazard perspective. Available fuel loads for this vegetation type are discontinuous and are not expected to readily accumulate due to maritime effects, prevailing winds and salt drift. These areas have been assigned a bushfire hazard level of 'Low'.

Areas of heath (Plate 2), scrub (Plate 3) and low banksia woodland, located within coastal dunal depressions and within the eastern portion of the project area, consist of denser and more continuous fuels and have been assigned a bushfire hazard level of 'Moderate'.

The area of tall eucalyptus woodland (Plate 4) within the northeast corner of the project area has been assigned a bushfire hazard level of 'Extreme'.

Given that the proposed development will result in clearing of a significant proportion of the existing vegetation extent, the post development vegetation extent will result in lower hazard levels than those currently depicted within the project area and will therefore reduce the bushfire risk to properties both within and adjoining the project area.

Vegetation within the project area will be retained within conservation areas 9, 10, 11, 14, 46, 48 and Regional Open Space (Figure 4), which will result in areas of 'Moderate' bushfire hazard level being retained in the majority of these areas post development. All vegetation to be retained in the foreshore reserve (ROS) has a bushfire hazard level of 'Low'.

Proposed POS areas (Figure 4) will all be subject to low fuel management and landscaped gardens, which will result in a post-development 'Low' bushfire hazard level. Proposed development areas will be cleared, resulting in a 'Low' bushfire hazard level.

## 2.4 BAL assessment

A BAL contour assessment has not been undertaken as part of this BMP on the basis that proposed lot layout is not yet known.

A BAL contour assessment will need to be undertaken at future planning stages and the BMP updated to reflect the outcomes of the assessment, including requirements that any proposed development located within 100 m of classified post development vegetation will require application of AS 3959 and increased building construction standards in response to assessed BAL.

Figure 4 identifies an indicative BAL assessment area based on a 100 m setback from proposed post development vegetation classified as a 'Moderate' bushfire hazard level, and therefore requiring application of AS 3959–2009 and a BAL response.

Proposed development within this BAL assessment area will need to achieve minimum hazard separation distances necessary for a maximum BAL–29 rating and to meet minimum 20 m Asset Protection Zone (APZ) requirements, which vary depending on the final vegetation classification and slope categories that apply.

APZ requirements can be met through a combination of proposed public roads surrounding vegetated conservation areas and Regional Open Space and building setbacks.

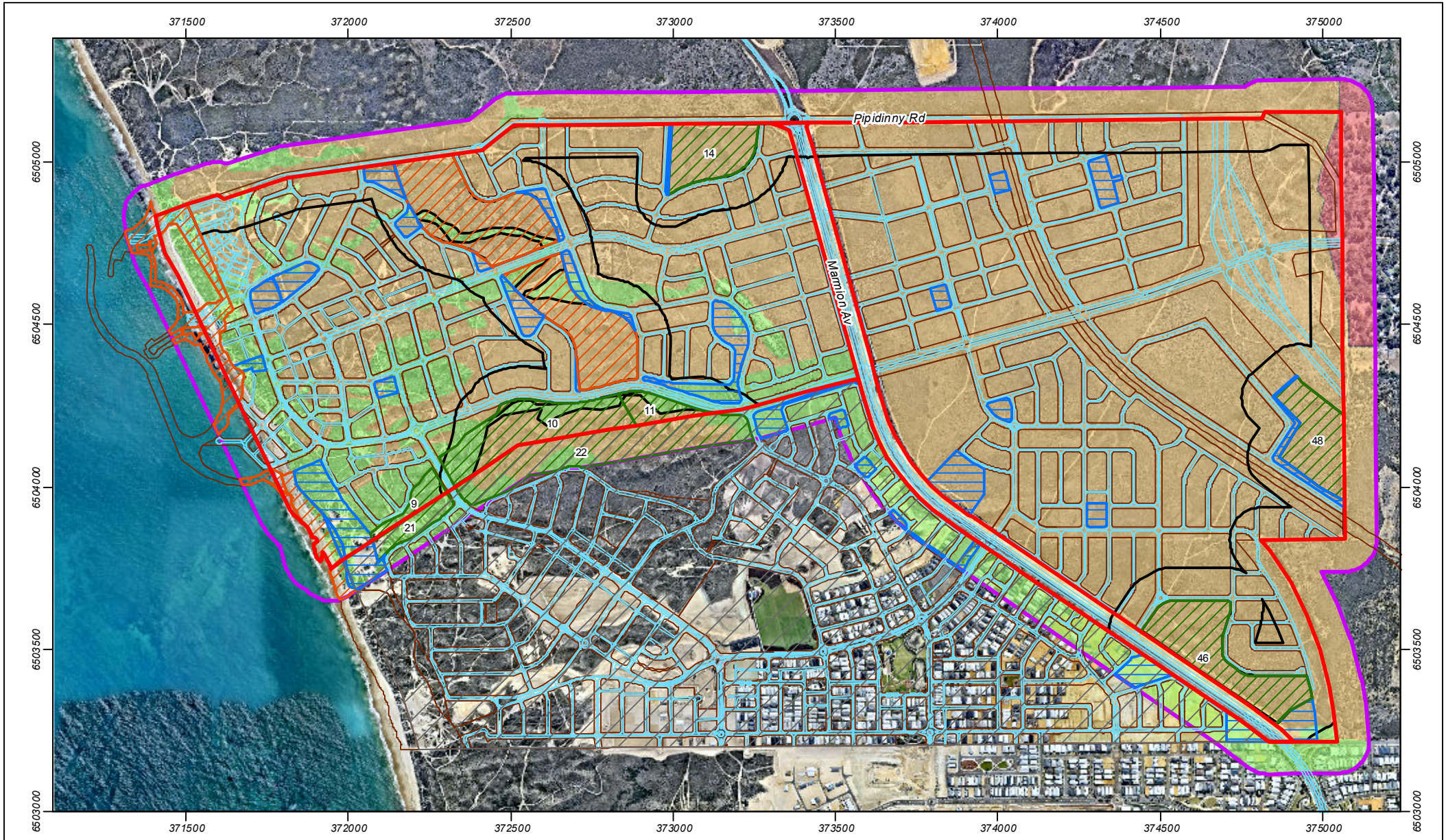



**Figure 4 Bushfire hazard level assessment**

Scale 1:15,984 at A4

0 100 200 300 400 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 28/06/2016
Author: JCrute
Source: Aerial image, structure plan & topography: Client 06/2016. Existing cadastre: SLIP, Landgate 2016.
Path: Q:\Consult2016\WMA\WMA16269\ArcMap_documents\R001\RevA\WMA16269_01_R001_RevA_F004.mxd

**Legend**

- Carriageways
- Road reserves
- Project area
- Existing cadastre
- Amberton Estate (already subject to approved FMP)
- Conservation areas
- Managed POS
- ROS
- Indicative 100m wide BAL assessment area
- 100m wide assessment area

**Bushfire hazard level**

- Extreme
- Low
- Moderate

strategen
ENVIRONMENTAL
info@strategen.com.au
www.strategen.com.au

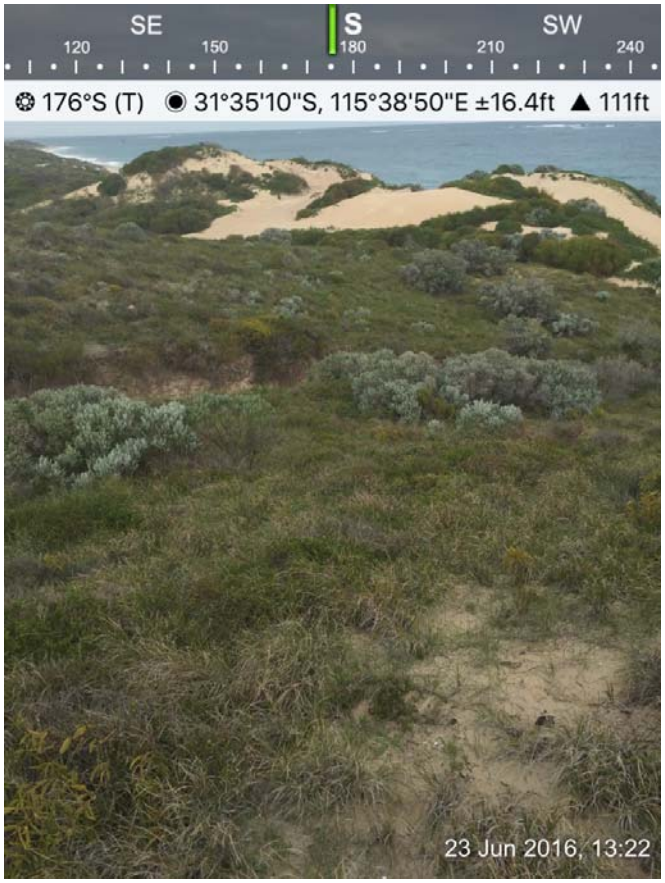



Plate 1: Low shrubland vegetation with bare sand dunes and access tracks


Plate 2: Heath vegetation in foreground and low shrubland vegetation on dunes in background


Plate 3: Scrub vegetation within dune depressions


Plate 4: Woodland within northeast corner of project area

# 3. Bushfire management measures

Strategen has identified a range of bushfire management measures to address compliance with the Guidelines. It should be noted that these measures are being provided at the strategic level in the absence of a development plan and that future addendums to this BMP will need to be prepared to align with future planning stages on provision of greater levels of detail.

## 3.1 Hazard separation distances

APZs will be identified as part of a revised BMP to be prepared at future planning stages on the basis of compliance with minimum separation distances necessary to achieve a maximum BAL–29 rating under AS 3959–2009. Minimum 20 m APZ requirements can be met through a combination of proposed public roads surrounding vegetated POS areas and building setbacks.

The APZs are low fuel areas required to be maintained on a regular and ongoing basis at a fuel load less than 2 t/ha to achieve a low threat minimal fuel condition status all year round. Overstorey trees can be retained to some extent within the APZ provided all flammable material including understorey grasses, weeds, shrubs and scrub are removed from the fuel profile, essentially creating a managed parkland cleared landscape, which would result in a diminishing level of radiant heat, ember attack and fire rate of spread at the dwelling interface. Lawns, managed gardens, paving, driveways and swimming pools are also suitable within the APZ.

It is proposed that construction of dwellings will meet the standard appropriate to the BAL for that location and will not exceed BAL–29 (WAPC 2015b) and therefore Hazard Separation Zones will not be required around APZs. The requirement for HSZs will need to be subject to further review in a revised BMP when proposed development layout is identified at future planning stages.

### 3.1.1 On-site staging buffers

Clearing will occur throughout the project area on a staged basis and in advance where necessary to ensure building construction is not inhibited by a temporary vegetation extent located within adjacent development stages yet to be cleared. This can be achieved by ensuring each approved stage subject to construction is surrounded by a 100 m wide, on-site cleared or low threat buffer prior to development (not including vegetation proposed to be retained). Once the buffers are created, they will need to be maintained on a regular and ongoing basis at a fuel load less than 2 t/ha to achieve a low threat minimal fuel condition all year round until such time that the buffer area is developed as part of the next development stage. This will also assist in managing the current on-site grassland, scrub and woodland hazards in proximity to proposed development.

## 3.2 Increased building construction standards

A BAL assessment will need to be undertaken at future planning stages and the BMP updated to reflect the outcomes of the assessment, including requirements that any proposed development located within 100 m of classified post development vegetation will require application of AS 3959 and increased building construction standards in response to assessed BAL.

As outlined in Section 3.1, APZs will be identified as part of a revised BMP to be prepared at future planning stages on the basis of compliance with minimum 20 m separation distance necessary to achieve a maximum BAL–29 rating under AS 3959–2009.

## 3.3 Vehicular access

The proposed vehicular access network will be required to link to the surrounding public road network and development design at future planning stages will be able to ensure that all residents and visitors of the development are provided with at least two vehicular access routes connecting to the surrounding public road network at all times, including during development staging.

The City of Wanneroo Firebreak Notice (Appendix 2) also requires 2 m wide firebreaks inside all external boundaries for any land less than 2,000 m² and 3 m wide firebreaks inside all external boundaries for any land 2 000 m² or greater.

Any proposed public roads, cul-de-sacs, private driveways longer than 50 m, emergency access ways or fire service access routes as part of the development will need to comply with technical requirements of the Guidelines, as outlined in Table 1.

Development design to be undertaken at future planning stages will ensure that the proposed development will avoid inclusion of any battle-axe access legs.

Table 1: Vehicular access technical requirements

| Technical requirement | Public road | Cul-de-sac | Private driveway | Emergency access ways | Fire service access routes |
|---|---|---|---|---|---|
| Minimum trafficable surface (m) | 6* | 6 | 4 | 6* | 6* |
| Horizontal distance (m) | 6 | 6 | 6 | 6 | 6 |
| Vertical clearance (m) | 4.5 | N/A | 4.5 | 4.5 | 4.5 |
| Maximum grade <50 m | 1 in 10 | 1 in 10 | 1 in 10 | 1 in 10 | 1 in 10 |
| Minimum weight capacity (t) | 15 | 15 | 15 | 15 | 15 |
| Maximum crossfall | 1 in 33 | 1 in 33 | 1 in 33 | 1 in 33 | 1 in 33 |
| Curves minimum inner radius | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 |

* Refer to E3.2 Public roads: Trafficable surface

Source: WAPC 2015b

## 3.4 Water supply

Water supply services will be extended throughout the project area from surrounding residential areas, which will result in provision of a reticulated water supply for proposed residences. The reticulated system will ensure an all year round supply of water is provided to meet minimum domestic and emergency water supply requirements.

At subsequent planning stages, the developer would also be required to prepare, have approved by the relevant water supply authority and Department of Fire and Emergency Services (DFES), and implement a detailed plan demonstrating the location and capacity of fire emergency infrastructure.

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

## 3.5 Fuel management within POS

Vegetation within the project area will be retained within conservation reserves, identified as area No 9, 10, 11, 14, 46, 48 on Figure 4, and one area of Regional Open Space. These areas will be managed as conservation reserves and management actions and associated responsibilities for these areas will be specified in a separate management plan, which may include requirements for internal firebreaks and public/emergency access.

The proposed POS areas will be subject to low fuel management and landscaped gardens. Fuel loads within these POS areas will need to be subject to ongoing management to a low fuel state.

## 3.6 Additional measures

Strategen makes the following recommendations for additional bushfire management measures to inform ongoing planning stages of the development and increase the level of bushfire risk mitigation across the site:

1. BMP and BAL assessment at future planning stages: Proposed management measures are based on information at the strategic planning stage and are likely to change as development design is identified as planning stages progress. Consequently, a revised BMP, including detailed BAL assessment on an individual lot basis, will be required for the proposed development at an appropriate future planning stage (such as subdivision) to ensure the management measures and BAL ratings and separation distances are consistent with the final development proposal.
2. Notification on Title: Strategen recommends that the abovementioned revised BMP include a requirement for notification to be placed on title for all lots within the development that have a BAL-12.5 rating or higher as a condition of subdivision to ensure all landowners/proponents and prospective purchasers are aware that their lot is in a designated bushfire prone area and that increased building construction standards will apply to future buildings. The notification on title is also to include that the site is subject to a BMP.
3. Vulnerable land uses: proposed development has the potential to establish vulnerable land uses[1] throughout the project area. Vulnerable land uses located in areas of BAL–12.5 to BAL–29 will require the following documentation in addition to this BMP to accompany submission of the Development Application in order to address Policy Measure 6.6.1 of SPP 3.7:
   (a) Emergency Evacuation Plan
4. Compliance with current City of Wanneroo annual firebreak notice: the developer/land manager and prospective land purchasers are to comply with the current City of Wanneroo annual firebreak notice (Appendix 2).

[1] Vulnerable land uses may include, but are not limited to: hospitals, nursing homes and retirement villages, tourist accommodation including camping grounds and eco-tourism, childcare centres, educational establishments, places of worship, retail and office premises as well as subsidiary uses of residential development, such as family day care centres or home businesses and essential infrastructure such as energy, transport, telecommunications and other utilities.

# 4. Proposal compliance and justification

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

6.2 Strategic planning proposals, subdivision and development applications

**a)** Strategic planning proposals, subdivision and development applications within designated bushfire prone areas relating to land that has or will have a Bushfire Hazard Level (BHL) above low and/or where a Bushfire Attack Level (BAL) rating above BAL-LOW apply, are to comply with these policy measures.

**b)** Any strategic planning proposal, subdivision or development application in an area to which policy measure 6.2 a) applies, that has or will, on completion, have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, may be considered for approval where it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.

**c)** This policy also applies where an area is not yet designated as a bushfire prone area but is proposed to be developed in a way that introduces a bushfire hazard, as outlined in the Guidelines.

6.3 Information to accompany strategic planning proposals

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

**a) (i)** the results of a BHL assessment determining the applicable hazard level(s) across the subject land, in accordance with the methodology set out in the Guidelines. BHL assessments should be prepared by an accredited Bushfire Planning Practitioner; or

**a) (ii)** where the lot layout of the proposal is known, a BAL Contour Map to determine the indicative acceptable BAL ratings across the subject site, in accordance with the Guidelines. The BAL Contour Map should be prepared by an accredited Bushfire Planning Practitioner; and

**b)** the identification of any bushfire hazard issues arising from the relevant assessment; and

**c)** clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages.

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

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

**5.1** Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.

**5.2** Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process.

**5.3** Ensure that higher order strategic planning documents, strategic planning proposals, subdivision and development applications take into account bushfire protection requirements and include specified bushfire protection measures.

**5.4** Achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity, with consideration of the potential impacts of climate change.

In response to the above requirements of SPP 3.7 and the Guidelines, bushfire management measures, as outlined in Section 3, have been devised for the proposed development in accordance with Guideline acceptable solutions to meet compliance with bushfire protection criteria. An 'acceptable solutions' assessment at the strategic planning stage is provided in Table 2 to assess the proposed bushfire management measures against each bushfire protection criteria in accordance with the Guidelines and demonstrate that the measures proposed meet the intent of each element of the bushfire protection criteria.

Table 2: Acceptable solutions assessment against bushfire protection criteria

| Bushfire protection criteria | Intent | Acceptable solutions | Proposed bushfire management measures | Compliance statement |
|---|---|---|---|---|
| **Element 1: Location** | To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure | A1.1 Development location<br>The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL–29 or below. | Refer to Section 3.2, which demonstrates that proposed development to be identified as part of future planning stages will be designed and located to ensure a rating of BAL 29 or below is achieved. | The measures proposed are considered to comply and meet the intent of Element 1 Location. |
| **Element 2: Siting and design of development** | To ensure that the siting and design of development minimises the level of bushfire impact | A2.1 Asset Protection Zone<br>Every building is surrounded by an APZ, depicted on submitted plans, which meets detailed requirements (refer to the Guidelines for detailed APZ requirements). | Refer to Section 3.1, which demonstrates that proposed development to be identified as part of future planning stages will be designed to ensure all development areas within 100 m of post development classified vegetation are provided a minimum 20 m wide APZ. | The measures proposed are considered to comply and meet the intent of Element 2 Siting and design of development |
| | | A2.2 Hazard Separation Zone<br>Every building and its contiguous APZ is surrounded by an HSZ, depicted on submitted plans, that meets detailed requirements (refer to the Guidelines for detailed HSZ requirements). An HSZ may not be required if the proposed construction meets the standard appropriate to the BAL for that location, and does not exceed BAL–29. | Refer to Section 3.1, which demonstrates that HSZs will not be required since individual dwelling construction requirements will be adopted to meet the standard appropriate to the BAL for that location, not exceeding BAL–29. The requirement for HSZs will need to be reviewed when detailed development layout is identified at future planning stages. | |
| **Element 3: Vehicular access** | To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event | A3.1 Two access routes<br>Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions. | Refer to Section 3.3, which demonstrates that proposed development to be identified as part of future planning stages will be designed to provide two access routes for all proposed lots through a combination of existing perimeter roads and proposed internal roads. | The measures proposed are considered to comply and meet the intent of Element 3 Vehicular access |
| | | A3.2 Public road<br>A public road is to meet the requirements in Table 2, Column 1. | Refer to Section 3.3, which demonstrates that any proposed public roads will be designed to meet minimum requirements outlined in Table 2. | |
| | | A3.3 Cul-de-sac (including a dead-end-road)<br>A cul-de-sac and/or a dead end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent), detailed requirements will need to be achieved (refer to the Guidelines for detailed cul-de-sac requirements). | Refer to Section 3.3, which demonstrates that any proposed cul-de-sacs will be designed to meet minimum requirements outlined in Table 2. | |

| | | | | |
|---|---|---|---|---|
| | | A3.4 Battle-axe<br>Battle-axe access leg should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) detailed requirements will need to be achieved (refer to the Guidelines for detailed battle-axe requirements). | Refer to Section 3.3, which demonstrates that proposed development will avoid inclusion of any battle-axe access legs. | |
| | | A3.5 Private driveway longer than 50 m<br>A private driveway is to meet detailed requirements (refer to the Guidelines for detailed private driveway requirements). | Refer to Section 3.3, which demonstrates that any proposed private driveways longer than 50 m will be designed to meet minimum requirements outlined in Table 2 | |
| | | A3.6 Emergency access way<br>An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet detailed requirements (refer to the Guidelines for detailed EAW requirements). | Refer to Section 3.3, which demonstrates that any proposed emergency access ways will be designed to meet minimum requirements outlined in Table 2 | |
| | | A3.7 Fire service access routes (perimeter roads)<br>Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire fighters and link between public road networks for fire fighting purposes. Fire service access routes are to meet detailed requirements (refer to the Guidelines for detailed fire service access route requirements). | Refer to Section 3.3, which demonstrates that any proposed fire service access routes will be designed to meet minimum requirements outlined in Table 2 | |
| | | A3.8 Firebreak width<br>Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level as prescribed in the local firebreak notice issued by the local government | Refer to Section 3.3, which demonstrates that all lots will need to meet minimum internal perimeter firebreak requirements as per the City of Wanneroo Firebreak Notice. | |
| **Element 4: Water** | To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire. | A4.1 Reticulated areas<br>The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services. | Refer to Section 3.4, which demonstrates that reticulated water supply will be provided for the proposed development. | The measures proposed are considered to comply and meet the intent of Element 4 Water |
| | | A4.2 Non-reticulated areas<br>Water tanks for fire fighting purposes with a hydrant or standpipe are provided and meet detailed requirements (refer to the Guidelines for detailed requirements for non-reticulated areas) | N/A Reticulated water supply will be provided for the proposed development. | |

| | | | | |
|---|---|---|---|---|
| | | A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively)<br>Single lots above 500 square metres need a dedicated static water supply on the lot that has the effective capacity of 10 000 litres. | N/A Reticulated water supply will be provided for the proposed development. | |

# 5. Implementation and enforcement

Implementation of the BMP and future revisions of the BMP apply to the developer, prospective landowners and local government to ensure bushfire management measures are adopted and implemented on an ongoing basis. A summary of the bushfire management measures described in Section 3, as well as an indicative works program to guide future planning, is provided in Table 3.

This indicative works program will need to be revised and updated as part of requirements for preparation of a revised BMP as planning stages progress.

Table 3: Indicative works program

| Bushfire management measure | Timing for application | Responsibility |
|---|---|---|
| Creation and maintenance of APZs | To be created for each development stage where required, prior to development within that stage, and maintained as required to ensure the APZs are kept in a low threat minimal fuel condition on a regular and ongoing basis | Developer during development of each relevant stage, relevant land authority/manager where required following completion of each relevant stage |
| Creation and maintenance of on-site staging buffers | To be created around each development stage where required, prior to development within that stage, and maintained as required to ensure the buffer is kept in a low threat minimal fuel condition on a regular and ongoing basis until developed | Developer |
| Implementation of increased building construction standards | At the building construction stage | Local government, builder, prospective landowners |
| Construction of public roads, emergency access ways, fire service access routes or firebreaks | Following subdivision approval and prior to construction of proposed dwellings | Developer |
| Construction of private driveways | Following subdivision approval and prior to construction of proposed dwellings | Prospective landowners |
| Implementation and maintenance of firebreaks | As required in accordance with Shire of Mundaring Firebreak Notice | Prospective landowners |
| Provision of reticulated water supply | Prior to construction of proposed dwellings | Developer |
| Fuel management within POS | Prior to construction of proposed dwellings | Developer for specified/agreed period, Shire thereafter |
| Preparation of Emergency Evacuation Plan | At the Development Application stage for any vulnerable land uses proposed in BAL–12.5 to BAL–29 areas | Prospective landowner |
| Notification on Title | Following subdivision approval | Developer |
| Revised BMP and BAL assessment at future planning stages | Prior to subdivision approval | Developer |

## 5.1 Document review

This BMP will need to be updated as part of future planning stages to ensure:

1. Proposed management measures are based on a final detailed development plan, including lot boundaries, road layout, building envelopes and locations.
2. Final development details and management measures are re-assessed for compliance with bushfire protection criteria.

The developer will be responsible for updating and revising the BMP until such time that the development is complete, after which the Shire will be the authority responsible for updating and revising the BMP.

## 5.2 Stakeholder consultation

Strategen has undertaken consultation with the client to ensure the aims and objectives of the BMP are in accordance with stakeholder expectations and the BMP maintains compliance with the BMP.

# 6. References

Armstrong P, 1996, *Vegetation Condition and Conservation Values for Lots 8 and 11 Eglinton, City of Wanneroo*, unpublished report for Landcorp and Alan Tingay and Associates.

ATA 2005, Metropolitan Region Scheme Amendment 1029/33 Alkimos-Eglinton *Flora, Vegetation and Fauna Baseline Information*. Report No. 2004/253.

Bureau of Meteorology (BoM) 2016, *Climate statistics for Australian locations: Monthly climate statistics for Bickley*, [Online], Commonwealth of Australia, available from: *http://www.bom.gov.au/climate/averages/tables/cw_009178.shtml*, [22/06/2016].

Commonwealth Science and Industrial Research Organisation (CSIRO) 1999, *Fire Danger and Fire Spread Calculator*, Commonwealth Science and Industrial Research Organisation, Perth.

Department of Fire and Emergency Services (DFES) 2016, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: *http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx*, [2/06/2016].

Heddle EM, Loneragan OW & Havel JJ 1980, *Darling System, Vegetation Complexes*, Forest Department, Perth.

McCaw L and Hanstrum B 2003, 'Fire environment of Mediterranean south-west Western Australia', in *Fire in Ecosystems of South-West Western Australia: Impacts and Management*, eds I Abbott & ND Burrows, Backhuys Publishers, Leiden, Netherlands, pp. 171–188.

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

Strategen 2016, *Fire Management Plan, Amberton Estate*, prepared for Stockland, Strategen, Perth.

Trudgen M and Keighery BJ 1990, *A report on the Flora and Vegetation of the Alkimos Area and Conservation Issues Affecting it*, unpublished report for Landcorp.

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

Western Australian Planning Commission (WAPC) 2015b, *Guidelines for Planning in Bushfire-Prone Areas*, Western Australian Planning Commission, Perth

## Appendix 1
## Gingin Aero January wind profiles

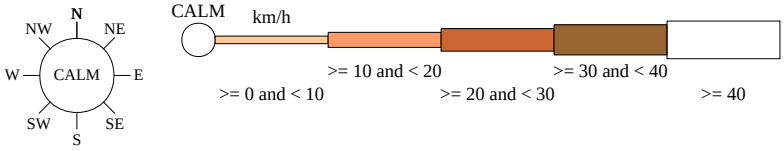
# Rose of Wind direction versus Wind speed in km/h (01 May 1996 to 30 Sep 2010)

Custom times selected, refer to attached note for details

## GINGIN AERO

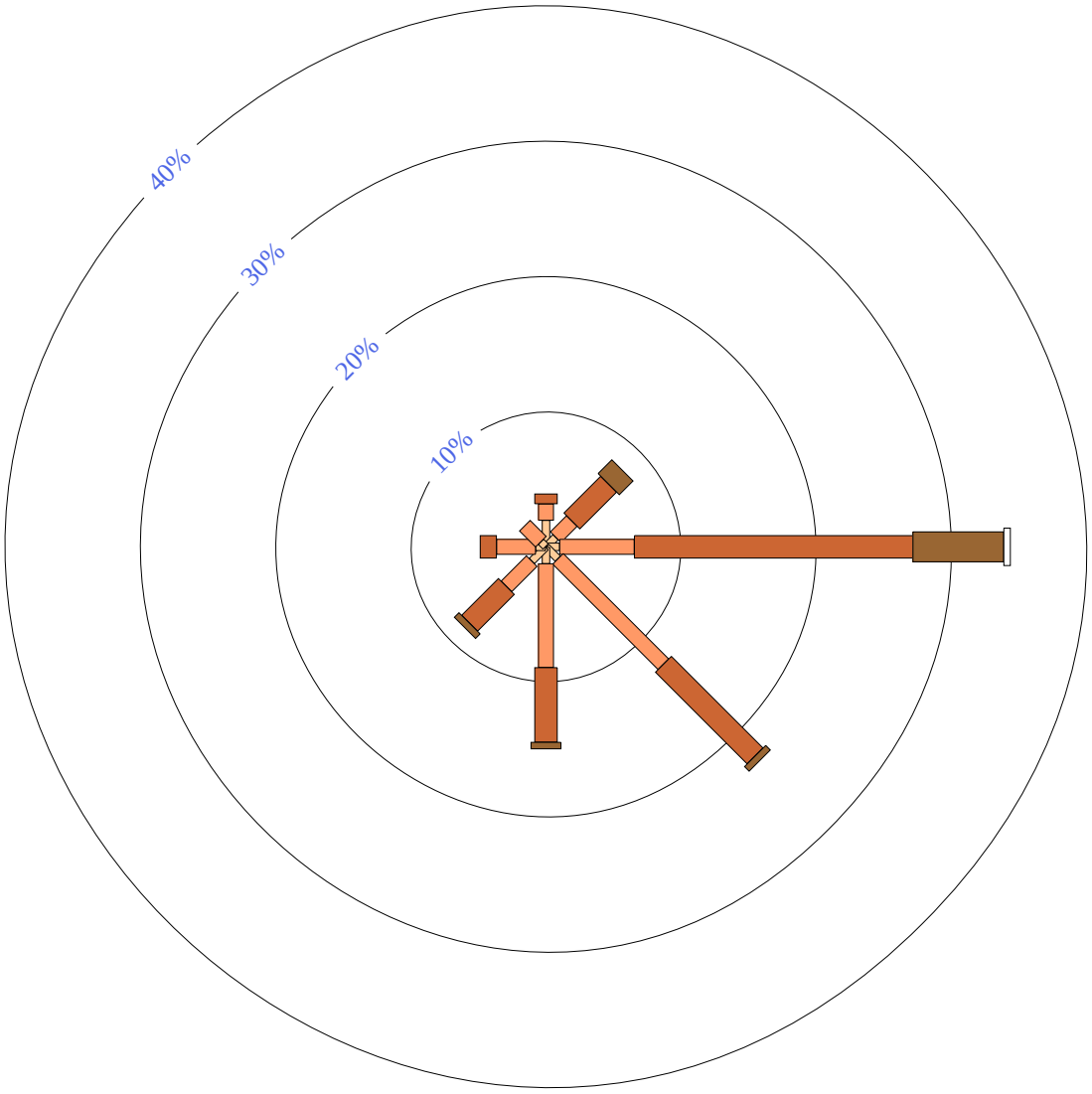
Site No: 009178 • Opened Jan 1968 • Still Open • Latitude: -31.4628° • Longitude: 115.8642° • Elevation 73m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.




9 am Jan
411 Total Observations

Calm *



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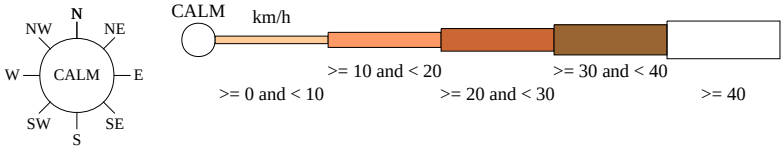
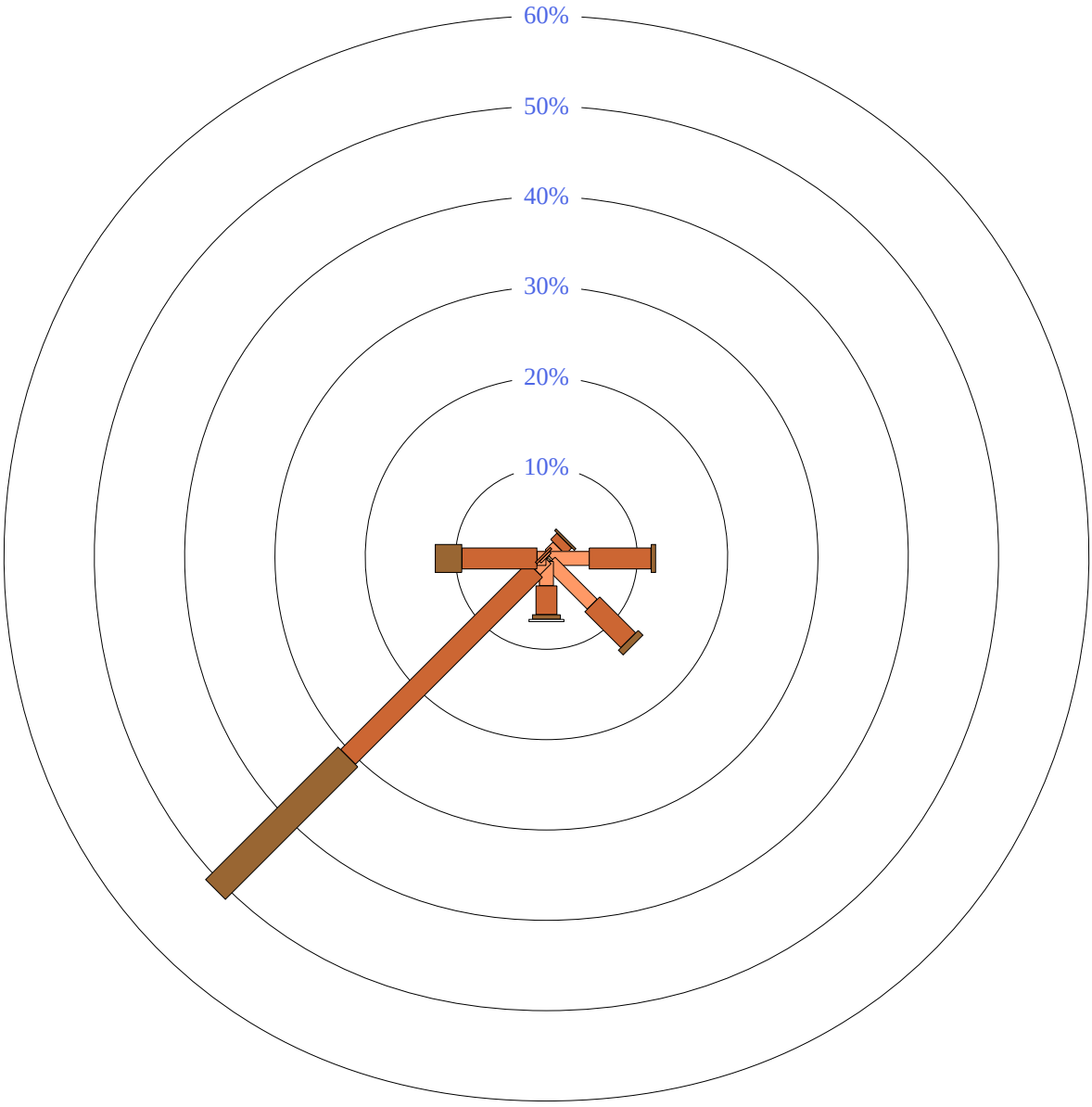



3 pm Jan
410 Total Observations

Calm *



## Appendix 2
## City of Wanneroo Firebreak Notice

City of Wanneroo

CITY OF WANNEROO

# FIRE AND BURNING INFORMATION

2015-2016

- BURNING PERIODS & FDRS
- BUILDING PROTECTION ZONES
- BURNING GARDEN REFUSE
- ALTERNATIVES TO BURNING
- FIRE BANS / BRIGADE CONTACTS
- BUSHFIRE SURVIVAL PLAN
- FIREBREAKS & EXAMPLES

**TO REPORT ALL FIRES RING 000**

# BURNING PERIOD DATES & FIRE DANGER RATINGS (FDRs)

## 1 DECEMBER TO 31 MARCH (INCLUSIVE)

**ALL burning, including garden refuse is prohibited during this period.**

Dates may be varied due to climate or weather conditions. Period variations will be advertised in local papers, the City website and Facebook page.

## BURNING PERMITS ARE REQUIRED 1 APRIL - 30 NOVEMBER

Permits to burn may be obtained from the City of Wanneroo at the following locations:

Wanneroo Animal Care Centre
1204 Wanneroo Road, Ashby // 4pm-6pm everyday

City of Wanneroo Civic Centre
23 Dundebar Road, Wanneroo // 9am-4pm weekdays

Two Rocks Volunteer Fire Brigade
Carraway Loop, Two Rocks. Call **0427 026 000** before attending. For Two Rocks residents only (Seatrees Estate and Breakwater estate)

ALL BURNING IS PROHIBITED ON DAYS OF **VERY HIGH** OR ABOVE FIRE DANGER RATINGS AND IF A TOTAL FIRE BAN OR A HARVEST AND VEHICLE MOVEMENT BAN IS DECLARED.

## FIRE DANGER RATINGS (FDR)

If you are in a bushfire risk location you need to know what the Fire Danger Rating (FDR) is for your area, monitor local conditions and keep informed.

The FDR is based on the forecast weather conditions and gives you advice about the level of bushfire threat on a particular day. When the rating is high, the threat of a bushfire increases.

### FIRE DANGER RATING INFORMATION BOARDS

These boards cleary display the daily fire danger rating and are featured at eight locations across the City of Wanneroo.

- Corner of Joondalup Drive and Wanneroo Road
- Wanneroo Road, south of the Yanchep Beach Road turn off
- Wanneroo Road, Carabooda
- Marmion Avenue, Jindalee
- Neaves Road, Mariginiup
- Old Yanchep Road, Pinjar
- Gnangara Road, Landsdale
- Countryside Drive, Two Rocks


### STAY INFORMED

An RSS feed is available to receive email alerts when the City's Harvest and Vehicle Movement Bans are declared. To sign up, visit the City website.

Harvest and Vehicle Movement Bans are also published on the website and broadcast on the ABC local radio station.

The City of Wanneroo's fire weather district is - Lower West Coast.

You can find out the daily FDR online at:

- www.dfes.wa.gov.au
- www.bom.gov.au

or by phoning the Telstra Weather Service on 1196.

# BUILDING PROTECTION ZONES

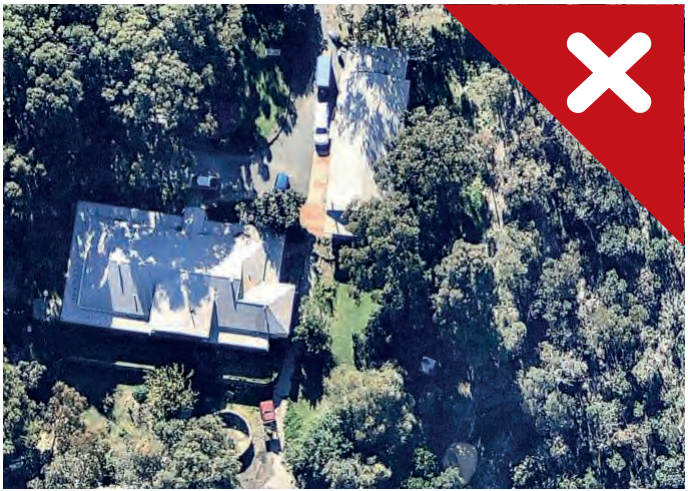
**A building protection zone (BPZ) is an area extending for at least 20 metres around a building on all sides where there is little or nothing to burn.**

Reducing vegetation, rubbish and anything that can burn from around your home will increase its chances of surviving a bushfire.


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

- Maintaining a minimum 2m gap between trees and the building. Make sure that no trees overhang the house.
- Ensuring tree crowns are a minimum of 10m apart.
- Ensuring there is a gap between shrubs and buildings of three times their mature height.
- Ensuring shrubs aren't planted in clumps.

- Keeping the grass short and prune the scrub so that it is not dense, nor does it have fine, dead aerated material in the crown of the scrub.
- Raking up leaves, twigs and removing tree trailing bark.
- Pruning lower branches (up to 2m off the ground) to stop a surface fire spreading to the canopy of the trees.
- Creating a mineral earth firebreak.
- Having your paths adjacent to the building and have your driveway placed so that it maximises the protection to the house.
- Keeping your gutters free of leaves and other flammable material



✓ EXAMPLE ABOVE:
extensive fire protection zone created around building.

✗ EXAMPLE LEFT:
no fire protection zone created around building.

# BURNING GARDEN REFUSE

There are many methods of hazard reduction available to residents. Reduction of fuel does not have to be as drastic as removing all vegetation. Burning garden refuse is one option available at certain times of the year.

## GARDEN REFUSE MAY BE BURNT WITHOUT A PERMIT AFTER 6PM, SUBJECT TO:

- the pile of refuse being burnt not exceeding 1sqm
- a 2 metre wide area clear of flammable material surrounding the pile
- the fire only being lit between 6pm and 11pm
- only one heap being burnt at any one time
- the fire being completely extinguished by midnight
- a person in control of the fire staying with the fire until it is completely extinguished
- there being a means of extinguishing the fire available at all times (eg garden hose, knapsack spray or fire unit)
- neighbours are informed of your intention to burn
- the smoke does not cause a nuisance to neighbours
- the smoke does not create a traffic hazard
- household or commercial waste, or any noxious materials are not burned.

## MITIGATION BURNS

For assistance regarding mitigation burns, contact the City of Wanneroo Fire Protection Officers where properties can be assessed. Volunteer Fire Brigades in conjunction with the City's Fire Protection Officers may be able to assist with undertaking the burns. For more information please call 9405 5000.

Mild intensity prescribed burn for fuel reduction.

Eight months post burn at Ashbrook Park.

### GARDEN REFUSE CANNOT BE BURNT:

- At any time during the Prohibited Burning Period
- If a Total Fire Ban or Harvest and Vehicle Movement Ban has been declared
- If the Fire Danger Rating is Very High or above.

NOTE: DO NOT BURN DAMP, WET OR GREEN MATERIAL AT ANY TIME AS THIS WILL CAUSE EXCESSIVE SMOKE.

# ALTERNATIVES TO BURNING

There are a range of alternatives to burning waste which can also be used as a method of hazard reduction.

In many circumstances, hand and mechanical clearing methods should be considered the best way to protect assets. These methods can be safer than burning, and easier to organise and maintain.

## Raking or manual removal of fine fuels

Remove fuels such as fallen leaves, twigs and bark.

## Mowing grass

Keep grass short, green and well watered. Mowed / slashed firebreaks need to be kept below 20mm.

## Spraying

Grass can be sprayed with herbicide to reduce fuel loads. This may be a practical alternative particularly if erosion is a concern or if areas are difficult to access.

## Slashing and mulching

This is an economical method of fuel reduction. To be effective, the cut material must be removed or allowed to rot before summer starts. Slashing and mowing may leave grass in rows, increasing fuel in some places. Mulching, or turbo mowing, also mulches the vegetation leaving the fuel where it is cut.

## Ploughing and grading

These methods can produce effective firebreaks, however, the areas need constant maintenance. Loose soil may erode in steep areas, particularly where there is high rainfall and strong winds.

For further information on preventing erosion please contact the Fire Protection Officer.

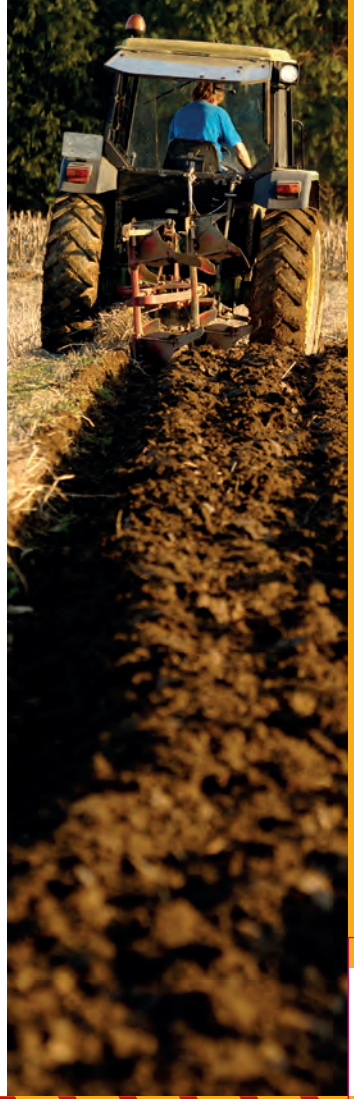
## DISPOSAL OF GREEN WASTE

City residents and ratepayers are able to dispose of green waste and garden refuse at the Greens recycling Facility (70 Motivation Drive, Wangara. 8am – 4.45pm weekends and public holidays).

Access to the site is free with a 'Greens voucher'. Four Greens vouchers are included with the annual Rates notice. Each voucher allows the disposal of a standard 6x4 trailer-load of clean greens at no charge. Entry fees apply without a valid voucher

Garden refuse can also be used as a mulch or compost to improve soils and the growth of plants. If you have large quantities of green waste (branches, tree trunks) you can arrange for mobile mulching services to mulch the material onsite.

Mulch piles should be no larger than 5 cubic metres to reduce the risk of spontaneous combustion and should be surrounded by a firebreak.



## VERGES - A SHARED RESPONSIBILITY

The City of Wanneroo urges all residents to include their property's verge in their fire preparation activities.

The City cannot do it alone, given its size and number of bush verges requiring maintenance.

# FIRE BANS / BRIGADE CONTACTS

## TOTAL FIRE BAN

**A Total Fire Ban is declared by Department of Fire and Emergency Services (DFES) on days when fires are most likely to threaten lives and property.**

WHEN A BAN IS DECLARED IT WILL BE FEATURED ON:

- the DFES website **www.dfes.wa.gov.au**
- DFES Twitter account **@dfes_wa**
- published to subscribers through DFES's automated RSS feeds
- broadcast on **ABC local radio**
- via DFES information line **1800 709 355**

## VOLUNTEER BUSH FIRE BRIGADES

Volunteer Bush Fire Brigades are called to fires via a paging and radio communications system. The 000 emergency number will put you in contact with DFES who will dispatch the nearest Brigade.

**Brigades should not be contacted directly to report a fire; call 000 to report a fire.**

## HARVEST AND VEHICLE MOVEMENT BAN

**Harvest and Vehicle Movement Bans must be imposed by a local government when the bush fire danger index exceeds 35 during a Total Fire Ban.**

They are also imposed when the Chief Bush Fire Control Officer is of the opinion that the use of engines, vehicles, plant or machinery during the prohibited burning times or the restricted burning times or both is likely to cause a fire or contribute to the spread of a bush fire.

If a Harvest and Vehicle Movement and Hot works Ban is declared it is published on the City's website and broadcast on radio 720 AM.

During a Total Fire Ban or Harvest and Vehicle Movement Ban you are not allowed to light, maintain or use a fire in the open air, or to carry out any activity in the open air that causes, or is likely to cause, a fire.

This includes a prohibition on the use of engines, vehicles, plant or machinery likely to cause or be conducive to the spread of a bush fire.

YOU COULD BE FINED UP TO $25,000 AND/OR JAILED FOR 12 MONTHS IF YOU BREACH A BAN.


## BRIGADE CONTACT INFORMATION

**Quinns Rocks Brigade**
T: 0428 498 779
www.quinnsrocksbfb.org.au

**Wanneroo Fire Support Brigade**
T: 0427 026 006
www.wanneroosupportbfb.org.au

Quinns Rocks Fire Station
14 Hidden Valley Retreat,
Clarkson

**Two Rocks Brigade**
Caraway Loop, Two Rocks
T: 0427 026 000
www.tworocksbfb.org.au

**Wanneroo Brigade**
Bldg 1, Ashby Operations Centre
1204 Wanneroo Road, Ashby
T: 0427 026 521
www.wanneroobfb.org.au

# PREPARE ACT SURVIVE

ARE YOU BUSHFIRE READY?

areyouready.wa.gov.au

## IT COULD SAVE YOUR LIFE!

If you live in or near bush, developing and using a **bushfire survival plan** is critical. Your plan will help you avoid making last minute decisions that could prove deadly during a bushfire.

## Your plan MUST include

1. **Your triggers to leave or start defending.**
2. **An informed decision about whether you will leave for a safer place or stay and actively defend.**

## Bushfire Survival Plan TIPS

- ☐ Your plan must work for you and your family. Everyone's bush fire survival plan will be different and depend on individual circumstances.
- ☐ If you live alone develop a plan with your neighbours.
- ☐ Write your plan down and don't doubt it when the time comes to put it into action.
- ☐ Prepare and practice your plan with all the members of your family before the start of the bushfire season.
- ☐ Review your plan when your family circumstances change.

**3** **A back-up plan.** Conditions can change very quickly in a bushfire, often without warning. Your plan must be flexible and cover a range of situations you may face before, during or after the fire.

**4** **Where you will go** and how you will get there if you plan to leave for a safer place?

**Research has shown that leaving late can be deadly. Over the last 100 years 60% of people who died in bushfires were found within 100 metres of their own residence.**

Act immediately. Never 'wait and see' what might happen. Relocating at the last minute can be deadly. **Never second guess your plan.**

☐ Don't forget to include your pets and livestock in your bushfire survival plan.

Download a bushfire survival plan template today at **www.dfes.wa.gov.au**

For more information visit **www.dfes.wa.gov.au** or contact **DFES Community Engagement** 9395 9861

Government of **Western Australia**
Department of **Fire & Emergency Services**

DFES
Department of Fire & Emergency Services

BUSHFIRE SURVIVAL PLAN

# FIREBREAKS / FUEL HAZARD REDUCTION / FIREBREAK EXAMPLES

**Under the Bush Fires Act (1954), all owners and occupiers of land in Western Australia must establish and maintain firebreaks.**

Fire breaks and protection measures are vital in assisting the prevention of fires spreading and to allow safer access for bush fire fighters and vehicles.

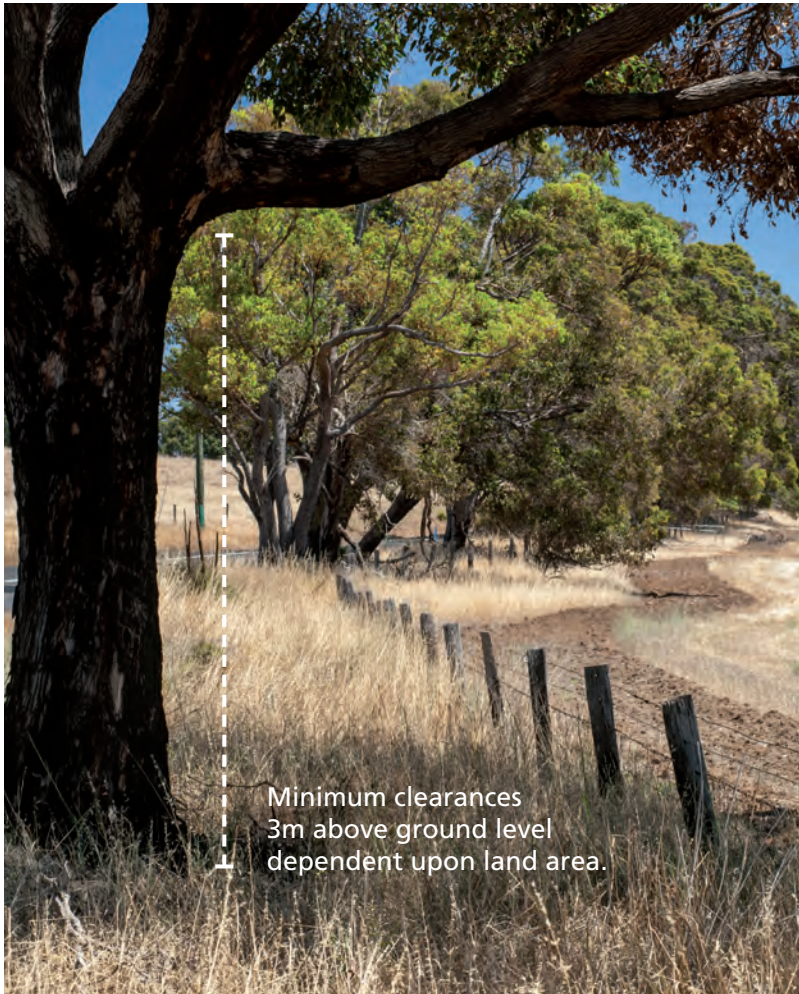
## ALL LAND OWNERS WITHIN THE CITY OF WANNEROO BE ADVISED

**Fire break installation must be completed by 15 November each year. Property inspections will commence the following day.**

Failure to comply with these requirements may incur fines and further action by the City of Wanneroo.

## Land with an area of less than 2,000m$^2$

- A firebreak, not less than two (2) metres wide must be cleared immediately inside (or as close as possible) and around all external boundaries of the land.
- All tree branches that over-hang a firebreak must be trimmed back to a minimum height of three (3) metres above ground level.



## Land with an area of 2,000m$^2$ or more

- A firebreak, not less than three (3) metres wide, must be cleared immediately inside (or as close as possible) around all external boundaries of the land.
- All tree branches that over-hang a firebreak must be trimmed back to a minimum height of three (3) metres above ground level.

## Buildings

- A firebreak not less than three (3) metres wide immediately around all external walls of every building must be cleared.

---

### APPLICATION TO VARY THE ABOVE REQUIREMENTS

If it is considered impracticable for any reason to implement any of these requirements, an application may be made not later than the 1st day of November annually to the Council or its authorised officer for permission to provide alternative fire protection measures. If permission is not granted the stated requirements must be complied with.

### ADDITIONAL WORKS

In addition to these requirements, you may be required to carry out further works which are considered necessary by an Authorised Officer and specified by way of a separate written notice forwarded to the address of the owner/s as shown on the City of Wanneroo rates record for the relevant land.

Non-compliant: no firebreak installed inside boundary fence

Compliant: grass slashed to ground level

Non-compliant: mineral earth fire break showing grass/weed regrowth

Compliant: mineral earth fire break

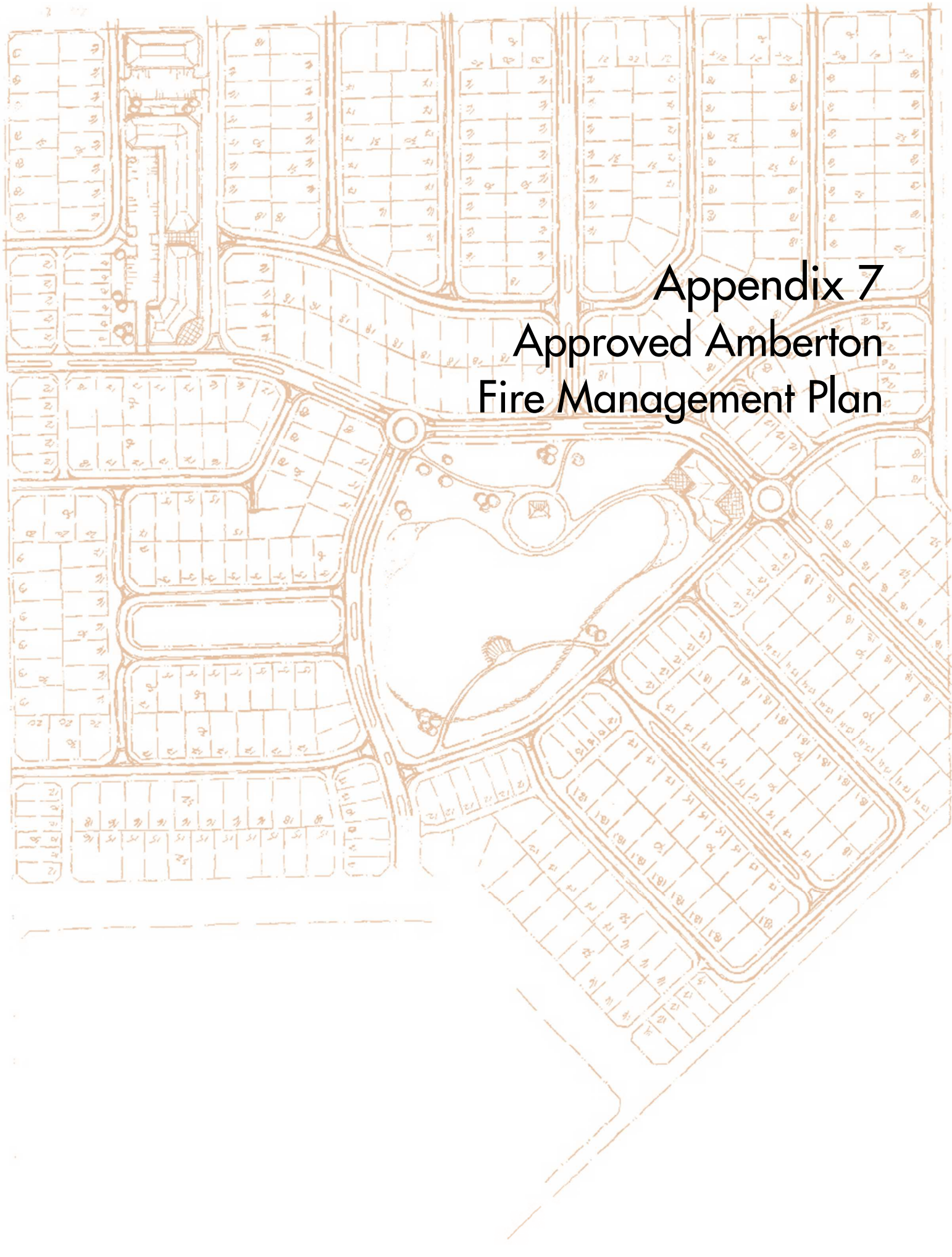
Non-compliant: thick scrub creates a fire hazard around power poles

Compliant: cleared buffer zone around power poles

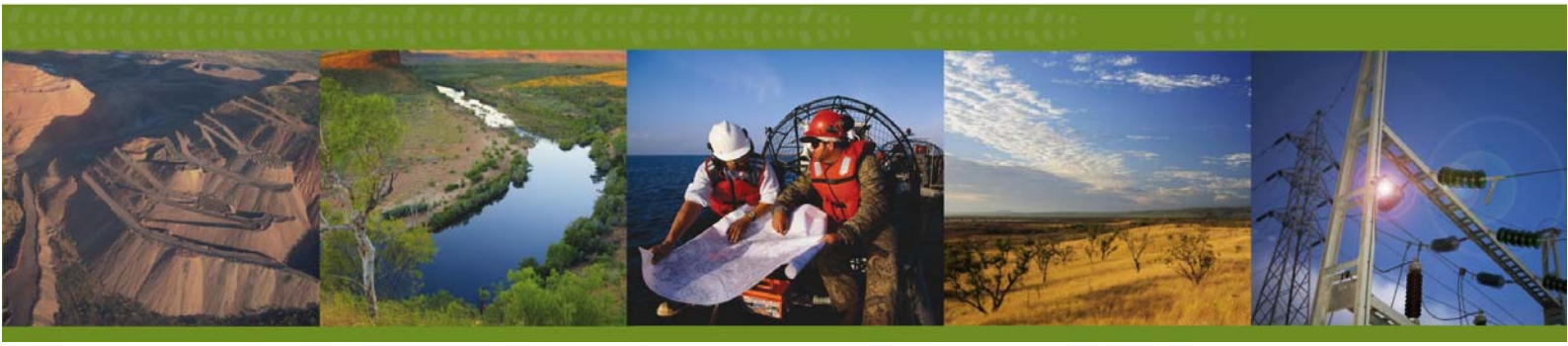
FIREBREAKS & EXAMPLES


23 Dundebar Road, Wanneroo, WA 6065
Locked Bag 1, Wanneroo, WA 6946
T : (08) 9405 5000  F : (08) 9405 5499

wanneroo.wa.gov.au



# Appendix 7
# Approved Amberton Fire Management Plan



# Fire Management Plan

Amberton Estate

Prepared for
Stockland
by Strategen

February 2016

STRATEGEN
environmental consultants

# Fire Management Plan

Amberton Estate

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

February 2016

## *Limitations*

**Scope of services**

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

**Reliance on data**

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

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

**Environmental conclusions**

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

**Client: Stockland**

| Report Version | Revision No. | Purpose | Strategen author/reviewer | Submitted to Client | |
|---|---|---|---|---|---|
| | | | | Form | Date |
| Draft Report | Rev A | For review by client | Z Cockerill | Electronic (email) | 2/09/2014 |
| Final Report | Rev 0 | Issued for use: for submission to City of Wanneroo and DFES | Z Cockerill / R Banks | Electronic (email) | 4/11/2014 |
| **Final Report** | **Rev 1** | **Issued for use: to address City of Wanneroo and DFES comments** | **Z Cockerill** | **Electronic (email)** | **12/02/2016** |

Filename: STO14116_01 R001 Rev 1 - 12 February 2016

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# 1. Introduction

## 1.1 Background

Stockland is in the process of developing Amberton Estate (the project area), located at Eglinton in the City of Wanneroo. The project area is proposed to be developed primarily for residential purposes in line with the approved Eglinton Local Structure Plan (LSP) and indicative Overall Estate Lot Layout Plan (Figure 1), which may be subject to future modification.

The project area and adjacent land contains coastal vegetation that may pose an inherent bush fire risk to future assets of the development, particularly in areas where vegetation on steep slopes is to be retained, such as within the proposed conservation reserve to the north.

Stockland has commissioned Strategen to prepare a Fire Management Plan (FMP) for the project area to guide bush fire protection of the proposed Amberton Estate residential development and ensure a suitable, compliant and effective bush fire management outcome is achieved for the site.

The FMP has been prepared in accordance with *Planning for Bush Fire Protection Guidelines Edition 2* (PFBFP Guidelines; WAPC et al. 2010), with consideration of *Draft State Planning Policy 3.7 Planning for Bushfire Risk Management* (DoP & WAPC 2014a) and accompanying *Draft Planning for Bushfire Risk Management Guidelines* (DoP & WAPC 2014b). The FMP is for submission to City of Wanneroo (CoW) and Department of Fire and Emergency Services (DFES). A completed FMP compliance checklist is contained in Appendix 1.

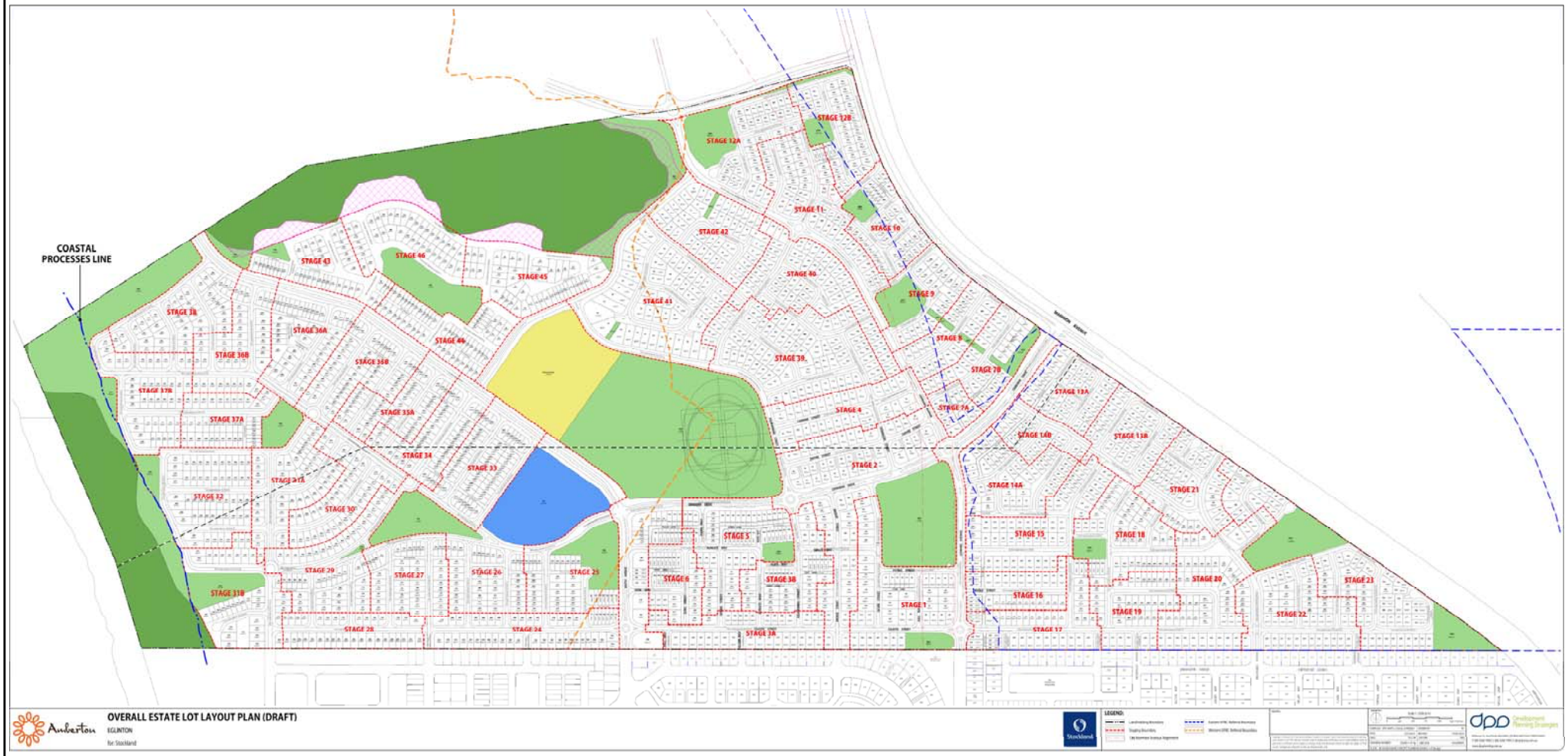
## 1.2 Purpose and application of the plan

The purpose of the FMP is to provide guidance on how to plan for and manage the potential bush fire risk to the project area through implementation of a range of bush fire risk treatment and mitigation measures. The FMP outlines how future on-site assets can be protected during the summer months when the threat from bush fire is at its peak. This is particularly relevant when existing fire appliances in the area may be unable to offer an adequate emergency suppression response. Therefore, the developer should aim to ensure site assets are self-protecting from bush fire.

Implementation of the FMP is a shared responsibility between the developer, CoW and prospective landowners to ensure bush fire risk treatment and mitigation measures are adopted and implemented on an ongoing basis to achieve bush fire management objectives.

## 1.3 Stakeholder consultation

Strategen has undertaken consultation with the developer, CoW and DFES to ensure aims and objectives of the FMP are in accordance with stakeholder expectations and the FMP maintains compliance with PFBFP Guidelines.




Source: DPS 2014

STRATEGEN

Fire Management Plan: Amberton Estate

Overall Estate Lot Layout Plan

Figure 1

# 2. Aim and objectives

## 2.1 Aim

The FMP aims to achieve a reduction in the occurrence of uncontrolled bush fires and minimise potential impacts on life and property of the proposed development through the following:

- quantifying the bush fire hazard and assessing the bush fire risk to the project area
- documenting bush fire prevention requirements of the project area to provide ongoing protection to future residents, visitors and built assets of the subject land
- identifying bush fire protection issues, appropriate strategies and those persons and/or organisations who have a responsibility to implement the FMP
- complying with PFBFP Guidelines and maintaining compatibility with bush fire management on neighbouring subdivisions
- providing guidance for the developer, CoW and prospective landowners to protect the subject land and on-site assets in the event that fire appliances may not be available to offer an adequate bush fire suppression response.

## 2.2 Objectives

Key objectives of the FMP and the relevant section/s of this document in which they are addressed are outlined in Table 1.

Table 1: Key objectives of the FMP

| Objective | Section |
|---|---|
| Define areas where values are located | Section 3.5 |
| Define and rank fire hazard areas | Section 4.2.1 |
| Nominate individuals and organisations responsible for fire management and associated works within the project area | Section 5.7 |
| Propose bush fire risk treatment and mitigation measures for the project area, with due regard for life, property and the environment | Section 5 |
| Provide performance criteria and acceptable solutions for all fire management works (e.g. development location, vehicular access, water supply, siting of development and design of development) | Section 4.2.2 and Section 5 |

# 3. Description of the area

## 3.1 General overview

Amberton Estate occupies 198 ha and forms Precinct 3 of the overall Eglinton LSP, located at Eglinton in the City of Wanneroo (Figure 2). Amberton Estate is situated approximately 18 km northwest of Joondalup and 43 km northwest of the Perth CBD. The site is partially developed, with the initial stages of development currently being constructed in the southeast. The remaining undeveloped portion of the site to the west comprises the balance of Lot 9007, as well as a narrow 'Parks and Recreation' reserve along the coast (Figure 3).

The project area is bound by the following:

- Indian Ocean to the west
- future development stages of the Eglinton LSP to the north
- Marmion Avenue and future development stages of the Eglinton LSP to the east
- current and future stages of the Shorehaven residential development to the south.

On-site vegetation is currently restricted to the undeveloped portion of the site to the west, of which the majority is proposed to be cleared following approval and development of ongoing stages of Amberton Estate.

Vegetation to the west within the foreshore reserve and to the north within a proposed conservation reserve is proposed to be retained as per the Eglinton LSP. All other on-site and surrounding areas of vegetation will be subject to various levels of clearing and disturbance following approval of ongoing stages of Eglinton and Shorehaven development.

### 3.1.1 Development context and fire management planning

Amberton Estate forms Precinct 3 of the overall Eglinton LSP, which is to be developed in accordance with the Alkimos Eglinton District Structure Plan and higher level planning documents including the Metropolitan Region Scheme (MRS) and City of Wanneroo District Planning Scheme No. 2 (DPS No. 2).

Initial development stages of Amberton Estate are currently being constructed in the southeast of the site, with future stages to occur over the remaining undeveloped portion of the site, followed by development of adjacent precincts at Eglinton to the north and east once the required approvals are in place.

This FMP has been prepared for Amberton Estate to manage the bush fire risk to future assets of the development and meet State bush fire planning requirements. A similar approach and methodology regarding vegetation and bush fire hazard assessment documented in this FMP has been adopted for other developments along the coastal strip in the locality, such as at Alkimos.

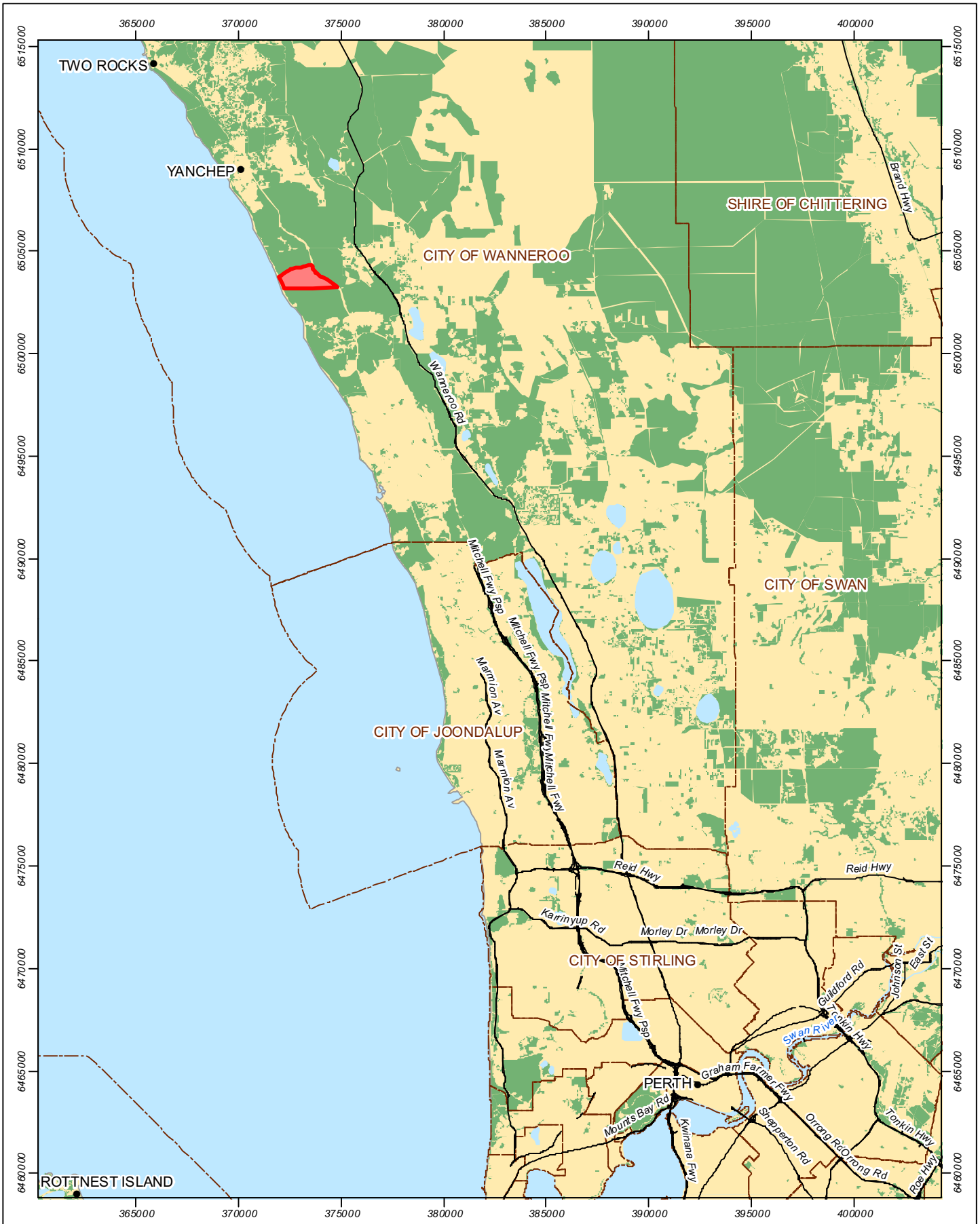



**Figure 2 Regional location**

Scale 1:250,000 at A4

0 1 2 3 km

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 11/06/2014
Author: JCrute
Source: Topography: Geoscience Australia 2011.


**Legend**

- Town
- Major road
- Major river
- Lakes
- Native vegetation
- Project area boundary
- Local government boundary

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

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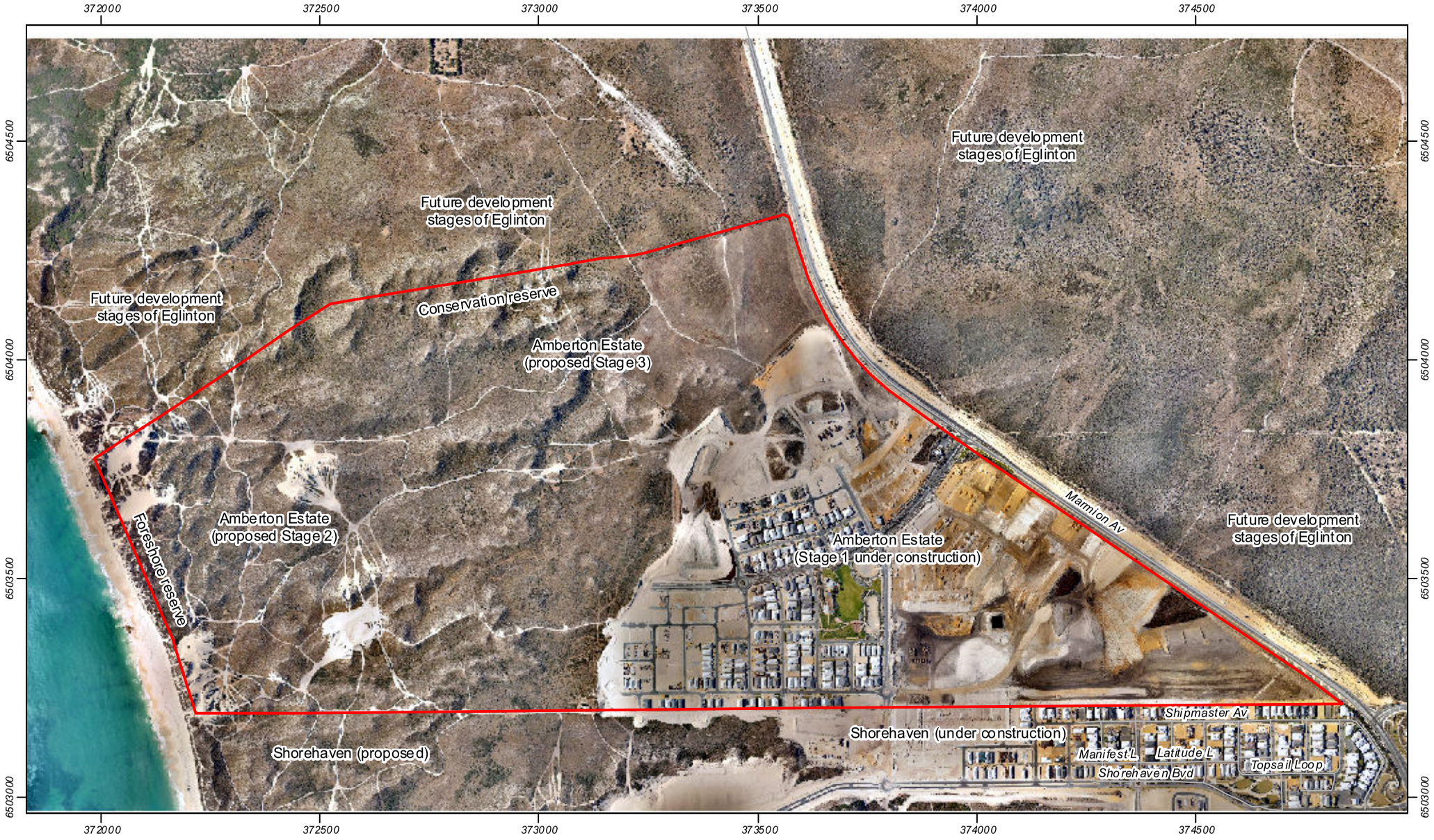


**Figure 3: Site overview**

Scale 1:12,000 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: 11/06/2014

Author: JCrute

Source: Client 2014.

**Legend**

Existing roads

Project area boundary

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

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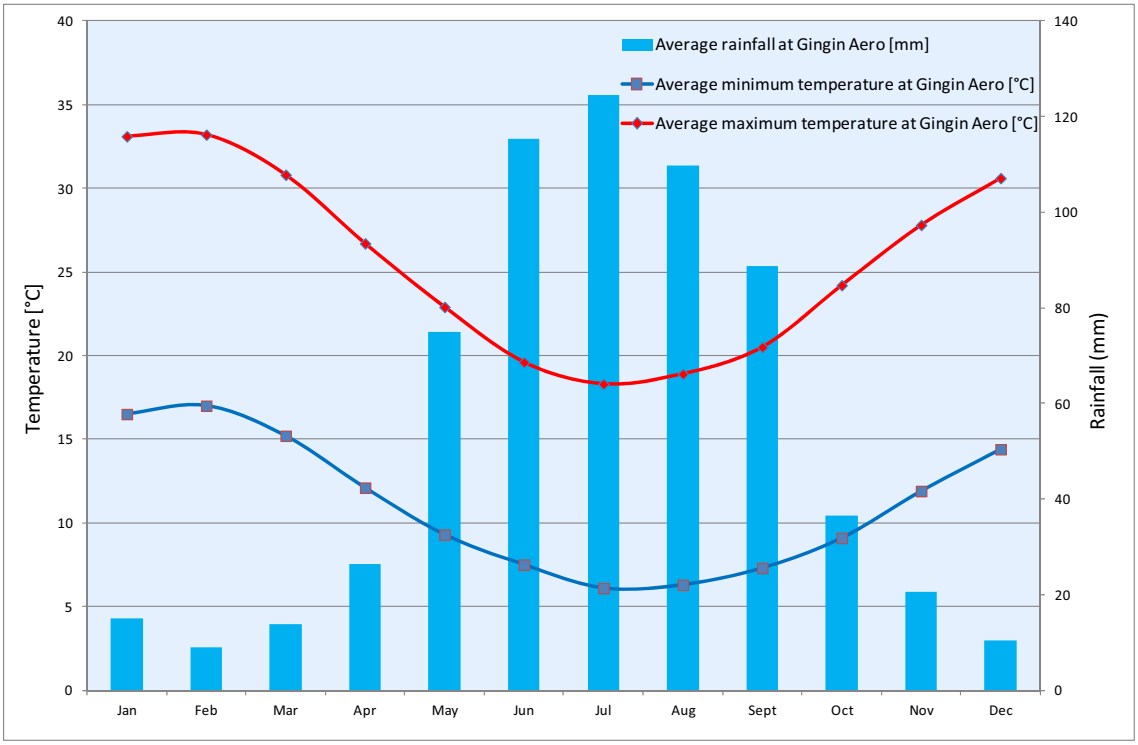
## 3.2 Local climate

Eglinton experiences a Mediterranean climate characterised by mild, wet winters and warm to hot, dry summers. The closest Bureau of Meteorology (BoM) weather station at Gingin Aero (Station No. 9178), located approximately 24 km northeast of the project area, provides average monthly climate statistics for the locality recorded since 1996, as illustrated in Figure 4. Climatic conditions at Eglinton are slightly cooler than Gingin Aero, with higher annual rainfall due to maritime effects and proximity to the Indian Ocean; however, the variations are not expected to be significant and statistics from Gingin Aero are considered suitable for the purposes of the fire weather assessment.

Average annual rainfall recorded at Gingin Aero is 648.4 mm (BoM 2014). Rainfall may occur at any time of year; however, most occurs in winter in association with cold fronts from the southwest. Highest temperatures occur from December to March, with average monthly maximums ranging from 30.6°C in December to 33.2°C in February (BoM 2014). Lowest temperatures occur from June to September, with average monthly minimums ranging from 6.1°C in July to 7.5°C in June (BoM 2014).




Source: BoM 2014

Figure 4: Average monthly climate statistics for Gingin Aero (Station No. 9178)

### 3.2.1 Worst case fire weather conditions

Southwest Western Australia generally experiences a cool to mild growing season in the months of August through to November of each year, followed by four months of summer drought conditions, which is when the potential for bush fire occurrence is at its peak.

Worst case fire weather conditions can occur during this dry period when a low pressure trough forms off the west coast and strong winds develop from the north or northeast. These conditions are sometimes associated with 'Extreme' or 'Catastrophic' fire dangers, which are consistent with very high temperatures, low relative humidity and strong winds. Based on the predominant summer climatic conditions of the local area, 'Extreme' and 'Catastrophic' fire dangers occur less than 5% of the time during the designated bush fire season, which equates to around six days between December and March (McCaw & Hanstrum 2003).

### 3.2.2 Predominant fire weather conditions

Predominant fire weather conditions are those that occur 95% of the time during the designated bush fire season. For the subject locality, these generally correlate with average January climatic conditions.

Mean January 9:00 am and 3:00 pm wind profiles for Gingin Aero are contained in Appendix 2. These illustrate that the predominant winds during the designated bush fire season are from the east in the morning averaging around 21 km/h; and from the southwest in the afternoon averaging around 26 km/h (BoM 2014).

Mean January 9:00 am and 3:00 pm relative humidity for Gingin Aero is approximately 48% and 33% respectively, with the January mean maximum temperature peaking at around 33°C (BoM 2014). These predominant fire weather conditions correlate with an average fire danger index of 'High', as determined using the Commonwealth Science and Industrial Research Organisation (CSIRO) Fire Danger and Fire Spread Calculator (CSIRO 1999).

### 3.2.3 Potential bush fire scenarios

A fire front approaching the site from the west within the foreshore reserve is considered unlikely to significantly impact future assets of the proposed development since the on-ground fire environment, environmental characteristics and potential fire conditions are not overly conducive to intense bush fire occurrence in this area. The low available fuel loads and broken up nature of the low shrubland vegetation, as well as the small fire run and predominant winds are not expected to be capable of supporting a bush fire with significant fire intensity and ember attack characteristics.

A fire front approaching the site from the north within the conservation reserve is considered a possible and much higher bush fire risk scenario that could impact future assets of the proposed development under suitable fire weather conditions. The vegetation consists of more intact, continuous shrubland vegetation under steep slopes, so there is an associated increase in potential bush fire risk, particularly with regards to ember attack on days of 'Extreme' or 'Catastrophic' fire weather and associated strong north/north-easterly winds.

## Landform and topography

The project area is located on the Swan Coastal Plain, which is characterised by a low-lying coastal plain mainly covered with woodlands. Younger sandy areas and limestones are dominated by heath and/or *Eucalyptus gomphocephala* (Tuart) woodlands (McKenzie et al. 2003).

The project area and adjacent land contains undulating to steep topography with numerous coastal dunes that vary in elevation and orientation (Figure 5). The majority of vegetation within and adjacent to the project area is proposed to be cleared as part of ongoing development at Eglinton and Shorehaven. As a result, slope will only be a factor contributing to the bush fire hazard and potential Bushfire Attack Level (BAL) in those areas where the current vegetation extent is proposed to be retained (i.e. within the foreshore reserve to the west and conservation reserve to the north).

Elevation within the north-south elongated foreshore reserve fluctuates between 1 mAHD (Australian Height Datum) at the shore line and 15 mAHD at dune high points, with an average slope of 5–10 degrees. Elevation within the east-west elongated ridge line of the conservation reserve fluctuates between 20 mAHD and 40 mAHD, with slopes exceeding 10 degrees in some areas.

Following site earthworks and levelling, both reserves will generally be located up-slope of future lots. Consequently, the existing topography and slope under vegetation will not increase the level of bushfire attack on the proposed development in terms of increased fire intensity or rate of spread should a bush fire emanate from these areas and approach the site. Ember attack however still remains a threat to future lots, particularly on days of 'Extreme' and 'Catastrophic' fire danger. This information is further considered as part of the BAL assessment for the development (refer to Section 4.2.3).


**Figure 5: Site topography**

Scale 1:8,000 at A3

0 50 100 150 200 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 2/09/2014
Author: JCrute
Source: Client 2014,

**Legend**

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

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## 3.3 Vegetation

### 3.3.1 Vegetation complexes

Regional vegetation survey and mapping of the Swan Coastal Plain, undertaken by Heddle et al. (1980), indicates the project area and adjacent land is contained predominantly within the Quindalup Vegetation Complex, with a small portion to the southeast contained within the Cottesloe Vegetation Complex Central and South (Figure 6). These vegetation complexes are described as:

- Quindalup Complex: coastal dune complex consisting mainly of two alliances including the strand and fore dune alliance and the mobile and stable dune alliance (local variations include low closed forest of *Melaleuca lanceolata-Callitris preissii* and closed scrub of *Acacia rostellifera*)
- Cottesloe Complex Central and South: mosaic of woodland of *Eucalyptus gomphocephala* and open forest of *E. gomphocephala-E. marginata-Corymbia calophylla* with closed heath on the limestone outcrops.

### 3.3.2 On-site vegetation extent

Aside from existing cleared and developed areas in the southeast of the site, the project area is a combination of low shrubland and open heath (both of the Class C shrubland vegetation class) consistent with the Quindalup Complex. Ongoing development stages of Amberton Estate will eventually result in clearance of the majority of on-site vegetation in preparation of a significant built and landscaped footprint across the site.

Vegetation to be retained to the west within the foreshore reserve consists of very low shrubland with numerous bare sand dunes. Vegetation growth in the foreshore reserve is restricted due to maritime effects, prevailing winds and salt drift, plus added disturbance from off-road vehicle use along the coastal strip.

Vegetation to be retained to the north within the conservation reserve consists of a combination of low shrubland and open heath. Low shrubland is generally lower in height and poses less of a bush fire risk compared to open heath, which contains a denser and taller continuation of coastal vegetation.

The above observations are consistent with detailed vegetation survey undertaken over the Eglinton LSP area by PGV Environmental (2013). The dominant on-site vegetation types were surveyed as:

- *Acacia cyclops* shrubland
- *Melaleuca systena*, *Lomandra maritima* low open heath
- *Acacia rostellifera*, *Melaleuca systena* low open heath.

### 3.3.3 Adjacent vegetation extent

Vegetation to the south consists of low shrubland, similar to that contained on site within the foreshore reserve. The vegetation is very low and sparse, particularly throughout sand dunes and areas disturbed by off-road vehicle use. Ongoing development of future stages of Shorehaven will remove the majority of vegetation to the south.

Vegetation to the north consists of low shrubland and open heath. Ongoing development of future precincts at Eglinton will remove the majority of vegetation to the north outside of the proposed conservation reserve.

Vegetation to the east (opposite Marmion Avenue) consists of a combination of low shrubland and low woodland. The low shrubland is similar to that contained on site and the low woodland contains a proportion of banksias, Grass trees and Tuarts, which become prevalent at further inland locations. Ongoing development of future precincts at Eglinton will remove the majority of vegetation to the east.

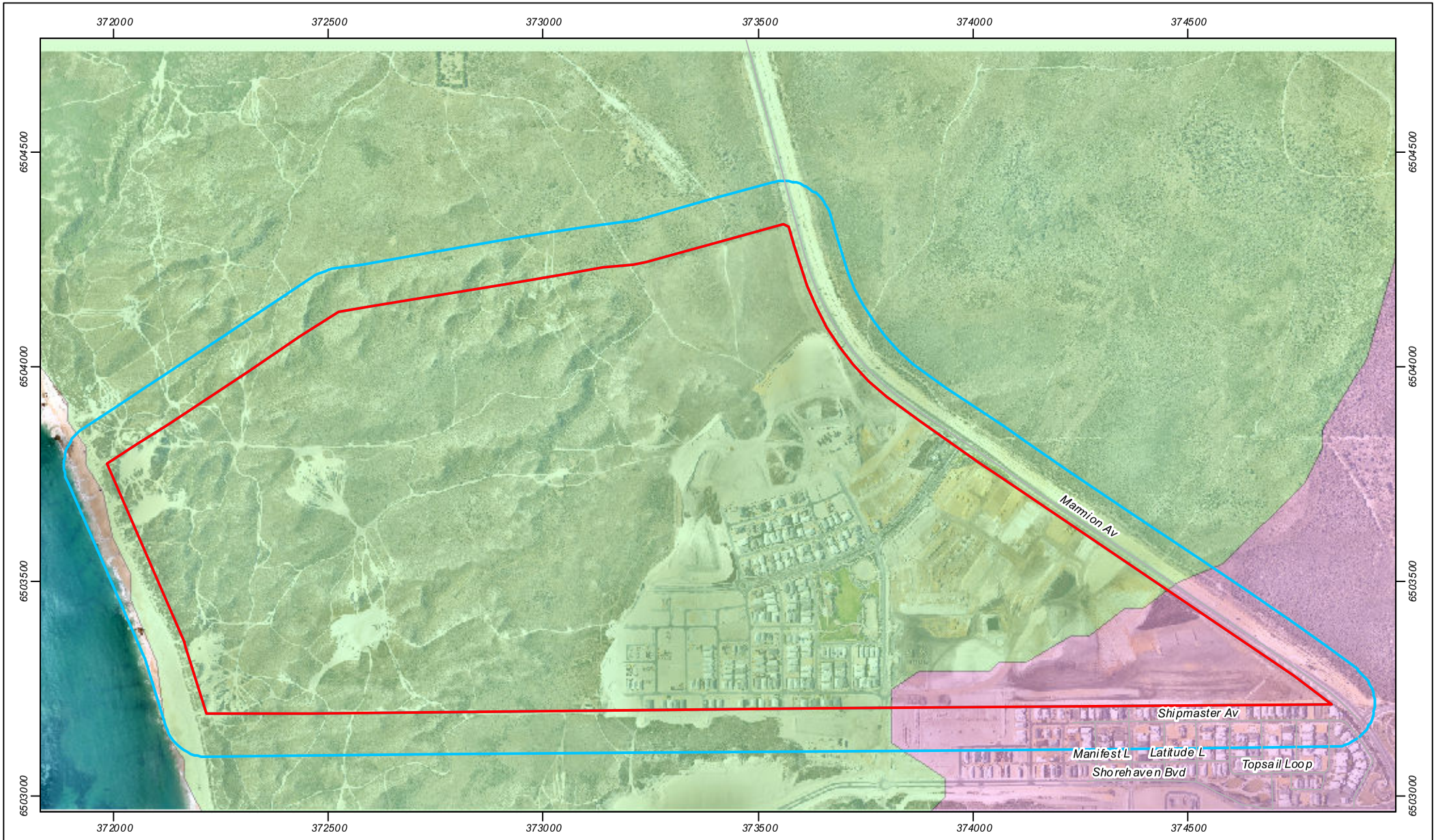


**Figure 6: Vegetation complexes**

Scale 1:12,000 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: 2/09/2014

Author: JCrute

Source: Client 2014.

**Legend**

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

**Vegetation complexes**

- Cottesloe complex - central and south
- Quindalup complex

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## 3.4 Zoning and land use

### 3.4.1 Current zoning and land use

The Eglinton LSP area is subject to the provisions of DPS No. 2, which establishes detailed statutory planning controls for the local government area, consistent with the broader controls under the MRS. Current MRS zoning across Amberton Estate is 'Urban', with a strip of 'Parks and Recreation' zoning along the coast in association with the foreshore reserve. Current zoning of the site under DPS No. 2 is predominantly 'Urban Development', with a strip of 'Parks and Recreation' zoning along the coast in association with the foreshore reserve.

### 3.4.2 Proposed zoning and land use

Amberton Estate is proposed to be zoned and developed primarily for residential purposes in accordance with the indicative Overall Estate Lot Layout Plan (Figure 1), which may be subject to future modification. This will result in development of over 2000 dwellings, several landscaped Public Open Space (POS) areas, as well as town centre, educational, mixed use and commercial precincts. Road, water, sewerage, power, gas and communication infrastructure will also be provided throughout the site.

The proposed foreshore and conservation reserves, located to the west and north respectively, will retain the current vegetation extent, with the foreshore reserve also proposed to be subject to landscape design in accordance with Appendix 4, consisting of numerous lawn, path, drainage, access, car parking, cafe, lookouts and dune rehabilitation areas.

On-site POS will generally consist of low fuel areas, such as managed parks, but may constitute some minor planting of vegetation species consistent with the current shrubland vegetation types present in the area. However, in small discrete patches such as drainage basins and dune rehabilitation areas, this vegetation is considered low threat from a bush fire hazard perspective and is not expected to pose a significant bush fire risk to future life and property assets of the site. In addition, all POS areas are proposed to be subject to landscape design with access paths and low fuel recreation areas implemented where possible. Long term management of POS areas following implementation of the development will be the responsibility of CoW.

### 3.4.3 Adjacent land use

Land adjacent to the project area is currently either unutilised or being prepared for residential development. Ultimately, the long term outlook is for urban communities to be developed along all adjoining boundaries of Amberton Estate, including:

- future development stages of Eglinton to the north
- future development stages of Eglinton to the east
- current and proposed stages of Shorehaven to the south.

## 3.5 Site assets

The project area is partially developed with some residences being constructed in the southeast of the site as part of initial development stages of Amberton Estate. The remaining undeveloped portion of the site to the west contains unutilised vegetated land. Ongoing development of the project area will significantly increase the critical life and property assets of the site, with over 2000 dwellings proposed. This will significantly intensify the number residents, visitors and built assets across the subject land.

## 3.6 Water and power supply

Reticulated water and underground power supply services will be provided throughout the project area through extension from surrounding areas of residential development.

## 3.7 Site access

Vehicular access to the project area is currently in the form of Cinnabar Drive, which navigates west off Marmion Avenue. A second access route is currently being constructed to link with Shorehaven to the south via Leeward Avenue, which ultimately links to Shorehaven Boulevard and back to Marmion Avenue. This will ensure that two different vehicular access routes are provided to the surrounding public road network for residents and visitors of Amberton Estate.

As Amberton Estate and adjoining residential developments progress, additional road access links will be provided to future stages of Eglinton to the north and east, as well as proposed stages of Shorehaven to the south. This will result in a future vehicular access network that will provide several links to the surrounding public road network, as indicated in Figure 1. The proposed vehicular access network will also provide buffers and access for emergency service vehicles between proposed residences and the surrounding vegetation extent, particularly adjacent to the conservation reserve.

# 4. Fire problem

## 4.1 Bush fire history, risk of ignition and suppression response capacity

The project area and adjacent land shows no evidence of recent bush fire occurrence. This is supported by the dominance of low shrubland vegetation and level of vegetation disturbance/clearing, as well as the relatively low level of visitor presence, which has resulted in a low risk of ignition to on-site vegetated areas. In addition, no fire scarring was observed during the site inspection and a review of Landgate (2014) indicates no recent bush fire occurrence in the area.

The risk of ignition increases at further inland locations where vegetation types and available fuel loads become more conducive to bush fire occurrence in association with the presence of Tuart and banksia woodland and forest. This is evident from a 2005 bush fire that occurred approximately 2.5 km northeast of the project area (Landgate 2014).

Based on the lack of bush fire history, ignition and occurrence of uncontrolled bush fires is considered to be uncommon throughout the project area and adjoining land. However, on development of the project area, the risk of ignition is expected to increase given the proposed increase in population, public access and urban development, particularly at the interface with vegetation contained within the northern conservation reserve. The expected increase in the risk of ignition will result in a subsequent increase in the overall bush fire risk to future assets of the development.

City of Wanneroo receives numerous bush fires per year ignited by a range of sources, usually associated with human presence, including:

- deliberately lit fires (e.g. suspected arson, torching of car bodies)
- accidental ignition (e.g. vehicle accidents, pole top fires, sparks from vehicle exhausts/machinery, agricultural and/or industrial work, incorrect disposal of cigarette butts, etc).

There are numerous emergency service resources located in City of Wanneroo that could provide a suppression response to the project area within 30 minutes if required, including local volunteer bush fire brigades stationed at Wanneroo, Quinns Rocks, Two Rocks and Wanneroo Fire Support.

## 4.2 Bush fire hazards

A bush fire hazard assessment aims to classify the bush fire hazard at both the strategic and local level, which leads to an assessment of the Bushfire Attack Level (BAL). A bush fire hazard assessment has been undertaken across the project area and adjacent land in accordance with procedures outlined in PFBFP Guidelines and *Australian Standard AS 3959–2009 Construction of Buildings in Bushfire-prone Areas* (AS 3959–2009).

### 4.2.1 Classifying the bush fire hazard

#### *Fuel hazard assessment*

A comprehensive fuel hazard assessment of the project area and adjacent land was undertaken by Strategen during a site visit on 17 April 2014. The assessment was undertaken on the basis of a visual inspection of the following factors, cross-referenced with the Swan Coastal Plain Visual Fuel Load Guide (FESA 2012):

- vegetation type and structure
- vegetation condition and density
- fuel age
- scrub, litter and trash accumulation.

### *On-site fuel hazards*

Aside from existing cleared and developed areas in the southeast of the site, the project area is a combination of low shrubland and open heath (both of the Class C shrubland vegetation class) with numerous bare dune areas and informal access tracks. Development of ongoing stages at Amberton Estate will eventually clear the majority of on-site vegetation in preparation of a significant built and landscaped footprint across the site. Areas proposed for vegetation retention on site include the foreshore reserve to the west and conservation reserve to the north, with fuel hazards described as follows:

1. The foreshore reserve contains low shrubland vegetation, which is dominant throughout the coastal strip and consists of very low shrubs at less than 40 cm in height (Plate 1). *Melaleuca systena* and *Lomandra maritima* are the dominant species. Average available fuel loads were assessed to be less than 5 t/ha (tonnes per hectare) and this vegetation is considered to be low threat from a bush fire hazard perspective, particularly since the vegetation is broken up by numerous tracks and bare sand dune areas. Available fuel loads for this vegetation type are not expected to readily accumulate due to maritime effects, prevailing winds and salt drift.
2. The conservation reserve contains a combination of low shrubland (as described above, Plate 2) and open heath (Plate 3). Open heath contains a denser and taller continuation of shrubs (up to 2 m in height) compared to low shrubland, consisting mainly of *Acacia cyclops* and *Acacia rostellifera*. Average available fuel loads within open heath vegetation were assessed to be 5–8 t/ha.

The shrubland vegetation to be retained on site, particularly within the conservation reserve, will pose the majority of the bush fire risk to future assets of Amberton Estate.

### *Adjacent fuel hazards*

Vegetation to the south of the site consists of low shrubland (Plate 4), similar to that contained on site within the foreshore reserve. The vegetation is very low and sparse and completely devoid in areas of bare sand dunes and informal access tracks. Fuel hazards to the south are not expected to pose a significant bush fire threat to future assets of Amberton Estate, especially since the land is proposed to be cleared as part of future development stages of Shorehaven.

Vegetation to the north of the site is a combination of low shrubland and open heath, similar to that contained within the on-site foreshore and conservation reserves. Fuel hazards to the north outside of the conservation reserve are not expected to pose a significant bush fire threat to future assets of Amberton Estate, especially since the land is proposed to be cleared as part of future development stages of Eglinton.

Vegetation to the east of the site (opposite Marmion Avenue) consists of low shrubland, which is similar to the vegetation contained on site, and grades to low woodland with increasing distance to the east. The commencement of low woodland vegetation is located greater than 100 m from the site's eastern boundary and consists of banksias, Grass trees and Tuarts, which subsequently increases the available fuel load potential. Fuel hazards to the east are not expected to pose a significant bush fire threat to future assets of Amberton Estate given the hazard separation distance provided by Marmion Avenue (80 m plus adjoining verges and cleared/disturbed land) plus proposed clearing of the land as part of future development stages of Eglinton.

Plate 1: Low shrubland with bare sand dunes and access tracks within foreshore reserve

Plate 2: Low shrubland within conservation reserve

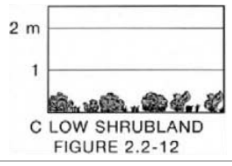
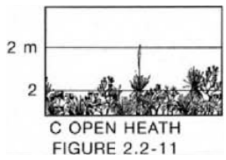
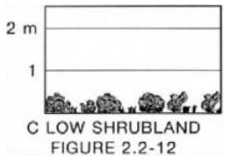
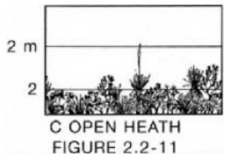
Plate 3: Open heath within conservation reserve

Plate 4: Low shrubland vegetation to the south proposed to be cleared as part of future stages of Shorehaven

### *Vegetation class*

An assessment of vegetation class within and adjacent to the project area has been undertaken in accordance with procedures outlined in PFBFP Guidelines (Table 2).

Table 2: Predominant vegetation class and type

| Predominant vegetation | Vegetation class | Vegetation type | Figure (as per PFBFP Guidelines) | Description (as per PFBFP Guidelines) |
|---|---|---|---|---|
| On-site vegetation, including within the foreshore reserve and conservation reserve | Shrubland | Low shrubland |  | Shrubs less than 2 m high; greater than 30% foliage cover; understoreys may contain grasses; Acacia and Casuarina often dominant in the arid and semi-arid zones |
| | | Open heath |  | Found in wet areas and/or areas affected by poor soil fertility or shallow soils; shrubs 1–2 m high often comprising Banksia, Acacia, Hakea and Grevillea; wet heaths occur in sands adjoining dunes of the littoral (shore) zone; montane heaths occur on shallow or waterlogged soils |
| Adjacent vegetation extent to the north, south and east (proposed to be cleared and developed) | Shrubland | Low shrubland |  | Shrubs less than 2 m high; greater than 30% foliage cover; understoreys may contain grasses; Acacia and Casuarina often dominant in the arid and semi-arid zones |
| | | Open heath |  | Found in wet areas and/or areas affected by poor soil fertility or shallow soils; shrubs 1–2 m high often comprising Banksia, Acacia, Hakea and Grevillea; wet heaths occur in sands adjoining dunes of the littoral (shore) zone; montane heaths occur on shallow or waterlogged soils |

### *Location of bush fire hazards*

The location of existing bush fire hazard areas is outlined in the vegetation class map (Figure 7). This map has been created using the abovementioned vegetation class descriptions.

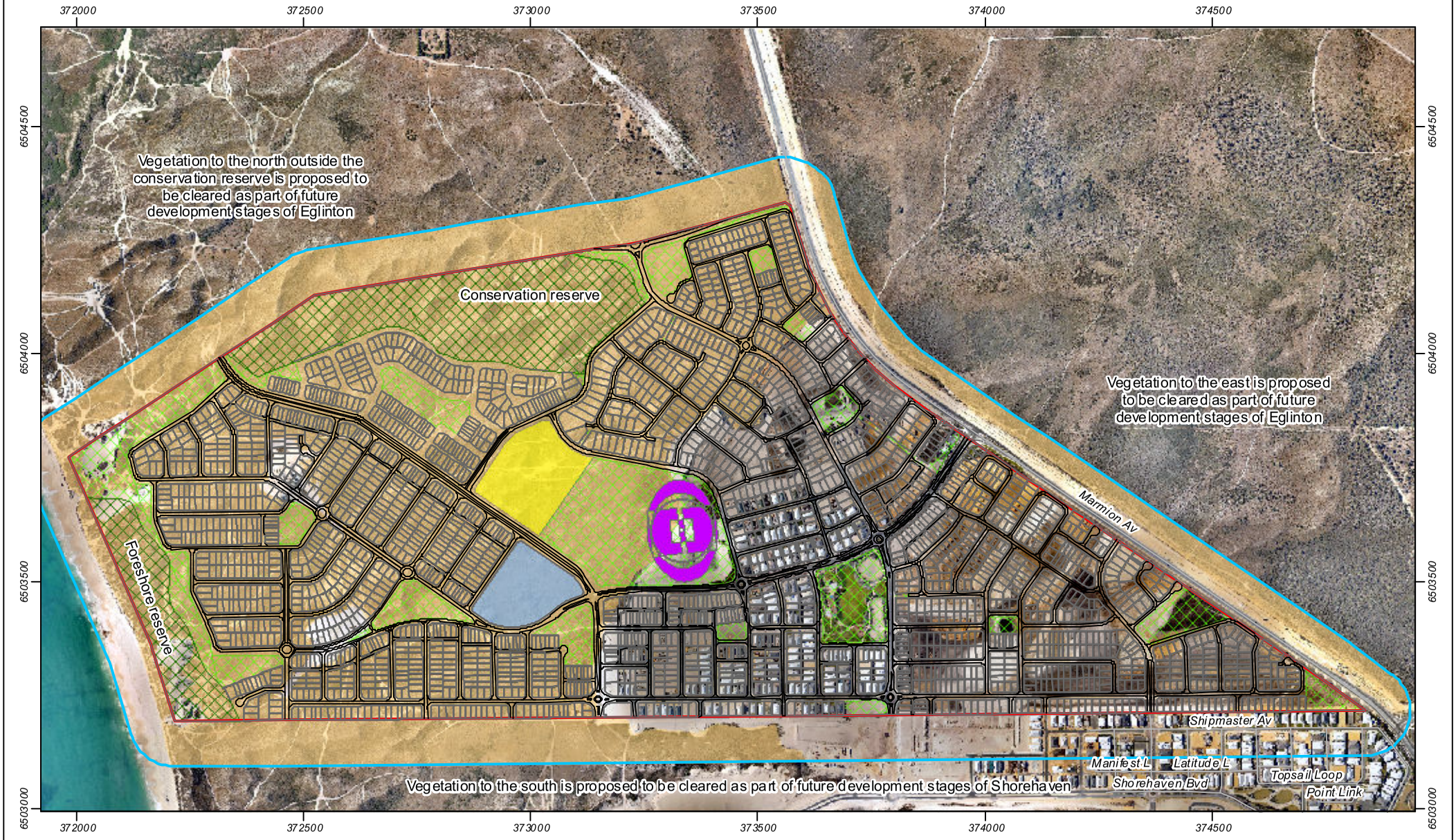



**Figure 7: Vegetation class map**

Scale 1:11,500 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: 2/09/2014

Author: JCrute

Source: Client 2014.

**Legend**

- Existing roads
- Carriageway
- Lot boundaries
- Project area boundary
- 100 m wide assessment area
- NC
- Primary School
- Oval Layout
- Foreshore and Conservation reserves
- POS areas

**Vegetation class**

- Shrubland

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### *Bush fire hazard levels*

Bush fire hazard levels of the predominant vegetation are displayed in the bush fire hazard assessment map (Figure 8). Classifying the bush fire hazard by assessing the predominant vegetation is a key to the initial determination of site suitability for development. This also leads to determination of the potential level of construction standard by the application of AS 3959–2009 for any proposed development located within 100 m of an assessed bush fire prone area (i.e. any area with a 'Moderate' or 'Extreme' bush fire hazard level).

The current bush fire hazard level across the developable area is 'Low', due to the presence of low shrubland vegetation. This hazard will be removed following clearing, earthworks and development of a significant built and landscaped footprint across the site and ongoing development stages of Amberton Estate.

The bush fire hazard level within the foreshore reserve is 'Low' due to the presence of low shrubland vegetation, which is considered low threat from a bush fire hazard perspective due to:

- the current low level of available fuels and lack of potential for fuel accumulation
- the non-continuous nature of the vegetation due to the presence of bare sand dunes and vegetation disturbance from informal access tracks
- the landscape design proposed throughout the foreshore reserve, which will create numerous low fuel landscaped and built areas (refer to Appendix 4).

The bush fire hazard level within the conservation reserve was assessed as:

- 'Low' in shrubland areas located on predominantly flat ground
- 'Moderate' in areas of shrubland vegetation on steep slopes due to the associated increase in risk from ember attack.

The bush fire hazard level to the south is 'Low' due to the presence of low shrubland vegetation. This hazard will be removed on development of future stages of Shorehaven.

The bush fire hazard level to the north outside the conservation reserve is 'Low' due to the occurrence of shrubland vegetation. These hazards will be removed on development of future stages of Eglinton to the north.

The bush fire hazard level to the east is 'Low' due to the occurrence of low shrubland vegetation. These hazards will be removed on development of future stages of Eglinton to the east.

According to AS 3959–2009 and PFBFP Guidelines, land with an assessed 'Moderate' or 'Extreme' bush fire hazard level is classified as bush fire prone land, which triggers implementation of AS 3959–2009 for any adjacent proposed development within 100 m, as depicted in Figure 8 by the 100 m wide BAL assessment area and associated distances assessed between proposed lots and 'Moderate' bush fire hazard areas.

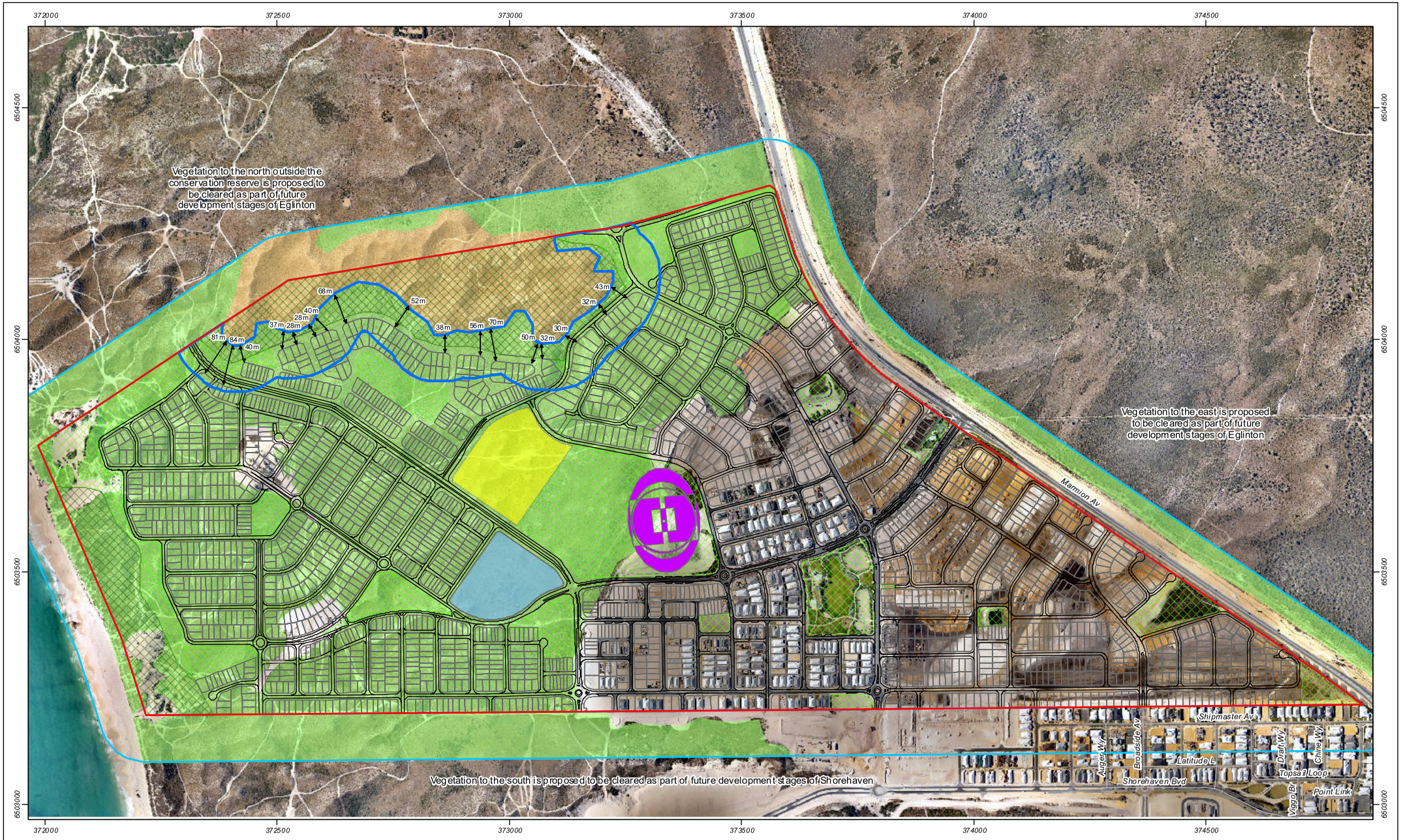


**Figure 8: Bush fire hazard assessment map**

Scale 1:7,500 at A3

0 50 100 150 200 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 2/09/2014
Author: JCrute
Source: Client 2014.

Path: Q:\Consult\2014\STO\STO14116\ArcMap_documents\R001\Rev0\STO14116_01_R001_Rev0_F008_A3.mxd

**Legend**

- Existing roads
- Carriageway
- Lot boundaries
- Project area boundary
- 100 m wide assessment area
- 100 m wide BAL assessment area
- Oval Layout
- NC
- Primary School
- Foreshore and Conservation reserves
- POS areas

**Bush fire hazard level**

- Low
- Moderate

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### 4.2.2 Bush fire hazard performance criteria

The relationship between various bush fire hazard levels and development performance criteria is set out in Table 3. A proportion of proposed lots are situated within 100 m of vegetation with a 'Moderate' bush fire hazard rating, as depicted in Figure 8. Consequently, a comprehensive suite of bush fire risk treatment and mitigation measures, including implementation of AS 3959-2009, will need to be implemented to protect site assets from these hazards.

Compliance with performance criteria for a 'Moderate' bush fire hazard level will be achieved for the proposed development, focussing on the key areas of development location, vehicular access, water supply, siting of development and design of development. Performance criteria will be achieved through adoption of recommended acceptable solutions outlined in PFBFP Guidelines.

Table 3: Bush fire hazard levels and performance criteria

| Bush fire hazard level | Bush fire protection performance criteria required |
|---|---|
| Low hazard | Development does not require special bush fire planning controls. Despite this, DFES strongly recommends that ember protection features be incorporated in design where practicable. |
| Moderate hazard | Performance criteria for:<br>• location (Element 1)<br>• vehicular access (Element 2)<br>• water (Element 3)<br>• siting of development (Element 4)<br>• design of development (Element 5). |
| Extreme hazard | Development is to be avoided in areas with these hazard levels. |

Source: WAPC et al. 2010

Compliance of the proposed development with bush fire protection performance criteria and associated acceptable solutions is documented in a completed compliance checklist (Appendix 1).

### 4.2.3 Classifying the Bushfire Attack Level (BAL)

This procedure, as outlined in PFBFP Guidelines and AS 3959–2009, uses a combination of the state-adopted Fire Danger Index (FDI) rating, vegetation class, slope under classified vegetation and the distance maintained between proposed development areas and classified vegetation to specify the BAL. Based on the specified BAL, construction requirements for proposed buildings can then be assigned.

#### *BALs imposed by the northern conservation reserve*

'Moderate' bush fire hazards retained within the northern conservation reserve will pose a permanent bush fire risk to future assets of the project area. Therefore, future lots located within 100 m of the 'Moderate' hazard should be prioritised for bush fire protection measures and will be required to implement BAL 12.5 construction standards on the basis of the following Method 1 BAL calculation carried out in accordance with AS 3959–2009 (also refer to Table 4):

1. The adopted Fire Danger Index for WA is FDI 80.
2. The classified vegetation type is shrubland.
3. The slope under classified vegetation is up-slope from the proposed development area.
4. The minimum distance between future lots and 'Moderate' hazard areas is 28 m.

A Method 2 BAL calculation for the above also arrives at BAL 12.5, which reaffirms the need for building protection against potential ember attack as a minimum requirement for the affected lots.

Table 4: Determination of Bushfire Attack Level (BAL)

| Vegetation class | Bushfire Attack Level (BAL) | | | | |
|---|---|---|---|---|---|
| | BAL FZ | BAL 40 | BAL 29 | BAL 19 | BAL 12.5 |
| | Distance (m) of the site from the predominant vegetation class | | | | |
| | All up-slopes and flat land (0 degrees) | | | | |
| Shrubland | <7 | 7–<9 | 9–<13 | 13–<19 | 19–<100 |

Source: WAPC et al. 2010

### *Remaining lots of Amberton Estate*

All proposed lots of Amberton Estate located further than 100 m from 'Moderate' bush fire hazard areas will not require heightened levels of construction standards, as per AS 3959–2009.

### *Building Protection Zone (BPZ)*

All proposed lots of Amberton Estate with an assessed BAL rating (i.e. BAL 12.5 lots) will be required to implement a 20 m wide BPZ. The BPZ is to be taken from the edge of any proposed building and maintained at less than 2 t/ha on an annual basis to provide low fuel defendable space for the protection of critical life and property assets from adjacent bush fire hazards. Road reserves, paths, managed POS, building setbacks, lawn areas and managed gardens are suitable options for inclusion into the BPZ. Fuel management within the BPZ should target the understorey and prevent accumulation of trash, litter and scrub/grass fuels on the ground, but allow retention of individual overstorey trees and shrubs.

### *Construction standards*

Relevant sections of AS 3959–2009 that outline construction standards for buildings in areas specified as BAL 12.5 are provided in Table 5. Construction standards for BAL 12.5 are fully explained in Appendix 3.

Table 5: Construction standards

| Bushfire Attack Level (BAL) | Classified vegetation within 100 m of the site and heat flux exposure thresholds | Description of predicted bush fire attack and levels of exposure | Relevant section of AS 3959–2009 |
|---|---|---|---|
| BAL 12.5 | ≤12.5 kW/m$^2$ | Ember attack | 3 and 5 |

Source: WAPC et al. 2010

## 4.3 Summary of key bush fire issues

The following is a summary of key bush fire issues that have been considered as part of the FMP to inform development of specified bush fire risk treatment and mitigation measures:

- the project area and adjoining land has not been subject to recent bush fire occurrence
- the risk of ignition is currently low, but is expected to increase following the proposed increase in population, public access and urban development, particularly at the interface with the northern conservation reserve
- response times in the event that the site is threatened by uncontrolled bush fire is within 30 minutes from local volunteer bush fire brigades
- following development, Amberton Estate will represent a significant built and landscaped footprint, which will result in removal of on-site vegetation, except for that retained within the foreshore reserve to the west and the proposed conservation reserve to the north
- the foreshore reserve contains low shrubland vegetation considered to be low threat from a bush fire hazard perspective ('Low' bush fire hazard)
- the conservation reserve will pose a permanent bush fire risk to future assets of the development through retention of shrubland vegetation on steep slopes ('Moderate' bush fire hazard)
- adjoining land to the north, south and east contains shrubland vegetation ('Low' bush fire hazards) proposed to be cleared to permit ongoing development of the Shorehaven and Eglinton urban residential developments
- following earthworks and site levelling, 'Moderate' hazards within the conservation reserve will be situated up-slope from proposed Amberton Estate lots
- a proportion of proposed lots are situated within 100 m of 'Moderate' bush fire hazard areas, which triggers implementation of AS 3959–2009 for these lots
- to mitigate the bush fire risk posed by the northern conservation reserve, particularly with regards to potential ember attack, BAL 12.5 will need to be implemented for all proposed lots within 100 m of the 'Moderate' hazard extent
- all proposed lots assessed as BAL 12.5 will require implementation of a 20 m wide BPZ
- all remaining lots located further than 100 m from 'Moderate' bush fire hazards will not require application of AS 3959–2009 or increased building construction standards
- performance criteria and acceptable solutions will be achieved for a 'Moderate' bush fire hazard level, focussing on the key areas of development location, vehicular access, water supply, siting of development and design of development.

# 5. Bush fire risk treatment and mitigation

The following subsections outline how the inherent bush fire risk to future life and property will be mitigated to achieve a suitable and effective bush fire management outcome for Amberton Estate. This will be achieved by complying with performance criteria and associated acceptable solutions in accordance with PFBFP Guidelines. Where applicable, these measures are illustrated on an aerial image of the project area in Figure 9 to assist with implementation of the FMP.

## 5.1 Development location

### 5.1.1 Location of residential lots

Strategic location, layout and management of future development at the planning stage can reduce future fire threat and risk to critical life and property assets.

All proposed lots of the Amberton Estate residential development will be contained within a significant built and landscaped footprint, where the majority of on-site vegetation is proposed to be cleared following earthworks and site levelling (Figure 9). A proportion of proposed lots on the periphery of the development to the north will be located within 100 m of 'Moderate' bush fire hazards retained within the proposed conservation reserve. These lots will require application of AS 3959–2009 and increased building construction standards, as assessed in Section 4.2.3 and discussed in Section 5.4.

The bulk of vegetation currently surrounding Amberton Estate will eventually be removed on development of surrounding residential communities in Shorehaven to the south and future stages of Eglinton development to the north and east. Ultimately, the long term outlook is for cleared and built urban communities to be developed along all adjoining boundaries of Amberton Estate (aside from the northern conservation reserve) (Figure 9).

Further to the above, this FMP makes provision for 100 m wide cleared buffers to be constructed on site adjacent to each development stage under construction, maintained annually at less than 2 t/ha to mitigate the bushfire risk from development staging.

The above measures will ensure the development is not located on land subject to either a 'Moderate' or 'Extreme' bush fire hazard level or require construction standards applicable to BAL 40 or BAL FZ. This meets performance criteria for development location (Element 1) by adopting acceptable solution A1.1.

### 5.1.2 Public Open Space

On-site POS will generally consist of low fuel areas, such as managed parks, but may constitute some minor planting of vegetation species consistent with the current shrubland vegetation types present in the area. However, in small discrete patches such as drainage basins and dune rehabilitation areas, this vegetation is considered low threat from a bush fire hazard perspective and is not expected to pose a significant bush fire risk to future life and property assets of the site. In addition, all POS areas are proposed to be subject to landscape design with access paths and low fuel recreation areas implemented where possible, as is the case with the foreshore reserve (refer to Appendix 4).

All POS areas will need to be maintained at or less than 5 t/ha on an annual basis, which can be achieved through preventing the accumulation of understorey fuels via mechanical slashing, chemical spraying for weed management and manual removal of trash and litter fuels prior to the onset of the designated bush fire season (Figure 9). Long term management of POS areas following implementation of the development will be the responsibility of CoW.

### 5.1.3 Management of the conservation reserve

Management actions and associated responsibilities for the northern conservation reserve will be specified in a separate management plan, which may include requirements for internal firebreaks and public/emergency access.

## 5.2 Vehicular access

Vehicular access to the project area is currently in the form of Cinnabar Drive, which navigates west off Marmion Avenue (refer to Access Route 1 on Figure 9). A second access route is currently being constructed to link with Shorehaven to the south via Leeward Avenue, which ultimately links to Shorehaven Boulevard and back to Marmion Avenue (refer to Access Route 6 on Figure 9). This measure adopts acceptable solution A2.1 by ensuring all residents and visitors of the development are provided with at least two vehicular access routes connecting to the public road network at all times.

The Overall Estate Lot Layout Plan outlined in Figure 1 is proposed to be modified to ensure a through access road is provided for Stage 45 lots adjacent to the northern conservation reserve and the existing dead end is removed. The through road will be in the form of an 18 m wide road reserve, including a footpath along the northern verge, located along the full southern perimeter of the northern conservation reserve boundary. This will essentially provide through access between Access Route 3 and Access Route 2 and will form the majority of a BPZ along this interface (Figure 9). Streetscape trees, if planted along this road, will occur at minimum 10 m intervals along the southern road verge only.

Fencing will not be installed along the southern POS boundary of the conservation reserve to ensure emergency fire services can properly access the conservation reserve interface and provide efficient suppression should a bushfire occur. These measures will negate the requirement to construct a firebreak along the southern perimeter of the northern conservation reserve.

As Amberton Estate and adjoining residential developments progress, additional vehicular access links will be provided to future stages of Eglinton development to the north and east, as well as existing and proposed stages of Shorehaven to the south. This will result in a future vehicular access network that will provide several links to the surrounding public road network (Figure 9). The proposed vehicular access network will also provide buffers and access for emergency service vehicles between proposed residences and the surrounding vegetation extent, particularly adjacent to the conservation reserve.

All public roads and culs-de-sac will be constructed to specifications in accordance with Main Roads WA, CoW and DFES requirements, which align with acceptable solution A2.2 and A2.3. Acceptable solutions A2.4, A2.5, A2.6, A2.7, A2.8, A2.9 and A2.10 are not applicable in this instance.

The proposed vehicular access network is considered adequate for the purposes of bush fire protection and will ensure the development meets performance criteria for vehicular access (Element 2).

## 5.3 Water supply

Reticulated water supply services will be provided throughout the proposed development for each lot, extended from adjacent areas of residential development. A network of hydrants will also be provided along the internal road network at locations which meet relevant water supply authority and DFES requirements (Figure 9). These measures will ensure the development meets performance criteria for water supply (Element 3) by adopting acceptable solution A3.1.

## 5.4 Siting of development

When considering the overall bush fire management of the project area, protection should be provided to critical life and property assets (residents, visitors and built assets) as a minimum requirement. Low fuel buffers between fire hazard areas and critical assets, as well as application of AS 3959–2009, can be implemented to achieve this.

Shrubland vegetation subject to significant slopes within the northern conservation reserve ('Moderate' bush fire hazard) is considered the predominant bush fire risk to future assets of Amberton Estate. Proposed lots located within 100 m of this hazard should be prioritised for bush fire protection through provision of low fuel defendable space in the form of a BPZ, as well as heightened levels of building construction standards through the application of AS 3959–2009. The BAL assessment undertaken in Section 4.2.3 achieves this through the following recommendations, as depicted in Figure 9:

1. Future lots located within 100 m of 'Moderate' bush fire hazard areas of the northern conservation reserve will be required to implement BAL 12.5 construction standards to mitigate the increased risk from ember attack associated with potential bush fire in this area.
2. All BAL 12.5 lots will require a 20 m wide BPZ through a combination of an 18 m wide road reserve and footpath, plus 2 m building setbacks. The BPZ is to be managed at less than 2 t/ha on an ongoing basis. The Overall Estate Lot Layout Plan outlined in Figure 1 will require the following modifications to reflect the above recommendations and maintain compliance with PFBFP Guidelines:
   (a) provision of an 18 m wide road reserve along the full southern boundary of the northern conservation reserve (road realignment will be required, as discussed in Section 5.2)
   (b) modify the lot layout to satisfy the above modification, in particular for Stages 43, 45 and 46.
3. All proposed lots of Amberton Estate located further than 100 m from 'Moderate' bush fire hazard areas will not require heightened levels of construction standards, as per AS 3959–2009.

The above measures will ensure the development meets performance criteria for siting of development (Element 4) by adopting acceptable solutions A4.1, A4.2, A4.3, A4.4 and A4.5, where applicable.

## 5.5 Design of development

The bush fire management concept provided in Figure 9 is expected to reduce the vulnerability of life and property assets from the effects of bush fire and greatly assist bush fire prevention and suppression operations. Given the proposed development is considered to comply with Element 4 Siting of development, there are no additional special design requirements.

## 5.6 Additional bush fire risk mitigation

The following measures will be implemented in addition to those outlined previously to provide a more thorough level of bush fire protection to residents, visitors and built assets of the subject land:

Annual fuel inspections: undertaken by CoW in accordance with the current City of Wanneroo annual firebreak notice (Appendix 5) under provisions of the *Bush Fires Act 1954*. Failure to comply with this FMP and the specified requirements of the current annual notice may result in the issuing of fines.

Landowner education and awareness: landowners should obtain a copy of local government and DFES bush fire information booklets that are currently available. In addition, attendance by landowners at annual DFES bush fire awareness briefings would be advantageous.

Section 70 Notification on Title: to be placed on all lots of the proposed development affected by a BAL rating to ensure prospective landowners are aware that an FMP exists over the site and that specified building requirements may apply.

## 5.7 Summary of bush fire risk mitigation and works program

A summary of the bush fire risk treatment and mitigation measures described in Section 5, as well as a works program, is provided in Table 6. These measures will be implemented to ensure ongoing protection of proposed life and property assets is achieved. Additional optional measures are also provided and can be adopted by residents to further mitigate their risk to life and property from uncontrolled bush fires. Timing and responsibilities are also defined to assist with implementation of each management measure.

Table 6: Summary of bush fire risk mitigation measures and works program

| Bush fire risk mitigation | Recommended works | Mandatory | Optional | Timing | Responsibility |
|---|---|---|---|---|---|
| Development location | Undertake development in accordance with Figure 1 (to be updated where necessary to reflect final design) to ensure future life and property are contained within a significant built and landscaped footprint through vegetation clearance, earthworks and site levelling. This will ensure development does not occur on land subject to either a 'Moderate' or 'Extreme' bush fire hazard level or require construction standards applicable to BAL 40 or BAL FZ. Refer to FMP Section 5.1.1. | Yes | No | During implementation of the development | Developer |
| | Construct 100 m wide, on-site cleared buffers adjacent to each individual development stage to mitigate the bushfire risk from development staging. The cleared buffers will be maintained annually at less than 2 t/ha. Refer to FMP Section 5.1.1. | Yes | No | During implementation of the development | Developer |
| | Develop POS in accordance with approved landscape design plans and ensure all POS is maintained at less than 5 t/ha through annual management of understorey fuels. Refer to FMP Section 5.1.2. | Yes | No | Manage POS annually prior to commencement of the designated bush fire season | Developer during development, CoW thereafter |
| | Implement any bush fire management measures outlined in the management plan for the northern conservation reserve, such as firebreaks or access. Refer to FMP Section 5.1.3. | Yes | No | During implementation of the development and ongoing management where applicable | Developer |
| Vehicular access | Implement an internal road network providing all residents and visitors of the development with at least two vehicular access routes connecting to the public road network at all times. Refer to FMP Section 5.2. | Yes | No | During implementation of the development | Developer |
| | Construct a through access road in the form of an 18 m wide road reserve and footpath along the full southern perimeter of the northern conservation reserve. Refer to FMP Section 5.2. | Yes | No | During implementation of the development | Developer |
| | Prohibit fencing along the southern POS boundary of the conservation reserve. Refer to FMP Section 5.2. | Yes | No | During implementation of the development | Developer |
| | Streetscape trees, if planted along the above road, will occur at minimum 10 m intervals along the southern road verge only. Refer to FMP Section 5.2. | Yes | No | During implementation of the development | Developer |
| | Construct all public roads and culs-de-sac in accordance with Main Roads WA, CoW and DFES requirements. Refer to FMP Section 5.2. | Yes | No | During implementation of the development | Developer |
| Water supply | Provide a reticulated water supply through extension of the existing reticulated water supply from adjacent developed areas. Refer to FMP Section 5.3. | Yes | No | During implementation of the development | Developer |
| | Provide a network of hydrants along the internal road network at locations which meet relevant water supply authority and DFES requirements. Refer to FMP Section 5.3. | Yes | No | During implementation of the development | Developer |
| Siting of development | Apply BAL 12.5 building construction standards for all proposed lots located within 100 m of 'Moderate' bush fire hazard areas of the northern conservation reserve, as per Figure 9. Refer to FMP Section 5.4. | Yes | No | During building construction | Developer, prospective landowners, builder |

| Bush fire risk mitigation | Recommended works | Mandatory | Optional | Timing | Responsibility |
|---|---|---|---|---|---|
| | Create a 20 m wide BPZ adjacent to BAL 12.5 lots through a combination of an 18 m wide road reserve and footpath, plus 2 m building setbacks, as per Figure 9. The BPZ is to be managed at less than 2 t/ha on an ongoing basis. Refer to FMP Section 5.4. | Yes | No | During building construction and annual maintenance thereafter | Developer during development, CoW and prospective landowners thereafter (i.e. with regards to maintenance of the road reserve and building setbacks respectively) |
| | Modify Figure 1 to reflect the following:<br>• provision of an 18 m wide road reserve along the full southern boundary of the northern conservation reserve<br>• realign the road accordingly to achieve the above<br>• modify the lot layout to satisfy the above modifications, in particular for Stages 43, 45 and 46.<br>Refer to FMP Section 5.4. | Yes | No | Prior to subdivision application | Developer |
| Design of development | Comply with acceptable solutions for A4.1, A4.2, A4.3, A4.4 and A4.5 where applicable. Refer to FMP Section 5.5. | Yes | No | During implementation of the development | Developer |
| Additional bush fire risk mitigation | Comply with the current City of Wanneroo annual firebreak notice. Refer to Appendix 5. Refer to FMP Section 5.6. | Yes | No | Annually prior to the onset of the designated bush fire season | Developer and prospective landowners |
| | Undertake an inspection of fuel hazards across proposed lots to assess compliance with the FMP and City of Wanneroo annual firebreak notice. Refer to FMP Section 5.6. | Yes | No | Annually prior to the onset of the designated bush fire season | CoW |
| | Issue work orders or fines where compliance with the *Bush Fires Act 1954*, FMP or City of Wanneroo annual firebreak notice has been compromised. Refer to FMP Section 5.6. | Yes | No | Annually prior to the onset of the designated bush fire season | CoW |
| | Obtain bush fire information booklets and attend annual DFES bush fire awareness briefings. Refer to FMP Section 5.6. | No | Yes | Annually | Prospective landowners |
| | Place a Section 70 Notification on all lots of the proposed development affected by a BAL rating to ensure prospective landowners are aware that an FMP exists over the site and that specified building requirements may apply. Refer to FMP Section 5.6. | Yes | No | On creation of Titles | Developer |
| Optional building measures | Restrict the installation of roof-top evaporative air-conditioners due to the associated increase in vulnerability to ember attack. | No | Yes | During implementation of the development | Developer, builder, prospective landowners |
| Restricted and prohibited burning times | Comply with the DFES/CoW-determined burning periods. Refer to Appendix 5. | Yes | No | As specified by DFES/CoW | Developer, prospective landowners |

# 6. Implementation of the Fire Management Plan

## 6.1 Implementation of bush fire risk treatment and mitigation

The works program provided in Table 6 provides clear direction for the implementation of all works associated with this FMP, including appropriate timing and responsibilities. In addition, the full range of bush fire risk treatment and mitigation measures, as well as location of implementation as specified in this FMP, is provided in Figure 9. The plan has been overlain on an aerial image of the project area to assist with implementation.

## 6.2 Assessment of bush fire risk treatment and mitigation measures

Implementation of the bush fire risk treatment and mitigation measures outlined in this FMP will ensure that should a bush fire occur within or adjacent to Amberton Estate, fire intensity on-site will be minimised and life and property assets are expected to be protected. In addition, a fire occurring on the site is highly likely to be readily contained within 30 minutes, which is the expected emergency response time provided by local bush fire brigades.

The cost of undertaking the various tasks and initiatives outlined in the FMP will provide significant cost benefit to the developer and landowners when compared with the possible loss of life, infrastructure and environmental values of the site.

Development location
1) All proposed lots to be developed within a significant cleared and landscaped footprint
2) Construct 100 m wide, on-site cleared buffers adjacent to each individual development stage and maintain annually at less than 2 t/ha to mitigate the bush fire risk from development staging
3) Develop POS in accordance with approved landscape design plans and ensure all POS is maintained at less than 5 t/ha through annual management of understorey fuels
4) Implement any bush fire management measures outlined in the management plan for the northern conservation reserve, such as firebreaks or access

Vehicular access
1) All residents and visitors of the development will be provided with at least two vehicular access routes connecting to the public road network at all times
2) Construct a through access road in the form of an 18 m wide road reserve and footpath along the full southern perimeter of the northern conservation reserve
3) Streetscape trees, if planted along the above road, will occur at minimum 10 m intervals along the southern road verge only
4) Prohibit fencing along the southern POS boundary of the conservation reserve
5) Construct all public roads and culs-de-sac in accordance with Main Roads WA, CoW and DFES requirements

Water supply
1) A reticulated water supply and a network of hydrants will be provided throughout the proposed development as required

Siting of development
1) Construction standards for BAL 12.5 will apply to all proposed buildings within selected lots in accordance with Figure 9
2) Create a 20 m wide BPZ adjacent to BAL 12.5 lots through a combination of an 18m wide road reserve and footpath, plus 2m building setbacks, maintained annually at less than 2 t/ha, as per Figure 9
3) Modify the Overall Estate Lot Layout Plan to reflect the following:
-provision of an 18m wide road reserve along the full southern boundary of the northern conservation reserve
-realign the road accordingly to achieve the above
-modify the lot layout to satisfy the above modifications, in particular for Stages 43, 45 and 46'

Additional measures
1) Section 70 Notification to be placed on all Titles affected by BALs to ensure prospective landowners are aware that an FMP exists over the site with specified building requirements that apply
2) Comply with the current City of Wanneroo annual firebreak notice

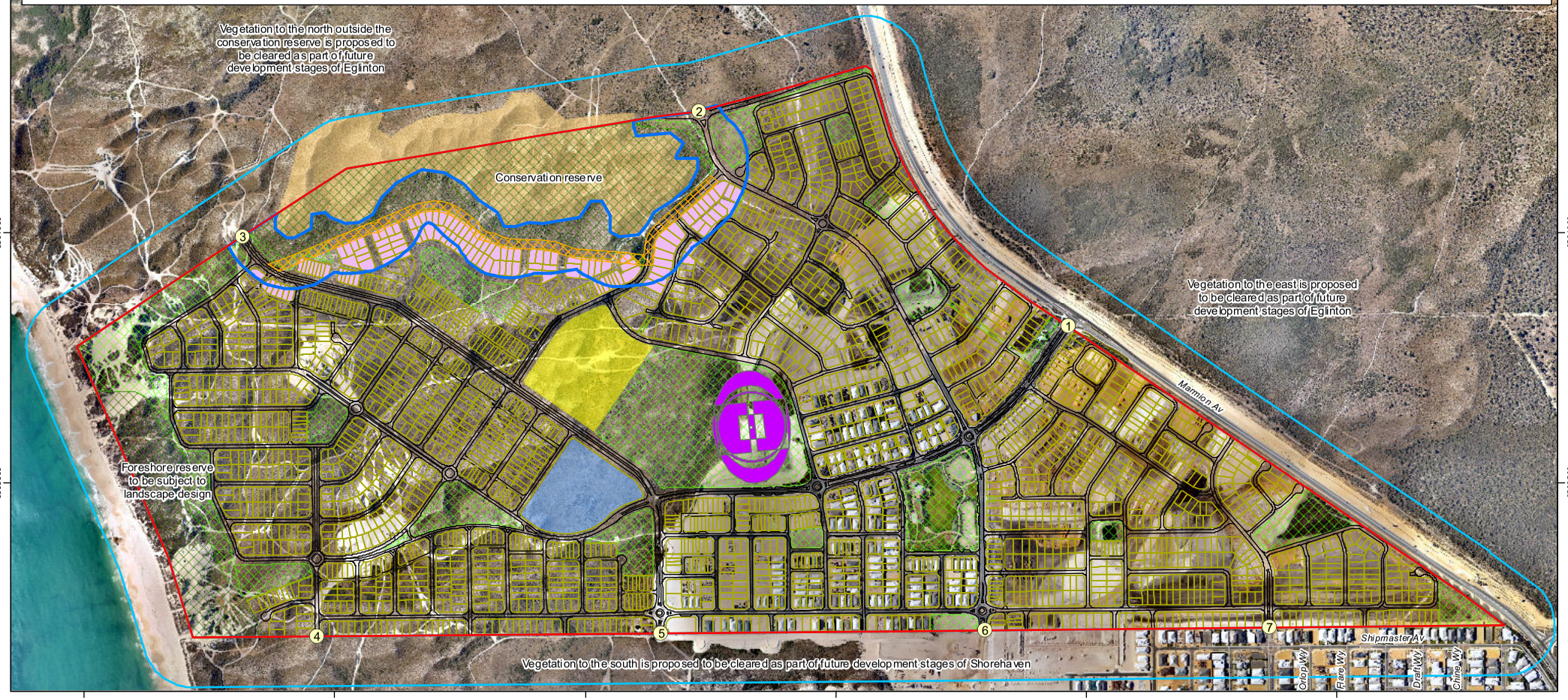



**Figure 9: Fire Management Plan: Amberton Estate**

Scale 1:8,000 at A3

0 50 100 150 200 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 12/02/2016
Author: JCrute
Source: Client 2014,

Path: Q:\Consult\2014\STO\STO14116\ArcMap_documents\R001\Rev0\STO14116_01_R001_Rev0_F009_A3.mxd

**Legend**

- Access routes
- Carriageway
- Lot boundaries
- Oval Layout
- NC
- Primary School
- Foreshore and Conservation reserves
- POS areas
- Project area boundary
- 100 m wide assessment area
- 100 m wide BAL assessment area
- 20m wide BPZ (18m wide through access road reserve, including footpath along northern verge, plus 2m building setback
- BAL 12.5

**Bush fire hazard level**

- Moderate

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

## 6.3 Legislative requirements, specifications and standards

The legislative requirements, specifications and standards applicable to implementation of this FMP are referenced in Section 7 and Appendix 6 and pertain to the following:

- *Bush Fires Act 1954*
- *Planning and Development Act 2005*
- *Environment Protection and Biodiversity Conservation Act 1999*
- *Environmental Protection Act 1986*
- *Wildlife Conservation Act 1950*
- Building Code of Australia
- Planning for Bush Fire Protection Guidelines (Edition 2)
- Australian Standard AS 3959–2009 Construction of Buildings in Bushfire Prone Areas
- City of Wanneroo annual firebreak notice.

# 7. References

Bureau of Meteorology (BoM) 2014, *Climate statistics for Australian locations: Monthly climate statistics for Gingin Aero*, [Online], Commonwealth of Australia, available from: *http://www.bom.gov.au/climate/averages/tables/cw_009178.shtml*, [3/06/2014].

Commonwealth Science and Industrial Research Organisation (CSIRO) 1999, *Fire Danger and Fire Spread Calculator*, Commonwealth Science and Industrial Research Organisation, Perth.

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

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

Emerge 2014, *Amberton Foreshore Preliminary Landscape Concept (Masterplan Rev H)*, plan prepared for Stockland, June 2014.

Fire and Emergency Services Authority (FESA) 2012, *Visual Fuel Load Guide for the scrub vegetation of the Swan Coastal Plain and Darling Scarp including Geraldton Sandplains & Leeuwin Ridge Regions of Western Australia*, Bush Fire and Environmental Protection Branch, Fire and Emergency Services Authority, Perth.

Heddle EM, Loneragan OW & Havel JJ 1980, *Darling System, Vegetation Complexes*, Forest Department, Perth.

Landgate 2014, *Firewatch*, [Online], Government of Western Australia, available from: *http://firewatch.landgate.wa.gov.au/landgate_firewatch_public.asp*, [25/07/2014].

McCaw L and Hanstrum B 2003, 'Fire environment of Mediterranean south-west Western Australia', in *Fire in Ecosystems of South-West Western Australia: Impacts and Management*, eds I Abbott & ND Burrows, Backhuys Publishers, Leiden, Netherlands, pp. 171–188.

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

PGV Environmental 2013, *Vegetation Associations and Condition*, plan prepared for Stockland, November 2013.

Smith R 2003, *Rural Urban Bush Fire Threat Analysis (RUBTA)*, Fire and Emergency Services Authority of Western Australia, Perth.

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

Standards Australia & Standards New Zealand (SA & SNZ) 2009, *Australian Standard/New Zealand Standard AS/NZS ISO 31000:2009 Risk management – Principles and guidelines*, Standards Australia/Standards New Zealand, Sydney/Wellington.

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

# Appendix 1
# Fire Management Plan compliance checklist

Compliance checklist for performance criteria and acceptable solutions

| Element | Acceptable solution | Compliance | Yes/No | Explanation (if no) |
|---|---|---|---|---|
| 1. Location | A1.1 Development location | Does the proposal comply with performance criteria P1 by applying acceptable solution A1.1? | Yes | |
| 2. Vehicular access | A2.1 Two access routes | Does the proposal comply with performance criteria P2 by applying acceptable solution A2.1? | Yes | |
| | A2.2 Public roads | Does the proposal comply with performance criteria P2 by applying acceptable solution A2.2? | Yes | |
| | A2.3 Cul-de-sacs | Does the proposal comply with performance criteria P2 by applying acceptable solution A2.3? | Yes | |
| | A2.4 Battle axes | Does the proposal comply with performance criteria P2 by applying acceptable solution A2.4? | N/A | |
| | A2.5 Private driveways | Does the proposal comply with performance criteria P2 by applying acceptable solution A2.5? | N/A | |
| | A2.6 Emergency access ways | Does the proposal comply with performance criteria P2 by applying acceptable solution A2.6? | N/A | |
| | A2.7 Fire service access routes | Does the proposal comply with performance criteria P2 by applying acceptable solution A2.7? | N/A | |
| | A2.8 Gates | Does the proposal comply with performance criteria P2 by applying acceptable solution A2.8? | N/A | |
| | A2.9 Firebreak widths | Does the proposal comply with performance criteria P2 by applying acceptable solution A2.9? | N/A | |
| | A2.10 Signs | Does the proposal comply with performance criteria P2 by applying acceptable solution A2.10? | N/A | |
| 3. Water | A3.1 Reticulated areas | Does the proposal comply with performance criteria P3 by applying acceptable solution A3.1? | Yes | |
| | A3.2 Non-reticulated areas (a) | Does the proposal comply with performance criteria P3 by applying acceptable solution A3.2? | N/A | |
| | A3.3 Non-reticulated areas (b) | Does the proposal comply with performance criteria P3 by applying acceptable solution A3.3? | N/A | |
| 4. Siting of development | A4.1 Hazard separation – moderate to extreme bush fire hazard level | Does the proposal comply with performance criteria P4 by applying acceptable solution A4.1? | Yes | |
| | A4.2 Hazard separation – low bush fire hazard level | Does the proposal comply with performance criteria P4 by applying acceptable solution A4.2? | N/A | |
| | A4.3 Building protection zone | Does the proposal comply with performance criteria P4 by applying acceptable solution A4.3? | Yes | |
| | A4.4 Hazard separation zone | Does the proposal comply with performance criteria P4 by applying acceptable solution A4.4? | N/A | |
| | A4.5 Reduction in bush fire attack level due to shielding | Does the proposal comply with performance criteria P4 by applying acceptable solution A4.5? | N/A | |
| 5. Design of development | A5.1 Compliant development | Does the proposal comply with performance criteria P5 by applying acceptable solution A5.1? | Yes | |

| Element | Acceptable solution | Compliance | Yes/No | Explanation (if no) |
|---|---|---|---|---|
| | A5.2 Non-compliant development | Does the proposal comply with performance criteria P5 by applying acceptable solution A5.2? | N/A | |

Note: Performance criteria and acceptable solutions are in accordance with *Planning for Bush Fire Protection Guidelines (Edition 2)* (WAPC et al. 2010).

**Applicant Declaration**

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

Full name: Roger Banks

Applicant signature: 

Date: 12/02/2016

# Appendix 2

# January wind profiles for Gingin Aero

# (BoM 2014)

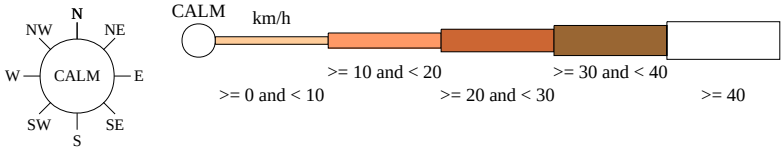
# Rose of Wind direction versus Wind speed in km/h (01 May 1996 to 30 Sep 2010)

Custom times selected, refer to attached note for details

## GINGIN AERO

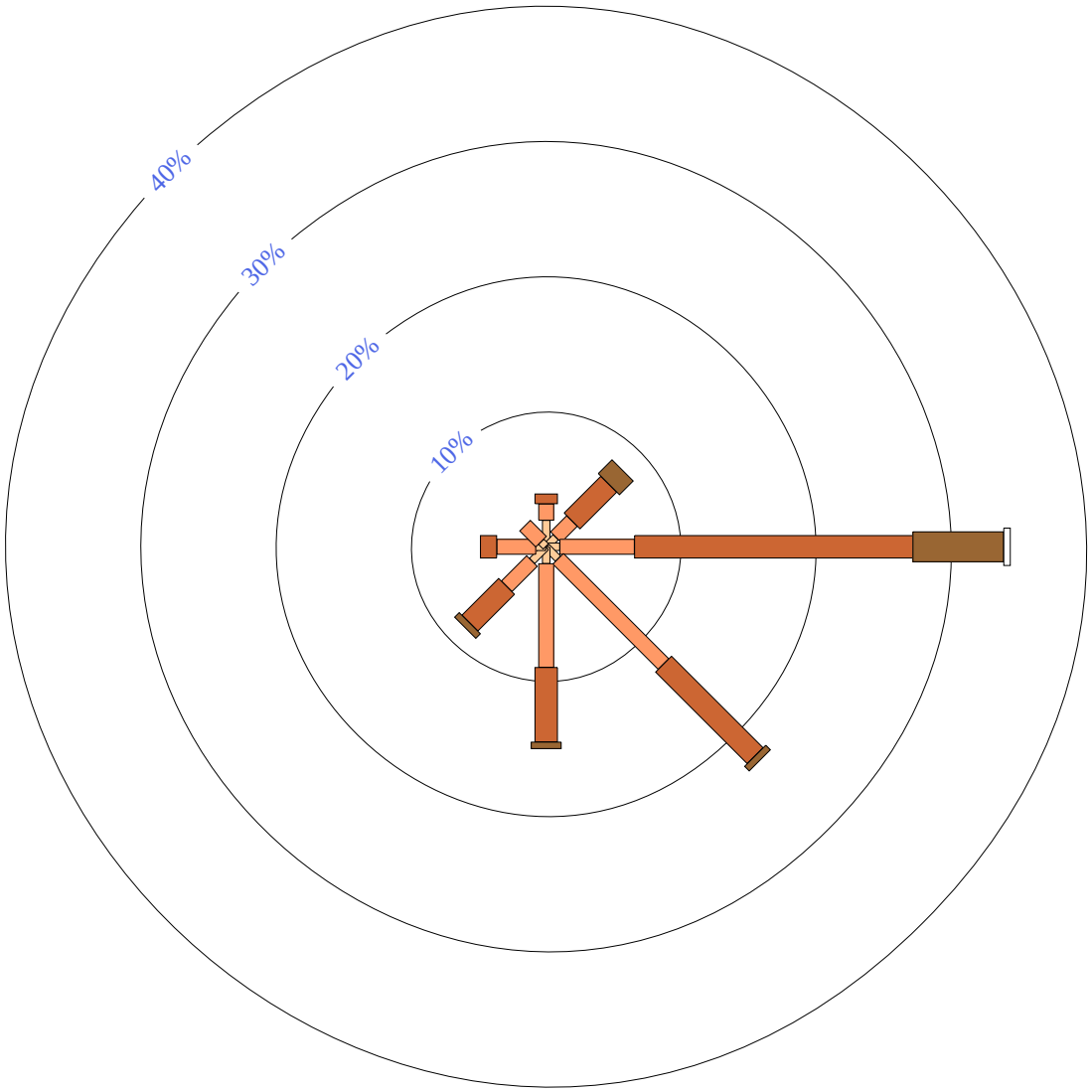
Site No: 009178 • Opened Jan 1968 • Still Open • Latitude: -31.4628° • Longitude: 115.8642° • Elevation 73m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.




9 am Jan
411 Total Observations

Calm *



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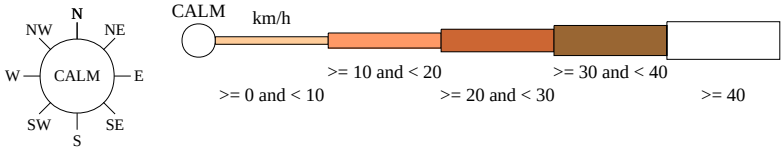
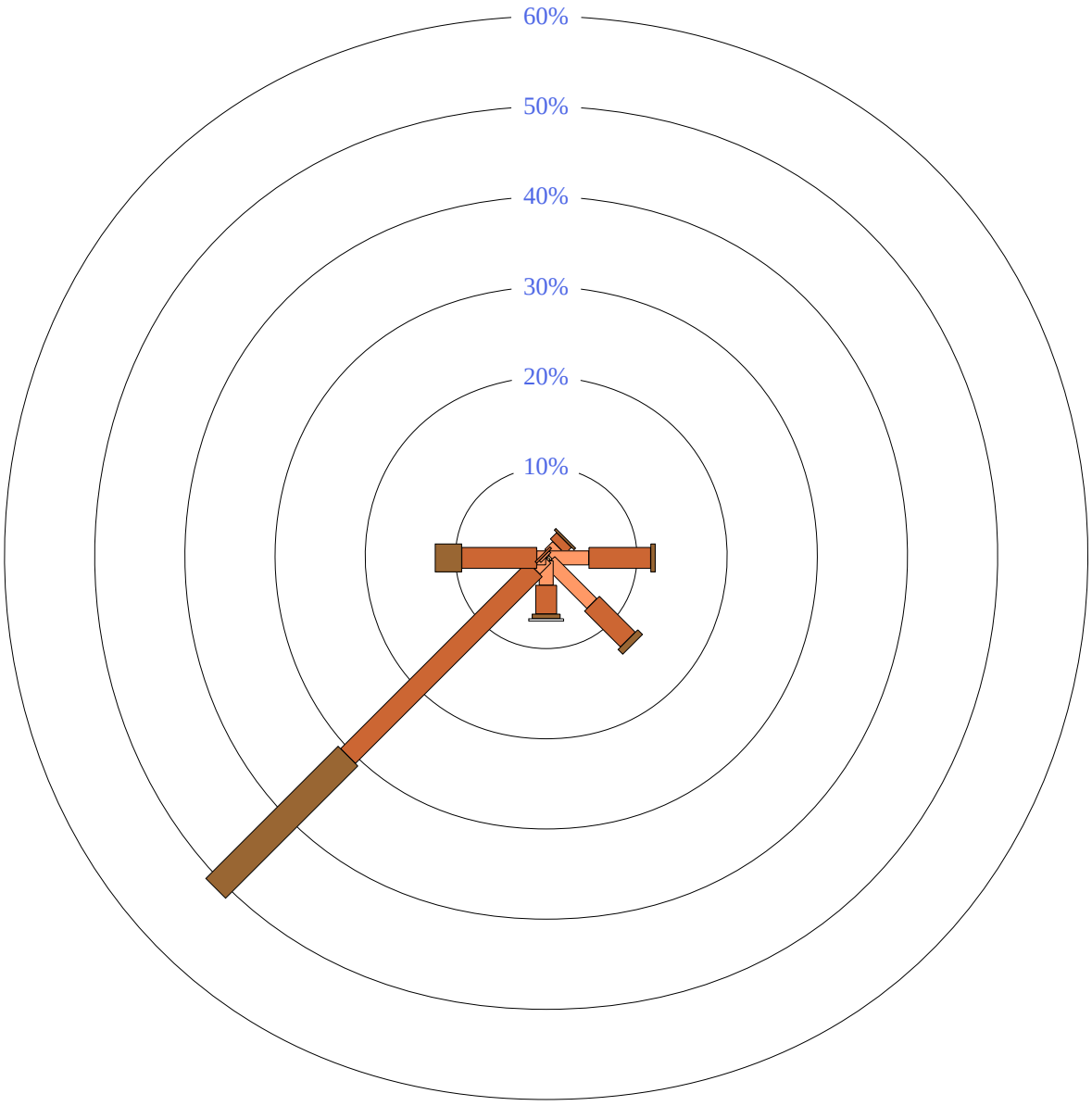



3 pm Jan
410 Total Observations

Calm *



# Appendix 3
# Construction standards for BAL 12.5
# as per AS 3959–2009

# SECTION 5 CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL 12.5 (BAL — 12.5)

## 5.1 GENERAL

A building assessed in Section 2 as being BAL—12.5 shall comply with Section 3 and Clauses 5.2 to 5.8.

NOTE: There are a number of Standards that specify requirements for construction; however, where this Standard does not provide construction requirements for a particular element, the other Standards apply.

Any element of construction or system that satisfies the test criteria of AS 1530.8.1 may be used in lieu of the applicable requirements contained in Clauses 5.2 to 5.8 (see Clause 3.8).

NOTE: BAL—12.5 is primarily concerned with protection from ember attack and radiant heat up to and including 12.5 kW/$m^2$ where the site is less than 100 m from the source of bushfire attack.

## 5.2 SUBFLOOR SUPPORTS

This Standard does not provide construction requirements for subfloor support posts, columns, stumps, piers and poles.

NOTE: The exclusion of requirements for subfloor supports applies to the principal building only and not to verandas, decks, steps, ramps and landings (see Clause 5.7).

**C5.2** *Ideally, storage of combustible materials beneath a floor at this BAL would not occur and on this assumption, there is no requirement to enclose the subfloor space or to protect flooring materials from bushfire attack. However, should combustible materials be stored, it is recommended the area be protected as materials stored in the subfloor space may be ignited by embers and cause an impact to the building.*

## 5.3 FLOORS

### 5.3.1 Concrete slabs on ground

This Standard does not provide construction requirements for concrete slabs on the ground.

### 5.3.2 Elevated floors

This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring.

## 5.4 EXTERNAL WALLS

### 5.4.1 Walls

That part of an external wall surface that is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less

than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D) shall be of—

(a) non-combustible material; or

(b) fibre-cement external cladding, a minimum of 6 mm in thickness; or

(c) bushfire-resisting timber (see Appendix F); or

(d) a timber species as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(e) a combination of any of Items (a), (b), (c) or (d) above.

There are no requirements for external wall surfaces 400 mm or more from the ground or for external wall surfaces 400 mm or more above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D).

### 5.4.2 Joints

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3 mm.

Alternatively, sarking-type material may be applied over the outer face of the frame prior to fixing any external cladding.

### 5.4.3 Vents and weepholes

Vents and weepholes in external walls shall be screened with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium, except where the vents and weepholes are less than 3 mm (see Clause 3.6), or are located in an external wall of a subfloor space.

## 5.5 EXTERNAL GLAZED ELEMENTS AND ASSEMBLIES AND EXTERNAL DOORS

### 5.5.1 Bushfire shutters

Where fitted, bushfire shutters shall comply with Clause 3.7 and be made from—

(a) non-combustible material; or

(b) a timber species as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(c) bushfire-resisting timber (see Appendix F); or

(d) a combination of any of Items (a), (b) or (c) above.

### 5.5.2 Windows

Window assemblies shall comply with one of the following:

(a) They shall be completely protected by a bushfire shutter that complies with Clause 5.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) For window assemblies less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), window frames and window joinery shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) A timber species specified in Paragraph E2 and listed in Table E2, Appendix E.

or

(C) Metal.

Or

(D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the frame and sash shall satisfy the design load, performance and structural strength of the member.

(ii) Externally fitted hardware that supports the sash in its functions of opening and closing shall be metal.

(iii) Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), the glazing shall be Grade A safety glass minimum 4 mm, or glass blocks with no restriction on glazing methods.

NOTE: Where double glazed units are used the above requirements apply to the external face of the window assembly only.

(iv) Where glazing is other than that specified in Item (iii) above, annealed glass may be used.

(v) The openable portions of windows shall be screened with mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

### 5.5.3 Doors—Side-hung external doors (including French doors, panel fold and bi-fold doors)

Side-hung external doors, including French doors, panel fold and bi-fold doors, shall comply with one of the following:

(a) They shall be protected by a bushfire shutter that complies with Clause 5.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Doors shall be—

(A) non-combustible; or

(B) a solid timber door, having a minimum thickness of 35 mm for the first 400 mm above the threshold; or

(C) a door, including a hollow core door, with a non-combustible kickplate on the outside for the first 400 mm above the threshold; or

(D) a fully framed glazed door, where the framing is made from materials required for bushfire shutters (see Clause 5.5.1), or from a timber species specified in Paragraph E2 and listed in Table E2, Appendix E.

(ii) Where doors incorporate glazing, the glazing shall comply with the glazing requirements for windows.

(iii) Doors shall be tight-fitting to the doorframe and to an abutting door, if applicable.

(iv) Where any part of the door assembly is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the door (see Figure D3, Appendix D), that part of the door assembly shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) A timber species specified in Paragraph E2 and listed in Table E2, Appendix E.

or

(C) Metal.

or

(D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the door assembly shall satisfy the design load, performance and structural strength of the member.

(v) Weather strips, draught excluders or draught seals shall be installed at the base of side-hung external doors.

**5.5.4 Doors—Sliding doors**

Sliding doors shall comply with one of the following:

(a) They shall be protected by a bushfire shutter that complies with Clause 5.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Any glazing incorporated in sliding doors shall be Grade A safety glass complying with AS 1288.

(ii) There is no requirement to screen the openable part of the sliding door. However, if screened, the screens shall be a mesh or perforated sheet made of corrosion-resistant steel, bronze or aluminium.

NOTE: The construction of manufactured sliding doors should prevent the entry of embers when the door is closed. There is no requirement to provide screens to the openable part of these doors as it is assumed that a sliding door will be closed if occupants are not present or during a bushfire event. Screens of materials other than those specified may not resist ember attack.

(iii) Sliding doors shall be tight-fitting in the frames.

### 5.5.5 Doors—Vehicle access doors (garage doors)

The following apply to vehicle access doors:

(a) The lower portion of a vehicle access door that is within 400 mm of the ground when the door is closed (see Figure D4, Appendix D) shall be made from—

(i) non-combustible material; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) fibre-cement sheet, a minimum of 6 mm in thickness; or

(iv) a timber species specified in Paragraph E1 and listed in Table E1, Appendix E; or

(v) a combination of any of Items (i), (ii), (iii) or (iv) above.

(b) Panel lift, tilt doors or side-hung doors shall be fitted with suitable weather strips, draught excluders, draught seals or guide tracks, as appropriate to the door type, with a maximum gap no greater than 3 mm.

(c) Roller doors shall have guide tracks with a maximum gap no greater than 3 mm and shall be fitted with a nylon brush that is in contact with the door (see Figure D4, Appendix D).

(d) Vehicle access doors shall not include ventilation slots.

## 5.6 ROOFS (INCLUDING VERANDA AND ATTACHED CARPORT ROOFS, PENETRATIONS, EAVES, FASCIAS, GABLES, GUTTERS AND DOWNPIPES)

### 5.6.1 General

The following apply to all types of roofs and roofing systems:

(a) Roof tiles, roof sheets and roof-covering accessories shall be non-combustible.

(b) The roof/wall junction shall be sealed, to prevent openings greater than 3 mm, either by the use of fascia and eaves linings or by sealing between the top of the wall and the underside of the roof and between the rafters at the line of the wall.

(c) Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

### 5.6.2 Tiled roofs

Tiled roofs shall be fully sarked. The sarking shall—

(a) have a flammability index of not more than 5;

(b) be located directly below the roof battens;

(c) cover the entire roof area including the ridge; and

(d) be installed so that there are no gaps that would allow the entry of embers where the sarking meets fascias, gutters, valleys and the like.

### 5.6.3 Sheet roofs

Sheet roofs shall—

(a) be fully sarked in accordance with Clause 5.6.2, except that foil-backed insulation blankets may be installed over the battens;

or

(b) have any gaps greater than 3 mm, under corrugations or ribs of sheet roofing and between roof components, sealed at the fascia or wall line and at valleys, hips and ridges by—

(i) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or

(ii) mineral wool; or

(iii) other non-combustible material; or

(iv) a combination of any of Items (i), (ii) or (iii) above.

### 5.6.4 Veranda, carport and awning roofs

The following apply to veranda, carport and awning roofs:

(a) A veranda, carport or awning roof forming part of the main roof space [see Figure D1(a), Appendix D] shall meet all the requirements for the main roof, as specified in Clauses 5.6.1, 5.6.2, 5.6.3, 5.6.5 and 5.6.6.

(b) A veranda, carport or awning roof separated from the main roof space by an external wall [see Figures D1(b) and D1(c), Appendix D] complying with Clause 5.4 shall have a non-combustible roof covering.

NOTE: There is no requirement to line the underside of a veranda, carport or awning roof that is separated from the main roof space.

**5.6.5 Roof penetrations**

The following apply to roof penetrations:

(a) Roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials, vent pipes and supports for solar collectors, shall be adequately sealed at the roof to prevent gaps greater than 3 mm. The material used to seal the penetration shall be non-combustible.

(b) Openings in vented roof lights, roof ventilators or vent pipes shall be fitted with ember guards made from a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(c) All overhead glazing shall be Grade A laminated safety glass complying with AS 1288.

(d) Glazed elements in roof lights and skylights may be of polymer provided a Grade A safety glass diffuser, complying with AS 1288, is installed under the glazing. Where glazing is an insulating glazing unit (IGU), Grade A toughened safety glass, minimum 4 mm, shall be used in the outer pane of the IGU.

(e) Flashing elements of tubular skylights may be of a fire-retardant material, provided the roof integrity is maintained by an under-flashing of a material having a flammability index no greater than 5.

(f) Evaporative cooling units shall be fitted with butterfly closers at or near the ceiling level or, the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(g) Vent pipes made from PVC are permitted.

**5.6.6 Eaves linings, fascias and gables**

The following apply to eaves linings, fascias and gables:

(a) Gables shall comply with Clause 5.4.

(b) Eaves penetrations shall be protected the same as for roof penetrations, as specified in Clause 5.6.5.

(c) Eaves ventilation openings greater than 3 mm shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds.

This Standard does not provide construction requirements for fascias, bargeboards and eaves linings.

### 5.6.7 Gutters and downpipes

This Standard does not provide material requirements for—

(a) gutters, with the exception of box gutters; and

(b) downpipes.

If installed, gutter and valley leaf guards shall be non-combustible.

Box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible material.

## 5.7 VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS

### 5.7.1 General

Decking shall be either spaced or continuous (i.e., without spacing).

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

**C5.7.1** *Spaced decking is nominally spaced at 3 mm (in accordance with standard industry practice); however, due to the nature of timber decking with seasonal changes in moisture content, that spacing may range from 0–5 mm during service. The preferred dimension for gaps is 3 mm (which is in line with other 'permissible gaps') in other parts of this Standard. It should be noted that recent research studies have shown that gaps at 5 mm spacing afford opportunity for embers to become lodged in between timbers, which may contribute to a fire. Larger gap spacings of 10 mm may preclude this from happening but such a spacing regime may not be practical for a timber deck.*

### 5.7.2 Enclosed subfloor spaces of verandas, decks, steps, ramps and landings

**5.7.2.1** *Materials to enclose a subfloor space*

This Standard does not provide construction requirements for the materials used to enclose a subfloor space except where those materials are less than 400 mm from the ground.

Where the materials used to enclose a subfloor space are less than 400 mm from the ground, they shall comply with Clause 5.4.

**5.7.2.2** *Supports*

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

**5.7.2.3** *Framing*

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

**5.7.2.4** *Decking*

This Standard does not provide construction requirements for decking that is more than 300 mm from a glazed element.

Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

(a) non-combustible material; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species, as specified in Paragraph E1 and listed in Table E1 of Appendix E;

(d) PVC-U; or

(e) a combination of any of Items (a), (b), (c) or (d) above.

**5.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings**

**5.7.3.1** *Supports*

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

**5.7.3.2** *Framing*

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

**5.7.3.3** *Decking*

This Standard does not provide construction requirements for decking unless it is less than 300 mm from a glazed element.

Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

(a) non-combustible material; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(d) a combination of any of Items (a), (b) or (c) above.

**5.7.4 Balustrades, handrails or other barriers**

This Standard does not provide construction requirements for balustrades, handrails and other barriers.

**5.8 WATER AND GAS SUPPLY PIPES**

Above-ground, exposed water and gas supply pipes shall be metal.

# Appendix 4
# Amberton Foreshore Preliminary Landscape Concept (Emerge 2014)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date • JUNE 2014
rev • H
scale • 1:1000 @ A1

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# AMBERTON FORESHORE MASTER PLAN REV H

## PRELIMINARY LANDSCAPE CONCEPT

emerge ASSOCIATES
Integrated Science & Design

## Appendix 5
## City of Wanneroo annual firebreak notice

# Protect your home and property from bushfires

NOTICE TO ALL OWNERS OR OCCUPIERS OF LAND IN THE DISTRICT OF THE CITY OF WANNEROO REGARDING FIREBREAKS.

The City of Wanneroo hereby gives notice pursuant to Section 33 of the **Bush Fires Act 1954** to all owners or occupiers of land in its district that they are required on or before 15 November, or within 14 days of becoming the owner or occupier of the land if that occurs after the 15 November, to annually plough, cultivate, scarify, or otherwise clear firebreaks as specified in this Notice and thereafter up to, and including the 30 April, annually, to maintain the firebreaks clear of flammable matter.

**1. Land having an area of 2000m2 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 2000m²**
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.

**3. Buildings**
A firebreak not less than 3 metres wide immediately around all external walls of every building must be cleared. Whenever a firebreak is cleared by burning the provisions of the Act and Regulations made thereunder must be observed. If pursuant to Item (2) of this Notice, mowing or slashing is carried out the height of vegetation thereafter must not exceed, as far as is reasonably practicable, 20mm over the entire area of the firebreak. The use of chemicals is subject to all restrictions imposed by the Department of Agriculture. Attention is drawn to the Flammable Liquids Regulations made under the Explosives and Dangerous Goods Act 1961,which requires a site on which flammable liquid is stored to be totally cleared of all flammable material for a minimum distance of 5 metres surrounding the site.

If it is considered to be impracticable for any reason to comply with the provisions of this Notice, application may be made not later than the 1st day of November annually to the Council or its authorised officer for permission to provide alternative fire protection measures. If permission is not granted the requirements of this Notice must be complied with.

**Penalty**
An owner or occupier of land who fails or neglects in any respect to comply with the requirements of this Notice is liable to a maximum fine of $5,000.

DATES TO REMEMBER

- **Firebreaks must be cleared by 15 November (AND KEPT CLEAR UNTIL APRIL 30)**
- **Burning permits required all year round**
- **Burning prohibited between 1 December to 31 March**

## When and how to obtain a fire permit

Permits are available from the City of Wanneroo at the following locations:

WANNEROO ANIMAL CARE CENTRE
Located at the rear of the Ashby Operations Centre, 1204 Wanneroo Road, Ashby
The City's Rangers / Fire Control Officers are available to issue permits 7 days a week* from 4pm - 6pm
*Except Good Friday

CITY OF WANNEROO CIVIC CENTRE
23 Dundebar Road, Wanneroo
The City's Fire Control Officers / Permit Issuing Officers are available to issue permits Monday to Friday 9am - 4pm

NEED ADVICE?
Further advice about how to protect your home, constructing firebreaks, and when and how to burn off, is available from the City of Wanneroo during office hours on 9405 5000.

City of Wanneroo
23 Dundebar Road, Wanneroo, WA 6065
Locked Bag 1, Wanneroo, WA 6946
T : (08) 9405 5000 F : (08) 9405 5499
After Hours : 1300 13 83 93
E : enquiries@wanneroo.wa.gov.au
wanneroo.wa.gov.au

# PROTECT YOUR HOME AND PROPERTY FROM BUSHFIRES

City of Wanneroo

# Keeping your home safe from fire

There are a number of ways you can help keep your home safe from fire:

- Install smoke detectors in your home
- Clear vegetation away from the walls of your home
- Clear all rubbish and flammable material from around your home to create a 20 metre circle of safety
- Store firewood, timber, petrol, and kerosene well away from your home
- Prior to summer, clean all leaves and debris from your gutters
- Don't have flammable trees such as conifers near buildings
- Have branches trimmed that overhang the house or powerlines
- Fit wire insect screens or shutters to windows and glass doors

**If a firebreak is impractical along your boundary for environmental or other reasons notify the City of Wanneroo by 1 October to obtain permission to install firebreaks in alternative positions, or of a different nature.**

## ALTERNATIVE METHODS OF REDUCING FIRE HAZARDS ON VACANT LAND

- For urban land less than 2000m$^2$, if mowing or slashing is carried out, the height of the vegetation must not exceed, as far as is reasonably practical, 20mm over the entire area of the firebreak
- The use of chemicals is subject to all restrictions imposed by the Department of Agriculture
- Mulching • Disposal at an authorised rubbish tip site

# When and how to burn

**NO BURNING FROM 1 DECEMBER - 31 MARCH**

Burning off - that is, bush/running fire including grass, on any land is totally prohibited between 1 December and 31 March. Fire permits for burning material other than garden rubbish are required all year round.

A person in control of the fire must stay with the fire until it is completely extinguished.

## GARDEN RUBBISH AND REFUSE

The burning of garden refuse is permitted between the hours of 6pm and 11pm, provided the fire danger rating is not VERY HIGH, SEVERE, EXTREME or CATASTROPHIC or a TOTAL FIRE BAN has been declared.

Fire danger rating signs are located at the following locations:

- Corner of Joondalup Drive and Wanneroo Road
- Wanneroo Road, south of the Yanchep Beach Road turn off
- Wanneroo Road, Carabooda • Marmion Avenue, Jindalee
- Neaves Road, Mariginiup • Old Yanchep Road, Pinjar
- Gnangara Road, Landsdale • Country Side Drive, Two Rocks

**Other points to remember when burning garden refuse and rubbish are:**

- All bush and flammable material must be thoroughly cleared within two metres of all points of the site of the fire
- The material must be on the ground, and be no more than one metre wide and one metre high

**Only one heap may be burnt at any one time**
**Incinerators may be used providing:**

- The incinerator is properly constructed and designed to prevent the escape of sparks of burning material
- The incinerator is situated not less than two metres away from a building or fence
- An area of two metres surrounding the incinerator is clear of all flammable material

## BARBECUES

Only gas or electric barbecues may be lit during VERY HIGH, SEVERE, EXTREME or CATASTROPHIC fire danger rating or declared TOTAL FIRE BAN. The lighting of solid fuel barbecues is not permitted on these days.

## SMOKE NUISANCES

City of Wanneroo residents are advised to be mindful of smoke issues associated with any burning that they conduct. Steps should be taken to avoid undue smoke impact to neighbours and adjacent roads. Smoke across roadways can severely impact motorists' visibility and therefore road safety. Issues of smoke nuisance are regulated by the Waste Avoidance and Resource Recovery Act 2007.

## CAMPFIRES

Campfires must not be lit on VERY HIGH, SEVERE, EXTREME or CATASTROPHIC fire danger days or declared TOTAL FIRE BAN. A person must remain in attendance at the site during the whole time the fire is burning. The user must extinguish the fire using water or earth before leaving the area.

# Hints for safer burning

- Don't light a fire on a hot or windy day
- Don't burn more than you can control
- Let your neighbours know you'll be burning material
- Make sure smoke and sparks will not affect your neighbour's washing or enter open windows
- Cut or rake long grass around trees, building and fences before burning
- Burn against the wind
- On a sloping block, burn from the top down
- Keep a hose or spray pack at hand to dampen down fierce fires
- If in doubt, don't burn material yourself - call the Volunteer Fire Brigade
- Stay with the fire until it is completely extinguished
- Where possible, don't burn any closer than 20 metres from your home or other buildings

# Penalties

Under the Bush Fires Act 1954, failing to comply with regulations can result in a fine ranging from $250 to $250,000 or imprisonment.

| | |
|---|---|
| Failure to maintain 2/3 metre firebreak as per firebreak order | $250 |
| Offence relating to lighting fire in the open air | $250 |
| Setting fire to bush during prohibited burning times | $250 |
| Failure of occupier to extinguish bush fire | $250 |

Major offences result in Court action with fines ranging from $250 to $250,000 or imprisonment for 14 years.

## THE BIGGEST PENALTY OF ALL

The biggest penalty of all would be losing your loved ones or home to fire. Please ensure you, your family and your home are kept safe by taking the necessary precautions.

# Special rural and residential land

Owners and occupiers of special rural and special residential land should be aware of their responsibilities to take bush fire prevention measures, while ensuring they do not contravene Town Planning Scheme provisions which control the removal of vegetation in Special Residential and Special Rural Zones.

These special rural zones were created in areas of natural flora, and the Scheme recognises the importance of preserving the natural environment in these areas. Anyone found cutting down, lopping or damaging trees in these areas without City approval may be guilty of an offence.

However, bush fire prevention, including the installation of firebreaks, is essential regardless of the zoning of the land.

Below are some guidelines for installing firebreaks in special rural zones to prevent bush fires, while minimising damage to the natural environment.

- A 3 metre wide and 3 metre high firebreak should be cleared around the perimeter of special rural or special residential lots
- These firebreaks need not be strictly around the perimeter, but may deviate according to the flora
- The firebreak does not have to be ploughed but can instead be created by clearing and removing all flammable material
- Care should be taken to avoid damaging or removing significant trees and shrubs
- Avoid the build up of undergrowth and leaf litter

# Appendix 6
# AFAC bush fire glossary

afac
Australasian Fire and Emergency Service Authorities Council

# BUSHFIRE GLOSSARY

Prepared by Rural and Land Management Group for AFAC Agencies

January 2012

January 2012

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http://knowledgeweb.afac.com.au/

# Preface

The AFAC Bushfire Glossary has been developed to promote an exchange of information between member agencies on terminology used specifically in bushfires.

The Glossary has been developed based on a set of agreed business rules. It includes the bushfire technical terms, their definition or description as adopted and applied by the AFAC member agencies. It does include some fire terms that are of a general industry wide nature for completeness. It excludes terms for which an agreed definition could not be reached by the member agencies.

This document is not designed to be a text book or to provide a discussion of a term beyond the definition/description of that term. Nor is it an attempt to modify or redefine terms defined in codes, standards or legislation. Terms that have been adopted for use by the fire management industry from another discipline will maintain the meaning ascribed to them in their originating discipline.

It is proposed that this Glossary will be reviewed regularly to ensure that it continues to be relevant and meets the needs of AFAC member agencies. This is the fifth review. It is the current 2012 version.

AFAC acknowledges the significant contribution of the Rural and Land Management Glossary Working Group lead by Greg Esnouf and Country Fire Authority staff, Matthew Fraser and Jo Richards, who contributed generously of their time and expertise in the establishment of this document and the work of the Genesis Institute to provide a framework for refining the glossary.

Previous versions of the Glossary were titled Wildfire Glossary. The term wildfire has been replaced with the term bushfire in line with a trend towards using language more accepted by the general public.

The terms appear in alphabetical order excluding spaces. In this way it is possible to find a compound word without knowing if it is one or two words.

# Aim

The purpose of this Glossary is to seek to facilitate a greater understanding by using common language between bushfire and land management agencies and support organisations during the prevention of, preparedness for, response to and recovery from bushfires.

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| Term | Definition |
|---|---|
| **Accelerant** | Any substance (such as oil, gasoline, etc) that is applied to a fuel-bed to expedite the burning process. |
| **Adaptor** | A fitting used to couple different sized hoses, hoses of the same size with different threads, or different types of couplings, or to connect the male to male, or female to female parts of the same type of coupling. |
| **Adsorption** | The taking in of water vapour from the air by dead plant material. |
| **Advance burn** | A prescribed fire that reduces fuel through a forest area before felling operations. It is intended to improve the safety of timber harvesting operations and as a silvicultural tool to protect lignotubers and standing trees. |
| **Advancing fire** | That portion of the fire with rapid fire spread and higher intensity which is normally burning with the wind and/or up slope. |
| **Aerial detection** | The discovering, locating and reporting of fires from aircraft. |
| **Aerial fuel** | See: Elevated fuel |
| **Aerial ignition** | Ignition of fuels by dropping incendiary devices or materials from aircraft. |
| **Aerial ignition device (AID)** | Inclusive term applied to equipment designed to ignite wildland fuels from an aircraft. |
| **Aerial Observer** | See: Air Observer |
| **Aerial reconnaissance** | Use of aircraft for detection of fires and observing fire behaviour, values-at-risk, suppression activity, and other critical factors to facilitate command decisions on strategy and tactics needed for fire suppression. |
| **Aerosol** | Airborne solid or liquid particles dispersed or suspended in a gas stream. |
| **After action review (AAR)** | A discussion, focused on performance standards, of an event that enables those involved to discover what happened, why it happened, and how to sustain strengths and improve on weaknesses. An After action review is a tool incident command personnel and units can use to get maximum benefit from every incident. It provides a review of the incident upon its completion to identify and discuss effective and non-effective performance and lessons learned and how to apply them in the future. (adapted from NWCG) |
| **AIIMS structure** | The combination of facilities, equipment, personnel, procedures, and communications operating within a common organisational structure with responsibility for the management of allocated resources to effectively accomplish stated objectives relating to an incident (AIIMS). |
| **Air attack** | The direct use of aircraft in the suppression of bushfires. |
| **Air attack Supervisor** | Primarily responsible for the safety and efficient tactical coordination of aircraft operations when fixed and/or rotary firebombing aircraft are operating at a fire (Air Attack Supervisor Training Manual). |
| **Air base Manager** | An experienced, trained person who is appointed to manage all the functions and personnel on an air base or helicopter base. |
| **Air mass** | A meteorological term referring to an extensive body of air within which the conditions of temperature and moisture in a horizontal plane are essentially uniform. |
| **Air Observer** | The primary role of the air observer is to aerially obtain intelligence to assist the planning of fire suppression operations (NSWRFS). |
| **Air operations** | The use of aircraft in support of an incident for the purposes of suppression, transportation of personnel, equipment or supplies, or for aerial reconnaissance. |

| Term | Definition |
|---|---|
| **Air operations Manager** | The air operations manager position is responsible for overall coordination of air operations and air support activities in support of an incident. |
| **Aircraft Officer** | The aircraft officer is responsible for ground operations and overall provision of support, enabling a safe and efficient air operation to be conducted. |
| **Airside** | The parts of an airport not normally open to unauthorised people. It comprises the apron, taxiways, runways and the areas containing them. |
| **Allocated resources** | Resources working at an incident (AIIMS). |
| **Anchor point** | An advantageous location, usually a barrier to fire spread, from which to start constructing a fireline. The anchor point is used to minimize the chance of being flanked by the fire while the line is being constructed (NWCG). |
| **Aqueous film forming-foam (AFFF)** | A synthetic amber coloured liquid concentrate mixed with water to form an agent that is capable of forming water-solution films on the surface of flammable liquids that prevent the escape of fuel vapours, excludes oxygen and maintain the surface when disturbed (self healing). |
| **Area ignition** | Ignition of several individual fires throughout an area, either simultaneously or in rapid succession, and so spaced that they add to and influence the main body of the fire to produce a hot, fast-spreading fire condition. Also called simultaneous ignition. |
| **Area of origin** | General location where the fire started. |
| **Arson** | The deliberate setting of a fire where the intent of the person responsible was to cause harm or destruction to life or property. |
| **Aspect** | The direction towards which a slope faces. |
| **Asphyxiants** | Substances which interfere with the respiratory process. |
| **Assembly area** | See Staging area. |
| **Assessment** | The process of determining if an individual has the prescribed skills, knowledge and experience needed to acquire a specific capability. |
| **Assets** | Anything valued by people which includes houses, crops, forests and, in many cases, the environment. |
| **Assisting agency** | An agency directly contributing suppression, support or service resources to another agency. |
| **Atmospheric stability** | The degree to which the atmosphere resists turbulence and vertical motion. |
| **Attack time** | See Elapsed time |
| **Australasian Inter-service Incident Management System (AIIMS)** | A nationally adopted structure to formalise a coordinated approach to emergency incident management. |
| **Automatic dispatch** | See Pre-planned dispatch. |
| **Automatic weather station (AWS)** | The Bureau's standard AWSs use sensors to monitor temperature, humidity, wind speed and direction, pressure and rainfall. Various advanced sensors are available for specialised applications. These sensors can monitor cloud height (ceilometer), visibility, present weather, thunderstorms, soil temperature (at a range of depths) and terrestrial temperature. (Developed from the BOM) |
| **Available fuel** | The portion of the total fuel that would actually burn under various environmental conditions. |
| **Available resources** | The resources at an incident and available for allocation at short notice. (AIIMS) |

| Term | Definition |
|---|---|
| **Backburn** | 1. A fire started intentionally along the inner edge of a fireline during indirect attack operations to consume fuel in the path of a bushfire (Australia).<br>2. A counterfire commenced from within continuous fuel for the purpose of fighting a fire (New Zealand). |
| **Back fire** | See: Backburn (Preferred term). |
| **Backing fire** | The part of a fire which is burning back against the wind or down slope, where the flame height and rate of spread are reduced. |
| **Bark fuel** | The flammable bark on tree trunks and upper branches. |
| **Bark heaps** | Accumulations of bark and branch material resulting from timber harvesting operations. Soil may be mixed with bark heaps, but generally the heap is formed by a machine dropping fresh bark on the top of the heap. |
| **Basal accumulation** | Bark fallen from a tree and forming a relatively high and localized accumulation of fine fuel. |
| **Base camp** | A location where personnel are accommodated and fed for a period of time. A base camp usually contains catering, ablution and accommodation facilities, a water supply and a lighting system, and may include other facilities such as car parking maintenance and servicing. (AIIMS) |
| **Bay(s)** | A marked indentation (s) in the fire perimeter usually located between two fingers. |
| **Beaufort wind scale** | A system for estimating wind speeds based on observation of visible wind effects. A series of descriptions of visible wind effects upon land objects or sea surfaces is matched with a corresponding series of wind speed ranges, each being allocated a *Beaufort number.* |
| **Blacking out** | The process of extinguishing or removing burning material along or near the fire control line, felling stags, trenching logs to prevent rolling and the like, in order to make the fire safe. |
| **Blackspot** | An area where two-way radio coverage does not exist. |
| **Blank cap** | The metal cap used on delivery outlets and on the suction inlet of the pump to prevent discharge of water. |
| **Blow down** | See: Wind throw. |
| **Blow up** | Sudden increase in fireline intensity or rate of spread of a fire sufficient to preclude direct control or to upset existing suppression plans. Often accompanied by violent convection and may have other characteristics of a fire storm. (NWCG) |
| **Bole** | The trunk of a tree. |
| **Bole damage** | The damage to the trunk of a living tree by fire, mechanical equipment or disease. |
| **Bracken** | Bracken fern varies significantly in height and density. If Bracken is generally upright (either alive or dead) with the majority of its biomass in the top half of the plant and only the stems in touch with the ground, then it is considered to be part of the elevated fuel. If however, it has collapsed and most of its biomass is in touch with the ground, then it is considered to be Near-surface fuel. |
| **Branch** | A tapered pipe, fitted to the end of a hose line, which increases the velocity (converting pressure energy to kinetic energy) of the water or foam solution travelling through the hose, and forms an effective firefighting jet or spray. |
| **Breakaway** | The points at which a fire, after it has been contained, escapes into unburnt areas across a fireline or fire edge. |

| Term | Definition |
|---|---|
| **Breeching** | A device to divide one hose line into two or collect two hose lines into one. |
| **Briefing** | A general overview of an operation. |
| **Broad area hazard reduction** | Large scale removal of selected fuel before the onset of a bushfire danger period. |
| **Broadcast burning** | See: Prescribed burning (Preferred term) |
| **Buffer** | A strip or block of land on which the fuels are reduced to provide protection to surrounding lands. |
| **Bulk water carrier** | A large tanker used for replenishing water to firefighting tankers. |
| **Burn back** | See: Reburn (Preferred term). |
| **Burning brands** | Lofted burning material such as bark, usually flaming. |
| **Burning conditions** | The state of the combined components of the fire environment that influence fire behaviour and fire impact in a given fuel type. Usually specified in terms of such factors as fire weather elements, fire danger indices, fuel load and slope. |
| **Burning off** | Generally setting fire - with more or less regard to areas carrying unwanted vegetation such as rough grass, slash and other fuels. |
| **Burning out** | To intentionally light fires to consume islands of unburned fuel inside the fire perimeter. |
| **Burning program** | A program of prescribed burns scheduled these for a designated area over a nominated time, normally looking ahead over one fire season (for the coming spring to the following autumn), but can also look ahead five years or more. |
| **Burning rotation** | The period between burning of a prescribed area for management purposes. |
| **Burning unit** | A specified land area for which prescribed burning is planned. |
| **Burn out** | 1. A fire set to consume islands of unburnt fuel inside the fire perimeter and between the fire edge and fireline (Australia).<br>2. A counterfire commenced from a natural or previously constructed firebreak for the purpose of fighting a fire (New Zealand). |
| **Burn over** | A section of fire that overruns personnel and/or equipment. |
| **Burn plan** | The plan which is approved for the conduct of prescribed burning. It contains a map identifying the area to be burnt and incorporates the specifications and conditions under which the operation is to be conducted. |
| **Bushfire** | Un planned vegetation fire. A generic term which includes grass fires, forest fires and scrub fires both with and without a suppression objective. |
| **Bushfire danger period** | A period of the year either established by legislation or declared by the relevant agency, when restrictions are placed on the use of fire due to dry vegetation and the existence of conditions conducive to the spread of fire. |
| **Bushfire management** | All those activities directed to prevention, detection, damage mitigation, and suppression of bushfires. Includes bushfire legislation, policy, administration, law enforcement, community education, training of fire fighters, planning, communications systems, equipment, research, and the multitude of field operations undertaken by land managers and emergency services personnel relating to bushfire control. |
| **Byram-Keetch Drought index (BKDI)** | See: Keetch-Byram Drought Index |
| **Cache** | A predetermined complement of supplies stored in a designated location. (CIMS). |
| **Campaign fire** | A fire normally of a size and/or complexity that requires substantial firefighting resources, and possibly several days or weeks to suppress. |

| Term | Definition |
|---|---|
| **Candle (Candling)** | A tree (or small clump of trees) is said to candle when its foliage ignites and flares up, usually from the bottom to top. |
| **Candlebark** | Long streamers of bark that have peeled from some eucalypt species that form fire brands conducive to very long distance spotting. |
| **Canopy** | The crowns of the tallest plants in a forest – the overstorey cover. |
| **Canopy cover** | Canopy cover refers to 2 dimensions (ie plan view, area coverage) |
| **Canopy density** | Canopy density refers to 3 dimensions (ie mass/volume) |
| **Catastrophic fire danger** | The highest fire danger rating as determined by fire agencies and generally with a Forest fire danger index greater than 100 or a Grassland fire danger index greater than 150. |
| **Central ignition** | A method of prescribed burning in which fires are set in the centre of an area to create a strong convective column. Additional fires are then set progressively closer to the outer control lines causing indraft winds to build up. This has the effect of drawing the fires towards the centre. |
| **Chaining** | The process of flattening vegetation (usually mallee or scrub) by dragging a heavy chain or cable between two large tractors or bulldozers. |
| **Charged line** | A line of fire hose filled with water under pressure and ready to use. |
| **CIMS** | Coordinated Incident Management System used in New Zealand. |
| **Class A foam** | See: Foam |
| **Class labels** | Class labels identify the type of hazardous material being stored or transported. These are grouped under broad classifications according to the predominant type of risk involved. |
| **Climate** | The atmospheric conditions of a place over an extended period of time. |
| **Clinometer** | An instrument used to measure the angle of a slope. |
| **Cloud cover** | The amount of sky covered or obscured by cloud, expressed in eighths. Eight eighths is complete cloud cover. |
| **Coarse fuels** | Dead woody material, greater than 25mm in diameter, in contact with the soil surface (fallen trees and branches). Some researchers categorise forest fuels as: fine <6 mm diameter; twigs 6-25 mm diameter; coarse >25 mm diameter. |
| **Code of Practice** | Document giving methods developed to assist compliance with acts and regulations in the performance of work. |
| **Cold front** | A cold front is the delineation between cold polar air moving towards the equator and undercutting warm tropical air moving poleward. The temperature differences across a cold front can be extreme and associated with strong winds. The warm tropical air is forced to rise and become unstable with the development of large cumuliform clouds. Severe weather such as thunderstorms, squall lines and severe turbulence may accompany these cold fronts. (BOM) |
| **Cold trailing** | A method of determining whether or not a fire is still burning, involving careful inspection and feeling with the hand, or by use of a hand-held infrared scanner, to detect any heat source. |
| **Collecting head** | A collecting head is used to collect (usually from two to four) lines into the suction inlet of a pump. |
| **Combat agency/authority** | See: Control authority |
| **Combustion** | Rapid oxidation of fuels producing heat, and often light. |

| Term | Definition |
|---|---|
| **Command** | The direction of members and resources of an agency in the performance of the agency's role and tasks. Authority to command is established in legislation or by agreement within an agency. Command relates to agencies and operates vertically within an agency. |
| **Communications plan** | Details the methods and systems for people to communicate with each other, the incident management structure, including the actual radio channels/mobile phone numbers. (AIIMS) |
| **Compartment** | (1) Forestry Definition – A basic administrative unit of a managed forest.<br>(2) Building Definition - An enclosed space with floor, walls and ceiling. |
| **Competency** | Skills and knowledge and their application within an occupation to the standard of performance required in the workplace. (Vic report) |
| **Conduction** | The transfer of thermal energy between regions of matter due to temperature gradient. |
| **Contained** | The status of a wildfire suppression action signifying that a control line has been completed around the fire, and any associated spot fires, which can reasonably be expected to stop the fire's spread. (NWCG) |
| **Contour lines** | Contour lines connect points of equal elevation on a topographical map. |
| **Control** | The overall direction of response activities in an emergency situation. Authority for control is established in legislation or in an emergency response plan, and carries with it the responsibility for tasking and coordinating other agencies in accordance with the needs of the situation. Control relates to situations and operates horizontally across agencies. |
| **Control authority** | The agency, service, organization or authority with legislative responsibility for control of the incident. (Also referred to as the responsible authority or agency.) (AFAC) |
| **Controlled** | The stage during fire suppression activities at which the complete perimeter of a fire is secured and no breakaway is expected. |
| **Controlled burning** | See: Prescribed burning. |
| **Control line** | See: Fireline |
| **Convection** | 1. As applied in meteorology, atmospheric motions that are predominantly vertical, resulting in vertical transport and mixing of atmospheric properties; distinguished from advection.<br>2. As applied in thermodynamics is a mechanism of heat transfer occurring because of the bulk movement of fluids. |
| **Convection burn** | See: Central ignition |
| **Convection column** | The rising column of smoke, ash, burning embers and other particle matter generated by a fire. |
| **Convective activity** | General term for manifestations of convection in the atmosphere, alluding particularly to the development of convective clouds and resulting weather phenomena, such as showers, thunderstorms, squalls, hail, and tornadoes. (NWCG) |
| **Convergence zone** | 1. See: Junction zone.<br>2. In fire weather, that area where two winds come together from opposite directions and are forced upwards often creating clouds and precipitation. (NWCG) |
| **Convoy** | Two or more vehicles driving together under the control of a single Convoy Leader. |

| Term | Definition |
|---|---|
| **Coordination** | The bringing together of agencies and elements to ensure effective response to an incident or emergency. It is primarily concerned with the systematic acquisition and application of resources in accordance with the requirements imposed by the emergency or emergencies. Coordination relates primarily to resources and operates:<br>• vertically, within an agency, as a function of the authority to command;<br>• horizontally, across agencies, as a function of the authority to control. |
| **Cordon** | A cordon is the means to maintain an area and is used to restrict movement into and out of an area. |
| **Coupe** | A defined forest area in which timber harvesting takes place. |
| **Crew** | See: Fire crew. |
| **Crew leader** | Person responsible for the supervision and management of crews |
| **Critical burnout time** | Total time a fuel can burn and continue to feed energy to the base of a forward-travelling convection column. |
| **Critical incident stress** | Unusually strong emotional reactions which have the potential to interfere with the ability of personnel to function, either at the incident scene or later, arising from any situation faced during operations. |
| **Critical incident stress debriefing** | The process in which teams of professional and peer counsellors provide emotional and psychological support to incident personnel who are or have been involved in a critical (highly stressful) incident. |
| **Cross bearings** | Intersecting lines of sight from two or more points on the same object; used to determine the location of bushfire from lookouts. |
| **Crown fire** | A fire that advances from top to top of trees or shrubs. |
| **Crown scorch** | Browning of the needles or leaves in the crown of a tree or shrub caused by heat from a fire. |
| **Crowning** | A fire ascending into the crowns of trees and spreading from crown to crown. |
| **Crowning potential** | A probability that a crown fire may start, calculated from inputs of foliage moisture content and height of the lowest part of the tree crowns above the surface. (NWCG) |
| **Curing** | Drying and browning of herbaceous vegetation due to mortality or senescence. |
| **Dead fuel** | Fuels with no living tissue in which moisture content is governed almost entirely by absorption or evaporation of atmospheric moisture (relative humidity and precipitation). (NWCG) |
| **Debrief** | To gather information from the participants in an action so as to gauge the success or otherwise of the action at the end of the task, shift, tour or incident. |
| **Deep-seated fire** | A fire burning far below the surface in duff, mulch, peat, or other combustibles as contrasted with a surface fire. |
| **Defensive strategy** | A firefighting strategy used where the protection of life and assets is a priority when a fire is:<br>(i) located in inaccessible or remote location OR<br>(ii) too intense to be safely or effectively attacked directly. |
| **Dehydration** | Excessive loss of water from the body's tissues. Dehydration may follow any condition in which there is a rapid depletion of body fluids. |
| **Delayed aerial ignition devices (DAID)** | An incendiary device that will ignite after a predetermined time. |

| Term | Definition |
|---|---|
| **Deliberate fire** | A fire resulting from a person placing burning material to cause ignition. The intent of the person may have been to cause harm or destruction to life or property (arson-criminal offence) or to modify fuels and/or vegetation for land management purposes (summary offence). See also Arson. |
| **Delivery hose** | Hose used to transport water under pressure. |
| **Delivery valve** | On a pump, the valved outlet through which water is discharged. |
| **Demobilisation** | The orderly release of resources no longer required at an incident. |
| **Depth of burn** | The reduction in forest floor litter thickness (cm) due to consumption by fire. Most commonly used in connection with prescribed burning. |
| **Desiccant** | A chemical that, when applied to a living plant causes or accelerates the drying out of its aerial parts. |
| **Desorption** | The loss of moisture to the atmosphere from dead plant material. |
| **Detection** | The discovery of a fire. Individuals, fire towers, reconnaissance aircraft and automatic devices may be used, either alone or in combination. |
| **Dew** | The moisture which collects in small droplets on the surface of substances and vegetation by atmospheric condensation, chiefly at night. |
| **Dew point temperature** | This is a measure of the moisture content of the air and is the temperature to which air must be cooled in order for dew to form. The dew-point is generally derived theoretically from dry and wet-bulb temperatures, with a correction for the site's elevation. (BOM) |
| **Dieback** | The progressive dying, from the top downward, of twigs, branches or tree crowns. |
| **Diffused pattern** | A spray pattern (as opposed to straight stream) of water or foam. |
| **Direct attack** | A method of fire attack where wet or dry firefighting techniques are used. It involves suppression action right on the fire edge which then becomes the fireline. |
| **Dispatch** | The act of ordering attack crews and/or support units to respond to a fire, or from one place to another. |
| **Division** | A portion of the incident comprising of two or more sectors. The number of sectors grouped in a Division should be such as to ensure effective direction and control of operations. Divisions are generally identified by a local geographic name. |
| **Dominant height** | Mean height of the largest trees in a stand. A specified number per unit area are generally selected. |
| **Downwind** | Away from the wind direction. In the direction opposite to the direction from which the wind is blowing. The direction that smoke will travel. |
| **Dozer** | A crawler tractor fitted with a blade which can be transported to a fire on a tray truck or trailer. Dozer is a shortened form of "Bulldozer" |
| **Dozer line** | Fireline constructed by the front blade of a dozer. |
| **Drain time** | The time (minutes) it takes for foam solution to drop out from the foam mass; for a specified percent of the total solution contained in the foam to revert to liquid and drain out of the bubble structure. |
| **Drift** | The effect of wind on smoke or on a water drop. |
| **Drip torch** | A canister of flammable fuel fitted with a wand, a burner head and a fuel flow control device. It is used for lighting fires for prescribed burning, backburning and burning out. |

| Term | Definition |
|---|---|
| **Drop pass** | Indicates that the firefighting aircraft has the target in sight and will make a drop of fire control agent on this run over the target. |
| **Drop pattern** | The distribution of an aerially delivered fire control agent drop on the target area in terms of its length, width, and momentum (velocity x mass) as it approaches the ground. The latter determines the relative coverage level of the fire control agent on fuels within the pattern. |
| **Drop zone (DZ)** | Target area for firefighting aircraft, or cargo dropping. |
| **Drought** | Prolonged absence or marked deficiency of precipitation (rain). (BOM) |
| **Drought index** | A numerical value reflecting the dryness of soils, deep forest litter, logs and living vegetation. |
| **Dry bulb temperature** | Technically, the temperature registered by the dry-bulb thermometer of a psychrometer. However, it is identical to the temperature of the air. (Degrees Celsius). (NZ) |
| **Dry firefighting** | The suppression of a fire without the use of water. This is normally achieved by removing the fuel by the use of hand tools, burning or machinery. |
| **Duff** | The layer of decomposing vegetative matter on the forest floor below the litter layer, the original structure still being recognisable. |
| **Ecological burning** | A form of prescribed burning. Treatment with fire of vegetation in nominated areas to achieve specified ecological objectives. |
| **Edge burning** | A term used to describe perimeter burning of an area in mild conditions prior to large scale prescribed burning. This practice is used to strengthen buffers and to reduce mop-up operations. |
| **Elevated fuel** | The standing and supported combustibles not in direct contact with the ground and consisting mainly of foliage, twigs, branches, stems, bark and creepers. |
| **Embers** | Glowing particles cast from the fire (as 'showers' or 'storms'). (Vic report) |
| **Emergency centre** | A facility where the coordination of the response and support to the incident is provided. |
| **En route resources** | Resources despatched to an incident that have not yet checked in. (AIIMS) |
| **Entrapment** | A situation in which individuals are exposed to life threatening or potentially life threatening conditions from which they cannot safely remove themselves. |
| **Equilibrium moisture content (EMC)** | The moisture content that a fuel element would attain if exposed for an infinite period in an environment of specified constant dry-bulb temperature and relative humidity. When a fuel element has reached its EMC, it neither gains nor loses moisture as long as conditions remain constant. |
| **Equipment** | All material supplied to an incident excluding personnel and vehicles. |
| **Escape route** | A planned route away from danger areas at a fire. |
| **Evacuation** | The temporary relocation of persons from dangerous or potentially dangerous areas to safe areas. |

| Term | Definition |
|---|---|
| **Exposures** | Parts of the same structure or other structures or property not directly involved in the fire but at risk of being burnt or damaged if the fire is not controlled. In the bushfire context:<br>1. Property that may be endangered by a fire burning in another structure or by a bushfire. In general, property within 12 metres of a fire may be considered to involve an exposure hazard, although in very large fires the danger may exist at much greater distances.<br>2. Direction in which a slope faces, usually with respect to cardinal directions (N, S, E, W).<br>3. The general surroundings of a site, with special reference to its openness to winds and sunshine. |
| **Extinguishing agent** | A substance used to put out a fire by cooling the burning material or blocking the supply of oxygen, or chemically inhibiting combustion or combinations of these mechanisms. |
| **Extreme fire behaviour** | A level of bushfire behaviour characteristics that ordinarily precludes methods of direct suppression action. One or more of the following is usually involved:<br>• high rates of spread<br>• prolific crowning and/or spotting<br>• presence of fire whirls<br>• a strong convective column.<br>Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously. |
| **Extreme fire danger** | The second highest fire danger rating as determined by fire agencies and generally with a Forest fire danger index between 75 and 99 or a Grassland fire danger index greater between 100 and 149. |
| **Facilities** | Permanent and temporary facilities where personnel sleep, cook, maintain and repair equipment. (AIIMS) |
| **Fall back fire control line** | Any fire control line which is at a distance from the fire perimeter, and is the second control line at which the fire perimeter may be stopped should it cross the first fire control line. Also known as 'fallback line'. |
| **Fine fuel** | Fuel such as grass, leaves, bark and twigs less than 6mm in diameter that ignite readily and are burnt rapidly when dry. |
| **Fingers** | Long and narrow slivers of fire which extend beyond the head or flanks. (AFAC) |
| **Fire** | The chemical reaction between fuel, oxygen and heat. Heat is necessary to start the reaction and once ignited, fire produces its own heat and becomes self-supporting. |
| **Fire access track** | A track constructed and/or maintained expressly for fire management purposes. |
| **Fire behaviour** | The manner in which a fire reacts to the variables of fuel, weather and topography. |
| **Fire Behaviour Analyst** | Person responsible for developing fire behaviour predictions based on fire history, fuel, weather, and topography. (NWCG)amended |
| **Fire behaviour model** | A set of mathematical equations that can be used to predict certain aspects of fire behaviour. |
| **Fire behaviour prediction** | Prediction of probable fire behaviour usually prepared by a fire behaviour analyst in support of fire suppression or prescribed burning operations. (NWCG) |
| **Fire behaviour prediction system** | A system that uses a set of mathematical equations to predict certain aspects of fire behaviour in wildland fuels when provided with data on fuel and environmental conditions. |

| Term | Definition |
|---|---|
| **Fire bombing** | A technique of suppressing a bushfire by dropping water, foam or retardants on it from an aircraft. |
| **Fire brand** | A piece of flaming or smouldering material capable of acting as an ignition source. eg eucalypt bark. |
| **Fire climate** | The composite pattern or integration over time of the fire weather elements that affect fire occurrence and fire behaviour in a given area. |
| **Fire control** | See Fire suppression. |
| **Fire control agent** | A substance that acts as an Extinguishing agent, and or a Fire retardant and or a Fire suppressant. |
| **Fire control line** | See: Fireline. |
| **Fire crew** | A general term for two or more firefighters organised to work as a unit. (NWCG) |
| **Fire danger** | Sum of constant danger and variable danger factors affecting the inception, spread, and resistance to control, and subsequent fire damage; often expressed as an index. (NWCG) |
| **Fire danger class** | A segment of a fire danger index scale identified by a descriptive term and or a colour code. The classification system may be based on more than one fire danger index and an assessment of risk exposure. |
| **Fire danger index (FDI)** | A relative number denoting the potential rates of spread, or suppression difficulty for specific combinations of temperature, relative humidity, drought effects and wind speed. |
| **Fire danger rating** | A relative class denoting the potential rates of spread, or suppression difficulty for specific combinations of temperature, relative humidity, drought effects and wind speed, indicating the relative evaluation of fire danger. |
| **Fire ecology** | The study of the relationships between fire, the physical environment and living organisms. |
| **Fire edge** | Any part of the boundary of a going fire at a given time. *NOTE*: The entire boundary is termed the 'fire perimeter'. |
| **Fire effects** | The physical, biological and ecological impact of fire on the environment. (NWCG) |
| **Fire environment** | The surrounding conditions, influences, and modifying forces of topography, fuel, and weather that determine fire behaviour. (NWCG) |
| **Firefighter** | Any employee, volunteer or agent of any fire agency who occupies, or is designated, to undertake a role for the purpose of fire suppression. |
| **Firefighting operations** | Any work or activity directly associated with control of fire. |
| **Fire frequency** | A general term referring to the recurrence of fire in a given area over time (NWCG). Also see: Fire regime |
| **Fire front** | The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified, the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smouldering combustion. (NWCG) |
| **Fireground** | The area in the vicinity of a fire suppression operations, and the area immediately threatened by the fire. It includes burning and burnt areas; constructed and proposed fire lines; the area where firefighters, vehicles, machinery and equipment are located when deployed; roads and access points under traffic management control; tracks and facilities in the area surrounding the actual fire; and may extend to adjoining area directly threatened by the fire. |

| Term | Definition |
|---|---|
| **Fire hazard** | A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control. |
| **Fire intensity** | See: Fireline intensity. |
| **Fireline** | A natural or constructed barrier, or treated fire edge, used in fire suppression and prescribed burning to limit the spread of fire. |
| **Fireline intensity** | The rate of energy release per unit length of fire front usually expressed in kilowatts per metre (Kw/m). The rate of energy release per unit length of fire front, defined by the equation I=Hwr, where<br>I = fireline intensity (kW/m)<br>H = heat yield of fuel (kJ/kg)-16,000 kJ/kg w = dry weight of fuel consumed (kg/m2) (mean total less mean unburnt)<br>r = forward rate of spread (m/s)<br>The equation can be simplified to I = w r/2<br>where I = fireline intensity (kW/m)<br>w = dry weight of fuel consumed (tonnes/ha)<br>r = forward rate of spread (m/hr) |
| **Fire lookout** | A structure strategically located and manned to detect the occurrence and the location of fires. It may be a tower or a structure on a high point |
| **Fire management** | All activities associated with the management of fire prone land, including the use of fire to meet land management goals and objectives. |
| **Fire potential** | The chance of a fire or number of fires occurring of such size, complexity or impact that requires resources (both a pre-emptive management and suppression capability) from beyond the area of the fire origin. (BCRC) |
| **Fire preparedness** | All activities undertaken in advance of bushfire occurrence to decrease its extent and severity and to ensure more effective fire suppression. |
| **Fire prevention** | All activities concerned with minimising the incidence of bushfire particularly those of human origin. |
| **Fire regime** | The history of fire in a particular vegetation type or area including the frequency, intensity and season of burning. It may also include proposals for the use of fire in a given area. (AFAC) |
| **Fire report** | An official record of a fire, generally including information on cause, location, action taken, damage, costs, etc., from start of the fire until completion of suppression action. These reports vary in form and detail from agency to agency (NWCG). Also see Report of Fire |
| **Fire retardant** | A chemical generally mixed with water, designed to retard combustion by a chemical reaction. It is applied as slurry from the ground or air to fuels ahead of the fire. |
| **Fire risk** | Processes, occurrences or actions that increase the likelihood of fires occurring. |
| **Fire run** | A rapid advance of a fire front. It is characterised by a marked transition in intensity and rate of spread. |
| **Fire scar** | 1) A healing or healed-over injury caused or aggravated by fire on a woody plant.<br>2) A mark left on a landscape by fire. |
| **Fire season** | The period during which bushfires are likely to occur, spread and do sufficient damage to warrant organised fire control. |
| **Fire simulator** | A device that imposes simulated fire and smoke on a projected landscape scene, for the purpose of informing fire suppression personnel of potential fire situations either for an actual fire or hypothetical fire(s). |
| **Fire spread** | Development and travel of fire across surfaces. |

| Term | Definition |
|---|---|
| **Fire storm** | Violent convection caused by a large continuous area of intense bushfire often characterised by destructively violent surface indrafts, a towering convection column, long distance spotting, and sometimes by tornado-like whirlwinds. (AFAC) |
| **Fire suppressant** | An additive designed to reduce the surface tension of water and/or to hold water in suspension thus increasing water's efficiency as a fire extinguishing agent. Suppressants are applied directly to the burning fuels. |
| **Fire suppression** | The activities connected with restricting the spread of a fire following its detection and before making it safe. |
| **Fire suppression organisation** | 1. The personnel and equipment collectively assigned to the suppression of a specific fire or group of fires.<br>2. The personnel responsible for fire suppression within a specified area.<br>3. The management structure, usually shown in the form of an organization chart of the persons and groups having specific responsibilities in fire suppression. (NWCG) |
| **Fire suppression plan** | See Incident action plan (IAP). |
| **Fire tetrahedron** | An instructional aid in which the sides of the tetrahedron (comprising 4 triangular shaped figures) are used to represent the 4 components of combustion and flame production process-fuel, heat, oxygen and the chemical chain reaction. |
| **Fire threat** | The impact a fire will have on a community. |
| **Fire tower** | Tower strategically located and manned to detect and report the occurrence and location of fires. A type of Fire lookout |
| **Fire training simulator** | A training device that imposes simulated fire and smoke on a projected landscape scene, for the purpose of instructing fire suppression personnel in fire situations and fire suppression techniques. |
| **Fire triangle** | Diagrammatic expression of the three elements that are necessary for a fire to occur. FUEL – HEAT – OXYGEN. The removal of any one of these will extinguish a fire. |
| **Fire weather** | Weather conditions which influence fire ignition, behaviour, and suppression. (NWCG) |
| **Fire weather forecast** | A weather prediction specially prepared for use in wildland fire operations and prescribed fire. (NWCG) |
| **Fire whirl** | Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame. Fire whirls range in size from less than one foot to over 500 feet in diameter. Large fire whirls have the intensity of a small tornado. (NWCG) |
| **Fire wind** | The inflow of air close to a fire caused by the action of convection. It is not to be confused with a prevailing wind. |
| **First attack** | See: Initial attack |
| **Fixed wing aircraft** | A heavier than air aircraft which obtains lift for flight by forward motion of wings through the air. |
| **Flame angle** | The angle of the flame in relation to the ground, caused by wind direction or the effect of a slope. |
| **Flame depth** | The depth of the zone within which continuous flaming occurs behind the fire edge. |

| Term | Definition |
|---|---|
| **Flame height** | The average maximum vertical extension of flames at the leading edge of the fire front. Occasional flashes that rise above the general level of flames are not considered. This distance is less than the flame length if flames are tilted due to wind or slope. (NWCG) |
| **Flame length** | The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface), an indicator of fire intensity. (NWCG) |
| **Flame Zone** | The highest level of bushfire attack as a consequence of direct exposure to flames from the fire front in addition to heat flux and ember attack. (AS 3959 - 2009) |
| **Flame zone** | The area around fuels where the combustion of gases occurs to form flames. |
| **Flaming zone** | See: Flame zone. |
| **Flammability** | The ease with which a substance is set on fire. |
| **Flammable** | Capable of being ignited and of burning with a flame. |
| **Flank attack** | Obtaining control of a fire by attacking its side/s (flank). |
| **Flanks of a fire** | Those parts of a fire's perimeter that are roughly parallel to the main direction of spread. (NWCG) |
| **Flare up** | Any sudden acceleration of fire spread, or intensification of fire, or a part of the fire. A flare up is of relatively short duration and does not radically change existing control plans. (NWCG) |
| **Flash fire** | A fast moving fire consuming most of the fine fuels available. |
| **Foam** | Foam is a mass of bubbles formed by mixing air with water and a foam concentrate in specific proportions. It is used as a firefighting agent to form a smothering, cooling and/or ignition preventing layer of the surface over a fuel. |
| **Foam blanket** | A layer of foam which forms an insulating and reflective barrier to heat and is used for fuel protection, suppression, and mop-up. (NWCG) |
| **Foam Class A** | A mixture of foam concentrate & water specifically formulated for extinguishing bushfires. The foam is biodegradable, non toxic and is used at very low concentrates. It may be delivered aspirated or non-aspirated. (See also Foam solution). |
| **Foam Class B** | A foam formulated for application on Class B fires |
| **Foam concentrate** | The concentrated foaming agent as received from the manufacturer which, when added to water, creates a foam solution. |
| **Foam inductor** | Equipment consisting of an inlet connection, ejector pump and a discharge assembly, for the induction of foam concentrate. |
| **Foam solution** | The mixture of water and foam concentrate. |
| **Forest** | An area, incorporating all living and non-living components, that is dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding 2 metres and with existing or potential crown cover of overstorey strata about equal to or greater than 20 per cent. This definition includes Australia's diverse native forests, woodlands and plantations, regardless of age. |
| **Forest fire** | A fire burning mainly in forest and/or woodland. |
| **Forest type** | A category for describing a forest commonly based on the predominant tree species, tree form and structure. |

| Term | Definition |
|---|---|
| **Forward looking infrared (FLIR)** | Hand held or aircraft mounted device designed to detect heat differentials and display them. FLIRs have thermal resolution similar to IR line scanners, but their spatial resolution is substantially less; commonly used to detect hot spots and flare ups obscured by smoke, evaluate the effectiveness of firing operations, or detect areas needing mop-up. (NWCG) |
| **Forward rate of spread (FROS)** | The speed with which a head fire moves in a horizontal direction across the landscape. |
| **Frontal fire intensity** | See: Fireline Intensity |
| **Front end loader** | Earthmoving equipment designed to move loose earth and/or loads into vehicles. A multi-purpose bucket is fitted to articulated arms at the front of the vehicle. May be either wheeled or tracked. |
| **Fuel** | Any material such as grass, leaf litter and live vegetation which can be ignited and sustains a fire. Fuel is usually measured in tonnes per hectare.<br>Related Terms: Available fuel, Coarse fuel, Dead fuel, Elevated dead fuel, Fine fuel Ladder fuels, Surface fuels, and Total fine fuel. |
| **Fuel age** | The period of time lapsed since the fuel was last burnt. |
| **Fuel arrangement** | A general term referring to the spatial distribution and orientation of fuel particles or pieces. (NWCG) |
| **Fuel array** | The totality of fuels displayed in a location: fine and coarse, live and dead. (Vic report) |
| **Fuel assessment** | The estimation or calculation of total and available fuel present in a given area. |
| **Fuel bed depth** | Average height of surface fuels contained in the combustion zone of a spreading fire front. (NWCG) |
| **Fuelbreak** | A natural or manmade change in fuel characteristics which affects fire behaviour so that fires burning into them can be more readily controlled. |
| **Fuelbreak system** | A series of modified strips or blocks tied together to form continuous strategically located fuel breaks around land units. |
| **Fuel continuity** | The degree or extent of continuous or uninterrupted distribution of fuel particles in a fuel bed thus affecting a fire's ability to sustain combustion and spread. This applies to aerial fuels as well as surface fuels. |
| **Fuel depth** | The average distance from the bottom of the litter layer to the top of the layer of fuel, usually the surface fuel. |
| **Fuel load** | The oven dry weight of fuel per unit area. Commonly expressed as tonnes per hectare. (AFAC). (Also known as fuel loading) |
| **Fuel management** | Modification of fuels by prescribed burning, or other means. (AFAC) |
| **Fuel map** | A map showing areas of varying fuel quantities and types and usually indicates past fire history. |
| **Fuel model** | Simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified. (NWCG) |
| **Fuel modification** | Manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control (e.g., lopping, chipping, crushing, piling and burning).(NWCG) |
| **Fuel moisture content** | The water content of a fuel expressed as a percent of the oven dry weight of the fuel particle. (%ODW) |

| Term | Definition |
|---|---|
| **Fuel moisture differential** | A term used to describe the situation where the difference in the moisture content between fuels on adjacent areas results in noticeably different fire behaviour on each area. |
| **Fuel profile** | The vertical cross section of a fuel bed down to mineral earth. |
| **Fuel quantity** | See: Fuel load. |
| **Fuel reduction** | Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control. |
| **Fuel reduction burning** | The planned application of fire to reduce hazardous fuel quantities; undertaken in prescribed environmental conditions within defined boundaries. |
| **Fuel separation** | The action of separating fuel for the purpose of providing a mineral earth firebreak. Also means the actual gap between fuel layers or particles eg gap between individual hummock grasses or gap between surface and canopy fuels |
| **Fuel type** | An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause predictable rate of spread or difficulty of control under specified weather conditions. (AFAC) |
| **Fuel weight** | See Fuel load. |
| **General origin area** | The larger area where the fire started that is readily identifiable based on macro scale indicators and witness statements. (NWCG) |
| **Going fire** | Any bushfire which is expanding and suppression actions have not yet contained the fire. |
| **Grass fire** | Any fire in which the predominant fuel is grass or grass like. (NWCG) |
| **Grassland curing** | The proportion of dead material in grasslands – usually increases over summer as tillers die off and dry out, increasing the risk of grassland fire. |
| **Grid ignition** | A method of lighting prescribed fires where ignition points are set individually at a predetermined spacing through an area. |
| **Ground crew** | See: Hand crew. |
| **Ground fire** | Fire that consumes the organic material beneath the surface litter ground, such as a peat fire. (NWCG) |
| **Ground fuel** | All combustible materials below the surface litter, including duff, roots, peat and saw dust dumps that normally support a glowing or smouldering combustion without flame. |
| **Habitat** | The local environment of conditions in which an animal or plant lives. |
| **Hand crew** | A fire suppression crew trained and equipped to fight fire with hand tools. |
| **Hand line** | A fireline constructed with hand tools. (NWCG) (Wildfire context) |
| **Hand trail** | See Hand line. |
| **Hang up** | A situation in which a tree is lodged in another and prevents it from falling to the ground. |
| **Hazard** | A source of potential harm or a situation with potential to cause loss. |
| **Hazard reduction** | See: Fuel Management |
| **Head** | See: Head Fire |
| **Head attack** | Directly knocking down the head of a fire. Recommended only for low intensity fires where firefighters can be sure that the fire will not flare up unexpectedly. |
| **Head fire** | The part of a fire where the rate of spread, flame height and intensity are greatest, usually when burning downwind or upslope. |

| Term | Definition |
|---|---|
| **Heat exhaustion** | A form of shock, due to depletion of body fluids resulting from overexposure to a hot environment. |
| **Heat stress** | Illness caused by the body overheating. |
| **Heat stroke** | A life-threatening condition that develops when the body's temperature-regulating and cooling mechanisms are overwhelmed and body systems begin to fail. |
| **Heat transfer** | The transfer of thermal energy from one physical system to another by conduction, convection or thermal radiation. |
| **Heavy fuels** | See: Coarse fuels. |
| **Heel** | See: Rear (Preferred term). |
| **Heel fire** | See: Backing Fire. |
| **Helibase (HB)** | A location for parking, refuelling and maintenance of helicopters operating in support of an incident. |
| **Helicopter** | A form of heavier-than-air, rotor-wing aircraft whose lift is produced by engine-driven rotors which behave as if they were both propellers and wings. |
| **Helipad (HP)** | A designated location which meets specific requirements for a helicopter to take off and land. |
| **Helitack crew** | An initial attack crew specially trained in the tactical and logistical use of helicopters for fire suppression. |
| **Heli-torch** | An aerial ignition device hung from or mounted on a helicopter to disperse ignited lumps of gelled gasoline. Used for backburns, burnouts, or prescribed burns. (NWCG) |
| **High fire danger** | The second lowest fire danger rating as determined by fire agencies and generally with a Forest fire danger index between 25 and 49 or a Grassland fire danger index between 25 and 49. |
| **High intensity fire** | Fires with an average intensity greater than 3000 $kW.m^{-1}$ and flame heights greater than 3 m, causing complete crown scorch or possibly crown fires in forests. Uncontrollable by direct attack. The term is also applied to stationary fires burning in very high fuel loads (such as logging slash). |
| **Hold over fire** | See: Sleeper |
| **Hop over** | See: Breakaway. |
| **Hose bandage** | A means of affecting a temporary repair to a canvas or synthetic hose. |
| **Hose strangler** | A crimping device for stopping the flow of water in a hose. |
| **Hot Refueller** | A trained person responsible for the operation of the equipment for the 'hot' refuelling of helicopters. |
| **Hot spot** | 1. A particularly active part of a fire.<br>2. An area of smouldering fuels requiring to be extinguished during patrol operations. |
| **Humus** | Layer of decomposed organic matter on the forest floor beneath the fermentation layer and directly above the soil. It is that part of the duff in which decomposition has rendered vegetation unrecognizable and mixing of soil and organic matter is underway. See Also: Duff & Litter |
| **Hygrometer** | An Instrument which measures the humidity in the air. |
| **Ignition** | The beginning of flame production or smouldering combustion; the starting of a fire. |

| Term | Definition |
|---|---|
| **Ignition pattern** | The manner in which a prescribed burn, backburn, or burnout is set, determined by weather, fuel, ignition system, topographic and other factors having an influence on fire behaviour and the objective of the burn. |
| **Ignition source** | A source of energy sufficient to initiate combustion. |
| **Incendiary** | A burning compound or metal used to produce intense heat or flame, like a bomb. |
| **Incendiary device** | Device designed and used to start a fire. |
| **Incident** | Any unplanned event requiring emergency intervention. (AIIMS) |
| **Incident Action Plan (IAP)** | The plan used to describe the incident objectives, strategies, resources and other information relevant to the control of an incident. (AIIMS) |
| **Incident control** | See: Incident management |
| **Incident Control Centre (ICC)** | The location where the Incident Controller and various members of the Incident Management Team provide overall direction of response activities. (See also Incident Control Point) |
| **Incident Controller** | The individual responsible for the management of all incident control activities across a whole incident (AIIMS) |
| **Incident Control Point (ICP)** | The location where the Incident Controller and, where established, members of the Incident Management Team provide overall direction of response activities in an emergency situation. (See also Incident Control Centre) |
| **Incident control system (ICS)** | A command structure to systematically and logically manage suppression of emergency incidents including bushfires, from small, simple incidents to large, difficult or multiple situations. It is designed to develop in modular fashion from the top (Incident Controller) downwards. Refer NIMS, AIIMS, CIMS |
| **Incident management** | The process of controlling the incident and coordinating resources. (EMA) |
| **Incident Management Team (IMT)** | The group of incident management personnel comprising the Incident Controller, and the personnel he or she appoints to be responsible for the functions of Operations, Planning and Logistics. (AIIMS) |
| **Incident objective** | An incident objective is a goal statement indicating the desired outcome of the incident. Incident objectives guide the development of the Incident Action Plan and must reflect the policies and needs of the control authority and supporting agencies. All factors affecting the incident and its potential impact must be considered before determining the objective. (AIIMS) |
| **Incident strategies** | The incident strategies will be developed from the incident objectives and will describe how the Incident Management Team plans to resolve the incident. There is a requirement for strategies to be developed throughout the incident and they should be reviewed for each operational period. (AIIMS) |
| **Indirect attack** | A method of suppression in which the control line is located some considerable distance away from the fire's active edge. Generally done in the case of a fast-spreading or high-intensity fire and to utilize natural or constructed firebreaks or fuelbreaks and favourable breaks in the topography. The intervening fuel is usually backburnt; but occasionally the main fire is allowed to burn to the line, depending on conditions.(NWCG) |
| **Induced wind** | See: Fire wind. |
| **Infrared scanning** | Use of an optical-electronic system for identifying or obtaining imagery of thermal infrared radiation to detect non-smoking fires or fire perimeters through smoke. |
| **Initial attack** | The first suppression work on a fire. |

| Term | Definition |
|---|---|
| **Instability** | The tendency for air parcels to accelerate when they are displaced from their original position; especially, the tendency to accelerate upward after being lifted. Instability is a prerequisite for severe weather - the greater the instability, the greater the potential for severe thunderstorms. (Weather Zone) |
| **Interface** | See: Urban Rural interface. |
| **Inversion** | A layer of the atmosphere in which temperature increases with increasing elevation. A condition of strong atmospheric stability. |
| **Island** | An unburnt area within a fire perimeter. |
| **Isobar** | Lines on weather maps joining places which have the same air pressure.(BOM) |
| **I zone** | See: Urban Rural interface. |
| **Jump fire** | See: Spot fire |
| **Jump over** | See: Breakaway |
| **Junction zone** | An area of greatly increased fire intensity caused by two fire fronts (or flanks) burning towards one another. |
| **Keetch-Byram Drought Index (KBDI)** | A numerical value reflecting the dryness of soils, deep forest litter, logs and living vegetation, and expressed as a scale from 0 - 200 where the number represents the amounts of rainfall (mm) to return the soil to saturation. |
| **Knock down** | To reduce the flame or heat on the more vigorously burning parts of a fire edge. (NWCG) |
| **Ladder fuels** | Fuels that provide vertical continuity between strata. Fire is able to carry surface fuels into the crowns of trees with relative ease. |
| **Lag time** | The time delay in fuel moisture content responding to changing environmental conditions (for example, relative humidity). Technically, it is the time necessary for a fuel particle to lose approximately 63% of the difference between its initial moisture content and its equilibrium moisture content. |
| **Lead agency** | The organisation with the legislative or agreed authority for control of an incident. |
| **Lee (leeward)** | Away from the wind, on the sheltered side of something that the wind is blowing on. |
| **Legislation** | A set of rules made by a State, Territory or Federal Government; includes acts and regulation. |
| **Light fuel** | An assessment of fuel quantity indicating a low weight. |
| **Lighting pattern** | See: Ignition pattern. |
| **Lightning** | The flash of light accompanying a sudden electrical discharge which takes place from or inside a cloud, or less often from high structures or the ground or from mountains. A large electrical spark. Caused when the negative charge in the lower part of the cloud and the positive charge in the upper part of the cloud become so great that they can overcome the natural resistance of the air and discharge between negative and positive takes place. (BOM) |
| **Lightning fire** | A fire caused by lightning. |
| **Lightning formation** | See: Lightning. |
| **Light patrol unit** | See: Tanker. |
| **Line ignition** | See: Strip burning. |

| Term | Definition |
|---|---|
| **Litter** | The top layer of the forest floor composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves and needles, little altered in structure by decomposition. (The litter layer of the forest floor). (NWCG) |
| **Litter bed fuel** | Dead fine fuel, including surface fuel and fuel lower in the fuel profile. |
| **Litter fall** | The addition of litter that falls from vegetation to the forest floor. |
| **Living fuels** | Fuels made up of living vegetation. |
| **Living shrub fuel** | Living understorey fine fuel less than 2 metres above ground level. |
| **Local winds** | Winds which are generated over a comparatively small area by local terrain and weather. They differ from those which would be appropriate to the general pressure pattern. (NWCG) |
| **Log** | Documentation of information and actions arising during an incident |
| **Logistics** | The provision of facilities, services and materials in support of an incident. |
| **Lookout** | 1. A person designated to detect and report fires from a fixed vantage point.<br>2. A member of a fire crew designated to observe the fire and warn the crew when there is danger.<br>3. For structure see: Fire lookout |
| **Lookout tower** | See: Fire tower. |
| **Low intensity fire** | A fire which travels slowly and only burns lower storey vegetation, like grass and lower tree branches, with an average intensity of less than 500 $kW.m^{-1}$ and flame height less than 1.5m. Usually causes little or no crown scorch and is easily controlled. |
| **Low-moderate fire danger** | The lowest fire danger rating as determined by fire agencies and generally with a Forest fire danger index less than 12 or a Grassland fire danger index less than 12. |
| **Medium fuels** | See Course fuels. |
| **Mineral earth** | When used in the context of fire control refers to a non-flammable surface (either natural or prepared) which provides a break in understorey, litter and humus fuels and hence a barrier (of varied effectiveness depending, amongst other things, on its width and the intensity of the approaching fire) to fire travelling on or near the ground surface. |
| **Mobilisation** | The processes and procedures for organisations to activate, assemble, and transport the requested resources to an incident. |
| **Moisture content** | See Fuel moisture content. |
| **Mopping up** | See Blacking out |
| **Mosaic** | Used in reference to the spatial arrangement of burnt and unburnt fuels at either a local or a landscape scale. |
| **Move up method** | See: Step-up method |
| **Multi-agency response** | The response to an incident where one or more agencies assist the jurisdictional control agency or agencies. |
| **Multiple fire situation** | A circumstance of high fire incidence over short periods of time in any administrative unit, usually overtaxing the normal initial attack capability of the unit. |
| **Natural barrier** | Any area where lack of flammable material obstructs the spread of vegetation fires. |

| Term | Definition |
|---|---|
| **Near surface fuel** | Live and dead fuel, including suspended leaves, bark or twigs, effectively in touch with the ground but not lying on it, with a mixture of vertical and horizontal orientation. |
| **Needle bed** | A fuel bed consisting mainly of pine needles. |
| **Nozzle** | A fitting that is used with a branch to control the size, pattern and/or velocity of water or extinguishing medium being discharged. |
| **One lick method** | A progressive system of building a fireline on a wildfire without changing relative positions in the line. Each worker does one to several "licks", or strokes removing a set proportion of the fuel on the line, with a given tool and then moves forward a specified distance to make room for the worker behind. (NWCG) |
| **Operations** | The direction, supervision and implementation of tactics in accordance with the Incident Action Plan. |
| **Operations point** | The location from which the overall field operations are commanded by the Operations Officer. (AIIMS) |
| **Parallel attack** | Method of fire suppression in which fireline is constructed approximately parallel to, and just far enough from the fire edge to enable workers and equipment to work effectively, though the fireline may be shortened by cutting across unburned bays. The intervening strip of unburned fuel is normally burned out as the control line proceeds but may be allowed to burn out unassisted where this occurs without undue delay or threat to the fireline. (NWCG) |
| **Parallel fire suppression** | See: Parallel attack. |
| **Parallel method** | See: Parallel attack. |
| **Parts of a Fire** | See: Bay(s), Fingers, Flanks of a fire, Head. |
| **Patch burning** | Burning in patches to prepare sites for group planting or sowing or to form a barrier to subsequent fires. (NWCG) |
| **Patrol** | 1. To travel over a given route to prevent, detect, and suppress fires. Includes interaction with the public for wildland fire prevention and educational purposes.<br>2. To go back and forth vigilantly over a length of control line during and/or after construction to prevent breakaways, suppress spot fires, and extinguish overlooked hot spots.<br>3. A person or group of persons who carry out patrol actions. (NWCG) |
| **Peat** | An amorphous organic material formed by anaerobic decomposition which usually means that the area is seasonally or permanently inundated with water. Peat fires burn by smouldering combustion and generate very high amounts of energy per unit area. |
| **Perimeter** | See: Fire perimeter. |
| **Peri urban interface** | See: Urban rural interface. |
| **Permit burn** | A burn carried out under permit from a Fire Authority. |
| **Personal protection equipment (PPE)** | The equipment and clothing designed to mitigate the risk of injury from the chemical, physical and thermal hazards that may be encountered at an incident. |
| **Personal protective clothing (PPC)** | The clothing designed to mitigate the risk of injury from the chemical, physical and thermal hazards that may be encountered at an incident. |
| **Plan of attack** | See: Incident Action Plan (Preferred term) |
| **Planned burning** | See: Prescribed burning. |
| **Pocket** | See: Island. |

| Term | Definition |
|---|---|
| **Point of attack** | The part of the fire on which work is started when suppression forces arrive. |
| **Point of origin** | The specific location where the fire started. |
| **Portable dam** | A temporary water storage used in conjunction with power pumps and hose lines. |
| **Predicted rate of spread** | The rate of spread predicted by the application of fire spread models utilising appropriate inputs of fuel conditions, topography and weather. Also see Rate of Spread. |
| **Pre-incident plan** | Advanced planning and preparation for an emergency situation. |
| **Pre-suppression plan** | See Pre-Incident Plan |
| **Prepared community** | A community that has developed effective emergency management arrangements at the local level, resulting in:<br>• An alert, informed and active community that supports its voluntary organizations<br>• An active and involved local government<br>• Agreed and coordinated arrangements from prevention, preparedness, response and recovery. |
| **Preparedness** | All activities undertaken in advance of the occurrence of an incident to decrease the impact, extent and severity of the incident and to ensure more effective response activities. |
| **Pre-planned dispatch** | The pre-planned dispatch of designated suppression forces to fires in predetermined zones. It is usually dependent on the location of the fire, and the forecast fire danger. |
| **Prescribed burn** | A fire utilised for Prescribed burning. |
| **Prescribed burn plan** | See: Burn plan. |
| **Prescribed burning** | The controlled application of fire under specified environmental conditions to a predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives. |
| **Prescribed fire** | Any fire ignited by management actions to meet specific objectives. A written, approved burn plan must exist, and approving agency requirements (where applicable) must be met, prior to ignition. |
| **Prescription** | A written statement defining the objectives to be attained during prescribed burning. |
| **Prevention** | All activities concerned with minimising the occurrence of incidents, particularly those of human origin. |
| **Profile litter moisture content** | The moisture content, expressed as a percentage of oven-dry weight, of the entire leaf litter bed above the mineral soil surface. |
| **Profile moisture content** | See Fuel moisture content. |
| **Psychrometer** | The general name for instruments designed for determining the relative humidity of the air. A psychrometer consists of wet and dry bulb thermometers, generally with the aid of psychrometric tables or a psychrometric slide rule. (BOM) |
| **Pulaski tool** | A combination chopping and trenching tool widely used in fireline construction, which combines a single-bitted axe blade with a narrow adze-like trenching blade fitted to a straight handle. (NWCG) |
| **Pumper** | A firefighting vehicle equipped with a large capacity pump, water tank and hose. Generally intended to be operated when stationary, from reticulated or static water supplies. |

| Term | Definition |
|---|---|
| **Quick-fill pump** | A high volume water pump used for filling tankers. |
| **Rain gauge** | The general name for instruments designed to measure the amount of rain that has fallen. |
| **Rakehoe (McLeod tool)** | A hand tool used for bushfire fighting, consisting of a combination of a heavy rake and hoe. |
| **Rate of spread (ROS)** | The speed with which a fire moves in a horizontal direction across the landscape at a specified part of the fire perimeter. See also Forward rate of spread. |
| **Reaction time** | The time taken between the report of a fire or incident, and the departure of the crew. See also Response time. |
| **Rear** | 1. That portion of a fire spreading directly into the wind or down slope.<br>2. That portion of a fire edge opposite the head.<br>3. Slowest spreading portion of a fire edge. Also called heel of a fire. (NWCG) |
| **Reburn** | Repeat burning of an area over which a fire has previously passed, but left fuel that later ignites when burning conditions are more favourable. (NWCG) |
| **Reconnaissance** | To examine a fire area to obtain information about current and probable fire behaviour and other related fire suppression information. (NWCG) |
| **Recovery** | The coordinated process of supporting emergency affected communities in reconstruction of the physical infrastructure and restoration of emotional, social, economic and physical wellbeing. |
| **Red Flag Warning** | A process for passing critical safety information to incident suppression resources and support resources on which they can base decisions regarding strategy, tactics and deployment. |
| **Regeneration burn** | A burn lit under prescribed conditions for the purpose of achieving regeneration of a particular vegetation type. |
| **Re-ignition** | The action of a material that ignites again after it has been extinguished. |
| **Relative humidity (RH)** | The amount of water vapour in a given volume of air, expressed as a percentage of the maximum amount of water vapour the air can hold at that temperature. |
| **Relay pumping** | Using a series of pumps positioned at intervals along a line or lines of hose to share the workload of pumping water over a long distance. |
| **Relief** | The replacement of personnel whose period of time at the incident has concluded. |
| **Report of fire** | The notification of the detection of a fire to the fire service. (AFAC) |
| **Residence time** | The time required for the flaming zone of a fire to pass a stationary point; the width of the flaming zone divided by the rate of spread of the fire. |
| **Resources** | All personnel and equipment available, or potentially available, for incident tasks. |
| **Response** | Actions taken in anticipation of, during, and immediately after an incident to ensure that its effects are minimised, and that people affected are given immediate relief and support. |
| **Response time** | The time taken between the report of a fire or incident, and arrival at the scene. It includes both reaction time and travel time. |
| **Responsible authority** | See: Control authority. |
| **Retardant** | See: Fire retardant. |

| Term | Definition |
|---|---|
| **Risk** | The exposure to the possibility of such things as economic or financial loss or gain, physical damage, injury or delay, as a consequence of pursuing a particular course of action. The concept of risk has two elements, i.e. the likelihood of something happening and the consequences if it happens. (AS4360) |
| **Risk analysis** | A systematic use of available information to determine how often specific events may occur and the magnitude of their likely consequences. |
| **Road Management Point** | A strategic position from which traffic can be observed and controlled. (See also Traffic Management Point and Vehicle Control Point) |
| **Rural** | Any area wherein residences and other developments are scattered and intermingled with forest, range, or farm land and native vegetation or cultivated crops. |
| **Rural urban interface (RUI)** | See Urban rural interface |
| **Safe** | The stage of bushfire suppression or prescribed burning when it is considered that no further suppression action or patrols are necessary. |
| **Safety zone** | An area cleared of flammable materials used for escape if the line is outflanked or in case a spot fire outside the control line renders the line unsafe. In fire operations, crews progress so as to maintain a safety zone close at hand, allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuelbreaks. They are greatly enlarged areas which can be used with relative safety by fire fighters and their equipment in the event of a blow up in the vicinity. (Vic report) |
| **Scorch height** | 1. The height above ground level up to which foliage has been browned by a fire.<br>2. A measurement for determining the acceptable height of flame during prescribed burning. |
| **Scout** | A person who checks and reports on conditions in the fire area. |
| **Scrub** | Refers to vegetation such as heath, wiregrass and shrubs, which grows either as an understorey or by itself in the absence of a tree canopy. |
| **Scrub fire** | Fires burning in scrub. |
| **Secondary fire control line** | See: Fall back fire control line. |
| **Sector** | A specific area of an incident which is under the control of a Sector Commander who is supervising a number of crews. |
| **Seen area** | The ground, or vegetation, that is directly visible from an established or proposed lookout point, or aerial detection flight route. |
| **Severe fire danger** | The third highest fire danger rating as determined by fire agencies and generally with a Forest fire danger index between 50 and 74 or a Grassland fire danger index between 50 and 74. |
| **Shift** | The period resources are allocated during an operation at the incident or on the fireground. |
| **Shift change** | Replacement of allocated crews and or equipment during operations. |
| **Situation report**<br>**(Sitrep)** | A report on the progress of the fire and the efforts to control it. It confirms the location of the fire, its status and potential and the number, nature and effectiveness of resources deployed. Situation reports are normally provided at regular times until the fire is declared safe. |
| **Size up** | The evaluation of a fire to determine a course of action for suppression. |
| **Slash** | Accumulated fuel resulting from such natural events as wind, fire, snow breakage, or from such human activities as logging, cutting or road construction. |

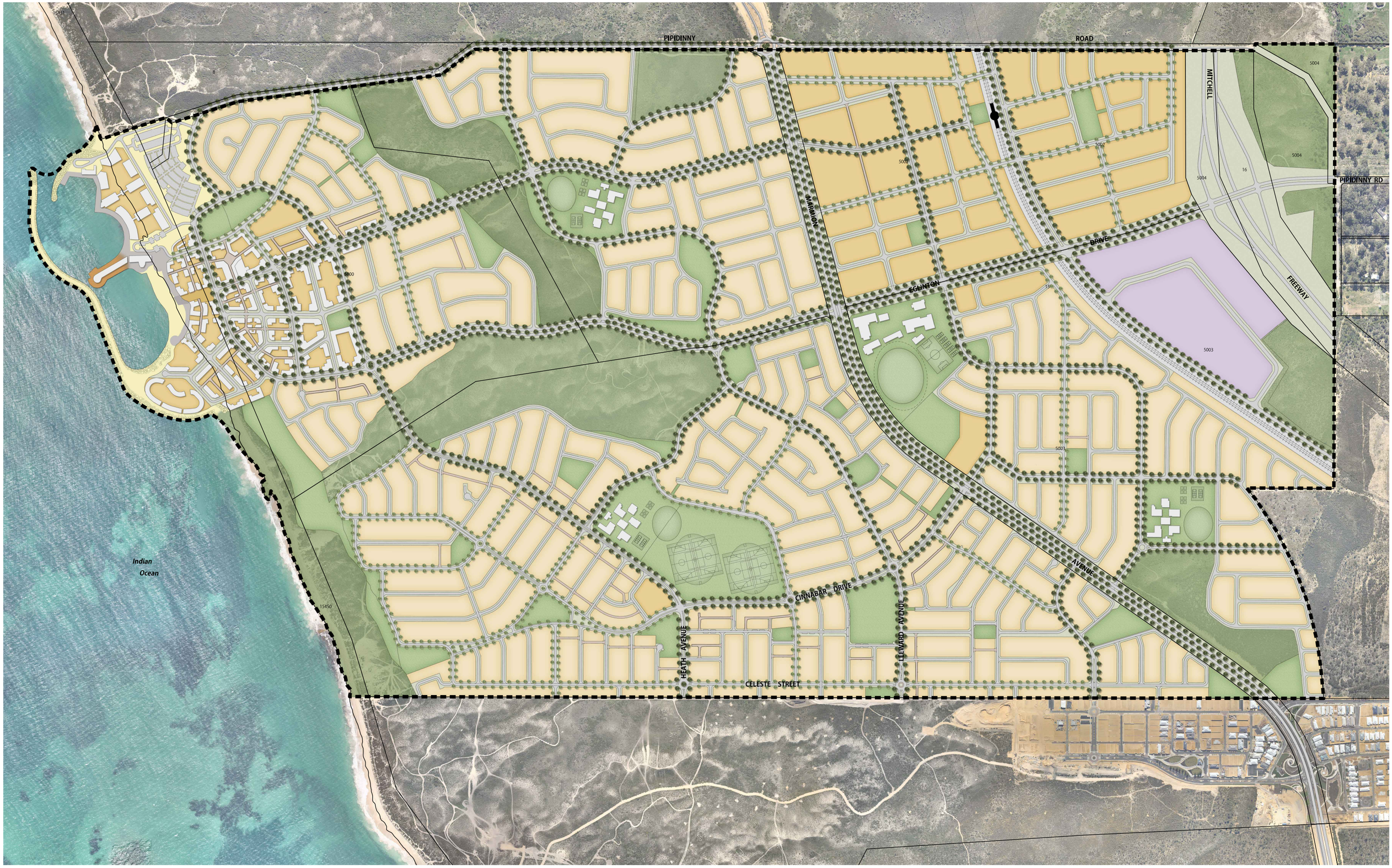
| Term | Definition |
|---|---|
| **Slash burn** | A prescribed burn conducted to consume slash for fire hazard reduction or silvicultural purposes. |
| **Sleeper** | 1. A fire that starts up again after appearing to have been extinguished.<br>2. A fire that is detected some time after an ignition opportunity (usually from lightning or hop over events). |
| **Slip-on unit** | A tank, a live hose reel or tray, a small capacity pump, and an engine combined into a single one-piece assembly that can be slipped onto a truck bed or trailer and used for spraying water and/or foam on bushfires. |
| **Slop over** | See: Breakaway |
| **Smoke management** | Used by land managers and meteorologists planning a prescribed burn, to ensure that smoke does not cause problems downwind of the burn. |
| **Smoke Plume** | The column of smoke that rises from a fire. (See also Convection Column) |
| **Smoker** | An isolated small burning item such as a log, stump or tree, in an area of fire otherwise mopped up. |
| **Softwood** | A conventional term used to describe a tree, and the timber of trees, belonging to the group of plants with cones, such as pine and cypress. |
| **Soil Dryness Index (SDI)** | A form of Drought Index, usually with slightly more detailed inputs than the Keetch-Byram Drought Index. May be on a scale of 0-200 like the KBDI, but some versions have different scales (for example, Western Australia: 0-2000). |
| **Southern Oscillation Index (SOI)** | The comparison of surface air pressure differences between Tahiti and Darwin that shows a strong correlation with rainfall. |
| **Spark arrestor** | A device fitted to the exhaust system of machinery for trapping carbon sparks. |
| **Spot fire** | 1. Isolated fire started ahead of the main fire by sparks, embers or other ignited material, sometimes to a distance of several kilometres.<br>2. A very small fire that requires little time or effort to extinguish. |
| **Spot ignition** | An ignition pattern using a series of spaced points of ignition. |
| **Spot over** | See: Breakaway |
| **Spotting** | Behaviour of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire. (NWCG) |
| **Staging area** | An area where resources are mustered and prepared for allocation to an incident. It may include the provision of welfare and equipment maintenance facilities. (AIIMS) |
| **Stand by** | The period during which personnel are to be immediately available at home or other location for fire suppression purposes. |
| **Static water supply** | A supply of water in a reservoir or pond, of limited capacity. |
| **Step-up method** | A method used by a team of firefighters to construct a firebreak in which each firefighter completely constructs a section of the firebreak after which the entire team ‘steps up’ to the next section. |
| **Strike teams** | A set number of resources of the same type that have an established minimum number of personnel. Strike Teams always have a leader (usually in a separate vehicle), and have a common communications system. Strike Teams are usually made up of five resources of the same type such as: vehicles, crews, earth moving machinery, etc (AIIMS). |

| Term | Definition |
|---|---|
| **Strip burning** | 1. An ignition pattern using lines of continuous fire.<br>2. In hazard reduction, burning narrow strips of fuel and leaving the rest of the area untreated by fire. (NWCG) |
| **Strip ignition** | See: Strip burning. |
| **Stripping** | See: Strip burning. |
| **Structure** | A constructed object, usually a free-standing building above ground. |
| **Sub surface fire** | See: Ground fire |
| **Sub surface fuel** | See: Ground fuel |
| **Suction hose** | Hose used to draught from static/open water. It has a hard, usually reinforced, exterior to prevent it collapsing when a partial vacuum exists within the hose. |
| **Supply hose** | Hose feeding from a water supply to a pump. |
| **Support agency** | An organisation contributing services or resources directly to a lead agency. |
| **Surface fire** | Fire that burns loose debris on the surface, which includes dead branches, leaves, and low vegetation. (NWCG) |
| **Surface fuel** | Litter fuels made up of leaves, twigs, bark and other fine fuel lying on the ground, predominately horizontal in orientation. |
| **Surface moisture content** | The moisture content expressed as a percentage of oven dry weight of the top 5-10 mm of leaf litter. |
| **Tactics** | These are the tasking of personnel and resources to implement the incident strategies. Incident control tactics are accomplished in accordance with appropriate agency procedures and safety directives. (AIIMS) |
| **Tail fire** | See: Backing fire. |
| **Tanker** | A mobile firefighting vehicle equipped with a water tank, pump, and the necessary equipment for spraying water and/or foam on bushfires. |
| **Task force** | A combination of resources assembled for a specific purpose. Task Force always have a leader (usually in a separate vehicle), and have a common communications system. Task Forces are established to meet tactical needs and may incorporate a mixture of different resources types. (AIIMS) |
| **Task group** | A large or complex combination of resources assembled for a specific purpose including intrastate, interstate and international deployments made up of multiple strike teams or task forces and or other response or support resources in any combination. |
| **Technical advisors** | Are advisors with special skills needed to support incident activities/functions.(AIIMS) |
| **Temperature (dry bulb)** | The ambient air temperature recorded by an exposed thermometer. |
| **Temperature (wet bulb)** | Wet bulb temperature is measured by placing a moist, single-layer, muslin sleeve over the bulb of a dry bulb thermometer. The difference between dry and wet bulb readings is used to determine relative humidity and dewpoint values. |
| **Test fire** | A controlled fire ignited to evaluate fire behaviour. |
| **Thermal imagery** | A display or print out from an infra-red scanning device. |
| **Thermal radiation** | The process by which the surface of an object radiates its thermal energy in the form of electromagnetic radiation. |

| Term | Definition |
|---|---|
| **Thermohygrograph** | An instrument that simultaneously and continuously measures and records temperature and relative humidity, normally by tracing each onto a revolving chart. Charts can be either for one day or one week of continuous recording. |
| **Time lag** | See: Lag time |
| **Tongues** | See: Fingers |
| **Topography** | The surface features of a particular area or region. It may include mountains, rivers, populated areas, roads and railways and fuel types. |
| **Torch** | See: Candle |
| **Torching** | See: Candle |
| **Traffic Management Point** | Point along movement routes that are staffed by emergency personnel to direct and control traffic flow. (See also Road Management Point and Vehicle Control Point) |
| **Travel time** | The time taken between the departure of a crew, and arrival at the incident. See also Response time. |
| **Under storey** | The lowest stratum of a multi-storeyed forest. |
| **Upwind** | Towards the wind direction. In the same direction as the direction from which the wind is blowing. The opposite direction to that smoke will travel. |
| **Urban** | Area in which residences and other human developments form an essentially contiguous covering of the landscape, includes most area within cities & towns, subdivisions, commercial and industrial parks, and similar development whether inside city limits or not. |
| **Urban interface** | See Urban rural interface |
| **Urban rural interface (URI)** | The line, area, or zone where structures and other human development adjoin or overlap with undeveloped bushland. |
| **Values at risk** | The natural resources or improvements that may be jeopardised if a fire occurs. |
| **Vehicle Control Point** | A point on a vehicle access route controlled by a barrier, or similar means, at which a vehicle is required to stop. (See also Road Management Point and Traffic Management Point) |
| **Very high fire danger** | The forth highest fire danger rating as determined by fire agencies and generally with a Forest fire danger index between 25 and 49 or a Grassland fire danger index between 25 and 49. |
| **Warning device** | Audible devise fitted to fire bombing aircraft to alert ground crews of pending drop. |
| **Water bombing** | See: Fire bombing. |
| **Water point** | Any natural or constructed supply of water that is readily available for fire control operations. |
| **Water tank** | A container capable of storing a large volume of water. |
| **Wetting agent** | A chemical added in low concentration to water. It is used in firefighting to break down the surface tension of the water and to improve its penetration into fuels. |
| **Widow maker** | See: Hang up |
| **Wilderness Area** | Places where wilderness quality defined using thresholds of remoteness, naturalness and total area is recognised and valued by society. |
| **Wildfire** | See: Bushfire. |
| **Wildfire control plan** | See: Incident Action Plan |

| Term | Definition |
|---|---|
| **Wildland urban interface (WUI)** | See: Urban rural interface |
| **Wind direction** | The direction from which the wind blows. |
| **Windfall** | See: Wind throw |
| **Wind throw** | An area of previously standing timber which has been blown over by strong winds or storms. |
| **Wind speed** | The rate of horizontal motion of the air past a given point expressed in terms of distance per unit of time. In the NZ Fire Danger Rating System, wind speed is measured at the standard height of 10 metres in the open, averaged over a 10-minute interval and in kilometres per hour. |
| **Wind strength** | Generally measured as wind speed. May be measured by the Beaufort wind scale. |
| **Windrow** | A long line of piled slash or debris resulting from forest or scrub clearing. |
| **Windrow burning** | The burning of windrows. |
| **Windward** | Towards the wind. You are windward if the wind is blowing on your face. |
| **Woodland** | A subset of forest plant communities in which the trees form only an open canopy (between 20% and 50% crown cover), the intervening area being occupied by lower vegetation, usually grass or scrub. |

# Appendix 8
# Proposed Amended Master Plan




# MASTER PLAN

Eglinton

Scale: 1:5000@A1
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