

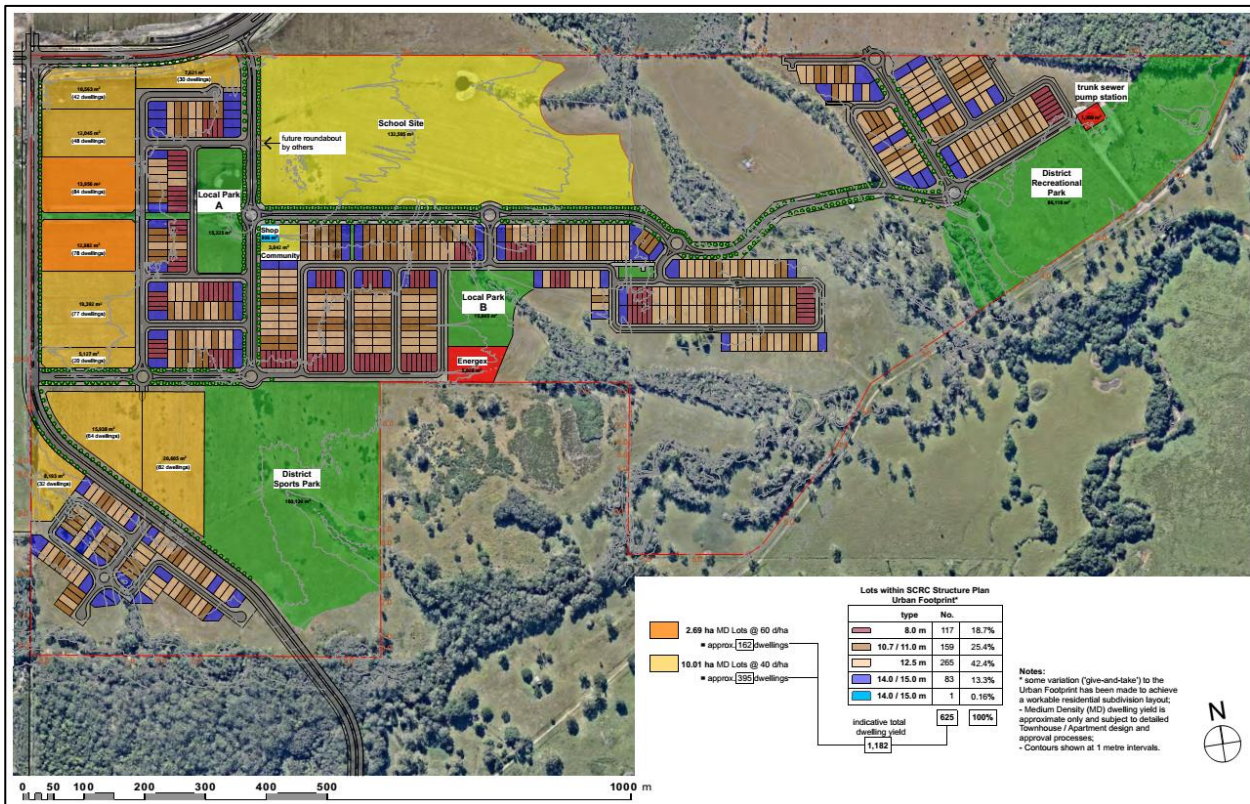
# **BUSHFIRE HAZARD ASSESSMENT AND MANAGEMENT PLAN v1**

## **AREA C OF THE PALMVIEW MASTER PLANNED AREA**

**LOT 346 ON SP287465**

**LAXTON ROAD**

**PALMVIEW**



**FOR  
PEET LIMITED  
JULY 2018**

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## DOCUMENT CONTROL


**Project Number:** J000240

**Client:** Peet Limited

**Document:** Bushfire Hazard Assessment and Management Plan

**Site:** Lot 346 on SP287465  
Area C of the Palmview Master Planned Area under the Palmview Structure Plan  
Laxton Road, Palmview

**File Location:** E:\CLIENTS\PEET - PALMVIEW AREA C\02\_BHAMP

Version	Date	Distribution	Author/s	Approved
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# **1 INTRODUCTION**

## **1.1 Background**

This Bushfire Hazard Assessment and Management Plan has been prepared to assess the degree of potential bushfire hazard acting on, and to prescribe bushfire risk minimisation strategies for, Area C of the Palmview Master Planned Area, formally described as Lot 346 on SP287465, located at Laxton Road, Palmview (referenced hereafter as 'the site').

The report was requested as a condition of the Preliminary Approval granted by Sunshine Coast Council for a material change of use of premises to which sections 242 and 899 of the Sustainable Planning Act 2009 apply to vary the effect of the planning scheme for Area C of the Palmview Master Planned Area under the Palmview Structure Plan (SCC Ref: MCU17/0106).

Condition 22 of the Approved Negotiated Decision Notice states that 'Subsequent to the approval of this preliminary approval and as part of the Local Area Development (Neighbourhood) Plan(s), the applicant must submit a Fire Management Plan which must include the following:

- (a) a plan relating to the whole of the land the subject of this Preliminary Approval;
- (b) a statement of the land the subject of this Preliminary Approval's context within the broader area, particularly in relation to potential off-site sources of increased fire hazard;
- (c) the location and severity of potential bushfire hazard which must have been identified by undertaking a site-based assessment based on the following:
  - (i) detailed data collected at the local level;
  - (ii) factors such as vegetation type, slope, aspect, and fire history (if available);
  - (iii) considering and assessing on-and-off site hazard implications of and for the development, including those posed by any nearby bushland;
  - (iv) future land uses and ecosystem rehabilitation objectives;
- (d) recommended remedial measures including specific features of the development design such as land use type, vehicular access, lot layout and house site location, proposed fire-fighting infrastructure such as water supply and fire maintenance trails, recommended standard of building construction, clearing and landscaping and advice to new residents;
- (e) a clear statement of any impact of the chosen mitigation measures on the environmental values of Area C and the measures taken to avoid or minimise this impact; and
- (f) a statement of the anticipated future bushfire hazard for the land the subject of this Preliminary Approval that might arise as part of revegetation objectives, by allowing for the provision for future assessment in accordance with paragraph C'.

This Bushfire Hazard Assessment and Management Plan therefore represents the applicants response to Condition 22.

## 1.2 The Sunshine Coast Planning Scheme 2014 Bushfire Hazard Overlay Map

The Sunshine Coast Council's Bushfire Hazard Overlay Map depicts the presence of a Medium Bushfire Hazard Area and associated Buffer impacting portions of the northern and southern extents of the site (refer to Plate 1).

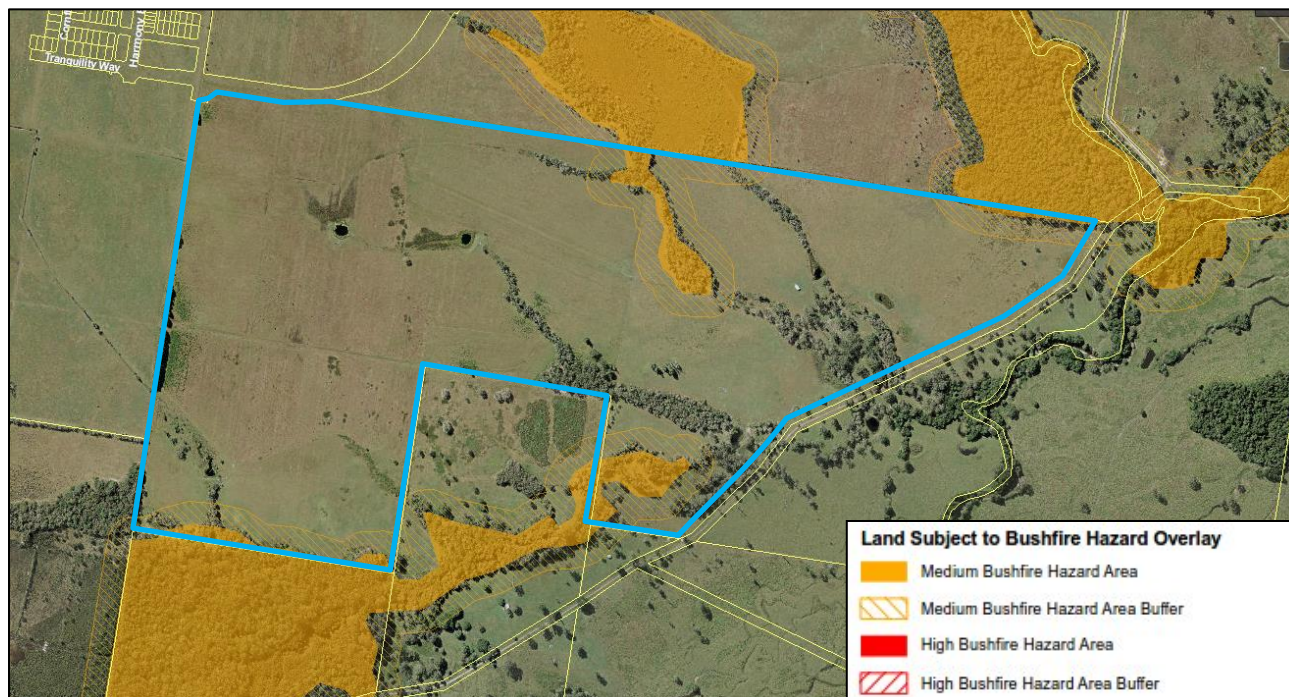


Plate 1 – Bushfire Hazard Overlay Areas

## 1.3 State Planning Policy Assessment Benchmark Mapping

The site is mapped on the State Planning Policy (SPP) Interactive Mapping System's Bushfire Prone Area mapping as containing a High and Medium Potential Bushfire Intensity Area and associated Potential Impact Buffer areas (refer to Plate 2).

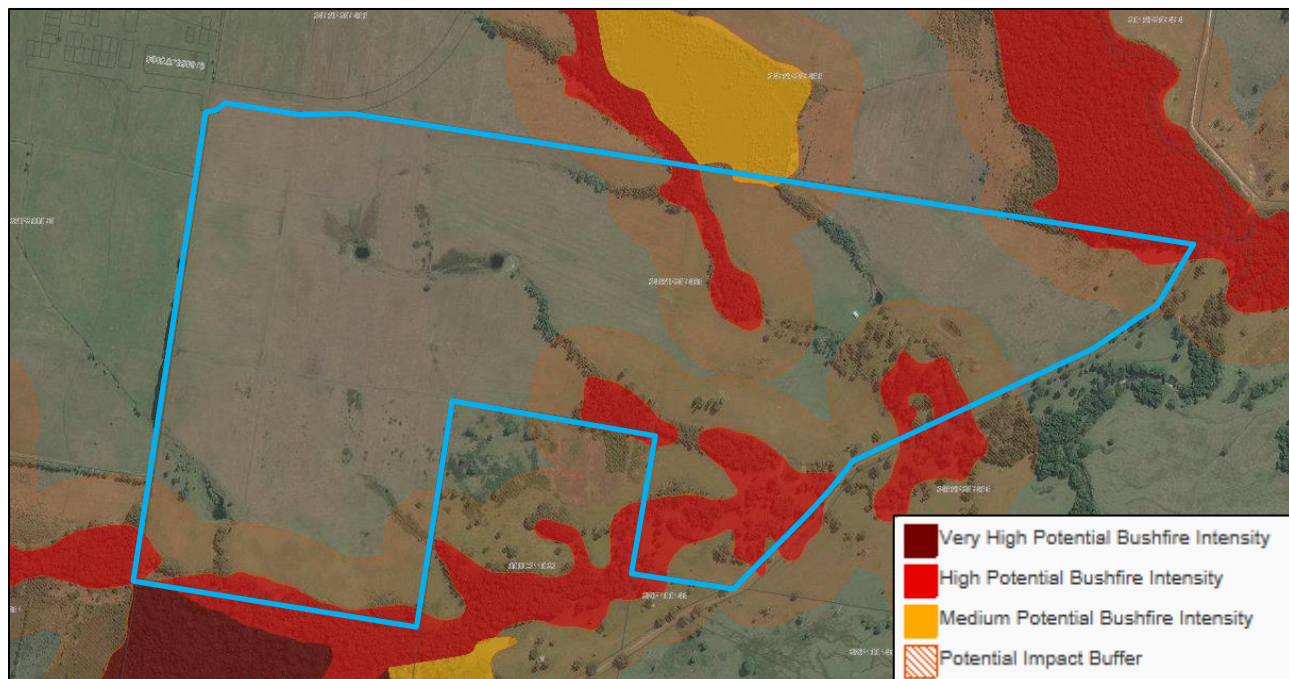


Plate 2 – SPP Bushfire Prone Area Mapping

The SPP mapping captures additional bushfire prone areas on the site compared to that shown on the Sunshine Coast Council's Bushfire Hazard Overlay Map. Under Chapter 2, Part 1, Section 8,

Item 4(a) of the *Planning Act 2016*, where there is an inconsistency between a State Planning Policy and local government planning instrument, the State Planning Policy applies over the local planning instrument. Therefore, the SPP Bushfire Prone Area mapping prevails as the most current hazard mapping and with respect to the trigger for assessment under Council's Bushfire Hazard Overlay Code.

#### 1.4 Development Proposal

Area C of the Palmview Master Planned Area will be developed in line with the Palmview Structure Plan vision which intends that the site will ultimately accommodate 1,190 new dwellings, a local activity centre, educational establishment as well as district recreation and sports parks and environmental open space. Area C has 17% of the land use entitlements of the overall Palmview Structure Plan Area which includes Harmony (Area A) and the Area B land holdings.

Development in Palmview is intended to contribute to the creation of a high-quality lifestyle with a diversity of housing choices available to meet all life stages and affordability. Development in Palmview is also intended to provide for the protection and enhancement of waterways, wetlands, bushland and the Mooloolah River floodplain such that a network of green open space is established providing an attractive setting for neighbourhoods. The intent of the development is to provide a variety of residential housing types and lot sizes that aim to satisfy consumer choice, housing affordability, population growth and sustainable urban development corridors.

The Indicative Master Plan for Area C has been prepared by Innovative Planning Solutions and is attached as Appendix 1 to this report.

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## 2 Site Description

### 2.1 General

The site comprises an area of approximately 128 hectares which has been historically utilised for cattle grazing and other agricultural pursuits and is therefore largely devoid of woody vegetation. Isolated patches of regrowth vegetation occur within the site extents and are commonly associated with drainage lines. Riparian vegetation associated with Sippy Creek abuts the north-eastern boundary with open Eucalypt forest located adjacent to the sites south-western boundary.

Plate 3 depicts the site's position in the landscape and the extent of pre-existing development. It is noted the land parcels to the west and north of the site are to be developed for Areas A and B respectively of the Palmview Structure Plan Area.

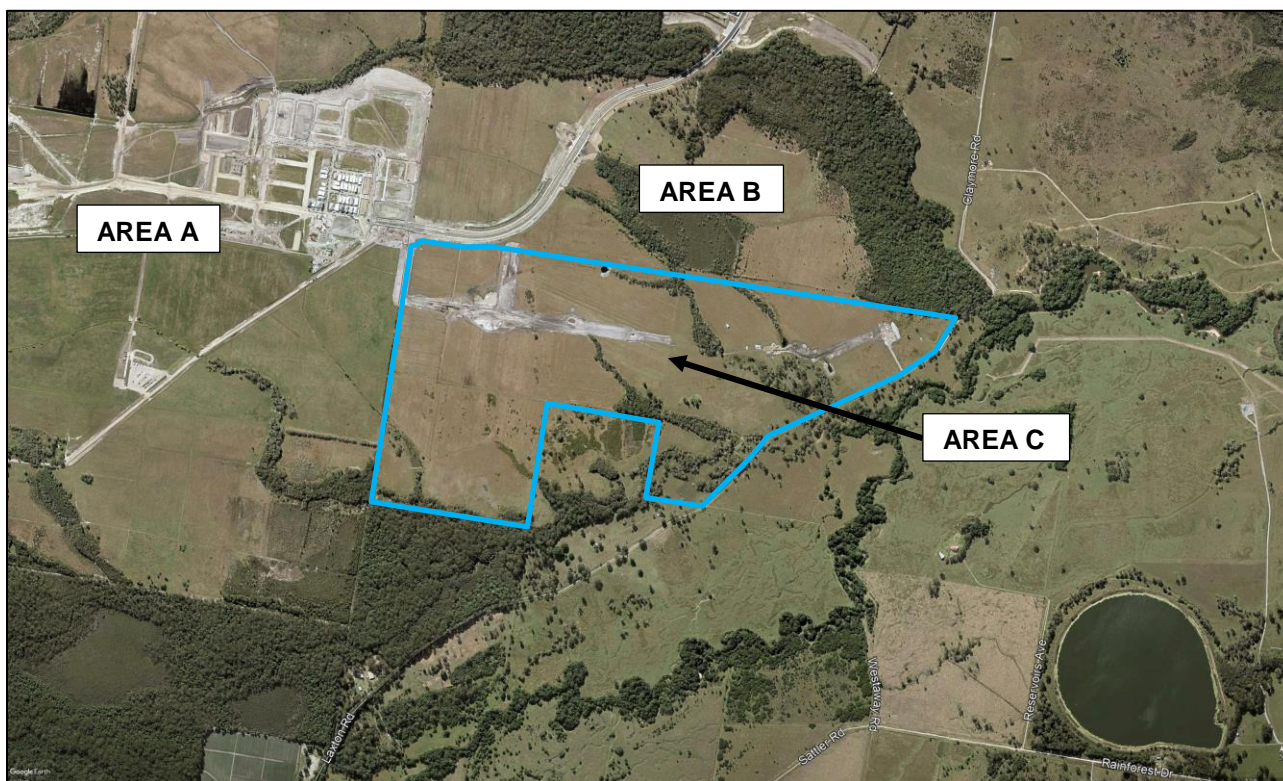


Plate 3 – Site Context (Source: Google Earth)

### 2.2 Topography

The site and immediately surrounding landscape features predominantly flat (0 - <5° slope) and low-lying land (2 - 10m AHD) positioned on the Mooloolah River alluvial floodplain. Several ephemeral drainage lines occur within low-lying areas of the site and Sippy Creek traverses adjacent to the sites north-eastern boundary. Plate 4 depicts topography conditions within and adjacent to the site.

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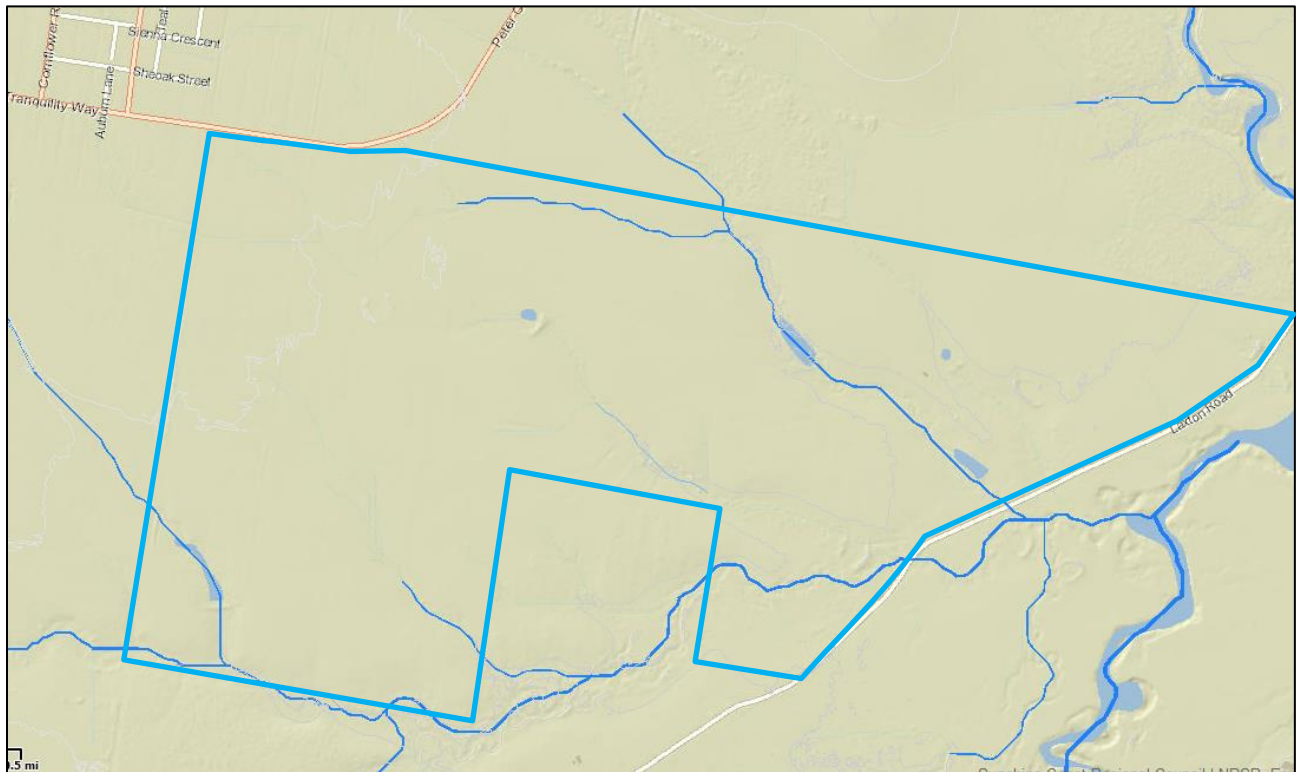


Plate 4 – Site Topography (Source: SCC Mymaps)

## 2.3 Vegetation

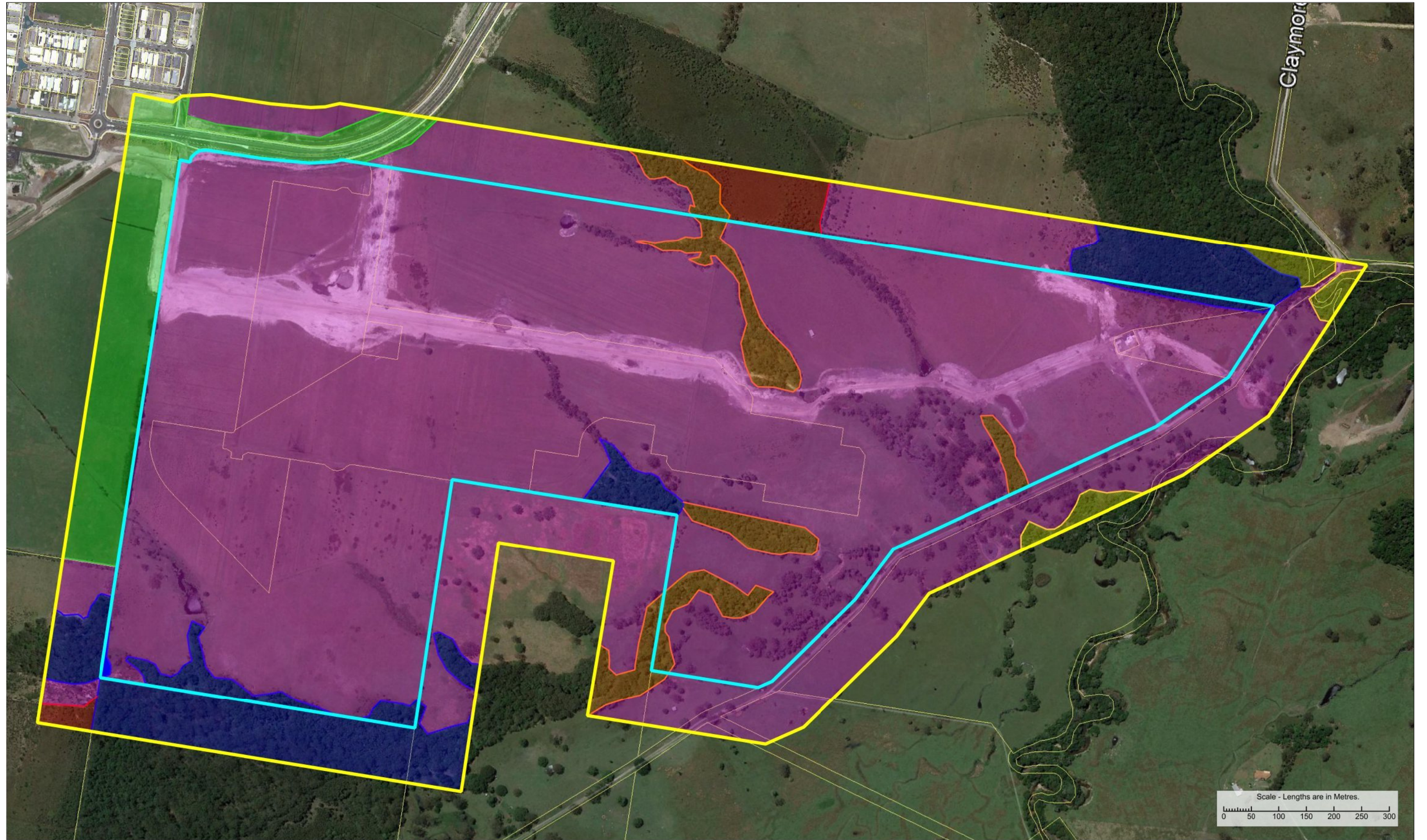
The following vegetation hazard classes (classified in accordance with Leonard *et al.* (2014)) were identified within the site and within 100m of the site:

- Vegetation Hazard Class 1 – Melaleuca Communities;
- Vegetation Hazard Class 2 – Open forest/woodlands – shrubby;
- Vegetation Hazard Class 4 – Heath Communities;
- Vegetation Hazard Class 12 – Mixture of rural classes – mainly grassland;
- Vegetation Hazard Class 16 – Mixture of urban classes; and
- Vegetation Hazard Class 17 - Rainforest

The vegetation characteristics of each vegetation hazard class are described in the following sections, while Figure 1 depicts the distribution of observed vegetation communities within the site and within 100m of the site.

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KEY	
<span style="border: 1px solid cyan; display: inline-block; width: 10px; height: 10px;"></span> ASSESSMENT SITE	<span style="display: inline-block; width: 10px; height: 10px; background-color: red;"></span> VHC 4 - HEATH COMMUNITIES
<span style="border: 1px solid yellow; display: inline-block; width: 10px; height: 10px;"></span> 100M BUFFER TO SITE	<span style="display: inline-block; width: 10px; height: 10px; background-color: magenta;"></span> VHC 12 - MIXTURE OF RURAL CLASSES
<span style="display: inline-block; width: 10px; height: 10px; background-color: green;"></span> VHC 1 - MELALEUCA COMMUNITIES	<span style="display: inline-block; width: 10px; height: 10px; background-color: blue;"></span> VHC 16 - MIXTURE OF URBAN CLASSES
<span style="display: inline-block; width: 10px; height: 10px; background-color: blue;"></span> VHC 2 - OPEN FOREST/WOODLAND - SHRUBBY	<span style="display: inline-block; width: 10px; height: 10px; background-color: yellow;"></span> VHC 17 - RAINFOREST



### 2.3.1 Vegetation Hazard Class 1 – Melaleuca Communities

Vegetation Hazard Class 1 (VHC 1) is present as several small units which flank drainage lines throughout the assessment area. The canopy layer within VHC 1 has attained an average height of 16m and is dominated by *Melaleuca quinquenervia* (broad-leaved paperbark) with *Eucalyptus tereticornis* (Queensland blue gum), *E. robusta* (swamp mahogany) and *Lophostemon suaveolens* (swamp box) also present. The mid-storey is generally dominated by juvenile *M. quinquenervia* with areas of localised *M. sieberi* dominance to the south of the site. The understorey is characterised by a dense association of sedges, *Blechnum indicum* (bungwahl fern) and *Lomandra longifolia* (mat rush). VHC 1 was observed to be generally consistent with the description for Regional Ecosystem (RE) 12.3.5 which is described as *Melaleuca quinquenervia* open forest on coastal alluvium. VHC 1 generally occurs within the assessment area as advanced regrowth rather than mature remnant vegetation.

Plate 5 depicts typical conditions within VHC 1 which has a potential fuel load of 33 t/ha (Leonard *et al.*, 2014).



Plate 5 – Characteristic vegetation within VHC 1

### 2.3.2 Vegetation Hazard Class 2 – Open forest/woodlands – shrubby

The majority of Vegetation Hazard Class 2 (VHC 2) was observed within the Sippy Creek riparian corridor to the north-east of the site and within the freehold allotment adjoining the south-western extent of the site. Only small and isolated units of VHC 2 were observed within the site. VHC 2 was observed to consist of a mixed open Eucalypt forest with areas of localised canopy species dominance reflecting the geological and topographic variations of the underlying landform. Dominant canopy species include *Eucalyptus pilularis* (blackbutt), *Syncarpia glomulifera* (turpentine), *E. racemosa* (scribbly gum) and *E. tindaliae* (Tindale's stringybark). *Corymbia intermedia* (pink bloodwood) and *C. gummifera* (red bloodwood) were present as sub-dominant canopy species. The average canopy height within VHC 2 is 26m. The midstorey is sparse to mid-dense and dominated by Acacia species, *Baeckea frutescens* (weeping Baeckea) and juvenile canopy trees. The understorey of the offsite units of VHC 2 was dominated by a dense association of native shrub species including *Acacia complanata* (flat-stemmed wattle), *Banksia spinulosa* (golden candles), *Leptospermum spp.* and sedges such as *Caustis blakei* (fox tail sedge). The understorey of the onsite units of VHC 2 is disturbed by livestock and generally dominated by sparse grasses and low shrubs. Plate 6 depicts typical conditions within VHC 2 which has a potential fuel load of 30 t/ha (Leonard *et al.*, 2014).





Plate 6 – Characteristic vegetation within VHC 2

### 2.3.3 Vegetation Hazard Class 4 – Heath communities

Vegetation Hazard Class 4 (VHC 4) is restricted to two small units; one adjacent to the site's northern boundary and the other adjacent to the south-west corner of the site. VHC 4 was observed to exhibit a low canopy height of approximately 1m with occasional *M. quinquenervia* emergents to a height of 6m. The community is characterised by a dense association of shrubs, ferns, grasses, sedges and herb species. Dominant species include *Melaleuca thymifolia* (thyme honey myrtle), *Banksia robur* (swamp Banksia), *Xanthorrhoea fulva* (wallum grasstree), *Hakea actites* (wallum Hakea), *Leptospermum* spp. and *Baeckea frutescens* (weeping Baeckea). VHC 4 was observed to be generally consistent with the description for RE 12.3.13 which is described as closed heathland on seasonally waterlogged alluvial plains.

Plate 7 depicts typical conditions within VHC 4 which has a potential fuel load of 27 t/ha (Leonard *et al.*, 2014).



Plate 7 – Characteristic vegetation within VHC 4

### 2.3.4 Vegetation Hazard Class 12 – Mixture of rural classes – mainly grassland

Vegetation Hazard Class 12 (VHC 12) is the dominant Vegetation Hazard Class within the assessment area and is characterised by unmanaged pasture grasslands with low density woody vegetation (including mature *E. tereticornis* individuals and sparse regrowth of *M. quinquenervia*). This vegetation hazard class is host to low and discontinuous fuel loads, however, where left unmanaged, is prone to grassfires. Plate 8 depicts typical conditions within VHC 12 which has a potential fuel load of 5 t/ha (Leonard *et al.*, 2014).





Plate 8 – Characteristic vegetation within VHC 12

### 2.3.5 Vegetation Hazard Class 16 – Mixture of urban classes

Vegetation Hazard Class 16 (VHC 16) includes all non-vegetated and sparsely vegetated areas with discontinuous fuel loads that are characterised by built infrastructure, regularly mown grass areas, landscaped gardens and areas of low density woody vegetation. Plate 9 depicts typical conditions within VHC 16 which has a potential fuel load of 3 t/ha (Leonard *et al.*, 2014).



Plate 9 – Characteristic vegetation within VHC 16

### 2.3.6 Vegetation Hazard Class 17 – Rainforest

Vegetation Hazard Class 17 (VHC 17) is restricted to two small units; one adjacent to the site's northern-eastern boundary flanking Sippy Creek, and another other adjacent to the eastern site boundary flanking the Mooloolah River. VHC 17 was observed to exhibit an average canopy height of approximately 24m with a typical riparian vine forest community characterised by canopy species such as *Waterhousea floribunda* (weeping lily pily), *Livistona australis* (cabbage tree palm) and *Cryptocarya* species over a generally sparse understorey. VHC 17 was observed to be generally consistent with the description for RE 12.3.1 which is described as gallery rainforest (notophyll vine forest) on alluvial plains.

Plate 10 depicts typical conditions within VHC 17 which has a potential fuel load of 1 t/ha (Leonard *et al.*, 2014).





Plate 10 – Characteristic vegetation within VHC 17

## 2.4 Off-site Vegetation

Vegetation units synonymous with VHC 2 – Open forest/woodlands – shrubby are present to the north-east and south-east of the site. These offsite vegetation units were observed to host high fuel loads typically associated with open Eucalypt forests. An approximately 11ha vegetation unit containing VHC 1 (Melaleuca communities) and VHC 4 (heath communities) is located adjacent to the centre of the northern boundary. The Palmview Area A residential development is located to the north-west of the site and exhibits very low fuel loads. The remaining landscape surrounding the site has predominantly been cleared for agricultural land uses and exhibits open pasture land with scattered woody vegetation containing discontinuous fuel loads. Plate 11 depicts the extent of vegetated areas and hence potential forest fire pathways onto the site.

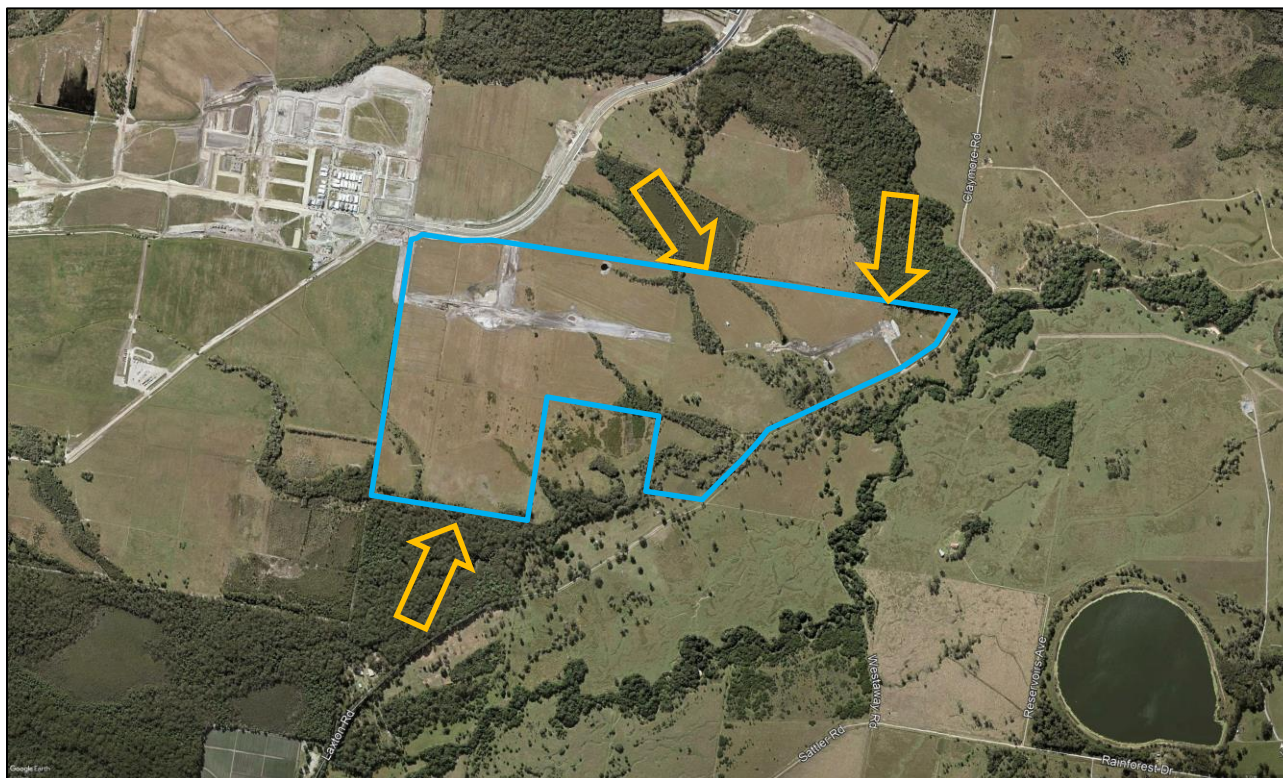


Plate 11 – Available direct forest fire pathways (Image source: Google Earth)

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### 3 HAZARD ASSESSMENT

#### 3.1 Hazard Assessment Methodology

The SCC Planning Scheme Policy for the Bushfire Hazard Overlay Code requires that a site-specific bushfire hazard assessment be prepared to assess the degree of bushfire hazard on a site captured within a mapped Designated Bushfire Hazard Area. The SPP Bushfire Prone Area mapping prevails over the SCC Bushfire Hazard Area mapping with respect to the currency of the methodology adopted to prepare the bushfire hazard area mapping and therefore prevails as the trigger for assessment under the SCC Planning Scheme Policy for the Bushfire Hazard Overlay Code. Therefore, the site-specific hazard mapping required by the Bushfire Hazard Overlay Code is to be prepared consistent with the methodology adopted to prepare the SPP mapping.

The method used to prepare the SPP mapping is described in *A new methodology for State-wide mapping of bushfire prone areas in Queensland* (Leonard *et al.*, 2014) which is also referenced in the Department of Infrastructure, Local Government and Planning's *State Planning Policy – Natural Hazards, Risk and Resilience – Technical Manual – A 'fit for purpose' approach in undertaking natural hazard studies and risk assessments*. The preparation of site specific hazard maps is described in these documents and is referenced as a Local Hazard Area Map. Preparation of a Local Hazard Area Map has been undertaken using a combination of methodologies from the following sources:

- A new methodology for State-wide mapping of bushfire prone areas in Queensland (Leonard *et al.*, 2014) for:
  - Prescription of Vegetation Hazard Classes;
  - Calculation of Potential Bushfire Intensity; and
  - Patch and corridor filtering.
- State Planning Policy Guideline – Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (2003) which was used as a guide for undertaking natural hazard assessment on a site-specific scale; and
- SCC's Planning Scheme Policy for the Bushfire Hazard Overlay Code (2014).

#### 3.2 Local Hazard Area Map

A Local Hazard Area Map was prepared by adopting the following methodology:

- Categorizing the vegetation within the site in accordance with the vegetation hazard classes derived from Leonard *et al.* (2014);
- Subdividing the identified vegetation hazard classes into bushfire hazard sub-units based on slope differences and vegetation hazard classes. All upslope and across slope vegetation units are allocated an underlying slope of 0 degrees as per methodology prescribed within the *State Planning Policy Guideline – Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* (2003);
- Using the patch and corridor filtering process identified in Leonard *et al.* (2014) to amend the bushfire hazard sub-units<sup>1</sup>; and
- Application of 100m Potential intensity buffers to the amended sub-units to derive an overall

<sup>1</sup> The patch and corridor filtering process to remove or downgrade hazard levels of small patches and narrow corridors involves the following three stages:

- Merging small patches of a single Vegetation Hazard Class less than 0.5 ha;
- Merging small Vegetation Hazard Class patches between 0.5 and 1 ha with higher or moderate fuel loads (greater than 8 tonnes/ha); and
- Removing narrow corridors of vegetation less than 100m wide through a process of patch erosion and dilation. These small patches are merged with surrounding vegetation by allocating a patch to the Vegetation Hazard Class that is most common to the patch boundary (Leonard *et al.*, 2014).



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### Local Hazard Area Map.

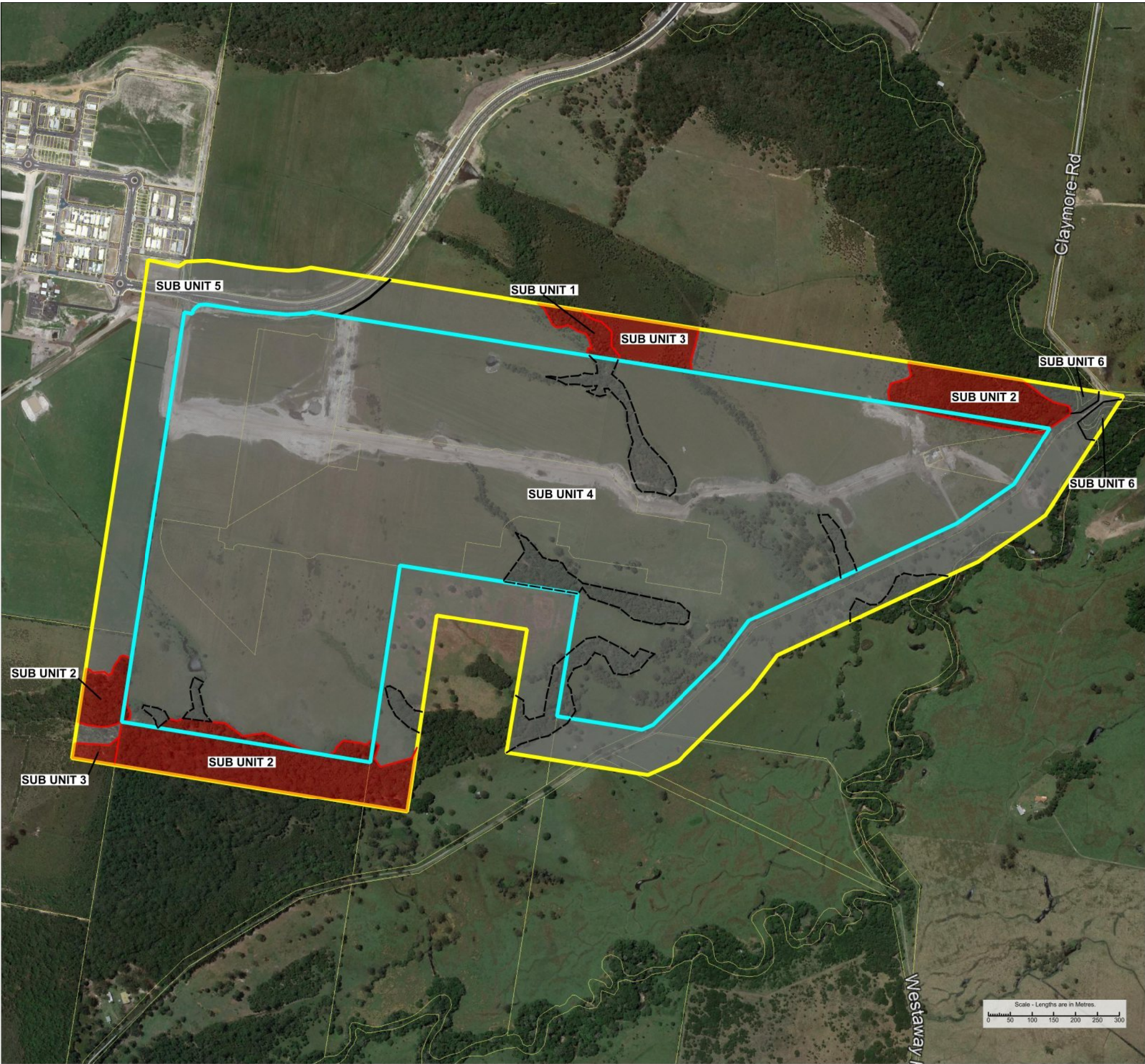
The sub-unit level Local Hazard Area Map is presented in Figure 2 with the overall Local Hazard Area Map presented in Figure 3. The Figure 3 Local Hazard Area Map identifies the following Potential Bushfire Intensity areas within the assessment area:

- High Potential Bushfire Intensity area; and
- Potential Impact Buffer.

The site scale Bushfire Intensity Area mapping presented in Figure 3 is to supersede the broadscale SPP mapping attributed to the site and is to be used to guide formulation of appropriate site-based hazard reduction measures.

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State Planning Policy – Natural Hazards, Risk and Resilience – Localised Bushfire Hazard Area Map

Assessment Methodology Undertaken in accordance with methodology detailed in the State Planning Policy – State Interest Technical Manual Natural Hazards, Risk and Resilience (2016).

\* From: Leonard, J., Newnham, G., Opie, K., and Blanchi, R. (2014) A new methodology for state-wide mapping of bushfire prone areas in Queensland. CSIRO, Australia.

Sub Unit 1

Vegetation Hazard Class	Potential Fuel Load (t/ha)	Fire Weather Severity (FFDI)	Maximum Landscape Slope (degrees)	Potential Fireline Intensity (kw/m) *	Potential Bushfire Intensity*
VHC 1 – Melaleuca Communities	33	50	0	33,759	High

Sub Unit 2

Vegetation Hazard Class	Potential Fuel Load (t/ha)	Fire Weather Severity (FFDI)	Maximum Landscape Slope (degrees)	Potential Fireline Intensity (kw/m) *	Potential Bushfire Intensity*
VHC 2 – Open forest/woodland – shrubby	30	50	0	27,900	High

Sub Unit 3

Vegetation Hazard Class	Potential Fuel Load (t/ha)	Fire Weather Severity (FFDI)	Maximum Landscape Slope (degrees)	Potential Fireline Intensity (kw/m) *	Potential Bushfire Intensity*
VHC 4 – Heath Communities	27	50	0	22,599	High

Sub Unit 4

Vegetation Hazard Class	Potential Fuel Load (t/ha)	Fire Weather Severity (FFDI)	Maximum Landscape Slope (degrees)	Potential Fireline Intensity (kw/m) *	Potential Bushfire Intensity*
VHC 12 – Mixture of rural classes – mainly grasslands	5	50	0	n/a	Grassfire prone/Low

Sub Unit 5

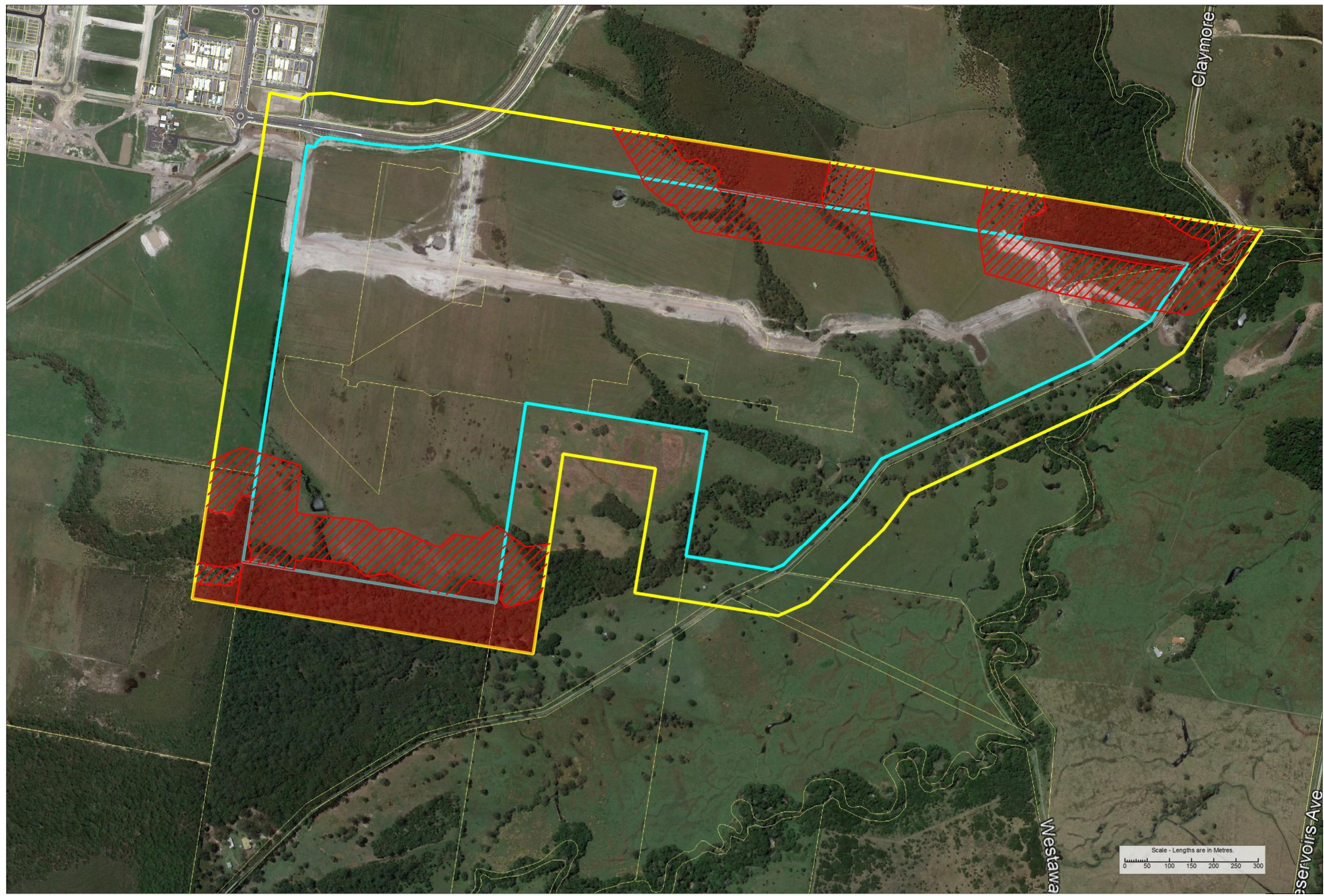
Vegetation Hazard Class	Potential Fuel Load (t/ha)	Fire Weather Severity (FFDI)	Maximum Landscape Slope (degrees)	Potential Fireline Intensity (kw/m) *	Potential Bushfire Intensity*
VHC 16 – Mixture of urban classes	3	50	0	n/a	Low

Sub Unit 6

Vegetation Hazard Class	Potential Fuel Load (t/ha)	Fire Weather Severity (FFDI)	Maximum Landscape Slope (degrees)	Potential Fireline Intensity (kw/m) *	Potential Bushfire Intensity*
VHC 17 - Rainforest	3	50	0	n/a	Low

- KEY**
- ASSESSMENT SITE
  - 100M BUFFER TO SITE
  - HIGH POTENTIAL BUSHFIRE INTENSITY AREA
  - LOW POTENTIAL BUSHFIRE INTENSITY AREA
  - SUB UNIT REMOVED VIA PATCH/CORRIDOR FILTERING





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### 3.3 Quantitative Modelling

Quantitative modelling of the potential bushfire conditions that may be experienced within the hazardous vegetation identified on Figure 3 has been undertaken to assist in quantifying the potential severity of impact to the proposed development. The models used comprise industry standard bushfire equations which have been built into the FLAMESOL computer model. FLAMESOL allows numerous input variables to be adjusted including fuel loads, fire danger index, site slope and distance to vegetation. FLAMESOL uses the following algorithms:

- Rate of Spread – McArthur (1973) and Nobel *et al.* (1980)
- Flame Length – NSW Rural Fire Service (2001) and Nobel *et al.* (1980)
- Elevation of Receiver – Douglas and Tan (2005)
- Flame Angle – Douglas and Tan (2005)
- Radian Heat Flux – Drysdale (1999), Sullivan *et al.* (2003) and Douglas and Tan (2005)

Fuel load inputs have been drawn from Leonard *et al.* (2014) based on the calculated potential fuel loads for VHC 1 (Melaleuca Communities), VHC 2 (Open forest/woodland – shrubby) and VHC 4 (Heath communities) which have been identified as the dominant hazardous vegetation units acting on the site. The output results are shown in Plates 12-14.



 <p>Calculated July 6, 2018, 8:47 am (BALc v.4.8)</p>			
Bushfire Attack Level calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	50	Rate of spread	0.89 km/h
Vegetation classification	Woodland	Flame length	9.8 m
Surface fuel load	15 t/ha	Flame angle	1 °
Overall fuel load	33 t/ha	Panel height	0.17 m
Vegetation height	n/a	Elevation of receiver	0.08 m
Effective slope	0 °	Fire intensity	15,345 kW/m
Site slope	0 °	Transmissivity	1
Distance to vegetation	0 m	Viewfactor	1
Flame width	100 m		
Windspeed	n/a		
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Plate 12 – FLAMESOL Modelling for VHC 1 Melaleuca Communities

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Calculated July 6, 2018, 8:49 am (BALc v.4.8)

Bushfire Attack Level calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	50	Rate of spread	1.5 km/h
Vegetation classification	Forest	Flame length	13.35 m
Surface fuel load	25 t/ha	Flame angle	1 °
Overall fuel load	30 t/ha	Panel height	0.23 m
Vegetation height	n/a	Elevation of receiver	0.11 m
Effective slope	0 °	Fire intensity	23,250 kW/m
Site slope	0 °	Transmissivity	1
Distance to vegetation	0 m	Viewfactor	1
Flame width	100 m		
Windspeed	n/a		
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

Plate 13 – FLAMESOL Modelling for VHC 2 Open forest/woodland – shrubby

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Calculated July 6, 2018, 8:51 am (BALc v.4.8)

Bushfire Attack Level calculator - AS3959-2009 (Method 2)			
Inputs		Outputs	
Fire Danger Index	50	Rate of spread	2.3 km/h
Vegetation classification	Shrubland	Flame length	9.17 m
Surface fuel load	15 t/ha	Flame angle	1 °
Overall fuel load	27 t/ha	Panel height	0.16 m
Vegetation height	1 m	Elevation of receiver	0.08 m
Effective slope	0 °	Fire intensity	32,113 kW/m
Site slope	0 °	Transmissivity	1
Distance to vegetation	0 m	Viewfactor	1
Flame width	100 m		
Windspeed	45 km/h		
Heat of combustion	18,600 kJ/kg		
Flame temperature	1,090 K		

**Plate 14 – FLAMESOL Modelling for VHC 4 Heath communities**

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## 4 **BUSHFIRE RISK ASSESSMENT**

### 4.1 **General**

The following sections provide an overall bushfire risk assessment for the proposed post development conditions which has been prepared generally in accordance with *State Planning Policy – State Interest Guideline – Natural Hazards, Risk and Resilience* (DILGP, 2016) and *AS/NZS ISO 31000:2009 – Risk Management Methodology*.

The bushfire risk assessment details the likelihood that the proposed development will be exposed to bushfire smoke, ember, radiant heat and/or flame attack considering the proximity to bushfire prone vegetation and likely bushfire behaviour. The bushfire risk assessment also assesses the consequences of a potential bushfire acting on the proposed allotments in relation to human health, property loss and environmental degradation. The risk assessment has assumed that all proposed risk mitigation measures detailed in Section 5 of this report are implemented and maintained.

According to AS/NZS ISO 31000:2009, a 'hazard' is defined as a source of potential harm or a situation with a potential to cause loss, whereas a 'risk' is the chance of something happening that will have an impact on objectives measured in terms of consequences and likelihood. The *State Planning Policy – State Interest Guideline – Natural Hazards, Risk and Resilience* (DILGP, April 2016) refers to 'acceptable risk', 'tolerable risk', and 'intolerable risk' which are defined below.

- **Acceptable risk**

- A risk that, following an understanding of the likelihood and consequences, is sufficiently low to require no new treatments or actions to reduce risk further. Individuals and society can live with this risk without feeling the necessity to reduce the risks any further.

- **Tolerable risk**

- A risk that, following an understanding of the likelihood and consequences, is low enough to allow the exposure to continue, and at the same time high enough to require new treatments or actions to reduce risk. Society can live with this risk but believe that as much as is reasonably practical should be done to reduce the risks further.

- **Intolerable risk**

- A risk that, following an understanding of the likelihood and consequences, is so high that it requires actions to avoid or reduce the risk. Individuals and society will not accept this risk and measures are to be put in place to reduce risks to at least a tolerable level.

### 4.2 **Risk of Hazardous Vegetation Within the Site**

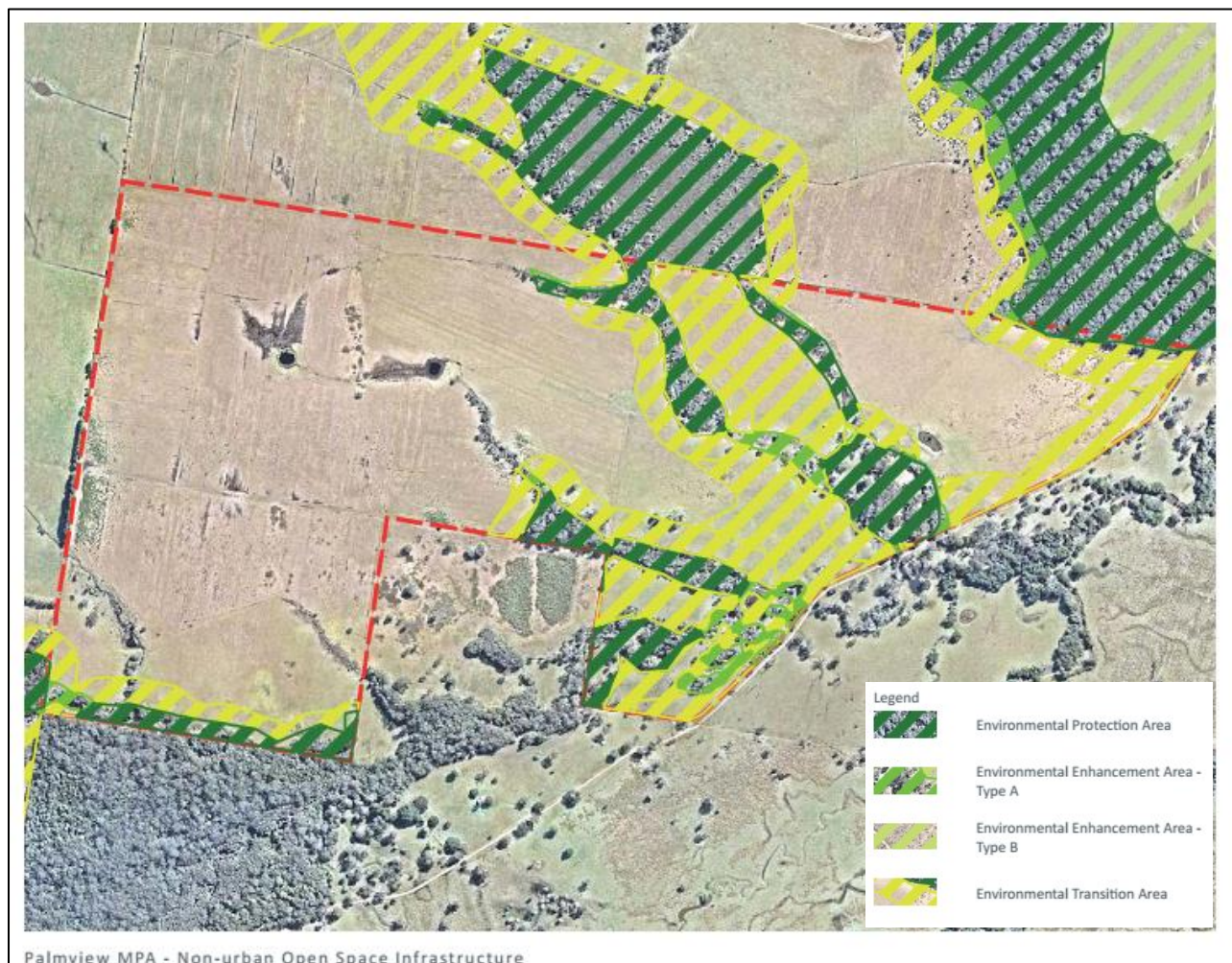
Figure 3 identifies that multiple High Potential Bushfire Intensity areas encroach only a limited distance into the north-eastern and south-western extents of the site, with the majority of the site located in a non-bushfire prone area.

Narrow units of regrowth VHC 1 and VHC 2 are present flanking internal drainage lines within the site and were removed as part of the patch and corridor filtering process implemented whilst preparing the Local Hazard Area Map. Leonard identifies that '*patch and corridor filtering is needed to identify and amend the estimated hazard potential of narrow or small patches of vegetation likely to prevent a running fire front from reaching its potential*'. The narrow width and general riparian influence of much of the onsite regrowth vegetation (which is predominantly less than 100m within most of the site) reduces the anticipated hazard associated with these vegetation units. Riparian communities typically exhibit high surface fuel moisture content, low flammability understorey species and discontinuous and fragmented surface fuel loads as a result of water columns and fuel load displacement during peak flows. These characteristics in association with the linear nature and high perimeter to core ratio of the vegetation unit, infers any fire within these units is likely to achieve only low to moderate bushfire severity and intensity. However, these narrow onsite units of vegetation are contiguous with larger units of offsite hazardous vegetation and therefore represent

a potential conduit for bushfire through the site.

The balance of the vegetation within the site comprises grazed grassland with scattered woody vegetation which exhibits low volume and discontinuous fuel loads and is synonymous with the low threat VHC 12. In consideration of the above, there is currently considered to be a tolerable level of risk to the site from a bushfire originating from within the site.

It is however noted that the plan of development includes approximately 44ha of rehabilitated native vegetation within the development area as depicted in Plate 15 and detailed in Appendix 2 - Rehabilitation Intent Plan prepared by Saunders Havill Group.



**Plate 15 – Rehabilitation Intent Plan (Source: Saunders Havill Group)**

The maturing of these rehabilitated areas will inevitably increase the risk and potential severity of bushfire impact to the site. The rehabilitation corridor through the east of the site will exceed a 100m fire line width and is aligned on a north-west to south-east axis. A fire in the rehabilitated corridor would be anticipated to most likely burn directly along the axis towards the south-east driven by regional west to north-westerly fire weather winds and therefore represents potential to attain maximum potential fire intensity, resulting in increased risk to flanking residential areas.

Consequently, and in consideration of the post development conditions, there is anticipated to be an intolerable level of risk to the areas flanking the central eastern rehabilitation corridor in the absence of risk mitigation strategies.

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## 4.3 Risk from Hazardous Vegetation External to Site

### 4.3.1 North

Figure 3 identifies that a large vegetation unit synonymous with VHC 2 (Open forest/woodland – shrubby) is present to the north-east of the site associated with the Sippy Creek riparian corridor. This vegetation unit represents a High Potential Bushfire Intensity vegetation unit and exhibits approximately 350m potential fire line width, albeit contiguous with a narrow band of low threat rainforest vegetation of approximately 50m width immediately flanking Sippy Creek on the northern extent of the vegetation unit. Whilst the rainforest vegetation reduces the overall bushfire hazard associated with this unit, the remaining extent of hazardous VHC 2 vegetation is sufficient in scale to potentially attain maximum potential fire line intensity prior to intercepting the site. The overall vegetation unit is located upwind in the path of regional north-westerly bushfire winds and therefore a bushfire originating to the north-west exhibits high risk of impacting the northern extent of the site during the fire season.

Figure 3 also depicts a hazardous vegetation unit of approximately 11ha adjacent to the centre of the site's northern boundary. This vegetation unit contains a mosaic of VHC 1 (Melaleuca communities) and VHC 4 (heath communities) both of which represent High Potential Bushfire Intensity vegetation units. This vegetation unit exhibits a width of approximately 220m at the interface with the site's northern boundary. The overall vegetation unit is located upwind in the path of regional north-westerly bushfire winds and therefore a bushfire originating to in this unit exhibits high risk of impacting the northern extent of the site during the fire season.

The development of adjacent Palmview Areas A & B also includes extensive natural area rehabilitation and revegetation programs as detailed in Plate 16. The widening of the Sippy Creek corridor to 300m width in the far north of Palmview Area A increases the risk of fire moving in an easterly direction through the landscape driven by hot and dry westerly fire winds. The reconnection of the currently fragmented corridor in Palmview Area B to the north of the site with the Sippy Creek fuel load also significantly increases the risk of fire transmission in a southerly direction toward the site from the Sippy Creek hazardous vegetation.

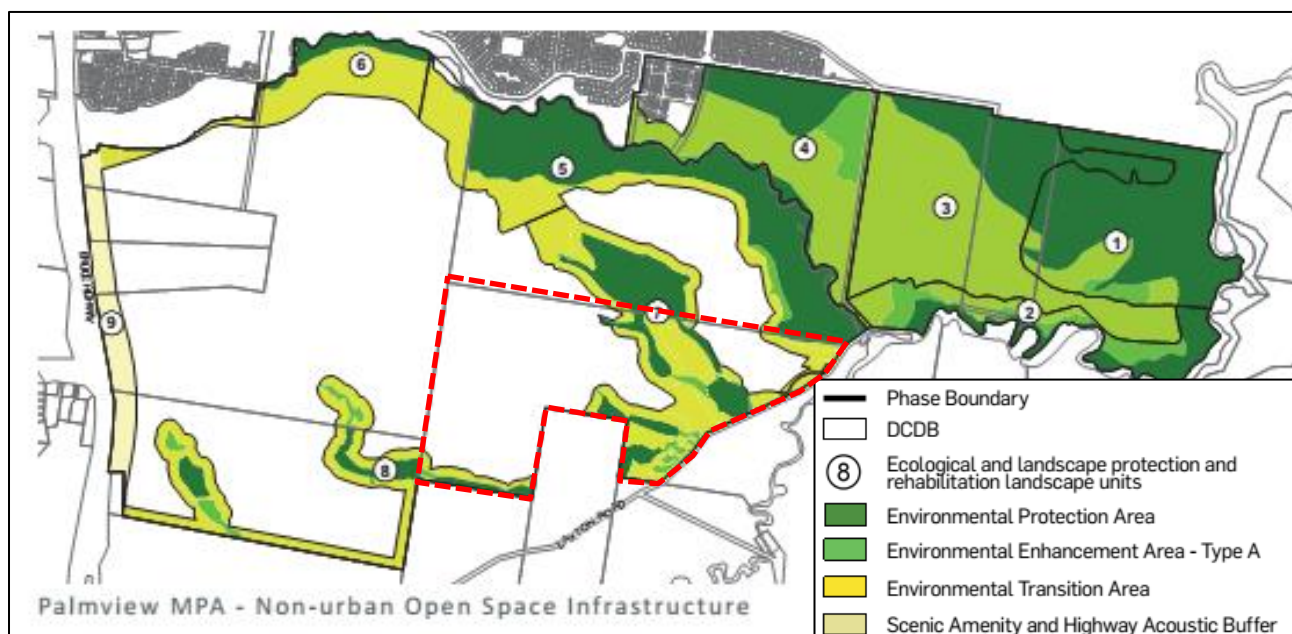


Plate 16 –Palmview Structure Plan Area Rehabilitation Intent (Source: Saunders Havill Group)

Overall, the position, composition and extent of hazardous vegetation to the north of the site post development represents an intolerable level of risk to the site in the absence of risk mitigation strategies.

#### 4.3.2 East

Figure 3 does not identify any hazardous vegetation to the east of the site, therefore there is currently anticipated to be an acceptable level of risk to the site from a bushfire originating from the east.

#### 4.3.3 South

Figure 3 identifies that vegetation synonymous with VHC 2 (Open forest/woodland – shrubby) is present to the south of the site. This vegetation unit represents a High Potential Bushfire Intensity vegetation unit and exhibits approximately 600m potential fire line width adjacent to the south-west corner of the site and a potential fire run distance of up to 2 kilometres, commencing from within the Palmview Conservation Park near the Bruce Highway to the south-west of the site. This hazardous open forest vegetation unit therefore represents the potential to support a significant high intensity fire run toward the site.

The risk of a severe fire burning from a southerly direction toward the site would historically and generally be considered low, with the weather conditions required to facilitate a fire from a southerly direction generally associated with cooler land temperatures and rainfall periods. Fires under such conditions are rarely, but not exclusively, associated with hazardous bushfire weather conditions on the Sunshine Coast. Nonetheless, the recent 2017/2018 summer wildfire event at Caloundra South burnt perilously close to the new Aura residential development under dry, south-westerly winds and commenced in immediate proximity to the Bruce Highway. Given the anticipated increase in the number and severity of high bushfire weather days in Australia in the foreseeable future, it is considered prudent to appropriately consider and subsequently mitigate the risk of the southerly adjacent bushfire hazard unit.

Overall, given the extent of hazardous vegetation located to the south of the site there is anticipated to be an intolerable level of risk to the site in the absence of risk mitigation strategies.

#### 4.3.4 West

Figure 3 does not identify any hazardous vegetation to the west of the site. The Harmony Palmview Area A residential community is currently under construction to the west and Plate 16 only identifies one small linear riparian rehabilitation area flanking the south-west corner of the site. Therefore, limited hazardous fuels loads are anticipated to exist post development to the west of the site, hence there is anticipated to be an acceptable level of risk to the site from a bushfire originating from the west.

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## 5 BUSHFIRE MANAGEMENT PLAN

### 5.1 General

The following sections describe the bushfire risk reduction measures to be incorporated into the proposed development to reduce the risk of bushfire impact to people and property to a level anticipated to be deemed acceptable to society. This assessment has been based on the post-development conditions within the site based on the Plan of Development and the anticipated post-development/post rehabilitation conditions throughout the site and adjoining lands (i.e. Palmview Areas A & B) to ensure the cumulative impact of rehabilitation is not discounted.

Implementation of the identified measures is not implied nor intended to advocate that building occupants remain on the site during a bushfire event, nor that people and property will be protected from bushfire impact. The measures are intended to reduce the potential severity of bushfire impact to the development and not prevent bushfire impact.

The scope of referenced management measures have been derived from:

- Bushfire Hazard Overlay Code 2014. *Sunshine Coast Planning Scheme 2014*. Sunshine Coast Council;
- SC6.7 Planning Scheme Policy for the Bushfire Hazard Overlay Code. *Sunshine Coast Planning Scheme 2014*. Sunshine Coast Council;
- Appendices 5B & 8 of State Planning Policy 1/03 'Mitigating the Adverse Impacts of Flood, Bushfire and Landslide, 2003; and
- *Australian Standard 3959-2009 Construction of Buildings in Bushfire Prone Areas* (AS3959 (2009)).

The bushfire risk reduction measures to be incorporated into the proposed development generally relate to the following elements:

- Asset Protection Zones and hazardous vegetation setbacks;
- Residential building construction standards;
- Water supply;
- Fire breaking trails;
- Roads; and
- Landscaping and natural area regrowth.

### 5.2 Asset Protection Zones and hazardous vegetation setbacks

Asset Protection Zones (APZ) provide a defensive tool to assist in the reduction of potential bushfire impact to people and property situated in bushfire prone areas. For illustrative purposes, Plate 17 depicts the concept of an APZ flanking a dwelling in bushfire prone areas.

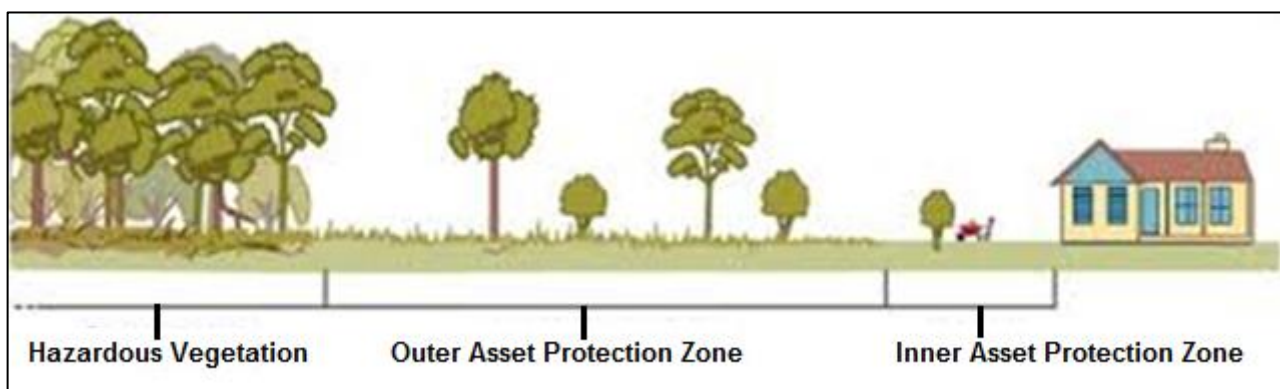


Plate 17 – Asset Protection Zones

The southern and northern site extents have been determined to be located within a High Potential Bushfire Intensity Area and Potential Impact Buffer area, hence provision of adequate separation



between the proposed built infrastructure and the adjoining hazardous vegetation is deemed appropriate. The provision of adequate building separation from the hazardous vegetation is required to provide a reasonable level of safety to site occupants and emergency services staff.

### 5.2.1 Sunshine Coast Council Bushfire Hazard Overlay Code

Performance Outcome 8 of the Sunshine Coast Planning Scheme Bushfire Hazard Overlay Code requires that the lot layout is designed to (a) mitigate any potential bushfire hazard and (b) provide safe building sites. To achieve this, AO8.2(b) of the Sunshine Coast Planning Scheme Bushfire Hazard Overlay Code stipulates provision of bushfire risk separation setbacks of up to 1.5 times the height of trees adjoining dwellings located in Designated Bushfire Prone Areas. The average canopy heights within the adjoining hazardous vegetation units and associated setbacks (1.5 x canopy height) has been provided as Table 1.

**Table 1 – Vegetation Setbacks as per AO8.2(b) of the Bushfire Hazard Overlay Code**

Vegetation Unit	Canopy Height	1.5 x Setback
VHC 1 – Melaleuca communities	16m	24m
VHC 2 – Open forest/woodland	26m	39m
VHC 4 – Heath communities	1m	1.5m

The small allotment sizes proposed within the development precludes the ability to provide dedicated asset protection zones internal of lot boundaries where limited open space is available. Therefore, the development will rely upon sufficient separation being provided external of individual allotments.

The Area C Master Plan minimises the siting of built infrastructure directly adjacent to the hazardous vegetation. The majority of built infrastructure is to be buffered to post development hazardous vegetation by either a perimeter road and a minimum 50m wide Environmental Transition Area (ETA) or a minimum 50m wide Environmental Transition Area. The intent of the Environmental Transition Area is to both buffer the adjoining Environmental Protection Area from development impacts and to embellish its values. It is understood the ETA will host mixed open space uses including low impact infrastructure such as bio-retention/detention basins, drainage pathways as well land to be fully rehabilitated for conservation purposes.

The ecological rehabilitation (i.e. revegetation) of the Environmental Transition Area exhibits the potential to develop a contiguous flammable pathway between the built infrastructure and the identified hazard areas. Hence appropriate design of the Environmental Transition Area is required adjacent to the development footprint to limit exacerbating bushfire hazard sources and subsequent risk acting on the development.

In response to the above and where no perimeter road is proposed to separate buildings from the Environmental Transition Areas or Environmental Protection Areas, a 20m cleared firebreak inclusive of a 6m cleared 4m formed fire trail is recommended to separate all buildings and flammable infrastructure/plant from the adjoining Environmental Protection Areas or Environmental Transition Areas. This 20m cleared firebreak will require regular maintenance (i.e. slashing) and will represent a fully cleared, accessible and functional inner Asset Protection Zone.

In addition, it is recommended that the external 20m of Environmental Transition Areas fronting the 20m formed firebreak or roadway, where present, comprise a low flammability, low fuel load generating vegetation community. This 20m zone would be classifiable as a low hazard sub unit and form an effective outer APZ.

The inclusion of the above approximate 40m APZ would equate to all future residential buildings fronting bushland areas triggering a maximum BAL 12.5 construction standard under AS3959 (2009) *Construction of Buildings in Bushfire Prone Areas* (where buildings are called up by the Standard). The inclusion of a 20m APZ would be anticipated to equate to a BAL 29 construction standard.

### 5.3 Water Supply

The availability of a reliable water supply for firefighting purposes is a vital tool in the defence of bushfire impact. The site is to be connected to a reticulated water supply with a minimum pressure and flow of 10 litres a second at 200kPa at all times and thereby complies with AO9.1 of Council's Bushfire Code.

To ensure adequate access to the water supply at appropriate locations throughout the development site, and in accordance with AO9.4 of Council's Bushfire Hazard Overlay Code, fire hydrants are recommended to be positioned and clearly identifiable along the perimeter roads, or fire breaks where no roads are present, that separate buildings from the interface with the Environmental Transition Areas, at not more than 100 metres apart.

### 5.4 Fire Breaking Trails

The provision of fire breaks and fire trails within a site located in a bushfire prone area offers an important bushfire defence measure to assist in reducing the risk and severity of bushfire ingress onto and through a site. The proposed development will be exposed to hazardous vegetation to varying degrees and therefore inclusion of fire breaks and fire trails to suppress fire movement and access the perimeter of the hazardous vegetation represents a critical bushfire impact reduction measure. Environmental Transition Areas with a minimum 50m width are to be rehabilitated between the hazardous vegetation and proposed residential areas which will increase the hazard volume and risk acting on the site. To assist with alleviating this increased risk and to provide adequate access to the perimeters of the hazardous vegetation for operational staff and their equipment, it is recommended:

- A 20m cleared firebreak inclusive of a 6m cleared 4m formed fire trail separates all buildings and flammable infrastructure/plant from Environmental Transition Areas where no perimeter roads will be present to perform this function. This 20m cleared firebreak will require regular maintenance (i.e. slashing) and will represent a fully cleared, accessible and functional inner Asset Protection Zone.
- A 6m wide 4m formed fire break trail is constructed along the interface of proposed new roads and Environmental Transitions Areas. The fire break trail would function with dual purpose being a vehicular accessible fire break trail and a natural areas vegetation management trail thereby removing the need for relevant vehicles and operational staff to rely on and congest the adjoining roadway when undertaking operations; and
- A 6m wide 4m formed fire break trail is constructed along the interface of the Environmental Protection Areas and Environmental Transitions Areas to provide a measure of internal access to the bushland. This measure will also assist with the development and maintenance of the Environmental Transitions Areas and Environmental Protection Areas.

It is expected that the firebreaks shall be generally constructed to the standard specified in AO7 of the SCC Bushfire Hazard Overlay Code, which specifies fire breaking trails are to:

- (a) have a cleared minimum width of 6 metres;
- (b) have a maximum gradient of 12.5%;
- (c) provide continuous access for fire fighting vehicles with entry and exit access to main roads;
- (d) allow for vehicle access every 200 metres;
- (e) provide passing bays and turning bays every 400 metres; and
- (f) are located within an access easement that is granted in favour of Council and Queensland Fire and Rescue Service.

### 5.5 Roads

New developments in bushfire prone areas should be serviced by safe access/exit points for both occupiers and emergency services personnel. The Indicative Master Plan identifies the vehicular access points to and from Area C (refer Appendix 1). The site is to be initially serviced by Peter Crosby Way from the northern boundary which will provide quick access to the Sunshine Motorway Arterial Link, to either Mooloolaba in the east or the Bruce Highway in the west.



Additional sub-arterial roads will be constructed as the Estate continues to be developed as defined in the sequencing plan below extracted from OPM P7.

Major transport infrastructure elements	Relative sequence of provision of infrastructure	Description of sequencing of development and the major transport infrastructure elements
Claymore Road Link	1	This link is provided before any development is carried out in the Palmview Master Planned Area.
Southern Road Link	2	This link is provided before the earlier of the following:- (a) the traffic volumes using Claymore Road (measured immediately south of the Sippy Creek crossing) exceed 22,000 vehicle movements per business day over a continuous 30 day period; or (b) a development approval for the development of the 4,000th Equivalent Dwelling in the Palmview Master Planned Area.
Springhill Drive/ University Way Link	3	This link is provided:- (a) after the provision of the following:- (i) Claymore Road Link; (ii) Southern Road Link; and (b) before a development approval for the development of the 5,000th Equivalent Dwelling in the Palmview Master Planned Area.
Southern Road Link Upgrade	4	This link is provided before a development approval for the development of the 6,500th Equivalent Dwelling in the Palmview Master Planned Area.
Western Service Road Access via Pignata Road	5	The local road network in Area A is to be planned to accommodate a future district collector street to the Western Service Road.

Note: Equivalent Dwelling or ED is the measure of the demand for the number of vehicle trips equivalent to that generated by a Dwelling calculated for the relevant development type worked out by Council using the demand generation rates.

The width and form of the sub-arterial connections provides for safe emergency access and egress opportunities to the site with generally only very low risk of access becoming constrained in a fire event.

The Peter Crosby Way link from the north of the site requires transit of Sippy Creek bushland conservation reserve which is considered a flammable bushland unit and therefore represents risk of ignition and subsequent impact to the sub-arterial road. Appropriate use of low flammability landscaping either side of the road's intersection of the Sippy Creek bushland environs should be sufficient to suppress risk of impact to an acceptable and manageable level.

Vehicular access and egress throughout the internal areas of the site have been designed to provide continuous access with very few terminating, or cul-de-sac roads proposed, which accords with best practise fire management road design principles. The internal through roads act to buffer the Residential Precincts from hazardous vegetation and will be constructed over generally flat gradients.

Several roads will interface Environmental Transitions Areas hence users of the roads may be potentially exposed to future increased risk of bushfire impacts (i.e. radiant heat and direct flame contact). Threat abatement measures have consequently been recommended herein including adoption of 6m wide 4m formed fire break trail flanking the road reserve and a bordering 20m wide low flammability zone within the Environmental Transitions Areas flanking the roadways.

## 5.6 Future Landscaping & Regrowth

A detailed Local Ecological and Landscape Protection and Rehabilitation Plan is being prepared for the development and will include design of the Environmental Transition Area bordering native vegetation within the site (refer Appendix 2 – Rehabilitation Intent Plan).

To reduce the potential for bushfire impact to buildings, structures, occupants and road users as a result of future regrowth and landscaping works within the site, it is recommended that the external 20m of the Environmental Transition Areas is maintained as a low flammability low fuel load zone. In this regard, this zone would maximise the use of locally indigenous, low flammability species and avoid creating conduits of high fire risk from peripheral vegetated areas into the site. This 20m zone would be classifiable as a low hazard sub unit and would not meet the criteria for Type A - Forest under AS3959-2009 at maturity. An example of a low growth transition zone forward of hazardous tall open forest vegetation and fronting a residential area is depicted in Plate 16. The vegetative conditions in the image are expected to reflect the mature phase post development conditions in the 20m fuel reduction zone of the Environmental Transition Area.



**Plate 16 – Example of low growth transitional area fronting residential development (Source: NCES)**

Suitable low flammability, low growth, open forest flora that can be used in drier elevated parts of the Environmental Transition Area could comprise, but not be limited to, *Banksia*, *Leptospermum*, *Callistemon*, *Allocasuarina*, *Lomandra*, *Ficinia*, *Xanthorrhoea*, *Carex* spp. with larger trees only planted at low densities toward the 20m line such as *Corymbia intermedia* (Pink Bloodwood) and *Eucalyptus racemosa* (Scribbly Gum). Wetter areas can be planted with local wetland and vineforest species including *Waterhousea floribunda*, *Tristaniopsis laurina*, *Elaeocarpus* spp., *Melaleuca* spp., *Baumea* spp., *Archontophoenix cunninghamiana*, *Syzygium* and *Acmena* spp. and even *Eucalyptus conglomerata* (Swamp Stringybark - Endangered NC Act & EPBC Act). It is recommended the supervising bushfire consultant review and approves the LELPRP being prepared to guide the rehabilitation of the Environmental Transition Areas within the site to ensure bushfire matters have been appropriately considered.

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## **6 Sunshine Coast Planning Scheme 2014**

### **6.1 Bushfire Hazard Overlay Code**

The Bushfire Hazard Overlay Code applies to self-assessable and assessable development that is:

- Subject to the bushfire hazard overlay shown on the overlay maps contained within Schedule 2 (Mapping) of the SCC Planning Scheme; and
- Identified as requiring assessment against the Bushfire hazard overlay code by the tables of assessment in Part 5 (Tables of assessment) of the SCC Planning Scheme.

The purpose of the Bushfire Hazard Overlay Code is to ensure that development avoids or mitigates the potential adverse impacts of bushfire on people, property, economic activity and the environment.

The development is considered assessable development and therefore is assessable against the assessment criteria contained within Table 8.2.4.3.2 of the Bushfire Hazard Overlay Code, which has been reproduced as Table 2.

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**Table 2 – 8.2.4.3.2 Criteria for Assessable Development**

PERFORMANCE OUTCOMES		ACCEPTABLE OUTCOMES		PROPOSAL COMPLIANCE SUMMARY
BUSHFIRE HAZARD ASSESSMENT AND MANAGEMENT				
PO1	Bushfire mitigation measures are adequate for the potential bushfire hazard level of the site, having regard to the following :- (a) vegetation type; (b) slope; (c) aspect; (d) on-site and off-site bushfire hazard implications of the particular development; (e) bushfire history; (f) conservation values of the site; and (g) ongoing maintenance. Note—where a bushfire hazard assessment and management plan has previously been approved for development proposed on the site (e.g. as part of a prior approval), design of the proposed development in accordance with that plan shall be taken as achieving compliance with this performance outcome.	AO1.1	The level of bushfire hazard shown on a Bushfire Hazard Overlay Map is confirmed through the preparation of a site-specific bushfire hazard assessment and management plan, prepared in accordance with the Planning scheme policy for the bushfire hazard overlay code.	The preparation of this Bushfire Hazard Assessment and Management Plan satisfies AO1.1.
		AO1.2	Development is located, designed and operated in accordance with a Council-approved bushfire hazard assessment and management plan, prepared in accordance with the Planning scheme policy for the bushfire hazard overlay code.	The proposed development has been located, designed and shall be operated in accordance with this Bushfire Hazard Assessment and Management Plan and therefore complies with AO1.2.
IMPACT OF BUSHFIRE MITIGATION MEASURES ON ECOLOGICALLY IMPORTANT AREAS				
PO2	Bushfire mitigation measures do not adversely impact on :- (a) biodiversity values and functionality; and (b) the long-term physical integrity of waterways, wetlands and native vegetation areas.	AO2	No acceptable outcome provided.	No bushfire mitigation measures have been proposed which adversely impact on biodiversity values and functionality or the long-term physical integrity of waterways, wetlands and native vegetation areas.
SAFETY OF PEOPLE AND PROPERTY				
PO3	Development maintains the safety of people and property from the adverse impacts of bushfire.	AO3	Development which will materially increase the number of people living or congregating on premises, including reconfiguring a lot, is not located or intensified within a confirmed medium or high bushfire hazard area. This includes, but is not limited to, the following uses :-	This Bushfire Hazard Assessment and Management Plan has been prepared to maintain the safety of people and property from the adverse impacts of bushfire.



PERFORMANCE OUTCOMES		ACCEPTABLE OUTCOMES	PROPOSAL COMPLIANCE SUMMARY
		(a) child care centre; (b) community care centre; (c) community residence; (d) community use; (e) educational establishment; (f) emergency services; (g) hospital; (h) indoor sport and recreation; (i) nature-based tourism; (j) outdoor sport and recreation; (k) relocatable home park; (l) resort complex; (m) short-term accommodation; (n) residential care facility; (o) retirement facility; (p) short-term accommodation; (q) tourist attraction; and (r) tourist park.  Note—the level of bushfire hazard shown on a Bushfire Hazard Overlay Map is to be confirmed through the preparation of a site-specific bushfire hazard assessment and management plan, prepared in accordance with the Planning scheme policy for the bushfire hazard overlay code.	
ESSENTIAL COMMUNITY INFRASTRUCTURE			
PO4	Essential community infrastructure is able to function effectively during and immediately after bushfire events.	AO4 Development involving essential community infrastructure is not located within a confirmed medium or high bushfire hazard area. OR Where located in a confirmed medium or high bushfire hazard area, development involving essential community infrastructure is designed to function effectively during and immediately after bushfire events in accordance with a Bushfire Hazard Assessment and Management Plan prepared in accordance with the Planning scheme policy for the bushfire hazard overlay code.	The proposed development involves essential community infrastructure in the form of a school within the north-western extent of the site. A specific Bushfire Hazard Assessment and Management Plan will be required to be prepared for the school in the future in accordance with the Planning Scheme Policy for the Bushfire Hazard Overlay Code.

PERFORMANCE OUTCOMES		ACCEPTABLE OUTCOMES		PROPOSAL COMPLIANCE SUMMARY
HAZARDOUS MATERIALS				
PO5	Public safety and the environment are not adversely affected by the detrimental impacts of bushfire on hazardous materials manufactured or stored in bulk.	AO5	Development involving the manufacture or storage of hazardous materials in bulk is not located within a confirmed medium or high bushfire hazard area.	The proposed development does not involve the manufacture or storage of hazardous materials in bulk.
ACCESS AND EVACUATION ROUTES				
PO6	Where development involves provision of a new public or private road, the layout, design and construction of the road:- (a) allows easy and safe movement away from any encroaching fire; (b) allows easy and safe access for fire-fighting and other emergency vehicles; and (c) provides for alternative safe access and evacuation routes should access in one direction be blocked in the event of a fire.	AO6.1	The road layout provides for “through roads” and avoids cul-de-sac and “dead end roads” (except where a perimeter road isolates the development from hazardous vegetation or the cul-de-sac are provided with an alternative access linking the cul-de-sac to other through roads).	A small number of cul-de-sac and “dead end roads” are proposed. However, the built areas are to be separated from hazardous vegetation by a minimum of 40m as per the recommendations of this report. The cul-de-sacs can thus be supported as the risk of bushfire hazard has been effectively reduced by other measures.
		AO6.2	Roads have a maximum gradient of 12.5%.	Due to the existing flat topography of the site, the gradient of the proposed roadways will comply with AO6.2.
FIRE BREAKING TRAILS				
PO7	Fire breaking trails are located, designed and constructed to mitigate against bushfire hazard by :- (a) ensuring adequate access for fire-fighting and other emergency vehicles; (b) ensuring adequate access for the evacuation of residents and emergency personnel in an emergency situation, including an alternative safe access routes should access in one direction be blocked in the event of fire; and (c) providing for the separation of developed areas and adjacent bushland.	AO7	Where development involves the creation of a new road, fire breaking trails are provided between the development site and hazardous vegetation. Such fire breaking trails: - (a) are located along and within a cleared road reserve having a minimum width of 20 metres; and (b) have a maximum gradient of 12.5%. OR Where development does not involve the creation of a new road, fire breaking trails are provided between the development site and hazardous vegetation. Such fire breaking trails: - (a) have a cleared minimum width of 6 metres; (b) have a maximum gradient of 12.5%; (c) provide continuous access for fire fighting vehicles; (d) allow for vehicle access every 200 metres;	Fire break trail recommendations are set in Section 5.2.1 & 5.4 of this report.  The fire breaks shall generally conform with the specifications detailed in AO7.



PERFORMANCE OUTCOMES		ACCEPTABLE OUTCOMES		PROPOSAL COMPLIANCE SUMMARY
		(e) provide passing bays and turning bays every 400 metres; and (f) are located within an access easement that is granted in favour of Council and Queensland Fire and Rescue Service.		
LOT LAYOUT				
PO8	The lot layout of development is designed to :- (a) mitigate any potential bushfire hazard; and (b) provide safe building sites.	AO8.1	Residential lots are designed so that their size and shape allow for efficient emergency access to buildings and for fire fighting vehicles (e.g. by avoiding battle-axe/hatchet lots and long narrow lots with long access drives to buildings).	Each allotment within the proposed Residential Precincts is expected to have direct road frontage to the proposed new internal roads allowing efficient access for emergency services. Each allotment will have short length access drive to dwellings.
		AO8.2	Residential lots are designed so that their size and shape ensure buildings and structures: - (a) are sited in locations of lowest hazard within the lot; (b) achieve setbacks from hazardous vegetation of 1.5 times the height of the predominant mature tree canopy or 10 metres, whichever is greater; (c) achieve a setback of 10 metres from any retained vegetation strips or small areas of vegetation; and (d) are sited so that elements of the development least susceptible to fire are sited closest to the fire hazard.	(a) The Residential Precincts have been sited in existing cleared areas which represent the lowest hazard areas within the site.  (b) The maintained Asset Protection Zones, fuel reduction zones and constructed firebreaks within the 50m wide Environmental Transition Area are proposed to buffer the Residential Precincts from the hazardous vegetation, thereby achieving a 40m setback which is more than 1.5 times adjoining tree height.  (c) A 10m setback from retained offsite vegetation has been exceeded.  (d) The development has been designed so that elements least susceptible to fire can be sited closest to the fire hazard.
WATER SUPPLY FOR FIRE FIGHTING PURPOSES				
PO9	Development provides an adequate water supply for firefighting purposes	AO9.1	Premises are connected to a reticulated water supply with a minimum pressure and flow of 10 litres a second at 200kPa at all times.	The site is to be connected to a reticulated water supply with a minimum

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	PROPOSAL COMPLIANCE SUMMARY
which is reliable, safely located and freely accessible.	OR Where there is no reticulated water supply:- (a) the premises has a minimum water supply capacity of 5,000 litres dedicated for firefighting purposes; and (b) the water supply dedicated to firefighting purposes is sourced from:- (i) a separate tank; (ii) a reserve section in the bottom part of the main water supply tank; (iii) a swimming pool installed immediately upon construction of the development; or (iv) a permanent dam.	pressure and flow of 10 litres a second at 200kPa at all times.
	<b>AO9.2</b> The water supply outlet for firefighting purposes is:- (a) located remote from any potential fire hazards, such as venting gas bottles; (b) provided with a pipe 50mm in diameter and fitted with a 50mm female camlock (standard rural fire brigade fitting); and (c) provided with a hardstand area within 6 metres of the outlet for fire vehicles.	The development will comply with AO9.2.
	<b>AO9.3</b> The pumps that pressurise water output from the tank, swimming pool or drain are able to be operated without reticulated power.	The development will comply with AO9.3.
	<b>AO9.4</b> Fire hydrants along perimeter roads adjacent to National Parks and other conservation reserves are located not more than 100 metres apart.	Fire hydrants are to be installed along roads & fire breaks located adjacent to Conservation Reserves at not more than 100 metres apart.
LANDSCAPE WORKS IN BUSHFIRE HAZARD AREAS		
<b>PO10</b> Development ensures that landscape treatment and species selection does not exacerbate potential bushfire hazard.	<b>AO10.1</b> Development provides for road verges and/or nature strips to be landscaped so as to form a swale drain for stormwater run-off with:- (a) low form, non-fire promoting native vegetation; or (b) low form and sparsely planted vegetation.	All landscape and revegetation works associated with the site are proposed to comply with AO10.1.



PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES	PROPOSAL COMPLIANCE SUMMARY
	Note—the Planning scheme policy for development works provides guidance on selection of non-fire promoting vegetation species.	
	<b>AO10.2</b> Development incorporates low form, non-fire promoting native vegetation on areas of the site that are adjacent to or abutting bushland.	All landscape and revegetation work associated with the site are proposed to comply with AO10.2.

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## 7 **CONCLUSIONS**

This Bushfire Hazard Assessment and Management Plan has been prepared to assess the degree of potential bushfire hazard and to prescribe bushfire risk minimisation strategies for Area C of the Palmview Master Planned Area, located at Laxton Road, Palmview. A Local Hazard Map has been prepared based on existing site conditions and has identified a High Potential Bushfire Intensity Area and a Potential Impact Buffer within and immediately adjacent to the site. Post development the extent of hazardous bushland areas on the site is anticipated to increase as a result of ecological rehabilitation works. Consequently, inclusion of hazard reduction measures into the proposed development plan is warranted.

Numerous bushfire reduction measures have been recommended herein, which if adopted, will assist in the protection of people and property during a bushfire emergency. Overall, the development proposed for the site, in combination with recommendations referenced herein, is deemed acceptable with respect to providing a reasonable level of protection for people and property within the site. The development has been assessed against the SCC Bushfire Hazard Overlay Code and found to be compliant with the Code subject to enactment of the design and management provisions prescribed herein. All future habitable buildings are anticipated to be required to be built to no higher Bushfire Attack Level than BAL 12.5 under AS3959-2009 (based on current Standard in print).

Bushfire is an extremely serious and often unpredictable phenomenon that requires serious preparatory planning and decision making to avoid potential damage to infrastructure and or loss of life. All recommendations made herein have been formulated based on site conditions at the time of writing and therefore may not be appropriate in the event site conditions change over time. Implementation of the bushfire mitigation measures referenced herein is not implied nor intended to advocate that residents remain on the site during a bushfire event nor that people and property will be protected from bushfire impact. The measures are intended to reduce the potential severity of bushfire impact to the development zone and not prevent actual bushfire impact. Site occupants are strongly recommended to seek regular advice from local fire authorities to ensure the recommendations presented in this report remain appropriate in future years.

The first call in the event of a bushfire emergency should always be '000'.



## **8 Recommendations**

The following recommendations are made to achieve compliance with the Bushfire Hazard Overlay Code and to provide a reasonable level of protection against bushfire impact on the site:

### **8.1.1 Fire breaks**

- A 20m cleared firebreak inclusive of a 6m cleared 4m formed fire trail separates all buildings and flammable infrastructure/plant from abutting Environmental Protection Areas or Environmental Transition Areas, where no perimeter roads will be present to perform this function. The 20m cleared firebreak will require regular maintenance (i.e. slashing) and will form an effective fully cleared inner Asset Protection Zone;
- A 6m wide 4m formed fire break trail is constructed along the internal perimeter of the Environmental Transitions Areas which flank proposed new roads. The 6m fire break trail would function with dual purpose being a fire break trail and a natural areas vegetation management trail thereby removing the need for relevant vehicles and operational staff to rely on and congest the adjoining roadway when undertaking operations; and
- A 6m wide 4m formed fire break trail is constructed along the interface of the Environmental Protection Areas and Environmental Transitions Areas to provide internal access to the post development bushland areas. This measure will also assist with vegetation management operations.

### **8.1.2 Water Supply**

- To ensure adequate access to the water supply at appropriate locations throughout the development site, and in accordance with AO9.4 of Councils Bushfire Hazard Overlay Code, fire hydrants are recommended to be positioned and clearly identifiable along the perimeter roads, or fire breaks where no roads are present, that separate buildings from the interface with the Environmental Transition Areas, at not more than 100 metres apart.

### **8.1.3 Landscaping**

- The external 20m of the Environmental Transition Areas fronting the 20m firebreak or roadway comprises a modified, low flammability, low fuel load generating vegetation community representative of an outer APZ as described in Section 5.6 herein; and
- The supervising bushfire consultant is to review and approve the LELPRP being prepared for Area C to guide the rehabilitation of the Environmental Transition Areas within the site to ensure bushfire matters have been appropriately considered.

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## 9 REFERENCES

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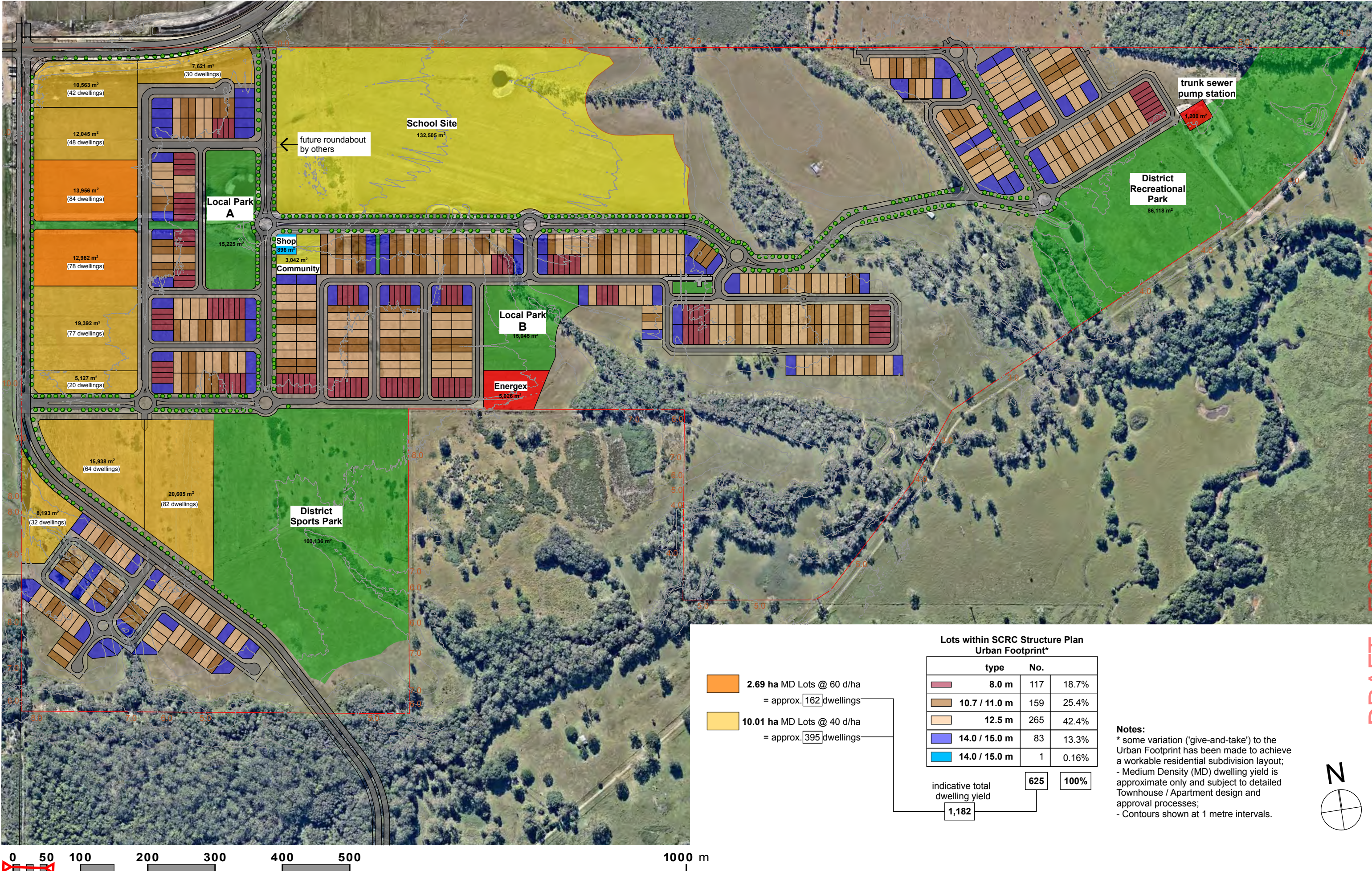
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**APPENDIX 1 – SITE PLAN**

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**APPENDIX 2 – REHABILITATION INTENT PLAN**

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Palmview Estate

# Ecological Rehabilitation Intent

Palmview Area C Development

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Palmview Estate  
Revegetation Intent Package

#### Site:

Palmview Estate  
Laxton Road, Palmview  
Lot 346 on SP287465  
PEET Limited Pty Ltd

#### Prepared by:

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#### Quality Information:

Project Number: 8206;  
Prepared by: Thomas Banham; and  
Reviewed by: Tony Luck, Murray Saunders & Rob McIlroy.

#### Revision History:

Revision:	Date Issued:	Authorised Name:
A	20.04.2017	Thomas Banham
B	28.04.2017	Murray Saunders

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## Introduction

This Ecological Rehabilitation Plan has been prepared for Peet's Palmview Estate Project known as Area C within the broader Palmview Structure Plan. This package is preliminary only and designed to set the intent of proposed rehabilitation outcomes for large areas of open space included within the project. Logically area and staged specific operational works scale rehabilitation plans will be prepared with varying stages of the proposal. Ecological Rehabilitation Works may not be staged based on area of development rather will focus on stages weed management and sequential rehabilitation works allowing for the successional change required to return broad open grazing land to sustainable native vegetation.

Peet's Palmview Estate includes large volumes of open space which include non urban land use intents of Environmental Protection, Environmental Enhancement Areas A and B. The predominant mapped area is noted as part of the Transition Area which is to be primarily used as buffer catering for a range of passive recreational and environmental objectives.

Ecological protection and rehabilitation are paramount in the Palmview Structure Plan which includes mapping, areas and specific code items fostering rehabilitation objectives. Peets project is depicted as containing the southern portion of Landscape Unit 7. This package uses detailed site scale information to refine broad Council mapping and into a finer grain of rehabilitation areas and methods based directly on site survey findings.

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Aerial photography of Palmview Estate view North





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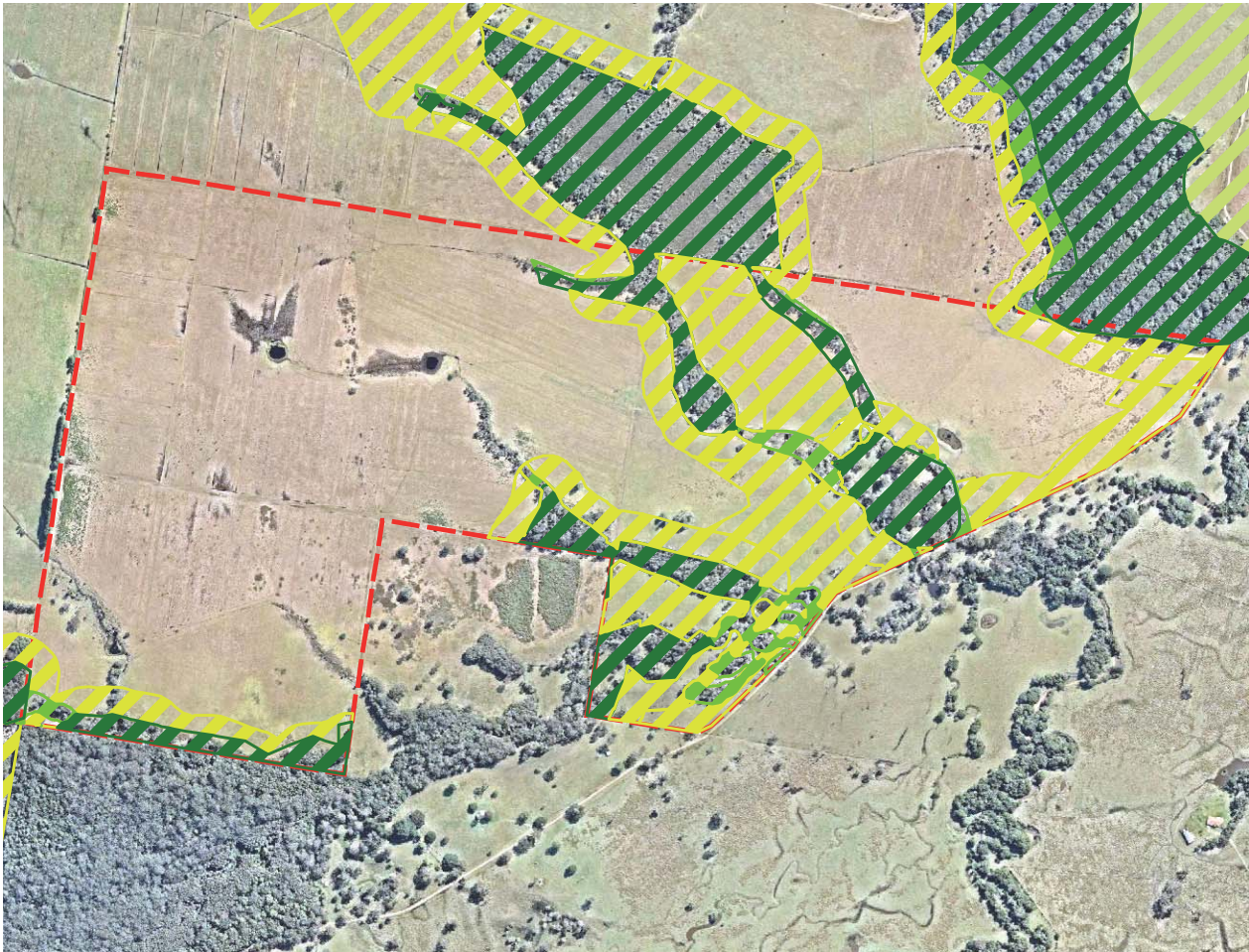


Council Environmental Areas Plan

Legend

-  State Significant Vegetation
  - State Government referable wetlands
  - SEQ RCMP Significant Wetlands
  - High Ecological Significance SEQ Regional Plan 2009-2031
  - Regional Ecosystem Ver 6.0
-  50m Buffer from State significant vegetation
-  100m Buffer from State significant vegetation
-  State Habitat Corridors (State Government)
-  Local Habitat Corridor

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Palmview MPA - Non-urban Open Space Infrastructure

Legend

Environmental Protection Area

Environmental Enhancement Area - Type A

Environmental Enhancement Area - Type B

Environmental Transition Area

Table: Outcomes of non-urban Open Space Infrastructure Area

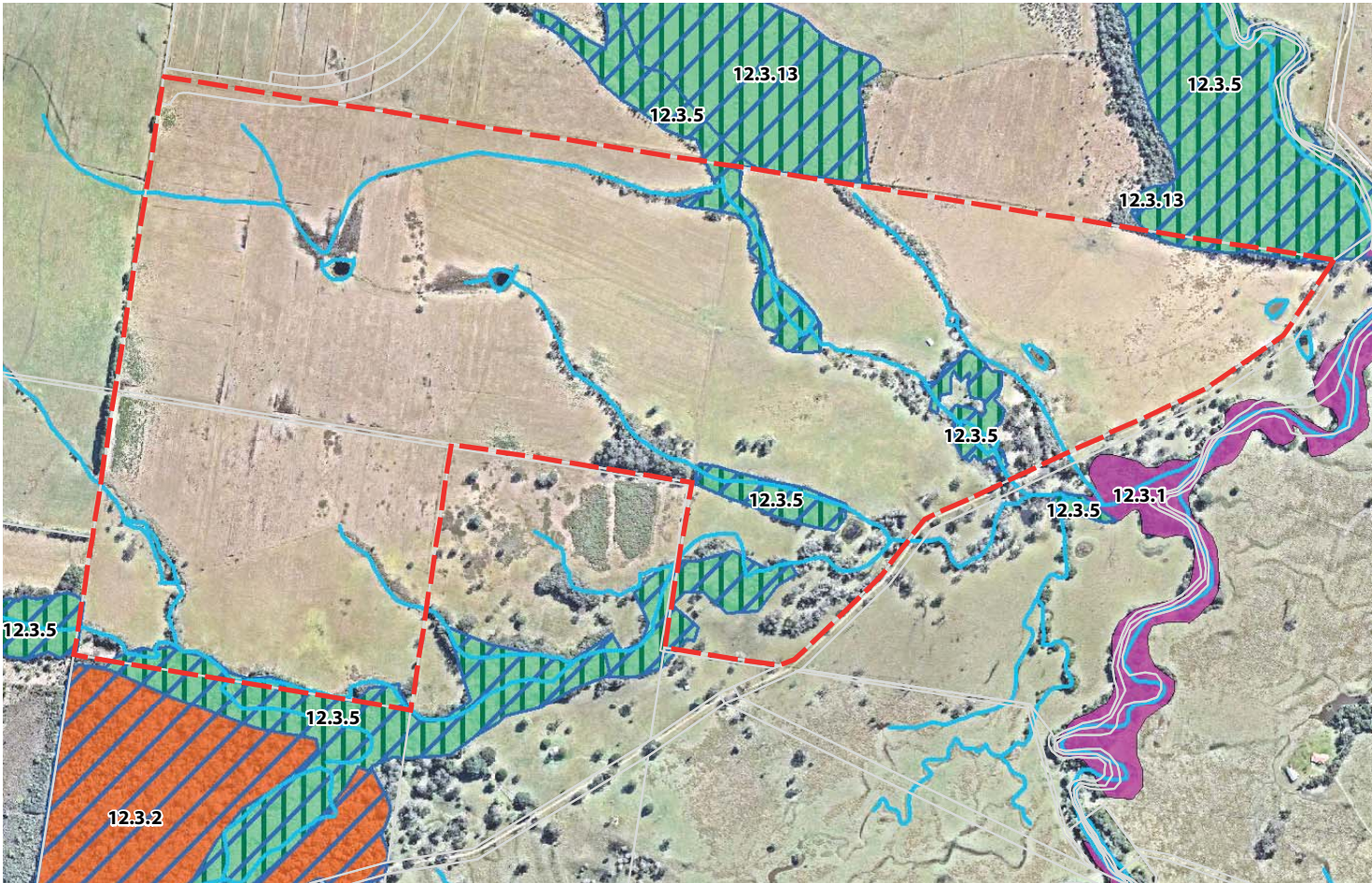
Non-urban open space infrastructure area		Ecological protection and rehabilitation objectives
Environmental Protection Area		<ul style="list-style-type: none"><li>• Provide for management that assists in the area becoming largely self sustaining and in good bio-condition for its corresponding regional ecosystem.</li><li>• Provide for long-term security of tenure for conservation purposes.</li></ul>
Environmental Enhancement Area - Type A		<ul style="list-style-type: none"><li>• Provide for assisted regeneration back to the area's former regional ecosystem and in good bio-condition.</li><li>• Enhance landscape scale habitat connectivity.</li><li>• Provide for long-term security of tenure for conservation purposes.</li></ul>
Environmental Enhancement Area - Type B		<ul style="list-style-type: none"><li>• Provide for strategic rehabilitation to enhance landscape connectivity and ecological values.</li><li>• Provide for long-term security of tenure for conservation purposes.</li></ul>
Environmental Transition Area		<ul style="list-style-type: none"><li>• Provide for establishment of buffer areas that enhance the ecological values of Environmental Protection and Environmental Enhancement Areas and protect them from the impacts of adjacent development.</li><li>• Allow for compatible passive recreation uses including pedestrian and cycleways, picnic areas and open play areas and water sensitive urban design features.</li></ul>
Scenic Amenity and Highway Acoustic Buffer		<p>Provide for native landscaping which:</p> <ul style="list-style-type: none"><li>(a) enhances the rural character of the area;</li><li>(b) provides a visual relief and noise buffer from the Bruce Highway;</li><li>(c) allows for compatible low impact recreation uses;</li><li>(d) allows for farm forestry uses or tree planting for carbon offsets, where appropriate; and</li><li>(e) provides environmental linkages and habitat value.</li></ul>



#3 Regional Ecosystem Map

Species List

Species	Common Name
<i>Livistonia australis</i>	Cabbage Tree Palm
<i>Casuarina cunninghamiana</i>	River She Oak
<i>Ficus coronata</i>	Creek Sandpaper Fig
<i>Melaleuca quinquenervia</i>	Broad Leaf Paperbark
<i>Glochidion sumatranum</i>	Large-leaved Cheese Tree
<i>Banksia robur</i>	Swamp Banksia
<i>Melastoma malabathricum</i>	Blue Tongue
<i>Persicaria decipiens</i>	Slender Knotweed
<i>Persicaria attenuata</i>	A Smartweed
<i>Ludwigia octovalvis</i>	Native Willow Primrose
<i>Phylidrum lanuginosum</i>	Woolly Frogmouth
<i>Cnetella asiatica</i>	Pennywort
<i>Eichhornia crassipes</i>	Water Hyacinth
<i>Nymphaea caerulea</i>	Blue Water Lilly
<i>Nymphoides indica</i>	Water Snowflakes
<i>Azolla filiculoides</i>	Azolla Fern
<i>Cyperus polystachyos</i>	Bunchy Sedge
<i>Lepironia articulata</i>	Grey Rush
<i>Juncus usitatus</i>	Common Rush
<i>Lomandra hystrix</i>	Creek Mat Rush
<i>Lygodium microphyllum</i>	Climbing Maidenhair Fern
<i>Blechnum indicum</i>	Bungwall
<i>Gahnia sieberiana</i>	Red-fruited Sawsedge
<i>Acacia attenuata</i>	Wattle
<i>Cassytha pubescens</i>	Dodder Laurel
<i>Lycopodiella cernua</i>	Coral Fern
<i>Alphitonia excelsa</i>	Soap Tree
<i>Trema tomentosa</i>	Poison Peach
<i>Pomax umbellata</i>	Pomax
<i>Smilax glycyphylla</i>	Sweet Sarsaparilla
<i>Geitonoplesium cymosum</i>	Scrambling Lilly
<i>Bignonia oblongifolia</i>	Coffee Bush
<i>Elaeocarpus reticulatus</i>	Blueberry Ash
<i>Commelina diffusa</i>	Wandering Jew
<i>Bursaria spinosa</i>	Black Thorn
<i>Smilax australis</i>	Barbed-wire Vine
<i>Parsonsia straminea</i>	Monkey Rope Vine
<i>Cardiospermum grandiflorum</i>	Balloon Vine
<i>Eustrephus latifolius</i>	Wombat Berry
<i>Imperata cylindrica</i>	Blady Grass
<i>Xanthorrhoea macronema</i>	Bottle Brush Grass Tree
<i>Hibbertia aspera</i>	Hibbertia
<i>Sida cordifolia</i>	Flannel Weed
<i>Ottoschloa gracillima</i>	Graceful Grass
<i>Pteridium esculentum</i>	Bracken
<i>Cinnamomum camphora</i>	Camphor Laurel
<i>Podocarpus elatus</i>	Brown Pine
<i>Carissa ovata</i>	Currant Bush
<i>Ficus obliqua</i>	Small-leaved Fig
<i>Melicope elaeagnifolia</i>	Pink Euodia
<i>Archontophoenix cunninghamiana</i>	Picabeen Palm
<i>Ficus watkinsiana</i>	Strangler Fig
<i>Flindersia schottiana</i>	Bumpy Ash
<i>Homalanthus nutans</i>	Native Bleeding Heart
<i>Alpinia caerulea</i>	Native Ginger
<i>Cupaniopsis anacardoides</i>	Tuckeroo
<i>Jagera pseudorhus</i>	Faambark
<i>Hymenoporum flavum</i>	Native Frangipani
<i>Corymbia trachyphloia</i>	Brown Bloodwood
<i>Corymbia intermedia</i>	Pink Bloodwood
<i>Eucalyptus pilularis</i>	Blackbutt
<i>Lophostemon confertus</i>	Brush Box
<i>Lophostemon suaveolens</i>	Swamp Box
<i>Eucalyptus tereticornis</i>	Forest Red Gum
<i>Eucalyptus racemosa</i>	Scribbly Gum
<i>Eucalyptus robusta</i>	Swamp Mahogany
<i>Synsarcia glomulifera</i>	Turpentine
<i>Ageratum houstonianum</i>	Blue Billygoat Weed
<i>Stenotaphrum secundatum</i>	Buffalo Grass



Regional Ecosystem Plan

Note: Species list generated from detailed site surveys

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Open Canopy with fern understory



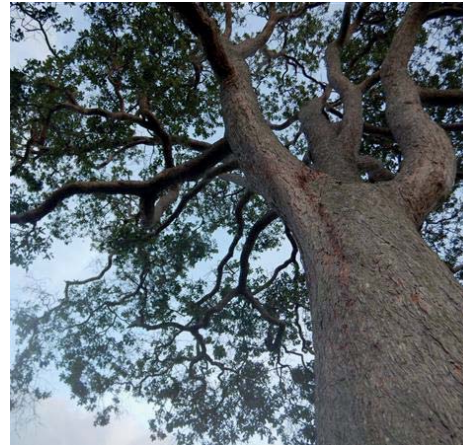
Open Pastrol grassland



Man made dam



Open gully line



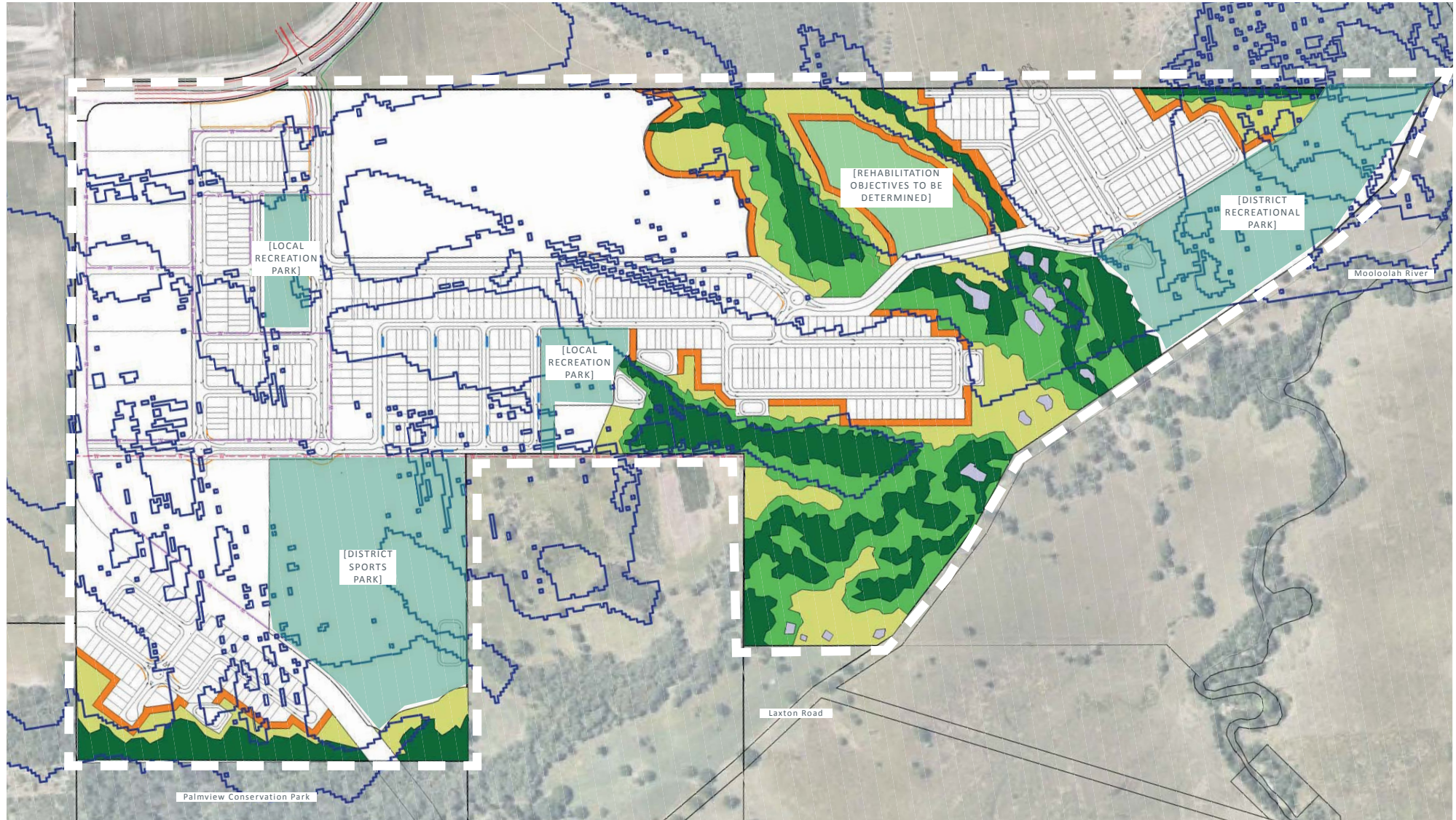
Swamp Mahogany



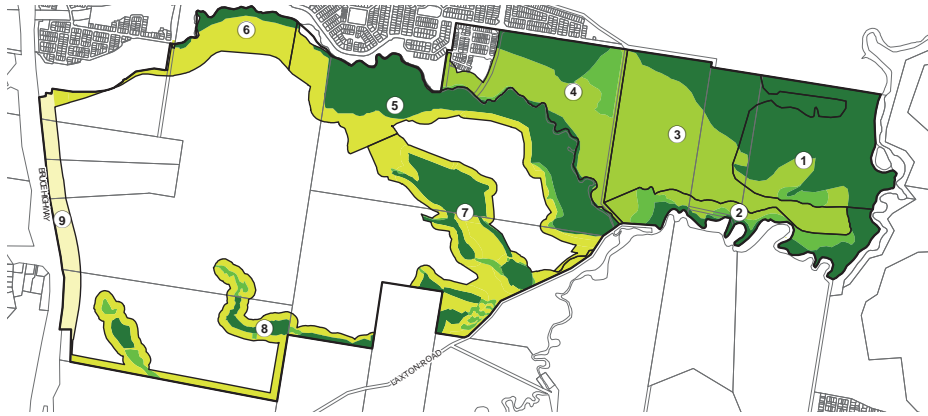
Melaleuca forests

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Preliminary Rehabilitation Plan - Overview












Palmview MPA - Non-urban Open Space Infrastructure

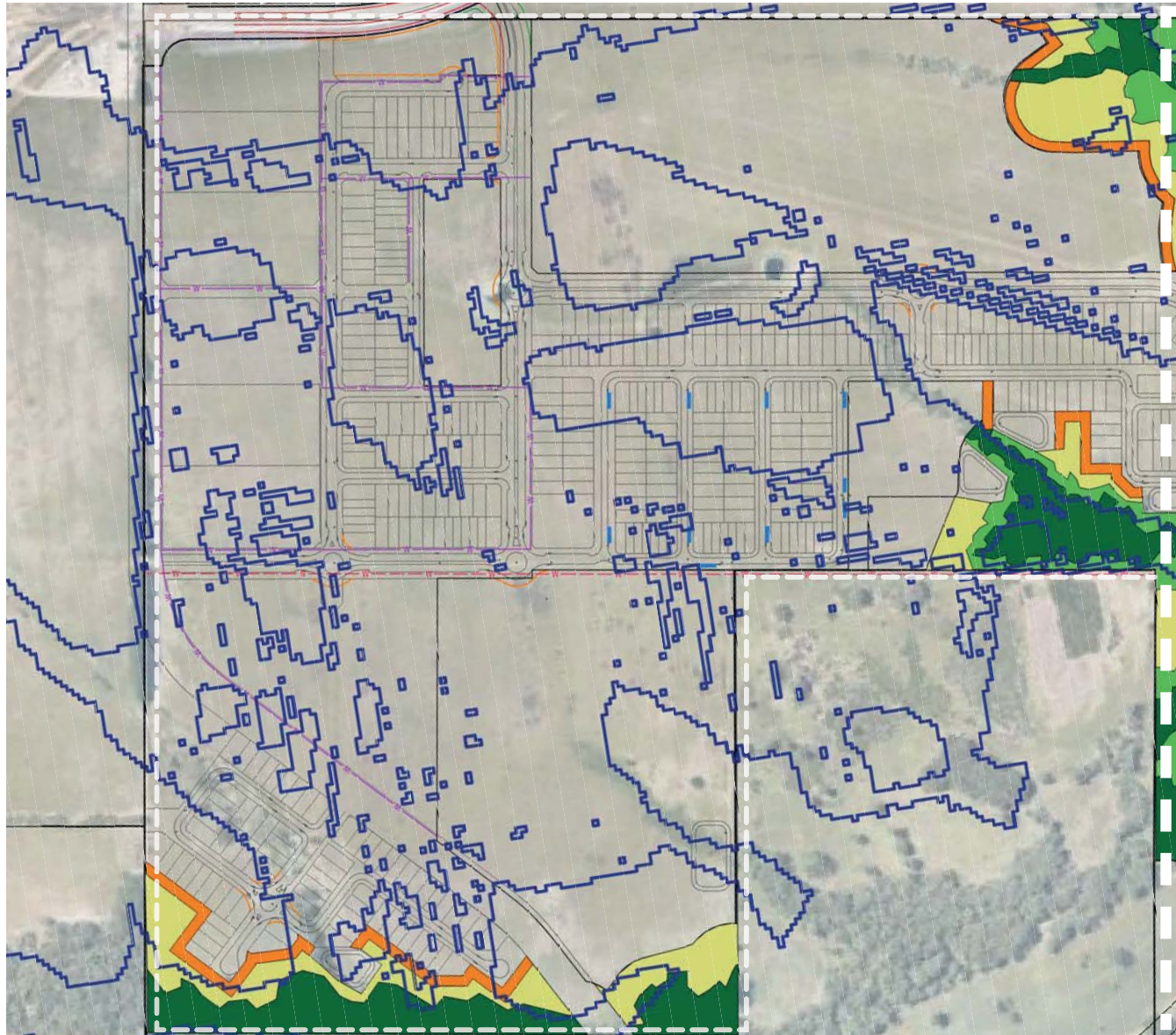
Landscape Unit	Description	Ecological protection and rehabilitation outcomes	Management requirements
Landscape Unit 7	<p>Landscape unit 7 is located centrally and forms a band that traverses the plan area, connecting landscape unit 5 to the Mooloolah River riparian corridor that lies just to the south of the Plan Area. It forms part of the Palmview fauna corridor.</p> <p>This landscape unit is characterised by remnant vegetation and a mosaic of vegetation and cleared land. Existing vegetation includes of concern RE 12.3.13 (Closed heathland on seasonally waterlogged alluvial plains near the coast) and RE 12.3.5 (<i>Melaleuca quinquenervia</i> open forest on coastal alluvial plains).</p> <p>All remnant vegetation within this landscape unit is identified as significant wetland by the <i>SEQ Regional Coastal Management Plan</i> and HES by the South East Queensland Regional Plan.</p> <p>This landscape unit includes essential habitat for threatened species <i>Crinia tinnula</i> (Wallum froglet) and <i>Litoria freycineti</i> (Wallum Rocketfrog).</p>	<ul style="list-style-type: none"> <li>Enhancement of landscape scale habitat connectivity, with particular emphasis on reconnecting fragmented habitat along a north-south alignment.</li> <li>Increase the extent of wetland ecosystems, with particular emphasis on active regeneration of land enclosed by remnant vegetation.</li> <li>Rehabilitation of wetland ecosystems to remnant status.</li> <li>Provision of habitat for significant flora and fauna species.</li> <li>Protection of the water quality of the Mooloolah River and off-site receiving environments.</li> <li>Maintenance of the hydrological function.</li> <li>Provision of opportunities for low impact recreation facilities in the south-western portion of this landscape unit (identified as DR3).</li> <li>Maintenance and enhancement of biodiversity values within urban recreation areas.</li> </ul>	<p>The management of this landscape unit is to retain and enhance remnant vegetation, re-establish habitat connectivity through mainly active mechanisms and protect habitat from the impacts of development.</p> <p>Management actions are to include the following:-</p> <ul style="list-style-type: none"> <li>establish fencing and exclude grazing;</li> <li>removal of invasive exotic species,</li> <li>infill planting to supplement natural regeneration;</li> <li>active revegetation, with particular emphasis on consolidating and expanding wetland vegetation and reconnecting habitat from north to south;</li> <li>retain mature and hollow bearing trees, minimise public access under Eucalypts by buffering with vegetation and locate recreation infrastructure away from Eucalypts in an urban recreation areas;</li> <li>maintain a grassed transition zone between residential development and vegetated area;</li> <li>careful management or rectification of the concentrated surface drainage or modified flows into natural sedgeland and wetland areas so as to prevent damage from scouring, changes in the wetland hydrology, the provision of degraded habitat for the establishment of invasive species and other negative impacts.</li> </ul>



## #7 Preliminary Rehabilitation Plan - West

### Legend

-  Existing intact patches & lineal strands of native vegetation
-  Development and revegetation interface zone - replanting to be cognisant of bushfire & buffering requirements
-  Revegetation Zone - Broad acre grasslands to be reinstated with relevant regional ecosystem vegetation
-  Dense Revegetation to match & infill adjoining existing vegetation community to north
-  Core Revegetation Zone - Drainage features & water course
-  Fragmented native values primarily with grass understory
-  Isolated native tree or small vegetation clump
-  Q100 Line
-  Rehabilitation Objective to be determined



Preliminary Rehabilitation Plan - West










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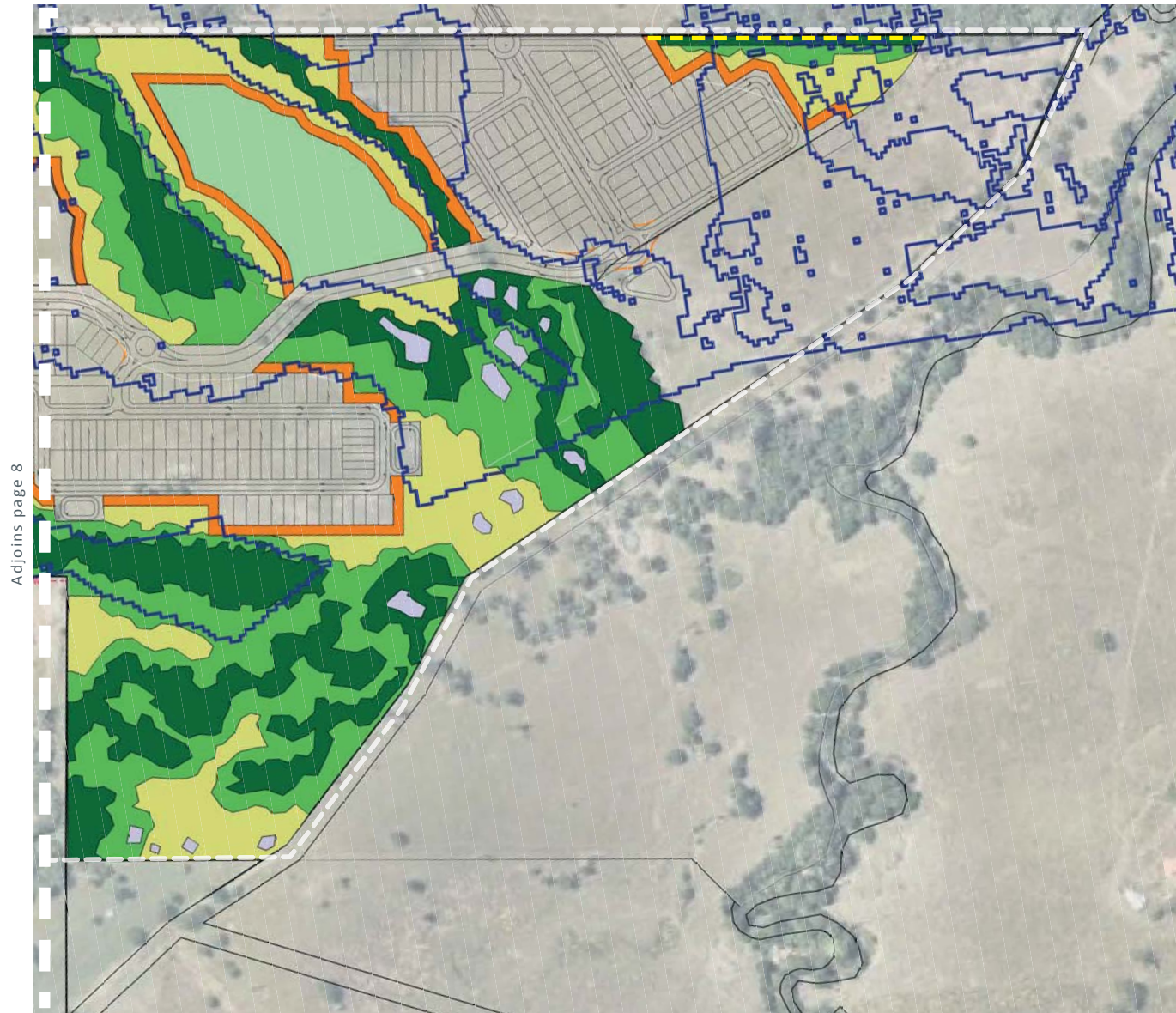
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## #7 Preliminary Rehabilitation Plan - East

### Legend

-  Existing intact patches & lineal strands of native vegetation
-  Development and revegetation interface zone - replanting to be cognisant of bushfire & buffering requirements
-  Revegetation Zone - Broad acre grasslands to be reinstated with relevant regional ecosystem vegetation
-  Dense Revegetation to match & infill adjoining existing vegetation community to north
-  Core Revegetation Zone - Drainage features & water course
-  Fragmented native values primarily with grass understory
-  Isolated native tree or small vegetation clump
-  Q100 Line
-  Rehabilitation Objective to be determined



Preliminary Rehabilitation Plan - East

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


#### REVEGETATION METHODOLOGY:

This Preliminary Rehabilitation Plan is designed to enhance the existing native vegetation areas within Area C. These plans identify control and revegetation measures based on site disturbance, topology and development footprint. Where existing native vegetation has established, low impact weed removal and rehabilitation techniques are suggested. In patches that have undergone clearing and major disturbances a more aggressive approach to weed removal and revegetation will be provided.


Below is the proposed breakdown of the different revegetation zones within Palmview Area C. The South East Queensland Restoration Guideline is the preferred revegetation methodology for a sustainable and site sensitive approach. The (4) four methodologies will be applied to each zones within this Preliminary Revegetation Plan:


 Existing Vegetation (Natural Regeneration): intact patches & lineal strands of vegetation


 Development Buffer (Reconstruction) replanting to be cognisant of bushfire buffering requirements

 Revegetation Zone (Reconstruction) Broad acre grasslands to be reinstated with relevant regional ecosystem vegetation

 Infill Zone (Assisted Natural Regeneration) Dense Revegetation to match & infill adjoining vegetation community to north

 Core Zone (Natural Regeneration) Drainage features & water course

 Fragmented Zone (Assisted Natural Regeneration) primarily grass understory planting

 Isolated native zone (Assisted Natural Regeneration) Isolated native tree or vegetation clumps

#### SOUTH-EAST QUEENSLAND RESTORATION GUIDELINES

##### NATURAL REGENERATION

###### Applies:

- To relatively large, intact and weed-free areas of native vegetation.
- Where the native plants are healthy and capable of regenerating without human intervention.
- When native plant seed is stored in the soil or will be able to reach the site from nearby natural areas, by birds or other animals, wind or water.
- Where the plant community has a high potential for recovery after any short-lived disturbance, such as a fire or cyclonic winds.
- When preventative action is all that is required to avert on-going disturbance, e.g. erection of fencing to prevent intrusion from cattle.

Planting in such sites can work against the aims of restoration by interfering with natural regeneration. The re-establishing plant community will be similar in structure, composition and diversity to the original vegetation.

##### ASSISTED NATURAL REGENERATION

###### Applies:

- To natural areas where the native plant community is largely healthy and functioning.
- When native plant seed is still stored in the soil or will be able to reach the site from nearby natural areas, by birds or other animals, wind or water.
- Where the natural regeneration processes (seedling germination, root suckering etc.) are being inhibited by external factors, such as weed invasion, soil compaction, cattle grazing, mechanical slashing etc.
- When limited human intervention, such as weed removal, minor amelioration of soil conditions, erection of fencing, cessation of slashing, etc. will be enough to trigger the recovery processes through natural regeneration.
- When major component is weed control.

Planting in such sites can work against the aims of restoration by interfering with natural regeneration. The re-establishing plant community will be similar in structure, composition and diversity to the original vegetation.

##### RECONSTRUCTION

###### Applies:

- Where the site is highly degraded or altered.
- When the degree of disturbance has been so great and long-standing that the pre-existing native plant community cannot recover by natural means.
- To sites such as areas of fill, sites affected by stormwater flow, and areas that have been drastically cleared, either mechanically or by stock even though there may be a few remaining native trees or shrubs.
- When a greater degree of human intervention is required, such as weed removal, cessation of grazing and/or slashing, amelioration of soil conditions such as importation of soils, drainage works or reshaping of the landscape.
- When a major component is the importation of native species through planting.

The re-establishing planted community should be similar to the original vegetation in structure, composition and diversity.

##### FABRICATION (Type Conversion)

###### Applies:

- Where site conditions have been irreversibly changed.
- When it is not possible to restore the original native plant community.
- Where a better-adapted local plant community can be planted that will function within the changed conditions.
- In situations such as the construction of a wetland plant community to mitigate increased urban stormwater run-off.
- N.B Revegetation (planting) is the major component in a fabrication program.

The re-establishing planted community should be similar to the naturally occurring plant community of the same type e.g. freshwater wetlands in structure, composition and diversity.

#9 Rehabilitation Planting Character



Existing intact patches of native vegetation



Revegetation interface zone - Fire resistant species



Dense Revegetation to match into existing vegetation



Revegetation Zone - Broad acre revegetation



Core Revegetation Zone to Drainage features



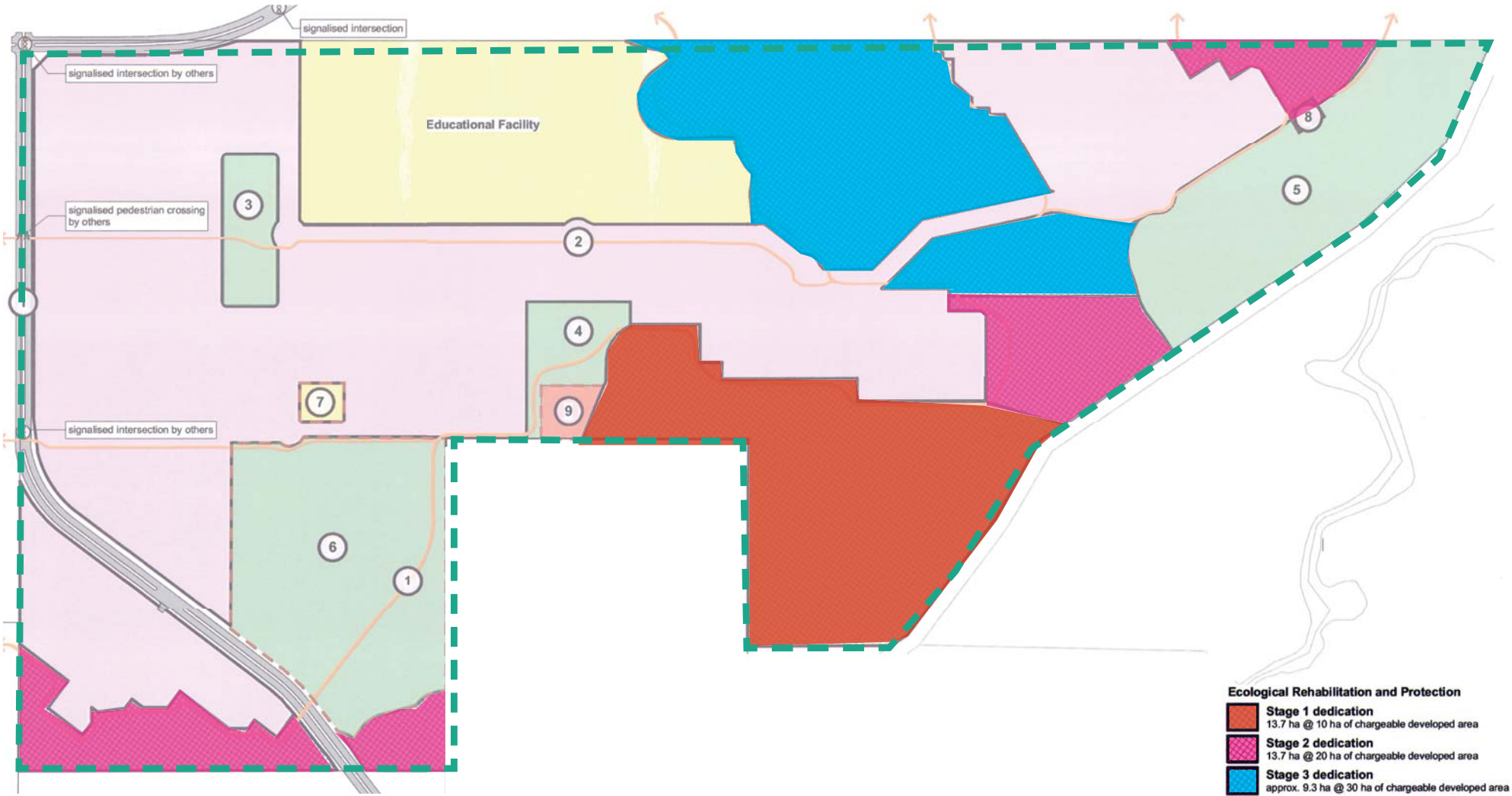
Fragmented native values - grass understory



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#10 Preliminary Rehabilitation Staging Plan



Preliminary Rehabilitation Staging Plan

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#11 Rehabilitation Planting Species



Banksia robur



Lophostemon confertus



Hibiscus tiliaceus



Eucalyptus robusta



Corymbia citriodora



Dianella spp



Lomandra spp



Xanthorrhoea fulva



Corymbia intermedia



Juncus usitatus



Ficinia nodosa



Gahnia sieberiana



Imperata cylindrica



Eucalyptus tereticornis



Eucalyptus intermedia