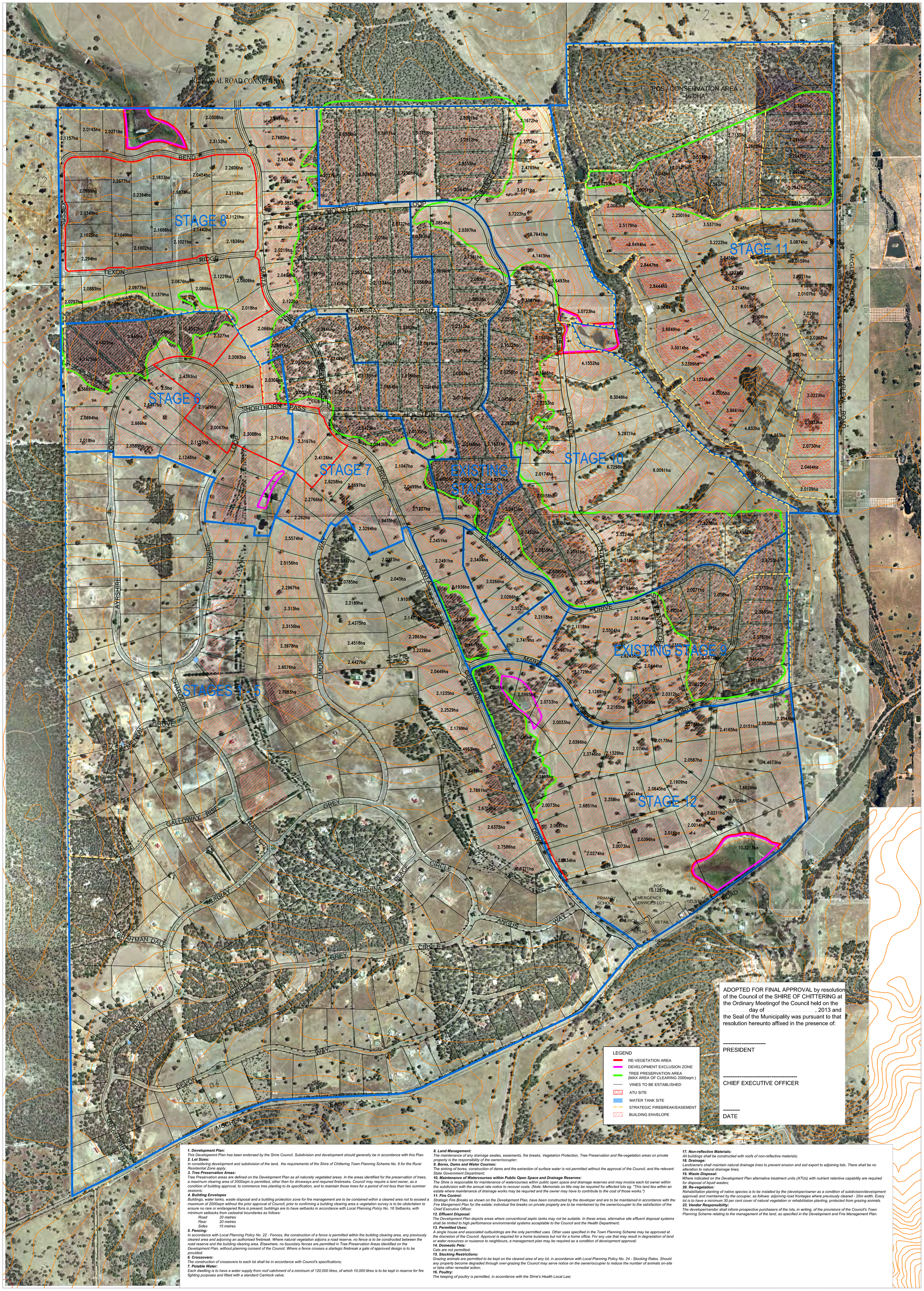
Development Services Attachments
Wednesday, 28 October 2015

REPORT NUMBER	REPORT TITLE AND ATTACHMENT DESCRIPTION	PAGE NUMBER(S)
9.1.1	**Proposed modifications to Maryville Downs Structure Plan, Stage 12** 1. Locality Plan 2. Proposed amended Structure Plan 3. Current endorsed Structure Plan 4. Draft Bushfire Management Plan 5. Local Water Management Strategy 6. Consultation Plan 7. Schedule of Submissions	1 - 168

Locality Plan

Stage 12 – Maryville Downs



ADOPTED FOR FINAL APPROVAL by resolution of the Council of the SHIRE OF CHITTERING at the Ordinary Meetingof the Council held on the ..... day of ....., 2013 and the Seal of the Municipality was pursuant to that resolution hereunto affixed in the presence of:

PRESIDENT

CHIEF EXECUTIVE OFFICER

DATE

1. Development Plan:
This Developemnt Plan has been endorsed by the Shire Council. Subdivision and development should generally be in accordance with this Plan.

2. Lot Sizes:
In considering development and subdivision of the land, the requirements of the Shire of Chittering Town Planning Scheme No. 6 for the Rural Residential Zone apply.

3. Tree Preservation Areas:
Tree Preservation areas are defined on the Development Plan as all naturally vegetated areas. In the areas identified for the preservation of trees, a maximum clearing area of 2000sqm is permitted, other than for driveways and required firebreaks. Council may require a land owner, as a condition of building approval, to commence tree planting to its specification, and to maintain those trees for a period of not less than two summer seasons;

4. Building Envelopes
Buildings, water tanks, waste disposal and a building protection zone for fire management are to be contained within a cleared area not to exceed a maximum of 2000sqm without the prior approval of Council; prior to confirming a building clearing area a vegetation survey is to be ubdertaken to ensure no rare or endangered flora is present; buildings are to have setbacks in accordance with Local Planning Policy No. 18 Setbacks, with minimum setbacks from cadastral boundaries as follows:

Road	*20 metres*
Rear	*20 metres*
Sides	*15 metres*

5. Fencing:
In accordance with Local Planning Policy No. 22 - Fences, the construction of a fence is permitted within the building clearing area, any previously cleared area and adjoining an authorised firebreak. Where natural vegetation adjoins a road reserve, no fence is to be constructed between the road reserve and the building clearing area. Elsewhere, no boundary fences are permitted in Tree Preservation Areas identified on the Development Plan, without planning consent of the Council. Where a fence crosses a startegic firebreak a gate of approved design is to be provided.

6. Crossovers:
The construction of crossovers to each lot shall be in accordance with Council's specifications;

7. Potable Water:
Each dwelling is to have a water supply from roof catchment of a minimum of 120,000 litres, of which 10,000 litres is to be kept in reserve for fire fighting purposes and fitted with a standard Camlock valve;

8. Land Management:
The maintenance of any drainage swales, easements, fire breaks, Vegetation Protection, Tree Preservation and Re-vegetation areas on private property is the responsibility of the owner/occupier;

9. Bores, Dams and Water Courses:
The sinking of bores, construction of dams and the extraction of surface water is not permitted without the approval of the Council, and the relevant State Government Department;

10. Maintenance of Watercourses within Public Open Space and Drainage Reserves:
The Shire is responsible for maintenance of watercourses within public open space and drainage reserves and may invoice each lot owner within the subdivision with the annual rate notice to recover costs. (Note: Memorials on title may be required for affected lots eg. "This land lies within an estate where maintenance of drainage works may be required and the owner may have to contribute to the cost of those works.")

11. Fire Control:
Strategic Fire Breaks as shown on the Development Plan, have been constructed by the developer and are to be maintained in accordance with the Fire Mangement Plan for the estate; individual fire breaks on private property are to be maintained by the owner/occupier to the satisfaction of the Chief Executive Officer.

12. Effluent Disposal:
The Development Plan depicts areas where conventional septic tanks may not be suitable. In these areas, alternative site effluent disposal systems shall be limited to high performance environmental systems acceptable to the Council and the Health Department;

13. Permitted Uses:
A single house and associated outbuildings are the only permitted uses. Other uses specified in the Town Planning Scheme may be approved at the discretion of the Council. Approval is required for a home buisiness but not for a home office. For any use that may result in degradation of land or water resources or nuisance to neighbours, a management plan may be required as a condition of development approval;

14. Domestic Pets:
Cats are not permitted;

15. Stocking Restrictions:
Grazing animals are permitted to be kept on the cleared area of any lot, in accordance with Local Planning Policy No. 24 - Stocking Rates. Should any property become degraded through over-grazing the Council may serve notice on the owner/occupier to reduce the number of animals on-site or take other remedial action;

16. Poultry:
The keeping of poultry is permitted, in accordance with the Shire's Health Local Law;

17. Non-reflective Materials:
All buildings shall be constructed with roofs of non-reflective materials;

18. Drainage:
Landowners shall maintain natural drainage lines to prevent erosion and soil export to adjoining lots. There shall be no alteration to natural drainage lines;

19. Waste Disposal:
Where indicated on the Development Plan alternative treatment units (ATUs) with nutrient retentive capability are required for disposal of liquid wastes;

20. Re-vegetation:
Rehabilitation planting of native species is to be installed by the (developer/owner as a condition of subdivision/development approval) and maintained by the occupier, as follows: adjoining road frontages where previously cleared - 20m width. Every lot is to have a minimum 30 per cent cover of natural vegetation or rehabilitation planting, protected from grazing animals.

23. Vendor Responsibility:
The developer/vendor shall inform prospective purchasers of the lots, in writing, of the provisions of the Council's Town Planning Scheme relating to the management of the land, as specified in the Development and Fire Management Plan.

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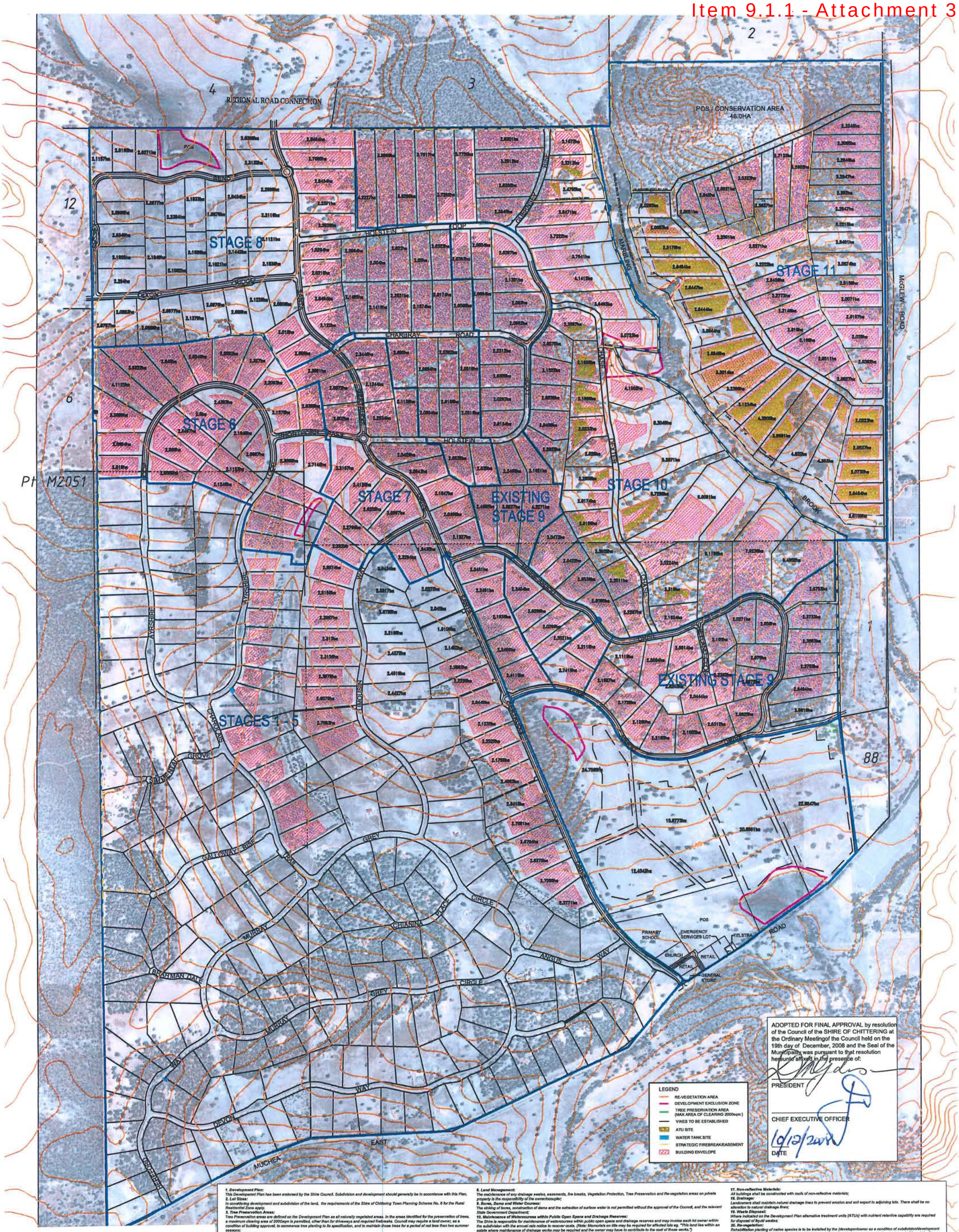
N

REV	DESRIPTION	YYMMDD	DRAWN	APPR'D
A	BASED ON PLAN GLE MAR DEV 02M	130708	FC&SB	TT

REVISED DEVELOPMENT PLAN
Maryville-Muchea East Road
Shire of Chittering

SIZE A1
1:7500
0 metres 75 150 225 300

REF NO. GLE MAR
DRAW NO. DEV 02
REV. N



LEGEND

- RE-VEGETATION AREA
- DEVELOPMENT EXCLUSION ZONE
- TREE PRESERVATION AREA (MAX AREA OF CLEARING 2000sqm)
- VINES TO BE ESTABLISHED
- ATU SITE
- WATER TANK SITE
- STRATEGIC FIREBREAK/EASEMENT
- BUILDING ENVELOPE

ADOPTED FOR FINAL APPROVAL by resolution of the Council of the SHIRE OF CHITTERING at the Ordinary Meetingof the Council held on the 19th day of December, 2008 and the Seal of the Municipality was pursuant to that resolution hereunto affixed in the presence of:

PRESIDENT

CHIEF EXECUTIVE OFFICER

16/12/2008
DATE

1. Development Plan:
This Development Plan has been endorsed by the Shire Council. Subdivision and development should generally be in accordance with this Plan.

2. Lot Sizes:
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SHIRE OF CHITTERING

18/03/0022

WAPC 136789

REVISED DEVELOPMENT PLAN

MARYVILLE - MUCHEA EAST ROAD

SHIRE OF CHITTERING

scale: 1:10000
drawn: PC
checked: TT
approved: TT
date: 1/11/2008
dwg: MARYVILLE.dv

day

dwg no: GLE MAR DEV 02 rev L

Stage 12 Maryville Estate

Fire Management Plan

Prepared for
RobertsDay
by Strategen

August 2015

strategen
ENVIRONMENTAL

Stage 12 Maryville Estate

Fire Management Plan

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

August 2015

Limitations

Scope of services

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

Reliance on data

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

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

Environmental conclusions

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

Client: RobertsDay

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Draft Report	Rev A	For review by Client	D Panickar / R Banks	Electronic	26 Aug 2015
Final Report	Rev 0	For submission to SoC	D Panickar	Electronic	28 Aug 2015

Filename: RDP15252_01 R001 Rev 0 - 28 August 2015

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1. Introduction

1.1 Background

RobertsDay are preparing a revised development plan for Stage 12 of the Maryville Estate (the project area) in the Shire of Chittering as displayed in Figure 1.

There is an inherent bush fire risk to future assets of the development from surrounding landholdings and proposed on-site retained vegetation and revegetation. Consequently, Strategen have been commissioned to prepare a Fire Management Plan (FMP) for the project area which documents suitable bushfire management and mitigation measures to ensure the protection of life and property assets contained within.

This FMP has been prepared in accordance with *Planning for Bush Fire Protection Guidelines (Edition 2)* (PFBFP Guidelines; WAPC et al. 2010), with consideration of the *Draft State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; DoP & WAPC 2015a) and accompanying *Draft Guidelines for Planning in Bushfire-Prone Areas* (revised guidelines; DoP & WAPC 2015b) for endorsement by Department of Fire and Emergency Services (DFES) and Shire of Chittering (SoC). A completed FMP compliance checklist is contained in Appendix 1.

1.2 Purpose and application of the document

The purpose of the FMP is to provide guidance on how to plan for and manage the potential bushfire risk associated with the project area through recommendation of a range of bushfire management measures. The FMP outlines how on-site assets can be protected during the summer months when the threat from wildfire is at its peak. This is particularly relevant when existing fire appliances in the area may be unable to offer a fast emergency suppression response. Therefore, proposed assets within the project area should be self-protecting from wildfire.

Implementation of the FMP applies to the current landowner/developer, SoC and perspective landowners to ensure bushfire management measures are adopted and implemented on an ongoing basis to achieve bushfire management objectives.

1.3 Stakeholder consultation

Strategen has facilitated consultation between the developer, SoC and DFES to ensure aims and objectives of the FMP are in accordance with stakeholder expectations and the FMP maintains compliance with the Guidelines.

1.4 Document review

This plan will be updated as required, following the date of approval to ensure:

1. Implementation of the FMP is assessed and corrective actions are applied in cases of non-compliance.
2. The effectiveness and impact of fire prevention work is evaluated.

The developer will be responsible for updating and revising the FMP until the development has been fully implemented, after which time SoC will be the authority responsible for updating and revising the FMP.

Figure 1: Stage 12 Maryville Estate - Development Plan

Scale 1:10,000 at A4

0 50 100 150 200 250 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 25/08/2015
Author: JCrute
Source: Aerial image: Client 2015.

Legend

- Project area
- Development exclusion
- Revegetation
- Proposed lots
- Existing buildings
- Building envelopes
- Sportsground
- Tree protection
- Vegetation
- Existing cadastre

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2. Aim and objectives

2.1 Aim

The FMP aims to achieve a reduction in the impact from uncontrolled bushfires and minimise potential impacts on life, property and environmental assets of the proposed development. This will be achieved by preparing an FMP that:

- quantifies the bushfire hazard and assesses the bushfire risk associated with the project area
- documents bushfire prevention requirements of the project area to provide ongoing protection to future residents, built assets and the subject land
- identifies bushfire protection issues, appropriate strategies and those persons and/or organisations who have a responsibility to implement the FMP
- is in accordance with the Guidelines and is compatible with bushfire management on neighbouring subdivisions
- provides guidance for the developer, SoC and perspective landowners to protect the subject land in the event that fire appliances may not be available to offer a fast suppression response.

2.2 Objectives

Table 1 outlines key objectives of the FMP and the relevant section/s of this document in which they are addressed.

Table 1: Key objectives of the FMP

Objective	Section
Define areas where values are located	Section 3.6
Define and rank fire hazard areas	Section 4.2.1
Nominate individuals and organisations responsible for fire management and associated works within the Project Area	Table 7
Propose fire management measures for the Project Area, with due regard for life, property and the environment	Section 5
Define an assessment procedure that will evaluate the effectiveness and impact of proposed, as well as existing fire prevention work and strategies	Section 6.3
Provide performance criteria and acceptable solutions for all fire management works (e.g. firebreaks, low fuel areas and building construction standards)	Section 4.2.2

3. Description of the area

3.1 General overview

The project area is located approximately 49 km northeast of the Perth CBD and is bound by Santa Gertrudis Drive, Maine Anjou Drive and Muchea East Road as displayed in Figure 2. The project area encompasses approximately 106.79 ha and currently contains, cleared agricultural land, private dams and approximately 8.45 ha of retained native trees adjacent to the northwest boundary.

The 8.45 ha of retained trees are proposed to be conserved in a 'tree preservation area' as part of the development. This area, as well as proposed revegetation areas throughout the project area will pose an inherent bushfire risk to life and property assets of the development. In addition, there are areas of retained vegetation in adjacent landholdings which will also pose a bushfire risk to assets of the development.

3.1.1 Development context and fire management planning

The development plan will guide future residential development over the project area, consisting of residential lots, an internal road network and Public Open Space (POS) areas. At a strategic level, the project area is located in both highly cleared and vegetated areas, will contain high residential occupancy and is situated adjacent to a potentially bushfire prone vegetation.

Due to the proximity of the project area to remnant native vegetation and the associated bush fire risk to the site, an FMP is required to document how the site will be protected from potential bush fire. This is consistent with current and proposed State level planning, as outlined in PFBFP Guidelines, draft State Planning Policy and revised draft Guidelines.

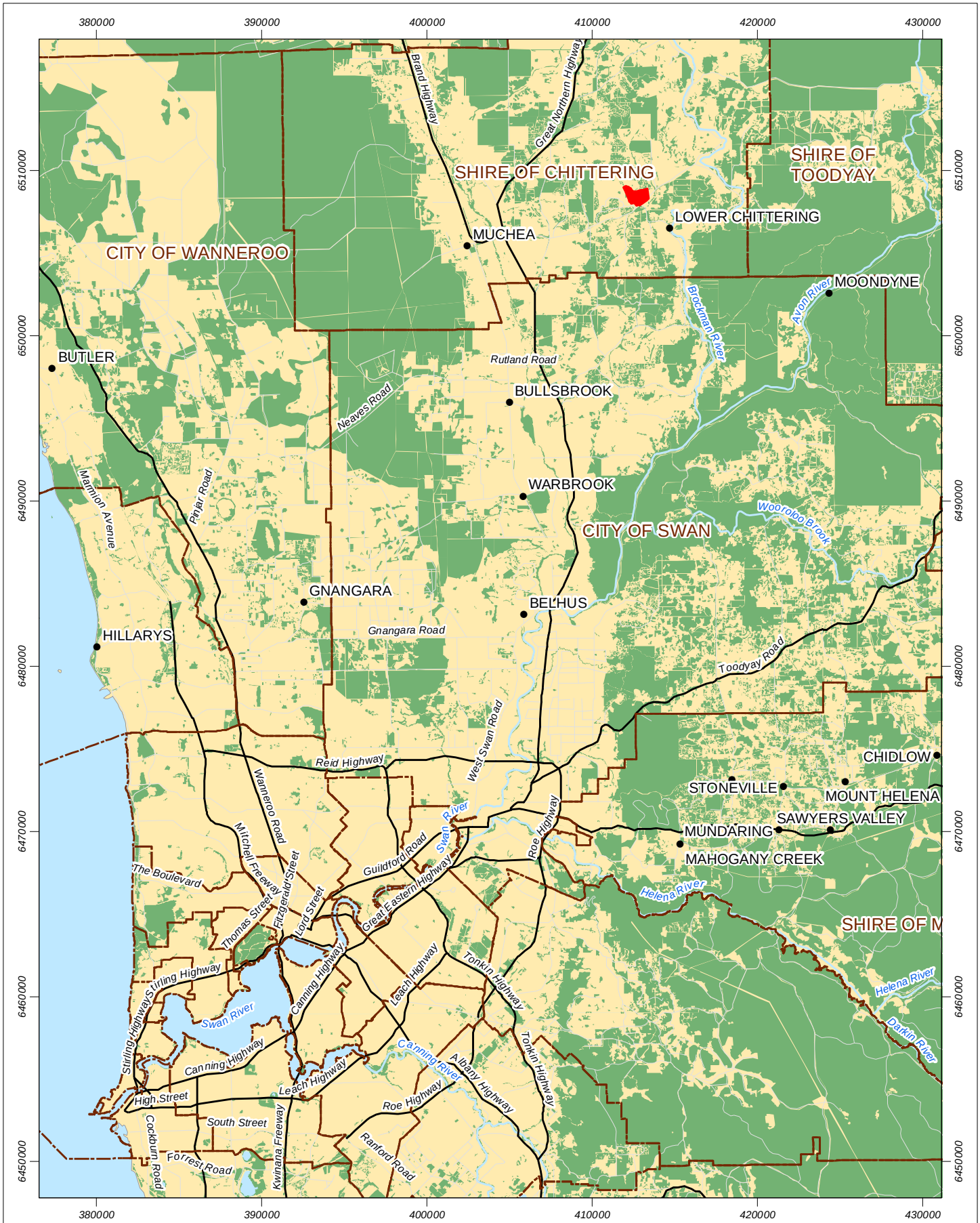

Figure 2: Regional location

Scale 1:310,261 at A4

0 2 4 6 8 10 km

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 21/08/2015
Author: JCrute
Source: Topography: Geoscience Australia 2011.

Legend

- Town
- Major road
- Minor road
- Major river
- Lakes
- Project area
- Local government boundary
- Native vegetation

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3.2 Local climate

Lower Chittering experiences a Mediterranean-type climate characterised by mild, wet winters and warm to hot, dry summers. The Bureau of Meteorology (BoM) weather station at Pearce RAAF base (Station No. 9053), located approximately 13 km southwest of the project area, provides average monthly climate statistics for the locality, as illustrated in Figure 3.

Average annual rainfall recorded (since 1955) at Pearce RAAF is 679.2 mm (BoM 2015). Rainfall may occur at any time of year; however, most occurs in winter in association with cold fronts from the southwest. Highest temperatures occur from December to March, with average monthly maximums ranging from 30.3°C in December to 33.5°C in January (BoM 2015). Lowest temperatures occur from June to September, with average monthly minimums ranging from 8.2°C in August to 9.4°C in June (BoM 2015).

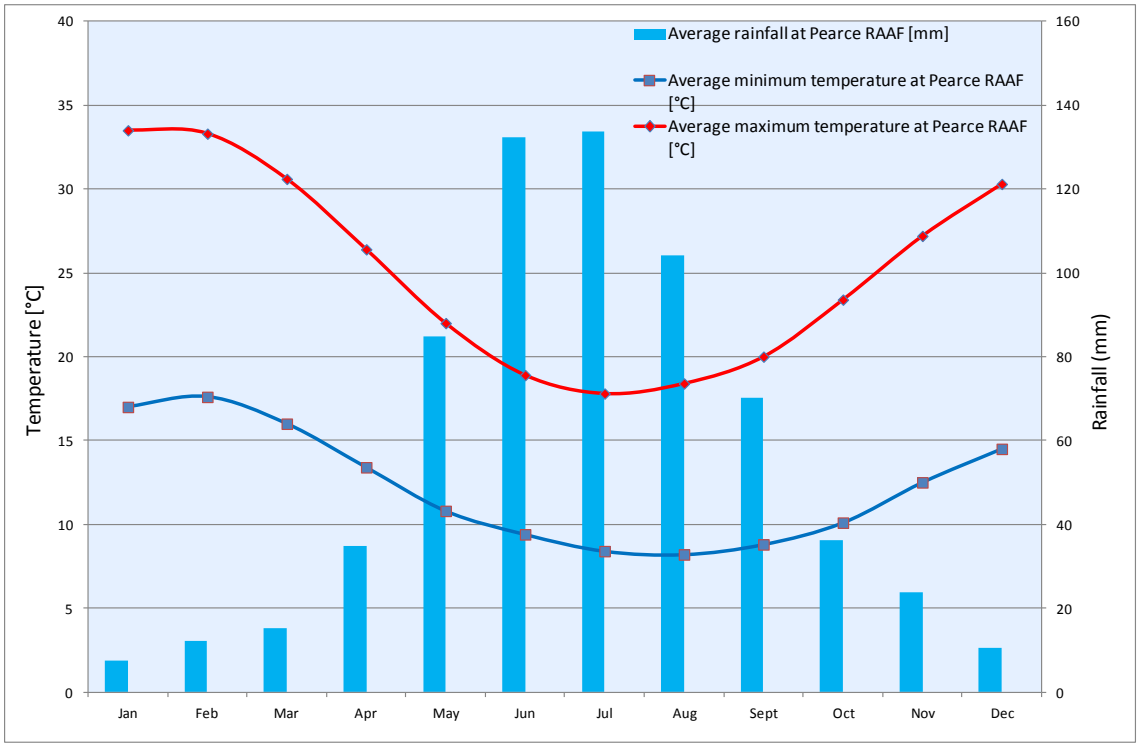

Figure 3: Average monthly climate statistics for Pearce RAAF (Station No. 9053)

3.2.1 Fire weather

Southwest Western Australia generally experiences a cool to mild growing season in the months of August through to November of each year, followed by four months of summer drought conditions, which is when the potential for wildfire occurrence is at its peak. The worst fire weather conditions occur during this dry period when a low pressure trough forms off the west coast and strong winds develop from the north or northeast. These conditions are sometimes associated with 'Extreme' or 'Catastrophic' fire danger indices, which are consistent with very high temperatures, low relative humidity and strong winds. Based on the predominant summer climatic conditions of the local area, these high fire risk conditions are considered to occur less than 5% of the time during the designated bush fire season, which equates to around 9 days between December and March.

Average 9:00 am and 3:00 pm January wind profiles for Pearce RAAF are contained in Appendix 2, which illustrate that the predominant winds during this high risk period are from the east in the morning averaging around 18 km/h; and from the southwest in the afternoon averaging around 20 km/h (BoM 2015). Mean 9:00 am and 3:00 pm relative humidity in January for Pearce RAAF is 48% and 30% respectively. These predominant fire weather conditions correlate with an average fire danger index of 'High', as determined using the Commonwealth Science and Industrial Research Organisation (CSIRO) Fire Danger and Fire Spread Calculator (CSIRO 1999). These dominant fire weather conditions are considered to occur more than 95% of the time during the designated bush fire season.

3.3 Landform and topography

The project area is located on the Swan Coastal Plain, which is characterised by a low-lying coastal plain mainly covered with woodlands. Banksia and Eucalyptus-Banksia woodlands are the usual vegetation contained within the dune systems (McKenzie *et al.* 2003).

The project area occurs on gently sloping land with elevation ranging from 160 mAHD (Australian Height Datum) in the north to 130 mAHD in the south (Figure 4).

3.4 Vegetation

3.4.1 Vegetation complexes

The project area is located in the South Western Botanical Province of Western Australia, in the Darling Botanical District and the Swan Coastal Plain subregion of the Drummond Botanical District (Beard 1990). At a finer scale, the project area is situated at the interface of the Coolakin (low rainfall) and Yalanbee (low rainfall) vegetation complexes as mapped by Heddle *et al.* (1980) and illustrated in Figure 5. These complexes are best described as:

- Coolakin (low rainfall): Woodland of *Eucalyptus wandoo* with mixtures of *E. patens, E. marginata* subsp. *thalassica* and *Corymbia calophylla* on the valley slopes in arid and perarid zones.
- Yalanbee (low rainfall): woodlands of *Eucalyptus wandoo* and *E. accedens* restricted to the uplands in the low rainfall areas in the north and east of the Darling Plateau.

3.4.2 On-site vegetation

Majority of vegetation within the project area has been cleared for existing agricultural land uses. Remaining vegetation is comprised of:

- isolated trees within paddocks
- a pocket of eucalypts in the northwest corner of the project area with the understorey cleared of vegetation
- woodland vegetation associated with Muchea East Road along the southern boundary of the project area.

3.4.3 Surrounding vegetation

Vegetation surrounding the project area is generally representative of the classifications listed above. Specifically these areas are comprised of the following:

- isolated trees within paddocks
- eucalypts with the understorey cleared of vegetation to the west and northwest of the project area
- woodland vegetation to the south and northeast of the project area.

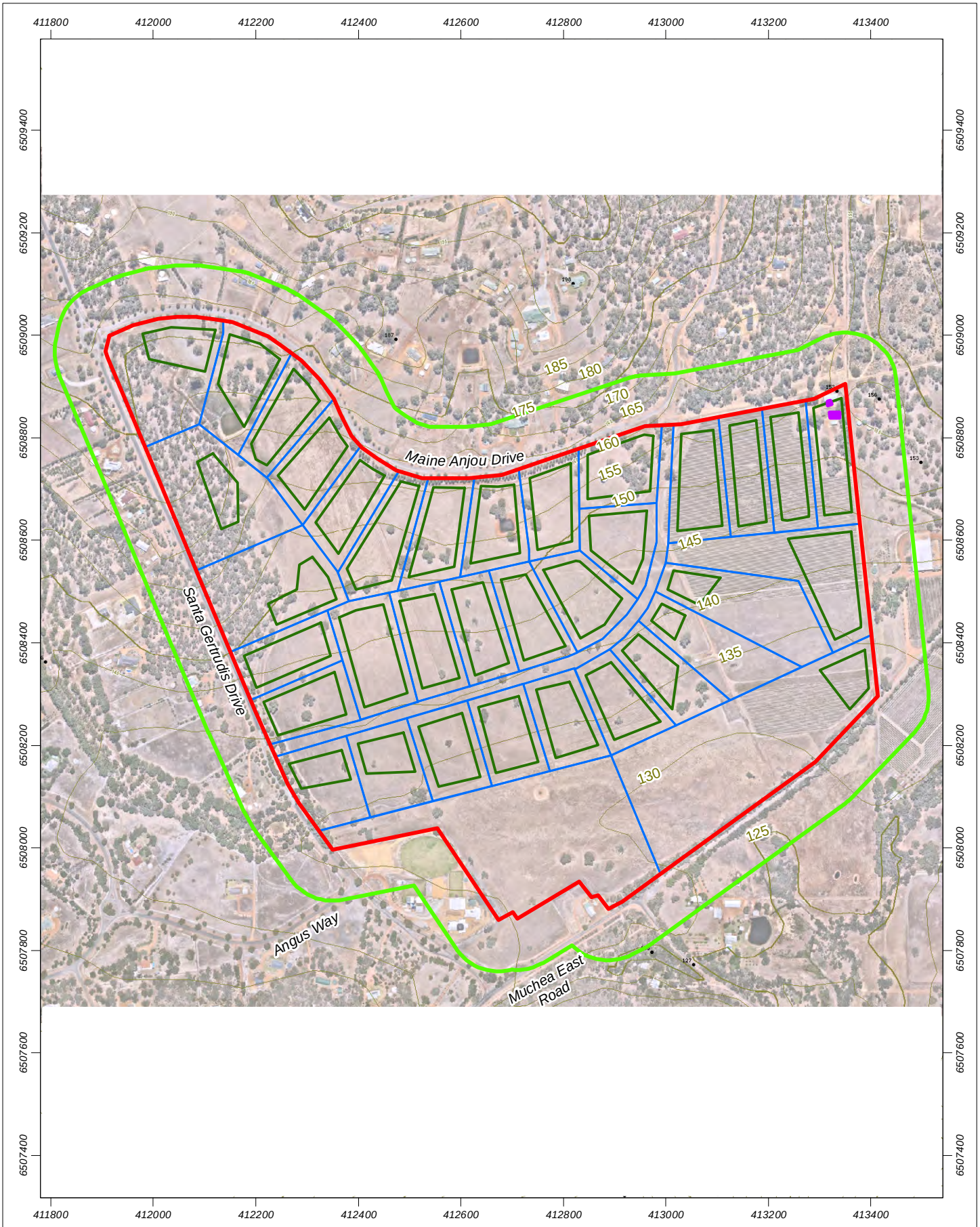

Figure 4: Site topography

Scale 1:10,000 at A4

0 50 100 150 200 250 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 25/08/2015
Author: JCrute
Source: Aerial image: Client 2015.
Topography: SLIP, Landgate 2015.
Path: Q:\Consult\2015\RDP\RDP15252\ArcMap_documents\R001\RevA\RDP15252_01_R001_RevA_F004.mxd

Legend

- Project area
- 100m wide assessment area
- Proposed lots
- Existing buildings
- Building envelopes
- Surface elevation (mAHD)
- Spot heights (mAHD)

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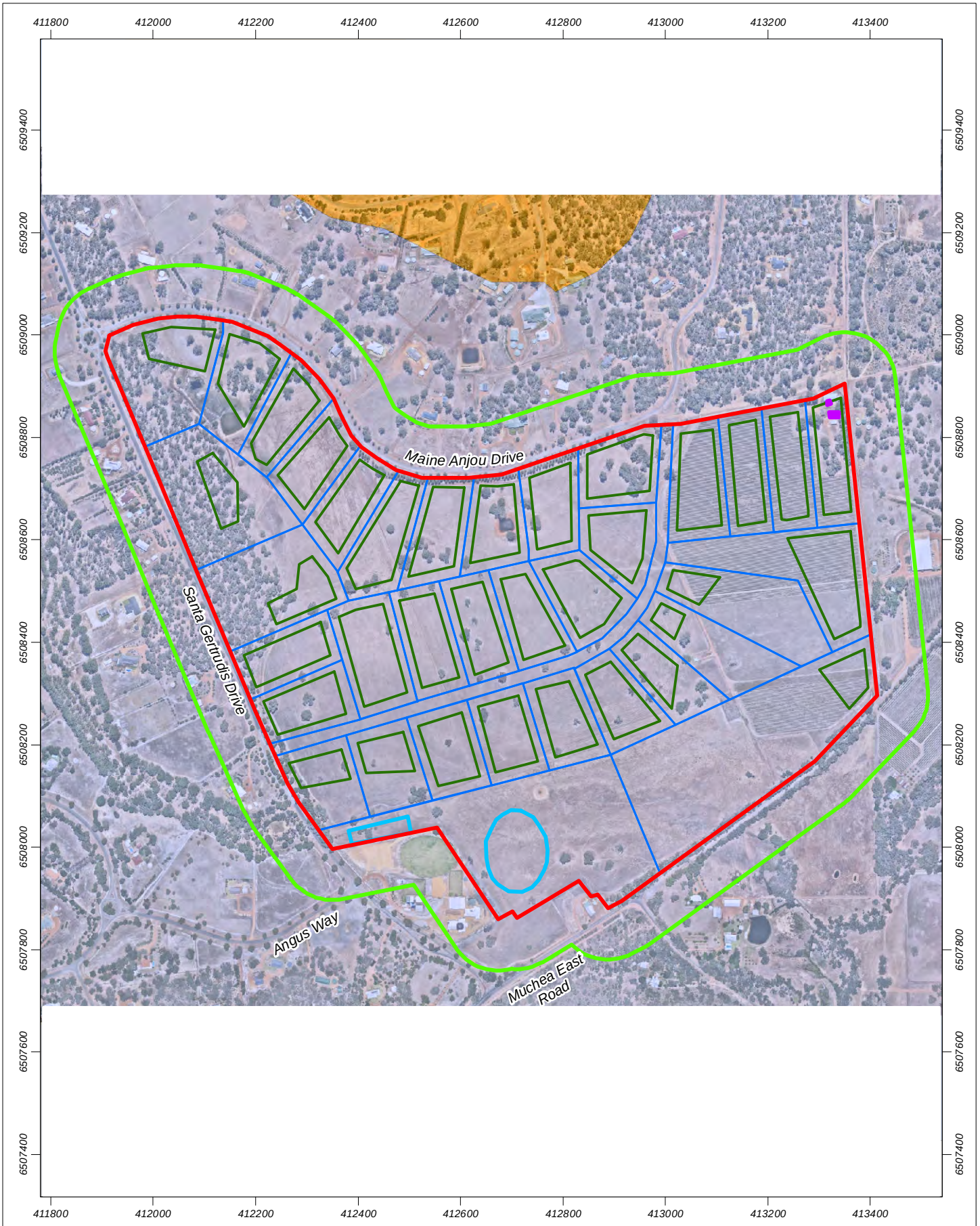

Figure 5: Vegetation complexes

Scale 1:10,000 at A4

0 50 100 150 200 250 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 25/08/2015
Author: JCrute
Source: Aerial image: Client 2015. Vegetation: System 6, DEC 2012.

Legend

- Project area
- 100m wide assessment area
- Proposed lots
- Existing buildings
- Building envelopes
- Sportsground

Vegetation complex

- Coolakin complex in low rainfall
- Yalanbee complex in low rainfall

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3.5 Land use

3.5.1 Current land use

The project area is zoned Rural Residential under the Shire of Chittering Town Planning Scheme No 6 (TPS No. 6, DoP 2015).

3.5.2 Proposed zoning and land use

The land is proposed to be developed for rural residential purposes in accordance with Figure 1, which will result in a total of 35 rural residential lots and one POS area, along with the provision of road, water, sewerage, power, gas and communications infrastructure.

Revegetation and tree retention areas are proposed within the project area which will pose a bushfire risk to life and property assets contained within rural residential lots.

3.5.3 Surrounding zoning and land use

Surrounding land is zoned a mixture of rural residential and Special Use. Special use areas comprise the following:

- a vineyard adjacent to the eastern boundary of the project area
- a school and church adjacent to the southwest boundary of the project area
- the Lower Chittering Volunteer Fire Station adjacent to the southern boundary of the project area.

3.6 Site assets

The project area currently contains minimal assets due to historical agricultural land uses. Site assest are currently limited to:

- native vegetation
- farm dams and fences.

3.7 Water and power supply

A 120 kL rainwater tank (of which 10 kL will be reserved for fire fighting purposes) will be constructed for each proposed dwelling. Each tank will be fitted with a hydrant or standpipe for fire fighting purposes and 50 mm male camlock couplings with full flow valves in accordance with 'Category C Domestic Water Tanks in Bush Fire Prone Areas', as outlined in the DFES Coupling Standard for Static Water supplies.

Power supply services will be extended throughout the project area from surrounding areas of residential developments.

3.8 Site access

The site can currently be accessed via informal tracks off Santa Gertrudis Drive and Maine Anjou Drive. The proposed vehicular access network will provide a formal access point (via a 25 m wide road) to both of these roads.

4. Fire problem

4.1 Bushfire history

There is no evidence of recent bush fire occurrence within and adjacent to the project area. FireWatch indicates that no bush fire activity has occurred in the immediate locality of the site for at least the past 25 years (Landgate 2015). In the absence of fire and fuel hazard reduction, the resulting available fuel loads throughout vegetated areas is generally high due to the increasing vegetation density and ongoing accumulation of trash, litter and scrub fuels at ground level.

The two most recent bushfires in the wider locality occurred approximately 4.3 km northeast of the project area in 2004 and 4.5 km east of the project area in 2011 (Landgate 2015).

On development of the project area, the risk of ignition is expected to increase given the existing high available fuel loads in adjoining vegetated land and proposed increase in population, public access and urban development at the bushland interface. The predominant sources of ignition are expected to be:

- deliberately lit fires (e.g. suspected arson)
- accidentally lit fires (e.g. vehicle accidents, sparks from vehicle exhausts and/or industrial work, incorrect disposal of cigarette butts).

There are numerous emergency service resources located in the Shire of Chittering that could provide a suppression response to the project area in approximately 30-40 minutes, including the Lower Chittering Volunteer Bush Fire Brigade located on adjacent land.

4.2 Bushfire hazards

A bushfire hazard assessment aims to classify the bush fire hazard at both the strategic and local level, which leads to an assessment of the BAL. A bushfire hazard assessment has been undertaken across the project area and adjacent land in accordance with procedures outlined in PFBFP Guidelines and AS 3959–2009.

4.2.1 Classifying the bushfire hazard

Fuel hazard assessment

A comprehensive fuel hazard assessment of the project area and adjacent land was undertaken by Strategen during a site visit on 19 August 2015. The assessment was undertaken on the basis of a visual inspection of the following factors, cross-referenced with the Swan Coastal Plain Visual Fuel Load Guide (FESA 2012):

- vegetation type and structure
- vegetation condition and density
- fuel age
- scrub extent
- litter and trash accumulation.

On-site fuel hazards

Historically, the project area would have a woodland-forest vegetation structure. However, due to historical clearing and understorey slashing, the project area is now only partially vegetated.

Areas containing isolated trees within paddocks were not assessed as containing a significant fuel hazard (Plate 1). Woodland vegetation within the proposed 'tree protection' area in the northwest portion of the project area contains total available fuel loads ranging from 8-10 t/ha (tonnes per hectare) with a large portion comprised of leaf litter fuels as outlined in Sneeuwjagt & Peet (1985) (Plate 2 and Plate 3). Woodland vegetation within the southern portion of the project area contains relatively intact understorey vegetation and consequently total available fuel loads in this area was higher than within the 'tree protection' area (assessed at 12-15 t/ha) (Plate 4).

Surrounding fuel hazards

Similarly to the project area, surrounding areas containing isolated trees within paddocks were not assessed as containing a significant fuel hazard. Woodland vegetation to the west and northwest of the project area is comprised of eucalypts with a modified understorey and total available fuel loads were assessed as between 8-12 t/ha (Plate 5 and Plate 6). Woodland vegetation to the north and south of the project area contains relatively intact understorey vegetation and total available fuel loads in this area were assessed at 12-15 t/ha (Plate 7 and Plate 8).

Plate 1: Site overview (isolated trees in paddocks)

Plate 2: Woodland vegetation within the proposed 'tree protection' area

Plate 3: Woodland vegetation within the proposed 'tree protection' area

Plate 4: Woodland vegetation in the southern portion of the project area

Plate 5: Woodland vegetation to the west of the project area

Plate 6: Woodland vegetation to the northwest of the project area

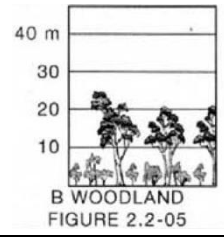
Plate 7: Woodland vegetation to the north of the project area

Plate 8: Woodland vegetation to the south of the project area

Vegetation class and type

An assessment of vegetation class and type within and adjacent to the project area has been undertaken in accordance with procedures outlined in Table 2.3 of AS 3959–2009 (Table 2).

Table 2: Predominant vegetation class and type

Predominant vegetation and fuel load	Vegetation class	Vegetation type	Figure (as per PFBFP Guidelines)	Description (as per PFBFP Guidelines)
On-site and surrounding woodland (8-15 t/ha)	(B) Woodland	Woodland		Trees 10–30 m high; 10-30% foliage cover dominated by eucalypts; understorey low trees to tall shrubs typically dominated by *Acacia*, *Callitris* or *Casuarina*.

Location of bushfire hazards

The location of existing bush fire hazard areas is outlined in the vegetation class map (Figure 6). This map has been created using the abovementioned vegetation class and type descriptions and assessed average available fuel loads.

Bushfire hazard levels

Bushfire hazard levels of the predominant vegetation are displayed in the bushfire hazard assessment map (Figure 7). Classifying the bushfire hazard by assessing the predominant vegetation is a key to the initial determination of site suitability for development. This also leads to determination of the potential level of construction standard by the application of AS 3959–2009 for any proposed development.

The pre-development, on-site bush fire hazard level is 'Low' within majority of the project area due to the largely cleared nature of vegetation contained within. Woodland areas within the project area were assessed as posing 'Moderate-Extreme' bushfire hazards. The proposed revegetation area in the souther portion of the project area is expected to pose a 'Moderate' bushfire hazard following implementation and is depicted as such in Figure 7. Proposed revegetation adjacent to Maine Anjou Drive and Santa Gertrudis Drive will comprise trees over grass for screening purposes and will not pose a bushfire hazard.

The bushfire hazard level throughout adjacent woodland vegetation to the north, south and west of the project area is 'Extreme' due to the occurrence of intact woodland vegetation strata and moderate to high build up of available fuel loads on the ground.

According to PFBFP Guidelines, land with an assessed 'Moderate' to 'Extreme' bush fire hazard level is classified as bushfire prone land, which triggers implementation of AS 3959–2009 for any adjacent proposed development within 100 m, as depicted in Figure 7 by the 100 m wide BAL application area.

4.2.2 Bushfire hazard performance criteria

The relationship between various bushfire hazard levels and development performance criteria is set out in Table 3. A portion of the project area and proposed lots are situated within 100 m of 'Extreme' bushfire hazard areas, as displayed in Figure 7. Consequently, a comprehensive suite of bush fire risk treatment and mitigation measures, including implementation of AS 3959-2009, will need to be implemented to protect future assets from existing hazard areas.

Compliance with performance criteria for a 'Moderate' bush fire hazard level will be achieved for the proposed development, focussing on the key areas of development location, vehicular access, water supply, siting of development and design of development. Performance criteria will be achieved through adoption of recommended acceptable solutions outlined in PFBFP Guidelines.

Table 3: Bushfire hazard levels and performance criteria

Bush fire hazard level	Bush fire protection performance criteria required
Low hazard	Development does not require special bush fire planning controls. Despite this, DFES strongly recommends that ember protection features be incorporated in design where practicable.
Moderate hazard	Performance criteria for: • location (Element 1) • vehicular access (Element 2) • water (Element 3) • siting of development (Element 4) • design of development (Element 5).
Extreme hazard	Development is to be avoided in areas with these hazard levels.

Source: WAPC et al. 2010

Compliance of the proposed development with bush fire protection performance criteria and associated acceptable solutions is documented in a completed compliance checklist (Appendix 1).

Figure 6: Vegetation class map

Scale 1:10,000 at A4

0 50 100 150 200 250 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 25/08/2015
Author: JCrute
Source: Aerial image: Client 2015.

Legend

- Project area
- 100m wide assessment area
- Development exclusion
- Revegetation
- Proposed lots
- Existing buildings
- Building envelopes
- Sportsground
- Existing cadastre
- Tree protection

Vegetation class

- Woodland

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Path: Q:\Consult\2015\RDP\RDP15252\ArcMap_documents\R001\RevA\RDP15252_01_R001_RevA_F006.mxd

Figure 7: Bushfire hazard assessment map

Scale 1:10,000 at A4

0 50 100 150 200 250 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 25/08/2015
Author: JCrute
Source: Aerial image: Client 2015.

Legend

- Project area
- 100m wide assessment area
- Development exclusion
- Revegetation
- Proposed lots
- Existing buildings
- Building envelopes
- Sportsground
- Existing cadastre
- Tree protection
- 100m wide BAL application area

Bushfire hazard level

- Extreme
- Moderate

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Path: Q:\Consult\2015\RDP\RDP15252\ArcMap_documents\R001\RevA\RDP15252_01_R001_RevA_F007.mxd

4.2.3 Classifying the Bushfire Attack Level (BAL)

This procedure, as outlined in PFBFP Guidelines and AS 3959–2009, uses a combination of the state-adopted Fire Danger Index rating of FDI 80, assessed vegetation class, slope under classified vegetation and distance maintained between proposed development areas and predominant vegetation to specify the Bushfire Attack Level (BAL). Based on the specified BAL, construction requirements for proposed buildings can then be assigned.

A portion of the proposed lots within project area will be located within 100 m of vegetation assessed as having a 'Moderate-Extreme' bushfire hazard level (i.e. bushfire prone land), which will require implementation of AS 3959–2009 and increased building construction standards for proposed built assets within the 100 m BAL application area (refer to Figure 7). BALs for proposed built assets within BAL application areas are outlined in Table 4.

Table 4: Determination of bushfire attack level (BAL)

Vegetation class	Bushfire Attack Level (BAL)				
	BAL FZ	BAL 40	BAL 29	BAL 19	BAL 12.5
	Distance (m) of the site from the predominant vegetation class				
	Upslope or flat land				
(B) Woodland	<10 (not supported)	10–<14 (not supported)	14–<20	20–<29	29–<100
	Downslope >0 to 5 degrees				
	<13 (not supported)	13–<17 (not supported)	17–<25	25–<35	35–<100

BAL 19 and corresponding construction standards will apply to all buildings within specified lots in accordance with Figure 8 due to the reduced separation distance to 'Moderate' bushfire hazards and lack of shielding. Hazard separation to these lots will be in the form of building setbacks, road reserve areas and low fuel areas which will achieve (at a minimum), a minimum 20 m wide Building Protection Zone (BPZ) to classified Woodland vegetation (25 m where woodland vegetation is downslope from proposed buildings).

BAL 12.5 and corresponding construction standards will apply to all buildings within specified lots in accordance with Figure 8. BAL 12.5 has been applied based on the separation distances to 'Moderate' and 'Extreme' bush fire hazard areas to proposed residential lots. Hazard separation to these lots will be in the form of building setbacks, low fuel areas and road reserve areas.

All other lots of the proposed development are considered to be BAL-Low, where there is insufficient risk to warrant specific construction requirements. The risk to these lots is diminished due to an increase in the low fuel separation distance to bush fire hazard areas and shielding properties provided by buildings located on the external lots.

Available fuel loads within the BPZ must be maintained within 2 t/ha annually or have grass slashed to a height of 50 mm. The following management measures will also be implemented within BPZs:

- trees are to be low pruned (lower branches trimmed) to at least a height of 2 m
- no tall shrubs or tree is to be located within 2 m of buildings (including windows)
- no tree crowns are to overhang buildings
- tree crowns are to be located a minimum distance of 10 m apart.

The above requirements have been adopted from specifications outlined in *Planning for Bush Fire Protection Guidelines (Edition 2)* (PFBFP Guidelines; WAPC et al. 2010), *Draft State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; DoP & WAPC 2015a) and *Draft Guidelines for Planning in Bushfire-Prone Areas* (revised guidelines; DoP & WAPC 2015b).

Relevant sections of AS 3959–2009 that outline construction standards for buildings in areas specified as BAL 19 and BAL 12.5 are provided in Table 5. Construction standards for BAL 19 and BAL 12.5 are fully explained in Appendix 3.

Table 5: Construction standards

Bushfire Attack Level (BAL)	Classified vegetation within 100 m of the site and heat flux exposure thresholds	Description of predicted bush fire attack and levels of exposure	Relevant section of AS 3959–2009
BAL 19	>12.5 kW/m^2 ≤19 kW/m^2	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3 and 6
BAL 12.5	≤12.5 kW/m2	Ember attack	3 and 5

Source: WAPC et al. 2010

4.3 Inherent bushfire risk

An inherent bush fire risk assessment quantifies the level of risk of loss or damage to current site assets from uncontrolled bush fire, prior to the implementation of the proposed development and associated bush fire risk treatment and mitigation measures.

The risk assessment is derived from the Fire and Emergency Services Authority (FESA, now DFES) *Rural Urban Bush Fire Threat Analysis* (Smith 2003) and Australian Standard/New Zealand Standard *AS/NZS ISO 31000:2009 Risk Management-Principles and Guidelines* (SA & SNZ 2009).

The inherent bush fire risk to the project area was assessed to be 'High' due to the proximity of existing site assets to 'Extreme' on-site and adjacent bush fire hazards, low levels of fuel load maintenance and as the likelihood of ignition and bush fire occurrence (Table 6).

Table 6: Inherent bush fire risk assessment for the project area

Parameter	Risk to site assets
On-site fuel hazard rating (highest rating)	Extreme
Are assets located up-slope from vegetation?	Yes - partially
Are assets located in the flame zone?	No
Resident/visitor presence (low, moderate, high)	Low
Values or assets (low, moderate, high)	Low
Fire unit access risk (low, moderate, high)	Low
Fire suppression response time (minutes)	30-40
Likelihood of ignition and bush fire occurrence (low, moderate, high)	Moderate
Level of bush fire management (low, moderate, high)	High
Overall inherent risk	**Moderate**

A residual bush fire risk assessment for the proposed development using the above methodology is provided in Section 6.2. This assessment quantifies the level of bush fire risk to proposed life and property assets of the project area following implementation of the development and associated bush fire risk mitigation measures.

4.4 Summary of key bushfire issues

The following is a summary of key bushfire issues that have been considered as part of the FMP to inform development of specified bushfire risk treatment and mitigation measures:

- majority of vegetation within the project area has been cleared for agricultural purposes
- retained vegetation is predominantly of a woodland structure containing varying amounts of understorey vegetation (i.e. completely cleared to fully vegetated)
- vegetation on surrounding land is contiguous with that contained within the project area
- there is a current risk of ignition to the site and adjacent vegetation, which is expected to increase given the existing high available fuel loads and proposed increase in population, public access and urban development at the bushland interface
- response times in the event that the site is threatened by uncontrolled bush fire is approximately 30-40 minutes from local volunteer and career bush fire brigades
- a portion of proposed lots within the project area are situated within 100 m of 'Moderate' and 'Extreme' bushfire hazard areas, which triggers implementation of AS 3959–2009
- a portion of proposed lots are situated up-slope (at a maximum angle of 5 degrees) from bushfire prone vegetation to the south
- based on the predominant vegetation type, slope under classified vegetation and separation distances, BAL 12.5 and BAL 19 building construction standards will apply to future residences as depicted in Figure 8
- a minimum 20 m wide BPZ (25 m where woodland vegetation occurs downslope from proposed buildings) will be maintained between classified woodland vegetation and proposed buildings
- available fuel loads within the BPZ must be maintained within 2 t/ha annually or have grass slashed to a height of 50 mm
- trees within the BPZ are to be low pruned (lower branches trimmed) to at least a height of 2 m
- no tall shrubs or tree is to be located within 2 m of buildings (including windows)
- no tree crowns are to overhang buildings
- tree crowns are to be located a minimum distance of 10 m apart.
- performance criteria and acceptable solutions will be achieved for a 'Moderate' bush fire hazard level, focussing on the key areas of development location, vehicular access, water supply, siting of development and design of development
- the inherent bush fire risk to the site was assessed to be 'Moderate'.

5. Bushfire risk treatment and mitigation

The following subsections outline how the inherent bushfire risk to future life and property assets of the project area will be mitigated to achieve a suitable and effective bushfire management outcome for the site. This will be achieved by meeting performance criteria and associated acceptable solutions in accordance with PFBFP Guidelines. Where applicable, these measures are illustrated on an aerial image of the project area to assist with implementation of the FMP (refer to Figure 8).

5.1 Development location

Strategic location, layout and management of future development at the planning stage can reduce future fire threat and risk to critical life and property assets.

Majority of vegetation within the project area has been cleared historically for existing land uses. Additionally, retained and planted vegetation assessed as posing 'Moderate' or 'Extreme' bushfire hazards will not be located directly adjacent to proposed built assets within the project area.

The above measures will ensure that proposed buildings will not be located on land subject to either an 'Extreme' bushfire hazard level or require construction standards applicable to BAL 40 or BAL FZ. This meets performance criteria for development location (Element 1) by adopting acceptable solution A1.1.

5.2 Vehicular access

The proposed vehicular access network will provide a formal access point to Santa Gertrudis Drive and Maine Anjou Drive. This meets acceptable solution A2.1 by ensuring all residents and visitors of the development are provided with at least two vehicular access routes connecting to the surrounding public road network at all times.

The proposed vehicular access network also provides buffers and access for emergency services between proposed residences and the bulk of surrounding bushfire hazards.

All public roads and private driveways will be constructed to specifications in accordance with Main Roads WA and DFES requirements, which align with acceptable solutions A2.2, and A2.5. Cul-de-sacs, battle axes, emergency access ways, fire service access routes, gates, firebreaks and signs are not proposed as part of the development, so compliance with acceptable solutions A2.3, A2.4, A2.6, A2.7, A2.8, A2.9 and A2.10 is not applicable in this instance.

The proposed vehicular access network is considered adequate for the purposes of bushfire protection and will ensure the development meets performance criteria for vehicular access (Element 2).

5.3 Water supply

A 120 kL rainwater tank (of which 10 kL will be reserved for fire fighting purposes) will be constructed for each proposed dwelling. Each tank will be fitted with a hydrant or standpipe for fire fighting purposes and 50 mm male camlock couplings with full flow valves in accordance with 'Category C Domestic Water Tanks in Bush Fire Prone Areas', as outlined in the DFES Coupling Standard for Static Water supplies.

The above measures will ensure the development meets performance criteria for water supply (Element 3) by adopting acceptable solution A3.2.

5.4 Siting of development

When considering the overall bushfire management of the project area, protection should be provided to critical life and property assets (residents, visitors and built assets) as a minimum requirement. Low fuel buffers between fire hazard areas and critical assets, as well as application of AS 3959–2009, can be implemented to achieve this.

Retained and planted vegetation within the project area as well as adjacent woodland vegetation are considered to be the predominant, long term bush fire risks to the proposed development. In the absence of ongoing vegetation management, these areas will increase in vegetation density and available fuel load.

Critical assets located in proximity to the above hazards should be prioritised for bushfire protection measures through provision of low fuel defendable space, such as Building Protection Zones (BPZs) and Hazard Separation Zones (HSZs), as well as heightened levels of construction standards through the application of AS 3959–2009. The BAL assessment undertaken in Section 4.2.3 achieves this through the following recommendations:

1. BAL 19 and BAL 12.5 will be implemented for all relevant buildings located within the project area as depicted in Figure 8 in association with a 20 m wide BPZ in the form of building setbacks, low fuel areas and road reserves (25 m where woodland vegetation is located downslope from proposed buildings).
2. Available fuel loads within the BPZs must be maintained within 2 t/ha or have grass slashed annually to a height of 50 mm.
3. Trees within the BPZ are to be low pruned (lower branches trimmed) to at least a height of 2 m.
4. No tall shrubs or tree is to be located within 2 m of buildings (including windows).
5. No tree crowns are to overhang buildings.
6. Tree crowns are to be located a minimum distance of 10 m apart.

The abovementioned recommendations are supported by sound justification and rationale based on potential fire behaviour characteristics of the surrounding vegetation and subsequent risk to proposed life and property assets (refer to Section 4.2.3).

The above measures will ensure the development meets performance criteria for siting of development (Element 4) by adopting acceptable solutions A4.1, A4.2, A4.3 and A4.4. A4.5 is not relevant in this instance as no additional shielding from direct flame contact or radiant heat is proposed.

5.5 Design of development

The bushfire management concept, as indicated in Figure 8 is expected to reduce the vulnerability of life and property assets from the effects of bushfire and greatly assist bush fire prevention and suppression operations. Given the proposed development is considered to comply with acceptable solutions A4.1, A4.2, A4.3 and A4.4 (A4.5 is not applicable in this instance); there are no special design requirements.

5.6 Additional bushfire risk mitigation

The following measures will be implemented in addition to those outlined previously to provide a more thorough level of bush fire protection to residents, visitors and built assets of the subject land:

1. Annual fuel inspections: undertaken by SoC in accordance with the current Shire of Chittering Firebreak Notice (Appendix 4) under provisions of the *Bush Fires Act 1954*. Failure to comply with this FMP and the specified requirements of the current Shire of Chittering Firebreak Notice may result in the issuing of fines.
2. Landowner education and awareness: landowners should be provided a copy of local government and DFES bush fire information booklets that are currently available. In addition, attendance by landowners at annual DFES bush fire awareness briefings would be advantageous.
3. Section 70 Notification on Title: to be placed on all Titles of the proposed development to ensure prospective landowners are aware that an FMP exists over the site with responsibilities that may apply.

5.7 Summary of bush fire risk mitigation and works program

A summary of the bush fire management measures described in Section 5, as well as a works program, is provided in Table 7. These measures will be implemented to ensure the ongoing protection of proposed life and property assets is achieved. Additional optional measures are provided and can be adopted by residents to further mitigate their risk to life and property from uncontrolled bush fires. Timing and responsibilities are also defined to assist with implementation of each management measure.

Table 7: Summary of bush fire risk mitigation measures and works program

Bush fire risk mitigation	Recommended works	Mandatory	Optional	Timing	Responsibility
Development location	Undertake development in accordance with the development plan to ensure that proposed buildings are not located on land subject to either an 'Extreme' bushfire hazard level or require construction standards applicable to BAL 40 or BAL FZ. Refer to FMP Section 5.1.	Yes	No	During implementation of the development	Developer
	Manage available fuel loads at less than 2 t/ha throughout all POS areas on an ongoing basis. This can be achieved through mechanical slashing, mowing, chemical spraying of weeds or manual removal of understorey grasses, trash and litter fuels. Refer to FMP Section 5.1.	Yes	No	Annually prior to the onset of the designated bushfire season	Developer during development, SoC thereafter
Vehicular access	Implement an internal road network providing all residents and visitors of the development with at least two vehicular access routes connecting to the surrounding public road network at all times. Refer to FMP Section 5.2.	Yes	No	During implementation of the development	Developer
	Construct all public roads and private driveways in accordance with Main Roads WA/SoC and DFES requirements. Refer to FMP Section 5.2.	Yes	No	During implementation of the development	Developer
Water supply	Ensure a 120 kL rainwater tank (of which 10 kL will be reserved for fire fighting purposes) is constructed for each proposed dwelling. Each tank is to be fitted with a hydrant or standpipe for fire fighting purposes and 50 mm male camlock couplings with full flow valves in accordance with 'Category C Domestic Water Tanks in Bush Fire Prone Areas', as outlined in the DFES Coupling Standard for Static Water supplies. Refer to FMP Section 5.3.	Yes	No	During implementation of the development	Developer
Siting of development	Apply BAL 12.5 and BAL 19 building construction standards for specified lots in accordance with Figure 8. Refer to FMP Section 5.4.	Yes	No	During building construction	Developer, prospective landowners, builder
	Provide and maintain BPZs as specified in FMP Section 5.4 between classified woodland vegetation and proposed buildings in accordance with Figure 8.	Yes	No	Implement during development and maintain annually thereafter	Developer during development, prospective landowners and SoC thereafter on the relevant managed lands
	Comply with BPZ requirements as specified in FMP Section 5.4.	Yes	No	Annually prior to the onset of the designated bushfire season	Developer during development, SoC thereafter
Design of development	Comply with all acceptable solutions for A4.1, A4.2, A4.3 and A4.4 (A4.5 is not applicable in this instance). Refer to FMP Section 5.	Yes	No	During implementation of the development	Developer
Additional bush fire risk mitigation	Comply with the current Shire of Chittering Firebreak Notice. Refer to Appendix 4. Refer to FMP Section 5.6.	Yes	No	Annually prior to the onset of the designated bushfire season	Developer, SoC and prospective landowners
	Undertake an inspection of fuel hazards across proposed lots to assess compliance with the FMP and Shire of Chittering Firebreak Notice. Refer to FMP Section 5.6.	Yes	No	Annually prior to the onset of the designated bushfire season	SoC
	Issue work orders or fines where compliance with the *Bush Fires Act 1954*, FMP or Shire of Chittering Firebreak Notice has been compromised. Refer to FMP Section 5.6.	Yes	No	Annually prior to the onset of the designated bush fire season	SoC

Bush fire risk mitigation	Recommended works	Mandatory	Optional	Timing	Responsibility
	Distribute bush fire information booklets and attend annual DFES bushfire awareness briefings. Refer to FMP Section 5.6.	No	Yes	Annually	Prospective landowners, SoC, DFES
	Place a Section 70 Notification on all Titles of the proposed development to ensure prospective landowners are aware that an FMP exists over the site with responsibilities that may apply. Refer to FMP Section 5.6.	Yes	No	On creation of Titles	Developer
Optional building measures	Restrict the installation of roof-top evaporative air-conditioners.	No	Yes	During implementation of the development	Developer, builder, prospective landowners
Restricted and prohibited burning times	Comply with the annual Shire of Chittering Firebreak Notice and DFES/SoC-determined burning periods. Refer to Appendix 4.	Yes	No	As specified by DFES/SoC	Developer, prospective landowners

6. Implementation of the Fire Management Plan

6.1 Implementation of bushfire risk treatment and mitigation measures

The works program provided in Table 7 provides clear direction for the implementation of all works associated with this FMP, including appropriate timing and responsibilities. In addition, Figure 8 outlines the full range of bushfire risk treatment and mitigation measures specified in this FMP, as well as correct locations for implementation. The plan has been overlain on an aerial image of the project area to assist with implementation.

6.2 Residual bushfire risk assessment

The residual bushfire risk is the level of risk remaining following implementation of the residential development and associated bushfire risk treatment and mitigation measures. A residual bushfire risk assessment is provided in Table 8.

The residual bushfire risk to life and property assets was assessed as 'Low', due to the comprehensive level of bushfire risk management proposed across the site and the subsequent expected improvement in building protection, access ability, emergency water supply and fire preparedness.

Table 8: Residual bushfire risk assessment for the project area

Parameter	Risk to site assets
On-site fuel hazard rating (highest rating)	Moderate
Are assets located up-slope from vegetation?	Yes (partially)
Are assets located in the flame zone?	No
Resident/visitor presence (low, moderate, high)	High
Values or assets (low, moderate, high)	High
Fire unit access risk (low, moderate, high)	Low
Fire suppression response time (minutes)	30-40
Likelihood of ignition and bush fire occurrence (low, moderate, high)	Moderate
Level of bush fire management (low, moderate, high)	High
Overall residual risk	**Low**

6.3 Assessment of bushfire risk treatment and mitigation measures

Implementation of the bushfire risk treatment and mitigation measures outlined in this FMP will ensure that should a bushfire occur within or adjacent to the residential development, fire intensity on-site will be minimised and life, property and environmental assets are expected to be protected. In addition, a fire occurring on the site is highly likely to be readily contained in approximately 30-40 minutes, which is within the normal emergency response time provided by local volunteer and career bush fire brigades.

The cost of undertaking the various tasks and initiatives outlined in the FMP will provide significant cost benefit to the developer and landowners when compared with the possible loss of life and infrastructure of the site.

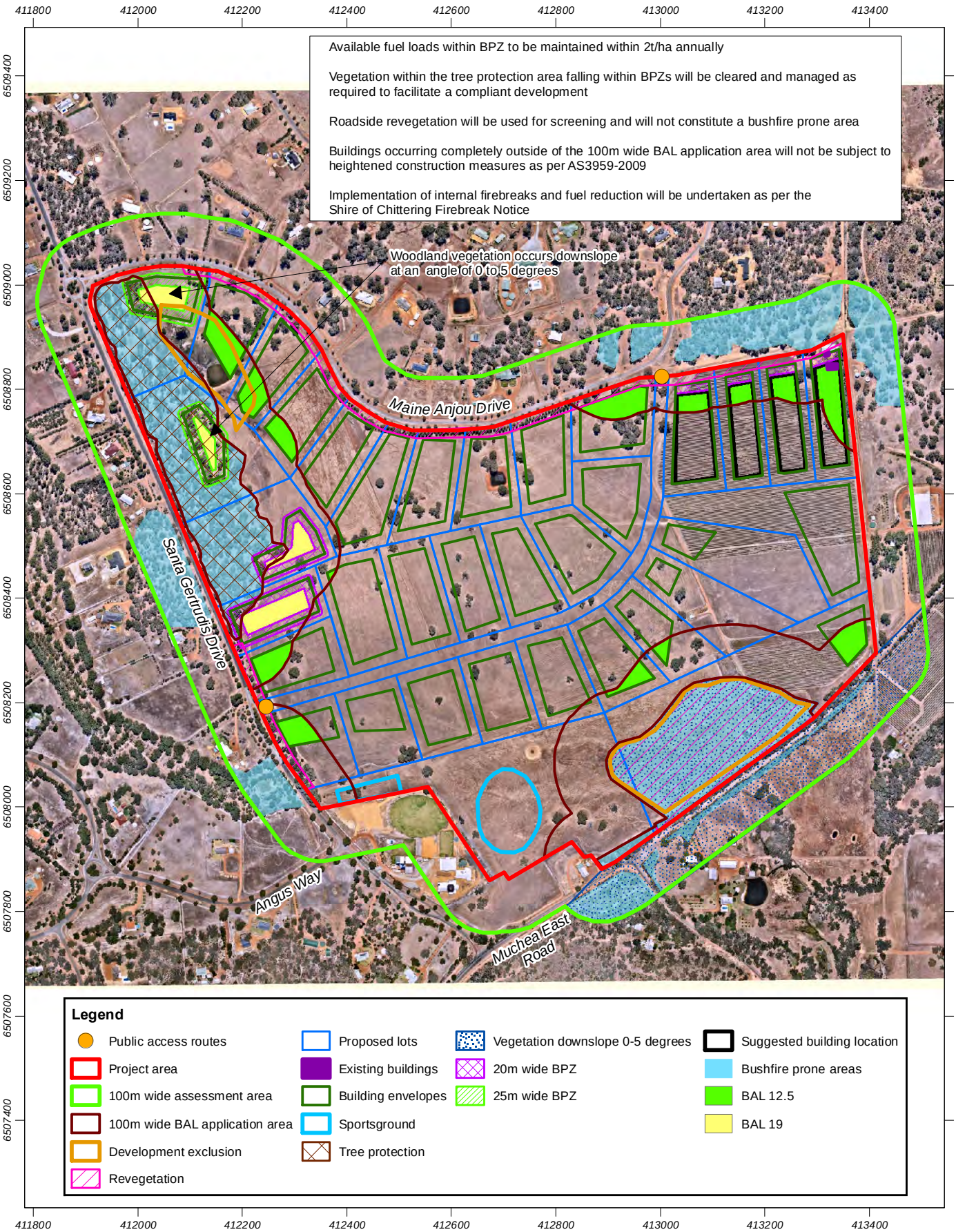

Figure 8: Fire Management Plan – Stage 12 Maryville Estate

Scale 1:10,000 at A4

0 50 100 150 200 250 m

N

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 28/08/2015
Author: JCrute
Source: Aerial image: Client 2015.

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6.4 Legislative requirements, specifications and standards

The legislative requirements, specifications and standards applicable to implementation of this FMP are referenced in Section 7 and Appendix 5 and pertain to the following:

- *Bush Fires Act 1954*
- *Planning and Development Act 2005*
- *Environment Protection and Biodiversity Conservation Act 1999*
- *Environmental Protection Act 1986*
- *Wildlife Conservation Act 1950*
- Building Code of Australia
- Planning for Bush Fire Protection Guidelines (Edition 2)
- Australian Standard AS 3959–2009 Construction of Buildings in Bushfire Prone Areas
- Shire of Chittering Firebreak Notice 2014-2015.

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Appendix 1
Fire Management Plan compliance checklist

Compliance checklist for performance criteria and acceptable solutions

Element	Acceptable solution	Compliance	Yes/No	Explanation (if no)
1. Location	A1.1 Development location	Does the proposal comply with performance criteria P1 by applying acceptable solution A1.1?	Yes	
2. Vehicular access	A2.1 Two access routes	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.1?	Yes	
	A2.2 Public roads	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.2?	Yes	
	A2.3 Cul-de-sacs	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.3?	N/A	No cul-de-sacs proposed
	A2.4 Battle axes	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.4?	N/A	No battle axe lots proposed
	A2.5 Private driveways	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.5?	Yes	
	A2.6 Emergency access ways	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.6?	N/A	No emergency access ways as per A2.6 design requirements proposed
	A2.7 Fire service access routes	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.7?	N/A	No fire service access routed as per A2.7 design requirements proposed
	A2.8 Gates	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.8?	N/A	No gates as per A2.8 design requirements proposed
	A2.9 Firebreak widths	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.9?	N/A	No firebreaks as per A2.9 design requirements proposed
	A2.10 Signs	Does the proposal comply with performance criteria P2 by applying acceptable solution A2.10?	N/A	No signs as per A2.10 design requirements proposed
3. Water	A3.1 Reticulated areas	Does the proposal comply with performance criteria P3 by applying acceptable solution A3.1?	N/A	The project area is not reticulated
	A3.2 Non-reticulated areas (a)	Does the proposal comply with performance criteria P3 by applying acceptable solution A3.2?	Yes	
	A3.3 Non-reticulated areas (b)	Does the proposal comply with performance criteria P3 by applying acceptable solution A3.3?	N/A	Compliance with A3.2 has been met
4. Siting of development	A4.1 Hazard separation – moderate to extreme bush fire hazard level	Does the proposal comply with performance criteria P4 by applying acceptable solution A4.1?	Yes	

Element	Acceptable solution	Compliance	Yes/No	Explanation (if no)
	A4.2 Hazard separation – low bush fire hazard level	Does the proposal comply with performance criteria P4 by applying acceptable solution A4.2?	Yes	
	A4.3 Building protection zone	Does the proposal comply with performance criteria P4 by applying acceptable solution A4.3?	Yes	
	A4.4 Hazard separation zone	Does the proposal comply with performance criteria P4 by applying acceptable solution A4.4?	No	AS 3959–2009 has been implemented accordingly
	A4.5 Reduction in bush fire attack level due to shielding	Does the proposal comply with performance criteria P4 by applying acceptable solution A4.5?	N/A	
5. Design of development	A5.1 Compliant development	Does the proposal comply with performance criteria P5 by applying acceptable solution A5.1?	Yes	
	A5.2 Non-compliant development	Does the proposal comply with performance criteria P5 by applying acceptable solution A5.2?	N/A	

Note: Performance criteria and acceptable solutions are in accordance with *Planning for Bush Fire Protection Guidelines (Edition 2)* (WAPC et al. 2010).

Applicant Declaration

I declare that the information provided is true and correct to the best of my knowledge.

Full name: Roger Banks

Applicant signature: 

Date: 26/08/2015

Appendix 2
January wind profiles for Pearce RAAF

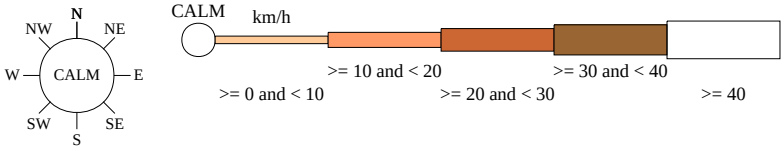
Rose of Wind direction versus Wind speed in km/h (02 Nov 1940 to 31 Oct 2011)

Custom times selected, refer to attached note for details

PEARCE RAAF

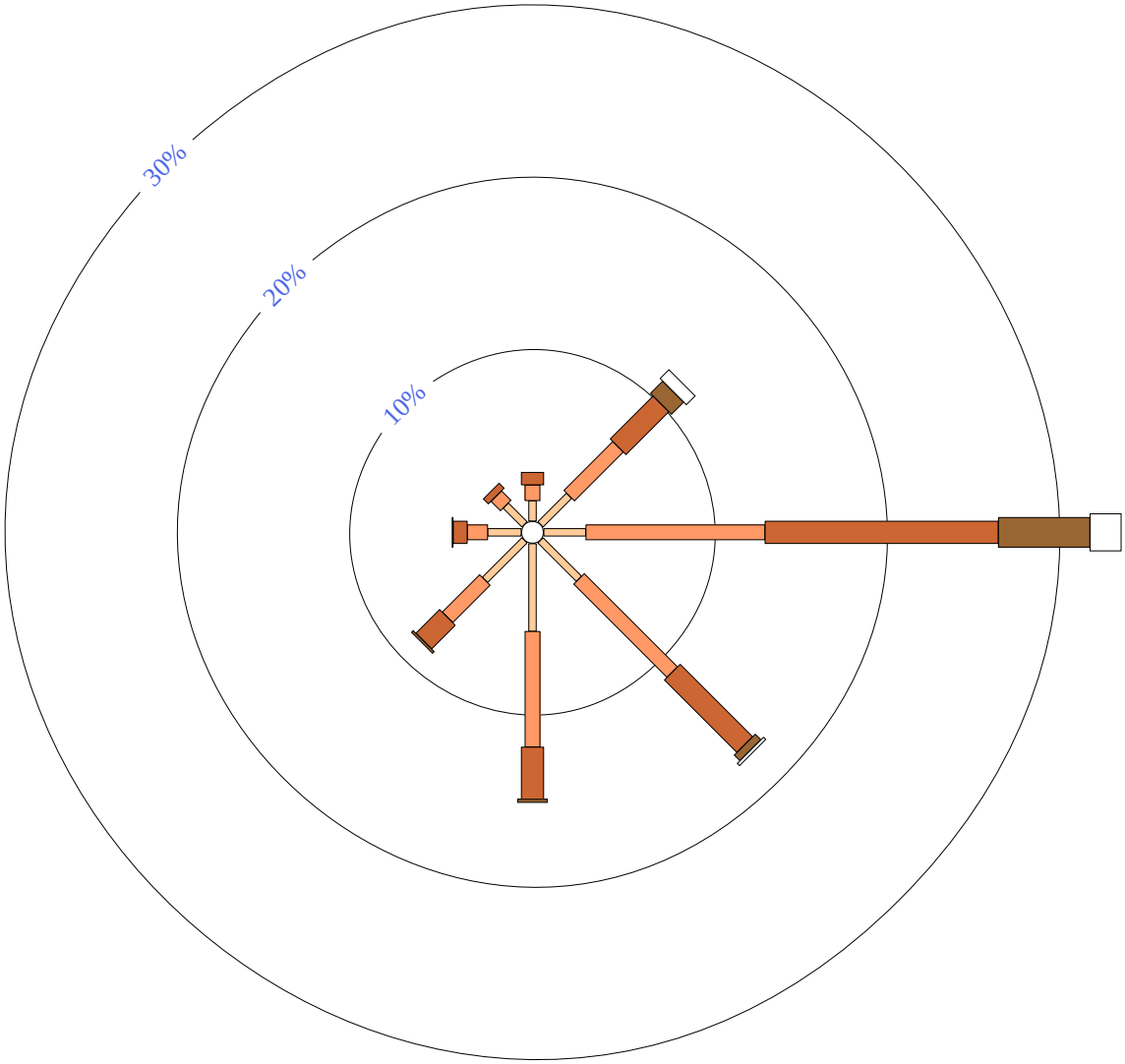
Site No: 009053 • Opened Jan 1937 • Still Open • Latitude: -31.6669° • Longitude: 116.0189° • Elevation 40m

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



9 am Jan
1093 Total Observations

Calm 3%



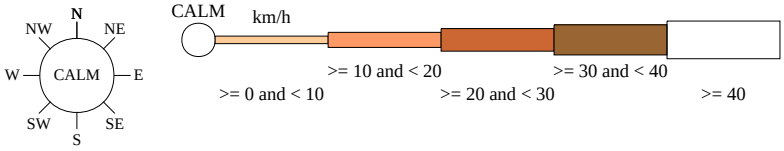
Rose of Wind direction versus Wind speed in km/h (02 Nov 1940 to 31 Oct 2011)

Custom times selected, refer to attached note for details

PEARCE RAAF

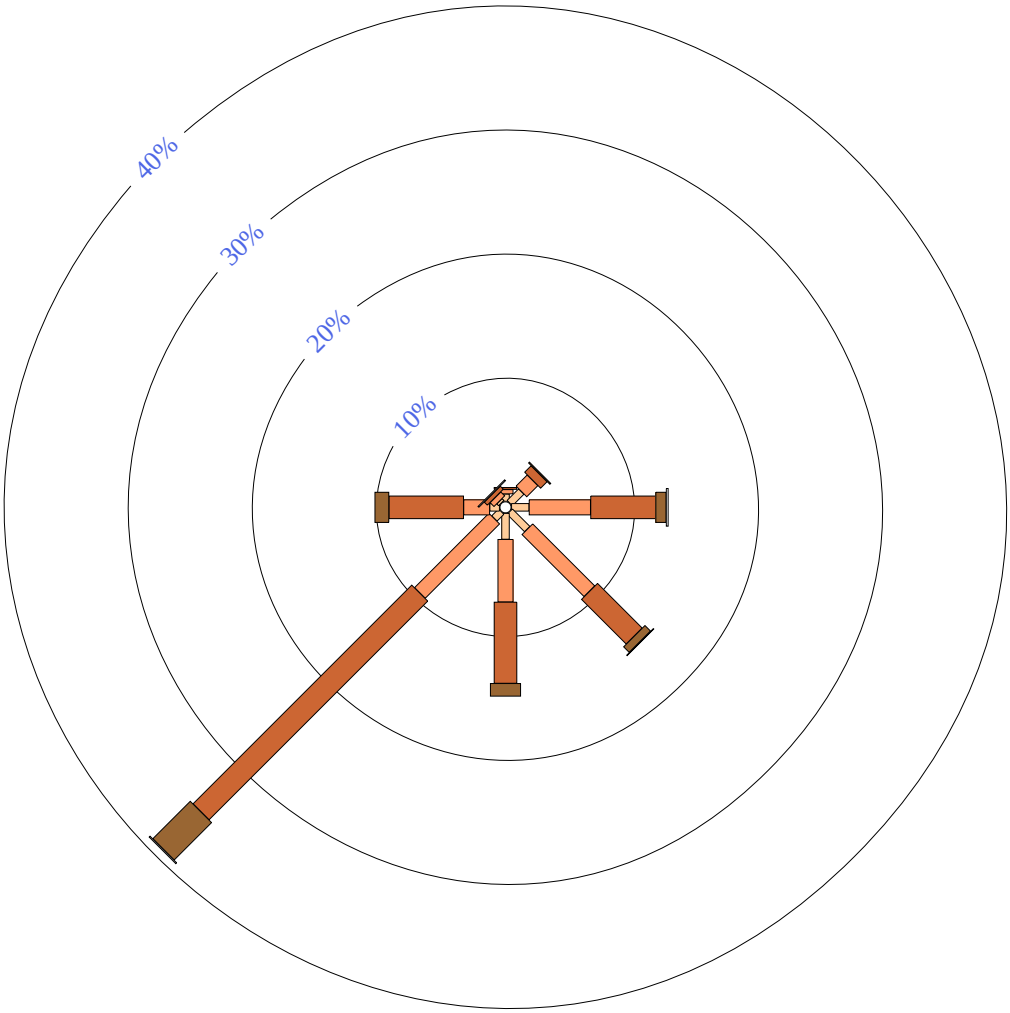
Site No: 009053 • Opened Jan 1937 • Still Open • Latitude: -31.6669° • Longitude: 116.0189° • Elevation 40m

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



3 pm Jan
1015 Total Observations

Calm 2%



Appendix 3
Construction standards for BAL 19 and BAL 12.5 as per AS 3959–2009

SECTION 6 CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL 19 (BAL — 19)

6.1 GENERAL

A building assessed in Section 2 as being BAL—19 shall comply with Section 3 and Clauses 6.2 to 6.8.

NOTE: There are a number of Standards that specify requirements for construction; however, where this Standard does not provide construction requirements for a particular element, the other Standards apply.

Any element of construction or system that satisfies the test criteria of AS 1530.8.1 may be used in lieu of the applicable requirements contained in Clauses 6.2 to 6.8 (see Clause 3.8).

NOTE: BAL—19 is primarily concerned with protection from ember attack and radiant heat greater than 12.5 kW/m2 up to and including 19 kW/m2.

6.2 SUBFLOOR SUPPORTS

This Standard does not provide construction requirements for subfloor support posts, columns, stumps, piers and poles.

NOTE: The exclusion of requirements for subfloor supports applies to the principal building only and not to verandas, decks, steps, ramps and landings (see Clause 6.7).

C6.2 Ideally, storage of combustible materials beneath a floor at this BAL would not occur and on this assumption, there is no requirement to enclose the subfloor space or to protect flooring materials from bushfire attack. However, should combustible materials be stored, it is recommended the area be protected as materials stored in the subfloor space may be ignited by embers and cause an impact to the building.

6.3 FLOORS

6.3.1 Concrete slabs on the ground

This Standard does not provide construction requirements for concrete slabs on ground.

6.3.2 Elevated floors

This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring.

6.4 EXTERNAL WALLS

6.4.1 Walls

That part of an external wall surface that is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18

degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D) shall be made from—

(a) non-combustible material; or

(b) fibre-cement external cladding, a minimum of 6 mm in thickness; or

(c) bushfire-resisting timber (see Appendix F); or

(d) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(e) a combination of any of Items (a), (b), (c) or (d) above.

This Standard does not provide construction requirements for external wall surfaces 400 mm or more from the ground or for external wall surfaces 400 mm or more above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D).

6.4.2 Joints

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3 mm.

Alternatively, sarking-type material may be applied over the outer face of the frame prior to fixing any external cladding.

6.4.3 Vents and weepholes

Vents and weepholes in external walls shall be screened with mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium, except where they are less than 3 mm (see Clause 3.6), or are located in an external wall of a subfloor space.

6.5 EXTERNAL GLAZED ELEMENTS AND ASSEMBLIES AND EXTERNAL DOORS

6.5.1 Bushfire shutters

Where fitted, bushfire shutters shall comply with Clause 3.7 and be made from—

(a) non-combustible material; or

(b) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(c) bushfire-resisting timber (see Appendix F); or

(d) a combination of any of Items (a), (b), or (c) above.

6.5.2 Windows

Window assemblies shall comply with one of the following:

(a) They shall be completely protected by a bushfire shutter that complies with Clause 6.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) For window assemblies less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings, having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), window frames and window joinery, shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) A timber species, as specified in Paragraph E2 and listed in Table E2, Appendix E.

or

(C) Metal.

or

(D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the frame and the sash shall satisfy the design load, performance and structural strength of the member.

(ii) Externally fitted hardware that supports the sash in its functions of opening and closing, shall be metal.

(iii) Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings, having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), the glazing shall be toughened glass, minimum 5 mm, or glass blocks with no restriction on glazing methods.

NOTE: Where double-glazed units are used, the above requirements apply to the external face of the window assembly only.

(iv) Where glazing is other than that specified in Item (iii) above, annealed glass may be used. Where annealed glass is used, the fixed and openable portions of windows shall be screened externally with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(v) Where toughened glass is used, the openable portions of windows shall be screened internally or externally with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(vi) Glazed elements that are designed to take internal screens shall use toughened glass and the openable portion shall be screened in such a way to have no gaps greater than 3 mm in diameter. Screening material shall be a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

6.5.3 Doors—Side-hung external doors (including French doors, panel fold and bi-fold doors)

Side-hung external doors, including French doors, panel fold and bi-fold doors, shall comply with one of the following:

(a) They shall be protected by a bushfire shutter that complies with Clause 6.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Doors shall be—

(A) non-combustible; or

(B) a solid timber door, having a minimum thickness of 35 mm for the first 400 mm above the threshold; or

(C) a door, including a hollow core door, with a non-combustible kickplate on the outside for the first 400 mm above the threshold; or

(D) a fully-framed glazed door, where the framing is made from materials specified for bushfire shutters (see Clause 6.5.1).

(ii) Where doors incorporate glazing, the glazing shall be toughened glass minimum 5 mm.

(iii) Doors shall be tight-fitting to the doorframe and to an abutting door, if applicable.

(iv) Where the doorframe is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the door (see Figure D3, Appendix D) the doorframe shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) A timber species, as specified in Paragraph E2 and listed in Table E2, Appendix E.

or

(C) Metal.

or

(D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the door assembly shall satisfy the design load, performance and structural strength of the member.

(v) Weather strips, draught excluders or draught seals shall be installed at the base of side-hung external doors.

6.5.4 Doors—Sliding doors

Sliding doors shall comply with one of the following:

(a) They shall be completely protected by a bushfire shutter that complies with Clause 6.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Any glazing incorporated in sliding doors shall be toughened glass, minimum 5 mm.

(ii) There is no requirement to screen the openable part of the sliding door. However, if screened, the screens shall be mesh or perforated sheet made of corrosion-resistant steel, bronze or aluminium.

NOTE: The construction of manufactured sliding doors should prevent the entry of embers when the door is closed. There is no requirement to provide screens to the openable part of these doors as it is assumed that a sliding door will be closed if occupants are not present or during a bushfire event. Screens of materials other than those specified may not resist ember attack.

(iii) Sliding doors shall be tight-fitting in the frames.

6.5.5 Doors—Vehicle access doors (garage doors)

The following apply to vehicle access doors:

(a) The lower portion of a vehicle access door that is within 400 mm of the ground when the door is closed (see Figure D4, Appendix D) shall be made from—

(i) non-combustible material; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) fibre-cement sheet, a minimum of 6 mm in thickness; or

(iv) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(v) a combination of any of Items (i), (ii), (iii) or (iv) above.

(b) Panel lift, tilt doors or side-hung doors shall be fitted with suitable weather strips, draught excluders, draught seals or guide tracks, as appropriate to the door type, with a maximum gap no greater than 3 mm.

(c) Roller doors shall have guide tracks with a maximum gap no greater than 3 mm and shall be fitted with a nylon brush that is in contact with the door (see Figure D4, Appendix D).

(d) Vehicle access doors shall not include ventilation slots.

6.6 ROOFS (INCLUDING VERANDA AND ATTACHED CARPORT ROOFS, PENETRATIONS, EAVES, FASCIAS, GABLES, GUTTERS AND DOWNPIPES)

6.6.1 General

The following apply to all types of roofs and roofing systems:

(a) Roof tiles, roof sheets and roof-covering accessories shall be non-combustible.

(b) The roof/wall junction shall be sealed, to prevent openings greater than 3 mm, either by the use of fascia and eaves linings or by sealing between the top of the wall and the underside of the roof and between the rafters at the line of the wall.

(c) Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

6.6.2 Tiled roofs

Tiled roofs shall be fully sarked. The sarking shall—

(a) have a flammability index of not more than 5, when tested to AS 1530.2;

(b) be located directly below the roof battens;

(c) cover the entire roof area including the ridge; and

(d) be installed so that there are no gaps that would allow the entry of embers where the sarking meets fascias, gutters, valleys and the like.

6.6.3 Sheet roofs

Sheet roofs shall—

(a) be fully sarked in accordance with Clause 6.6.2, except that foil-backed insulation blankets may be installed over the battens;

or

(b) have any gaps greater than 3 mm under corrugations or ribs of sheet roofing and between roof components sealed at the fascia or wall line and at valleys, hips and ridges by—

(i) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or

(ii) mineral wool; or

(iii) other non-combustible material; or

(iv) a combination of any of Items (i), (ii), or (iii) above.

6.6.4 Veranda, carport and awning roofs

The following apply to veranda, carport and awning roofs:

(a) A veranda, carport or awning roof forming part of the main roof space [see Figure D1(a), Appendix D] shall meet all the requirements for the main roof, as specified in Clauses 6.6.1, 6.6.2, 6.6.3, 6.6.5 and 6.6.6.

(b) A veranda, carport or awning roof separated from the main roof space by an external wall [see Figures D1(b) and D1(c), Appendix D] complying with Clause 6.4 shall have a non-combustible roof covering.

NOTE: There is no requirement to line the underside of a veranda, carport or awning roof that is separate from the main roof space.

6.6.5 Roof penetrations

The following apply to roof penetrations:

(a) Roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials, vent pipes and supports for solar collectors shall be adequately sealed at the roof to prevent gaps greater than 3 mm. The material used to seal the penetration shall be non-combustible.

(b) Openings in vented roof lights, roof ventilators or vent pipes shall be fitted with ember guards made from a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(c) All overhead glazing shall be Grade A laminated safety glass complying with AS 1288.

(d) Glazed elements in roof lights and skylights may be of polymer provided a Grade A safety glass diffuser, complying with AS 1288, is installed under the glazing. Where glazing is an insulating glazing unit (IGU), Grade A toughened safety glass of minimum 4 mm shall be used in the outer pane of the IGU.

(e) Flashing elements of tubular skylights may be of a fire-retardant material, provided the roof integrity is maintained by an under-flashing of a material having a flammability index no greater than 5.

(f) Evaporative cooling units shall be fitted with butterfly closers at or near the ceiling level, or the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

6.6.6 Eaves linings, fascias and gables

The following apply to eaves linings, fascias and gables:

(a) Gables shall comply with Clause 6.4.

(b) Eaves penetrations shall be protected the same as for roof penetrations, as specified in Clause 6.6.5.

(c) Eaves ventilation openings greater than 3 mm shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds.

This Standard does not provide construction requirements for fascias, bargeboards and eaves linings.

6.6.7 Gutters and downpipes

This Standard does not provide material requirements for—

(a) gutters, with the exception of box gutters; and

(b) downpipes.

If installed, gutter and valley leaf guards shall be non-combustible.

Box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible material.

6.7 VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS

6.7.1 General

Decking shall be either spaced or continuous (i.e., without spacings).

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

C6.7.1 Spaced decking is nominally spaced at 3 mm (in accordance with standard industry practice); however, due to the nature of timber decking with seasonal changes in moisture content, that spacing may range from 0–5 mm during service. The preferred dimension for gaps is 3 mm (which is in line with other ‘permissible gaps’) in other parts of this Standard. It should be noted that recent research studies have shown that gaps at 5 mm spacing afford opportunity for embers to become lodged in between timbers, which may contribute to a fire. Larger gap spacings of 10 mm may preclude this from happening but such a spacing regime may not be practical for a timber deck.

6.7.2 Enclosed subfloor spaces of verandas, decks, steps, ramps and landings

6.7.2.1 *Materials to enclose a subfloor space*

This Standard does not provide construction requirements for the materials used to enclose a subfloor space except where those materials are less than 400 mm from the ground.

Where the materials used to enclose a subfloor space are less than 400 mm from the ground, they shall comply with Clause 6.4.

6.7.2.2 *Subfloor supports*

This Standard does not provide construction requirements for subfloor support posts, columns, stumps, stringers, piers and poles.

6.7.2.3 *Framing*

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

6.7.2.4 *Decking*

This Standard does not provide construction requirements for decking that is more than 300 mm from a glazed element.

Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

(a) non-combustible material; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(d) a combination of any of Items (a), (b), or (c) above.

6.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings

6.7.3.1 *Supports*

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

6.7.3.2 *Framing*

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

6.7.3.3 *Decking*

This Standard does not provide construction requirements for decking that is more than 300 mm from a glazed element.

Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

(a) non-combustible material; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(d) a combination of any of Items (a), (b), or (c) above.

6.7.4 Balustrades, handrails or other barriers

This Standard does not provide construction requirements for balustrades, handrails and other barriers.

6.8 WATER AND GAS SUPPLY PIPES

Above-ground, exposed water and gas supply pipes shall be metal.

SECTION 5 CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL 12.5 (BAL — 12.5)

5.1 GENERAL

A building assessed in Section 2 as being BAL—12.5 shall comply with Section 3 and Clauses 5.2 to 5.8.

NOTE: There are a number of Standards that specify requirements for construction; however, where this Standard does not provide construction requirements for a particular element, the other Standards apply.

Any element of construction or system that satisfies the test criteria of AS 1530.8.1 may be used in lieu of the applicable requirements contained in Clauses 5.2 to 5.8 (see Clause 3.8).

NOTE: BAL—12.5 is primarily concerned with protection from ember attack and radiant heat up to and including 12.5 kW/m^2 where the site is less than 100 m from the source of bushfire attack.

5.2 SUBFLOOR SUPPORTS

This Standard does not provide construction requirements for subfloor support posts, columns, stumps, piers and poles.

NOTE: The exclusion of requirements for subfloor supports applies to the principal building only and not to verandas, decks, steps, ramps and landings (see Clause 5.7).

C5.2 *Ideally, storage of combustible materials beneath a floor at this BAL would not occur and on this assumption, there is no requirement to enclose the subfloor space or to protect flooring materials from bushfire attack. However, should combustible materials be stored, it is recommended the area be protected as materials stored in the subfloor space may be ignited by embers and cause an impact to the building.*

5.3 FLOORS

5.3.1 Concrete slabs on ground

This Standard does not provide construction requirements for concrete slabs on the ground.

5.3.2 Elevated floors

This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring.

5.4 EXTERNAL WALLS

5.4.1 Walls

That part of an external wall surface that is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less

than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D) shall be of—

(a) non-combustible material; or

(b) fibre-cement external cladding, a minimum of 6 mm in thickness; or

(c) bushfire-resisting timber (see Appendix F); or

(d) a timber species as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(e) a combination of any of Items (a), (b), (c) or (d) above.

There are no requirements for external wall surfaces 400 mm or more from the ground or for external wall surfaces 400 mm or more above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D).

5.4.2 Joints

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3 mm.

Alternatively, sarking-type material may be applied over the outer face of the frame prior to fixing any external cladding.

5.4.3 Vents and weepholes

Vents and weepholes in external walls shall be screened with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium, except where the vents and weepholes are less than 3 mm (see Clause 3.6), or are located in an external wall of a subfloor space.

5.5 EXTERNAL GLAZED ELEMENTS AND ASSEMBLIES AND EXTERNAL DOORS

5.5.1 Bushfire shutters

Where fitted, bushfire shutters shall comply with Clause 3.7 and be made from—

(a) non-combustible material; or

(b) a timber species as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(c) bushfire-resisting timber (see Appendix F); or

(d) a combination of any of Items (a), (b) or (c) above.

5.5.2 Windows

Window assemblies shall comply with one of the following:

(a) They shall be completely protected by a bushfire shutter that complies with Clause 5.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) For window assemblies less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), window frames and window joinery shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) A timber species specified in Paragraph E2 and listed in Table E2, Appendix E.

or

(C) Metal.

Or

(D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the frame and sash shall satisfy the design load, performance and structural strength of the member.

(ii) Externally fitted hardware that supports the sash in its functions of opening and closing shall be metal.

(iii) Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), the glazing shall be Grade A safety glass minimum 4 mm, or glass blocks with no restriction on glazing methods.

NOTE: Where double glazed units are used the above requirements apply to the external face of the window assembly only.

(iv) Where glazing is other than that specified in Item (iii) above, annealed glass may be used.

(v) The openable portions of windows shall be screened with mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

5.5.3 Doors—Side-hung external doors (including French doors, panel fold and bi-fold doors)

Side-hung external doors, including French doors, panel fold and bi-fold doors, shall comply with one of the following:

(a) They shall be protected by a bushfire shutter that complies with Clause 5.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Doors shall be—

(A) non-combustible; or

(B) a solid timber door, having a minimum thickness of 35 mm for the first 400 mm above the threshold; or

(C) a door, including a hollow core door, with a non-combustible kickplate on the outside for the first 400 mm above the threshold; or

(D) a fully framed glazed door, where the framing is made from materials required for bushfire shutters (see Clause 5.5.1), or from a timber species specified in Paragraph E2 and listed in Table E2, Appendix E.

(ii) Where doors incorporate glazing, the glazing shall comply with the glazing requirements for windows.

(iii) Doors shall be tight-fitting to the doorframe and to an abutting door, if applicable.

(iv) Where any part of the door assembly is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the door (see Figure D3, Appendix D), that part of the door assembly shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F).

or

(B) A timber species specified in Paragraph E2 and listed in Table E2, Appendix E.

or

(C) Metal.

or

(D) Metal-reinforced PVC-U. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel and the door assembly shall satisfy the design load, performance and structural strength of the member.

(v) Weather strips, draught excluders or draught seals shall be installed at the base of side-hung external doors.

5.5.4 Doors—Sliding doors

Sliding doors shall comply with one of the following:

(a) They shall be protected by a bushfire shutter that complies with Clause 5.5.1.

or

(b) They shall be completely protected externally by screens with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

or

(c) They shall comply with the following:

(i) Any glazing incorporated in sliding doors shall be Grade A safety glass complying with AS 1288.

(ii) There is no requirement to screen the openable part of the sliding door. However, if screened, the screens shall be a mesh or perforated sheet made of corrosion-resistant steel, bronze or aluminium.

NOTE: The construction of manufactured sliding doors should prevent the entry of embers when the door is closed. There is no requirement to provide screens to the openable part of these doors as it is assumed that a sliding door will be closed if occupants are not present or during a bushfire event. Screens of materials other than those specified may not resist ember attack.

(iii) Sliding doors shall be tight-fitting in the frames.

5.5.5 Doors—Vehicle access doors (garage doors)

The following apply to vehicle access doors:

(a) The lower portion of a vehicle access door that is within 400 mm of the ground when the door is closed (see Figure D4, Appendix D) shall be made from—

(i) non-combustible material; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) fibre-cement sheet, a minimum of 6 mm in thickness; or

(iv) a timber species specified in Paragraph E1 and listed in Table E1, Appendix E; or

(v) a combination of any of Items (i), (ii), (iii) or (iv) above.

(b) Panel lift, tilt doors or side-hung doors shall be fitted with suitable weather strips, draught excluders, draught seals or guide tracks, as appropriate to the door type, with a maximum gap no greater than 3 mm.

(c) Roller doors shall have guide tracks with a maximum gap no greater than 3 mm and shall be fitted with a nylon brush that is in contact with the door (see Figure D4, Appendix D).

(d) Vehicle access doors shall not include ventilation slots.

5.6 ROOFS (INCLUDING VERANDA AND ATTACHED CARPORT ROOFS, PENETRATIONS, EAVES, FASCIAS, GABLES, GUTTERS AND DOWNPIPES)

5.6.1 General

The following apply to all types of roofs and roofing systems:

(a) Roof tiles, roof sheets and roof-covering accessories shall be non-combustible.

(b) The roof/wall junction shall be sealed, to prevent openings greater than 3 mm, either by the use of fascia and eaves linings or by sealing between the top of the wall and the underside of the roof and between the rafters at the line of the wall.

(c) Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

5.6.2 Tiled roofs

Tiled roofs shall be fully sarked. The sarking shall—

(a) have a flammability index of not more than 5;

(b) be located directly below the roof battens;

(c) cover the entire roof area including the ridge; and

(d) be installed so that there are no gaps that would allow the entry of embers where the sarking meets fascias, gutters, valleys and the like.

5.6.3 Sheet roofs

Sheet roofs shall—

(a) be fully sarked in accordance with Clause 5.6.2, except that foil-backed insulation blankets may be installed over the battens;

or

(b) have any gaps greater than 3 mm, under corrugations or ribs of sheet roofing and between roof components, sealed at the fascia or wall line and at valleys, hips and ridges by—

(i) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium; or

(ii) mineral wool; or

(iii) other non-combustible material; or

(iv) a combination of any of Items (i), (ii) or (iii) above.

5.6.4 Veranda, carport and awning roofs

The following apply to veranda, carport and awning roofs:

(a) A veranda, carport or awning roof forming part of the main roof space [see Figure D1(a), Appendix D] shall meet all the requirements for the main roof, as specified in Clauses 5.6.1, 5.6.2, 5.6.3, 5.6.5 and 5.6.6.

(b) A veranda, carport or awning roof separated from the main roof space by an external wall [see Figures D1(b) and D1(c), Appendix D] complying with Clause 5.4 shall have a non-combustible roof covering.

NOTE: There is no requirement to line the underside of a veranda, carport or awning roof that is separated from the main roof space.

5.6.5 Roof penetrations

The following apply to roof penetrations:

(a) Roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials, vent pipes and supports for solar collectors, shall be adequately sealed at the roof to prevent gaps greater than 3 mm. The material used to seal the penetration shall be non-combustible.

(b) Openings in vented roof lights, roof ventilators or vent pipes shall be fitted with ember guards made from a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(c) All overhead glazing shall be Grade A laminated safety glass complying with AS 1288.

(d) Glazed elements in roof lights and skylights may be of polymer provided a Grade A safety glass diffuser, complying with AS 1288, is installed under the glazing. Where glazing is an insulating glazing unit (IGU), Grade A toughened safety glass, minimum 4 mm, shall be used in the outer pane of the IGU.

(e) Flashing elements of tubular skylights may be of a fire-retardant material, provided the roof integrity is maintained by an under-flashing of a material having a flammability index no greater than 5.

(f) Evaporative cooling units shall be fitted with butterfly closers at or near the ceiling level or, the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(g) Vent pipes made from PVC are permitted.

5.6.6 Eaves linings, fascias and gables

The following apply to eaves linings, fascias and gables:

(a) Gables shall comply with Clause 5.4.

(b) Eaves penetrations shall be protected the same as for roof penetrations, as specified in Clause 5.6.5.

(c) Eaves ventilation openings greater than 3 mm shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds.

This Standard does not provide construction requirements for fascias, bargeboards and eaves linings.

5.6.7 Gutters and downpipes

This Standard does not provide material requirements for—

(a) gutters, with the exception of box gutters; and

(b) downpipes.

If installed, gutter and valley leaf guards shall be non-combustible.

Box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible material.

5.7 VERANDAS, DECKS, STEPS, RAMPS AND LANDINGS

5.7.1 General

Decking shall be either spaced or continuous (i.e., without spacing).

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

C5.7.1 *Spaced decking is nominally spaced at 3 mm (in accordance with standard industry practice); however, due to the nature of timber decking with seasonal changes in moisture content, that spacing may range from 0–5 mm during service. The preferred dimension for gaps is 3 mm (which is in line with other 'permissible gaps') in other parts of this Standard. It should be noted that recent research studies have shown that gaps at 5 mm spacing afford opportunity for embers to become lodged in between timbers, which may contribute to a fire. Larger gap spacings of 10 mm may preclude this from happening but such a spacing regime may not be practical for a timber deck.*

5.7.2 Enclosed subfloor spaces of verandas, decks, steps, ramps and landings

5.7.2.1 *Materials to enclose a subfloor space*

This Standard does not provide construction requirements for the materials used to enclose a subfloor space except where those materials are less than 400 mm from the ground.

Where the materials used to enclose a subfloor space are less than 400 mm from the ground, they shall comply with Clause 5.4.

5.7.2.2 *Supports*

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

5.7.2.3 *Framing*

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

5.7.2.4 *Decking*

This Standard does not provide construction requirements for decking that is more than 300 mm from a glazed element.

Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

(a) non-combustible material; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species, as specified in Paragraph E1 and listed in Table E1 of Appendix E;

(d) PVC-U; or

(e) a combination of any of Items (a), (b), (c) or (d) above.

5.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings

5.7.3.1 *Supports*

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

5.7.3.2 *Framing*

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

5.7.3.3 *Decking*

This Standard does not provide construction requirements for decking unless it is less than 300 mm from a glazed element.

Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from—

(a) non-combustible material; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species, as specified in Paragraph E1 and listed in Table E1, Appendix E; or

(d) a combination of any of Items (a), (b) or (c) above.

5.7.4 Balustrades, handrails or other barriers

This Standard does not provide construction requirements for balustrades, handrails and other barriers.

5.8 WATER AND GAS SUPPLY PIPES

Above-ground, exposed water and gas supply pipes shall be metal.

Appendix 4
Shire of Chittering Firebreak Notice
2014-2015

Shire of Chittering

FIREBREAK NOTICE

2014 - 2015
Shire of Chittering

FOR ALL FIRES CALL

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THIS FIREBREAK NOTICE CONTAINS IMPORTANT INFORMATION, PLEASE READ IT CAREFULLY AND STORE IN A SAFE PLACE FOR FUTURE REFERENCE.

FOR FURTHER INFORMATION ON THIS NOTICE CONTACT THE SHIRE OF CHITTERING
Phone: 9576 4600 Fax: 9576 1250
Email: chatter@chittering.wa.gov.au
Website: www.chittering.wa.gov.au

FIREBREAK NOTICE

BUSH FIRES ACT 1954
Shire of Chittering

Notice to all owners and/or occupiers of land situated in the Shire of Chittering.

As a measure to assist in the control of bush fires, or prevent the spread or extension of a bush fire which may occur, all owners and occupiers of land within the shire's district are required before the 16th day of October in each year, or within 14 days of becoming the owner or occupier of land if after that date, to clear firebreaks or take measures in accordance with this notice and maintain those firebreaks and measures in accordance with this notice up to and including the 31st day of May in the following year.

Pursuant to the powers contained in Section 33 of THE BUSH FIRES ACT 1954, you are hereby required to clear all flammable material from fire breaks, not less than 3 metres in width and 4 metres vertically, immediately inside all external boundaries of any lot owned or occupied by you and situated within the Shire of Chittering. Such firebreaks may be constructed by one or more of the following methods:

Ploughing, cultivating, scarifying, raking, burning, chemical spraying or other approved method.

The following land categories are to be cleared and maintained to the satisfaction of an Authorised Officer of the Shire.

Rural Residential and Shire Town sites with land with less than 2 hectares

Do not require boundary firebreaks but are required to follow General Fire Hazard Reduction.

All properties, including Rural Residential and Shire Town sites with land equal to or greater than 2 hectares

Must clear a firebreak of all flammable materials three (3) metres wide, with a four (4) metre vertical clearance along the inside of the boundary to the property.

Land greater than 120 hectares

Land with an area of 120 hectares or more must have a firebreak in such a position which divides the land into areas not exceeding 120 hectares.

Fire Management Plans

Where Fire Management Plans have been implemented as part of a subdivision, property owners must ensure their property meets the requirements as outlined in the Fire Management Plan. Property owners should seek clarification from the Shire of Chittering if they are unsure in regards to their responsibilities and the requirements contained within their Fire Management Plan and this Firebreak Notice.

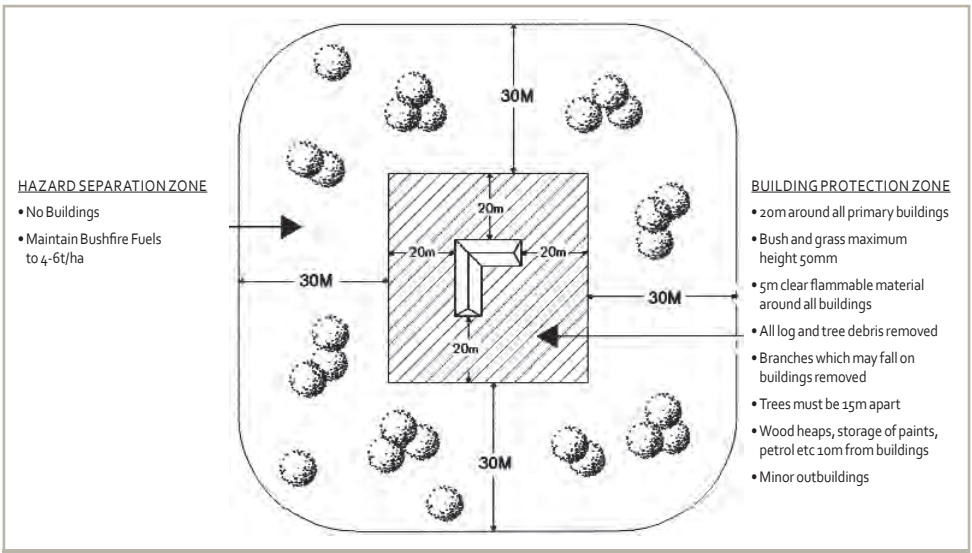
Buildings, haystacks and fuel storage

Clear a firebreak, not less than five (5) metres wide with a four (4) metre vertical clearance completely surrounding and not more than twenty (20) metres from the perimeter of all buildings, haystacks and fuel storage areas within the property.

General Fire Hazard Reduction

All property owners are required to reduce fire hazards on their property prior to the summer season by maintaining grassed areas as far as reasonably practicable, to 50mm in height over the entire area, by slashing or the application of stock. It is recommended that property owners program their hazard reduction in conjunction with the clearing and maintenance of firebreaks. Hazard Reduction Orders will be issued where landowners have failed to reduce fire hazards.

Installation of a building protection zone



BUILDING PROTECTION & HAZARD SEPARATION ZONES

A Building Protection Zone of 20 metres is to be constructed within the Lot around all buildings as follows:

- Bush Fire fuels to be maintained at or below 2 tonnes per hectare and dry grass must be maintained below a height of 50mm;
- The first 5m around all buildings is to be cleared of all flammable material. Reticulated gardens may be located in this zone;
- The spacing of trees should be 15-20 metres apart to provide for a separation of 10 metres between crowns;
- Trees are to be under/low pruned at least to a height of 2 metres;
- No tall shrub or tree is to be planted within 2 metres of a building including windows.

Alternative firebreaks

If it is impractical for you to clear a firebreak along your boundary you can request permission from the Shire to install a firebreak in an alternative location or of a different nature. All requests must be in writing to the Shire and received by 1 October.

Harvesting operations (including stubble processing)

The Shire will permit harvesting operations, including stubble processing, during the Restricted and Prohibited period on the following conditions:

- That a fully operational fire fighting unit (inclusive of associated pump, hose system and a minimum of 600 litres of water is present) at all times.
- Harvesting operations, and stubble processing, are not permitted when the Shire has declared a Harvest and Vehicle Movement Ban, including Hot Works Activities.

Harvesting operations (including stubble processing) on Sunday and Public Holidays, excepting Christmas, Boxing Day and New Year's Day, will be permitted on the following conditions, in addition to the conditions above.

- The Local Fire Control Officer is notified.
- Two (2) able-bodied adult persons are present during the harvesting operations, only one (1) of whom may be harvesting.

Control of operations likely to cause a fire

Property owners should take care to prevent bush fires. The operation of welding equipment and angle grinders are activities likely to create a fire danger when used in the open air. A person shall provide at least one fire extinguisher at the place where welding or cutting operations are carried out and surround this place with a firebreak which is at least five (5) metres wide.

For updates on Hot Works, Harvest and Movement of Machinery Bans please ring the information line on: **9576 0219** (recorded message) or register with the SMS warning system with the Shire to receive a text when a ban is implemented.

HOT WORKS, HARVEST AND MOVEMENT OF MACHINERY BAN WILL BE IN PLACE ON CHRISTMAS, BOXING DAY AND NEWS YEARS DAY

Fire Danger Rating

No fire of any kind may be lit on a day when the forecast Fire Danger rating for the District is very high or above.

The fire danger rating is supplied daily by the Bureau of Meteorology.

This information is also available from the Telstra Weather service on Ph: 1196, the Bureau of Meteorology website (www.bom.gov.au) and is displayed on the information boards located (1) Great Northern Highway, Muchea, (2) John Glenn Park, Muchea (3) Cnr Wandena and Muchea East Road Lower Chittering, (4) Clune Park, Bindoon, (5) Cnr Crest Hill Road & Mooliabeenee Road, Bindoon. The Chittering fire weather district is the Lower West Inland.

Burning of garden refuse

Garden refuse must not be burnt at any time during the PROHIBITED burning period or at any time if a total fire ban or a harvest and vehicle movement ban has been declared or at any time if the fire danger rating is very high or above.

A permit is required to burn garden refuse before 6pm during the RESTRICTED Burning Periods, and is subject to the conditions as set out on the permit.

Garden refuse may be burnt without a permit after 6pm during the RESTRICTED burning periods, subject to the following conditions of THE BUSH FIRE ACT 1954 and the HEALTH ACT 1911.

- You notify your neighbours and local Fire Control Officer of your intention to burn.
- The pile of refuse being burnt does not exceed (1m x 1m x 1m).
- A 5 metre wide area clear of flammable material surrounds the pile. (Lawn, Paths, Driveways, etc. may be considered as cleared area).
- The fire is only lit between 6pm and 11pm.
- Only 1 pile is to be alight at one time.
- The fire is completely extinguished by midnight.
- At least 1 adult person is in attendance at all times.
- There is a means of extinguishing the fire available at all times. (e.g. garden hose, knapsack spray or fire unit).
- The smoke from your fire does not cause a nuisance to neighbours.
- The smoke from your fire does not create a traffic hazard.
- Do not burn household or commercial waste or any noxious materials.
- Do not burn damp, wet or green material at any time as this will cause excessive smoke.
- Other than during the RESTRICTED or PROHIBITED periods, garden refuse may be burnt at any time, but care must be exercised.

Smoke from the burning of garden rubbish can cause nuisance and annoyance to other residents. Please consider this and plan to minimise smoke.

Fire breaks

NOT ACCEPTABLE FIRE BREAK

ACCEPTABLE FIRE BREAK

Local Bush Fire Control Officers

LOWER CHITTERING		
Steve Browne		0427 300 964
Martin Lee		0430 431 473
MUCHEA		
Paul Martin		0418 948 593
Peter Hall		0437 908 079
UPPER CHITTERING		
Phil Humphry	9576 1050	0427 761 050
Bob Wainwright	9571 4665	0437 163 428
BINDOON		
FredHoogland	9576 0131	0422 228 415
Nicholas Walter		0418 597 103
Dennis Badcock	9576 1536	0428 947 853
WANNAMAL		
Kim Haeusler	9655 9043	0428 559 043
Greg Cocking DCBFCO (North)	9655 7015	0408 900 462
COMMUNITY EMERGENCY SERVICES MANAGER CHIEF BUSH FIRE CONTROL OFFICER		
Jamie O'Neill	9576 4600	0409 529 138
DEPUTY CHIEF (SOUTH)		
Ian Hollick	9571 8388	0427 489 287
DEPUTY CHIEF (NORTH)		
Greg Cocking	9655 7015	0408 900 462
SHIRE FIRE CONTROL OFFICERS		
Rangers	9576 4600	

HOT WORKS, HARVEST AND MOVEMENT OF MACHINERY BANS INFORMATION LINE 9576 0219

NOTE:

Fire Control Officers are not obliged to issue permits and they may advise on alternatives to burning. Please remember Fire Control Officers are Volunteers and their availability to issue permits may vary, assist them by planning in advance. Permits cannot be issued over the phone and should a Fire Control Officer refuse to issue a permit, it is a breach of the Act to request a permit from another Fire Control Officer.

Restricted and Prohibited burning periods

Lighting fires on your property can be extremely dangerous. To help reduce the risk, PROHIBITED and RESTRICTED burning times are set according to seasonal conditions and may be adjusted. These dates indicate when you are required to seek a Burning Permit and when lighting fires is prohibited. There is a requirement to notify neighbours of a planned burn.

Restricted and Prohibited Burning Periods

Burning is prohibited from 1 DECEMBER TO 31 MARCH.

Permits are required from 19 OCTOBER TO 30 NOVEMBER and 1 APRIL TO 31 MAY.

The following restrictions apply throughout Restricted and Prohibited periods

- No burning on Sundays and Public Holidays
- No burning of garden refuse
- No lighting of camp fires or solid fuel BBQs in the open air in the Shire of Chittering
- Burning of road side verges is prohibited without written approval from the Shire of Chittering or other authorities.

Dates to remember

FIREBREAKS MUST BE CLEARED BY
16 OCTOBER AND REMAIN CLEARED UNTIL 31 MAY

BURNING IS PROHIBITED BETWEEN
1 DECEMBER TO 31 MARCH

BURNING PERMITS ARE REQUIRED BETWEEN
19 OCTOBER TO 30 NOVEMBER AND 1 APRIL TO 31 MAY

BURNING IS PROHIBITED ON ANY DAY WHEN THE FIRE DANGER INDEX REACHES VERY HIGH, SEVERE, EXTREME OR CATASTROPHIC OR A TOTAL FIRE BAN HAS BEEN DECLARED.

Penalties

FAILURE TO COMPLY WITH THIS FIREBREAK NOTICE CAN RESULT IN FINES RANGING FROM $250 TO $250,000 OR IMPRISONMENT.

CAUTION: RESTRICTED AND PROHIBITED PERIODS ARE SUBJECT TO SEASONAL CHANGES, IF IN DOUBT CONTACT THE SHIRE 9576 4600

FOR FURTHER INFORMATION ON THIS NOTICE CONTACT THE SHIRE OF CHITTERING

Phone: 9576 4600 Fax: 9576 1250
Email: chatter@chittering.wa.gov.au

Appendix 5
AFAC bush fire glossary

afac
Australasian Fire and Emergency Service Authorities Council

BUSHFIRE GLOSSARY

Prepared by Rural and Land Management Group for
AFAC Agencies

January 2012

January 2012

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East Melbourne Victoria 3002
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Email: afac@afac.com.au
Internet: http://www.afac.com.au
http://knowledgeweb.afac.com.au/

Preface

The AFAC Bushfire Glossary has been developed to promote an exchange of information between member agencies on terminology used specifically in bushfires.

The Glossary has been developed based on a set of agreed business rules. It includes the bushfire technical terms, their definition or description as adopted and applied by the AFAC member agencies. It does include some fire terms that are of a general industry wide nature for completeness. It excludes terms for which an agreed definition could not be reached by the member agencies.

This document is not designed to be a text book or to provide a discussion of a term beyond the definition/description of that term. Nor is it an attempt to modify or redefine terms defined in codes, standards or legislation. Terms that have been adopted for use by the fire management industry from another discipline will maintain the meaning ascribed to them in their originating discipline.

It is proposed that this Glossary will be reviewed regularly to ensure that it continues to be relevant and meets the needs of AFAC member agencies. This is the fifth review. It is the current 2012 version.

AFAC acknowledges the significant contribution of the Rural and Land Management Glossary Working Group lead by Greg Esnouf and Country Fire Authority staff, Matthew Fraser and Jo Richards, who contributed generously of their time and expertise in the establishment of this document and the work of the Genesis Institute to provide a framework for refining the glossary.

Previous versions of the Glossary were titled Wildfire Glossary. The term wildfire has been replaced with the term bushfire in line with a trend towards using language more accepted by the general public.

The terms appear in alphabetical order excluding spaces. In this way it is possible to find a compound word without knowing if it is one or two words.

Aim

The purpose of this Glossary is to seek to facilitate a greater understanding by using common language between bushfire and land management agencies and support organisations during the prevention of, preparedness for, response to and recovery from bushfires.

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Bushfire Glossary

Term	Definition
Accelerant	Any substance (such as oil, gasoline, etc) that is applied to a fuel-bed to expedite the burning process.
Adaptor	A fitting used to couple different sized hoses, hoses of the same size with different threads, or different types of couplings, or to connect the male to male, or female to female parts of the same type of coupling.
Adsorption	The taking in of water vapour from the air by dead plant material.
Advance burn	A prescribed fire that reduces fuel through a forest area before felling operations. It is intended to improve the safety of timber harvesting operations and as a silvicultural tool to protect lignotubers and standing trees.
Advancing fire	That portion of the fire with rapid fire spread and higher intensity which is normally burning with the wind and/or up slope.
Aerial detection	The discovering, locating and reporting of fires from aircraft.
Aerial fuel	See: Elevated fuel
Aerial ignition	Ignition of fuels by dropping incendiary devices or materials from aircraft.
Aerial ignition device (AID)	Inclusive term applied to equipment designed to ignite wildland fuels from an aircraft.
Aerial Observer	See: Air Observer
Aerial reconnaissance	Use of aircraft for detection of fires and observing fire behaviour, values-at-risk, suppression activity, and other critical factors to facilitate command decisions on strategy and tactics needed for fire suppression.
Aerosol	Airborne solid or liquid particles dispersed or suspended in a gas stream.
After action review (AAR)	A discussion, focused on performance standards, of an event that enables those involved to discover what happened, why it happened, and how to sustain strengths and improve on weaknesses. An After action review is a tool incident command personnel and units can use to get maximum benefit from every incident. It provides a review of the incident upon its completion to identify and discuss effective and non-effective performance and lessons learned and how to apply them in the future. (adapted from NWCG)
AIIMS structure	The combination of facilities, equipment, personnel, procedures, and communications operating within a common organisational structure with responsibility for the management of allocated resources to effectively accomplish stated objectives relating to an incident (AIIMS).
Air attack	The direct use of aircraft in the suppression of bushfires.
Air attack Supervisor	Primarily responsible for the safety and efficient tactical coordination of aircraft operations when fixed and/or rotary firebombing aircraft are operating at a fire (Air Attack Supervisor Training Manual).
Air base Manager	An experienced, trained person who is appointed to manage all the functions and personnel on an air base or helicopter base.
Air mass	A meteorological term referring to an extensive body of air within which the conditions of temperature and moisture in a horizontal plane are essentially uniform.
Air Observer	The primary role of the air observer is to aerially obtain intelligence to assist the planning of fire suppression operations (NSWRFS).
Air operations	The use of aircraft in support of an incident for the purposes of suppression, transportation of personnel, equipment or supplies, or for aerial reconnaissance.

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Term	Definition
Air operations Manager	The air operations manager position is responsible for overall coordination of air operations and air support activities in support of an incident.
Aircraft Officer	The aircraft officer is responsible for ground operations and overall provision of support, enabling a safe and efficient air operation to be conducted.
Airside	The parts of an airport not normally open to unauthorised people. It comprises the apron, taxiways, runways and the areas containing them.
Allocated resources	Resources working at an incident (AIIMS).
Anchor point	An advantageous location, usually a barrier to fire spread, from which to start constructing a fireline. The anchor point is used to minimize the chance of being flanked by the fire while the line is being constructed (NWCG).
Aqueous film forming-foam (AFFF)	A synthetic amber coloured liquid concentrate mixed with water to form an agent that is capable of forming water-solution films on the surface of flammable liquids that prevent the escape of fuel vapours, excludes oxygen and maintain the surface when disturbed (self healing).
Area ignition	Ignition of several individual fires throughout an area, either simultaneously or in rapid succession, and so spaced that they add to and influence the main body of the fire to produce a hot, fast-spreading fire condition. Also called simultaneous ignition.
Area of origin	General location where the fire started.
Arson	The deliberate setting of a fire where the intent of the person responsible was to cause harm or destruction to life or property.
Aspect	The direction towards which a slope faces.
Asphyxiants	Substances which interfere with the respiratory process.
Assembly area	See Staging area.
Assessment	The process of determining if an individual has the prescribed skills, knowledge and experience needed to acquire a specific capability.
Assets	Anything valued by people which includes houses, crops, forests and, in many cases, the environment.
Assisting agency	An agency directly contributing suppression, support or service resources to another agency.
Atmospheric stability	The degree to which the atmosphere resists turbulence and vertical motion.
Attack time	See Elapsed time
Australasian Inter-service Incident Management System (AIIMS)	A nationally adopted structure to formalise a coordinated approach to emergency incident management.
Automatic dispatch	See Pre-planned dispatch.
Automatic weather station (AWS)	The Bureau's standard AWSs use sensors to monitor temperature, humidity, wind speed and direction, pressure and rainfall. Various advanced sensors are available for specialised applications. These sensors can monitor cloud height (ceilometer), visibility, present weather, thunderstorms, soil temperature (at a range of depths) and terrestrial temperature. (Developed from the BOM)
Available fuel	The portion of the total fuel that would actually burn under various environmental conditions.
Available resources	The resources at an incident and available for allocation at short notice. (AIIMS)

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Term	Definition
Backburn	1. A fire started intentionally along the inner edge of a fireline during indirect attack operations to consume fuel in the path of a bushfire (Australia). 2. A counterfire commenced from within continuous fuel for the purpose of fighting a fire (New Zealand).
Back fire	See: Backburn (Preferred term).
Backing fire	The part of a fire which is burning back against the wind or down slope, where the flame height and rate of spread are reduced.
Bark fuel	The flammable bark on tree trunks and upper branches.
Bark heaps	Accumulations of bark and branch material resulting from timber harvesting operations. Soil may be mixed with bark heaps, but generally the heap is formed by a machine dropping fresh bark on the top of the heap.
Basal accumulation	Bark fallen from a tree and forming a relatively high and localized accumulation of fine fuel.
Base camp	A location where personnel are accommodated and fed for a period of time. A base camp usually contains catering, ablution and accommodation facilities, a water supply and a lighting system, and may include other facilities such as car parking maintenance and servicing. (AIIMS)
Bay(s)	A marked indentation (s) in the fire perimeter usually located between two fingers.
Beaufort wind scale	A system for estimating wind speeds based on observation of visible wind effects. A series of descriptions of visible wind effects upon land objects or sea surfaces is matched with a corresponding series of wind speed ranges, each being allocated a *Beaufort number.*
Blacking out	The process of extinguishing or removing burning material along or near the fire control line, felling stags, trenching logs to prevent rolling and the like, in order to make the fire safe.
Blackspot	An area where two-way radio coverage does not exist.
Blank cap	The metal cap used on delivery outlets and on the suction inlet of the pump to prevent discharge of water.
Blow down	See: Wind throw.
Blow up	Sudden increase in fireline intensity or rate of spread of a fire sufficient to preclude direct control or to upset existing suppression plans. Often accompanied by violent convection and may have other characteristics of a fire storm. (NWCG)
Bole	The trunk of a tree.
Bole damage	The damage to the trunk of a living tree by fire, mechanical equipment or disease.
Bracken	Bracken fern varies significantly in height and density. If Bracken is generally upright (either alive or dead) with the majority of its biomass in the top half of the plant and only the stems in touch with the ground, then it is considered to be part of the elevated fuel. If however, it has collapsed and most of its biomass is in touch with the ground, then it is considered to be Near-surface fuel.
Branch	A tapered pipe, fitted to the end of a hose line, which increases the velocity (converting pressure energy to kinetic energy) of the water or foam solution travelling through the hose, and forms an effective firefighting jet or spray.
Breakaway	The points at which a fire, after it has been contained, escapes into unburnt areas across a fireline or fire edge.

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Term	Definition
Breeching	A device to divide one hose line into two or collect two hose lines into one.
Briefing	A general overview of an operation.
Broad area hazard reduction	Large scale removal of selected fuel before the onset of a bushfire danger period.
Broadcast burning	See: Prescribed burning (Preferred term)
Buffer	A strip or block of land on which the fuels are reduced to provide protection to surrounding lands.
Bulk water carrier	A large tanker used for replenishing water to firefighting tankers.
Burn back	See: Reburn (Preferred term).
Burning brands	Lofted burning material such as bark, usually flaming.
Burning conditions	The state of the combined components of the fire environment that influence fire behaviour and fire impact in a given fuel type. Usually specified in terms of such factors as fire weather elements, fire danger indices, fuel load and slope.
Burning off	Generally setting fire - with more or less regard to areas carrying unwanted vegetation such as rough grass, slash and other fuels.
Burning out	To intentionally light fires to consume islands of unburned fuel inside the fire perimeter.
Burning program	A program of prescribed burns scheduled these for a designated area over a nominated time, normally looking ahead over one fire season (for the coming spring to the following autumn), but can also look ahead five years or more.
Burning rotation	The period between burning of a prescribed area for management purposes.
Burning unit	A specified land area for which prescribed burning is planned.
Burn out	1. A fire set to consume islands of unburnt fuel inside the fire perimeter and between the fire edge and fireline (Australia). 2. A counterfire commenced from a natural or previously constructed firebreak for the purpose of fighting a fire (New Zealand).
Burn over	A section of fire that overruns personnel and/or equipment.
Burn plan	The plan which is approved for the conduct of prescribed burning. It contains a map identifying the area to be burnt and incorporates the specifications and conditions under which the operation is to be conducted.
Bushfire	Un planned vegetation fire. A generic term which includes grass fires, forest fires and scrub fires both with and without a suppression objective.
Bushfire danger period	A period of the year either established by legislation or declared by the relevant agency, when restrictions are placed on the use of fire due to dry vegetation and the existence of conditions conducive to the spread of fire.
Bushfire management	All those activities directed to prevention, detection, damage mitigation, and suppression of bushfires. Includes bushfire legislation, policy, administration, law enforcement, community education, training of fire fighters, planning, communications systems, equipment, research, and the multitude of field operations undertaken by land managers and emergency services personnel relating to bushfire control.
Byram-Keetch Drought index (BKDI)	See: Keetch-Byram Drought Index
Cache	A predetermined complement of supplies stored in a designated location. (CIMS).
Campaign fire	A fire normally of a size and/or complexity that requires substantial firefighting resources, and possibly several days or weeks to suppress.

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Term	Definition
Candle (Candling)	A tree (or small clump of trees) is said to candle when its foliage ignites and flares up, usually from the bottom to top.
Candlebark	Long streamers of bark that have peeled from some eucalypt species that form fire brands conducive to very long distance spotting.
Canopy	The crowns of the tallest plants in a forest – the overstorey cover.
Canopy cover	Canopy cover refers to 2 dimensions (ie plan view, area coverage)
Canopy density	Canopy density refers to 3 dimensions (ie mass/volume)
Catastrophic fire danger	The highest fire danger rating as determined by fire agencies and generally with a Forest fire danger index greater than 100 or a Grassland fire danger index greater than 150.
Central ignition	A method of prescribed burning in which fires are set in the centre of an area to create a strong convective column. Additional fires are then set progressively closer to the outer control lines causing indraft winds to build up. This has the effect of drawing the fires towards the centre.
Chaining	The process of flattening vegetation (usually mallee or scrub) by dragging a heavy chain or cable between two large tractors or bulldozers.
Charged line	A line of fire hose filled with water under pressure and ready to use.
CIMS	Coordinated Incident Management System used in New Zealand.
Class A foam	See: Foam
Class labels	Class labels identify the type of hazardous material being stored or transported. These are grouped under broad classifications according to the predominant type of risk involved.
Climate	The atmospheric conditions of a place over an extended period of time.
Clinometer	An instrument used to measure the angle of a slope.
Cloud cover	The amount of sky covered or obscured by cloud, expressed in eighths. Eight eighths is complete cloud cover.
Coarse fuels	Dead woody material, greater than 25mm in diameter, in contact with the soil surface (fallen trees and branches). Some researchers categorise forest fuels as: fine <6 mm diameter; twigs 6-25 mm diameter; coarse >25 mm diameter.
Code of Practice	Document giving methods developed to assist compliance with acts and regulations in the performance of work.
Cold front	A cold front is the delineation between cold polar air moving towards the equator and undercutting warm tropical air moving poleward. The temperature differences across a cold front can be extreme and associated with strong winds. The warm tropical air is forced to rise and become unstable with the development of large cumuliform clouds. Severe weather such as thunderstorms, squall lines and severe turbulence may accompany these cold fronts. (BOM)
Cold trailing	A method of determining whether or not a fire is still burning, involving careful inspection and feeling with the hand, or by use of a hand-held infrared scanner, to detect any heat source.
Collecting head	A collecting head is used to collect (usually from two to four) lines into the suction inlet of a pump.
Combat agency/authority	See: Control authority
Combustion	Rapid oxidation of fuels producing heat, and often light.

Term	Definition
Command	The direction of members and resources of an agency in the performance of the agency's role and tasks. Authority to command is established in legislation or by agreement within an agency. Command relates to agencies and operates vertically within an agency.
Communications plan	Details the methods and systems for people to communicate with each other, the incident management structure, including the actual radio channels/mobile phone numbers. (AIIMS)
Compartment	(1) Forestry Definition – A basic administrative unit of a managed forest. (2) Building Definition - An enclosed space with floor, walls and ceiling.
Competency	Skills and knowledge and their application within an occupation to the standard of performance required in the workplace. (Vic report)
Conduction	The transfer of thermal energy between regions of matter due to temperature gradient.
Contained	The status of a wildfire suppression action signifying that a control line has been completed around the fire, and any associated spot fires, which can reasonably be expected to stop the fire's spread. (NWCG)
Contour lines	Contour lines connect points of equal elevation on a topographical map.
Control	The overall direction of response activities in an emergency situation. Authority for control is established in legislation or in an emergency response plan, and carries with it the responsibility for tasking and coordinating other agencies in accordance with the needs of the situation. Control relates to situations and operates horizontally across agencies.
Control authority	The agency, service, organization or authority with legislative responsibility for control of the incident. (Also referred to as the responsible authority or agency.) (AFAC)
Controlled	The stage during fire suppression activities at which the complete perimeter of a fire is secured and no breakaway is expected.
Controlled burning	See: Prescribed burning.
Control line	See: Fireline
Convection	1. As applied in meteorology, atmospheric motions that are predominantly vertical, resulting in vertical transport and mixing of atmospheric properties; distinguished from advection. 2. As applied in thermodynamics is a mechanism of heat transfer occurring because of the bulk movement of fluids.
Convection burn	See: Central ignition
Convection column	The rising column of smoke, ash, burning embers and other particle matter generated by a fire.
Convective activity	General term for manifestations of convection in the atmosphere, alluding particularly to the development of convective clouds and resulting weather phenomena, such as showers, thunderstorms, squalls, hail, and tornadoes. (NWCG)
Convergence zone	1. See: Junction zone. 2. In fire weather, that area where two winds come together from opposite directions and are forced upwards often creating clouds and precipitation. (NWCG)
Convoy	Two or more vehicles driving together under the control of a single Convoy Leader.

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Term	Definition
Coordination	The bringing together of agencies and elements to ensure effective response to an incident or emergency. It is primarily concerned with the systematic acquisition and application of resources in accordance with the requirements imposed by the emergency or emergencies. Coordination relates primarily to resources and operates: • vertically, within an agency, as a function of the authority to command; • horizontally, across agencies, as a function of the authority to control.
Cordon	A cordon is the means to maintain an area and is used to restrict movement into and out of an area.
Coupe	A defined forest area in which timber harvesting takes place.
Crew	See: Fire crew.
Crew leader	Person responsible for the supervision and management of crews
Critical burnout time	Total time a fuel can burn and continue to feed energy to the base of a forward-travelling convection column.
Critical incident stress	Unusually strong emotional reactions which have the potential to interfere with the ability of personnel to function, either at the incident scene or later, arising from any situation faced during operations.
Critical incident stress debriefing	The process in which teams of professional and peer counsellors provide emotional and psychological support to incident personnel who are or have been involved in a critical (highly stressful) incident.
Cross bearings	Intersecting lines of sight from two or more points on the same object; used to determine the location of bushfire from lookouts.
Crown fire	A fire that advances from top to top of trees or shrubs.
Crown scorch	Browning of the needles or leaves in the crown of a tree or shrub caused by heat from a fire.
Crowning	A fire ascending into the crowns of trees and spreading from crown to crown.
Crowning potential	A probability that a crown fire may start, calculated from inputs of foliage moisture content and height of the lowest part of the tree crowns above the surface. (NWCG)
Curing	Drying and browning of herbaceous vegetation due to mortality or senescence.
Dead fuel	Fuels with no living tissue in which moisture content is governed almost entirely by absorption or evaporation of atmospheric moisture (relative humidity and precipitation). (NWCG)
Debrief	To gather information from the participants in an action so as to gauge the success or otherwise of the action at the end of the task, shift, tour or incident.
Deep-seated fire	A fire burning far below the surface in duff, mulch, peat, or other combustibles as contrasted with a surface fire.
Defensive strategy	A firefighting strategy used where the protection of life and assets is a priority when a fire is: (i) located in inaccessible or remote location OR (ii) too intense to be safely or effectively attacked directly.
Dehydration	Excessive loss of water from the body's tissues. Dehydration may follow any condition in which there is a rapid depletion of body fluids.
Delayed aerial ignition devices (DAID)	An incendiary device that will ignite after a predetermined time.

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Term	Definition
Deliberate fire	A fire resulting from a person placing burning material to cause ignition. The intent of the person may have been to cause harm or destruction to life or property (arson-criminal offence) or to modify fuels and/or vegetation for land management purposes (summary offence). See also Arson.
Delivery hose	Hose used to transport water under pressure.
Delivery valve	On a pump, the valved outlet through which water is discharged.
Demobilisation	The orderly release of resources no longer required at an incident.
Depth of burn	The reduction in forest floor litter thickness (cm) due to consumption by fire. Most commonly used in connection with prescribed burning.
Desiccant	A chemical that, when applied to a living plant causes or accelerates the drying out of its aerial parts.
Desorption	The loss of moisture to the atmosphere from dead plant material.
Detection	The discovery of a fire. Individuals, fire towers, reconnaissance aircraft and automatic devices may be used, either alone or in combination.
Dew	The moisture which collects in small droplets on the surface of substances and vegetation by atmospheric condensation, chiefly at night.
Dew point temperature	This is a measure of the moisture content of the air and is the temperature to which air must be cooled in order for dew to form. The dew-point is generally derived theoretically from dry and wet-bulb temperatures, with a correction for the site's elevation. (BOM)
Dieback	The progressive dying, from the top downward, of twigs, branches or tree crowns.
Diffused pattern	A spray pattern (as opposed to straight stream) of water or foam.
Direct attack	A method of fire attack where wet or dry firefighting techniques are used. It involves suppression action right on the fire edge which then becomes the fireline.
Dispatch	The act of ordering attack crews and/or support units to respond to a fire, or from one place to another.
Division	A portion of the incident comprising of two or more sectors. The number of sectors grouped in a Division should be such as to ensure effective direction and control of operations. Divisions are generally identified by a local geographic name.
Dominant height	Mean height of the largest trees in a stand. A specified number per unit area are generally selected.
Downwind	Away from the wind direction. In the direction opposite to the direction from which the wind is blowing. The direction that smoke will travel.
Dozer	A crawler tractor fitted with a blade which can be transported to a fire on a tray truck or trailer. Dozer is a shortened form of "Bulldozer"
Dozer line	Fireline constructed by the front blade of a dozer.
Drain time	The time (minutes) it takes for foam solution to drop out from the foam mass; for a specified percent of the total solution contained in the foam to revert to liquid and drain out of the bubble structure.
Drift	The effect of wind on smoke or on a water drop.
Drip torch	A canister of flammable fuel fitted with a wand, a burner head and a fuel flow control device. It is used for lighting fires for prescribed burning, backburning and burning out.

Term	Definition
Drop pass	Indicates that the firefighting aircraft has the target in sight and will make a drop of fire control agent on this run over the target.
Drop pattern	The distribution of an aerially delivered fire control agent drop on the target area in terms of its length, width, and momentum (velocity x mass) as it approaches the ground. The latter determines the relative coverage level of the fire control agent on fuels within the pattern.
Drop zone (DZ)	Target area for firefighting aircraft, or cargo dropping.
Drought	Prolonged absence or marked deficiency of precipitation (rain). (BOM)
Drought index	A numerical value reflecting the dryness of soils, deep forest litter, logs and living vegetation.
Dry bulb temperature	Technically, the temperature registered by the dry-bulb thermometer of a psychrometer. However, it is identical to the temperature of the air. (Degrees Celsius). (NZ)
Dry firefighting	The suppression of a fire without the use of water. This is normally achieved by removing the fuel by the use of hand tools, burning or machinery.
Duff	The layer of decomposing vegetative matter on the forest floor below the litter layer, the original structure still being recognisable.
Ecological burning	A form of prescribed burning. Treatment with fire of vegetation in nominated areas to achieve specified ecological objectives.
Edge burning	A term used to describe perimeter burning of an area in mild conditions prior to large scale prescribed burning. This practice is used to strengthen buffers and to reduce mop-up operations.
Elevated fuel	The standing and supported combustibles not in direct contact with the ground and consisting mainly of foliage, twigs, branches, stems, bark and creepers.
Embers	Glowing particles cast from the fire (as 'showers' or 'storms'). (Vic report)
Emergency centre	A facility where the coordination of the response and support to the incident is provided.
En route resources	Resources despatched to an incident that have not yet checked in. (AIIMS)
Entrapment	A situation in which individuals are exposed to life threatening or potentially life threatening conditions from which they cannot safely remove themselves.
Equilibrium moisture content (EMC)	The moisture content that a fuel element would attain if exposed for an infinite period in an environment of specified constant dry-bulb temperature and relative humidity. When a fuel element has reached its EMC, it neither gains nor loses moisture as long as conditions remain constant.
Equipment	All material supplied to an incident excluding personnel and vehicles.
Escape route	A planned route away from danger areas at a fire.
Evacuation	The temporary relocation of persons from dangerous or potentially dangerous areas to safe areas.

Term	Definition
Exposures	Parts of the same structure or other structures or property not directly involved in the fire but at risk of being burnt or damaged if the fire is not controlled. In the bushfire context: 1. Property that may be endangered by a fire burning in another structure or by a bushfire. In general, property within 12 metres of a fire may be considered to involve an exposure hazard, although in very large fires the danger may exist at much greater distances. 2. Direction in which a slope faces, usually with respect to cardinal directions (N, S, E, W). 3. The general surroundings of a site, with special reference to its openness to winds and sunshine.
Extinguishing agent	A substance used to put out a fire by cooling the burning material or blocking the supply of oxygen, or chemically inhibiting combustion or combinations of these mechanisms.
Extreme fire behaviour	A level of bushfire behaviour characteristics that ordinarily precludes methods of direct suppression action. One or more of the following is usually involved: • high rates of spread • prolific crowning and/or spotting • presence of fire whirls • a strong convective column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.
Extreme fire danger	The second highest fire danger rating as determined by fire agencies and generally with a Forest fire danger index between 75 and 99 or a Grassland fire danger index greater between 100 and 149.
Facilities	Permanent and temporary facilities where personnel sleep, cook, maintain and repair equipment. (AIIMS)
Fall back fire control line	Any fire control line which is at a distance from the fire perimeter, and is the second control line at which the fire perimeter may be stopped should it cross the first fire control line. Also known as 'fallback line'.
Fine fuel	Fuel such as grass, leaves, bark and twigs less than 6mm in diameter that ignite readily and are burnt rapidly when dry.
Fingers	Long and narrow slivers of fire which extend beyond the head or flanks. (AFAC)
Fire	The chemical reaction between fuel, oxygen and heat. Heat is necessary to start the reaction and once ignited, fire produces its own heat and becomes self-supporting.
Fire access track	A track constructed and/or maintained expressly for fire management purposes.
Fire behaviour	The manner in which a fire reacts to the variables of fuel, weather and topography.
Fire Behaviour Analyst	Person responsible for developing fire behaviour predictions based on fire history, fuel, weather, and topography. (NWCG)amended
Fire behaviour model	A set of mathematical equations that can be used to predict certain aspects of fire behaviour.
Fire behaviour prediction	Prediction of probable fire behaviour usually prepared by a fire behaviour analyst in support of fire suppression or prescribed burning operations. (NWCG)
Fire behaviour prediction system	A system that uses a set of mathematical equations to predict certain aspects of fire behaviour in wildland fuels when provided with data on fuel and environmental conditions.

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Term	Definition
Fire bombing	A technique of suppressing a bushfire by dropping water, foam or retardants on it from an aircraft.
Fire brand	A piece of flaming or smouldering material capable of acting as an ignition source. eg eucalypt bark.
Fire climate	The composite pattern or integration over time of the fire weather elements that affect fire occurrence and fire behaviour in a given area.
Fire control	See Fire suppression.
Fire control agent	A substance that acts as an Extinguishing agent, and or a Fire retardant and or a Fire suppressant.
Fire control line	See: Fireline.
Fire crew	A general term for two or more firefighters organised to work as a unit. (NWCG)
Fire danger	Sum of constant danger and variable danger factors affecting the inception, spread, and resistance to control, and subsequent fire damage; often expressed as an index. (NWCG)
Fire danger class	A segment of a fire danger index scale identified by a descriptive term and or a colour code. The classification system may be based on more than one fire danger index and an assessment of risk exposure.
Fire danger index (FDI)	A relative number denoting the potential rates of spread, or suppression difficulty for specific combinations of temperature, relative humidity, drought effects and wind speed.
Fire danger rating	A relative class denoting the potential rates of spread, or suppression difficulty for specific combinations of temperature, relative humidity, drought effects and wind speed, indicating the relative evaluation of fire danger.
Fire ecology	The study of the relationships between fire, the physical environment and living organisms.
Fire edge	Any part of the boundary of a going fire at a given time. *NOTE*: The entire boundary is termed the 'fire perimeter'.
Fire effects	The physical, biological and ecological impact of fire on the environment. (NWCG)
Fire environment	The surrounding conditions, influences, and modifying forces of topography, fuel, and weather that determine fire behaviour. (NWCG)
Firefighter	Any employee, volunteer or agent of any fire agency who occupies, or is designated, to undertake a role for the purpose of fire suppression.
Firefighting operations	Any work or activity directly associated with control of fire.
Fire frequency	A general term referring to the recurrence of fire in a given area over time (NWCG). Also see: Fire regime
Fire front	The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified, the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smouldering combustion. (NWCG)
Fireground	The area in the vicinity of a fire suppression operations, and the area immediately threatened by the fire. It includes burning and burnt areas; constructed and proposed fire lines; the area where firefighters, vehicles, machinery and equipment are located when deployed; roads and access points under traffic management control; tracks and facilities in the area surrounding the actual fire; and may extend to adjoining area directly threatened by the fire.

Bushfire Glossary

Term	Definition
Fire hazard	A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control.
Fire intensity	See: Fireline intensity.
Fireline	A natural or constructed barrier, or treated fire edge, used in fire suppression and prescribed burning to limit the spread of fire.
Fireline intensity	The rate of energy release per unit length of fire front usually expressed in kilowatts per metre (Kw/m). The rate of energy release per unit length of fire front, defined by the equation I=Hwr, where I = fireline intensity (kW/m) H = heat yield of fuel (kJ/kg)-16,000 kJ/kg w = dry weight of fuel consumed (kg/m2) (mean total less mean unburnt) r = forward rate of spread (m/s) The equation can be simplified to I = w r/2 where I = fireline intensity (kW/m) w = dry weight of fuel consumed (tonnes/ha) r = forward rate of spread (m/hr)
Fire lookout	A structure strategically located and manned to detect the occurrence and the location of fires. It may be a tower or a structure on a high point
Fire management	All activities associated with the management of fire prone land, including the use of fire to meet land management goals and objectives.
Fire potential	The chance of a fire or number of fires occurring of such size, complexity or impact that requires resources (both a pre-emptive management and suppression capability) from beyond the area of the fire origin. (BCRC)
Fire preparedness	All activities undertaken in advance of bushfire occurrence to decrease its extent and severity and to ensure more effective fire suppression.
Fire prevention	All activities concerned with minimising the incidence of bushfire particularly those of human origin.
Fire regime	The history of fire in a particular vegetation type or area including the frequency, intensity and season of burning. It may also include proposals for the use of fire in a given area. (AFAC)
Fire report	An official record of a fire, generally including information on cause, location, action taken, damage, costs, etc., from start of the fire until completion of suppression action. These reports vary in form and detail from agency to agency (NWCG). Also see Report of Fire
Fire retardant	A chemical generally mixed with water, designed to retard combustion by a chemical reaction. It is applied as slurry from the ground or air to fuels ahead of the fire.
Fire risk	Processes, occurrences or actions that increase the likelihood of fires occurring.
Fire run	A rapid advance of a fire front. It is characterised by a marked transition in intensity and rate of spread.
Fire scar	1) A healing or healed-over injury caused or aggravated by fire on a woody plant. 2) A mark left on a landscape by fire.
Fire season	The period during which bushfires are likely to occur, spread and do sufficient damage to warrant organised fire control.
Fire simulator	A device that imposes simulated fire and smoke on a projected landscape scene, for the purpose of informing fire suppression personnel of potential fire situations either for an actual fire or hypothetical fire(s).
Fire spread	Development and travel of fire across surfaces.

Term	Definition
Fire storm	Violent convection caused by a large continuous area of intense bushfire often characterised by destructively violent surface indrafts, a towering convection column, long distance spotting, and sometimes by tornado-like whirlwinds. (AFAC)
Fire suppressant	An additive designed to reduce the surface tension of water and/or to hold water in suspension thus increasing water's efficiency as a fire extinguishing agent. Suppressants are applied directly to the burning fuels.
Fire suppression	The activities connected with restricting the spread of a fire following its detection and before making it safe.
Fire suppression organisation	1. The personnel and equipment collectively assigned to the suppression of a specific fire or group of fires. 2. The personnel responsible for fire suppression within a specified area. 3. The management structure, usually shown in the form of an organization chart of the persons and groups having specific responsibilities in fire suppression. (NWCG)
Fire suppression plan	See Incident action plan (IAP).
Fire tetrahedron	An instructional aid in which the sides of the tetrahedron (comprising 4 triangular shaped figures) are used to represent the 4 components of combustion and flame production process-fuel, heat, oxygen and the chemical chain reaction.
Fire threat	The impact a fire will have on a community.
Fire tower	Tower strategically located and manned to detect and report the occurrence and location of fires. A type of Fire lookout
Fire training simulator	A training device that imposes simulated fire and smoke on a projected landscape scene, for the purpose of instructing fire suppression personnel in fire situations and fire suppression techniques.
Fire triangle	Diagrammatic expression of the three elements that are necessary for a fire to occur. FUEL – HEAT – OXYGEN. The removal of any one of these will extinguish a fire.
Fire weather	Weather conditions which influence fire ignition, behaviour, and suppression. (NWCG)
Fire weather forecast	A weather prediction specially prepared for use in wildland fire operations and prescribed fire. (NWCG)
Fire whirl	Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame. Fire whirls range in size from less than one foot to over 500 feet in diameter. Large fire whirls have the intensity of a small tornado. (NWCG)
Fire wind	The inflow of air close to a fire caused by the action of convection. It is not to be confused with a prevailing wind.
First attack	See: Initial attack
Fixed wing aircraft	A heavier than air aircraft which obtains lift for flight by forward motion of wings through the air.
Flame angle	The angle of the flame in relation to the ground, caused by wind direction or the effect of a slope.
Flame depth	The depth of the zone within which continuous flaming occurs behind the fire edge.

Term	Definition
Flame height	The average maximum vertical extension of flames at the leading edge of the fire front. Occasional flashes that rise above the general level of flames are not considered. This distance is less than the flame length if flames are tilted due to wind or slope. (NWCG)
Flame length	The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface), an indicator of fire intensity. (NWCG)
Flame Zone	The highest level of bushfire attack as a consequence of direct exposure to flames from the fire front in addition to heat flux and ember attack. (AS 3959 - 2009)
Flame zone	The area around fuels where the combustion of gases occurs to form flames.
Flaming zone	See: Flame zone.
Flammability	The ease with which a substance is set on fire.
Flammable	Capable of being ignited and of burning with a flame.
Flank attack	Obtaining control of a fire by attacking its side/s (flank).
Flanks of a fire	Those parts of a fire's perimeter that are roughly parallel to the main direction of spread. (NWCG)
Flare up	Any sudden acceleration of fire spread, or intensification of fire, or a part of the fire. A flare up is of relatively short duration and does not radically change existing control plans. (NWCG)
Flash fire	A fast moving fire consuming most of the fine fuels available.
Foam	Foam is a mass of bubbles formed by mixing air with water and a foam concentrate in specific proportions. It is used as a firefighting agent to form a smothering, cooling and/or ignition preventing layer of the surface over a fuel.
Foam blanket	A layer of foam which forms an insulating and reflective barrier to heat and is used for fuel protection, suppression, and mop-up. (NWCG)
Foam Class A	A mixture of foam concentrate & water specifically formulated for extinguishing bushfires. The foam is biodegradable, non toxic and is used at very low concentrates. It may be delivered aspirated or non-aspirated. (See also Foam solution).
Foam Class B	A foam formulated for application on Class B fires
Foam concentrate	The concentrated foaming agent as received from the manufacturer which, when added to water, creates a foam solution.
Foam inductor	Equipment consisting of an inlet connection, ejector pump and a discharge assembly, for the induction of foam concentrate.
Foam solution	The mixture of water and foam concentrate.
Forest	An area, incorporating all living and non-living components, that is dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding 2 metres and with existing or potential crown cover of overstorey strata about equal to or greater than 20 per cent. This definition includes Australia's diverse native forests, woodlands and plantations, regardless of age.
Forest fire	A fire burning mainly in forest and/or woodland.
Forest type	A category for describing a forest commonly based on the predominant tree species, tree form and structure.

Term	Definition
Forward looking infrared (FLIR)	Hand held or aircraft mounted device designed to detect heat differentials and display them. FLIRs have thermal resolution similar to IR line scanners, but their spatial resolution is substantially less; commonly used to detect hot spots and flare ups obscured by smoke, evaluate the effectiveness of firing operations, or detect areas needing mop-up. (NWCG)
Forward rate of spread (FROS)	The speed with which a head fire moves in a horizontal direction across the landscape.
Frontal fire intensity	See: Fireline Intensity
Front end loader	Earthmoving equipment designed to move loose earth and/or loads into vehicles. A multi-purpose bucket is fitted to articulated arms at the front of the vehicle. May be either wheeled or tracked.
Fuel	Any material such as grass, leaf litter and live vegetation which can be ignited and sustains a fire. Fuel is usually measured in tonnes per hectare. Related Terms: Available fuel, Coarse fuel, Dead fuel, Elevated dead fuel, Fine fuel Ladder fuels, Surface fuels, and Total fine fuel.
Fuel age	The period of time lapsed since the fuel was last burnt.
Fuel arrangement	A general term referring to the spatial distribution and orientation of fuel particles or pieces. (NWCG)
Fuel array	The totality of fuels displayed in a location: fine and coarse, live and dead. (Vic report)
Fuel assessment	The estimation or calculation of total and available fuel present in a given area.
Fuel bed depth	Average height of surface fuels contained in the combustion zone of a spreading fire front. (NWCG)
Fuelbreak	A natural or manmade change in fuel characteristics which affects fire behaviour so that fires burning into them can be more readily controlled.
Fuelbreak system	A series of modified strips or blocks tied together to form continuous strategically located fuel breaks around land units.
Fuel continuity	The degree or extent of continuous or uninterrupted distribution of fuel particles in a fuel bed thus affecting a fire's ability to sustain combustion and spread. This applies to aerial fuels as well as surface fuels.
Fuel depth	The average distance from the bottom of the litter layer to the top of the layer of fuel, usually the surface fuel.
Fuel load	The oven dry weight of fuel per unit area. Commonly expressed as tonnes per hectare. (AFAC). (Also known as fuel loading)
Fuel management	Modification of fuels by prescribed burning, or other means. (AFAC)
Fuel map	A map showing areas of varying fuel quantities and types and usually indicates past fire history.
Fuel model	Simulated fuel complex for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified. (NWCG)
Fuel modification	Manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control (e.g., lopping, chipping, crushing, piling and burning).(NWCG)
Fuel moisture content	The water content of a fuel expressed as a percent of the oven dry weight of the fuel particle. (%ODW)

Term	Definition
Fuel moisture differential	A term used to describe the situation where the difference in the moisture content between fuels on adjacent areas results in noticeably different fire behaviour on each area.
Fuel profile	The vertical cross section of a fuel bed down to mineral earth.
Fuel quantity	See: Fuel load.
Fuel reduction	Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control.
Fuel reduction burning	The planned application of fire to reduce hazardous fuel quantities; undertaken in prescribed environmental conditions within defined boundaries.
Fuel separation	The action of separating fuel for the purpose of providing a mineral earth firebreak. Also means the actual gap between fuel layers or particles eg gap between individual hummock grasses or gap between surface and canopy fuels
Fuel type	An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause predictable rate of spread or difficulty of control under specified weather conditions. (AFAC)
Fuel weight	See Fuel load.
General origin area	The larger area where the fire started that is readily identifiable based on macro scale indicators and witness statements. (NWCG)
Going fire	Any bushfire which is expanding and suppression actions have not yet contained the fire.
Grass fire	Any fire in which the predominant fuel is grass or grass like. (NWCG)
Grassland curing	The proportion of dead material in grasslands – usually increases over summer as tillers die off and dry out, increasing the risk of grassland fire.
Grid ignition	A method of lighting prescribed fires where ignition points are set individually at a predetermined spacing through an area.
Ground crew	See: Hand crew.
Ground fire	Fire that consumes the organic material beneath the surface litter ground, such as a peat fire. (NWCG)
Ground fuel	All combustible materials below the surface litter, including duff, roots, peat and saw dust dumps that normally support a glowing or smouldering combustion without flame.
Habitat	The local environment of conditions in which an animal or plant lives.
Hand crew	A fire suppression crew trained and equipped to fight fire with hand tools.
Hand line	A fireline constructed with hand tools. (NWCG) (Wildfire context)
Hand trail	See Hand line.
Hang up	A situation in which a tree is lodged in another and prevents it from falling to the ground.
Hazard	A source of potential harm or a situation with potential to cause loss.
Hazard reduction	See: Fuel Management
Head	See: Head Fire
Head attack	Directly knocking down the head of a fire. Recommended only for low intensity fires where firefighters can be sure that the fire will not flare up unexpectedly.
Head fire	The part of a fire where the rate of spread, flame height and intensity are greatest, usually when burning downwind or upslope.

Bushfire Glossary

Term	Definition
Heat exhaustion	A form of shock, due to depletion of body fluids resulting from overexposure to a hot environment.
Heat stress	Illness caused by the body overheating.
Heat stroke	A life-threatening condition that develops when the body's temperature-regulating and cooling mechanisms are overwhelmed and body systems begin to fail.
Heat transfer	The transfer of thermal energy from one physical system to another by conduction, convection or thermal radiation.
Heavy fuels	See: Coarse fuels.
Heel	See: Rear (Preferred term).
Heel fire	See: Backing Fire.
Helibase (HB)	A location for parking, refuelling and maintenance of helicopters operating in support of an incident.
Helicopter	A form of heavier-than-air, rotor-wing aircraft whose lift is produced by engine-driven rotors which behave as if they were both propellers and wings.
Helipad (HP)	A designated location which meets specific requirements for a helicopter to take off and land.
Helitack crew	An initial attack crew specially trained in the tactical and logistical use of helicopters for fire suppression.
Heli-torch	An aerial ignition device hung from or mounted on a helicopter to disperse ignited lumps of gelled gasoline. Used for backburns, burnouts, or prescribed burns. (NWCG)
High fire danger	The second lowest fire danger rating as determined by fire agencies and generally with a Forest fire danger index between 25 and 49 or a Grassland fire danger index between 25 and 49.
High intensity fire	Fires with an average intensity greater than 3000 $kW.m^{-1}$ and flame heights greater than 3 m, causing complete crown scorch or possibly crown fires in forests. Uncontrollable by direct attack. The term is also applied to stationary fires burning in very high fuel loads (such as logging slash).
Hold over fire	See: Sleeper
Hop over	See: Breakaway.
Hose bandage	A means of affecting a temporary repair to a canvas or synthetic hose.
Hose strangler	A crimping device for stopping the flow of water in a hose.
Hot Refueller	A trained person responsible for the operation of the equipment for the 'hot' refuelling of helicopters.
Hot spot	1. A particularly active part of a fire. 2. An area of smouldering fuels requiring to be extinguished during patrol operations.
Humus	Layer of decomposed organic matter on the forest floor beneath the fermentation layer and directly above the soil. It is that part of the duff in which decomposition has rendered vegetation unrecognizable and mixing of soil and organic matter is underway. See Also: Duff & Litter
Hygrometer	An Instrument which measures the humidity in the air.
Ignition	The beginning of flame production or smouldering combustion; the starting of a fire.

Term	Definition
Ignition pattern	The manner in which a prescribed burn, backburn, or burnout is set, determined by weather, fuel, ignition system, topographic and other factors having an influence on fire behaviour and the objective of the burn.
Ignition source	A source of energy sufficient to initiate combustion.
Incendiary	A burning compound or metal used to produce intense heat or flame, like a bomb.
Incendiary device	Device designed and used to start a fire.
Incident	Any unplanned event requiring emergency intervention. (AIIMS)
Incident Action Plan (IAP)	The plan used to describe the incident objectives, strategies, resources and other information relevant to the control of an incident. (AIIMS)
Incident control	See: Incident management
Incident Control Centre (ICC)	The location where the Incident Controller and various members of the Incident Management Team provide overall direction of response activities. (See also Incident Control Point)
Incident Controller	The individual responsible for the management of all incident control activities across a whole incident (AIIMS)
Incident Control Point (ICP)	The location where the Incident Controller and, where established, members of the Incident Management Team provide overall direction of response activities in an emergency situation. (See also Incident Control Centre)
Incident control system (ICS)	A command structure to systematically and logically manage suppression of emergency incidents including bushfires, from small, simple incidents to large, difficult or multiple situations. It is designed to develop in modular fashion from the top (Incident Controller) downwards. Refer NIMS, AIIMS, CIMS
Incident management	The process of controlling the incident and coordinating resources. (EMA)
Incident Management Team (IMT)	The group of incident management personnel comprising the Incident Controller, and the personnel he or she appoints to be responsible for the functions of Operations, Planning and Logistics. (AIIMS)
Incident objective	An incident objective is a goal statement indicating the desired outcome of the incident. Incident objectives guide the development of the Incident Action Plan and must reflect the policies and needs of the control authority and supporting agencies. All factors affecting the incident and its potential impact must be considered before determining the objective. (AIIMS)
Incident strategies	The incident strategies will be developed from the incident objectives and will describe how the Incident Management Team plans to resolve the incident. There is a requirement for strategies to be developed throughout the incident and they should be reviewed for each operational period. (AIIMS)
Indirect attack	A method of suppression in which the control line is located some considerable distance away from the fire's active edge. Generally done in the case of a fast-spreading or high-intensity fire and to utilize natural or constructed firebreaks or fuelbreaks and favourable breaks in the topography. The intervening fuel is usually backburnt; but occasionally the main fire is allowed to burn to the line, depending on conditions.(NWCG)
Induced wind	See: Fire wind.
Infrared scanning	Use of an optical-electronic system for identifying or obtaining imagery of thermal infrared radiation to detect non-smoking fires or fire perimeters through smoke.
Initial attack	The first suppression work on a fire.

Term	Definition
Instability	The tendency for air parcels to accelerate when they are displaced from their original position; especially, the tendency to accelerate upward after being lifted. Instability is a prerequisite for severe weather - the greater the instability, the greater the potential for severe thunderstorms. (Weather Zone)
Interface	See: Urban Rural interface.
Inversion	A layer of the atmosphere in which temperature increases with increasing elevation. A condition of strong atmospheric stability.
Island	An unburnt area within a fire perimeter.
Isobar	Lines on weather maps joining places which have the same air pressure.(BOM)
I zone	See: Urban Rural interface.
Jump fire	See: Spot fire
Jump over	See: Breakaway
Junction zone	An area of greatly increased fire intensity caused by two fire fronts (or flanks) burning towards one another.
Keetch-Byram Drought Index (KBDI)	A numerical value reflecting the dryness of soils, deep forest litter, logs and living vegetation, and expressed as a scale from 0 - 200 where the number represents the amounts of rainfall (mm) to return the soil to saturation.
Knock down	To reduce the flame or heat on the more vigorously burning parts of a fire edge. (NWCG)
Ladder fuels	Fuels that provide vertical continuity between strata. Fire is able to carry surface fuels into the crowns of trees with relative ease.
Lag time	The time delay in fuel moisture content responding to changing environmental conditions (for example, relative humidity). Technically, it is the time necessary for a fuel particle to lose approximately 63% of the difference between its initial moisture content and its equilibrium moisture content.
Lead agency	The organisation with the legislative or agreed authority for control of an incident.
Lee (leeward)	Away from the wind, on the sheltered side of something that the wind is blowing on.
Legislation	A set of rules made by a State, Territory or Federal Government; includes acts and regulation.
Light fuel	An assessment of fuel quantity indicating a low weight.
Lighting pattern	See: Ignition pattern.
Lightning	The flash of light accompanying a sudden electrical discharge which takes place from or inside a cloud, or less often from high structures or the ground or from mountains. A large electrical spark. Caused when the negative charge in the lower part of the cloud and the positive charge in the upper part of the cloud become so great that they can overcome the natural resistance of the air and discharge between negative and positive takes place. (BOM)
Lightning fire	A fire caused by lightning.
Lightning formation	See: Lightning.
Light patrol unit	See: Tanker.
Line ignition	See: Strip burning.

Term	Definition
Litter	The top layer of the forest floor composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves and needles, little altered in structure by decomposition. (The litter layer of the forest floor). (NWCG)
Litter bed fuel	Dead fine fuel, including surface fuel and fuel lower in the fuel profile.
Litter fall	The addition of litter that falls from vegetation to the forest floor.
Living fuels	Fuels made up of living vegetation.
Living shrub fuel	Living understorey fine fuel less than 2 metres above ground level.
Local winds	Winds which are generated over a comparatively small area by local terrain and weather. They differ from those which would be appropriate to the general pressure pattern. (NWCG)
Log	Documentation of information and actions arising during an incident
Logistics	The provision of facilities, services and materials in support of an incident.
Lookout	1. A person designated to detect and report fires from a fixed vantage point. 2. A member of a fire crew designated to observe the fire and warn the crew when there is danger. 3. For structure see: Fire lookout
Lookout tower	See: Fire tower.
Low intensity fire	A fire which travels slowly and only burns lower storey vegetation, like grass and lower tree branches, with an average intensity of less than 500 $kW.m^{-1}$ and flame height less than 1.5m. Usually causes little or no crown scorch and is easily controlled.
Low-moderate fire danger	The lowest fire danger rating as determined by fire agencies and generally with a Forest fire danger index less than 12 or a Grassland fire danger index less than 12.
Medium fuels	See Course fuels.
Mineral earth	When used in the context of fire control refers to a non-flammable surface (either natural or prepared) which provides a break in understorey, litter and humus fuels and hence a barrier (of varied effectiveness depending, amongst other things, on its width and the intensity of the approaching fire) to fire travelling on or near the ground surface.
Mobilisation	The processes and procedures for organisations to activate, assemble, and transport the requested resources to an incident.
Moisture content	See Fuel moisture content.
Mopping up	See Blacking out
Mosaic	Used in reference to the spatial arrangement of burnt and unburnt fuels at either a local or a landscape scale.
Move up method	See: Step-up method
Multi-agency response	The response to an incident where one or more agencies assist the jurisdictional control agency or agencies.
Multiple fire situation	A circumstance of high fire incidence over short periods of time in any administrative unit, usually overtaxing the normal initial attack capability of the unit.
Natural barrier	Any area where lack of flammable material obstructs the spread of vegetation fires.

Bushfire Glossary

Term	Definition
Near surface fuel	Live and dead fuel, including suspended leaves, bark or twigs, effectively in touch with the ground but not lying on it, with a mixture of vertical and horizontal orientation.
Needle bed	A fuel bed consisting mainly of pine needles.
Nozzle	A fitting that is used with a branch to control the size, pattern and/or velocity of water or extinguishing medium being discharged.
One lick method	A progressive system of building a fireline on a wildfire without changing relative positions in the line. Each worker does one to several "licks", or strokes removing a set proportion of the fuel on the line, with a given tool and then moves forward a specified distance to make room for the worker behind. (NWCG)
Operations	The direction, supervision and implementation of tactics in accordance with the Incident Action Plan.
Operations point	The location from which the overall field operations are commanded by the Operations Officer. (AIIMS)
Parallel attack	Method of fire suppression in which fireline is constructed approximately parallel to, and just far enough from the fire edge to enable workers and equipment to work effectively, though the fireline may be shortened by cutting across unburned bays. The intervening strip of unburned fuel is normally burned out as the control line proceeds but may be allowed to burn out unassisted where this occurs without undue delay or threat to the fireline. (NWCG)
Parallel fire suppression	See: Parallel attack.
Parallel method	See: Parallel attack.
Parts of a Fire	See: Bay(s), Fingers, Flanks of a fire, Head.
Patch burning	Burning in patches to prepare sites for group planting or sowing or to form a barrier to subsequent fires. (NWCG)
Patrol	1. To travel over a given route to prevent, detect, and suppress fires. Includes interaction with the public for wildland fire prevention and educational purposes. 2. To go back and forth vigilantly over a length of control line during and/or after construction to prevent breakaways, suppress spot fires, and extinguish overlooked hot spots. 3. A person or group of persons who carry out patrol actions. (NWCG)
Peat	An amorphous organic material formed by anaerobic decomposition which usually means that the area is seasonally or permanently inundated with water. Peat fires burn by smouldering combustion and generate very high amounts of energy per unit area.
Perimeter	See: Fire perimeter.
Peri urban interface	See: Urban rural interface.
Permit burn	A burn carried out under permit from a Fire Authority.
Personal protection equipment (PPE)	The equipment and clothing designed to mitigate the risk of injury from the chemical, physical and thermal hazards that may be encountered at an incident.
Personal protective clothing (PPC)	The clothing designed to mitigate the risk of injury from the chemical, physical and thermal hazards that may be encountered at an incident.
Plan of attack	See: Incident Action Plan (Preferred term)
Planned burning	See: Prescribed burning.
Pocket	See: Island.

Term	Definition
Point of attack	The part of the fire on which work is started when suppression forces arrive.
Point of origin	The specific location where the fire started.
Portable dam	A temporary water storage used in conjunction with power pumps and hose lines.
Predicted rate of spread	The rate of spread predicted by the application of fire spread models utilising appropriate inputs of fuel conditions, topography and weather. Also see Rate of Spread.
Pre-incident plan	Advanced planning and preparation for an emergency situation.
Pre-suppression plan	See Pre-Incident Plan
Prepared community	A community that has developed effective emergency management arrangements at the local level, resulting in: • An alert, informed and active community that supports its voluntary organizations • An active and involved local government • Agreed and coordinated arrangements from prevention, preparedness, response and recovery.
Preparedness	All activities undertaken in advance of the occurrence of an incident to decrease the impact, extent and severity of the incident and to ensure more effective response activities.
Pre-planned dispatch	The pre-planned dispatch of designated suppression forces to fires in predetermined zones. It is usually dependent on the location of the fire, and the forecast fire danger.
Prescribed burn	A fire utilised for Prescribed burning.
Prescribed burn plan	See: Burn plan.
Prescribed burning	The controlled application of fire under specified environmental conditions to a predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives.
Prescribed fire	Any fire ignited by management actions to meet specific objectives. A written, approved burn plan must exist, and approving agency requirements (where applicable) must be met, prior to ignition.
Prescription	A written statement defining the objectives to be attained during prescribed burning.
Prevention	All activities concerned with minimising the occurrence of incidents, particularly those of human origin.
Profile litter moisture content	The moisture content, expressed as a percentage of oven-dry weight, of the entire leaf litter bed above the mineral soil surface.
Profile moisture content	See Fuel moisture content.
Psychrometer	The general name for instruments designed for determining the relative humidity of the air. A psychrometer consists of wet and dry bulb thermometers, generally with the aid of psychrometric tables or a psychrometric slide rule. (BOM)
Pulaski tool	A combination chopping and trenching tool widely used in fireline construction, which combines a single-bitted axe blade with a narrow adze-like trenching blade fitted to a straight handle. (NWCG)
Pumper	A firefighting vehicle equipped with a large capacity pump, water tank and hose. Generally intended to be operated when stationary, from reticulated or static water supplies.

Term	Definition
Quick-fill pump	A high volume water pump used for filling tankers.
Rain gauge	The general name for instruments designed to measure the amount of rain that has fallen.
Rakehoe (McLeod tool)	A hand tool used for bushfire fighting, consisting of a combination of a heavy rake and hoe.
Rate of spread (ROS)	The speed with which a fire moves in a horizontal direction across the landscape at a specified part of the fire perimeter. See also Forward rate of spread.
Reaction time	The time taken between the report of a fire or incident, and the departure of the crew. See also Response time.
Rear	1. That portion of a fire spreading directly into the wind or down slope. 2. That portion of a fire edge opposite the head. 3. Slowest spreading portion of a fire edge. Also called heel of a fire. (NWCG)
Reburn	Repeat burning of an area over which a fire has previously passed, but left fuel that later ignites when burning conditions are more favourable. (NWCG)
Reconnaissance	To examine a fire area to obtain information about current and probable fire behaviour and other related fire suppression information. (NWCG)
Recovery	The coordinated process of supporting emergency affected communities in reconstruction of the physical infrastructure and restoration of emotional, social, economic and physical wellbeing.
Red Flag Warning	A process for passing critical safety information to incident suppression resources and support resources on which they can base decisions regarding strategy, tactics and deployment.
Regeneration burn	A burn lit under prescribed conditions for the purpose of achieving regeneration of a particular vegetation type.
Re-ignition	The action of a material that ignites again after it has been extinguished.
Relative humidity (RH)	The amount of water vapour in a given volume of air, expressed as a percentage of the maximum amount of water vapour the air can hold at that temperature.
Relay pumping	Using a series of pumps positioned at intervals along a line or lines of hose to share the workload of pumping water over a long distance.
Relief	The replacement of personnel whose period of time at the incident has concluded.
Report of fire	The notification of the detection of a fire to the fire service. (AFAC)
Residence time	The time required for the flaming zone of a fire to pass a stationary point; the width of the flaming zone divided by the rate of spread of the fire.
Resources	All personnel and equipment available, or potentially available, for incident tasks.
Response	Actions taken in anticipation of, during, and immediately after an incident to ensure that its effects are minimised, and that people affected are given immediate relief and support.
Response time	The time taken between the report of a fire or incident, and arrival at the scene. It includes both reaction time and travel time.
Responsible authority	See: Control authority.
Retardant	See: Fire retardant.

Term	Definition
Risk	The exposure to the possibility of such things as economic or financial loss or gain, physical damage, injury or delay, as a consequence of pursuing a particular course of action. The concept of risk has two elements, i.e. the likelihood of something happening and the consequences if it happens. (AS4360)
Risk analysis	A systematic use of available information to determine how often specific events may occur and the magnitude of their likely consequences.
Road Management Point	A strategic position from which traffic can be observed and controlled. (See also Traffic Management Point and Vehicle Control Point)
Rural	Any area wherein residences and other developments are scattered and intermingled with forest, range, or farm land and native vegetation or cultivated crops.
Rural urban interface (RUI)	See Urban rural interface
Safe	The stage of bushfire suppression or prescribed burning when it is considered that no further suppression action or patrols are necessary.
Safety zone	An area cleared of flammable materials used for escape if the line is outflanked or in case a spot fire outside the control line renders the line unsafe. In fire operations, crews progress so as to maintain a safety zone close at hand, allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuelbreaks. They are greatly enlarged areas which can be used with relative safety by fire fighters and their equipment in the event of a blow up in the vicinity. (Vic report)
Scorch height	1. The height above ground level up to which foliage has been browned by a fire. 2. A measurement for determining the acceptable height of flame during prescribed burning.
Scout	A person who checks and reports on conditions in the fire area.
Scrub	Refers to vegetation such as heath, wiregrass and shrubs, which grows either as an understorey or by itself in the absence of a tree canopy.
Scrub fire	Fires burning in scrub.
Secondary fire control line	See: Fall back fire control line.
Sector	A specific area of an incident which is under the control of a Sector Commander who is supervising a number of crews.
Seen area	The ground, or vegetation, that is directly visible from an established or proposed lookout point, or aerial detection flight route.
Severe fire danger	The third highest fire danger rating as determined by fire agencies and generally with a Forest fire danger index between 50 and 74 or a Grassland fire danger index between 50 and 74.
Shift	The period resources are allocated during an operation at the incident or on the fireground.
Shift change	Replacement of allocated crews and or equipment during operations.
Situation report **(Sitrep)**	A report on the progress of the fire and the efforts to control it. It confirms the location of the fire, its status and potential and the number, nature and effectiveness of resources deployed. Situation reports are normally provided at regular times until the fire is declared safe.
Size up	The evaluation of a fire to determine a course of action for suppression.
Slash	Accumulated fuel resulting from such natural events as wind, fire, snow breakage, or from such human activities as logging, cutting or road construction.

Term	Definition
Slash burn	A prescribed burn conducted to consume slash for fire hazard reduction or silvicultural purposes.
Sleeper	1. A fire that starts up again after appearing to have been extinguished. 2. A fire that is detected some time after an ignition opportunity (usually from lightning or hop over events).
Slip-on unit	A tank, a live hose reel or tray, a small capacity pump, and an engine combined into a single one-piece assembly that can be slipped onto a truck bed or trailer and used for spraying water and/or foam on bushfires.
Slop over	See: Breakaway
Smoke management	Used by land managers and meteorologists planning a prescribed burn, to ensure that smoke does not cause problems downwind of the burn.
Smoke Plume	The column of smoke that rises from a fire. (See also Convection Column)
Smoker	An isolated small burning item such as a log, stump or tree, in an area of fire otherwise mopped up.
Softwood	A conventional term used to describe a tree, and the timber of trees, belonging to the group of plants with cones, such as pine and cypress.
Soil Dryness Index (SDI)	A form of Drought Index, usually with slightly more detailed inputs than the Keetch-Byram Drought Index. May be on a scale of 0-200 like the KBDI, but some versions have different scales (for example, Western Australia: 0-2000).
Southern Oscillation Index (SOI)	The comparison of surface air pressure differences between Tahiti and Darwin that shows a strong correlation with rainfall.
Spark arrestor	A device fitted to the exhaust system of machinery for trapping carbon sparks.
Spot fire	1. Isolated fire started ahead of the main fire by sparks, embers or other ignited material, sometimes to a distance of several kilometres. 2. A very small fire that requires little time or effort to extinguish.
Spot ignition	An ignition pattern using a series of spaced points of ignition.
Spot over	See: Breakaway
Spotting	Behaviour of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire. (NWCG)
Staging area	An area where resources are mustered and prepared for allocation to an incident. It may include the provision of welfare and equipment maintenance facilities. (AIIMS)
Stand by	The period during which personnel are to be immediately available at home or other location for fire suppression purposes.
Static water supply	A supply of water in a reservoir or pond, of limited capacity.
Step-up method	A method used by a team of firefighters to construct a firebreak in which each firefighter completely constructs a section of the firebreak after which the entire team ‘steps up’ to the next section.
Strike teams	A set number of resources of the same type that have an established minimum number of personnel. Strike Teams always have a leader (usually in a separate vehicle), and have a common communications system. Strike Teams are usually made up of five resources of the same type such as: vehicles, crews, earth moving machinery, etc (AIIMS).

Term	Definition
Strip burning	1. An ignition pattern using lines of continuous fire. 2. In hazard reduction, burning narrow strips of fuel and leaving the rest of the area untreated by fire. (NWCG)
Strip ignition	See: Strip burning.
Stripping	See: Strip burning.
Structure	A constructed object, usually a free-standing building above ground.
Sub surface fire	See: Ground fire
Sub surface fuel	See: Ground fuel
Suction hose	Hose used to draught from static/open water. It has a hard, usually reinforced, exterior to prevent it collapsing when a partial vacuum exists within the hose.
Supply hose	Hose feeding from a water supply to a pump.
Support agency	An organisation contributing services or resources directly to a lead agency.
Surface fire	Fire that burns loose debris on the surface, which includes dead branches, leaves, and low vegetation. (NWCG)
Surface fuel	Litter fuels made up of leaves, twigs, bark and other fine fuel lying on the ground, predominately horizontal in orientation.
Surface moisture content	The moisture content expressed as a percentage of oven dry weight of the top 5-10 mm of leaf litter.
Tactics	These are the tasking of personnel and resources to implement the incident strategies. Incident control tactics are accomplished in accordance with appropriate agency procedures and safety directives. (AIIMS)
Tail fire	See: Backing fire.
Tanker	A mobile firefighting vehicle equipped with a water tank, pump, and the necessary equipment for spraying water and/or foam on bushfires.
Task force	A combination of resources assembled for a specific purpose. Task Force always have a leader (usually in a separate vehicle), and have a common communications system. Task Forces are established to meet tactical needs and may incorporate a mixture of different resources types. (AIIMS)
Task group	A large or complex combination of resources assembled for a specific purpose including intrastate, interstate and international deployments made up of multiple strike teams or task forces and or other response or support resources in any combination.
Technical advisors	Are advisors with special skills needed to support incident activities/functions.(AIIMS)
Temperature (dry bulb)	The ambient air temperature recorded by an exposed thermometer.
Temperature (wet bulb)	Wet bulb temperature is measured by placing a moist, single-layer, muslin sleeve over the bulb of a dry bulb thermometer. The difference between dry and wet bulb readings is used to determine relative humidity and dewpoint values.
Test fire	A controlled fire ignited to evaluate fire behaviour.
Thermal imagery	A display or print out from an infra-red scanning device.
Thermal radiation	The process by which the surface of an object radiates its thermal energy in the form of electromagnetic radiation.

Term	Definition
Thermohygrograph	An instrument that simultaneously and continuously measures and records temperature and relative humidity, normally by tracing each onto a revolving chart. Charts can be either for one day or one week of continuous recording.
Time lag	See: Lag time
Tongues	See: Fingers
Topography	The surface features of a particular area or region. It may include mountains, rivers, populated areas, roads and railways and fuel types.
Torch	See: Candle
Torching	See: Candle
Traffic Management Point	Point along movement routes that are staffed by emergency personnel to direct and control traffic flow. (See also Road Management Point and Vehicle Control Point)
Travel time	The time taken between the departure of a crew, and arrival at the incident. See also Response time.
Under storey	The lowest stratum of a multi-storeyed forest.
Upwind	Towards the wind direction. In the same direction as the direction from which the wind is blowing. The opposite direction to that smoke will travel.
Urban	Area in which residences and other human developments form an essentially contiguous covering of the landscape, includes most area within cities & towns, subdivisions, commercial and industrial parks, and similar development whether inside city limits or not.
Urban interface	See Urban rural interface
Urban rural interface (URI)	The line, area, or zone where structures and other human development adjoin or overlap with undeveloped bushland.
Values at risk	The natural resources or improvements that may be jeopardised if a fire occurs.
Vehicle Control Point	A point on a vehicle access route controlled by a barrier, or similar means, at which a vehicle is required to stop. (See also Road Management Point and Traffic Management Point)
Very high fire danger	The forth highest fire danger rating as determined by fire agencies and generally with a Forest fire danger index between 25 and 49 or a Grassland fire danger index between 25 and 49.
Warning device	Audible devise fitted to fire bombing aircraft to alert ground crews of pending drop.
Water bombing	See: Fire bombing.
Water point	Any natural or constructed supply of water that is readily available for fire control operations.
Water tank	A container capable of storing a large volume of water.
Wetting agent	A chemical added in low concentration to water. It is used in firefighting to break down the surface tension of the water and to improve its penetration into fuels.
Widow maker	See: Hang up
Wilderness Area	Places where wilderness quality defined using thresholds of remoteness, naturalness and total area is recognised and valued by society.
Wildfire	See: Bushfire.
Wildfire control plan	See: Incident Action Plan

Bushfire Glossary

Term	Definition
Wildland urban interface (WUI)	See: Urban rural interface
Wind direction	The direction from which the wind blows.
Windfall	See: Wind throw
Wind throw	An area of previously standing timber which has been blown over by strong winds or storms.
Wind speed	The rate of horizontal motion of the air past a given point expressed in terms of distance per unit of time. In the NZ Fire Danger Rating System, wind speed is measured at the standard height of 10 metres in the open, averaged over a 10-minute interval and in kilometres per hour.
Wind strength	Generally measured as wind speed. May be measured by the Beaufort wind scale.
Windrow	A long line of piled slash or debris resulting from forest or scrub clearing.
Windrow burning	The burning of windrows.
Windward	Towards the wind. You are windward if the wind is blowing on your face.
Woodland	A subset of forest plant communities in which the trees form only an open canopy (between 20% and 50% crown cover), the intervening area being occupied by lower vegetation, usually grass or scrub.

LOCAL WATER MANAGEMENT STRATEGY

Maryville Estate Stage 12





LOCAL WATER MANAGEMENT STRATEGY

Maryville Estate Stage 12

Prepared by:

RPS

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Document Status

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Disclaimer

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FIGURES

(compiled at rear of report)

APPENDICES

1.0 INTRODUCTION

1.1 Background and Planning Context

Maryville is the centre of a rural residential area in the southern part of the Shire of Chittering (SoC). As outlined in the SoC's Local Planning Strategy 2001–2015 (SoC 2009), Maryville is intended to be promoted as a minor community centre for the area to provide a range of lot sizes for rural residential living as well as minor recreation, community and retail purposes.

Maryville estate Stage 12 is located in the southern portion of Maryville and included within the SoC Development Plan for Maryville estate. The revised Development Plan, which includes Stage 12, is to be considered by Council. The Stage 12 site was originally shown as "Vineyard Lots" however, the existing vineyards were later identified as being no longer required by the owner of the adjacent winery. Subsequently, a Revised Development Plan was prepared for the Stage 12 site that included the removal of the unwanted vineyards. The Revised Development Plan for Stage 12 is included as Appendix 1.

1.2 Document Structure

This Local Water Management Strategy (LWMS) has been prepared at the request of the SoC. The scope and content of this LWMS has been tailored to suit the scale and nature of the development and to be consistent with the level of stormwater management reporting previously undertaken for existing stages of the development. This approach was discussed with the Department of Water (DoW) who advised that a reduced-scope LWMS that addresses specifically the drainage design details for the proposed development would be appropriate.

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2.0 EXISTING ENVIRONMENT

2.1 Site Location and Setting

The site comprises the south-eastern portion of the Maryville estate and it is bounded on the north and west by Maine-Anjou Drive and Santa Gertrudis Drive, respectively, beyond which lie existing, constructed stages of the estate. The site is bounded on the south-east by Chittering Road, beyond which are other rural residential and agricultural landholdings.

2.2 Proposed Development

The development layout includes only a single road to be constructed through the site to connect the north to south alignment of Maine-Anjou Drive on the northern boundary of the site to Santa Gertrudis Drive on the western site boundary. The development will also involve upgrading the small section of Jersey Road adjacent to the north-eastern portion of the site and the associated drainage for that section of road.

The new road will facilitate subdivision of the site to provide 35 rural residential lots, ranging in size from approximately 2.0 to 10.3 ha.

2.3 Geology and Soils

Surface geology mapping available from the Perth Groundwater Atlas (DoW 2015) indicates that the surface soil types are likely to be comprised of variably laterised colluvium including valley-fill deposits.

2.4 Hydrology

The site naturally falls to the south with an average gradient of approximately 4 to 5%. A number of small existing drainage channels enter the site at the northern boundary through culverts under Maine-Anjou Drive. These channels all drain to the southern portion of the site where a creek line runs from west to east across the site, entering from Santa Gertrudis Drive and exiting via an existing culvert under Chittering Road into Marbling Brook, a tributary of the Brockman River.

The existing watercourses upstream, within and downstream of the site are heavily disturbed with numerous farm dams and cleared areas. The creek line that runs through the site has been cleared for pastoral use and it exists as a broad, low-lying area with no significant defined watercourse. However, the aerial imagery identifies where water accumulates at the south-east of the site before exiting via the culvert under Chittering Road.

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3.0 WATER SERVICING

3.1 Potable Water

Potable water supply will be the responsibility of lot owners and will be sourced from collection of roof run-off into rainwater tanks. Each dwelling will be required to have a large capacity rainwater tank for the storage of drinking water as well as to maintain a reserve of water for firefighting purposes.

3.2 Wastewater Servicing

Wastewater treatment and disposal will also be the responsibility of lot owners. The Stage 12 layout and building envelope areas have been designed to ensure that the placement of all dwellings is on land with a "High or Fair Capability" for on-site effluent disposal in accordance with the findings of a land capability assessment undertaken for the site by Land Assessment Pty Ltd. The assessment of land capability for on-site effluent disposal considered the depth and type of soils as well as proximity to watercourses and drainage areas.

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4.0 STORMWATER MANAGEMENT

The following stormwater management strategy and design has been developed by Pritchard Francis consulting engineers and is consistent with the drainage design for previous stages of the Maryville estate development.

4.1 Stormwater Management Principles

The key principles for stormwater management at the site include maintaining the pre-development hydrological regime of the site as much as possible. This includes maintaining pre-development flow directions and flow paths as well as detaining post-development flows in order to protect downstream areas from increased post-development flows and prevent flooding.

A number of existing flow paths enter the site along the northern boundary via culverts under Maine-Anjou Drive. These north to south drainage corridors will be maintained through the new lots as the responsibility of the lot owners and will be facilitated by culverts to be installed under the new road within Stage 12. As per pre-development conditions, the north to south drainage corridors will convey stormwater to the creek line at the south of the site which flows east across the site and through a culvert beneath Chittering Road and into the Marbling Brook.

Road drainage within the site will be managed via table drains alongside the road that collect road run-off and direct it into detention basins located beside the road. The detention basins will attenuate the post-development flow rates prior to discharging into the north to south drainage corridors to be conveyed to the creek at the south of the site.

Lot drainage will comprise on-site retention via rainwater tanks. Each dwelling will have a large capacity rainwater tank to collect roof run-off for both drinking water and firefighting supply. The large capacity of the drainage tanks mean that run-off from the buildings will occur only infrequently in major events. Given the rural residential nature of the lots, they will remain predominately pervious and as such, pre-development hydrological processes of infiltration and evapo-transpiration will be maintained with run-off occurring only during the more intense rainfall events. Any run-off that does occur from the lots will discharge into either the maintained north to south drainage corridors or the road drainage system that in turn flows into the north to south drainage corridors.

The overall drainage strategy will results in the pre-development hydrological regime being maintained and no significant changes to stormwater flow rates discharging from the site or the location of discharge from the site.

4.2 Stormwater Management Design

The road drainage system is illustrated in Appendix 2. Figure A below illustrates the general road and table drain configuration from previous stages of the development. As shown in Appendix 2, the road drainage design for Stage 12 will entail a table drain along the entire northern side of the new road. Another table drain will be located on the southern side of the upgraded Jersey Road on the northern site boundary that extends into the site along the south-eastern side of the new road. There will be several basins along the length of the table drains, with these providing detention of their respective upstream catchment areas prior to overtopping into the next, downstream section of table drain.

The detained stormwater flows within the table drain collect at a downstream detention basin at the low point in the road, prior to discharging to one of the existing north to south drainage lines or, in the case of the Jersey Road table drain, to a detention basin at the north-east corner of the site, which discharges to a drainage line along the eastern site boundary.

The final, downstream detention basin for the main, internal road drainage system outfalls to one of the maintained north to south drainage lines via a 525 mm diameter culvert under the new road, whilst the detention basin at the north-east corner of the site will overtop via a rock-pitched spillway.

Appendix 2 also provides standard details for the construction of the detention basins. The basins will typically be 1 m in depth with one in three rock pitched battered walls. The detention basins have been sized to contain the critical 10 year average recurrence interval (ARI) rainfall event, meaning that stormwater flows will only bypass the detention basins during very infrequent rainfall events, and even then, a large proportion of the run-off will be detained within the table drains and basins.

Table 1 below provides the detention basin dimensions and volumes as calculated by Pritchard Francis for the critical 10 year ARI event. The basin numbers are ordered from west (1) to east (8).

Table 1: Basin Design Parameters

Basin Number	Dimensions	Top Area (ha)	Volume (m3)
1	16 × 18	0.18	150
2	21 × 23	0.35	290
3	16 × 18	0.17	140
4	18 × 20	0.22	190
5	12 × 14	0.08	70
6	14 × 16	0.13	110
7	13 × 15	0.10	85
8	18 × 20	0.22	190

The drainage design (Appendix 2) also details the location of existing drainage infrastructure such as the points where upstream catchments drain into the site through culverts beneath Maine-Anjou Drive as well as the inflow and outfall locations of the creek line in the southern portion of the site. Also provided are culvert sizes for where the existing north to south drainage lines will cross the new road.

4.3 Stormwater Quality

Stormwater quality management will be largely achieved by the fact that the majority of rainfall events will be completely retained within the roadside table drains and detention basins due to their being sized for the 10 year ARI event. Therefore, the vast majority of pollutants that are mobilised by run-off will also be retained within the drains and basins with only very infrequent run-off from the road catchment to downstream water bodies.

In addition, the change in land use from agricultural to low density rural residential is likely to result in a reduction in nutrient input loads, and therefore may result in improved stormwater quality after development.

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5.0 CONSTRUCTION MANAGEMENT

Water management objectives for the construction phase of the development will include preventing scour and sediment mobilisation during construction activities. This will entail standard site management practices such as dust suppression and temporary run-off control measures to be implemented by the civil construction contractors as required.

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RPS

FIGURES

38 Station Street, Subiaco | T +61 8 92111111 | F +61 8 92111122 | www.rpsgroup.com.au

RPS

Job Number: D15142
Doc Number: 001
Date: 28.08.15
Scale: Map 1: 10,000 Overview 1: 500,000 @ A4
Created by: MA
Source: Imagery - Landgate

0 50 100 200 300 400 m

Figure 1

Site Location

RPS

APPENDIX 1

Revised Development Plan –
Maryville Estate Stage 12

roberts day

OUR REF: GLE MAR

05 July 2013

Shire of Chittering
PO BOX 70
Great Northern Highway
BINDOON WA 6502

Attention: Mr. A Awang- Executive Manager Development Services

Dear Azhar,

RE: MARYVILLE ESTATE- STAGE 12 (REVISED DEVELDPMENT PLAN)

Background

This submission has been prepared as a basis for seeking Council support for Stage 12 Maryville as shown on the Revised Development Plan.

Stage 12

Location

Proposed stage 12 is located in the Southern portion of Maryville, just North of the intersection of Muchea East Road and Santa Gertrudis Drive.

Zoning and Statutory Considerations

The subject land is contained within the 'Rural Residential' zone under the Shire of Chittering Town Planning Scheme No 6. The stage 12 is currently shown of the endorsed Development Plan for Maryville as 'Vineyard Lots'.

These vines were previously supplying grapes to the adjacent winery (Western Range). The winery has now been sold to a new owner who no longer requires the grapes from the vineyard. The vines will therefore be removed upon the development of stage 12.

The revised Development Plan with the proposed stage 12 is therefore submitted to the Shire of Chittering for advertising and subsequent endorsement.

Stage 12 Design

The stage 12 land is predominantly cleared and was used previously for grazing (cattle and sheep). Over the past 10 years the eastern portion has been used for a vineyard, which previously supplied grapes to the adjacent winery. The Northwest corner of the site contains some remnant trees directly adjacent Santa Gertrudis Drive. The predominantly cleared nature of the land on the gentle slopes is ideal for rural residential lots.

To ensure the correct placement of future housing and to aid in the design process a land capability assessment of the stage 12 land was undertaken by Land Assessment Pty Ltd (Martin Wells). The stage 12 design has been prepared to ensure each of the proposed lots has sufficient area for the placement of a house pad on land with a 'High or Fair Capability' for on-site effluent disposal (refer attached plan).

The proposed Road network will provide a connection (25m Road Reserve) between Main Anjou Drive and Santa Gertrudis Drive. The Stage 12 design proposes the creation of 35 rural residential lots ranging in area from 2.0ha to 10.3ha (refer attached plan).

Remnant Vegetation

The area of remnant vegetation in the Northwest corner of stage 12 will be retained and protected via a 'tree preservation area' as designated on the Revised Development Plan. The only exemption being a 'max area of clearing 2000sqm' for one of the proposed lots.

Development Exclusion Zone

Two 'Development Exclusion Zones' are shown on the revised Development Plan for stage 12;

- The existing dam and drainage line in the North-West corner
- The existing soakage area/drainage line on the Southern boundary of stage 12, directly adjacent Muchea East Road.

The design proposed for stage 12 ensures the proposed lots with the two 'Development Exclusion Zones are large enough to contain suitable land for a dwelling.

Re-Vegetation Area

The revised Development Plan proposes two re-vegetation areas being the; soakage area/drainage line on the southern boundary and along drainage line adjacent Santa Gertrudis Drive. The re-vegetation of these areas will be undertaken by the developers as successfully implemented in the existing stages of Maryville.

Summary

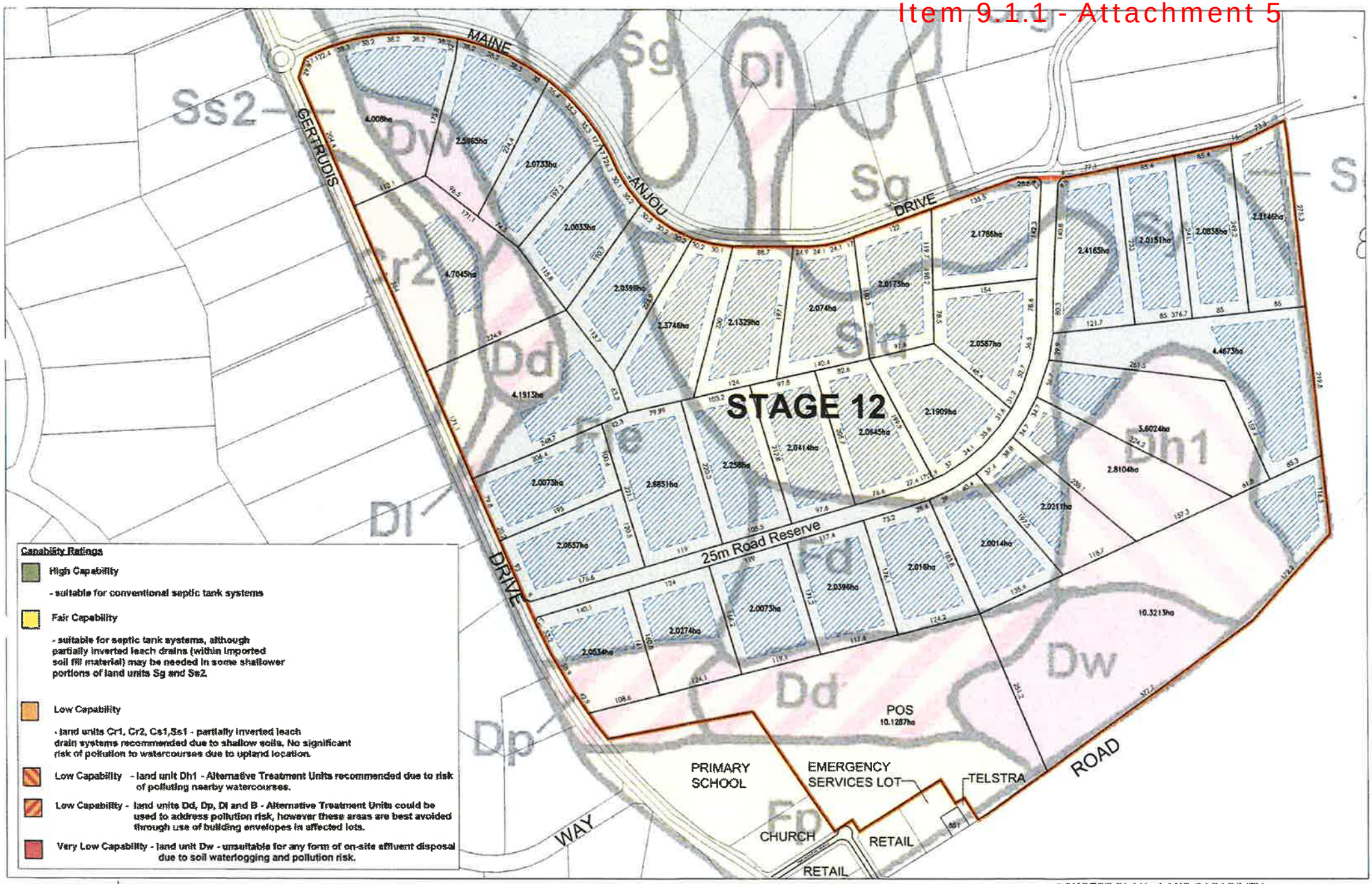
The future development of stage 12 as facilitated by the Revised Development Plan will enhance and contribute to the increasingly high standard of development that is already occurring within Maryville Estate.

We look forward to the Shire's favourable consideration of this submission. Should you require any further information or clarification of the above, please do not hesitate to contact the undersigned on 9218 8700

Yours sincerely
ROBERTS DAY

TIM TREFRY FPIA
PRINCIPAL

CC: MR T PRINDIVILLE
MR K PRINDIVILLE



Capability Ratings

High Capability

- suitable for conventional septic tank systems

Fair Capability

- suitable for septic tank systems, although partially inverted leach drains (within imported soil fill material) may be needed in some shallower portions of land units Sg and Se2.

Low Capability

- land units Cr1, Cr2, Cs1,Ss1 - partially inverted leach drain systems recommended due to shallow soils. No significant risk of pollution to watercourses due to upland location.

Low Capability - land unit Dh1 - Alternative Treatment Units recommended due to risk of polluting nearby watercourses.

Low Capability - land units Dd, Dp, Dl and B - Alternative Treatment Units could be used to address pollution risk, however these areas are best avoided through use of building envelopes in affected lots.

Very Low Capability - land unit Dw - unsuitable for any form of on-site effluent disposal due to soil waterlogging and pollution risk.

LEGEND

Building Envelope

robertsday
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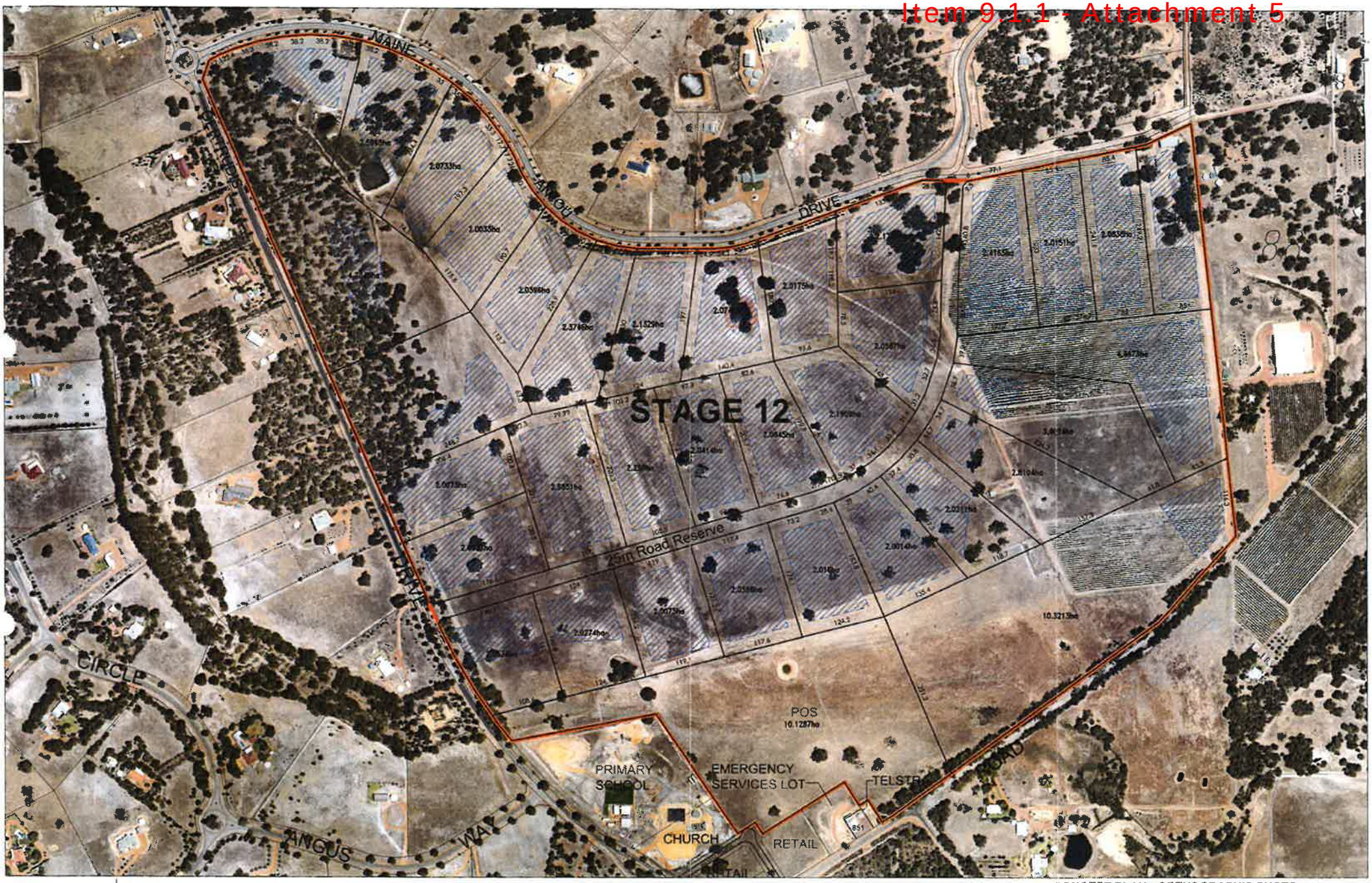
Level 1 | 139 Royal Street East Perth
Western Australia 6004 AUSTRALIA
T: 08 9218 8700 | F: 08 9218 8701
www.robertsday.com.au

client: Stamford Forrest
project: Maryville

CONCEPT PLAN - LAND CAPABILITY
Maryville - Muchea East Road
Shire of Chittering

0 metres 50 100 150 200 250
SCALE 1:5000 @ SHEET A1

DRAWN: GLE MAR | DRAWING NUMBER: PLA 10 | ISSUE: B



robertsday

LEGEND

Building Envelope

CONCEPT PLAN - ORTHOGRAPHIC PHOTO
Maryville - Muchea East Road
Shire of Chittering

RPS

APPENDIX 2

Drainage Design

NORTH

EXISTING STAGE 9

MAINEANJOU ROAD

PROPOSED STAGE 12

GERTRUDS DRIVE

PROPOSED 25m ROAD RESERVE

APPROX CREEK LINE. ACTUAL POSITION TO BE PICKED UP BY SURVEYORS (TYP)

NATURAL CREEK LINE. ACTUAL POSITION TO BE PICKED UP BY SURVEYORS (TYP)

ASSUMED LEGAL POINT OF DISCHARGE

CLASS 4
US TBC
ϕ 375 /100
L=12m
DS TBC

CLASS 4
US TBC
ϕ 375 /100
L=20m
DS TBC

CLASS 4
US TBC
ϕ 525 /100
L=18m
DS TBC

CLASS 4
US TBC
ϕ 450 /100
L=12m
DS TBC

CLASS 4
US TBC
ϕ 750 /100
L=12m
DS TBC

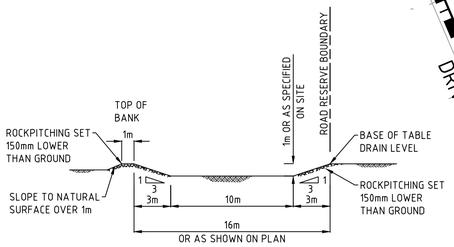
NOTES

1. ALL INDIVIDUAL LOTS TO CONTAIN STORMWATER ON SITE.
2. INSTALL ϕ375 CLASS 4 PIPE UNDER DRIVEWAYS.

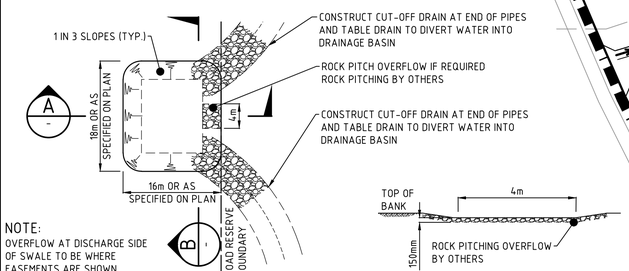
LEGEND

- LIMITS OF WORKS BOUNDARY
- PROPOSED LOT BOUNDARY
- EXISTING LOT BOUNDARY
- PROPOSED CULVERT
- PROPOSED TABLE DRAIN
- PROPOSED DRAINAGE BASIN
- EXISTING CULVERT
- EXISTING CREEK/FLOW PATH
- EXISTING CONTOUR

UPSTREAM I.L — US?
PIPE DIAMETER/GRADE — ϕ ? /?
PIPE LENGTH — L=?
DOWNSTREAM I.L — DS?



SECTION A
SCALE 1:250



NOTE:
OVERFLOW AT DISCHARGE SIDE OF SWALE TO BE WHERE EASEMENTS ARE SHOWN

TYPICAL DETAIL DRAINAGE BASIN PLAN
SCALE 1:500

SECTION B
SCALE 1:100

REV	BY	CHKR	DATE	DESCRIPTION
B	SM	RC	24/08/15	BASIN SIZE AMENDED AND NOTE ADDED
A	SM	RC	21/08/15	ISSUED FOR INFORMATION

CONCEPT
FOR DISCUSSION ONLY

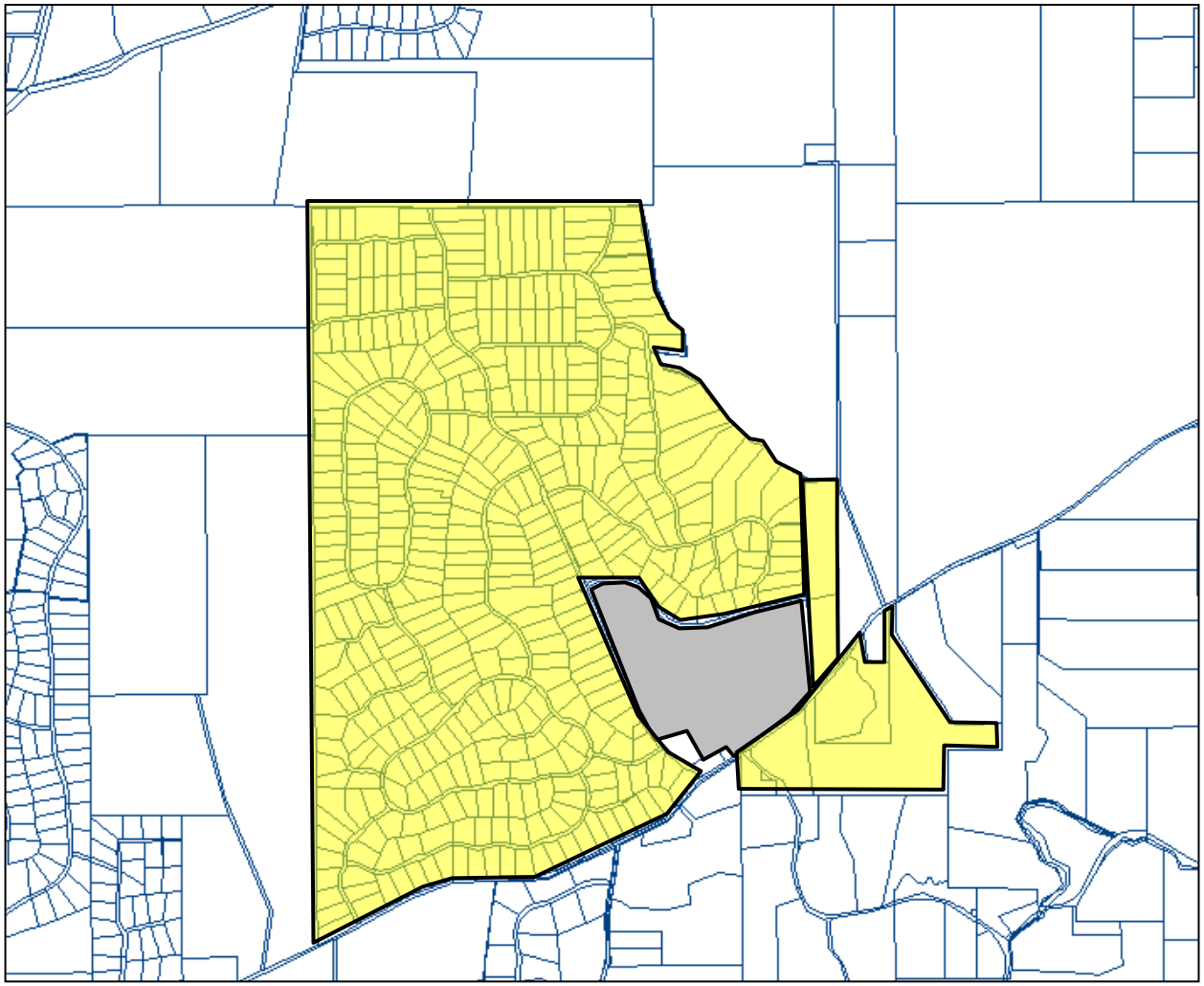
pritchard francis
civil and structural engineering consultants

Level 1, 430 Roberts Road
PO Box 2150
Subiaco WA 6904
Telephone: (08) 9382 5111
Facsimile: (08) 9382 5199
admin@pfeng.com.au
ACN: 008 891 094

SCALE U.N.O. 40m 0m 40m 80m — 1:2000
DATE: AUGUST 2015
DESIGNED: RC
DRAWN: SM
CHECKED: DH
HORIZONTAL COORDINATE SYSTEM: PCG94
VERTICAL COORDINATE SYSTEM: AHD

CLIENT & JOB: ROBERTS DAY
MARYVILLE RURAL DEVELOPMENT - STAGE 12
TITLE: DRAINAGE CONCEPT PLAN
SHEET SIZE: A1
DRG No: 15269-C3-DP-01
REVISION: B

Consultation Plan



Note: Properties highlighted yellow were notified by letter. Property highlighted in grey is Stage 12 Maryville Downs.

Schedule of Submissions – Proposed Development Plan – Maryville Downs Stage 12

	Submission Comments	Applicant Response Comments	Officer Response Comments
Public Submission - A	1. We would like to voice our approval and encouragement for the proposed Stage 12 of Maryville Downs Lower Chittering to go ahead. 2. The increased number of blocks available in the estate is in high demand, and I was told the POS at the back of the school/church would also be released. 3. The local community have been waiting a very long time for this and it is greatly needed.	Noted – The 10ha POS area will be ceded to the Crown / Shire of Chittering as part of this approval process as agreed with Council.	1. Noted. 2. The release of the Public Open Space to the Shire is required separate to the determination of this application. It should be noted that the land has been ceded to the Shire for public open space (parks and recreation use). The development of this land will require funding and budgeting. 3. Noted.
Public Submission – B	1. Disapprove of the proposed modification to develop Stage 12 subdivision instead of the proposed creation of 5 vineyards. 2. Vineyards offer an opportunity for wine tasting and the possibility of future restaurant/cafes which we feel would enhance the area for visitors and locals and would help to keep it in keeping with the older areas of orange growing horticulture which are closely located to this proposed development.	The existing vines and 5 proposed vineyard lots were designed to supply grapes to the adjacent winery (Western Range). The winery has been sold to a new owner who no longer requires the grapes from the vineyard. The stage 12 land is zoned 'Rural Residential' under the Shire of Chittering Town Planning Scheme No 6. 2.0 – 10.0ha lots as proposed in stage 12 is in keeping with the existing zoning, subject to adoption of a Revised Development Plan for Maryville.	1. Noted. 2. The vineyard lots are zoned 'Rural Residential' and their operation is subject to the landowner. Council cannot enforce the operation of the vineyards.
Public Submission – C	1. I would like to express the need for Bridle Trails to be incorporated into the new development. 2. There is currently nowhere to ride other than the road on the entire estate. This is getting increasingly dangerous with the issues we are having with dirt bikes and hoon activity not to mention speeding school buses and trucks. 3. I run a Facebook page for horse owners in the area and we have 33 members, where possible we ride in groups for safety. 4. It would not only be good for horses but people who cycle and walk in the area. 5. I walk with my neighbour several times a week and again we can only do this on the road.	1–5. Residents are able to ride horses on the generous road reserves (25m) that have been created throughout the estate and can also access the strategic firebreaks. These same two options will also be available as part of the stage 12 development.	1–5. The Shire acknowledges the community demand for bridle trails in the estate. The Shire recommends that a bridle trail be incorporated into the Structure Plan, within the wide road reserve, and should be connected to the public open space and future trail routes.
Public Submission – D	1. I would like to voice my support for the Stage 12 development, including the public open space. 2. Furthermore I would like to help voice the growing need for bridle trails in the area due to the large and ever growing number of horse owners in the area. Bridle trails would encourage a community spirit in the riders as well as keep motorists and horse riders separate, minimising the likelihood of injury through vehicle related accidents.	1. Noted 2. Residents are able to ride horses on the generous road reserves (25m) that have been created throughout the estate and can also access the strategic firebreaks. These same two options will also be available as part of the stage 12 development.	1. Noted. 2. Noted. Council is currently discussing possible solutions for providing bridle trails in the rural residential areas, however it should be noted both the public open space and bridle trail land is and would be vested to the Shire, rather than being developed by the Developer.
Public Submission - E	1. I live in Maryville and love the area but would dearly love to have some horse riding trails included in your plan, there are a lot of us in this area who are proud of our horse properties and take great care in maintaining them.	1. Refer point 2 response D above	2. Noted. Council is currently discussing possible solutions for providing bridle trails in the rural residential areas.

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Public Submission - F	1. Is the developer going to be directed to develop the POS area as park area? As is the general way that other shires work with developers. And then for the Shire to maintain? Or is it just going to be left as is?	The 10ha POS is being transferred to the Shire free of cost. As part of the stage 11 & 12 approval process a contribution will be paid to Council towards the future development of the POS area.	1. The Public Open Space is to be transferred to the Shire free of cost. The development and maintenance of this cost will be the responsibility of the Shire.
Public Submission - G	1. When we purchased our block in 2009 we were informed at the time that the maximum development of this land would ever be up to 5 vineyard lots. Had we been aware that further development would be proposed, this would have affected our decision to buy this particular block, and would have likely reduced the value of our block at the time due to the adverse effects on the outlook and view afforded by the location. 2. Reduced property value - This proposed development would have a direct and negative effect on the current value of our property. We are immediately opposite the development on the same street, thus will feel the most adverse effects from this proposed modification. Instead of overlooking a lush paddock of picturesque vineyard lots, we would see much smaller blocks with houses and properties of variable standards and appearances, as well as the prospect of ongoing construction in the foreseeable future. Additionally this proposed development would impact the resale of our property should we chose to move, likely making it more difficult to sell to due to reduction of aesthetic values and causing us to likely experience delays and/or require us to reduce our selling price to remain competitive. This would be such a shame as we have built a beautiful home we are very proud of which improves the value of the block and the surrounding estate. These factors may be grounds for seeking compensation if the proposed modification to the development plan goes ahead. 3. Privacy - Our house was designed with the current outlook in mind, to take in our spectacular view over farmland and the valley. We have a lot of windows overlooking this view. This affords us little privacy from the front of our property, but as there was no chance of us having close neighbours across the road when we bought the block and designed the house, this was not considered a major drawback. Any people that live opposite us would be able to see directly into our living areas, as we had no reason to take this into account when designing and building our dream home. This could obviously be severely deleterious to our quiet enjoyment of our property and home. any renovations to increase privacy would not only be expensive, but reduce the	1,2,3,4 & 6. Refer response submission B. In addition the planning system and specifically TPS 6 makes provision for a revised development plan to be prepared and submitted to Council for consideration & adoption.	1. Noted. The Town Planning Scheme allows for the revision or modification of a Structure Plan. Under the current Structure Plan the maximum number of lots that could be subdivided in the Stage 12 area is the five (5) lots. However, the Scheme stipulates that this land can be subdivided to Rural Residential capacity. 2. Noted. Comments made impact on amenity is noted however the impact on property values is not a planning matter considered by Council. 3. Noted. Local Planning Policy No 18 requires a minimum separation distance of 50m between dwellings to aid in privacy. The subject sites are a minimum of 2 hectares in size, it is considered that lots of this size do not create direct privacy implications and allow for sufficient separation between dwellings.

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	Submission Comments	Applicant Response Comments	Officer Response Comments
	beauty and appeal of our home. 4. Aesthetics – we currently enjoy an uninterrupted view of farmland across the valley and the feeling of openness this affords. This would be utterly ruined by the proposed development modification. This not only affects our future enjoyment of our property, but will adversely affect the market value. 5. Town Planning – our understanding is that it is a requirement to have larger blocks that buffer an area of retail, as will be present at the corner of Muchea East Rd and Santa Gertrudis Drive. As approximately 5 acre blocks are the norm for this estate, it makes sense that larger vineyard blocks in Stage 12 would be more sensible to buffer the church, school and retail zones. 6. As you can see there are a number of strong grounds that we object to in regards to this modification. These factors not only affect ourselves, but our near neighbours on our street also. As this plan was not a factor when we purchased our block, designed and built our house, we feel that the negative impacts of the development would be an unfair imposition. We feel that this modification would not only devalue our property, but our neighbours and indeed possibly a significant part of the estate that currently enjoys the view, outlook and tranquillity provided in its current state. As citizens that will be most directly and adversely affected by these changes, we ask that our views are assessed accordingly and adequate impact given to our comments.	5. There is no 'planning requirement' in TPS 6 or the adopted Development Plan for Maryville to provide a buffer adjacent the retail / village centre site.	4. Noted. 5. There is no requirement in the Town Planning Scheme, other planning legislation or policy that stipulates a buffer surrounding retail type lots. 6. All submissions are attached to the Agenda Report for Council's consideration.
Public Submission - H	1. For whatever reasons Maryville Downs Stage 11 has failed to be developed to date so we presume that the purpose of the proposed modification to increase the density of properties in Maryville Downs Stage 12 is to replace lost income and probably some costs related to Stage 11. 2. We were advised by Satterley at the time of purchasing our property during the Maryville Downs Stage 9 release in 2005 that the lower side of Maine-Anjou Drive would not be built out. While we were not overly impressed with the proposed modification due to the visual impact this will have on our view from our property, in reality any objection we have wouldn't carry a lot of weight so we support the proposed modification on the proviso that the following points are discussed and key parts form part of the conditions for approval. 3. Development - Our main concern is some recent developments in Maryville Downs have not conformed	1. Subdivision approval has been granted by the WA Planning Commission for stage 11 and will be developed in the approval timeframe. The stage 12 rural residential proposal is in response to the adjacent winery no longer using the vineyard as a source of grapes and thereby responding with a use permissible under the current zoning. 2. Noted 3. Noted	1. The Applicants have the right to apply to modify the Structure Plan, provided the modifications meet the requirements of the Town Planning Scheme i.e. minimum lot size. 2. Noted. 3. The Restrictive Covenants applicable between the landowner and purchaser in Maryville Downs estate have

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	to the Maryville Downs Covenants and Building Guidelines and such developments can adversely affect the rural feel of the estate and property values. As Stage 12 will be located on one of the main entrances to the estate it is very important that any development conforms in order to fit in i.e. not look like an afterthought, maintains aesthetics, not adversely affect property values and maintains equality and fairness to other property owners that have complied with the estate development requirements.		now expired. The standard planning and building requirements apply to all landowners through the relevant legislation and policies.
	- Any development in Maryville Downs Stage 12 is required to meet Estate Restrictive Covenants and Building Guidelines as per the previous stages. Purchasers to be made fully aware of these and sign acceptance and compliance of these during the purchase process. Reason being that there has been development in Maryville Downs in the past few years that doesn't comply or fit with the rural lifestyle eg long/high limestone walls, large industrial size sheds, large like homes – see Sussex Bend, Holstein Loop and Dexter Chase for examples. Non-compliant development like these impact the rural feel of the estate, resident's lifestyles and property values. The Shire of Chittering has a poor track record when it comes to compliance monitoring and enforcement. There have been cases of individual developments found to be non-compliant eg unapproved/excessive vegetation clearing, encroachment into setbacks, excessive heights of sheds, unapproved truck parking. Resolution and retrospective planning approval after the fact is not acceptable nor is the pleading of ignorance by property owners as a defence.	- The stage 12 purchasers will be made aware of the Estate Restrictive Covenants and Building Guidelines as part of the contract of sale.	- Landowners are made aware of the Shire planning and building requirements as part of the contract of sale through Notification on the Title and Restrictive Covenants. The Structure Plan is made available to landowners, which further establishes general requirements for building and using the land.
	- Fencing and landscaping to be of the same quality or better as per the rest of the estate to maintain continuity of aesthetics and so the new development doesn't look like an afterthought.	- Boundary fencing & landscaping will be provided as per the existing stages at Maryville.	- Noted. Boundary fencing and landscaping can be considered as a condition of subdivision.
	- No development to occur that will adversely affect existing properties values.	- The Revised Development Plan for Maryville includes a 'Tree Preservation Area' in stage 12 that encompasses the majority of trees fronting Santa Gertrudis Drive and the westerly section of Main Anjou Drive.	- Any development on the land would require to be compliant with the Town Planning Scheme and limited to the permissible uses consistent with the zone i.e. single house.
	- All existing trees and vegetation on any Stage 12 properties fronting Main Anjou Drive and Santa Gertrudis Drive to be preserved as they provide a screen of the proposed development for existing residents.	Any future development of permissible land use will be in accordance with the provisions of Town Planning Scheme 6 and any conditions of approval as issued by the Shire of Chittering.	
	- New crossovers and property entries to be offset		- Noted. This can be assessed at subdivision stage.

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	from those of established properties to avoid conflicts. - If not already met, Developer to meet all obligations due under Maryville Stage 11, prior to Stage 12 being approved. - No transport depots or unapproved truck/trailer parking. - No sheds larger than stipulated in the Maryville Downs Estate Restrictive Covenants and Building requirements. - No shed like homes i.e. homes based on shed designs. - Limit on number and size of structures per property eg single residence, 2 sheds, no granny flats or similar. - Purchasers at the point of sale to be made aware of Shire of Chittering current fire break requirements and awareness of ongoing maintenance, costs and loss of use of land to avoid recent frustrations experienced by existing land holders and residents when the Shire of Chittering changed the rules..		- Noted. This is agreed between the Developer and Council. - Noted. All lots require to comply to the Town Planning Scheme. - Noted. Restrictive Covenants are applicable between the purchaser and owner and have not been created under the Town Planning Scheme. - Should an application for a dwelling meet the requirements of the Town Planning Scheme, a shed-like home could be supported. - The Town Planning Scheme does not limit the number of outbuildings on a property. Only one dwelling and one granny flat may be permitted on Rural Residential land. - Noted. A Notification on the Title advises landowners of the existence of a Fire Management Plan, which outlines the landowner's responsibilities.
	4. Community Benefits – Despite the advanced age of Maryville Downs, the only significant community infrastructure installed to date has been the recent (2012/2013) installation of the playground at Sussex Bend. Existing residents should receive some physical benefits from Stage 12 for all to share. - Development of the Commercial Centre, Public Open Space and associated amenities to be undertaken concurrently with development of Stage 12. - Development and construction of bridle trails for the numerous horse owners in the area. - The Shire of Chittering to advise residents what it intends to do with any Developer Contributions generated from sale of the new lots as Developer Contributions should be spent in the lower part of the Shire on badly needed infrastructure. There is currently too much focus by the Shire on Bindoon.	4. Notwithstanding the creation of Maryville Estate to a high standard in terms of road construction, fencing and an extensive revegetation program undertaken over the past 20 years, the development of the final two stages being 11 & 12 will also deliver the following community benefits: • Land containing the Marbling Brook to be fenced and ceded free of cost to Council. • 10ha of Public Open Space adjacent Muchea East Road to be ceded to Council free of cost. • 46ha of POS / Conservation area in the northern portion of stage 11 to be ceded to Council free of cost. • A contribution to a 'Community Fund'	4. Noted. The Shire has inherited the public open space and agreed to the 46 hectare Conservation lot as part of Stage 11 and 12. However due to there being no formal Developer Contribution Plan in place for Community Infrastructure, the Developer has only ceded the land undeveloped. - The Public Open Space is to be ceded to the Shire within an agreed timeframe. The 'Commercial Centre' has been granted subdivision approval. - The construction of bridle trails in the area has been noted and is currently being considered. - The Shire is currently in the process of establishing and preparing a Developer Contributions Scheme and Community Infrastructure Plan.
	5. During construction – - Fence off Stage 12 to prevent interaction of children, pets, livestock etc with heavy earthmoving machinery. - No earthmoving work to be undertaken on	5. Any future civil construction works will be undertaken in accordance with a Shire of Chittering approval and any associated conditions pertaining to hours of operation, access, dust and noise controls.	5. – - Noted. - Noted. Construction/subdivision works can only be controlled by the Shire for noise and dust nuisances.

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	weekends. - Be mindful of Immaculate Heart College drop off/pick up times, activities, small vehicles, children, exposure to dust, noise etc. - Monitor and minimise dust and noise during construction works. - Fire management plan to be in place and tested. Provide alternative escape routes should road closures be required during fire season. - Do not impede the use of existing roads during connection of new roads to existing infrastructure. - Give residents at least 2 weeks advance notice of any unplanned power or telecommunication outages due to construction works. Reduce number and duration of outages as much as possible.	A separate 'Fire Management Plan' for stages 11 & 12 has been prepared and submitted to the Shire of Chittering for endorsement. It in not anticipated that future civil construction works will require any power or telecommunication outages. Any scheduled outages will require affected residents to be notified.	- Noted. - Noted. - Noted. A Bushfire Management Plan has been submitted with the Development Plan. A Bushfire Management Plan is to be endorsed prior to subdivision clearance, which includes the associated works. - Noted. - Noted.
Public Submission - I	1. The proponent makes an inferred assertion that the land in question is zoned rural residential, *'contained within a rural residential zone'*. It is assumed from the information provided that the proponent is of belief that the land area in question has been zoned rural residential and that Council has the ability to consider the proposal of rural residential subdivision as a minor variation to an approved development plan. 2. An inspection of the WAPC published LPS map (August 2013) reveals that the land area is currently zoned rural small holdings (minimum area 5.0 hectares) and has been developed in conformity with the zoning, including and uses on SU1, SU2, church, school, vineyards and recreation reserve. 3. Has the WAPC approved a change in zoning from rural small holdings to rural residential? 4. Does Council have the authority to consider the subdivision proposal in its current form, as a minor variation to an approved development plan, or is there a requirement for the proponent to seek and obtain a scheme zoning amendment? 5. The winery and vineyard on SU2 is clearly an operational facility approved by Council and the WAPC. It is unclear what planning relevance exists, if any, related to commercial arrangements that may or may not have been entered into between the proponent vineyard operators and the winery. 6. The normal operation of the existing winery and	1. The stage 12 land is zoned 'Rural Residential' under the Shire of Chittering Town Planning Scheme 6. 2. The current zoning of the land in TPS 6 is the primary piece of statutory planning that determines the ability for land to be subdivided. If Council resolve to support the Revised Development Plan then a subdivision application can be considered by the WA Planning Commission. 3. Not applicable. If Council support the Revised Development Plan then the LPS can be updated to reflect the current zoning & Development Plan if required. 4. Yes, there is no statutory planning requirement for a scheme amendment. 5. The commercial operations of the winery are not a planning consideration relevant to the proposed stage 12. 6. The operation of the vineyard has been undertaken by	1. The subject land is zoned 'Rural Residential' under Town Planning Scheme No 6. 2. The land is zoned 'Rural Residential'. In its current form the land can be subdivided in accordance with the Town Planning Scheme. The proposed Structure Plan addresses the soil capability with larger lots over what would be identified for Rural Smallholdings. 3. As per Applicant's comments. 4. The Scheme and Local Planning Policy No 32 allows for modifications/amendments to Structure Plans. 5. Noted. The operation of the vineyard is in the control of the landowner. 6. The Applicant has stated the vineyards are to be removed,

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	vineyards in the locality would, by their nature, generate airborne odours and spray drift. It would be reasonable to assume that the current activities and off site impacts are dealt with by approved environmental management plans or appropriate land use zoning.	containing any current activities on site. The development of the stage 12 lots will result in the removal of the vines.	hence the application to further develop the site.
	7. How does the proponent intend to create a 500 metre buffer from sensitive receptors (residential housing), more particularly from sulphur products?	7. The vineyard operation was not the subject of a 500m buffer requirement. The development of the stage 12 lots will result in the removal of the vines.	7. Noted. As per previous comment a buffer is not required.
	8. Is it the proponents intention to remove the existing vineyard prior to commencing any subdivision activity, if approved or in the alternate, the proponent intends to maintain the operation of the vineyard until the last proposed surveyed lot has been sold, thereby creating possible health issues and/or conflicts?	8. The civil construction works associated with the creation of the stage 12 lots will require the removal of the vines. This means the existing vines will be removed prior to the sale of any future lots in stage 12.	8. Noted. Any staged subdivision would require the removal of the vines.
	9. Council previously considered an application (May 2013?) by the proponent to transfer land between two related parties. A Council pre-condition on lifting a caveat to allow the transfer involved the parties agreeing to the title transfer and vesting of the identified recreation reserve within 6 months of the Council approval decision.	9. The project surveyors have prepared a Deposited Plan for the creation of the 10ha POS / recreation reserve. The 10ha POS will be vested with the Shire of Chittering in accordance with the conditions of subdivision approval as issued for stage 11.	9. The 10 hectare public open space has been vested to the Shire for public recreation purposes.
	10. Has the proponent transferred title to the recreation reserve?	10. This process is currently being undertaken, refer point 9 above.	10. The transfer of the title is not part of this application.
	11. Has the Shire lifted the caveat to allow the transfer of title between the two proponent-related parties?	11. The existing caveat on the Maryville land is still operational. The caveat will be lifted once the conditions of approval applicable to stage 11 have been undertaken.	11. As per comment 10.
	12. In the event that title transfer and vesting of the recreation reserve has not been commenced or completed within the reasonable time specified, and given the current proposal bounds the reserve area, why would the proponent hold the view that Council should seriously entertain supporting the current proposal prior to title and vesting to the recreation reserve being completed?	12. The vesting of the 10ha POS / recreation reserve is a condition of the stage 11 WAPC approval is currently being undertaken.	12. As per comment 10 and 11.
	13. The LPS map (2013) identifies a watercourse traversing proposed lots, to the north west of the proposed development area, draining into a creek line on the recreation reserve and subsequently into Marbling Brook. Of note, the proponent has been aware for a considerable time of a saline seep at the head of the water course and it was the submitters understanding that a number of remedial conditions had been attached to previous approvals to adequately address the environmental degradation created by the saline seep and dam storage of saline water. In addition, it is the submitters understanding that remedial revegetation commitments were entered into, such that the water	13. The landowners have successfully completed all necessary works associated with previous stages of Maryville Estate. The Revised development Plan for Maryville designates 'Revegetation Areas' adjacent Santa Gertrudis Dive in stage 12 and the wetland / dampland adjacent Muchea east Road. The revegetation areas will be planted with appropriate trees, vegetation in consultation with the Chittering Landcare group as per previous work on Maryville Estate.	13. Noted. Revegetation of these areas has been identified on the proposed Structure Plan and would be a requirement of subdivision.

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	course traversing the recreation reserve and the identified wetland area bounding Chittering Road, on the south east corner, were to be replanted with appropriate vegetation based on advice from Chittering Landcare.		
	14. Does the proponent hold the view that all necessary remedial environmental works, commitments and conditions from previous approvals have been satisfied?	14. Yes	14. This does not form part of this application.
	15. What evidence does the proponent rely on to support the answer to 14 above?	15. All relevant clearances have been issued for previous stages and titles created.	15. As per comment 14.
	16. In or about 2001, Council granted conditional development approval for the proponent's vineyard development. Incorporated into that approval was authorisation to draw groundwater from the site. The proponent provided the Shire and a number of Government Agencies with a document titled 'Groundwater and spring flow evaluation, Maryville-Marbling area, Chittering Shire, Rockwater February 2003'. Within the document the proponent identifies: - A bore identified as 'salt bore' drilled to a depth of 64 metres, penetrating a number of confined aquifer layers with reported saline groundwater - A bore identified as 'Maryville main bore' drilled to a depth of 82 metres, penetrating a number of confined aquifer layers with a reported salinity initially of 860mg/L TDS deteriorating to 1370mg/L TDS in 2003, utilised to irrigate the vineyard area. - A well in proximity to the wet land area bounding Chittering Road, of unknown depth, displaying free flowing artesian characteristics. As the commercial vineyard development and incorporated infrastructure was the subject of Council conditional approval and the proponent has notified Council of its intention to remove the approved development, is there then a requirement for the proponent to? - Decommission and seal 'salt bore', 'Maryville main bore', and the free flowing artesian well in conformity with the requirements of the Australian bore construction standards, with the works being undertaken by a registered class 3 driller, as the open bores and well are likely to cross contaminate the aquifers intersected causing environmental harm to the groundwater resources and impact other users in the area.	16. The existing bore will be sold with one of the proposed lots in stage 12.	16. Noted. - Noted. - Noted. The Applicant has indicated the vineyard will no longer be operational once Stage 12 has been subdivided. - Bore licences are monitored by the Department of Water, not the Shire. - Noted. The use of the existing bore is to be administered by the Department of Water. - As per comment above. - As per comment above. - Noted, as per comment above.
	17. Incorporated within the proponent's letter is notification	17. The existing vineyard will be removed and the site cleaned	17. – The use of land for commercial purposes is entirely in the

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	to the Shire of the proponent's intention to cease commercial grape production, with removal of the vines and associated infrastructure, inclusive of overhead high voltage power lines. Council granted conditional development approval for the vineyard development in the first instance and therefore, is it reasonable for Council to? - Treat the notification as a separate item, preceding consideration of the subdivision proposal, as a current application request to withdraw the conditional development approval previously granted. - Require the proponent to remove all vines and associated infrastructure and 'make good' the land to the satisfaction of the CEO, within a specified time period.	ready for sale as part of the future stage 12 civil contract works.	interest of the landowner/operator. - The planning approval for the vineyard development does not require to be 'withdrawn'. It is a land use subject to the site and would become redundant through lack of operation. - Noted. It is considered should the Structure Plan and subdivision be supported, the removal of the vines will simply be undertaking as a result of the Developer wanting to progress the subdivision of the land.
	18. Any real or perceived health, environmental or social issues/conflicts, would be avoided in the event that the proponent was successful in its endeavours to develop the area as rural residential.	18. Noted	18. Noted.
	19. TPS 6 identifies that building envelopes of 2000 square metres are to be shown on development plans submitted by proponents. The plans available do not identify the building envelopes.	19. The Revised Development Plan depicts building envelopes which take into consideration setbacks and land capability mapping for on-site effluent disposal. Within the nominated building envelopes clearing of 2000m2 is not permitted without the prior approval of Council.	19. The proposed Structure Plan includes building envelopes and provisions outlining clearing up to 2,000 square metres. The Shire Recommendation is to remove building envelopes and replace with building exclusion areas as it is considered building envelopes are too restrictive for 2 hectare lots that can be managed through the setbacks and exclusion zones.
	20. Is it the proponent's intention to resubmit the proposed development plan that clearly identifies building envelopes?	20. Refer response 19 above.	20. Refer to comment 19 above.
	21. A 10.3 hectare lot on the south east corner of the proposed development area incorporates a previously identified wetland area.	21. Noted, the wetland area is a designated 'Re-vegetation Area' in the Revised Development Plan.	21. Noted. The wet area is identified on the Structure Plan as a 'Development Exclusion Zone' requiring revegetation.
	22. Where does the proponent intend to locate the building envelope taking into consideration the wetland area, setbacks from Chittering Road and a 500 metre buffer from the winery?	22. The building envelope for the 10.3ha lot is located on the eastern portion of the lot.	22. As per the proposed Structure Plan and Shire Recommendation for building exclusion zones.
	23. A condition attached to the Council granted vineyard development approval was that direct entry and exit from the site to Chittering Rd was not approved. Is it the proponent's intention to apply to Council for approval to allow direct access to Chittering Road from the 10.3 hectare lot?	23. The stage 12 design proposes access to the building envelope via a crossover from Muchea east Road. The traffic counts for Muchea East Road confirm the daily traffic volumes do not preclude Council from granting approval to a single crossover for a future residential dwelling.	23. Direct access of the POS to Chittering Road is not considered a part of this Structure Plan but will be considered with the development of the POS.
	24. It would appear that the submitted subdivision plan does not account for a 10 metre road reserve widening of Chittering Road and Muchea East Road.	24. The Revised Development Plan does not designate a 10m widening of Muchea East Road. This matter can be dealt with as a condition of subdivision approval if considered	24. Noted. The Shire's Technical Services have requested a 10m road widening of Chittering Road, which has been included in the Officer's Recommendation to be depicted

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		appropriate.	on the Structure Plan.
	25. Was a 10 metre road reserve widening a condition of a previous approval associated with the site? 26. Is it the proponent's intention to satisfy a 10 metre road reserve widening, consistent with other subdivision developments in the locality? 27. In surveying the recreation reserve area has the proponent accounted for the road reserve widening to ensure that the agreed to community land area has not been diminished?	25. No 26. No, A 10m road widening has not been a condition of approval for any previous Maryville planning application. 27. There is no requirement in the stage 11 subdivision approval as issued by the WAPC to accommodate a road widening along Muchea East Road.	25. The Officer's Recommendation requires the 10m road widening on the Structure Plan. 26. As per comment 24 above. 27. It is understood the 10ha POS figure was to be an approximate minimum size. The 10m road widening would reduce this slightly however it is considered it is justified.
Public Submission J	1. There are quite a number of developments in and around Maryville Downs, some of which have not sold well after quite a while on the market and to have another one with 35 blocks could end up the same and could de-value nearby land. 2. To keep a vineyard area would add a bit of diversity to the area.		1. Noted. The sale of lots is not a planning consideration. Market viability sits with the owner/developer. 2. The vineyards are contained within private land. The Shire cannot force the landowner to keep the vineyards.
Public Submission K	1. Whilst we are not entirely opposed to the development, we feel that the vista from Muchea East Road towards Chittering Road could be compromised. Being a popular tourist drive on that stretch of road, the development could affect the general outlook of the area substantially. 2. Before any further developments in or around Maryville Downs estate are being undertaken, it would be greatly appreciated if Muchea East Road could be upgraded from Wandena Road through to Chittering Road. We believe that Muchea East Road desperately requires resurfacing and the marking of lines would also make it a much safer journey, especially in severe weather conditions. With any further development, there will obviously be an increased number of heavy vehicles. This in turn will deteriorate the already poor condition of the road further.		1. Noted. 2. Noted. The upgrade of roads would be considered at the subdivision stage.
Public Submission L	1. Would like to have some horse riding trails included in the plan. There are a lot of us in this area who are proud of our horse properties and take great care maintaining them.		1. Noted. The Officer's Recommendation addresses the need for bridle trails on the Structure Plan and attempt to incorporate with the greater area.
Main Roads WA	1. No objection.	Noted	1. Noted.
Chittering Landcare Group	1. The headwaters of the Marbling Brook, one of the few freshwater streams entering the Brockman River, arises in the wet area on the south eastern boundary of this proposed development, most of which is within the 10.3 hectare lot. Protection of this important resource is vital. The area is marked as development exclusion zone and should be protected from any sort of development including playing fields. Conditions on the development	1. The wetland area located in the 10.3ha lot is designated as a "Re-vegetation Area" and a 'Development Exclusion Zone'. Accordingly no development will occur within the designated zone and it will be re-vegetated in consultation with the Chittering Landcare Group. The restriction of individual residential bores is not in the control of the developer.	1. Noted. The Structure Plan protects the wet area as a 'Development Exclusion Zone' and 're-vegetation area'.

Schedule of Submissions – Proposed Development Plan – Maryville Downs Stage 12

	Submission Comments	Applicant Response Comments	Officer Response Comments
	state "the sinking of bores, construction of dams and the extraction of surface water is not permitted without the approval of Council and the relevant State Government Department". It is recommended that no bores be permitted within the Stage 12 development area. Extraction of water from this immediate area will cause irrevocable damage to the flows in the Marbling Brook, loss of downstream vegetation and loss of productive capability for downstream orchards which have existing riparian rights. There has been a significant reduction in flows in the Marbling Brook due to the number of bores already established within existing Maryville stages and by new developments adjacent to this site – the aquifer has been depleted and there are constant reports to the landcare centre of neighbourhood disputes about drawing of water.		
	2. The Marbling Brook Catchment Group was formed when the drawing of water from a roadside bore adjacent to this development exclusion zone threatened the flows of the Marbling Brook. The group had the support of the then Waters and Rivers Commission, now the Department of Water.	2. Noted	2. Noted.
	3. As these lots are greater than two hectares, the properties within the tree preservation area will require three metre firebreaks. There are three lots within the tree preservation area. With the building envelopes and the fire breaks most of the trees will be gone. The Landcare Group would recommend that the tree preservation area be included in only one lot to reduce the loss of vegetation. The revegetation area around the saline dam in the north of this stage will need to include significant plantings of juncus kraussil and other salt tolerant species.	3. The three proposed lots located within the tree preservation area will not result in the loss of 'most of the trees'. The nominated building envelope for two of the three lots contains predominantly cleared land. The third lot is subject to a maximum clearing area 0f 2000m2. Experience from existing stages at Maryville confirms residents work to retain trees where possible. The revegetation area around the dam will be planted with appropriate species in consultation with the Chittering Landcare Group.	3. Noted.
	4. It is not clear which lots are required to have ATUs. In the original proposal of 2002 (Stage 2) these lots were to be much larger and all of those on the south eastern boundary were required to have ATUs to prevent contamination of the Marbling Brook water resource. This is recommended for all lots south east of the internal roadway.	4. The building envelopes have been positioned based upon land capability mapping for suitable on-site effluent disposal as prepared by Land Assessment Pty Ltd (Martin Wells). The nominated building envelopes have been positioned on land suitable for septic tank systems some with inverted leach drains.	4. Noted. The Officer's Recommendation proposes to amend the Structure Plan to clearly reflect the effluent disposal requirements for landowners and the Shire, which is to be later determined by the Shire's Principal Environmental Health Officer.
	5. In Stage 12 it will be extremely important that the area is not overstocked. Degradation of the soil structure will allow direct impact on the water aquifer by manures. This is not appropriate in this highly sensitive area. Monitoring and action by the Council will be required.	5. Noted	5. Noted. The Officer's Recommendation proposes areas excluding or restricting stock to address this concern.
Western Power	1. No specific comments at this time.	Noted	1. Noted.

Schedule of Submissions – Proposed Development Plan – Maryville Downs Stage 12

	Submission Comments	Applicant Response Comments	Officer Response Comments
Telstra Corporation Limited	1. No objection.	Noted	1. Noted
Water Corp	1. No comments.	Noted.	1. Noted
Department of Health	1. Capability of the land to dispose wastewater will need to be demonstrated at subdivision application. 2. The Department's scoping tool that identifies potential health impacts that should be addressed or incorporated into the development plan.		1. Noted. The Applicant has undertaken and provided Council with a Land Capability Assessment of the site for effluent disposal. 2. Noted.