



## Development Services Attachments Wednesday, 17 August 2016

REPORT NUMBER	REPORT TITLE AND ATTACHMENT DESCRIPTION	PAGE NUMBER(S)
9.1.1	<b>Proposed Scheme Amendment No. 56: Rezone from 'Agricultural Resource' to 'Rural Smallholdings' – Lots 1 and 2 Teatree Road, Bindoon</b> 1. Scheme Amendment document includes, but not limited to: (i) Locality Plan (ii) draft Structure Plan (iii) Flora and Fauna Survey (iv) Bushfire Management Plan 2. Advice received from Department of Planning	1 – 478
9.1.2	<b>Local Planning Policy 7 Outbuildings Policy Review</b> 1. Proposed Local Planning Policy 7 'Outbuildings' 2. Existing Local Planning Policy 7 'Outbuildings and Swimming Pools'	479 – 497
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LOTS 1 & 2 TEA TREE ROAD, BINDOON

SHIRE OF CHITTERING  
LOCAL SCHEME AMENDMENT NO. 56



SHIRE OF CHITTERING  
TOWN PLANNING SCHEME NO. 6  
AMENDMENT NO. 56

LOTS 1 & 2 TEA TREE ROAD, BINDOON  
SHIRE OF CHITTERING

PREPARED FOR  
MAROU PROPERTY DEVELOPMENTS PTY LTD

BY  
WHELANS TOWN PLANNING

July 2016



SHIRE OF CHITTERING  
TOWN PLANNING SCHEME NO. 6

AMENDMENT NO. 56

LOTS 1 & 2 TEA TREE ROAD, BINDOON

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PLANNING AND DEVELOPMENT ACT 2005  
RESOLUTION TO ADOPT AMENDMENT TO LOCAL PLANNING SCHEME

SHIRE OF CHITTERING  
TOWN PLANNING SCHEME NO. 6

AMENDMENT NO. 56

RESOLVED that the Council, in pursuance of Section 75 of the Planning & Development Act 2005, amend the above local planning scheme by:

1. Rezoning part of Lot 1 & all of Lot 2 Tea Tree Road, Bindoon from 'Agricultural Resource' to 'Rural Smallholdings' and amending the Scheme Map accordingly.

The Amend is complex under the provisions of the Planning and Development (Local Planning Schemes) Regulations 2015 of the following reason(s):

1. An amendment that is not consistent with a local planning strategy for the scheme that has been endorsed by the Commission;
2. An amendment that is not addressed by any local planning strategy.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 2016

\_\_\_\_\_  
CHIEF EXECUTIVE OFFICER

**MINISTER FOR PLANNING  
PROPOSAL TO AMEND A TOWN PLANNING SCHEME**

<b>LOCAL AUTHORITY</b>	Shire of Chittering
<b>DESCRIPTION OF TOWN PLANNING SCHEME</b>	Town Planning Scheme No. 6
<b>TYPE OF SCHEME</b>	District Scheme
<b>SERIAL NUMBER OF AMENDMENT</b>	Amendment No. 56
<b>PROPOSAL</b>	To rezone Lots 1 & 2 Tea Tree Road, Bindoon from 'Agricultural Resource' to 'Rural Smallholdings', to facilitate development of the land in accordance with the 'Rural Smallholdings' zone.

## SCHEME AMENDMENT REPORT

### LOTS 1 & 2 TEA TREE ROAD BINDOON



Original timber posts set out on Lot 1 for vineyard (2012)

## 1.0 INTRODUCTION

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This report presents a proposal to initiate a Town Planning Scheme Amendment to the Shire of Chittering Town Planning Scheme No. 6 (TPS 6). The proposal seeks to rezone Lots 1 & 2 Tea Tree Road, Bindoon ("the subject site") from "Agricultural Resource" to "Rural Smallholdings".

The report provides a description of the subject site, details of the proposal and town planning justification. A draft Structure Plan (Appendix 4) has been prepared as supporting information to this proposed Local Scheme Amendment. However formal Structure Plan approval is not being sought as part of this application to rezone the subject site.

### 1.1 Location

Lots 1 & 2 (formerly Lot 102) Tea Tree Road, Bindoon is situated within the Shire of Chittering approximately 7 kilometres south-west of the Bindoon townsite and approximately 85 kilometres north-east of Perth. **Figure 1** is a location plan of the subject site. The combined area of Lots 1 & 2 is approximately 483.9 hectares and the property has frontage to Tea Tree Road along the northern boundary of approximately 2,661 metres.

Tea Tree Road is presently a gravel road serving the large rural properties west of Bindoon. Brennan Road runs along the property's western boundary, however, the road is not formally constructed and is also a gravel road. **Figure 2** shows the cadastral boundaries and aerial view of the subject site.

### 1.2 Landownership

The (2) land parcels forming the subject site are in ownership of M & I Marouchtchak. The legal description and area of each land parcel is set out in Table 1 below.

Table 1. Land description and area of lots comprising subject site

Lot	Plan	Volume	Folio	Area (ha)
1	41201	2618	80	433.81
2	41201	2618	81	50.09
<b>TOTAL</b>				<b>483.90</b>

## 2.0 SITE CONTEXT AND DESCRIPTION

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### 2.1 Existing Land Use and Background

The subject site has an area of 483.9 hectares and in the past it has been used for grazing with occasional cereal and lupin crops. Most of the land has been cleared for agricultural pursuits but there are some stands of remnant vegetation left on the property. The property is currently being used for grazing. Rows of *Tagasaste* have been planted in the past in the central area of the subject site by the landowner as supplementary stock feed.

In the last few years the landowner has put considerable effort into preparing the eastern side of Lot 1 in anticipation of developing a vineyard. This has included the construction of fencing, sinking of a bore and earthworks to establish a dam. The intention was that the eastern part of the subject site would remain as a lifestyle lot owned and maintained by the current owner, with the western side of the land sold as smaller rural lots to fund and invest in the vineyard. It has only come to the Landowners attention, at the beginning of 2016, that ambitions for the land were put in doubt with the realignment of the Perth-Darwin Highway. It would appear from the indicative alignment of the Highway that for the vineyard to continue the dam and fencing may need to be relocated at considerable cost.

### 2.2 Surrounding Context

The predominant surrounding land use is rural based, comprising of agricultural activities and rural residential living (refer to **Figure 3**). To the east of the subject land (excluding neighbouring Lot 4) many of the original rural properties in the area have been subdivided into predominantly 2.0 – 2.5 hectare lots supporting rural-residential living, with some larger 3 - 4 hectare lots within those developments. The neighbouring land uses to the south, north, east and west are predominantly large agricultural lots or undeveloped land containing remnant vegetation.

Lot 101 to the west has been recently rezoned to 'Rural Conservation' with approval for cluster rural residential development. On the opposite side of Tea Tree Road to the north is the new Parkwood Springs Estate which has been approved and subdivided into 4 hectare rural residential lots.

The subject site is strategically located to provide a transitional land use between 'Rural Conservation' and 'Agricultural Resource' land and the rural-residential living precincts to the east. This will be further discussed in the report as town planning rationale for the proposed rezoning to 'Rural Smallholdings'.

## 2.3 Opportunities and Constraints

A Land Capability Assessment (**Appendix 1**), was undertaken by Landform Research in May 2000. The assessment was based on field analysis on 3 May 2000, 48 soil auger holes, geological and hydrological mapping, knowledge of the area, aerial photography interpretation and published information.

Opportunities and constraints have been identified from the Land Capability Assessment. Opportunity exists to create a unique rural smallholdings development which is site specific and relevant to its local context. The following are some of the opportunities identified for the subject land:

### Opportunities

- Proximity to Bindoon Townsite - The subject land is only 7 kilometres south-west of Bindoon townsite and all its services and amenities.
- Availability of Groundwater - The white sand filled valleys contain abundant accessible groundwater of high quality with the greatest volumes of groundwater being in the central east valley. The landowner currently has a licensed bore approved by Department of Water.
- Vineyard - Soils have potential for cottage and perennial horticulture, particularly on the eastern side where there is good sources of groundwater. The landowner has obtained a license from Department of Water to extract groundwater for the proposed vineyard in the north-east of the property however the exact location of this vineyard is dependent on the location of the Perth-Darwin Highway.
- Soils high in phosphorous retention - The presence of yellow sand with good phosphorous retention over most of the site is suitable for on-site wastewater treatment.
- Ridges Views - The form of ridges provide visual screening as well as aesthetical values such as views and cooling breezes in summer.

### Constraints

- There are limited land and environmental constraints for the site which would preclude development of the site for rural smallholding land use.
- Soak/Dam - There is a small soak/dam near the eastern boundary which will limit development and setback of residences from the wetland area, for instance, nominal Department of Environment and Conservation 100m buffer for effluent disposal from soak/dam wetland.
- The exact future alignment of the Perth-Darwin Highway is not yet know and as such currently only the indicative alignment dictates the eastern boundary of the proposed change of zone over the subject site.

The main opportunities and constraints for the site are shown in **Appendix 2** Opportunities and Constraints plan.

## 2.4 Topography

The land varies from two main ridges at just over 210m AHD in the south east corner and 205m AHD in the central west dropping to 175m in a gentle valley in the south western corner and 163m on the central eastern boundary.

## 2.5 Geology and Soils

Quartz sands cover the majority of the property with leaching of sand to white sand occurring in the valleys. The main soil types found on the subject land are Leached Sand over Gravel, Leached White Sand, Yellow Sand and Ferricrete and Gravel, which are typical for its position in the landscape. These sands are described as free draining calcareous sand of high permeability.



(Above) Typical view of white sands found on the property

## 2.6 Hydrology

### Groundwater

Groundwater drains from each catchment, which is defined by the ridges found on the subject land, with the greatest volume of groundwater in the central east valley. The landowner has stated that the groundwater bore on the property is at a depth of around 30 metres.



### Surface Water

Surface drainage is minimal due to the permeability of the soil. The only natural expression of surface water within the development site is a small flow emanating from the soak/dam in the central east. The direction of flow is east and surface drainage ultimately enters into Lake Chittering about 3 kilometres to the east of the subject land. There is no evidence of surface salinity and the Land Capability Assessment concluded that it is unlikely that salinity will be an issue in the future even though the land has been excessively cleared.

### Wetlands

There are no natural wetlands or sumplands within the subject site. As mentioned above, there is a soak or dam in the eastern portion of the development site which feeds into a series of soaks and a dampland on the neighbouring eastern property. For the subject land, infiltration at source is the dominant hydrological characteristic in the pre-development catchment.

## 2.7 Vegetation & Flora

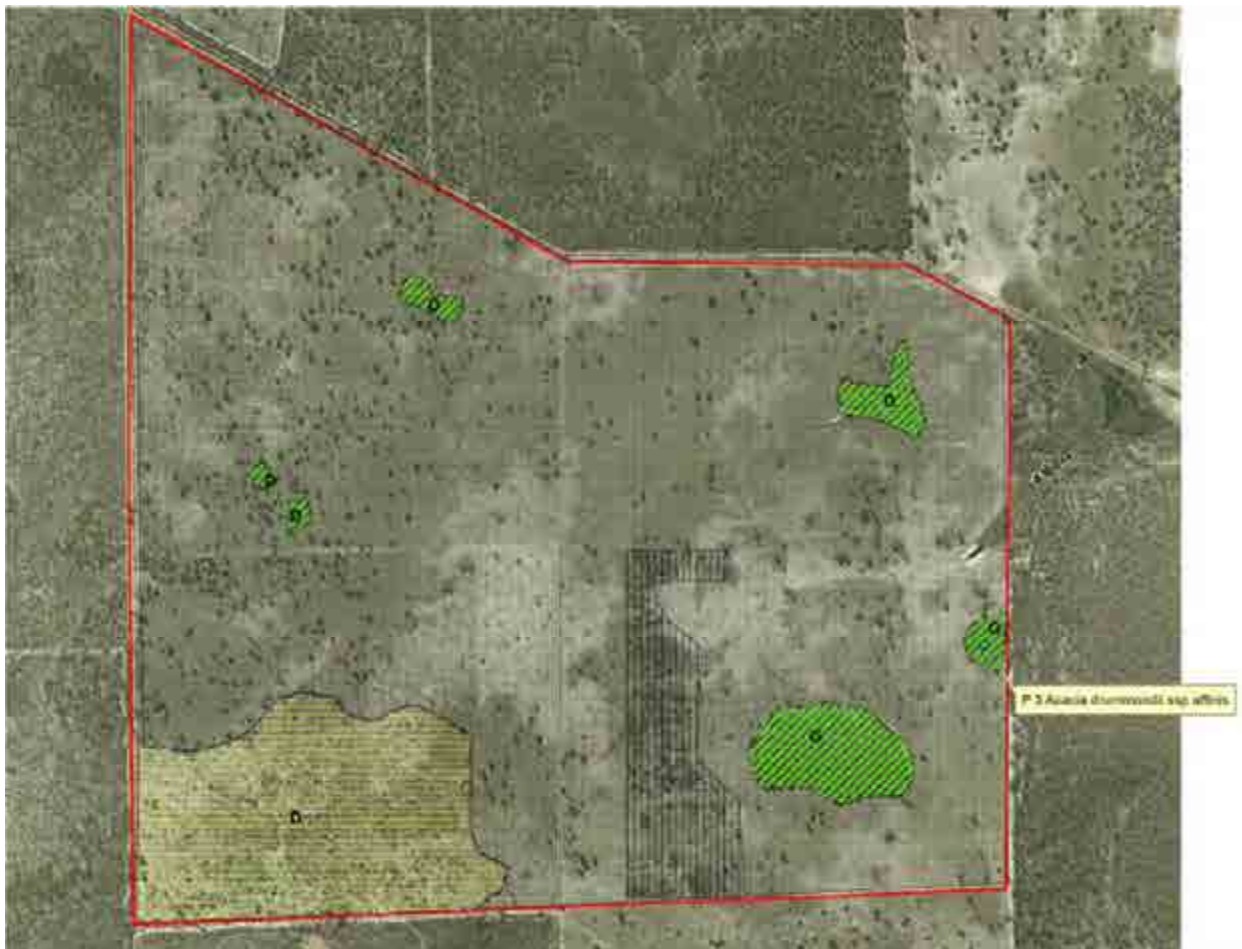
The subject land has been predominantly cleared apart from scattered remnant stands of trees. The main vegetation on the site can be described as tree remnants of Eucalyptus woodlands. Some of the gravel ridges have largely been left as remnant vegetation, but have been subjected to grazing to the extent that the vegetation diversity of species is limited both in numbers and density in most areas. The leached white sands in the west and south have been allowed to regenerate with there being evidence of some native species repopulating some areas of the property.

Landform Research in its Land Capability Assessment report made these comments on flora and vegetation on the property

*"...Tagasaste has been planted in the central south on leached and yellow sands. The main vegetation on the site are tree remnants of Eucalypt woodlands. The following partial community types are represented by scattered Eucalypts and taller shrubs: Jarrah – Marri (Eucalyptus marginata, E. calophylla) Woodland occurs on the ferricrete/gravel and duricrust, grading into Jarrah Woodland where duricrust becomes significant and the soil more shallower. Marri Woodland was the dominant original vegetation on the yellow sand but changes to Pricklebark (E. tottiana) Woodland and remnant Banksia Woodland as the sand becomes more leached to the south west. Juncas pallidus occurs on wet pasture areas with the introduced Isolepis prolifera associated with the wet area around the soak in the central east. No evidence of dieback disease was noted." [page 4].*

The 2011 Spring Flora and Vegetation Survey (Bio Diverse Solutions, 2012) (**Appendix 3**) identified the presence of Priority 3 species (*Acacia drummondii* ssp *affinis*) in the eastern portion of the development site.

The Survey recommends that development is restricted in this area and the remnant vegetation area containing Priority 3 species *Acacia drummondii* ssp *affinis* is fenced to exclude stock in order to maintain habitat for the flora species. It should be noted that the draft Structure Plan (**Appendix 4**) prepared does not propose any development in the eastern portion of the development site and therefore the P3 flora species in this area should be retained within a large lifestyle lot.



Location of Priority 3 Flora *Acacia drummondii* ssp *affinis*) in the eastern portion of the subject site



(Above) View of artificial re-growth *Tagasaste* rows near the central part of the site used to supplement livestock feed

(Below) Typical parkland cleared areas of the subject site with remnant eucalyptus trees



## 2.8 Fauna

The only remnant vegetation on the development site is the scattered trees and native vegetation pockets on the ridges. Due to the clearing of the land there is limited natural habitat for fauna. The trees on the development site potentially provide habitat for birds, however, no Carnaby Black Cockatoos were observed during site inspections.

Wherever possible, significant healthy trees will be preserved as part of development of the site. Kangaroos are frequent and reptiles are likely to be found on the site, including skinks, goannas, snakes etc that are local to the area. Feral animals such as rabbits and foxes are also likely to be found on the development site.

Plantings and revegetation can form linkages between remnant pockets of vegetation and to the more substantially remnant vegetation on surrounding neighbouring properties. It is likely that the development site attracts fauna that migrates between the surrounding remnant vegetated areas that have been assessed as important biodiversity areas under the Shire's Biodiversity Strategy.

## 2.9 Indigenous & European Heritage

### Indigenous Heritage

A search of the Department of Indigenous Affairs (DIA) Aboriginal Heritage Inquiry System indicates there are no registered Aboriginal Heritage sites within the development site.

It is important to note that the database of heritage sites held by the DIA is not comprehensive and there exists the potential for unknown sites of Indigenous heritage significance to be located inside or within close proximity to the subject land.

Archaeological monitoring is recommended for any eventual excavation works as part of subdivision and development. The process for protecting Indigenous heritage sites and considering proposals that may impact a known site is set out under the *Aboriginal Heritage Act 1972*. The Act protects all Aboriginal sites in WA whether they are known to the DIA or not.

### European Heritage

There are no places or sites of cultural significance within the subject site area under the Shire of Chittering Municipal Heritage Inventory and State Heritage Register.

## 3.0 KEY PLANNING FRAMEWORK

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### 3.1 SPP 2.5 'Agricultural and Rural Land Use Planning'

For lot sizes in Rural Smallholdings, SPP 2.5 sets out a range of 4ha – 40ha in size. The Policy recommends that a Rural Smallholding zone focus on providing rural living and rural lifestyle land use. SPP 2.5 generally requires proposals for Rural Smallholdings to be consistent with Local Planning Strategies and located in areas where bushfire risk is not extreme and there are no significant topography, environment, or servicing constraints. The subject site is well suited for Rural Smallholdings zone and this will be further discussed in the report, however in summary and as per section 5.6 *Rural living precincts* of SPP 2.5:

- the precinct will not conflict with rural land use activity or reduce the primary production potential of adjoining or nearby land;
- the extent of proposed rural living settlement is guided by existing land supply and take-up and population projections;
- the precinct is predominantly cleared of remnant vegetation or the loss of remnant vegetation through clearing for building envelopes, bushfire protection, access and fencing is minimised and environmental assets are not compromised;
- the land within the precinct is capable of supporting the development of a dwelling(s) and is not located in a flood prone area;
- the land within the precinct is not subject to a buffer from an adjoining land use or the impact(s) from the buffer can be managed;
- the lots can be serviced by constructed road/s capable of providing access during all weather conditions, including access and egress for emergency purposes;
- it can be demonstrated that the precinct is not in an extreme bushfire risk area and any lesser bushfire risk can be minimised and managed without adversely affecting the natural environment; and
- in areas of moderate bushfire risk, dwellings will be required to be constructed to Australian Standard 3959 Construction of Buildings in Bushfire-Prone Areas (AS 3959) and separation distances are to comply with relevant guidelines for bushfire protection.

### 3.2 SPP 5.4 'Road and Rail Transport Noise and Freight Considerations in Land Use Planning'

This Policy seeks to protect the community from unreasonable levels of transport noise by establishing a standardised set of criteria to be used in the assessment of

developments close to transport corridors and to protect freight corridors from incompatible urban encroachment.

In relation to this scheme amendment and future subdivision in line with the proposed Structure Plan, the 5 – 6 ha lots proposed for development will be set on the western side of the subject site. As per clause 5.6 of SPP 5.4 this is an appropriate form of noise mitigation to separate noise-sensitive land uses from the potential noise generated by the Perth-Darwin Highway by a distance of greater than 900m.

Any noise sensitive buildings set on the large lifestyle lot will also require a set back from the Highway of no less than a minimum 300m limit. It is anticipated that noise studies will only need to be conducted as part of the planning application process for noise sensitive buildings constructed closer to the Perth-Darwin Highway inside the 300m offset or in the event of future structure planning on the large lifestyle lot.

### 3.3 Shire of Chittering Local Planning Strategy 2004

The Shire of Chittering Local Planning Strategy 2004 (LPS) was endorsed by the Shire of Chittering and Western Australian Planning Commission as a planning instrument to guide land uses and subsequent development within the Shire for the period 2001 – 2015.

The LPS identifies the subject site as suitable for 'Rural Retreat – Priority Development Area' development (with minimum lot size of 10 hectares). However, as will be discussed under heading 4.1 of this report, the subject site is considered better suited for 'Rural Smallholdings'.

### 3.4 Shire of Chittering Draft Local Planning Strategy Update 2010

The Shire of Chittering Draft Local Planning Strategy Update 2010 proposes modifications to the LSP 2004. It is noted that Lots 1 & 2 Tea Tree Road are retained under the draft Local Planning Strategy Update 2010 as 'Rural Retreat'. Should this proposed local scheme amendment be supported, the draft LSP will require updating to reflect proposed 'Rural Smallholdings'.

### 3.5 Shire of Chittering Town Planning Scheme No. 6

The subject land is currently zoned 'Agricultural Resource' under the Shire of Chittering Town Planning Scheme No. 6. The proposal is to rezone the subject land from 'Agricultural Resource' to 'Rural Smallholdings'. A Structure Plan is required as a prerequisite to subdivision and/or development in order to provide an appropriate planning framework to guide decision making regarding subdivision and/or development approval.

### 3.6 Local Planning Policy No. 21 – Fire Management

This policy applies to all land zoned Rural Residential, Rural Retreat and Rural Smallholdings under TPS 6. A Bushfire Management Plan is to be prepared in accordance with the Policy for the proposed ODP. A Bushfire Hazard Assessment is



required for the proposed Local Scheme Amendment and this is provided for in **Appendix 5**.

### 3.7 Local Planning Policy No. 32 – Structure Plans

For the rezoning and development of the subject site, the policy requires preparation of a Structure Plan which considers the proposed subdivision of land and assembly of elements including road layout, configuration of proposed lots, provision of infrastructure, public open space and fire risk assessment/management.

Under the policy, a minimum lot size of 5 hectares is applied to the Rural Smallholdings zone. A draft Structure Plan is provided with this scheme amendment as supporting information to demonstrate how the subject site could be subdivided/developed under a 'Rural Smallholdings' zone. An indicated location of the Perth-Darwin Highway has been added onto this plan acknowledging the proposed location of the Highway. The alignment is at this stage indicative and will be formalised through further consultation with the Main Roads Department (MRWA).

## 4.0 PLANNING RATIONALE

### 4.1 Local Planning Strategy 2004 (LPS)

The Shire of Chittering LPS identifies the subject site as future 'Rural Retreat', however, the subject site falls outside designated Rural Retreat Precincts as per [Figure 8 in the LPS] (as shown in **Figure 4**).

The LPS identifies Small Ruralholding Precincts to be located further away from Bindoon townsite as per [Figure 7 in the LPS] (as shown in **Figure 5**). It is considered that the subject site has merit for rezoning to 'Rural Smallholdings', being in relative proximity to Bindoon townsite.

The Shire's LPS identifies Rural Residential Precincts as per [Figure 6 in the LPS] (refer to **Figure 6**). The subject site falls within a portion of the Chittering Heights Estate/Odelon Estate Precinct with the balance of the subject site abutting this Precinct and the Country Club Estate Precinct to the north-east.

The proposed Scheme Amendment for the subject site provides for a suitable transition of rural residential to the east and larger agricultural lots to the west (including the western neighbouring 'Rural Conservation' lot).



## 4.2 Suitability of Subject Site for Rural Smallholdings

### Vegetation Clearing

The subject site has historically been cleared for grazing and does not form part of environmentally sensitive areas as identified in the Shire of Chittering Local Biodiversity Strategy.

### Site Accessibility & upgrading of Tea Tree Road

The subject site is accessible via Tea Tree Road, which has been sealed up to Parkwood Springs Estate providing bitumen access to that development. Further west of Parkwood Springs Estate Tea Tree road is trafficable but constructed gravel. Brennan Road along the western boundary of the subject site is also trafficable gravel road.

The proposed 'Rural Smallholdings' zone will provide opportunity to create a rural smallholding subdivision over the subject site, which will in turn require the upgrading (to bitumen standard) of Tea Tree Road along the frontage of the subject site. Brennan Road potentially can remain as a gravel trafficable road providing a secondary access point to the subject site. The primary access to the subject site would be Tea Tree Road.

Part of the upgrading of Tea Tree Road will require extension of the bitumen seal from Parkwood Springs Estate to the north-east corner of the subject site. Of particular significance will be the need to upgrade the drainage crossing of the natural surface drainage line on the northern side of Tea Tree Road to the southern wetland area in neighbouring Lot 4 to the east. At present the water flow across Tea Tree Road is uncontrolled and creates a water hazard and erosion issue.



Natural surface water drainage across Tea Tree Road opposite wetland area in Lot 4 – image taken in summer

Upgrading of the road by the developer would necessitate installation of a suitable culvert to allow the natural surface drainage to pass under Tea Tree Road to the wetland within Lot 4.



Upgrade to Tea Tree Road as part of Parkwood Springs Estate development

#### Suitability of Small Ruralholding Lot Size

The subject site is generally within a transitional area between rural residential development to the east and agricultural lots to the west. The proposed 'Rural Smallholdings' zone would provide opportunity for minimum lot size of 5 hectares, which would not be out of keeping with the character of the area. To the east of the development site there are existing and planned rural residential developments.

Parkwood Springs Estate to the north is zoned 'Rural Residential' with lot sizes of 4 hectares. The neighbouring land to the west (Lot 101 Tea Tree Road) is zoned 'Rural Conservation' with a WAPC conditional approval for (cluster subdivision, providing for lot sizes of 5000m<sup>2</sup>).

Market sounding indicates that the community prefers lot sizes in this locality to be generally around 1 – 5 hectares. For the majority, larger lot sizes above 5 hectares are not preferable, due to issues of land maintenance.

Further, lot sizes around 4 – 5 hectares are sufficient to provide a rural lifestyle and amenity. From a perspective of landowner maintenance (i.e. sustainable land management practice), a 4 - 5 hectare lot size (i.e. generally the size of a primary school site) is reasonably manageable, for inexperienced prospective landowners seeking a *tree change*, or those wishing to downsize.

Generally speaking larger lot sizes (i.e. 10 hectares or greater) attracts less market and community demand. Accordingly, the Proponent requests the 'Small Ruralholdings' zone in lieu of a 'Rural Retreat' zone, to create opportunity to provide a more appropriate lot product to meet community demand and expectations.

### Land Supply and Population Growth

As per the Shire of Chittering *Strategic Community Plan 2012-2022* the population of the Shire is predicted to double by 2026. Added to this will be a significant increase in the range of the 35-69 years of age cohort. This will increase demand for a variety housing that will allow tree change, low land maintenance lifestyle options. The *Strategic Community Plan* acknowledges that future lifestyle choice for the increased population will require an increased availability of varied lot sizes to meet the needs of the community now and into the long term.

Added pressure is presumed to be generated on the local land availability with the development of the Perth-Darwin bypass and the increased employment opportunities generated by the developing Muchea Employment Node.

### Perth-Darwin Highway

The Perth-Darwin Highway is expected to be completed in approximately 2019. With the creation of this new bypass opportunities will arise in the form of improved access to the subject site and added points of egress in the event of emergency evacuation due to bushfire. There is also the added connectivity to the Bindoon Townsite the future Muchea Employment area and the reduced travel time into the Perth metropolitan area.

At the time of incorporation of the Perth-Darwin Highway alignment into the scheme amendment document (February 2016) the exact alignment had not been finalised. As such the exact eastern boundary of the proposed 'Small Rural Holdings' zone cannot be determined until the final road layout is formalised. All land within the proposed road reserve and to the east of the Perth-Darwin Highway alignment will not change from the current Agricultural Resource zone.

## 4.3 Opportunities for Ecological Linkages

The subject site is in a unique location between pockets of environmentally sensitive areas as identified in the Shire of Chittering Local Biodiversity Strategy. In particular, the subject site is between Indicative High Conservation Value Areas (IHCVA) to the north, east, south and west as shown in **Figure 7** in proximity to subject site.

As part of structure planning, there is opportunity to investigate local ecological links or biodiversity corridors to join these IHCVAs for the benefit of fauna as encouraged in the Shire of Chittering Local Biodiversity Strategy. The Proponent's preference is for the ecological links to be provided for within proposed public open space (POS) with management order to the Shire of Chittering. However, this would be subject to further consideration.

## 4.4 Other Considerations

If the subject site were subdivided/developed as 'Rural Retreat' only, the maximum lot yield that could be achieved would be (44) rural retreat lots as shown in **Figure 8**. Notwithstanding issues of commercial viability (i.e. 10 hectare lots require substantially greater servicing and road infrastructure requirements), subdivision/development at 10 hectares on a broad scale is an inefficient use of land and resources.

Although commercial viability is generally not a town planning consideration, the viability of a proposal should be fundamentally important in any town planning decision making.

The objectives of the 'Rural Smallholdings' zone are set out in Clause 4.2.4 under the Shire of Chittering TPS 6, which states:

*"To preserve productive land suitable for intensive horticulture and other compatible productive rural uses in a sustainable manner.*

*To protect the landform and landscape values of the district against despoliation and land degradation.*

*To provide lots with a minimum size of 5ha."*

The draft Structure Plan demonstrates the suitability of the subject site to meet the objectives of the 'Rural Smallholdings' zone, in that:

- (i) The proposed lifestyle lot (in the draft structure plan) is site responsive and takes advantage of the good agricultural soils and groundwater supply on the eastern side of the property, for proposed horticultural use (i.e. vineyard with potential tourist use). The larger lot to the east also acts as a buffer from potential noise associated with the Perth-Darwin Highway.
- (ii) 'Rural Smallholding' lifestyle lots (i.e. 5 hectares in size) respond to community demand and expectations. The lots provide opportunity for prospective landowners to plant trees and vegetation (or manage re-growth of areas within the lot), as an overall lot size of 5 hectares is not considered too large an area for inexperienced landowners to manage.
- (iii) Providing an attractive and interesting rural development for people to live in, particularly with the development of a vineyard on the larger eastern lot (to be retained by the landowner) with potential for future tourist accommodation and function/reception overlooking an artificial lake (re-contouring of the existing soak/dam) to create a sense of community and identity.
- (iv) Potential delivery of an attractive proposed Public Open Space (POS) network in the structure plan could incorporate public amenities such as walking and bridle trails, not just for the exclusive use of immediate residents in the structure plan.
- (v) The proposed 'Rural Smallholdings' is considered appropriate given that the majority of the subject land has already been historically cleared for grazing and there are no significant biodiversity areas within the subject site. Neither would the proposal require extensive and significant clearing of existing vegetation for building envelopes as the site has already been cleared and 5 hectare lot sizes allow areas outside of the nominated building envelope (i.e. 3,000m<sup>2</sup>) to potentially re-grow, subject to bushfire management.

- (vi) Smaller rural lot sizes work better on cleared land creating opportunities for rehabilitation and reduced risks associated with bush fires, compared with smaller lots in more densely vegetated areas.

#### **Extinguishment of use for Extractive Industry - Sand**

In circa early 2010 the Department of Mines & Petroleum (DMP) sought permission from the landowner to carry out geological tests within the subject site to investigate the extent and quality of sand deposits found within the subject site. DMP confirmed the success of the geological testing and Main Roads WA (MRWA) entered into agreement with the landowner to extract sand from the subject site under the *Public Works Act 1902*. Around late 2010, MRWA extracted approximately 70,000 – 80,000 cubic metres of sand from the south-east portion of the subject site for its road upgrade works in the Bindoon and Chittering area. The MRWA south-east extraction area and access tracks are clearly visible in Figure 2.

In May 2012 the landowner sought development approval to carry out Extractive Industry – Sand over a portion of the subject site. At its Meeting held 15 August 2012 the Shire of Chittering refused the development application on the grounds of strong community objections relating to traffic, noise, dust, proximity to conservation category wetland [within neighbouring Lot 4] and that the subject site is within a *“...predominantly rural lifestyle area .... the subject site is identified as high priority development area for the purpose of rural retreat....”*.

In September 2012 the landowner lodged an application for review by State Administrative Tribunal (SAT) against the Shire’s refusal decision. Following SAT mediation, the Shire of Chittering reconsidered its decision and at its Meeting held 20 March 2013, Council resolved to grant planning approval subject to conditions. The Extractive Industry – Sand development approval for the subject site is valid until 30 June 2022, after which time a renewal of the use would be required.

Subsequently under the current ‘Agricultural Resource’ zone, the subject site can be utilised for Extractive Industry – Sand. However, rezoning the subject site to ‘Rural Smallholdings’ would mean that Extractive Industry use is a prohibited (“X”) use, under the Shire of Chittering Town Planning Scheme No. 6. The local community has expressed previous strong concern in relation to use of the subject site for Extractive Industry, with [rural residential type] land use being the preferred use of the subject site, if given an option between the two land use categories. The current proposal to rezone the subject site to ‘Rural Smallholdings’ effectively would extinguish the ability of the subject site to be used for Extractive Industry in future. Notwithstanding, the landowner is aware that the ‘Rural Smallholdings’ rezoning will essentially close-the-door on any ability to undertake Extractive Industry land use on the subject site. In terms of sourcing basic raw materials, there are potentially other locations within the Shire of Chittering for extractive industry (sand) in less sensitive areas.

It should be noted that while the subject land is identified as an Extractions area under State Planning Policy 2.4 *Basic Raw Materials* it is not considered a Priority Resource Location and therefore is not of regional significance in terms of future basic raw materials extraction.

## 5.0 BUSHFIRE MANAGEMENT PLAN

A Bushfire Hazard Assessment (BHA) has been undertaken to inform the proposed Local Scheme Amendment and draft Structure Plan design and recommends appropriate bushfire management response and measures. The Bushfire Management Plan was reviewed to reflect new legislation and updated in June 2016.

Overall, the Bushfire Management Plan (Appendix 5) including BHA categorises the subject site as having an 'Extreme - Moderate' Bushfire Hazard level. The Bushfire Management Plan recommends a number of fire management measures be undertaken to address the risk of bushfire to property and persons within and adjacent to the ODP area. The risk of bushfire is to be generally managed in terms of implementation of the following:

- A detailed Bushfire Management Plan (BMP) being prepared and endorsed at the subdivision stage. The subdivision will comply with the bushfire protection criteria Acceptable Solutions as per the newly released Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015);
- Ensure that dwellings are built to BAL/AS3959-2009 Building Standards if 100m setback cannot be achieved within their property from Woodland Type B;
- Section 70A notifications on title advising prospective residents in areas which are affected by the Bushfire Management Plan;
- Identification and maintenance of APZ's (i.e. low fuel loading) of 20 metres of any habitable building in areas adjacent to or within proximity to 'extreme - high fire risk areas' as identified in the Fire Management Plan;
- Construction of road system which provides for two access points onto Tea Tree Road and an Emergency Access Way and Fire Service Access onto Brennan Road in the west and to southern firebreaks (in adjacent properties) to the south and meet the Acceptable Solution;

The subdivision will comply with an Acceptable Solution by applying either a 100m Hazard Separation Zone (HSZ) at the interface of the building and the bushfire hazard or a setback associated with BAL construction and AS3959-2009 as outlined in the BAL Contour Map outlined in attached BMP. It has been advised that no higher BAL allocation than BAL 12.5 needs to be applied to the dwellings.

## 6.0 INFRASTRUCTURE & SERVICING

In 2009 SMEC Urban civil engineering consultants reviewed the subject site for potential to accommodate proposed rural smallholdings development of the property and concluded that there are no significant constraints that would preclude development of the subject land in terms of servicing for a rural smallholdings development. With the current subdivision and development occurring at Parkwood Springs Estate, services have been extended and are now closer to the subject site than beforehand.

## 6.1 Earthworks

The subject land has no severely sloping areas which would present any significant engineering constraints for road construction. The proposed road levels will be designed to match (where practical) the existing ground levels to minimise earthworks. No earthworks are proposed to be undertaken to the proposed lots.

Some earthworks will be required for the new subdivision roads and strategic firebreak access routes within the subject site to accommodate subdivision. Aside from road works, consideration may be given to improving the storage capacity of the existing soak on the property for water supply (e.g. vineyard) and aesthetic purposes. This would require separate development approval from the Shire depending on the nature of the works.

There may also be a requirement for excavation within the building envelope areas for the construction of dwellings and on-site effluent disposal, depending upon ease of excavation. This would be subject to individual geotechnical investigations and assessment for development areas.

## 6.2 Local Roads

Tea Tree Road is a single carriageway road providing existing access to the subject site. Tea Tree Road is currently a constructed bitumen road up to the Parkwood Estate (Lot 9502) and west onwards the road is a trafficable gravel road. As part of subdivision and development of the subject site, the section of Tea Tree Road along the frontage of the subject site would need to be constructed to a standard of the Shire's satisfaction.

Brennan Road abutting the western boundary of the subject site is a single carriageway trafficable gravel road, which extends from Tea Tree Road and terminates at the south-west boundary of Lot 2. This road would not be required to be constructed to bitumen standard, however, as outlined in the Bushfire Management Plan, Brennan Road provides an alternative access route.

## 6.3 On Site Effluent Disposal – Nutrient Management

There is no reticulated sewerage in this area and it is proposed that wastewater management be accommodated by on-site effluent disposal units. Across the development site, the yellow sands and ferricrete soils that are found have high phosphate absorbing qualities. This is based on the level of sesquioxides and clay at depth and the depth to water tables. The leached white sands on the western ridges frequently overlies yellow sand, gravel and ferricrete at depths of approximately one metre.

All yellow sand, loam, gravel and duricrust soils on the subject site are capable of supporting conventional effluent disposal systems, with the exception of the leached white sands in lower lying areas mainly found in the eastern part of the development site, particularly around the soak. These are contained within the proposed larger eastern lot in the draft Structure Plan.



The Land Capability Assessment report recommends a 100m setback for on-site effluent disposal systems from the existing soak, however under the draft Structure Plan no lots are proposed within the eastern half of the subject site.

Late winter groundwater monitoring and laboratory soil testing confirms the site's suitability to support on-site effluent disposal. For more details on geotechnical and nutrient management (effluent disposal), refer to the Land Capability Assessment report (Appendix 1) and Land Capability for On-Site Effluent Disposal (Appendix 6).

## 6.4 Water Supply

There is no reticulated water supply in the nearby area and there are no plans to provide reticulated water to this area. Development on each proposed lot will provide a 120Kl water storage tank for potable water.

Rainwater harvesting shall be in accordance with the Shire of Chittering Town Planning Scheme Clause 5.8.5 "Non-Potable Water Supply", whereby rainfall harvesting using rain surface runoff collection areas shall be as follows:

*"Where rainfall is to be used as the predominate source for a water storage tank, the minimum collection area, in terms of rain surface runoff, to service the tank, is to be provided. The collection area will normally comprise of the roof area of structures on the lot and may include the dwelling, outbuildings and any other structure capable of collecting and directing water into the tank.*

*The size of the collection area is to be based on the following calculation:*

*Collection area (m<sup>2</sup>) = 120,000 divided by (0.85 x (local rainfall – 24mm))*

*Where:*

- *Collection area (m<sup>2</sup>) is the minimum area for rain surface runoff that is required to service the water tank.*
- *120,000 is the minimum size of the water tank in litres (unless Council has determined an alternative size in accordance with the Scheme).*
- *0.85 is the efficiency of the collection (a minimum of 85% of the water will be collected).*
- *Local rainfall is the average annual mean rainfall measured in millimeters (mm) guided by the nearest collection point provided by the Bureau of Meteorology.*
- *24mm is the anticipated loss through absorption and wetting of materials based on 2mm a month."*

Projections using the WAPC rainfall catchment calculator and mean rainfall levels from the Bindoon area show that sufficient rain harvesting is possible to service the intended zone for both potable indoor/outdoor and firefighting water requirements. Adequate water supply will require a minimum 516m<sup>2</sup> roof surface area per lot for water harvesting.

## 6.5 Power

There is existing power supply infrastructure in the vicinity of the proposed development and the subdivision would be supplied with underground high and low voltage power, including provision of transformers and switchgear around the development site. The

required extensions and upgrades necessary to facilitate 'Rural Smallholdings' subdivision and development would be subject to consultations with the relevant servicing authorities at the time of subdivision.

## 6.6 Telecommunications

There is existing telecommunication infrastructure available along Tee Tree Road and preliminary consultation with Telstra by SMEC Urban indicates that it is possible to connect to this service. Additional cabling will need to be provided to service the subdivision.

## 6.7 Gas

Reticulated gas is not an available service within the area.

## 7.0 CONCLUSION

The proposed 'Rural Smallholdings' zone for the subject site is considered to be a better town planning outcome, compared with rezoning to 'Rural Retreat', which requires a minimum 10 hectare lot size. Although the subject site is identified under the current Shire Local Planning Strategy for 'Rural Retreat', it is considered a 'Rural Smallholdings' zone is more site specific and more responsive to its local context.

Rezoning the majority of the subject site to 'Rural Smallholdings' will provide the opportunity to create a commercially viable subdivision with minimum lot size of 5 hectares, as demonstrated in the draft Structure Plan accompanying this scheme amendment proposal as supporting information only. The portion of Lot 1 that will remain as 'Agricultural Resource' is dependent upon the final location of the Perth-Darwin Highway. This will need to be confirmed with the MRWA.

The benefits for the community of rezoning (and subsequent thereafter development) the subject site to 'Rural Smallholdings' include, but not limited to:

- Creation of 5 – 6 hectare lots which offer a different market product to Parkwood Springs Estate and compliment the nearby rural residential land uses to the east (with possible public open space ecological linkages);
- Generally provide a transitional land use between 'Agricultural Resource' lots to the south and west and rural residential land use to the north and east;
- Provide for proper and orderly settlement expansion in Bindoon to accommodate for population growth on land which has been predominantly cleared in the past for grazing, thereby having limited impact on biodiversity values to the local environment;
- Subdivision for settlement, of the [already cleared] subject site, would reduce pressure to set aside other lands for settlement expansion (to accommodate population growth), of which other lands may have more significant environmental values to overcome;
- Upgrading of Tea Tree Road to bitumen seal abutting the subject site, including bitumen road extension from Parkwood Springs Estate and the delivery of an appropriate culvert treatment for the wetland crossing in front of eastern neighbouring Lot 4, which would provide for a more controlled natural surface drainage crossing; and
- Currently under 'Agricultural Resource' zone, the subject site could be utilised for Extractive Industry – Sand. Rezoning of the subject site to 'Rural Smallholdings' means that Extractive Industry uses are a prohibited ("X") use under the Shire of Chittering Town Planning Scheme No. 6. The community has expressed previous concern in relation to use of the subject site for Extractive Industry, with [rural residential type] land use being the preferred use of the subject site, if given an option between the two land use categories.

Upon adoption of the 'Rural Smallholdings' zone, an application for Structure Plan would be required for approval as a prerequisite to subdivision and/or development of the subject site in accordance with the Shire of Chittering Town Planning Scheme No. 6.

**PLANNING & DEVELOPMENT ACT 2005**

**SHIRE OF CHITTERING**

**TOWN LOCAL PLANNING SCHEME NO. 6**

**AMENDMENT NO. 56**

The Shire of Chittering under and by virtue of the powers conferred upon it in that behalf by the Planning and Development Act 2005 hereby amends the above local planning scheme by:

1. Rezoning part of Lot 1 & all of Lot 2 Tea Tree Road, Bindoon from 'Agricultural Resource' to 'Rural Smallholdings' and amending the Scheme Map accordingly.

**ADOPTION**

ADOPTED for advertising resolution of the Shire of Chittering at the Ordinary Council Meeting held on \_\_\_\_\_ day of \_\_\_\_\_ 2016.

\_\_\_\_\_  
Shire President

\_\_\_\_\_  
Chief Executive Officer

## Council Recommended/Submitted for Approval

Support for the submission to the Minister for Planning for approval by resolution of the Shire of Chittering at the Ordinary Council Meeting held on the \_\_\_\_\_ day of \_\_\_\_\_ 2016 and the Common Seal of the Shire of Chittering was hereunto affixed by the authority of a resolution of the Council in the presence of:

\_\_\_\_\_  
Shire President

\_\_\_\_\_  
Chief Executive Officer

## WAPC Recommended/Submitted for Approval

\_\_\_\_\_  
Delegated under S.16  
of the Planning and Development Act 2005

\_\_\_\_\_  
Date

## Approval Granted

\_\_\_\_\_  
Minister for Planning  
S.87 of the Planning and Development Act 2005

\_\_\_\_\_  
Date

# SHIRE OF CHITTERING TOWN PLANNING SCHEME No. 6

-Amendment No.



EXISTING ZONING



SCHEME (AMENDMENT) MAP

## LEGEND

### LOCAL SCHEME RESERVES

Major Road

### ZONES

Agricultural Resource

Rural Residential

Small Rural Holdings

### OTHER

Military Considerations

SCALE 1:30000



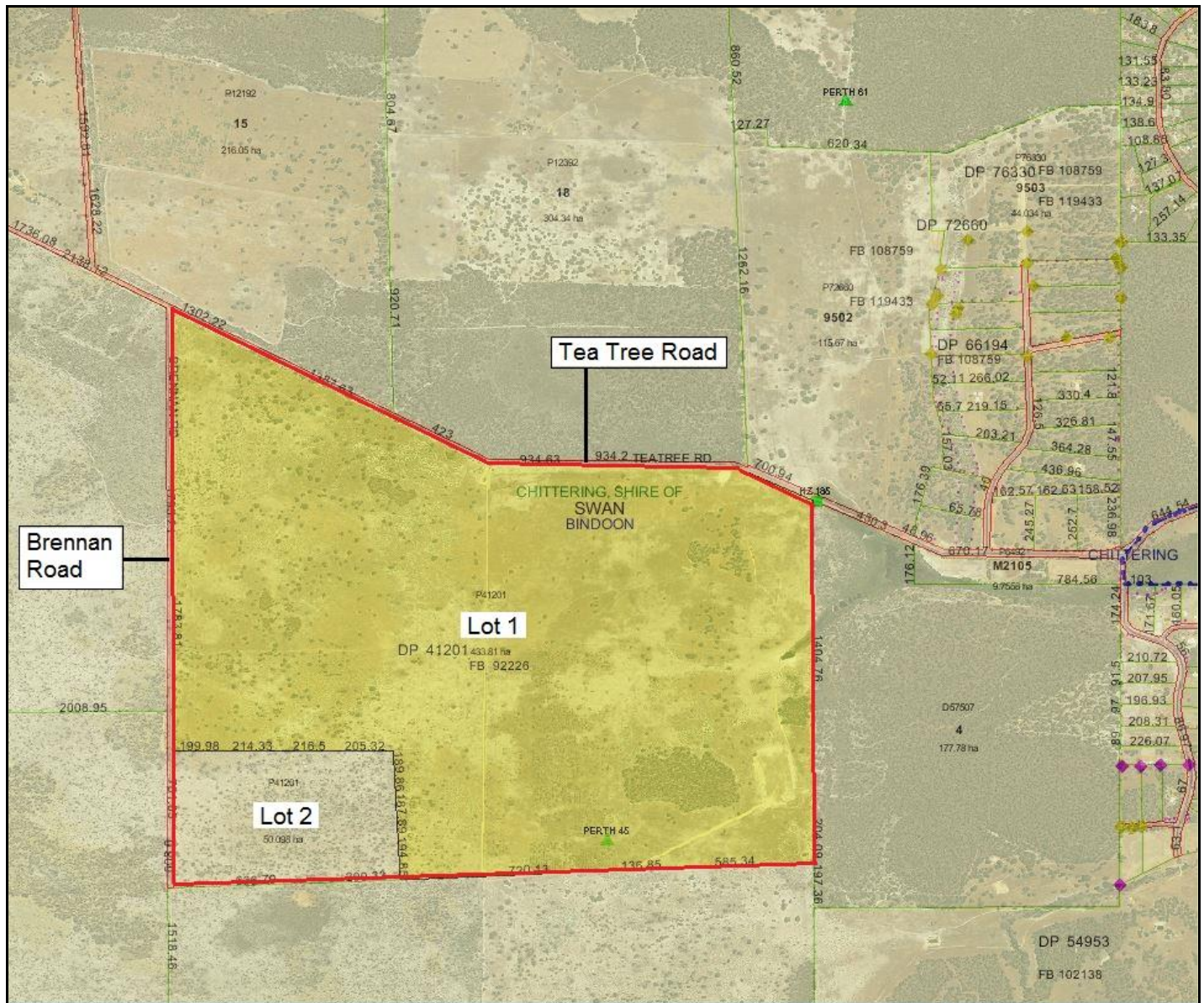
# FIGURES

## APPENDIX 1

## FIGURE 1

### LOCATION PLAN

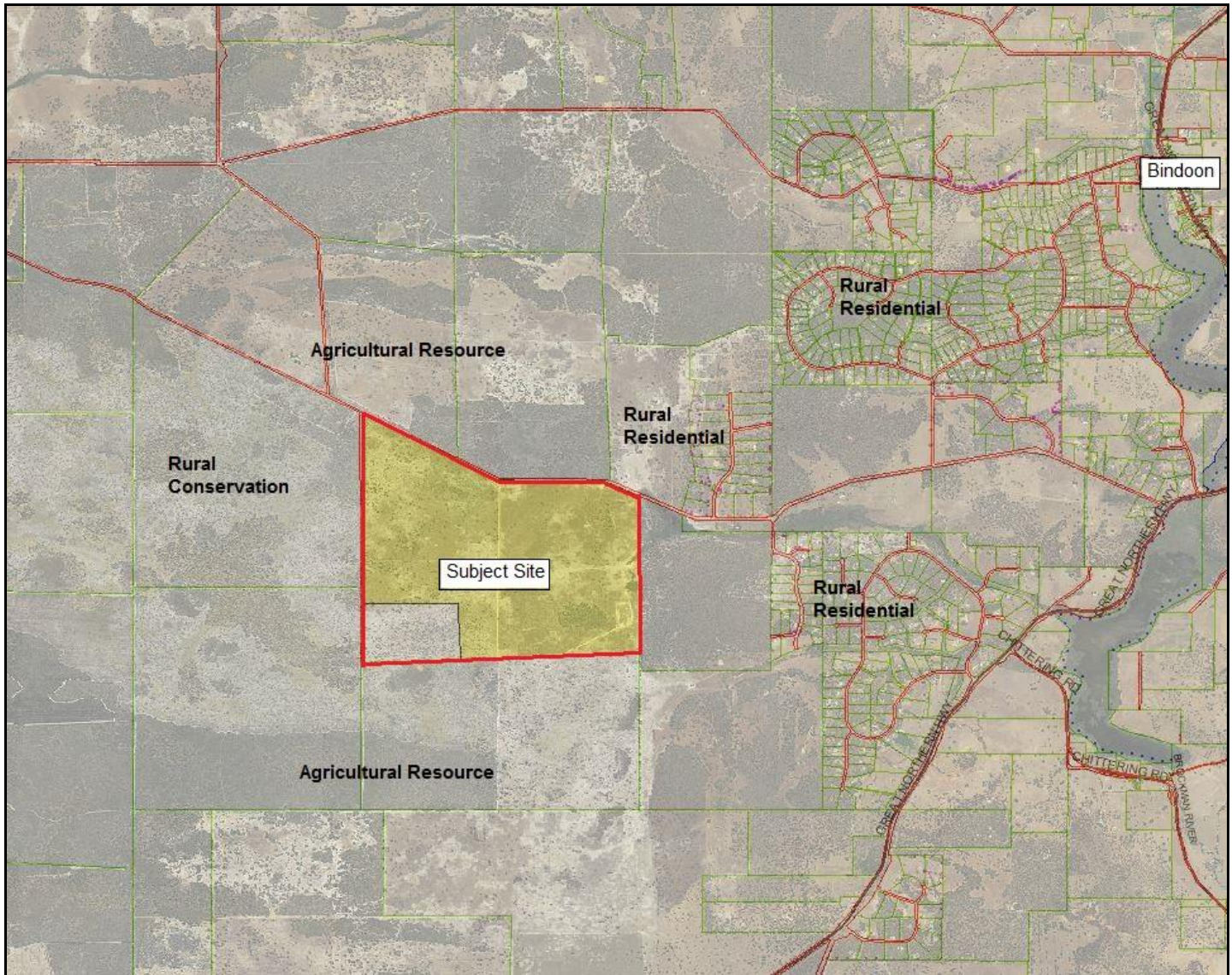




(Source: Landgate 2015 - modified)

FIGURE 2  
CADASTRAL & AERIAL VIEW





(Source: Landgate 2015 - modified)

**FIGURE 3**  
SURROUNDING CONTEXT





Shire of Chittering – Local Planning Strategy, 2001 - 2015

Figure 7 – Small Rural Holdings Precincts

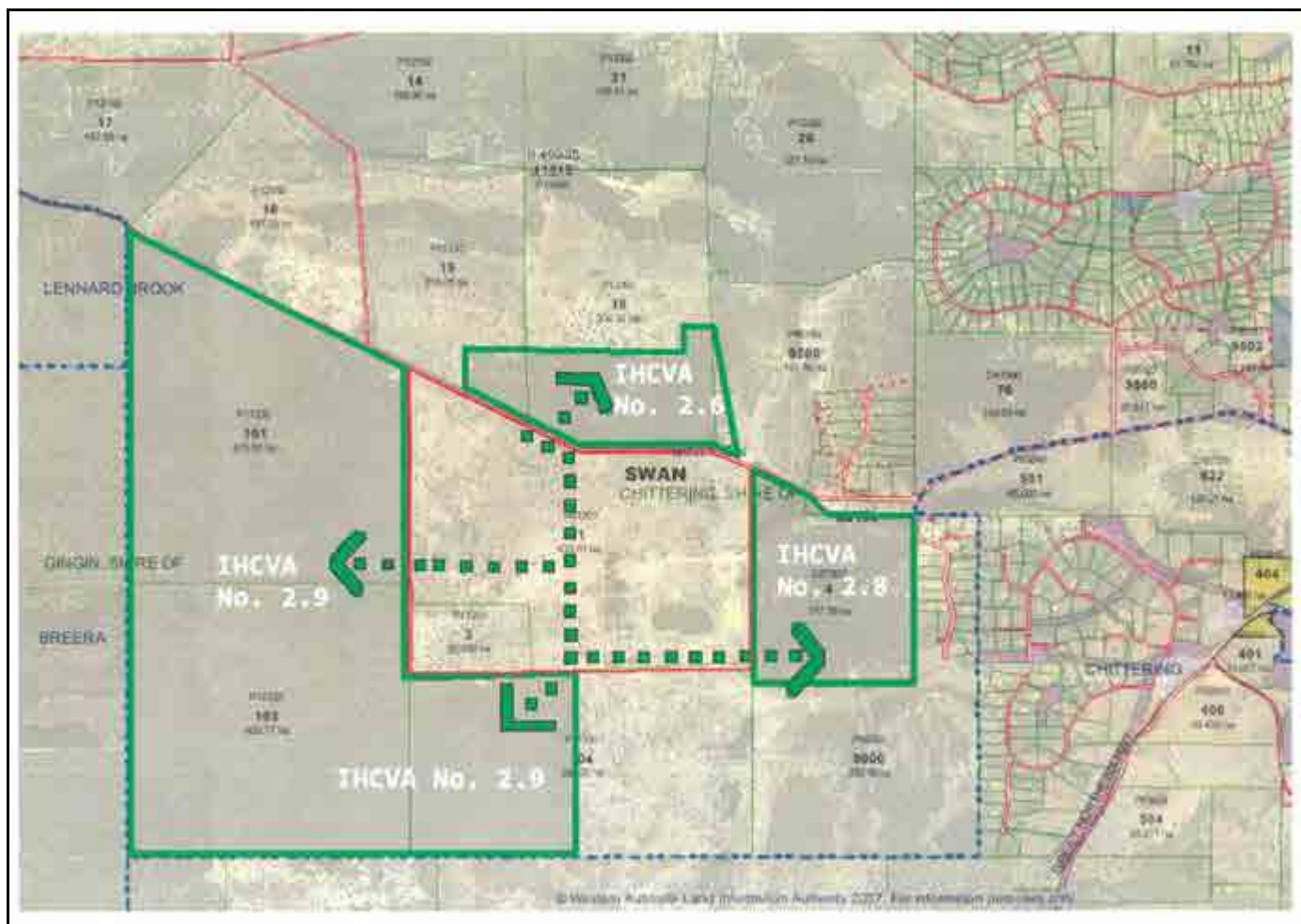


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(Source: Shire of Chittering Local Planning Strategy, 2004 - modified)

FIGURE 5  
LPS RURAL SMALLHOLDINGS PRECINCTS





(Source: Landgate - *modified*)





FIGURE 8  
RURAL RETREAT SUBDIVISION CONCEPT PLAN

## Land Capability Assessment (May, 2000)

# **LAND CAPABILITY ASSESSMENT**

**LOT 102 TEATREE ROAD**

**CHITTERING**

**Prepared by**

**LANDFORM RESEARCH**

**25 Heather Road  
Roleystone**

**MAY 2000**

**Note:** This is not the original cover page for the Landform Research Report and has been prepared for identification purposes only.

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Soil Characteristics  
Land Qualities  
Development Capability  
Agriculture Capability

## **PLANS**

Soil Map  
Land Capability  
Geotechnical Risk  
Potential Land Uses

## **PHOTOGRAPHS**

Aerial photography  
General view across central north east of Lot 102  
Regrowth of native vegetation in the south west  
Soak on eastern boundary  
Yellow sands that underly most of the site

## 1.0 INTRODUCTION

This study of Lot 102 Tee Tree Road, Chittering, was carried out to assess the current environmental status of the land, determine the land capability, and identify particular land uses suited to the site. The environmental management of the potential land uses was also considered. The assessment was based on a field analysis on 3 May 2000, 48 soil auger holes, geological and hydrological mapping, knowledge of the area, aerial photography interpretation and published information.

The site lies approximately 7.0 km south of Bindoon townsite, on the southern side of Tee Tree Road. The western boundary of Lot 102 will be slightly altered and moved eastwards when the planned Perth Darwin Highway is constructed. This will reduce the size of the lot by perhaps 40 hectares.

The current area of Lot 102 is 483.9 hectares.

## 2.0 EXISTING ENVIRONMENT

### 2.1 Geology and Geomorphology

The land varies from two main ridges at just over 210 metres in the south east corner and 205 in the central west dropping to 175 metres in a gentle valley in the south western corner and 163 metres on the central eastern boundary. Lot 102 straddles the divide between the east flowing streams and the west flowing streams.

The site lies at or just west of the Darling Fault, based on field geology on adjoining properties and gravity interpretation from the 1 : 250 000 Perth Geology Sheet, WA Geological Survey.

No rocks of the Chittering Metamorphic Belt occur on site, with the main rock type being remnants of a ferricrete cemented sandstone of alluvial origin that caps the ridges across the site. These may possibly have formed prior to the Eocene, and were slightly uplifted in the Late Eocene uplift which changed river patterns in the south west of Western Australia. This rock is resistant to erosion and this resistance has resulted in the formation of the ridges.

Deep yellow sands cover the remainder of the property. These sands are quartz sands of aeolian (wind deposition) origin or have been reworked by winds. They are earthy at depth and may have originally contained feldspar, which has now weathered to clay. Leaching of the sand to white sand, occurs in the valleys.

As the site appears to be west of the Darling Fault it is interpreted to be underlain by Cretaceous sediments on top of Mesozoic and Palaeozoic sediments of the Perth Basin.

## 2.2 Soils

The soils of the site reflect their position in the landscape and the underlying geology.

Resistant ferricrete with minor associated gravel is exposed on the higher elevations of the ridges with. Yellow sands cover the lower elevations and valleys, becoming thicker and more leached towards the stream valley floors.

The sand can be divided into three main types based on the colour, composition and fertility. Fertility is assessed as showing better pasture growth on aerial photography 1996 – 98.

Soil types are;

- Ferricrete and Gravel
- Leached Sand over Gravel
- Earthy Yellow Sand
- Yellow Sand
- Leached White Sand

**Ferricrete and Gravel** caps the ridges. The laterite duricrust restricts root penetration ensuring that the soil has very low capability. In general these soils have not been cleared.

**Leached Sand over Ferricrete** occurs on the upper slopes where grey sand over white or cream sand is generally 300 mm to 1000 mm thick over ferricrete. The soils are relatively infertile but the ferricrete influences soil fertility as shown by aerial photography by having better nutrient and water retention at depth. White sand deeper than 1000 mm, even if ferricrete does occur at depth, is of even lower fertility and is labelled Leached White Sand.

Hole 3	Central east
0 – 70 mm	Dark grey quartz sand
70 – 360 mm	Cream sand
360 – 880 mm	Pale yellow sand
880 mm	Ferricrete gravel
End of hole at 880 mm	

**Earthy Yellow Sand** occurs on the upper and mid slopes particularly in the central north. The sand has a thin grey surface horizon over dark yellow sand that is predominantly earthy, with small amounts of clay increasing with depth from a horizon that varies from near the surface to over 1000 mm. These soils are shown by aerial photography of pasture quality to be the most fertile on site with good broad acre and perennial horticulture capability (provided sufficient water is available). The clay and goethite increase the water and nutrient retention of the profile, which is moderate.

Hole 12 South eastern corner	
0 – 100 mm	Grey quartz sand
100 – 1 560 mm	Yellow sand becoming darker with depth
1 560 – 1 970 mm	Dark yellow earthy sand
End of hole at 1 970 mm	



**Yellow Sand** occurs on the mid slopes where leaching has occurred. Its colour varies from cream to yellow in the upper horizons depending on the amount of goethite present. Clay has generally been removed from the upper metre of the soil profile. Leaching of the upper horizons reduces the fertility but the nutrient retention of the profile remains high for effluent disposal based on the depth of the soil.

Hole 47	Central north western corner
0 – 120 mm	Grey quartz sand
120 – 560 mm	Cream to pale yellow sand
560 - > 1 000 mm	Yellow quartz sand
End of hole 1 000 mm	

**Leached White Sand** is a leached white quartz sand formed from the removal of the yellow brown goethite covering from the quartz grains. These occupy the valley floors from the south west through to the eastern edge, and a patch in the north west. The leached sand contains in excess of 1 to 2 metres of white sand over yellow sand at depth. These soils have low to very low soil fertility and capability. In more recent times native vegetation on these soils has been allowed to regrow because of the low fertility in the west.

The areas of lowest elevation are wetter and thus are more capable for agricultural activity

Hole 28	Central south western corner
0 – 110 mm	Grey quartz sand
110 - > 1 300 mm	White quartz sand grading to cream quartz sand
End of hole 1 300 mm	

## 2.3 Climate

The climate of the area is typically Mediterranean with warm to hot dry summers followed by cool to mild wet winters. Data is recorded at Bindoon.

Summer maximum temperatures range from about 33 °C in the hottest months down to between 17 - 18 °C in winter. Minima range from 17 °C in summer down to 7 °C in winter. Rainfall at Bindoon averages about 795 mm.

Wind directions are predominantly from the east on summer mornings and south west in the afternoon depending on the arrival of the sea breeze. Winter winds are more variable.



## 2.4 Hydrology

Surface drainage is minimal due to the permeability of the soil, with only a small flow emanating from the soak/dam in the central east, draining to the east to ultimately enter Lake Chittering.

Groundwater drains from each catchment, defined by the ridge highs of the basement, with the volume being directly proportional to the size of the catchment and depth of sand. Therefore the greatest volumes of groundwater are in the central east valley and the south west. Water is available in the north but quantities will be reduced because the area of catchment is less.

Salinity levels are low, being 70 mSm in the soak on the eastern boundary, and 50 mSm in the bore in the centre of the site (potable water is <170 mSm). The current owner stated that the bore was at a depth of 30 metres.

There is no evidence of surface salinity and, considering the extent of clearing, and the depth to underlying sediments, it is unlikely that salinity will be expressed in the surface soils in the future.

## 2.5 Vegetation

The sandy soils are predominantly cleared apart from scattered trees which have mostly been retained. The gravel ridges have largely been left as remnant vegetation, but have been grazed to the extent that species are restricted in richness and density in most areas. The leached white sands in the west and south west have been allowed to regenerate and some indigenous species are now gaining a hold in these areas.

It was not possible to search for Rare and Declared species because of seasonal factors. *Acacia anomala*, a Declared Rare Plant, may possibly occur in the area but would be restricted to the ferricrete ridges which are recommended to remain as remnant vegetation.

Tagasaste has been planted in the central south on leached and yellow sands.

The main vegetation on the site are tree remnants of Eucalypt woodlands. The following partial community types are represented by scattered Eucalypts and taller shrubs;

**Jarraah-Marri** (*Eucalyptus marginata*, *E. calophylla*) Woodland occurs on the ferricrete/gravel and duricrust, grading into Jarraah Woodland where duricrust becomes significant and the soil more shallow. Marri Woodland was the dominant original vegetation on the yellow sand but changes to **Pricklebark** (*E. tottiana*) Woodland and remnant **Banksia Woodland** as the sand becomes more leached to the south west.

*Juncus pallidus* occurs on wet pasture areas with the introduced *Isolepis prolifera* associated with the wet area around the soak in the central east.

No evidence of dieback disease was noted.

Species noted during the site inspection are listed, with their most common habitat noted,

	Ferricrete Ridge remnants	Sand areas
<i>Allocasuarina humilis</i>		X
<i>Baeckea camphorsmae</i>	X	
<i>Banksia grandis</i>	X	
<i>Banksia menziesii</i>	X	
<i>Bossiaea eriocarpa</i>		X
<i>Calothamnus quadrifidus</i>	X	
<i>Conostephium pendulum</i>		X
<i>Conostephium pendulum</i>		X
<i>Daviesia incrassata</i>	X	X
<i>Daviesia triflora</i>		X
<i>Drosera pallida</i>	X	
<i>Dryandra lindleyana</i>	X	
<i>Dryandra sessilis</i>	X	
<i>Eremaea pauciflora</i>		X
<i>Eucalyptus calophylla</i>	X	
<i>Eucalyptus marginata</i>	X	
<i>Eucalyptus tottiana</i>		X
<i>Gastrolobium calycinum</i>	X	X
<i>Grevillea synaphea</i>	X	
<i>Haemodorum spicatum?</i>	X	
<i>Hakea lissocarpha</i>	X	
<i>Hibbertia cuneiformis</i>		X
<i>Hibbertia huegelii</i>	X	
<i>Hibbertia hypericoides</i>	X	X
<i>Hibbertia lasiopus</i>	X	
<i>Isolepis prolifera</i>		X
<i>Jacksonia floribunda</i>		X
<i>Juncus pallidus</i>		X
<i>Lepidosperma angustifolium</i>	X	X
<i>Lyginia barbata</i>		X
<i>Mesomelaena stygia</i>		X
<i>Mesomelaena tetragona</i>	X	
<i>Nuytsia floribunda</i>		X
<i>Patersonia juncea</i>		X
<i>Petrophile semuriae</i>		X
<i>Petrophile striata</i>	X	
<i>Petrophile linearis</i>		X
<i>Stirlingia latifolia</i>		X
<i>Styphelia tenuiflora</i>	X	
<i>Synaphea spinulosa?</i>		X
<i>Xanthorrhoea gracilis</i>		X
<i>Xanthorrhoea preissii</i>	X	

### 3.0 LAND CAPABILITY

#### The opportunities of the site are:

- Shallow ground water of high quality through the central and eastern parts of the site.
- Proximity to Bindoon.
- The presence of cottage and perennial horticulture in the Bindoon-Chittering area which could be extended to this site.
- The potential to further develop tourism in the Bindoon-Chittering area.
- Proximity to the proposed Perth to Darwin Highway.
- Remnant vegetation on the ridge areas.
- The presence of yellow sand over most of the site, which has good phosphorous retention in its profile.
- The form of the ridges which provide visual screening as well as increasing the aesthetics of the site.
- The presence of the wetland/soak in the central east.

#### The constraints on the site are:

- The poor quality of the ferricrete soils.
- A lack of supplementary water supplies over the ridge areas.
- Potential for wind erosion on the sandy soils.
- Shallow ground water that could be altered through in-appropriate land use.
- The presence of significant shallow groundwater flows that form the start of a water flow to Lake Chittering.
- The presence of significant areas of leached white sand that has very low agricultural capability and susceptibility to wind erosion.

### 3.1 Water Availability

The shallow sand filled valleys contain abundant shallow ground water, particularly in the central eastern parts. The groundwater drains from each catchment as defined by the ridges with the volume being directly proportional to the size of the catchment and depth of sand. Therefore the greatest volumes of groundwater are in the central east valley and the south west with lesser flows in the north and north west.

The nature of the site may however permit water to be available from depths of about 30 metres on the ridges which is slightly above the elevation of the shallow groundwater in the valleys.

Salinity levels are low, being 50 - 70 mSm which is potable (potable water is <170 mSm). Potability could be restricted in some areas by elevated iron levels.

Catchment on the site is difficult to estimate, but with a rainfall of 795 mm perhaps 15% of precipitation may reach the water table based on the depth to groundwater. If this was the case a recharge of 1 200 kL per hectare may be possible. Quantities will need to be proven in the field prior to any large scale development being undertaken. The soak in the east may have a catchment of 25 hectares which could result in available water of 30 000 kL/year. This volume of water would be sufficient for 10 hectares of olives. A similar volume may be available in the south western corner.

With the location of the site on or just west of the Darling Fault, there is potential for deep groundwater. However contact with Water and Rivers Commission officers reveals that potential aquifers are not available and any supplies of deep groundwater are small and unlikely to be sufficient for agricultural land uses apart from stock supplies and minor perennial horticulture.

Lot 102 lies within the Gingin Groundwater Area and thus licences are required for both deep and superficial aquifers. Apart from maintenance of environmental flows, licences are likely to be available for extraction from the superficial aquifers.

### 3.2 Soil Types

Soil types range from moderate for many agricultural activities on the earthy yellow sands to low and very low on the leached white sands and areas of ferricrete outcrop. The better soils can be identified from aerial photography and field observation to be significantly better than the leached sand over gravel and the yellow sands.

Perennial horticulture such as olives is suitable for the earthy sands with wine or dried grapes in selected areas of earthy sands. These sands will however require irrigation and improvement through the addition of organic matter. The leached sand over ferricrete, whilst being better than leached white sands, has low capability for more intensive agriculture and is probably better planted to perennial pasture and stock feed shrubs such as *Tagasaste*.

The ferricrete gravels of the ridges have low capability for agriculture and should not be cleared.

See attached Land Capability maps.

### 3.3 On Site Effluent Disposal - Nutrient Management

The yellow sands and ferricrete soils have high phosphate adsorbing qualities based on the level of sesquioxides and clay at depth and the depth to water tables. Even the leached white sands on the ridges frequently overlies yellow sand, gravel and ferricrete at depths of a metre or so.

All yellow sand, loam, gravel and duricrust soils are capable of supporting conventional effluent disposal systems with the exception of the low elevation leached white sands which should be excluded from effluent disposal or will require alternative waste water disposal systems to ensure workable waste water disposal. 4.6 Nutrient Management-Effluent Disposal

### 3.4 Basic Raw Materials

There are supplies of sand on Lot 102. The earthy sand has potential as "bricks" sand and the leached sand potential for fill sand. Currently the market for these sands is low but in the future this will increase as the rate of development increases in the area.

Whether this sand should be retained for future use in the construction industry is debatable bearing in mind the long time frames for markets to increase. As the majority of land in the Bindoon area is broad acre land on which similar sand resources occur this site may not be

required. A larger lot in the south western corners could be set aside to protect sand resources if required. This area is currently being allowed to slowly revegetate to indigenous species.

### **3.5 Stocking Rates**

The leached white sands have stocking rates of less than 1 DSE (one dry sheep equivalent per hectare if maintained on site all year round) if they are dry and not located on the lower elevations where summer moisture is available. Yellow sands have a slightly higher stocking rate of 3 to 5 depending on the soil, geomorphic position and availability of water for pasture management. A horse is rated as equivalent to 12 DSE.

The ferricrete ridges should not be stocked because of their poor pasture growth and difficulty with management.

The availability of water for summer irrigation pasture improvements and the use of perennial species can increase stocking rates significantly on all soil types.

Wind erosion of the site is currently moderate but could be extensive if adequate vegetation cover was not maintained. Care must be taken with the yellow sand leached sands which can easily blow when disturbed in summer.

## 4.0 POTENTIAL LAND USES

### 4.1 Current Land Uses

In the recent past the property has been used for grazing with occasional cereal and lupin crops. Currently the site is used for grazing.

### 4.2 Potential Land Uses

Some parts of Lot 102 are capable of more intensive land use provided groundwater is available as interpreted and observed around the soak in the east and the south western corner. There is a good opportunity to develop parts of Lot 102 as small scale perennial horticulture to complement other activities in the Bindoon-Chittering area such as tourism.

There is always a divergence of opinion on what is the best use for land such as this. The best soils are also the best soils for perennial horticulture and hobby rural blocks as they are least likely to degrade. On the other hand it is a more sustainable option to nominate areas where soils are known to be good as blocks suitable for perennial horticulture. This preserves the best soil and water resources for viable rural activities. Land of lower quality can then be used for hobby agriculture.

- Perennial crops are well suited to the region such as olives, essential oils, carob beans, nuts, floriculture, stone, citrus fruit and grapes on the better earthy yellow sands with water available.
- Aquaculture for yabbies, trout and marron in fresh water dams and tanks is unlikely to be viable because of the potential for nutrient loss and lack of suitable material for dam construction.
- Floriculture could be based on either indigenous flora such as Geraldton Wax, Banksias, Smoke Bushes, Eucalypts, Kangaroo Paws, Honey Myrtles, or exotics like Proteas on better soils.
- Some small areas are suited to cottage industries such as lavender, herbs and the like which require small areas and supplies of fresh water. These would compliment the local tourist craft and cottage industries.
- Perfume, essential oils and essences could be incorporated into cottage and craft industries to become a focus of tourism
- On the other hand intensive stocking is not appropriate because of the potential for soil erosion. However alternative stock such as emus and ostriches, may be sustainable because of the quality of the soils, provided adequate soil cover is maintained.



### 4.3 Agroforestry

Agroforestry is the intermingling production of agricultural produce with forestry produce. This could either take the form of alley type farming or the growth of small plantations developed as crop diversification, which may allow selected livestock to graze the understorey to reduce the weed and grass competition, while also preventing a fire hazard.

The trees can be selected to provide summer fodder, shelter belts, wind breaks, honey production, and wildlife habitats, depending on the trees used. This type of landuse could be the grazing of stock within the pine plantation following thinning to allow more light and the growth of pasture species.

#### Plantation Crops

Radiata Pines, Pinaster Pines, Tasmanian Blue Gums, Eucalyptus oil production may be possible. Other species may also be possible following research and the establishment of markets such as Blackwood *Acacia melanoxylon*, Spotted Gum *Eucalyptus maculata* and White Cypress *Callitris columellaris* and there may well be other suitable trees available as current and future research investigates and improves Australia's flora. The rainfall of 795 mm meets the criteria for these tree crops with perhaps Pinaster Pines being the most likely.

#### Plant Oil Production

There is great potential for the use of eucalyptus oil as a biodegradable industrial solvent. Recent advancements in bulk harvesting and processing, combined with development of high yielding clone varieties, allow oil mallee to be planted as double rows of trees one machine width apart. Planting density is typically 1100 to 1300 trees per hectare although this site is unlikely to have sufficient area for a viable industry.

The importation of essential oils increases annually and was near \$8 million in 1988/89. Oil production from genera such as *Leptospermum*, *Melaleuca*, *Kunzea*, *Eucalyptus* and *Baeckea* can provide a source of steam volatile oil that has uses in the perfume, flavouring, antiseptic and veterinary industries. Generally these species require large quantities of water and would only be sustainable on the lower slopes in the eastern portion of the site where irrigation is available. These generally need to be large mechanised operations extending over 10 or more hectares.

### 4.4 Viticulture

Viticulture encompasses both table grapes, wine and dried fruit production. The market is expanding for grape products for the local and export markets. Vineyards have already been established in the general area, but normally on the better loam soils. The earthy yellow sands have lower potential than the loam soils in other parts of the Bindoon area but have potential to provide a variation in both the type of grape and quality of the wine produced, which may be exploitable.

#### Table Grapes

Table grapes are grown with summer irrigation to increase the size of the berry. When correctly established table grape production from 1 - 2 hectares can be viable with crops producing up to 30 tonnes per hectare. Trellising and protection from birds is essential and increases establishment

costs to \$50 000 per hectare. The valley slopes on the earthy yellow soils are well suited to table grapes. Table grapes will need to be regularly irrigated but wine and currant grapes may not require daily watering. Trickle or micro-sprinkler fertigation systems are preferred.

### **Wine Grapes**

Wine grapes require less summer water but need to be actively growing to allow good sugar production whilst at the same time maintaining the flavour and aroma compounds that are essential to good wines. Rainfall during the ripening period will cause sudden swelling and cracking of the grapes and encourage fungal attack as will high humidity. Frost is of low potential in this area.

North facing slopes are preferred as these maintain higher night temperatures in the soils. Wind is to be avoided and therefore the gently sloping valleys slopes are highly suitable particularly in the east.

Yields can be 5 - 15 t/ha depending on the level of irrigation with the lower yielding vineyards producing better wine because of increased flavour. A minimum area of about 4 - 8 ha of grapes is normally required for a small viable winery but there are markets for grapes produced by smaller operations which can be sold to existing wine makers in the Chittering/Bindoon area. Water requirements are lower than for table grapes and can be from 2 000 - 3 000 kL/hectare/year. In Wandering wine grapes are grown with only 600 kL per hectare because of the lack of water, but if available at least 1 200 kL per hectare is desirable. However a minimum of 3 000 kL per hectare should be planned for.

Typical vineyards in the Perth hills produce small quantities of wine, for example Avalon, Glen Forrest (100 cases annually from 2.5 hectares), Darlington Estate, Darlington (2000 cases annually), Piesse Brook, Bickley (1000 cases annually from 4 hectares). Olive Farm has 12 hectares with 11 varieties of grapes producing only 4 000 cases annually.

Smaller vineyards such as these normally pre-purchase grapes from quality vineyards. For example Aquila Estate is developed on similar yellow sand at Carabooda. It has only 4 hectares of vines but purchases grapes under long term contract from other areas such as Margaret River.

The current price for grapes varies from \$700 to \$1 500 per tonne, with say an average price of \$1 200 for high quality wine grapes at an average production of perhaps 6 t/ha. Greater tonnages per hectare do not normally command as high prices. For example at 15 tonnes per hectare a price of only \$700 per tonne may be paid. With increased plantings in recent years top quality grapes will always attract a premium but can only be produced where water is restricted or manipulated. Therefore grapes can generate about \$7 000 - 9 000 per hectare, making a viable income on relatively small vineyards of 8 hectares. In addition it is generally recognised in the industry that a family is capable of working 5 - 8 hectares of vines as a family operation with additional labour only required at picking time.

Recent research by CSIRO has shown that two fertigation lines alternatively used will enhance yield, reduce water consumption by half and produce better quality grapes.

### **Dried Grapes**

There is increased interest in dried fruit, of high quality and extensive plantings have now been made in the eastern states. These must be planted to enable full mechanisation. Dried sultanas



and currents can attract \$1000 per tonne for high quality fruit with a production of 10 tonnes dried fruit per hectare. The plantings in the eastern states are in the order of 200 hectares but smaller mechanised plantings and co-operatives are possible.

#### 4.5 Other Crops

##### Herbs

Herbs have a high potential to form the basis of cottage or commercial industries. The potential for herbs is growing because of increasing world wide use and the fact that Australia currently imports over 90% of its herb needs. Herbs are used for food flavourings, pharmaceuticals, essential oils and insecticides. Many herbs could potentially be grown but as some require different climatic conditions, research is needed into the selection of the most appropriate species for the area. These are normally grown on a larger scale using mechanised harvesting. For example profit margins of about \$1 200 per hectare would dictate a large operation unsuited to this site (Hyde 1998).

##### Essential Oils

There are many essential oils such as the tree crops (discussed under trees) and a wide variety of oils derived from herbs. Nearly \$3 million peppermint oil and nearly \$5 million of other oils were imported in 1988/89 although production has since commenced in the eastern states. These would fit very well into the current agricultural trends in Bindoon and could supply some of the local markets.

Examples include lemon, rose and peppermint oils from pelargoniums and lemon from lemon grass. Large mechanised operations are normally required for other than hobby incomes and these will be restrained by the slopes on this site.

##### Lavender

On the other hand Lavender has large potential markets for oil production or as heads of dried lavender. Dried lavender heads return \$18 to \$22 per kg. Stems of lavender sell for \$1.50 to \$2.00 per bunch wholesale with up to 10 bunches per bush and 3 000 - 5 000 bushes per hectare depending on the level of mechanisation. Selling stems and value added products could make a 2 hectare operation viable.

A variety of methods of extraction such as steam distillation, maceration and expression can be used to extract oils. Larger areas are required when oil is produced.

Soils are suited to production, and *Lavandula stoechas* is growing wild on the site.

#### 4.6 Freshwater Aquaculture

Aquaculture for yabbies, trout and marron in fresh water dams and tanks is unlikely to be viable because of the potential for nutrient loss and lack of suitable material for dam construction.

#### 4.7 Floriculture

Almost any native or exotic species suited to Mediterranean climates could be grown on the earthy yellow sands using water taken from the central drainage lines, and the plants watered by trickle irrigation. Water increases the quality and quantity of the blooms. Typical species could be Geraldton Wax, kangaroo paws, smoke bush, many of the Myrtaceae, Banksias, Verticordias (feather flowers) and other genera.

Floriculture can vary from native plants requiring low levels of water to exotics that require similar amounts to vegetables (up to 10,000 m<sup>3</sup>/ha). Depending on the species grown there should be sufficient water for a viable operation.

Dieback disease is a major concern for the industry as many species of wildflowers are susceptible.

Using suitable management techniques such as fertilising, pruning and removal of competitors, floriculture can return between \$1 000/ha to \$2 500/ha. The current market for flowers is the east coast of Australia and overseas, where markets are growing and new markets are being sought.

Almost any native or exotic species suited to Mediterranean climates could be grown on the site with water taken from the central drainage lines and the plants watered by trickle irrigation. Water increases the quality and quantity of the blooms. Typical species could be Geraldton Wax, kangaroo paws, smoke bush, many of the Myrtaceae, Banksias, Verticordias (feather flowers) and other genera. The local *Boronia megastigma* is particularly suited and commands high prices when sold by the bunch.

Using suitable management techniques such as fertilising, pruning and removal of competitors, floriculture can return between \$1 000/ha to \$30 000/ha depending on the variety. The current market for flowers is the east coast of Australia and overseas, where markets are growing and new markets are being sought. Areas of 2 to 20 hectares can be viable depending on the species.

It is not uncommon for floriculture to be able to generate a viable or good hobby farm income on 2 hectares, for example Proteas, Lavender, Melaleuca and Eucalypts foliage, bulbs, Chrysanthemum, Roses, whereas some other species may require larger areas.

Some examples of areas required for a potentially viable income;

Lavender, roses, Chrysanthemum,	1 - 2 hectares
Banksias, bulbs	2 - 5 hectares
Boronia, Melaleuca and Eucalyptus foliage	2 - 3 hectares
Flannel Flowers	1 - 2 hectares
Geraldton Wax	1 - 2 hectares
Kangaroo Paws	2 - 3 hectares
Proteas	2 - 4 hectares

The most prospective areas are the yellow sands of the central north and east.

#### 4.8 Fruit Trees/Perennial Horticulture

Perennial horticulture can include citrus, nut crops, olives, stone fruit, apples and the like. Again the area required to produce a viable income or hobby income will vary with the species grown, however for most perennial fruit such as apples and stone fruit a minimum of 5 - 10 hectares is required. Some speciality fruit such as Kiwi Fruit, passion fruit and others can generate a viable income from 2 - 3 hectares.

**Stone Fruit, Citrus** and some other perennial crops require much higher water usage of up to 10 000 kL per hectare which will restrict them to the eastern and possibly south western edges where earthy yellow sands occur near available water.

The earthy yellow sands, whilst capable of growing citrus trees, are not as good as the loam soils utilised in other parts of the Bindoon area..

**Olives** are suited to long, warm, dry summers with temperature ranges of 31 to 38 degrees C. A winter chill factor of 10 to 12 degrees mean temperature suggests that inland and southern areas are more suitable. Mature trees under irrigation produce 50 kg per year whilst non irrigated trees can be expected to produce half this amount. The Australian market is large and growing for both fruit and oil. In 1996/97 \$100 million olive oil and fruit were imported but significant plantings have been made Australia wide in the last year or two. Today the world market is satisfied so export potential could be restricted.

The most suitable soils for olives are the earthy sands. Irrigation of only 3 000 kL/hectare/year is required for table fruit but this can be reduced to increase the intensity of the flavours. Premium quality oil is probably where the best market potential lies but will need good marketing efforts and/or value adding to make any plantings viable. Depending on the variety and type of value adding 2 - 20 hectares of olives can produce a viable income. For example at Margaret River Stellar Ridge winery is trialing value added olive products that can produce a viable income from one hectare of olives.

##### Nut Crops

Nuts require conditions similar to those for fruit trees however most are popular with parrots and cockatoos and thus will require protection if they are to be grown successfully.

**Almonds** are more suited to the site and may not require summer water.

**Pecans** and **Walnuts** need deep, well drained soils and moisture throughout the year, particularly from spring to mid-summer. They could form part time incomes from small lots.

Other nut crops that have potential are as follows: **Pistachio, Quandong, Bunya Pine, Ginkgo, Jojoba, Manula and Tung**. (Suitability details should be obtained from the Department of Agriculture W.A.).

#### 4.9 Alternative Stocking

Whilst, traditionally, areas such as this have been used for cattle there are several alternative animals that can be raised on small holdings because they command higher values and are easier

on soils. In general intensive stocking is not suitable for this site because of the steeper slopes and potential for nutrients to run off in surface flows.

**Emus and Ostriches** can be stocked at much higher stocking rates than hoofed animals because they are "easy" on the soil and are less likely to lead to soil degradation. Viable emu or ostrich businesses have been established on as small as 2 - 5 hectares. At this level they do not have the same environmental impact in terms of odour and soil degradation as other stock and do not need large buffers such as pigs. For example there are operations on Armadale Road, Forrestdale and at North Dandalup on small holdings adjacent to dwellings. Currently the price of these birds is depressed but with development is likely to turn around at some time in the future. There are some indications in the eastern states of increased interest in ostriches. However emus and ostriches on small rural holdings may have the potential to lead to nutrient loss from leached soils and thus suitable nutrient management techniques may need to be incorporated into any commercial venture depending on the location.

**Alpacas and Llamas** have soft hooves and are also suitable for stocking at higher than traditional rates. They command high prices and studs can be sustained on small lots down to 5 hectares or less. Currently these studs are aimed at the pet and stud markets, but the fleece commands high value and, as the cost of the animals reduces through increased numbers of animals, a balance will be reached where commercial production will occur.

An Alpaca stud currently operates on the Toodyay - Northam Road near Northam.

Small studs of **Goats** with premium fleece characteristics such as Angoras and Mohair are possible in addition to use as hobby activities. **Milking Sheep and Goat** operations, with the consequent production of small volumes of cheese, can be operated on small holdings, although supplies of fresh water for processing may prove limiting in some areas. At high stocking rates these have high potential to lead to soil degradation from wind erosion through hoof damage to pasture. The same situation exists for deer.

**Small cattle such as Dexter and Lowline** require less land and command higher prices as stud animals. These breeds are very well suited to small rural holdings because they are easy to manage and do not require the equipment and fencing needed for larger breeds. There is a growing market for small cattle on small rural holdings and the owners of these holdings normally have the funds to pay the higher prices required.

**Miniature Horses** have similar qualities and are just at the stage of developing a pet market for small rural holdings.

## 5.0 GEOTECHNICAL CONSIDERATIONS

### 5.1 House and Road Construction - Foundation Stability

Foundation stability for roads is high for all soils.

Foundation stability for dwellings is also high in all areas (AS 2870 Site Class A). The area around the soak in the central east is not suitable for dwellings or waste water disposal because of the leached sands and elevated water tables.

	GEOTECHNICAL FACTOR	MANAGEMENT
5.1.1	Foundation stability	<ul style="list-style-type: none"> <li>Foundation stability is AS 2870 Class A</li> </ul>

### 5.2 Drainage and Flood Risk

All areas apart from adjacent to the soak and the north eastern corner adjacent to the road are well drained.

There is no evidence of potential flooding.

	GEOTECHNICAL ISSUE	MANAGEMENT
5.2.1	Flood risk	<ul style="list-style-type: none"> <li>There should be adequate setback of 100 metres from the soak in the central east.</li> </ul>

## 6.0 ENVIRONMENTAL MANAGEMENT

The following items are identified as the most likely to impact on the environment. These items can be managed by the implementation of the management recommendations. Other items are unlikely to impact or the impact is regarded as small.

However the nature of the environmental management will depend on the nature of the subdivision proposed. Some areas of subdivision are proposed on the attached maps, but these are suggestions and will depend on planning issues. Thus the list of environmental management recommendations will act as a general guideline on how to achieve an environmentally sensitive development.

### 6.1 Aesthetics

The undulating nature of the site, and the low ridges, increase the aesthetic quality of the site as well as helping to reduce the impact of developments by providing sufficient screening. However the northern portion of the site is visible from Tee Tree Road and the Western portion will be visible from the planned Perth - Darwin Highway.

The colour and style of dwellings and other structures could be visually compatible with the area and to this end developments should be coloured, painted or colour bond sheeting used. The use of grey galvanised or zinc/alum sheeting should be avoided unless as an integral part of a development such as a roof on a "country style" home or shielded from key sight lines.

Alteration to existing view scapes from Tee Tree Road can be kept to manageable levels through the listed actions.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.1.1.	Remnant vegetation and trees	<ul style="list-style-type: none"> <li>Development should include preservation of existing trees and vegetation by the sympathetic location of building envelopes.</li> <li>Trees should be preserved and protected from grazing pressure.</li> <li>Additional trees could be planted in strategic clumps to protect the views.</li> <li>Development should be restricted by a 100 metre setback from the soak.</li> </ul>
6.1.2	Setbacks	<ul style="list-style-type: none"> <li>Developments should be set back 100 metres from Tee Tree Road.</li> </ul>
6.1.3	Dwellings, fences and other developments are to be aesthetically compatible with the area.	<ul style="list-style-type: none"> <li>Restrictions could be placed on the use of visually non compatible materials.</li> </ul>

### 6.2 Subdivision Layout and Buffers

Lot sizes will depend on planning issues in addition to the land capability. Suggested lot sizes and potential land uses are shown on the attached maps.

It is preferred that smaller lots are clustered to assist servicing and buffer requirements. These should be located in areas which have lower soil capability but yet capable of pasture management through the use of groundwater. The best water sources could be utilised for



perennial horticulture and should thus be preserved on agricultural lots of 10 to 20 hectares to retain potential viable agricultural land.

A larger lot could be retained to protect sand resources in the south western corner but these resources are unlikely to be required for many years, and alternative resources occur on broad acre agricultural land to the west. In addition as this area of white sand is currently undergoing slow regeneration the best solution is likely to be to allow this process to continue. Therefore larger lots of 20 to 40 hectares are probably the best alternative. To preserve the sand a large lot could be retained as one broad acre lot.

One issue with lot sizes is the potential buffer between broad acre farmland and the creation of smaller lots. The land to the west, half of the south and east is uncleared remnant vegetation on soils of low land capability. It is unlikely that this vegetation will ever be cleared and will form a buffer.

The predominant winds are mainly from the east on summer mornings and south west in the afternoons. Winter winds are more variable.

A recent document relating to the potential conflict of horticulture and dwellings is the Draft Environmental Code of Practice for Vineyards, jointly prepared by Agriculture WA, Department of Environment Protection, Water and Rivers Commission, Grape Growers Association and the Wine Industry of WA.

The Draft Environmental Code of Practice recognises that buffers are related to aspects of the site conditions and land uses. Under spray drift, the Code of Practice quotes Spillman 1988 who stated that under research and subsequent modeling for aerial spray equipment (non-hooded) there was negligible drift 300 metres downwind. Based on that research a minimum distance was accepted as 300 metres where open ground applies but this can be reduced with the use of effective tree buffers and can be as low as 40 metres in the case of small vineyards. The Review of Agricultural Chemical Spray Drift, 1993, Coordinating Committee on Agricultural Chemicals, also recognised the potential for screening trees to reduce spray drift and the desirable use of "shelter belts" (p19).

As the only portion of land adjacent to broad acre farm land is in the south buffers are not necessary over the majority of Lot 102. In the south east the prevailing winds do not blow from the south and a setback of 100 metres for dwellings together with tree planting along this section of the boundary will provide protection.

	ENVIRONMENTAL ISSUE	MANAGEMENT
6.2.1	Subdivision design	<ul style="list-style-type: none"> <li>• Buffers are not required round most of the boundary because it adjoins remnant vegetation which is unlikely to be cleared.</li> <li>• A setback of 100 metres from the boundary in the south east together with tree planting along the cleared boundary will provide separation between broad acre land and any development.</li> <li>• Setbacks of 100 metre from roads are recommended.</li> <li>• Building envelopes should be located 100 metres from the soak in the central east.</li> </ul>

### 6.3 Flora and Fauna

The only remnant vegetation on the site is the scattered trees and the ridge tops. These should be retained and incorporated into any further plantings. Plantings and revegetation can form linkages as shown on the attached plans. Fauna will be advantaged by the planting of additional vegetation on newly created lots.

The natural regrowth on the leached sands in the west should be encouraged to regrow because these areas have very low soil capability and are highly susceptible to wind erosion. This is the current plan for these soils.

The wetland/soak should be protected.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.3.1	Remnant trees	• Trees should be protected from grazing pressure.
6.3.2	Remnant vegetation	• Roadside vegetation should be retained and local species used in any planting of the roadside.
6.3.3	Weeds	• As the site is cleared pasture weeds will not be an issue apart from the need for lot owners to control Declared weeds such as Skeleton Weed that has been recorded on the site in the past.
6.3.4	Fauna	• Fauna are likely to increase with development of small rural holdings.
6.3.5	Nearby remnant vegetation	• Cats are difficult to control and education is the most satisfactory method, through Shire of Chittering, local newsletters etc. • Dogs can be controlled through Council bylaws and public education.
6.3.6	Wetland/soak	• Development should be restricted by a 100 metre setback from the wetland/soak.

### 6.4 Water Quality - Lake Chittering

Lot 102 forms part of the catchment for the stream line running east to Lake Chittering, a System 6 nominated reserve. A soak on the central eastern boundary is the start of one tributary of this drainage line. The main issue is to prevent the level of nutrients or salinity from rising in this water flow and to ensure that sufficient water continues to flow from Lot 102 to maintain the stream and wetland functions.

Perennial horticulture associated with commercial operations and cottage industries will use potentially less water than annual horticulture and is better suited to the site, based on soil types, and will use significantly less nutrient usages.

Set backs from the soak should be 100 metres for developments and 50 metres for perennial horticulture. Water flows can be protected under the revised Rights in Water and Irrigation Act which will be implemented in the near future, where licences will be required to take water.



	ENVIRONMENTAL FACTOR	MANAGEMENT
6.4.1	Lake Chittering	<ul style="list-style-type: none"> <li>Water flows can be maintained at adequate levels through encouragement of perennial agricultural activities, the restriction on intensive annual horticulture and the proposed changes to the Rights in Water and Irrigation Act.</li> <li>Larger lot sizes on the leached sands, potential nutrient calculations and soil assessments, suggest that potential nutrient losses from the proposed land uses will be minimal if at all.</li> <li>There is no evidence of salinity on site and the underlying geology and hydrology suggest that salinity will not increase with development.</li> </ul>
6.4.2	Soak	<ul style="list-style-type: none"> <li>Covered under Lake Chittering above.</li> <li>Development are recommended to be restricted by a 100 metre setback from the soak with a 50 metre buffer for perennial horticulture.</li> </ul>

## 6.5 Heritage

Heritage issues concern the management of flora and mature trees.

	ENVIRONMENTAL ISSUE	MANAGEMENT
6.5.1	Archaeological sites	<ul style="list-style-type: none"> <li>There are no sites known to the Department of Aboriginal Affairs.</li> </ul>
6.5.2	Potential aboriginal sites	<ul style="list-style-type: none"> <li>Aboriginal sites are protected under the Aboriginal Protection Act.</li> </ul>

## 6.6 Nutrient Management - Effluent Disposal

Phosphorous is the main nutrient implicated in algal blooms in waterways. Nitrates can be bound to organic matter in the soil and lost through soil micro flora under anoxic conditions.

Nitrogenous substances are also taken up by vegetation or lost through volatilisation of ammonia. In leached sands with shallow groundwater, such as near the soak, the movement to the water table can be too fast for microbial activity to occur and thus setbacks are required.

The impact of nutrients is low in deep yellow sands for broad acre agricultural activities. In most areas, apart from the valley floors in the east and west, leached sands are underlain by yellow sand, or ferricrete, which increases the phosphorous retention capability. Phosphorous is adsorbed onto the yellow/brown goethite on the sand grains and in the ferricrete together with the 1 -- 3% clay within the earthy sands. Phosphate retention capability must consider the whole soil profile which on the higher elevations is up to 30 metres to the water table, reducing down slope. Even five metres of sand with a low phosphate retention (PRI 5) is capable of retaining 60 kg of phosphorous per m<sup>2</sup>.

The main issue with effluent disposal in subdivisions such as this is the design and placement of the systems to ensure that they work and provide adequate microbial purification rather than nutrient loss.

Yellow sands are recognised for their ability in managing nutrients in a number of published documents, for example SPP2 Peel-Harvey Estuary.

Appleyard S J 1993, *Explanatory Notes for the Groundwater Vulnerability to Contamination Maps of the Perth Basin*, Department of Minerals and Energy, 1993/6, shows the site as having Very Low Vulnerability to contaminate the deep aquifers of the Swan Coastal Plain.

Poinke established that the risk of phosphate loss from coloured sands such as those on the site are very effective at retaining phosphorous. Poinke et al, *Effect of Irrigated Horticultural Cropping on Groundwater Quality: Swan Coastal Plain, Western Australia*, CSIRO Water Resources Series No 2. Lantzke, 1997, *Phosphorous and nitrate loss from horticulture on the Swan Coastal Plain*, Agriculture WA

All soils are capable of supporting conventional effluent disposal systems with the exception of the small low lying areas adjacent to the soak, and will comply with the Government Sewerage Policy (metropolitan area).

There should be a 100 metre setback from the soak which complies with Water and Rivers Commission recommendations.

#### Nutrient Loadings

The leached white sands have stocking rates of less than 1 DSE (one dry sheep equivalent per hectare if maintained on site all year round) if they are dry and not located on the lower elevations where summer moisture is available. Yellow sands have a slightly higher stocking rate of 3 to 5 depending on the soil, geomorphic position and availability of water for pasture management.

The current input of nutrients will be predominantly from fertiliser applications and legume pasture.

Land Use	Kg/P/hectare/year	Kg/N/hectare/year
Carnations	80	1 920
Vegetables	80 - 340	400 - 900
Citrus	30 - 73	68 - 102
Olives	20 - 40	40 - 80
4 DSE/ha	6	40
1 horse	11	60
Domestic waste water of one household	5 - 6	18

Agriculture WA, 1990, *Horticulture and the environment*, Misc Pub 20/90.

Lantzke N, 1997, *Phosphorous and nitrate loss from horticulture on the Swan Coastal Plain*, Agriculture WA, Misc Pub 16/97.

Estimations of the impact of the nutrient loading can only be made based on denitrification, volatilisation of ammonia, recycling, uptake by vegetation and phosphate absorption by clays and sesqui-oxides.

The greatest input of phosphorous can come from the keeping of stock in confined areas such as a stable, or intensive annual horticulture. This may lead to soil degradation through wind erosion and dust generation and is not recommended.

Potential loss of nutrients from pasture and less intensive/perennial horticulture such as grapes, depends on the fertiliser application regime and the quality of the soils. This would not normally lead to nutrient losses, with the exception of applications applied to the lower lying leached sands.

A typical conventional septic system releases 5.5 kg P/year and 18 kg N/year. However allowing for six chickens, a dog and cat and a 250 m<sup>2</sup> area of fertilised horticulture, a further loading of 12.3 kg N/year and 5.2 kg P/year can be added for the dwelling area. (Data from Select Committee on Metropolitan Development and Groundwater Supplies, Legislative Assembly 1994 and Nitrate management in the Jandakot UWPCA, Dames and Moore, undated). One horse is estimated at 60 kg N/year and 11 kg P/year.

Typical nutrient loadings that can be expected from the various soil types

Soil type	Possible lot size and activity	Nitrogen loading per hectare	Phosphorus loading per hectare	Likely nutrient scenario
Yellow sands	Current maximum stocking rate 5 DSE per hectare	50.30 kg N/ha/year	7.35 kg P/ha/year	Unlikely to be nutrient export
Leached sands with yellow sand or ferricrete at depth	2 ha conventional septic system 1 ha cottage garden	65.2 kg N/ha/year	20.4 kg P/ha/year	Unlikely to be nutrient export
Yellow sands	Estimated average potential stocking rate 4 - 5 DSE per hectare for a 3 hectare block and conventional septic system.	30.1 kg N/ha/year	7.2 kg P/ha/year	Unlikely to be nutrient export
Yellow sands	10 hectares olives, no stock and conventional septic system.	83.0 kg N/ha/year	41.1 kg P/ha/year	Unlikely to be nutrient export.
Yellow sands	20 hectares no stock and conventional septic system.	81.5 kg N/ha/year	40.6 kg P/ha/year	Unlikely to be nutrient export.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.6.1	Effluent disposal	<ul style="list-style-type: none"> <li>All soil types are suitable for conventional septic systems with the exception of the area adjacent to the soak</li> <li>There should be no more than one effluent disposal unit per lot.</li> </ul>
6.6.2	Land use and stocking	<ul style="list-style-type: none"> <li>Intensive agricultural pursuits such as piggeries and feed lotting should not be permitted.</li> <li>Any stocking should be to Agriculture WA recommendations.</li> <li>Lots sizes suggested take into account the potential for nutrient loss and Agriculture WA stocking rates.</li> </ul>

**6.7 Drainage, Salinity and Flood Risk**

All areas are well drained.

There is little potential for salinity increases in the soak on the eastern boundary.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.7.1	Potential flooding	• There is no risk of flooding.
6.7.2	Salinity	• No action required.

**6.8 Mature Trees**

Trees should be protected and developments located at sufficient distance to ensure dwellings are not subjected to risk associated with falling limbs or trees blown over.

	ENVIRONMENTAL ISSUE	MANAGEMENT
6.8.1.	Mature trees	• Developments should be located at sufficient distance to ensure dwellings are not subjected to risk associated with falling limbs or trees blown over.

**6.9 Wind and Water Erosion**

The potential for wind erosion is high on the sands, although yellow sands are capable of growing better pasture which must be maintained throughout the year. Wind erosion can also be reduced through the use of irrigation, wind breaks, planting perennial species such as tagasaste, and stock matched to the quality of pasture. Sometimes dust can be more of a problem than actual erosion when for example a horse is kept in a small paddock or stables.

In the west on the leached white sands indigenous vegetation is being allowed to regrow as a means of managing soil erosion. This is a successful method of land management, but does take the area out of production.

Potential water erosion is low apart from non wetting sloping sands.

	ENVIRONMENTAL ISSUE	MANAGEMENT
6.9.1	Soil erosion	<ul style="list-style-type: none"> <li>• Adequate vegetation cover should be maintained on all soils throughout the year.</li> <li>• Stocking rates should be matched to pasture conditions.</li> </ul>

## 6.10 Fire Control

Fire Control falls under the Bush Fires Control Act (as amended) and the Shire of Chittering.

Fire management will depend on lot sizes and permitted land uses. As the site is cleared with scattered trees, fire risk is reduced, although grass fires can produce high hazard given the right conditions. Fire risk is normally reduced through subdivision design, reduction in fuel by burning off or other means, the design and maintenance of strategic firebreaks, the availability of machinery and water to fight fires and the provision of emergency escapes.

The fire risk to property will increase following subdivision so it is important that the risk is minimised. Existing and new water sources will be able to be used for fire fighting and the roads will act as firebreaks together with the creation of new firebreaks as required.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.10.1	Fire Risk	<ul style="list-style-type: none"> <li>Increased access, firebreaks and water points will assist fire reduction risk.</li> <li>The roads will act as fire breaks.</li> </ul>

## 6.11 Social Impact

Social impact of the proposed sub division will be minimal but will be positive by bringing additional people to Bindoon/Chittering.

There is potential for this site to be developed for cottage industries, craft and other small scale tourism activities which will be valuable additions to the Bindoon/Chittering area.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.11.1	Social Impact	None required.

## 7.0 CONCLUSIONS

Lot 102 lies approximately 7.0 km south of Bindoon townsite, on the southern side of Tee Tree Road. The western boundary of Lot 102 will be slightly altered and moved eastwards when the planned Perth Darwin Highway is constructed. This will reduce the size of the lot by perhaps 40 hectares.

Lot 102, therefore, with its location adjacent to the proposed Perth Darwin Highway and proximity to Bindoon, is well placed for subdivision into a creative range of lots and landuses.

The subdivision of Lot 102 Tee Tree Road, Chittering has the potential to be a valuable addition to the local community and tourism industry. The soils and supplies of water provide high capability for some new and creative activities on smaller lot sizes provided the land management issues on the less capable soils are met.

Parts of Lot 102 are capable of sustaining small rural holdings ranging in size from 2.0 – 5.0 hectares in a cluster with the balance taken up by larger lots. The best agricultural land is in the east because of available water and could be protected in larger 10 and 20 hectares lots. On the other hand leached white sands are better left to allow regrowth of indigenous vegetation as is occurring.

Other lots are better suited to hobby, perennial horticulture or conservation lots because only domestic/stock supplies of groundwater are likely to be available.

The management actions listed under Environmental Management, Geotechnical Considerations, and the opportunities and constraints, are to provide guidance for subdivision design, and the development of conditions.

Any environmental issues identified can be managed through subdivision design and normal conditions that are placed on subdivision and developments.

  
Lindsay Stéphens



Soil Characteristics	Ferricrete and Gravel	Leached Sand over Ferricrete	Earthy Yellow Sand	Yellow Sand	Leached White Sand
Location	On the higher elevations and ridges	Flanks or slopes adjacent to the ridges	Upper catchment	Upper catchment	Gentle valleys
Topsoil Texture	Yellow brown gravel and duricrust	Grey quartz sand	Grey quartz sand and yellow sand	Grey quartz sand and yellow sand	Grey quartz sand
Subsoil Texture	Yellow brown gravel and duricrust over loam-clays at depth	White sand over gravel and duricrust at depths of up to 1000 mm	Cream sand over yellow sand at shallow depth	Cream sand over yellow sand at shallow depth	Leached white sand over yellow/orange/brown sand at 1 meter or so.
Stone	Duricrust a major component of ridge tops	Nil	Nil	Nil	Nil
Gravel	Major component	Minor	Minor gravel	Minor gravel	Minor
Depth to Bedrock	Ferricrete over deep sediments	Ferricrete at < 1 metre over deep sediments duricrust may occur at 1 or 2 metres	Deep sediments	Deep sediments	Deep sediments
Hardpan	Ferricrete	Ferricrete at depth	Traffic hardpans possible	Traffic hardpans unlikely	Unlikely to develop
PH	Acidic to neutral	Acidic to neutral	Acidic to neutral	Acidic to neutral	Acidic to neutral
Salinity	Low	Low	Low	Low	Low
Soil Permeability	High	High	High	High	High
Soil Shrinkage	Very low	Very low	Very low	Very low	Very low



Land Qualities	Ferricrete and Gravel	Leached Sand over Ferricrete	Earthy Yellow Sand	Yellow Sand	Leached White-Sand
Slope	Gentle	Gentle to moderate	Gentle to moderate	Gentle	Gentle
Slope Stability	High	High	High	High	High
Wind Erosion Risk	Low	High	Moderate to high	Moderate to high	Moderate to high
Water Erosion Risk	Low	Low	Low	Low	Low
Drainage	Well drained	Well drained	Well drained	Well drained	Well drained
Moisture Availability	Very low	Very low	Moderate	Low - moderate	Very low
Water Logging	Nil	Nil	Nil	Nil	Adjacent to the soak
Wetability	Moderate	Non wetting at times	Non wetting at times	Non wetting at times	Non wetting at times
Flood Risk	Nil	Nil	Nil	Nil	Nil
Surface Water - Availability/Quality	Nil	Nil	Nil	Nil	Only at soak
Ground Water - Availability/Quality	Low potential	Low potential	Low potential	Low to moderate	Low to moderate
Salinity Risk	Low	Low	Low	Low	Low
Microbial Purification	Moderate to high based on soil depth	Moderate to high based on soil depth	Moderate to high based on soil depth	Moderate - high	Moderate to low
Water Pollution Risk	Low	Low	Low	Low	Low - moderate
Soil Profile; Phosphate absorption	High on the proportion of iron oxides and depth of soils	High based on ferricrete at depth	Moderate to high based on depth of yellow sand and presence of clay	Moderate based on depth of yellow sand	Low based on yellow sand at depth
Soil Profile; Nitrogen Removal	Low to moderate depending on the degree of anoxic conditions	Low to moderate depending on the degree of anoxic conditions	Moderate depending on the degree of anoxic conditions	Low to moderate depending on the degree of anoxic conditions	Low to moderate depending on the degree of anoxic conditions
Existing Degradation	Largely uncleared	Cleared	Cleared	Cleared	Cleared

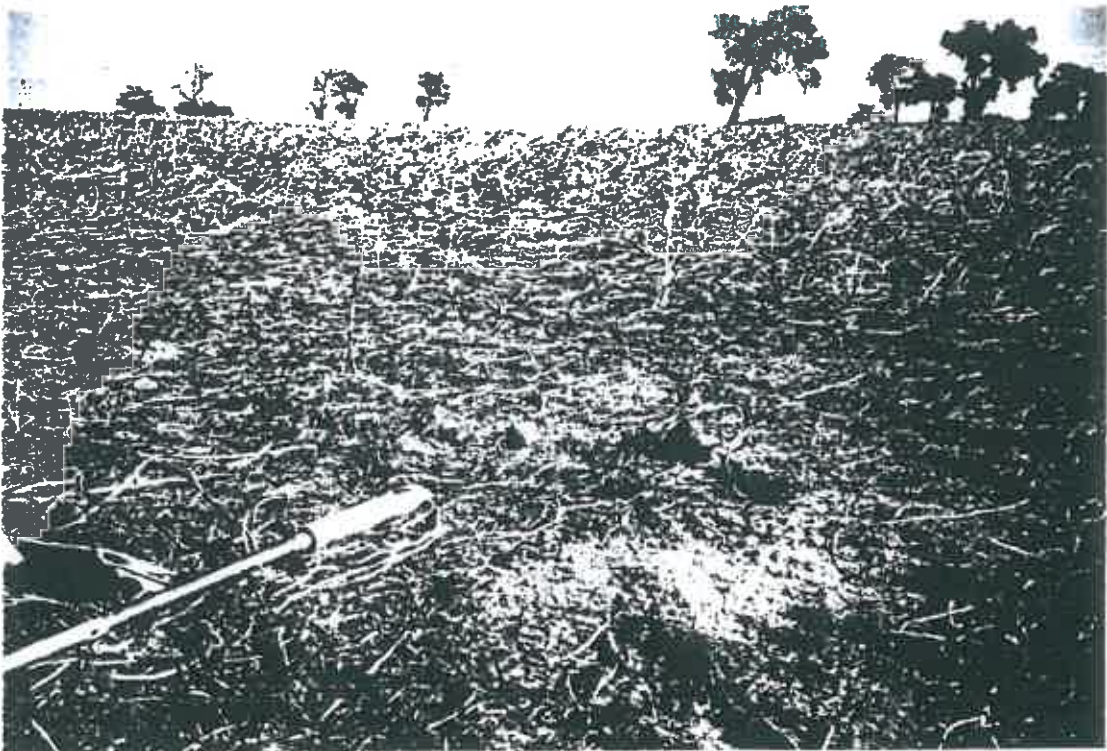
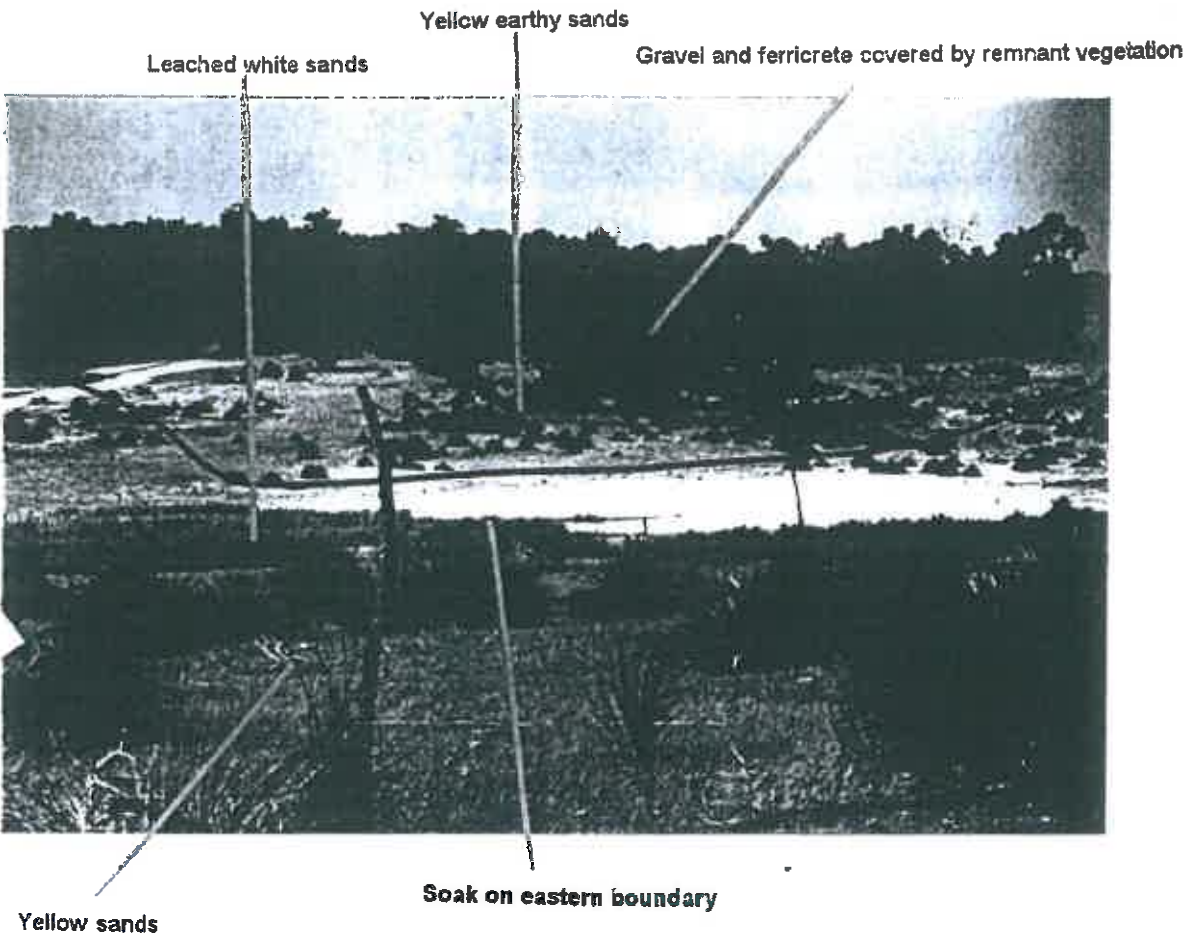


**General view across the central north east of Lot 102**

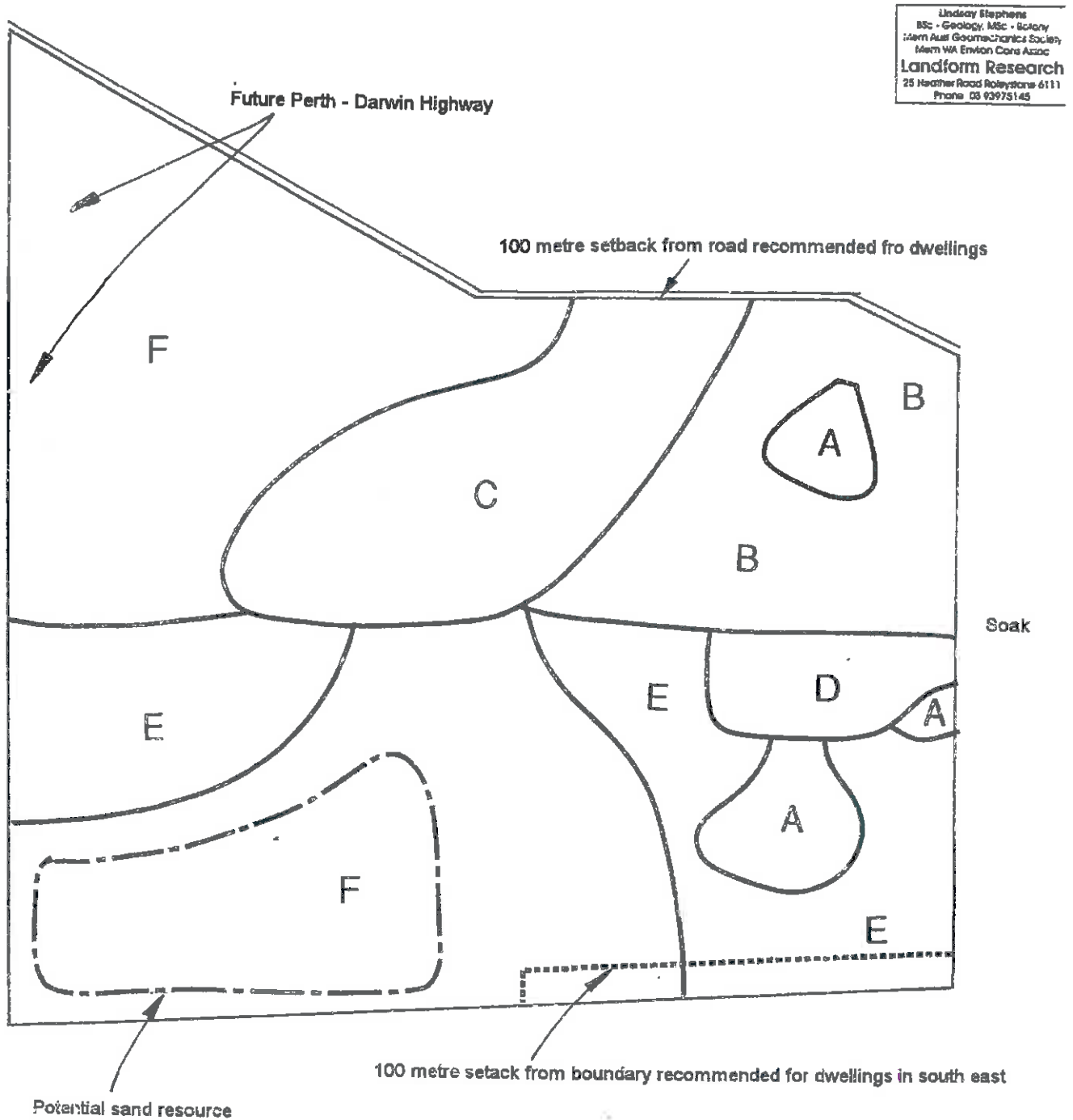


**Regrowth of native vegetation in the south west**





Yellow sands that underly most of the site



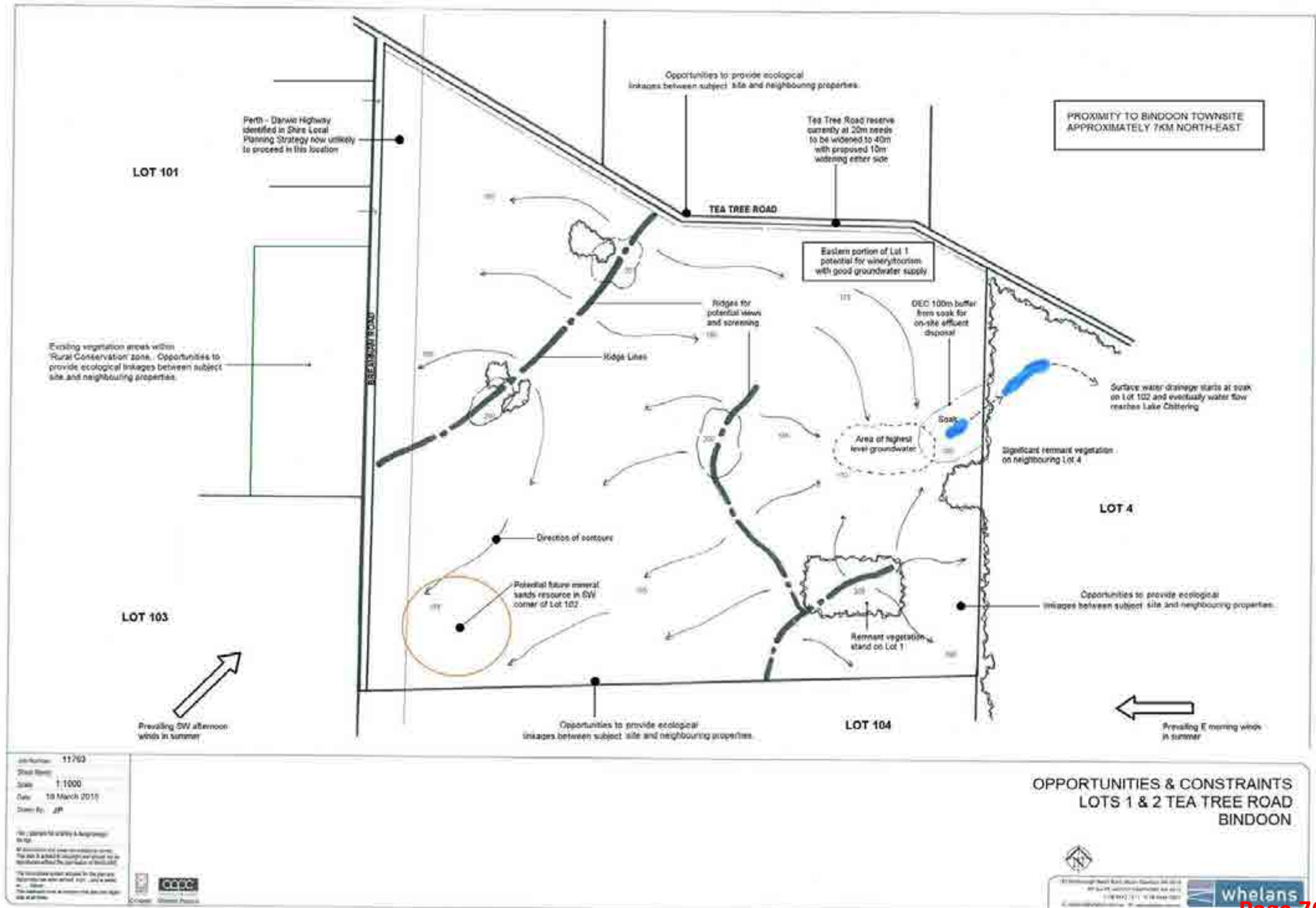
## POTENTIAL LAND USES

### Lot 102 Tee Tree Road, Bindoon

	Possible Land Use	Soil Type	Possible Lot Sizes	Water Availability
A	Conservation	Ferricrete rock and gravel	< 5 ha	Very low
B	Rural Living	Yellow sand	2 - 5 ha	Water may be available and should be restricted to 1 500 kL per lot
C	Perennial Horticulture/hobby	Earthy and yellow sands	10 ha	Stock water, insufficient for irrigation
D	Perennial horticulture	Earthy and yellow sands	10 - 20 ha	Water available for irrigation of crops. Perhaps >10 ha perennial horticulture possible
E	Hobby	Yellow sands and sand over ferricrete	5 - 10 ha	Water may be available and should be restricted to 1 500 kL per lot
F	Large hobby and conservation lots	Leached sands and sand over ferricrete	10 - 20 ha	Stock water likely to be available

# APPENDIX 2

## Opportunities & Constraints Plan



# APPENDIX 3

## SPRING FLORA & VEGETATION SURVEY



# Lot 1 and 2 Tea Tree Road, Bindoon WA

## Spring Flora and Vegetation Survey



Kathryn Kinnear

Bio Diverse Solutions

15/3/2012



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SOLUTIONS**

## DOCUMENT CONTROL

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## 1. Introduction

Bio Diverse Solutions was commissioned to undertake a Spring Flora and Vegetation Survey of Lot 1 and 2 Tee Tree Road Bindoon as part of investigations requested from Whelans in support of a proposal to rezone a portion of the land for Rural Residential purposes. The Spring Flora and Vegetation Survey is required by the Western Australian Planning Commission (WAPC) to assist with the rezoning process. The survey is aligned to Environmental Protection Authority (EPA) *Guidance Statement number 51: Terrestrial Flora and Vegetation Surveys*.

This report details the vegetation types on site, provides a flora inventory for the site, an assessment of Threatened Flora, and recommendations for management of the proposed land use.

### 1.1. Alignment to Legislation, Policy and Guidelines

In assessing the property, Bio Diverse Solutions has prepared this report aligned to the following legislation, please refer to Table 1 below.

**Table 1–Government Legislation Applicable to the Proposal**

Legislation	Responsible Government Agency	Aspect
<i>Agricultural and Related Resources Protection Act 1976</i>	Department of Agriculture, Western Australia	Weeds and feral pest animals
<i>Conservation and Land Management Act 1984</i>	Department of Environment and Conservation	Wetlands/Flora and fauna / habitat /weeds / pests / diseases
<i>Environmental Protection Act 1986 (Part IV)</i>	Office of the Environmental Protection Authority	Assessment and Management Environmental Impact
<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>	Department of Environment and Conservation	Clearing of native vegetation
<i>Local Government Act 1995</i>	Shire of Chittering	Development approvals, Building approvals
<i>Soil and Land Conservation Act 1945</i>	Department of Agriculture and Food	Protection of soil resources
<i>Wildlife Conservation Act 1950</i>	Department of Environment and Conservation	Protection of indigenous wildlife
<i>The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).</i>	The Commonwealth Department of Sustainability, Environment, Water, Population and Communities	Protection of Vulnerable and Threatened species of national significance
<i>Country Areas Water Supply Act 1947 (WA) (CAWS Act).</i>	Department of Water, Water Corporation WA	Protection of water source areas and drinking water catchments.

### 1.2. Spring Flora and Vegetation Survey Method

This study was undertaken in October 2011 in spring conditions and has included desktop analysis and site survey of the site vegetation.

Desktop analysis included a number of resources reviewed, including:

- Database searches of the DEC Threatened Flora Database and review of Threatened Flora plant species for location, habitat and growth form;
- General texts including Native Vegetation WA (Shepherd *et al* 2002), A Biodiversity Audit of WA (Hearn *et al.*, 2002), and Local Biodiversity Strategy Shire of Chittering (SoC, 2010);
- Public available databases (Florabase, SLIP, WALIS, ASRIS etc);
- Review of species form, growth and habitat at the DEC State herbarium; and
- Overlay of GIS datasets (DEC Pre-European Vegetation extent and Department of Water (DoW) 250K Hydrogeology).

Site Survey included:

- The survey area was approximately 484 ha, with the majority of the site cleared. Remnant vegetation patches were traversed on foot and intensively sampled, a list of dominant flora species present (native and exotic) was compiled as seen; samples or photographs were collected for unfamiliar species;
- Threatened Flora searches as listed by DEC was undertaken in known locations and probable habitat types;
- Specimens collected were pressed, dried and identified;
- Specialist texts were used to identify specimens (Wheeler *et al*, 2002) with some checked against examples in the reference herbarium. The authority for taxonomic names was DEC's Florabase website as of November 2011;
- Assessment of vegetation types present and vegetation condition; and
- Herbarium verification for Threatened Species as required.

Vegetation condition was assessed to the following criteria:

- Pristine: Pristine or nearly so, no obvious signs of disturbance;
- Excellent: Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species;
- Very good: Vegetation structure altered, obvious signs of disturbance;
- Good: Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate to it;
- Degraded: Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management; and
- Completely Degraded: The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

(Keighery, 1994)

### 1.3. Other documents relating to this plan

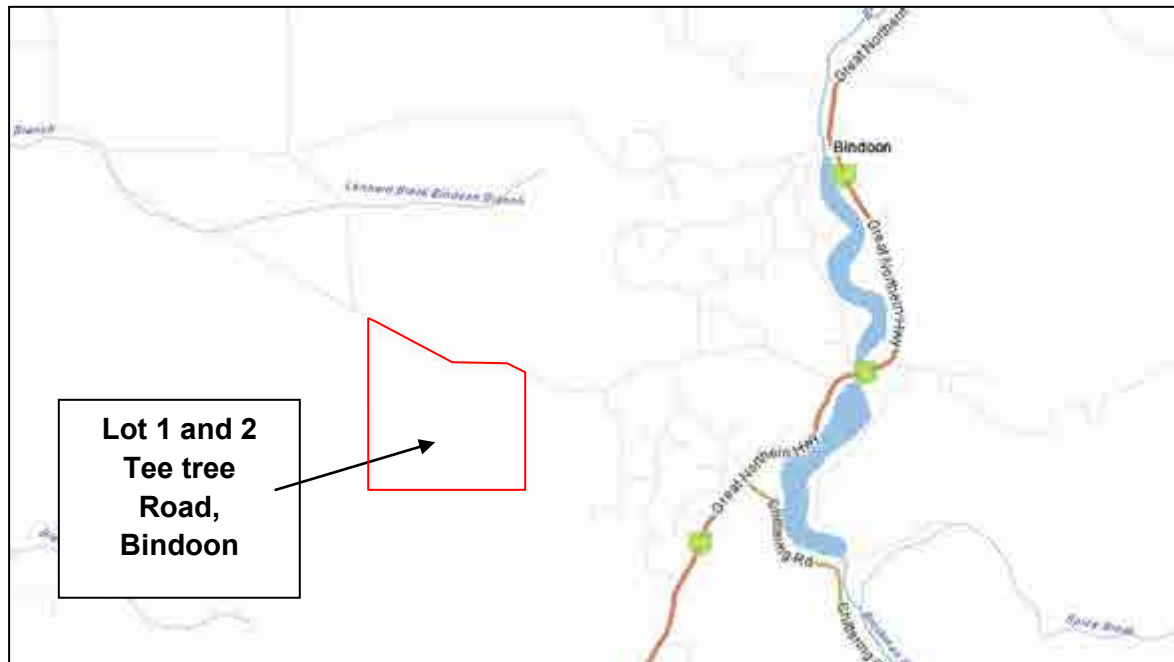
Other unpublished documents that have been prepared for this development proposal which should be consulted when reading this plan include:

- Outline Development Plan -Whelans (2012) ?
- Land Capability Report – Landform Research (2000)
- Fire Management Plan – Bio Diverse Solutions (2012)
- Stormwater Management Plan – Whelans/SMEC (2012)

## 2. Site details

The subject site is located south of Tee Tree Road and east of Brennan Road, approximately 10 km's south of Bindoon town site in the municipality of the Shire of Chittering. The subject site is a 48ha rural lot which has been used for grazing of stock. Please refer to Figure 1 below - Locality Map, and Site Location Mapping Appendix A.

**Figure 1 – Subject site locality**



### 2.1. Development proposal

The applicant is seeking to rezone the subject area for 'Rural Retreat'. The "Spring Flora and Vegetation Survey" has been undertaken prior the WAPC assessment for rezoning, to verify the floristic conditions on site and gives recommendations for any proposed development.

The development proposal includes the creation of 44 Rural Retreat Lots. In creating the subdivision the developer proposes to implement "Vegetative Corridors" to increase linkages to remnant vegetation from the north-south and east-west.

Please refer to the Outline Development Guide Plan as provided by Whelans, Appendix B.



### 3. Desktop Assessment – Regional Setting

#### 3.1. Current site land use

The site is currently 2 rural lots of predominantly cleared paddocks with grasslands and small isolated patches of remnant vegetation, newly installed vineyards and tagasaste plantation. Historically the subject area has been used for sheep and cattle grazing. An abandoned shack exists in 1 (south west corner) and some shed buildings are located in Lot 2 associated with the rural activities. Please refer to Photograph 1 and 2 below.



**Photograph 1** – View of abandoned shack in Lot 1 (south west of subject area)



**Photograph 2** – View of shed infrastructure in Lot 2, associated with rural activities.

#### 3.2. Climate

Bindoon has similar climate to Perth (75 Km away) and thus has been described as per Bureau of Meteorology descriptions of Perth. Perth experiences a Mediterranean climate, characterised by hot, dry summers and mild, wet winters. These seasons extend into the autumn and spring months, which are transitional periods between the main seasons.

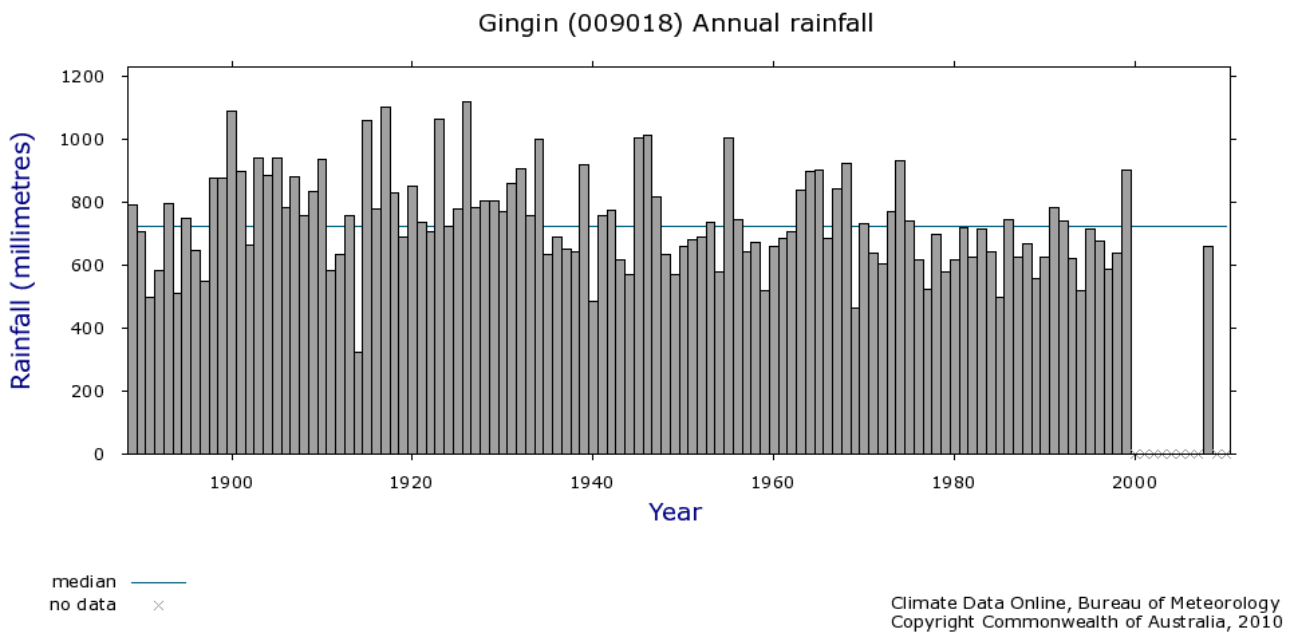
The climate of the region is strongly influenced by the position of the axis of the band of high pressure known as the sub-tropical ridge, and in the warmer months by the development in the easterlies to the north of the ridge of a trough of low pressure near the West Coast. For much of the year the ridge is located to the south allowing the east or southeasterly winds to prevail. During the cooler months the ridge periodically moves to the north allowing cold fronts to pass over the west coast and deliver much of the annual rainfall. Sometimes these fronts interact with tropical cloud bands from the northwest and this can enhance the amount of rainfall produced.

##### 3.2.1. Rainfall

Of the annual mean rainfall of 869 mm, which occurs on 119 rain days, about 80% usually falls between May and September. Rain occurs on four days out of every seven on average during winter. Flooding is rare in Perth, however heavy rain may be produced by strong winter cold fronts or, less frequently, by summer storms or, more rarely, by decaying tropical cyclones. The highest daily rainfall is 120.6 mm recorded on 9 February 1992.

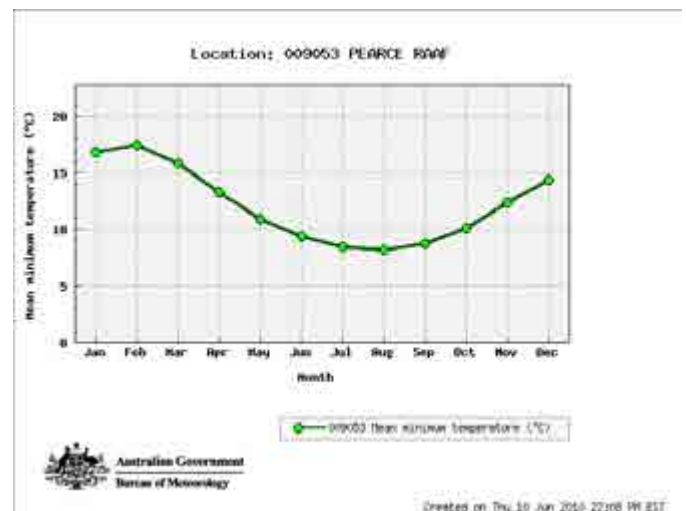
In contrast to winter rainfall, the mean summer rainfall is just 36 mm on an average of 10 rain days. It is not unusual for there to be extended dry periods during the warmer months. Please refer to Gingin Annual Rainfall graph over the page (Figure 2).



**Figure 2 – BoM Rainfall for Gingin Station**

### 3.2.2. Temperature

Mean monthly air temperature range from 31°C in February to 18°C in July and August. Summer maximum temperatures are strongly dependent upon the arrival time of the reliable sea breezes. On some days the difference between the maximum temperatures on the coast and the eastern suburbs may exceed 10°C. Heatwaves are associated with strong easterly winds and the late arrival or absence of the sea breeze. The highest temperature ever recorded is 46.2°C, however, the temperature exceeds 40°C on only three days per year on average. The average minimum temperature ranges from just 8°C in July and August to 17°C in January and February. Temperatures below 5°C are not uncommon during any of the winter months. The lowest temperature ever recorded at Perth Airport is -1.1. Please refer to average temperatures below for Gingin (40km away), Figure 3.

**Figure 3 – Average Temperatures BoM**

### 3.2.3. Wind

Winds are mainly easterly but varied in the warmer months by reliable afternoon sea breezes from the south west and in the cooler months by the westerlies that are associated with the bulk of the annual rainfall. Despite the occurrence of strong winds or gales, average wind speeds in winter are considerably lighter than in summer.

### 3.2.4. Climate Change

Climate change is expected to impact on the future rainfall pattern of the area. It is recognised that the average rainfall has already declined by 20%-30% over the past few decades and that the long term impact of climate change may lead to a shift in rainfall, as well as dryer climatic conditions for the region. The long term changes are predicted to impact on the flora, fauna and water availability for the region. (Climate Commission 2010)

The Climate Commission (Climate Commission 2010) estimates that  
*“...Rainfall patterns in Western Australia have changed over the last 40 years. There is significant evidence that climate change has contributed to the marked drying trend in the southwest of the state.”*

The construction of the proposed development is not predicted to be affected by sea-level rise, however could be affected from increased intensity rainfall events or extended drying periods. The findings from the Land Capability Report (Landform Research 2000) recommends 100m setback from the soak in the central east area. This will ensure that any flooding or high rainfall periods do not affect infrastructure and that any watershed from the development from increased intensity rainfall events does not affect the Chittering River catchment area.

### 3.3. Topography and Slope

The subject site is located in an undulating landscape on the Dandaragan Plateau with the average slope for the site (assessed as an average over 4 slopes 100m in distance) calculated to be less than 5° and range between 1° and 3°. One metre contours indicate there are 2 hills in the western portion up to 201m AHD and one dominant ridge in the south east of the subject site up to 208m AHD. The lowest elevation of the site is in the east along the formation of a creek upper catchment at 168m AHD.

### 3.4. Geology and Site Soils

Australian Geoscience Mapping indicates the site is from the Pleistocene (Recent) Period (**Qpo**): **colluviums, soil and undifferentiated sand cover over laterite of Coastal plain, includes minor alleviated areas** (AGM, 1984). The subject site lies west of the Darling Scarp, within the Dandaragan trough of the Perth basin landform system.

### 3.5. Vegetation Types

The subject lies within the Swan IBRA bioregion. This bioregion is comprised of *“low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils.”* The area is located within the SWA1- Dandaragan Plateau *The plateau is bordered by Derby and Dandaragan Faults. Cretaceous marine sediments are mantled by sands and laterites. Characterised by Banksia low woodland, Jarrah - Marri woodland, Marri woodland, and by scrub-heaths on laterite pavement and on gravelly sandplains.* (Hearn et al., 2002).

The vegetation has been mapped on a broad scale by Beard (Shepherd et al 2002) in the 1970's, where a system was devised for state-wide mapping and vegetation classification based on geographic, geological, soil, climate structure, life form and vegetation characteristics (Sandiford and Barrett 2010).

A GIS search of Beards vegetation classification for general area places the site within 2 broad Vegetation Associations for the site:

**System Association: Gingin 1027**

- Vegetation Association Number: 1027
- Vegetation Description: *Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia/Medium sparse woodland; jarrah & marri.*

(Source DEC Pre-European Vegetation GIS dataset)

**3.6. Threatened Flora Search**

A search of the DEC Threatened Flora Database within 5km of the subject area was undertaken a summary shown in Table 2 below and as provided by DEC in Appendix C.

**Table 2 – Threatened Flora Database Search Summary**

SPECIES	CONSERVATION CODE
<i>Acacia drummondii</i> subsp. <i>affinis</i>	3
<i>Acacia pulchella</i> var. <i>reflexa</i> <i>acuminate bracteole variant</i> (R.J. Cumming 882)	3
<i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>	3
<i>Astroloma</i> sp. <i>Cataby</i> (E.A. Griffin 1022)	4
<i>Chamelaucium</i> sp. <i>Gingin</i> (N.G. Marchant 6)	T
<i>Cyanicula ixioides</i> subsp. <i>candida</i>	2
<i>Gastrolobium nudum</i>	2
<i>Grevillea corrugata</i>	T
<i>Hypocalymma</i> sp. <i>Tea Tree Road</i> (O. Davies OD 171)	1
<i>Oxymyrrhine coronata</i>	4
<i>Ptychosema pusillum</i>	T
<i>Tetratheca pilifera</i>	3
<i>Verticordia rutilastra</i>	3

Under the *Wildlife Conservation Act 1950*, the Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection. Schedules 1 and 2 deal with those that are threatened and that are presumed extinct, respectively.

Definitions of Threatened Flora under the *Wildlife Conservation Act 1950* are as follows:

- **T: Threatened Flora (Declared Rare Flora — Extant)**  
Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the *Wildlife Conservation Act 1950*).  
Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria:  
CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild  
EN: Endangered – considered to be facing a very high risk of extinction in the wild  
VU: Vulnerable – considered to be facing a high risk of extinction in the wild.
- **X: Presumed Extinct Flora (Declared Rare Flora — Extinct)**  
Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 under the *Wildlife Conservation Act 1950*).

Taxa that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora List under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Taxa that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Conservation Dependent species are placed in Priority 5.

- **Priority 1** - Poorly known Taxa. Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. Priority 1 taxa may include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey;
- **Priority 2** - Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey;
- **Priority 3** - Poorly Known Taxa. Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey;
- **Priority 4** - Rare Taxa. Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years; and
- **Priority 5** - Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.

Based on the desktop assessment that has been conducted above, several Priority and Threatened Species could be present within the vicinity of Lot 1 and 2 Tee Tree Road Bindoon. A detailed site search was undertaken to assess the site for the above listed flora species (Table 2, Page 10).

#### 4. Site Assessment

Site flora survey and intensive Threatened Flora survey was undertaken at the proposed development areas and remnant vegetation areas, this was undertaken on the 13<sup>th</sup> October 2011. This is the spring flowering period, and considered the appropriate time of year to capture most flowering species for positive identification.

##### 4.1. Methodology

The survey area is defined as Lot 1 and 2 Tee Tree Road Bindoon, with the whole property mapped for vegetation types and intensive flora sampling for Threatened Flora in possible habitat types and remnant vegetation areas.

The remnant vegetation areas were traversed on foot and a list of dominant flora species present (native and exotic) was compiled as seen; samples or photographs were collected for unfamiliar species. Specimens collected were pressed, dried and identified. Specialist texts were used to identify specimens (Wheeler *et al*, 2002) with some checked against examples in the reference herbarium at the DEC Albany Regional Herbarium for confirmation. The authority for taxonomic names was DEC's Florabase website as of November 2011.

Intensive survey was undertaken for Threatened Flora species, with follow up identification at the DEC State Herbarium. Areas were searched for Threatened Flora adjacent to known populations and likely habitat for specific species. Vegetation condition was assessed during the field survey. Vegetation condition was assessed using the vegetation condition scale as per Keighery (1994).

##### 4.2. Vegetation

Detailed vegetation inventory was undertaken in the vegetation types identified on site. A total of 149 species was identified within 3 vegetation types. The vegetation types are shown below in Table 3.

**Table 3 – Vegetation Types Identified on site**




Vegetation Unit	Beards Vegetation Association	Site Unit Description	Photograph
Medium woodland; jarrah-marri (EmCc)	965	Medium woodland of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i>	



Table 3 cont.

Vegetation Unit	Beards Vegetation Association	Site Unit Description	Photograph
<b>Mosaic Medium open woodland: jarrah, marri &amp; banksias (EmCcBa),</b>	1027	Medium open woodland: Jarrah & Marri, with low woodland Banksia/sparse woodland jarrah/marri	
<b>Cleared paddock areas</b>	N/A	Open paddocks, cleared of native vegetation, occasional paddock trees Jarrah & Marri,	

A map of the vegetation types identified on site is shown in Appendix D. Descriptions and Photographs of each vegetation type are given in the following sections.

#### 4.3. Marri Jarrah (EmCc)

Shepard *et al.* (2002) estimate the pre-European extent of 965: Medium woodland; Jarrah – Marri was 114,948ha, with a current area of 5,415ha. It is estimated that 36% of this vegetation type is represented in national parks, nature reserves and state forest and 10.2% is represented in other reserves. The subject site comprised of approximately 20% of this vegetation type which was identified as small isolated remnant areas which had not been previously cleared in the eastern side of the subject area. Please refer to Appendix D– Vegetation Mapping.

The dominant overstorey species in this vegetation type are: *Eucalyptus marginata*, jarrah; and *Corymbia calophylla*, marri. These species form a mosaic of Medium to Low Open Forest with tree height between 15 to 30m. Jarrah comprises between 30-70% of the canopy cover and marri comprise 2-10% canopy cover. Banksia grandis, *Allocasuarina humilis*, occasional *Eucalyptus tottiana* (Coastal Blackbutt), *Banksia sessilis* var. *Sessilis*, *Xanthorrhoea preissii* and *Hakea lissocarpa* were the dominant second storey species within this vegetation complex, and represent 10-30% vegetation cover. These species were shrubs 1- 2m. The midstorey species were generally less dominant due to the vegetation being grazed. Please refer to Photographs 5 and 6.





**Photograph 5** – View along eastern boundary of subject site in Jarrah/Marri vegetation type, Good Condition.



**Photograph 6** – View of Jarrah/Marri in south east of subject site, the largest remnant patch, Good condition.

Other species identified within this cover class (1m to greater than 2m in height) include: *Anigozanthos humilis*; *Austrodanthonia occidentalis*, *Baeckea grandiflora*; *Caladenia flava* *Drosera erythrorhiza*; *Elythranthera brunonis*, *Haemodorum venosum*; *Kennedia prostrata*, *Lomandra caespitosa*, *Neurachne alopecuroidea*, *Petrophile striata*; *Stylidium hispidum*; *Stylidium calcaratum*; *Trachymene pilosa*, and *Tricoryne elatior*. The sedge and herb storey in this vegetation complex has 10-30% cover depending on the amount of grazing the vegetation has sustained. The majority of species were less than 1m in height. Please refer to Appendix D – Flora Species List.

The Medium Woodland vegetation type is generally considered to be in “Disturbed” condition: “Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate to it;” (Keighery, 1994). Some areas of “Good Condition”: Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate to it; (Keighery, 1994), occurs in the eastern extent of the remnant vegetation areas. Refer to Mapping Appendix D.

#### 4.4. Mosaic: open woodland: Jarrah & Marri, with low woodland *Banksia*/sparse woodland jarrah/marri (EmCcBa)

Shepard *et al.* (2002) estimate the pre-European extent of Vegetation Type 1027 open woodland: Jarrah & Marri, with low woodland *Banksia*/sparse woodland jarrah/marri was 46,748ha, with a current area of 16,423ha. It is estimated that 30.1% of this vegetation type is represented in national parks, nature reserves and state forest, and 0% is represented in other reserves. Lot 1 (south west of subject area) is comprised of approximately 90% of this vegetation type, although is in a much degraded form due to clearing and grazing of stock. Please refer to Appendix D – Vegetation Mapping.

The overstorey in this vegetation type is dominated by a mosaic of *Eucalyptus marginata*, jarrah; *Corymbia calophylla*, marri, and *Banksia attenuata*; Slender *Banksia* and occasional *Eucalyptus tottiana*, Coastal Blackbutt and *Nuytsia floribunda*; Australian Christmas Tree, comprising to 10-60% cover depending on disturbance. The dominant shrubland species in this vegetation type are: *Pteridium esculatum*, bracken, *Adenanthos cygnorum*, *Astroloma xerophyllum*, *Bossiaea eriocarpa*, *Centrolepis drummondiana*, *Daviesia nudiflora*, *Hakea ruscifolia*, *Hibbertia hypericoides*,

*Lechenaultia floribunda* *Jacksonia floribunda*, *Patersonia occidentalis*, and *Synaphea spinulosa* which comprise 0-30% cover depending on disturbance. Please refer to Photograph 7 below.



**Photograph 7** – View of Mosaic: jarrah, marri, banksias woodland in sandy soils in south west of subject area.

This vegetation type which has been disturbed is generally considered to be in “Degraded” condition: *“Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management”*. (Keighery, 1994).

#### 4.5. Paddock Grasslands (G)

The cleared areas form approximately 70% of the property. This vegetation type is considered to be in a “Completely Degraded” condition: *“The structure of the vegetation is no longer intact and the area is completely or almost completely without native species”* (Keighery, 1994). This area can be described as Parkland Cleared, and may have been cleared in the past for the purposes of farming and agricultural use. Vegetation is primarily composed of environmental (non aggressive) weed species with isolated trees of *E.marginata* and *C.calophylla* and some areas of tagsaste plantations.

Please refer to Photograph 8 and 9 below, and Vegetation Mapping Appendix D.



**Photograph 8** – View to the west from eastern paddocks



**Photograph 6** – View of isolated Jarrah/Marri trees in cleared paddock areas.

#### 4.6. Recommendations

Based on the site survey, it is therefore recommended:

- The development is restricted to areas previously disturbed.
- Intact native vegetation in “Good” Condition should be retained to preserve biodiversity and habitat;
- Clearing of any native vegetation should be restricted to existing cleared areas and should not extend into current remnant vegetation patches; and
- Vegetation should be fenced from stock.

#### 4.7. Threatened Flora

A search of the DEC Threatened (Declared Rare) Flora and WA Herbarium Databases was undertaken with the Species and Communities Branch of DEC. Please refer to Report in Appendix C. The database search revealed a possible 13 species could be located within 5km of the subject area.

The subject site was intensively searched in remnant vegetation areas for Threatened Flora species, as listed in Table 2 and Appendix C. Searches were undertaken in walked, sweeping transects searching all of the remnant vegetation areas for a minimum of 100m outside of vegetation areas.

Site searches revealed the presence of Priority Flora species (*Acacia drummondii* ssp *affinis*), Priority 3 pursuant to Subsection 2 of Section 23F of the *Wildlife Conservation Act 1950*. Please refer to Vegetation Mapping Appendix D.

No species of Declared Rare Flora (DRF) was located on site.

It is therefore recommended:

- The development is restricted to areas previously cleared, and the remnant vegetation area containing the Priority 3 species *Acacia drummondii* ssp *affinis* is fenced to exclude stock to maintain habitat for the species.

#### 4.8. Environmentally Sensitive Areas and Threatened Ecological Communities

There are no Environmentally Sensitive Areas on the subject site or adjacent to Lot 1 and 2 Tee Tree Road, Bindoon.

A search for Threatened Ecological Communities (TECs) within the Swan (SWA2) IBRA bioregion on the SLIP portal database found that there are no TECs present on the subject site.

#### 4.9. Weeds

In 1976 the Agriculture Protection Board introduced legislation to control weeds – the *Agriculture and Related Resources Protection Act 1976*. This legislation sets out “declared” plants and legal obligations to landowners in regards to these species. If a plant is declared then landowners are obliged to control that plant on their properties.

Environmental Weeds are defined by the “Environmental Weeds Strategy for Western Australia” (1999) as “plants that establish themselves in natural ecosystems and proceed to modify natural processes, usually adversely, resulting in the decline of the communities they invade”. At present there is no legislation governing management of Environmental Weeds, landowners are encouraged to control movement and restrict further spread of these species.

Any plant other than a declared plant can be prescribed as a “Pest Plant”, under Section 109 of the *Agriculture and Related Resources Protection Act 1976*. Typically these are prescribed whereby the occurrence of these may adversely affect property values, comfort or convenience of the inhabitants of a particular district.

The Act states (6) (1) “The council may serve on the owner or occupier of private land...a duly completed notice...requiring him/her to destroy eradicate, or otherwise control any pest plant on that land”(Agriculture and Related Resources Protection Act 1976).

Thirty eight weed species in total were recorded, excepting the Pink Gladiolus (*Gladiolus caryophyllaceus*), the majority of these weeds are non aggressive in nature, refer to Table 3.

**Table 3 – Weed species present on site**

Family	Species	Common Name
POACEAE	<i>Avena sp.</i>	Wild oats
BRASSICACEAE	<i>Brassica tournefortii</i>	
POACEAE	<i>Bromus diandrus</i>	
MYRTACEAE	<i>Callistemon x citrinus</i>	
FABACEAE	<i>Chamaecytisus palmensis</i>	Tagasaste
ASTERACEAE	<i>Cotula coronopifolia</i>	Waterbuttons
CYPERACEAE	<i>Cyperus brevifolius</i>	
CYPERACEAE	<i>Cyperus tenuiflorus</i>	
ORCHIDACEAE	<i>Disa bracteata</i>	
SCROPHULARIACEAE	<i>Dischisma arenarium</i>	
POACEAE	<i>Ehrharta longiflora</i>	Annual Veldt Grass
GERANIACEAE	<i>Erodium botrys</i>	
IRIDACEAE	<i>Gladiolus caryophyllaceus</i>	Pink gladiolus
ASTERACEAE	<i>Helichrysum luteoalbum</i>	
ASTERACEAE	<i>Hypochaeris glabra</i>	
CYPERACEAE	<i>Isolepis marginata</i>	
CYPERACEAE	<i>Isolepis prolifera</i>	
FABACEAE	<i>Lotus subbiflorus</i>	
FABACEAE	<i>Ornithopus compressus</i>	
FABACEAE	<i>Ornithopus sativus</i>	
OROBANCHACEAE	<i>Orobanche minor</i>	
SCROPHULARIACEAE	<i>Parentucellia viscosa</i>	
POACEAE	<i>Pentaschistis airoides</i>	
POLYGONACEAE	<i>Persicaria decipiens</i>	
CARYOPHYLLACEAE	<i>Petrorhagia dubius</i>	
POACEAE	<i>Polypogon monspeliensis</i>	Annual beardgrass
IRIDACEAE	<i>Romulea rosea</i>	Guildford grass
ASTERACEAE	<i>Sonchus asper</i>	
ASTERACEAE	<i>Sonchus oleraceus</i>	Sowthistle
FABACEAE	<i>Trifolium arvense</i>	Hare's foot clover
FABACEAE	<i>Trifolium dubium</i>	
FABACEAE	<i>Trifolium hirtum</i>	Rose clover
FABACEAE	<i>Trifolium subterraneum</i>	Subclover
ASTERACEAE	<i>Ursinia anthemoides</i>	
ASTERACEAE	<i>Vellereophyton dealbatum</i>	
POACEAE	<i>Vulpia myuros</i>	
CAMPANULACEAE	<i>Wahlenbergia capensis</i>	

The weed species identified are not “Declared” weeds under the *Agricultural and Related Resources Protection Act 1976*, and are environmental weeds which should be restricted from movement off-site and further into any adjacent vegetation. The Pink Gladiolus (*Gladiolus*



*caryophyllaceus*) is aggressive and is present within the remnant native vegetation on the eastern boundary of the subject site. It is recommended this species is targeted for control and eradication from the area to allow native species to establish.

Skeleton Weed (*Chondrilla juncea*) has been recorded on site, however no species were located during vegetation survey. Skeleton Weed is a Declared plant. Management strategies for this species include:

- P1 – Plants which cannot be introduced or spread; and
- P4 – Containment, plants should be prevented from further spread.

***Skeleton Weed Control Method - Report any plants to the Department of Agriculture and Food (DAFWA)***

All plants found must be reported immediately to Agriculture Western Australia or District Agriculture Protection officers to be dealt with under the Skeleton Weed Eradication Project.

It is therefore recommended:

- Weeds should be controlled on-site and restricted from movement offsite, this can be undertaken by ensuring machines are clean on entry and exit when disturbing any soils or vegetative matter;
- The Pink Gladiolus (*Gladiolus caryophyllaceus*) is targeted for eradication in the eastern remnant vegetation area; and
- Continue monitoring the subject area for occurrences of the Declared plant Skeleton Weed (*Chondrilla juncea*) and if located report to DAFWA.

## 5. Discussion

The Shire of Chittering have a Local Biodiversity Strategy which aims to conserve existing native vegetation and extend linkages to further protect vegetation complexes and values. The subject site is not located in a Priority area or contains a Priority Vegetation Complex.

The Priority areas of native vegetation (SOC, 2010) include:

- Natural areas with vegetation complexes under represented regionally and locally, within and outside the IHCVAs;
- Adequate buffers to significant flora, fauna and ecological communities;
- Adequate buffers to creeklines and other wetlands;
- Vegetation that provides habitat to Carnaby's black cockatoos;
- Patches of native vegetation that form a regional or local ecological linkage;
- Buffers to formal conservation reserves as well as private properties with voluntary management agreements through Land for Wildlife and conservation reserves or similar; and
- High conservation value roadside remnant vegetation.

The vegetation on site supports possible habitat and feed trees for the Carnaby's Black Cockatoo and Baudin's Cockatoo these species are presently protected Federally and under State legislation.

### **Status:**

Carnaby's Black Cockatoo: Wildlife Conservation (Specially Protected Fauna) Notice 2010 - Schedule 1 Endangered: EPBC Act Endangered; Forest Red-Tailed Black Cockatoo: Wildlife Conservation (Specially Protected Fauna) Notice 2010 Schedule 1 - Vulnerable: EPBC Act Vulnerable;.

A survey of possible habitat trees and feed trees was not undertaken within the scope of these works. It is possible that isolated trees in paddock areas could be frequented by these species. A survey of trees which are going to be removed in the paddock areas (i.e for road or fencing infrastructure) should be undertaken and referral to the Federal Department of Sustainability, Environment, Water, Population and Communities may be required depending on the outcome.

The subject site supports remnant native vegetation patches in the east of the site which is in "Good" Condition which, if fenced from stock, would recover to "Excellent Condition without any further revegetation. The protection of these areas would provide an increase in the biodiversity values of the local area, meeting one of the aims of the Shire of Chittering Biodiversity Strategy.

It is recommended to the client that the following is implemented at Subdivision to ensure the existing Biodiversity values are achieved and future values for the area are achieved:

1. Protect the Priority 3 species *Acacia drummondii ssp affinis*, and provide further suitable habitat for the species in the future by fencing the area from stock;
2. Increase the local Biodiversity by creating north-south and east-west micro corridors.
3. The remnant vegetation areas in the east should be fenced to exclude stock in an effort to increase the biodiversity within these areas and encourage regeneration.
4. A survey of current habitat and feed trees of the Carnaby's and Red tailed black cockatoo occur of any trees >500mm diameter.
5. Applying Development Exclusion Zones over remnant vegetation areas in 'Good Condition' to ensure the long term protection of these areas. A notification on title should be applied to ensure if the land is sold this is known to prospective buyers.

These recommendations have been mapped across the site and is shown in Appendix F – Recommendations Mapping.



## 6. Conclusion

Bio Diverse Solutions was commissioned to undertake a Spring Flora and Vegetation Survey of Lot 1 and 2 Tee Tree Road Bindoon as part of investigations requested from Whelans in support of a proposal to rezone land for Rural Residential purposes. The Spring Flora and Vegetation Survey is required by the Western Australian Planning Commission (WAPC) to assist with the rezoning process. The survey is aligned to Environmental Protection Authority (EPA) *Guidance Statement number 51: Terrestrial Flora and Vegetation Surveys*.

This report details the vegetation types on site, gives a flora inventory, an assessment of Threatened Flora and recommendations for future management of the proposed Rural Residential Development land use. The assessment of the site involved desktop assessment by review of the GIS datasets mapping (DoW, DEC), review of DEC Threatened Flora Database, review of literature sources, searches of Florabase and associated reference texts.

The survey area was approximately 484 ha, with the majority of the site cleared for agricultural use, intensive survey was undertaken in remnant vegetation patches via traversing on foot. Physical survey was undertaken in the spring flowering period on the 13<sup>th</sup> October 2011, which is considered the appropriate time of year for positively identifying plant species. Site survey included sweeping transects across the whole site, remnant vegetation areas, and further intensive searches for Threatened Flora at probable habitat types.

A total of three Vegetation types were identified on site, being:

- Medium woodland; jarrah-marri (EmCc);
- Mosaic: Medium open woodland: Jarrah & Marri, with low woodland Banksia/sparse woodland jarrah/marri; and
- Grassland areas: bare paddock areas.

One Priority species as listed by the Wildlife Conservation Act 1950 was located within a remnant vegetation area in the east. This area is not proposed to be disturbed as part of the subdivision development.

The proposed development is utilising already cleared/disturbed areas for infrastructure requirements, with some removal of isolated paddock trees for road/infrastructure requirements. The vegetation in these areas was considered to be in Completely Degraded Condition. It is not anticipated that this development will impact the remnant vegetation areas which are in Good Condition.

The findings in this report are based on the implementation of the following recommendations:

1. Protect the Priority 3 species *Acacia drummondii* ssp *affinis*, and provide further suitable habitat for the species in the future by fencing the area from stock;
2. Increase the local biodiversity by creating north-south and east-west micro corridors, by linking to the remnant vegetation patches in the east of the subject site and through the north of existing Lot 1;
3. The remnant vegetation areas in the east should be fenced to exclude stock in an effort to increase the biodiversity within these areas and encourage regeneration;
4. A survey of current habitat and feed trees of the Carnaby's and Red tailed black Cockatoo occur of any trees >500mm diameter, depending on the outcome of the survey, possible referral may be required to the Federal Department of Sustainability, Environment, Water, Population and Communities;
5. Applying Development Exclusion Zones over remnant vegetation areas in 'Good Condition' to ensure the long term protection of these areas. A notification on title should be applied to ensure if the land is sold this is known to prospective buyers.

6. Weeds should be controlled on-site and restricted from movement offsite, this can be undertaken by ensuring machines are clean on entry and exit when disturbing any soils or vegetative matter;
7. The Pink Gladiolus (*Gladiolus caryophyllaceus*) is targeted for eradication in the eastern remnant vegetation area; and
8. Continue monitoring the subject area for occurrences of the Declared plant Skeleton Weed (*Chondrilla juncea*) and if located report to DAFWA.

If the above recommendations are implemented the property would assist in achieving the following goals from the Shire of Chittering's local Biodiversity Strategy:

1. **Goal 1 – Retention of natural areas:** through the fencing of all the “Good Condition” vegetation areas and providing linkages to adjacent remnant vegetation.
2. **Goal 2 – Protection of natural areas:** in remnant vegetation areas place “Development Exclusion” and notification on title top prospective buyers.

Bio Diverse Solutions conclude that if the listed recommendations are implemented by the client, the development of rural residential on Lot 1 and 2 Tee Tree Road Bindoon can be implemented sustainably and in an environmentally sound manner.

It is further recommended that if the construction of this development is not undertaken within 5 years of this survey, after that time the Spring Survey should be re-conducted to verify/confirm absence/presence of Threatened Flora species adjacent to proposed disturbance areas.

## 7. References

Australian Geoscience Mapping (1984) Map series S50-14 Part of Sheet S150-13, Mt Barker to Perth.

Beard's Vegetation Classification dataset, 1:3,000,000 digital representation of Beard's vegetation map of the state of Western Australia.

Bureau of Meteorology Climate Data Gingin accessed December 2011:

<http://www.bom.gov.au/climate/data/index.shtml>

Climate Commission (2010) Climate Change Impacts, website accessed 15-11-11 from

<http://climatecommission.gov.au/topics/western-australia-climate-change-impacts/>

Commonwealth of Australia (1996) *The National Strategy for the Conservation of Australia's Biological Diversity*. Department of Environment, Sport and Territories, Canberra, ACT. Department of Environment and Conservation (DEC) (2006) *List of Threatened Ecological Communities on the Department of Environment and Conservation's Threatened Ecological Community (TEC) Database endorsed by the Minister for Environment, Species and Communities Branch*.

Department of Environment and Conservation (DEC) (2008) *Priority Ecological Communities for Western Australia*.

Department of Sustainability, Environment, Water, Population and Communities (2011) *Environment Protection and Biodiversity Conservation Act 1999 draft referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered), Calyptorhynchus latirostris Baudin's cockatoo (vulnerable), Calyptorhynchus baudinii Forest red-tailed black cockatoo (vulnerable)*. Commonwealth of Australia.

Environmental Protection Authority (EPA) (2002) *Terrestrial Biological Surveys as an Element of Biodiversity Protection*, Position Statement No. 3, March 2002.

EPA (2004) *Guidance for the Assessment of Environmental Factors, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*, Guidance Statement No 51 June 2004;

Gardner, C.A. (1979) *Eucalypts of Western Australia*, Western Australian Department of Agriculture, Bulletin 4013.

Hearn, R., Williams, K. and Comer, S. (2002) *Swan (SWA- Swan)*, A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002, Department of Conservation and Land Management.

Hussey, B.M.J., Keighery, E.J., Coussens, R.D., Dodd, J. and Lloyd, S.G. (1997) *Western Weeds A Guide to the Weeds of Western Australia*, The Weeds Society of WA Inc.

Keighery, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA.

Lindenmayer, D. and Burgman, M. (2005) *Practical Conservation Biology*, CSIRO Publishing, Victoria, Australia.

Moore, J. and Wheeler, J. *Southern Weeds and Their Control*, Department of Agriculture.

Sandiford, E.M. and Barrett, S. (2010). *Albany Regional Vegetation Survey, Extent Type and Status, A project funded by the Western Australian Planning Commission (EnviroPlanning "Integrating NRM into Land Use Planning" and State NRM Program)*, South Coast Natural

*Resource Management Inc. and City of Albany for the Department of Environment and Conservation.* Unpublished report. Department of Environment and Conservation, Western Australia.

Shire of Chittering (2010) Local Biodiversity Strategy, Shire of Chittering, Bindoon WA.  
Wheeler, J, Marchant, N. and Lewington, M., (2002) *Flora of the South West, Volume 1 & 2*, Australian Biological Resources Study, University of Western Australia.

**Appendices**

**Appendix A – Location Mapping**

**Appendix B – Outline Development Plan**

**Appendix C – DEC Threatened Flora Report**

**Appendix D – Vegetation Mapping**

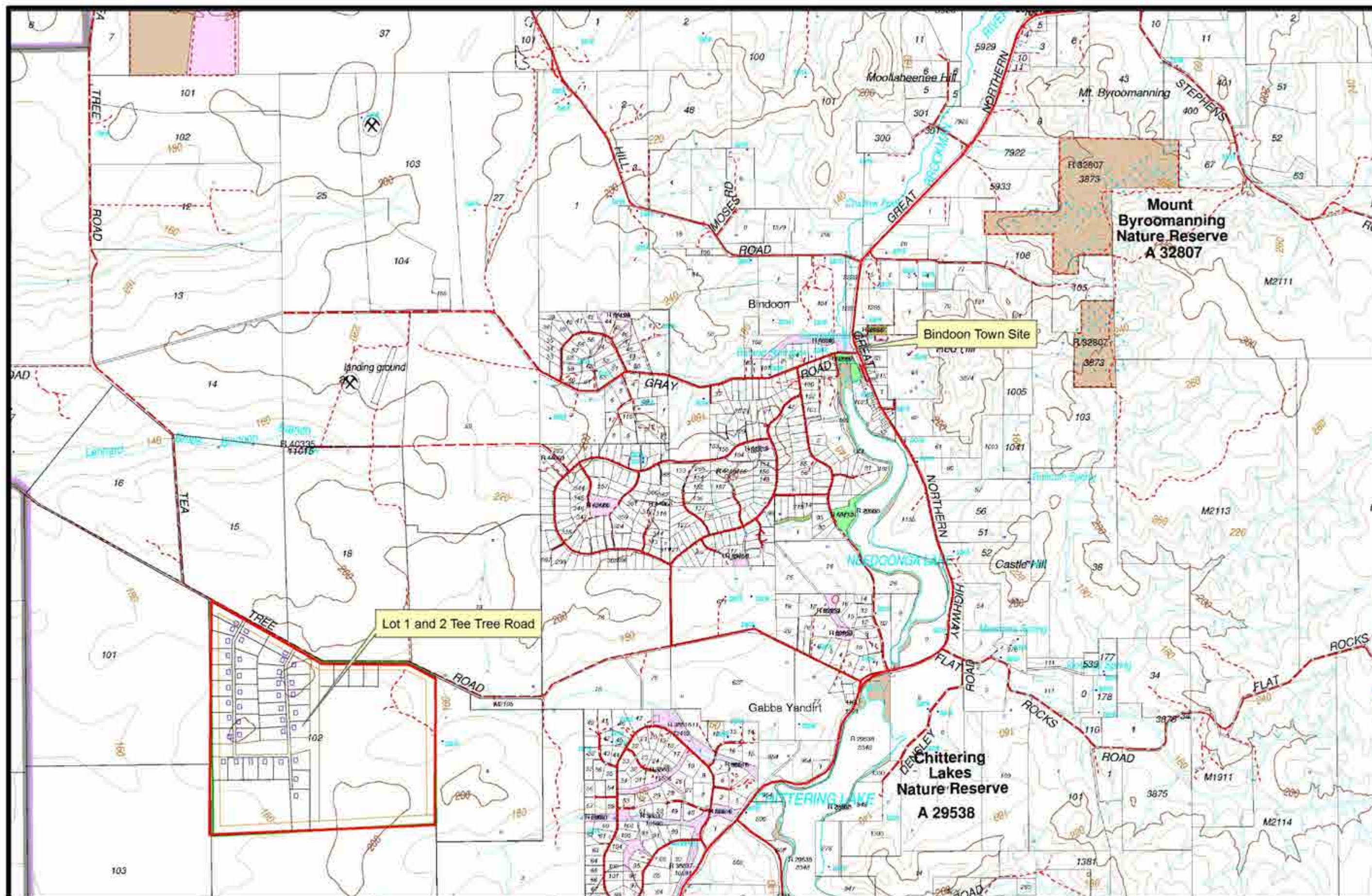
**Appendix E – Flora Species List**

**Appendix F – Recommendations Mapping**

**Appendix A**

**Location Mapping**





## Legend

Subject area

Scale  
1:40000 @ A3



0 390 780 1,560 2,340 3,120 Meters



**BIO  
DIVERSE  
SOLUTIONS**

55 Peppermint Drive  
Albany, WA 6330  
Australia  
Tel: 08 9841 3936  
Fax: 08 9841 3936  
Mob: 0447 555 516

CLIENT Lot 1 and 2 Tee Tree Road  
Bindoon WA

## Location Mapping

STATUS	FILE	DATE
FINAL	WHEL014	20/01/2012



**Appendix B**

**Outline Development Guide Plan**

**Whelans**

10m road widening of Tea Tree Road

Dwelling construction within 100m FHS to be BAL 12.5

Brennan Road as Strategic Fire Break

Proposed subdivision roads 30m wide

Public open space corridors to link areas of high biodiversity

Retention of windmill on Lot 31

Landowner to retain balance lot for winery and possible incidental tourism uses

Emergency and Fire Service access within POS

Future site for Ukrainian Youth Camp

**ADOPTION**

Adopted by resolution of the Council of the Shire of Chittering and the Ordinary meeting of Council held on the day of 2012 and the seal of the municipality was pursuant to the resolution hereto affixed in the presence of:

President

Chief Executive Officer

Date



**LEGEND**

- 100m Fire Hazard Separation
- Public Open Space
- Strategic Fire Breaks (indicative only)
- Building Envelopes
- Strategic Fire Service Access

**PUBLIC OPEN SPACE**  
Total Site Area of Lots 1 & 2 = 483 hectares  
Public Open Space provided = 48 hectares (10%)

**DEVELOPMENT PLAN LOT YIELD**  
Total No. lots proposed = 44  
(including indicative lots on Tea Tree Rd)

- (a) Development Plan  
This Development Plan has been approved by the Council and the Western Australian Planning Commission. Subdivision and development should generally be in accordance with the Plan.
- (b) Development Requirements and 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 Retreat zone apply.
- (c) Vegetation Preservation  
No clearing is permitted without Planning Consent, within areas of Vegetation Protection and fire-vegetation as depicted on the Development Plan - unless those trees are dead, diseased or present danger to property.
- (d) Building Envelopes  
Buildings, water tanks and waste disposal are to be contained within an area not to exceed a maximum of 2,000 sqm without the prior approval of Council. Building envelopes are to be setback from cadastral boundaries as follows:  
Highways 100 metres  
Road 20 metres  
Rear 20 metres  
Side 15 metres  
If the site is to have a sand pad for the proposed dwelling greater than 0.5 metres above natural ground level, then for every 0.5 metres or height above natural ground level, setback distances are to be increased by 2 metres.
- (e) Fencing  
In accordance with Local Planning Policy No. 22 "Fences", within a lot the construction of a fence around the building envelope, any previously cleared area and adjoining an authorised firebreak, is permitted. Elsewhere, no boundary fences are permitted in vegetation protection areas identified on the Development Plan, without planning consent of the Council.
- (f) Crossovers  
The construction of a crossover to each lot is to be in accordance with Council's specifications.
- (g) 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 the lighting purposes and fitted with a standard 50mm male Camlock valve.
- (h) Land Management  
The maintenance of any drainage swales, easements, fire breaks and vegetation protection and re-vegetation areas is the responsibility of the owner/occupier.
- (i) Bore, Dams and Water Courses  
The sinking of bores, construction of dams and extraction of surface water is not permitted without the approval of the Council and relevant State Government department.
- (j) Fire Control  
Strategic Fire Breaks as shown on the Development Plan will be constructed by the Developer and are to be maintained by the owner/occupier to the satisfaction of the Chief Executive Officer and the Fire and Emergency Services Authority, in accordance with Local Planning Policy No. 21 "Fire Management Plans".
- (k) Permitted Uses  
In considering development and subdivision of the land, the requirements of the Shire of Chittering Town Planning Scheme No. 6 for the Rural Retreat zone apply. 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.
- (l) Stocking Restrictions  
Grazing animals are to be restricted to avoid overgrazing in accordance with Local Planning Policy No. 24 "Stocking Rates and Keeping of Animals".
- (m) Domestic Pests  
The keeping of domestic cats shall be prohibited.
- (n) Roofing Materials  
All buildings shall be constructed with roofs of non-reflective materials.
- (o) Waste Disposal  
Where indicated on the Development Plan, alternative treatment units are required for effluent disposal.
- (p) 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.
- (q) 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 Plan and Fire Management Plan.

Job Number: 11783  
Sheet Name: 11783-6  
Scale: 1:1500 @ A3  
Date: 15/3/2012  
Drawn By: SJF  
Checked by: JEP  
File: s:\Projects\11717\planning\drawings & design\design\11783 outline develop plan.dgn  
All dimensions and areas are subject to survey. This plan is subject to copyright and should not be reproduced without the permission of WHELAN.  
The Coordinate system adopted for this plan and digital data has been derived from Landgate SC28 and is based on MGRS Datum, June 2000. This document must accompany the plan and digital data at all times.



# **OUTLINE DEVELOPMENT PLAN LOTS 1 & 2 TEA TREE ROAD BINDOON**



1:500 0 1000 2000 4000 6000 750

133 Scarborough Beach Road, Mount Hawthorn WA 6016  
PO Box 99, WHELAN TOWN PLANNING WA 6016  
T: 08 9440 1311 F: 08 9440 3701  
E: whelan@whelan.com.au W: www.whelan.com.au

**Appendix C**

DEC Threatened Flora

Database Search



Department of  
**Environment and Conservation**

*Our environment, our future*



Your Ref:

Our Ref: **23-1011FL**

Enquiries: Jessica Donaldson

Phone: (08) 9334 0123

Fax: (08) 9334 0278

Email: [jessica.donaldson@dec.wa.gov.au](mailto:jessica.donaldson@dec.wa.gov.au)

**Bio Diverse Solutions**

55 Peppermint Drive  
Albany WA 6330

Attention: Kathryn Kinnear

Dear Kathryn Kinnear,

**REQUEST FOR RARE FLORA INFORMATION**

I refer to your request of 03 October 2011 for Threatened Flora information in the Bindoon area. The search was conducted within a 5km radial area from the central coordinates you submitted.

A search was undertaken for this area of **(1)** the Department's *Threatened (Declared Rare) Flora* database (for results, *if any*, see "DEFL" – coordinates are GDA94), **(2)** the *Western Australian Herbarium Specimen* database for priority species opportunistically collected in the area of interest (for results, *if any*, see "WAHERB" – coordinates are GDA94 – see condition number 9 in the attached 'Conditions in Respect of Supply' and **(3)**, the Department's *Declared Rare and Priority Flora List* [this list is searched using 'place names'. This list, which may also be used as a species target list, contains species that are declared rare (Conservation Code R or X for those presumed to be extinct), poorly known (Conservation Codes 1, 2 or 3), or require monitoring (Conservation Code 4) – for results, *if any*, see "DP List"]. The results are attached electronically to this email.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the seventh point, which refers to the requirement to undertake field investigations for the accurate determination of rare flora occurrence at a site. *The information supplied should be regarded as an indication only of the rare flora that may be present and may be used as a target list in any surveys undertaken.*

The information provided does not preclude you from obtaining and complying with, where necessary, land clearing approvals from other agencies.

An invoice for \$300 (plus GST) to supply this information will be forwarded.

It would be appreciated if any populations of rare flora you encounter in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss rare flora management, please contact Dr Ken Atkins, Manager, Species and Communities Branch, on (08) 9334 0455.

Yours faithfully

Jessica Donaldson

.....  
for Keiran McNamara  
DIRECTOR GENERAL

7 October 2011

**Species and Communities Branch**

17 Dick Perry Ave, Technology Park, Kensington

Phone: (08) 9334 0455 Fax: (08) 9334 0278

Locked Bag 104, Bentley Delivery Centre, Bentley, Western Australia 6983

[www.dec.wa.gov.au](http://www.dec.wa.gov.au)

## DEPARTMENT OF ENVIRONMENT AND CONSERVATION

### RARE FLORA INFORMATION

#### CONDITIONS IN RESPECT OF SUPPLY OF INFORMATION

1. All requests for data to be made in writing to the Director General, Department of Environment and Conservation, Attention: Threatened Flora Database Officer, Species and Communities Branch.
2. The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided, without the prior written consent of the Director General, Department of Environment and Conservation.
3. Specific locality information for Declared Rare Flora is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for DRF may not be used in public reports without the written permission of the Director General, Department of Environment and Conservation. Publicly available reports may only show generalised locations or, where necessary, show specific locations without identifying species. The Department is to be contacted for guidance on the presentation of rare flora information.
4. Note that the Department of Environment and Conservation respects the privacy of private landowners who may have rare flora on their property. Rare flora locations identified in the data as being on private property should be treated in confidence, and contact with property owners made through the Department of Environment and Conservation.
5. Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data provided, they may be present. The Department of Environment and Conservation accepts no responsibility for this.
6. Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.
7. **It should be noted that the supplied data do not necessarily represent a comprehensive listing of the rare flora of the area in question. Its comprehensiveness is dependant on the amount of survey carried out within the specified area. The receiving organisation should employ a botanist, if required, to undertake a survey of the area under consideration.**
8. Acknowledgment of the Department of Environment and Conservation as source of the data is to be made in any published material. The unique reference number that is given upon the request for information should be quoted. Copies of all such publications are to be forwarded to the Department of Environment and Conservation, Attention: The Manager, Species and Communities Branch.
9. The development of the PERTH Herbarium database was not originally intended for electronic mapping (eg. GIS ArcView). The latitude and longitude coordinates for each entry are not verified prior to being databased. It is only in recent times that collections have been submitted to PERTH with GPS recorded in latitude and longitude coordinates. Therefore, be aware when using this data in ArcView that some records may not plot to the locality description given with each collection.

#### Species and Communities Branch

17 Dick Perry Ave, Technology Park, Kensington

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Locked Bag 104, Bentley Delivery Centre, Bentley, Western Australia 6983

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**THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

**DECLARED RARE AND PRIORITY FLORA LIST**

for Western Australia

**CONSERVATION CODES**

**R: Declared Rare Flora - Extant Taxa**

**Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.**

**X: Declared Rare Flora - Presumed Extinct Taxa**

**Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.**

**1: Priority One - Poorly known Taxa**

**Taxa which are known from one or a few (generally <5) populations which are under threat**, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

**2: Priority Two - Poorly Known Taxa**

**Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat** (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

**3: Priority Three - Poorly Known Taxa**

**Taxa which are known from several populations, and the taxa are not believed to be under immediate threat** (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

**4: Priority Four - Rare Taxa**

**Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors.** These taxa require monitoring every 5-10 years.

Note, the need for further survey of poorly known taxa is prioritised into the three categories depending on the perceived urgency for determining the conservation status of those taxa, as indicated by the apparent degree of threat to the taxa based on the current information.

**Species and Communities Branch**

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ABBREVIATIONS USED IN THREATENED FLORA DATABASE PRINTOUTS

**VESTING**

AAP	Aboriginal Planning Authority
AGR	Chief Executive, Dep. of Agriculture
ALT	Aboriginal Land Trust
APB	Agricultural Protection Board of WA
BGP	Botanical Gardens & Parks Authority
BSA	Boy Scouts Association
CC	Conservation Commission – NPNCA - LFC
CGT	Crown Grant in Trust
COM	Commonwealth of Australia
CRO	Crown Freehold-Govt Ownership
CRW	Crown
DAG	Dep. of Agriculture
DOW	Dep. of Water
DPI	Dep. of Planning & Infrastructure
EXD	Exec Direc CALM
FES	Fire and Emergency Services Aust.
HOW	Dep. of Housing/State Housing Commission
ILD	Industrial Lands Develop. Auth
LAC	LandCorp
MAG	Minister for Agriculture
MBC	Metropolitan Cemeteries Board
MED	Ministry of Education
MHE	Minister for Health
MIN	Minister for Mines
MPL	Ministry for Planning
MPR	Minister for Prisons
MRD	Main Roads WA
MTR	Minister for Transport
MWA	Minister for Water Resources
MWO	Minister for Works
NAT	Natural Trust of Australia WA
NON	Not Vested
PLB	Pastoral Lands Board
PRI	Private/Freehold
RAI	Public Transport Authority
REL	Religious Organisation
SEC	Synergy (ex Western Power)
SHI	Shire
SPC	State Planning Commission
SWA	State of Western Australia
TEL	Telstra
UNK	Unknown
WAT	Water Corporation
WEL	Minister Community Welfare
WRC	Water & Rivers Commission
XPL	Ex-Pastoral Lease

**PURPOSES**

ABR	Aboriginal Reserve
ACC	Access Track
AER	Aerodrome
AIR	Airport
ARS	Agricultural Research Station
BAP	Baptist Union of WA
CAM	Camping
CAR	Caravan park
CEM	Cemetery
CFA	Conservation of Fauna
CFF	Conservation Of Flora & Fauna
CFL	Conservation of Flora
CHU	Church
CPK	Car Park
CMN	Communications
COM	Common

CON	Conservation Park
DEF	Defence
DRA	Drain
EDE	Educational Endowment
EDU	Educational purposes UWA
ENE	Enjoyment of Natural Environ.
EXC	Excepted from sale
EXL	Exploration Lease
EXP	Experimental Farm
FIR	Firing Range
FOR	State Forest
GE	General Lease
GHA	Grain Handling
GOL	Golf
GRA	Gravel Pit
GVT	Government Requirements
HAR	Harbour Purposes
HEP	Heritage Purposes
HER	Heritage trail
HOS	Hospital
KEN	Kennels
LPR	Landscape Protection
MIN	Mining lease
MUN	Municipal Purposes
NPK	National Park
NRE	Nature Reserve
OTH	Other
PAR	Parkland (& Recreation)
PAS	Pastoral lease
PFF	Protection of Flora & Fauna
PFL	Protection of Flora
PIC	Picnic ground
PLA	Plantation
POS	Public Open Space
PRS	Prison site
PUR	Purchase Lease
PUT	Public Utility
QUA	Quarry
RAD	Radio Station
RAC	Racecourse
REC	Recreation
REH	Rehabilitation/Re-establish Native Plants
RRE	Railway Reserve
RUB	Rubbish
SAN	Sand
SCH	School-site
SET	Settlers requirements
SHI	Shire Requirements
SHO	Showgrounds
SNN	Sanitary
SOI	Soil Conservation
STO	Stopping place
TIM	Timber
TOU	Tourism
TOW	Town-site
TRA	Training Ground
TRI	Trig station
UCL	Unallocated Crown Land
UNK	Unknown
VER	Road Verge
VPF	Vermin Proof Fence
WAT	Water
WLS	Wildlife Sanctuary
WOO	Firewood

**DEPARTMENT OF ENVIRONMENT AND CONSERVATION**  
**DECLARED RARE AND PRIORITY FLORA LIST**  
**16 September 2010**

SPECIES / TAXON	CONS CODE	DEC REGION	DISTRIBUTION	FLOWER PERIOD
<i>Acacia browniana</i> var. <i>glaucescens</i>	2	MW,SW	Bindoon, Julimar, Mogumber	
<i>Acacia drummondii</i> subsp. <i>affinis</i>	3	MW,SW	Bindoon, Muchea, Julimar, Wannamal, Mullewa, New Norcia, Drummond NR	
<i>Acacia pulchella</i> var. <i>reflexa</i> acuminate bracteole variant (RJ Cumming 882)	3	SW	Wannamal, Bindoon, York, Boonanarring	
<i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>	3	SW,SR	Chidlow, Mundaring, Collie, Bindoon, Muchea, Sawyers Valley	
<i>Asteridea gracilis</i>	3	SW,SC	Gosnells, Mt Saddleback, South Stirling, Gordon Inlet, Bindoon, Helena Valley	Sep-Oct
<i>Asterolasia nivea</i>	T	SW	Bindoon	Aug-Oct
<i>Astroloma</i> sp. <i>Cataby</i> (EA Griffin 1022)	4	MW,SW	Eneabba, Gairdner Range, Cataby, Calingiri, Bindoon, New Norcia	Feb-Jul
<i>Astroloma</i> sp. <i>Nannup</i> (RD Royce 3978)	4	SR,SW,WA	Bindoon, Forest Grove, Nannup, Scott River, Careys Flat, Manjimup (Barlee Brook), Witchcliffe, Abba River, Margaret River	Apr-Jun
<i>Calothamnus pachystachyus</i>	4	MW,SW	Bindoon, Mogumber, New Norcia	Aug-Oct
<i>Commersonia</i> sp. Bindoon (CF Wilkins & F & J Hort CW 2155)	1	SW	Bindoon	
<i>Conostylis caricina</i> subsp. <i>elachys</i>	1	WB,SW	Gunyidi, Goomalling, Dowerin, Bindoon	Aug,Sep
<i>Cyanicula ixioides</i> subsp. <i>candida</i>	2	SW	Bindoon, Smiths Mill, York, Wooroloo	Sep-Oct
<i>Drosera sewelliae</i>	1	SW	Lower Chittering, Julimar	Oct
<i>Eucalyptus exilis</i>	4	MW,WB,SW	Mt Lesueur, Coorow, Boyagin Rock, Wandering, Bindoon, Gunapin, Coomallo NR, Beverley	Dec-Apr
<i>Gastrolobium crispatum</i>	1	SW	Bindoon, Julimar, Gidgegannup, Mt Byroomanning	Oct
<i>Goodenia arthrotricha</i>	T	SW,MW	Wannamal, Moora, Ellis Brook, Bindoon	Nov,Dec
<i>Grevillea corrugata</i>	T	SW	Bindoon	Aug-Sep
<i>Grevillea drummondii</i>	4	MW,SW	Bindoon, Hay Flat, New Norcia, Yandan Hill	Jun-Oct
<i>Grevillea florida</i>	3	MW,SW	Bindoon, New Norcia, Cataby	Jul-Sep
<i>Hibbertia glomerata</i> subsp. <i>ginginensis</i>	1	SW	Gingin, Bindoon	Jul-Sep
<i>Hibbertia miniata</i>	4	SW	Hay Flat, Bindoon Hill, Julimar, Wannamal	Jul-Oct
<i>Hypocalymma</i> sp. Tea Tree Road (O. Davies OD 171)	1	SW	Bindoon	
<i>Hypocalymma sylvestre</i>	1	SW	Chittering	Aug-Oct
<i>Johnsonia inconspicua</i>	3	SR,SW	South of Carbunup, Yelverton, Bindoon, Julimar, Quindalup	Nov
<i>Lasiopetalum</i> sp. Toodyay (F. Hort 2689)	1	SW	Wannamal, Bindoon Training Area	Sep
<i>Lechenaultia magnifica</i>	1	SW,WB	Bindoon, Julimar SF, Calingiri, Gingin	Nov
<i>Oxymyrrhine coronata</i>	4	SW	Chittering, Bullsbrook, Avon Valley	Dec,Jan
<i>Persoonia sulcata</i>	4	SW,WB,MW	John Forrest N.P., Wongamine N.R., Bindoon, Dardadine, Calingiri	Sep-Nov
<i>Petrophile plumosa</i>	3	MW,SW	Bindoon, Mogumber, New Norcia	Jul-Nov
<i>Schoenus griffinianus</i>	3	MW,WB,SW	Eneabba, Wongan Hills, Greenough, Chittering, Hazelmere, Wanneroo	Oct-Nov

**DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DECLARED RARE AND PRIORITY FLORA LIST  
16 September 2010**

SPECIES / TAXON	CONS CODE	DEC REGION	DISTRIBUTION	FLOWER PERIOD
<i>Senecio gilbertii</i>	1	SW,SR	Bindoon, York, Wooroloo, Wilga, Gooseberry Hill	Sep-Nov
<i>Spirogardnera rubescens</i>	T	MW,SW	Bindoon-Eneabba, Alexander Morrison NP	Aug-Nov
<i>Stylidium cymiferum</i>	3	MW,SW	Calingiri, Bindoon, Chittering, Toodyay	Oct
<i>Stylidium glabrifolium</i>	2	SW	Bindoon	Oct
<i>Synaphea grandis</i>	4	MW,SW	Wannamal, New Norcia, Julimar, Muccha, Bindoon, Gingin	Oct-Nov
<i>Synaphea panhesya</i>	1	SW	Bindoon, Mogumber	Aug-Sep
<i>Tetratheca similis</i>	3	SW	Bindoon, Mt Dale area, Wandoo CP	Aug-Sep
<i>Verticordia serrata</i> var. <i>Udumung</i> (D Hunter & B Yarran 941006)	2	SW	Bindoon	Oct

OID SHEET_NO	SPECIES	CONSCODE	20_1011_WAHERB SITE	VEGETATION	LOCALITY	LAT	LONG_	DATE_
PERTH 00319244	Acacia drummondii subsp. affinis	3	On hillside in latetitic gravel.		22.5 km from Bullsbrook East towards Chittering	-31.4642	116.025	02 08 1973
PERTH 07215134	Acacia drummondii subsp. affinis	3	On high ground between the highway and lake.	Remnant woodland. Contiguous with fringing vegetation on la	Site 7, Great Northern Highway, S of Bindoon	-31.4167	116.0833	09 2005
PERTH 00342750	Acacia pulchella var. reflexa acuminate bracteole varian	3	Road verge.	Eucalyptus calophylla-wandoo woodland.	8 km (5 miles) from Bindoon towards Toodyay	-31.4519	116.09	05 09 1981
PERTH 1616188	Adenanthos cygnorum subsp. chamaephyton	3	Low upland, well drained; shallow grey sand over laterite,	Low Heath C over Low Heath D (Scheme of Muir 1977); Alloca	Private Property, 6.4 km at 250degrees from Bindoon	-31.409	116.0348	24 11 1990
PERTH 07215126	Adenanthos cygnorum subsp. chamaephyton	3	On slope above the highway, adjacent to totally cleared pa	Isolated remnant woodland. Good understorey diversity rema	Site 10, Great Northern Highway, S of Bindoon	-31.4167	116.0833	09 2005
PERTH 01297473	Astroloma sp. Cataby (E.A. Griffin 1022)	4	Yellow gravel soil.	Forest.	7 miles from Bindoon, 50 miles NE of Perth	-31.3833	116.0833	27 04 1957
PERTH 07782160	Chamelaucium sp. Gingin (N.G. Marchant 6)	T	Slope, dry red-brown gravel.	No associated species.	Lot 439 Breera Road, Gingin, lot number on front entry gate shown as 4!	-31.4401	115.9693	03 09 2007
PERTH 847917	Cyanicula ixioiodes subsp. candida	2		Eucalyptus wandoo and E. calophylla woodland over formerly	9 km NNE of Bindoon, access off Stevenson Road	-31.3833	116.0833	21 09 1986
PERTH 01052683	Gastrolobium nudum	2			Chittering	-31.4414	116.0964	25 09 1956
PERTH 04360745	Grevillea corrugata	T	In gravelly loam.	Beside road in eucalypt forest. Disturbed verge.	Julimar road, 1.3 km from Chittering road, c. 10 km S of Bindoon	-31.4333	116.0667	04 10 1992
PERTH 04360753	Grevillea corrugata	T	In gravelly loam.	Beside road in eucalypt forest. Disturbed verge.	Julimar road, 1.3 km from Chittering road, c. 10 km S of Bindoon	-31.4333	116.0667	04 10 1992
PERTH 04360761	Grevillea corrugata	T	In gravelly loam.	Beside road in eucalypt forest. Disturbed verge.	Julimar road, 1.3 km from Chittering road, c. 10 km S of Bindoon	-31.4333	116.0667	04 10 1992
PERTH 07739028	Hypocalymma sp. Tea Tree Road (O. Davies OD 171)	1	Gentle slope. Damp, brown sand-loam-gravel over laterite.	Low Heath D. Hibbertia hypericoides var. hypericoides, Pentas	In property of Tea Tree Road, Bindoon	-31.4417	116.0547	22 11 2007
PERTH 03259951	Oxymyrrhine coronata	4	Lateritic gravel.	Marginal Jarrah/Wandoo forest.	3.5 km SE of Keating road, Chittering	-31.4414	116.0964	10 12 1981
PERTH 07782152	Ptychosema pusillum	T	Slope, dry white sand.	Low Woodland B over Low Heath Cover Herbs. Banksia menze	Lot 439 Breera Road, Gingin, Plants at NE corner of property on fire brea	-31.4383	115.9716	18 09 2007
PERTH 08202931	Tetratheca pilifera	3	Slope, breakaway. Gully, drainage line. Dry - moist brown l	Eucalyptus wandoo fringing shrubland. Associated species: Tr	350 Bindoon Spring Road, ca 750 m E of the farmhouse, Toodyay Wes	-31.4137	116.0723	08 10 2009
PERTH 07835302	Verticordia rutilastra	3	Sand, flat, private property.	Low Open Woodland of Eucalyptus todiana and Banksia attar	Lot 26 Ioppolo Road, Dandragan Plateau	-31.4548	115.9904	12 10 2008

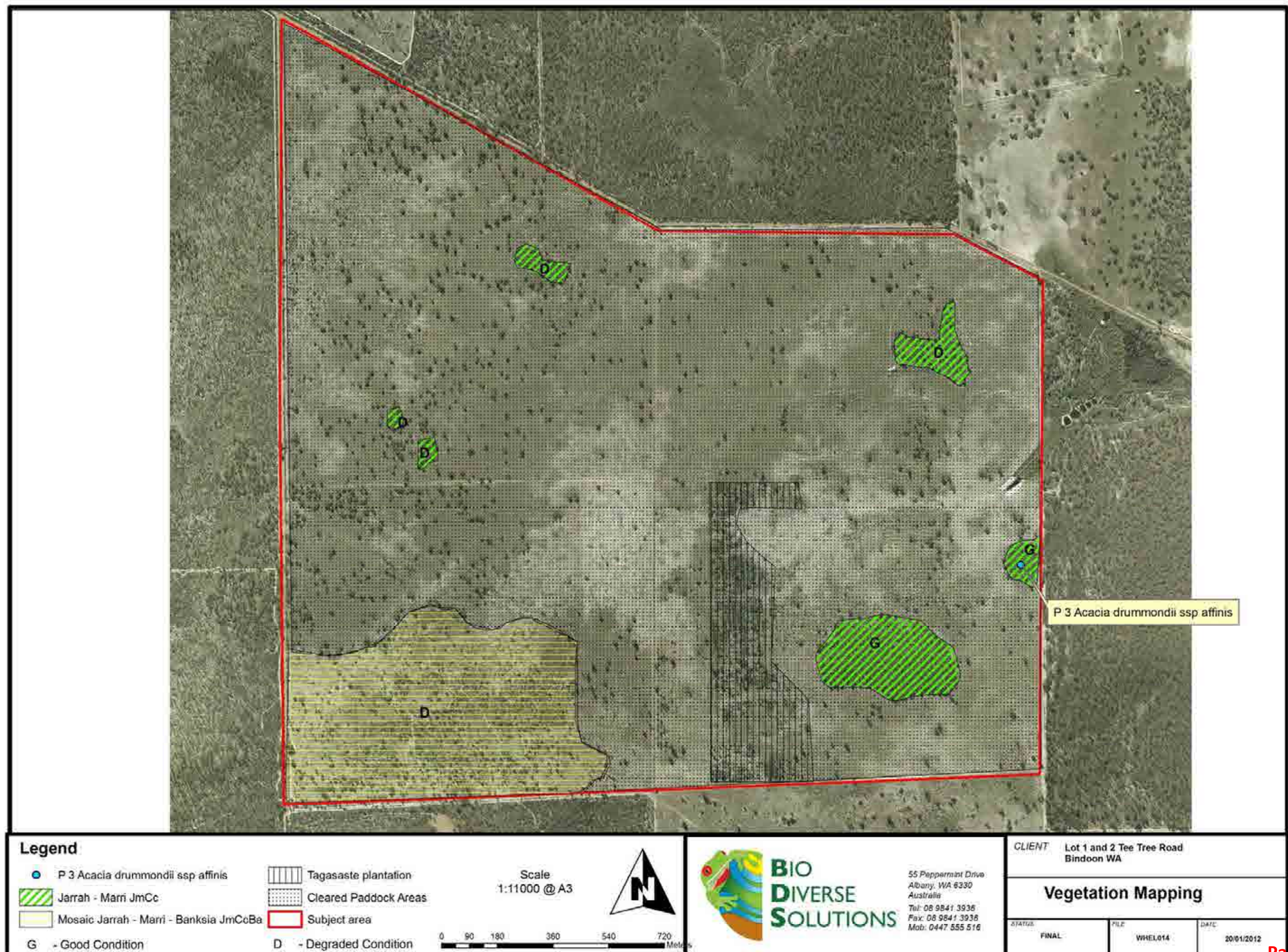


23_1011 DEFL												
OID_	SHEET	SPNAME	CONSVCOE	POPID1	POPID2	GDA94LAT	GDA94LONG	VESTING	PURPOSE1	PURPOSE2	STATUS	OWNERDATE
	25616	Acacia drummondii subsp. affinis		3	16	-31.41667	116.08333	UNK	UNK			1/09/2005 0:00
	9630	Adenanthos cygnorum subsp. chamaephyton		3	3 A	-31.40322	116.08842	MRD	GRA			26/10/1996 0:00
	9631	Adenanthos cygnorum subsp. chamaephyton		3	3 B	-31.40322	116.08897	SHI	OTH			26/10/1996 0:00
	9632	Adenanthos cygnorum subsp. chamaephyton		3	3 C	-31.40349	116.08869	SHI	VER			26/10/1996 0:00
	9636	Adenanthos cygnorum subsp. chamaephyton		3	3 D	-31.41294	116.09147	SHI	VER			26/10/1996 0:00
	9639	Adenanthos cygnorum subsp. chamaephyton		3	4	-31.43016	116.07814	MRD	VER			26/10/1996 0:00
	9655	Adenanthos cygnorum subsp. chamaephyton		3	11	-31.40905	116.03481	PRI				24/11/1990 0:00
	25678	Adenanthos cygnorum subsp. chamaephyton		3	20	-31.40906	116.03481	PRI				24/11/1990 0:00
	27496	Chamelaucium sp. Gingin (N.G. Marchant 6)	T		7	-31.44006	115.96925	PRI				3/09/2007 0:00
	27494	Ptychosema pusillum	T		3	-31.43828	115.97161	PRI				3/09/2007 0:00

**Appendix D**

Vegetation Mapping







**Appendix E**

Flora Species List

**Flora species list**

Family	Species	Common Name	Weed
FABACEAE	<i>Acacia barbinervis ssp barbinervis</i>		
FABACEAE	<i>Acacia drummondii ssp affinis</i>	P3 #319	
FABACEAE	<i>Acacia pulchella</i>		
FABACEAE	<i>Acacia pulchella var. pulchella</i>		
PROTEACEAE	<i>Adenanthos cygnorum</i>		
ASTERACEAE	<i>Angianthus tomentosus</i>		
HAEMODORACEAE	<i>Anigozanthos humilis</i>	Cats paw	
CASUARINACEAE	<i>Allocasuarina humilis</i>		
ERICACEAE	<i>Astroloma pallidum</i>		
ERICACEAE	<i>Astroloma xerophyllum</i>		
POACEAE	<i>Austrostipa compressa</i>		
POACEAE	<i>Austrodanthonia occidentalis</i>		
POACEAE	<i>Avena sp.</i>	Wild oats	Y
MYRTACEAE	<i>Babingtonia camphorosmae</i>		
MYRTACEAE	<i>Baeckea crispiflora var. tenuior</i>		
MYRTACEAE	<i>Baeckea grandiflora</i>		
PROTEACEAE	<i>Banksia attenuata</i>		
PROTEACEAE	<i>Banksia dallanneyi var. dallanneyi</i>		
PROTEACEAE	<i>Banksia grandis</i>		
PROTEACEAE	<i>Banksia sessilis var. sessilis</i>		
CYPERACEAE	<i>Baumea rubiginosa</i>		
RUTACEAE	<i>Boronia ramosa ssp anethifolia</i>		
FABACEAE	<i>Bossiaea eriocarpa</i>		
BRASSICACEAE	<i>Brassica tournefortii</i>		Y
POACEAE	<i>Bromus diandrus</i>		Y
COLCHICEAE	<i>Burchardia congesta</i>		
HEMEROCALLIDACEAE	<i>Caesia micrantha</i>		
ORCHIDACEAE	<i>Caladenia flava</i>		
PORTULACACEAE	<i>Calandrinia corrigioloides</i>		
MYRTACEAE	<i>Callistemon x citrinus</i>		Y
LAURACEAE	<i>Cassytha flava</i>		
CENTROLEPIDACEAE	<i>Centrolepis drummondiana</i>		
FABACEAE	<i>Chamaecytisus palmensis</i>	Tagasaste	Y
ASPARAGACEAE	<i>Chamaescilla corymbosa</i>	Blue squills	
PROTEACEAE	<i>Conospermum stoechadis</i>		
HAEMODORACEAE	<i>Conostylis setosa</i>		
MYRTACEAE	<i>Corymbia calophylla</i>	Marri	
ASTERACEAE	<i>Cotula coronopifolia</i>	Waterbuttons	Y
CRASSULACEAE	<i>Crassula exserta</i>		
CYPERACEAE	<i>Cyperus brevifolius</i>		Y
CYPERACEAE	<i>Cyperus tenuiflorus</i>		Y
FABACEAE	<i>Daviesia decurrens</i>		



Family	Species	Common Name	Weed
FABACEAE	<i>Daviesia nudiflora</i>		
FABACEAE	<i>Daviesia preissii</i>		
FABACEAE	<i>Daviesia triflora</i>		
RESTIONACEAE	<i>Desmocladius fascicularis</i>		
ASPARAGACEAE	<i>Dichopogon capillipes</i>		
ORCHIDACEAE	<i>Disa bracteata</i>		Y
SCROPHULARIACEAE	<i>Dischisma arenarium</i>		Y
DROSERACEAE	<i>Drosera erythrorhiza</i>		
DROSERACEAE	<i>Drosera glanduligera</i>		
DROSERACEAE	<i>Drosera macrantha</i>		
DROSERACEAE	<i>Drosera pallida</i>		
POACEAE	<i>Ehrharta longiflora</i>	Annual Veldt Grass	Y
ORCHIDACEAE	<i>Elythranthera brunonis</i>	Enamel Orchid	
MYRTACEAE	<i>Eremaea pauciflora</i>		
GERANIACEAE	<i>Erodium botrys</i>		Y
MYRTACEAE	<i>Eucalyptus marginata</i>	Jarrah	
MYRTACEAE	<i>Eucalyptus todtiana</i>		
PROTEACEAE	<i>Grevillea synapheae</i>		
IRIDACEAE	<i>Gladiolus caryophyllaceus</i>	Pink gladiolus	Y
FABACEAE	<i>Gompholobium knightianum</i>		
FABACEAE	<i>Gompholobium tomentosum</i>		
HAEMODORACEAE	<i>Haemodorum venosum</i>		
PROTEACEAE	<i>Hakea lissocarpha</i>		
PROTEACEAE	<i>Hakea ruscifolia</i>		
ASTERACEAE	<i>Helichrysum luteoalbum</i>		Y
DILLENIACEAE	<i>Hibbertia huegelii</i>		
DILLENIACEAE	<i>Hibbertia hypericoides</i>		
DILLENIACEAE	<i>Hibbertia lasiopus</i>		
DILLENIACEAE	<i>Hibbertia racemosa</i>		
DILLENIACEAE	<i>Hibbertia subvaginata</i>		
ASTERACEAE	<i>Hyalospermum cotula</i>		
ASTERACEAE	<i>Hypochaeris glabra</i>		Y
CYPERACEAE	<i>Isolepis marginata</i>		Y
CYPERACEAE	<i>Isolepis prolifera</i>		Y
FABACEAE	<i>Isotropis cuneiformis</i>		
FABACEAE	<i>Jacksonia floribunda</i>		
FABACEAE	<i>Jacksonia sternbergiana</i>		
JUNCACEAE	<i>Juncus pallidus</i>		
JUNCACEAE	<i>Juncus planifolius</i>		
FABACEAE	<i>Kennedia prostrata</i>		
MYRTACEAE	<i>Kunzea glabrescens</i>		
ASTERACEAE	<i>Lagenophora huegelii</i>		
GOODENIACEAE	<i>Lechenaultia biloba</i>		
GOODENIACEAE	<i>Lechenaultia floribunda</i>		

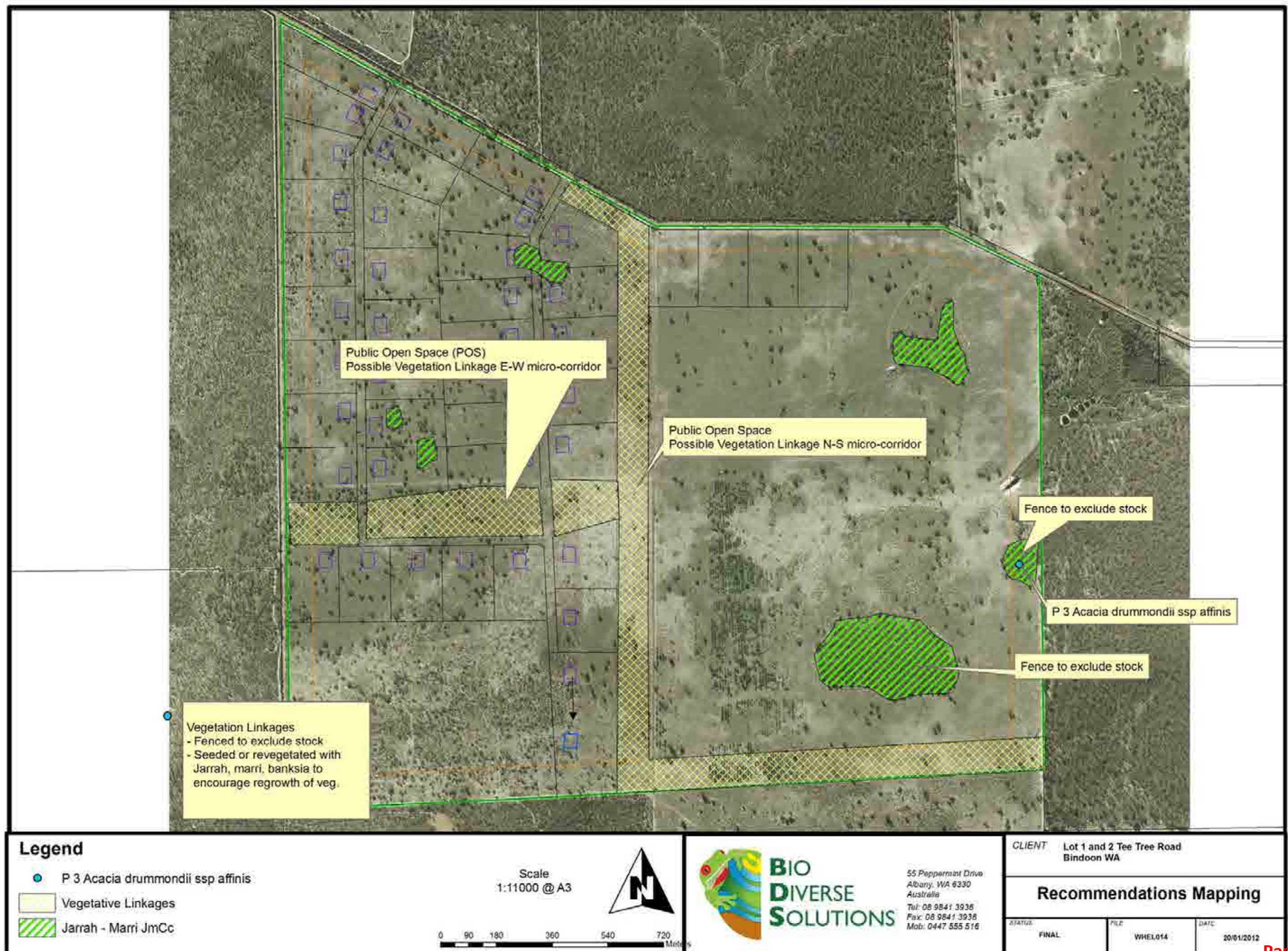
Family	Species	Common Name	Weed
ORCHIDACEAE	<i>Leporella fimbriata</i>	Hare orchid	
MYRTACEAE	<i>Leptospermum erubescens</i>		
MYRTACEAE	<i>Leptospermum spinescens</i>		
ERICACEAE	<i>Leucopogon nutans</i>		
ERICACEAE	<i>Leucopogon propinquus</i>		
CAMPANULACEAE	<i>Lobelia rhombifolia</i>		
ASPARAGACEAE	<i>Lomandra caespitosa</i>		
ASPARAGACEAE	<i>Lomandra hermaphrodita</i>		
ASPARAGACEAE	<i>Lomandra preissii</i>		
ASPARAGACEAE	<i>Lomandra sericea</i>		
FABACEAE	<i>Lotus subbiflorus</i>		Y
ZAMIACEAE	<i>Macrozamia reidlei</i>		
MYRTACEAE	<i>Melaleuca preissiana</i>		
MYRTACEAE	<i>Melaleuca trichophylla</i>		
RESTIONACEAE	<i>Mesomelaena pseudostygia</i>		
POACEAE	<i>Neurachne alopecuroides</i>		
LORANTHACEAE	<i>Nuytsia floribunda</i>		
FABACEAE	<i>Ornithopus compressus</i>		Y
FABACEAE	<i>Ornithopus sativus</i>		Y
OROBANCHACEAE	<i>Orobanche minor</i>		Y
SCROPHULARIACEAE	<i>Parentucellia viscosa</i>		Y
IRIDACEAE	<i>Patersonia occidentalis</i>		
GERANIACEAE	<i>Pelargonium capitatum</i>		
POACEAE	<i>Pentaschistis airoides</i>		Y
POLYGONACEAE	<i>Persicaria decipiens</i>		Y
PROTEACEAE	<i>Petrophile linearis</i>		
PROTEACEAE	<i>Petrophile macrostachya</i>		
PROTEACEAE	<i>Petrophile striata</i>		
CARYOPHYLLACEAE	<i>Petrorhagia dubius</i>		Y
RUTACEAE	<i>Philothea spicata</i>		
LOGANIACEAE	<i>Phyllangium paradoxum</i>		
EUPHORBIACEAE	<i>Phyllanthus calycinus</i>		
ASTERACEAE	<i>Podothea gnaphalioides</i>		
POACEAE	<i>Polypogon monspeliensis</i>	Annual beardgrass	Y
ORCHIDACEAE	<i>Pterostylis nana</i>		
ORCHIDACEAE	<i>Pterostylis vittata</i>		
ORCHIDACEAE	<i>Pyrorchis nigricans</i>		
ASTERACEAE	<i>Rhodanthe citrina</i>		
IRIDACEAE	<i>Romulea rosea</i>	Guildford grass	Y
MYRTACEAE	<i>Scholtzia involucreta</i>		
ASTERACEAE	<i>Sonchus asper</i>		Y
ASTERACEAE	<i>Sonchus oleraceus</i>	Sowthistle	Y
STYLIDACEAE	<i>Stylidium hispidum</i>		
STYLIDACEAE	<i>Stylidium calcaratum</i>		

Family	Species	Common Name	Weed
PROTEACEAE	<i>Synaphea spinulosa</i>		
CYPERACEAE	<i>Tetraria octandra</i>		
TREMANDRACEAE	<i>Tetradlea hirsuta</i>		
FABACEAE	<i>Trifolium arvense</i>	Hare's foot clover	Y
FABACEAE	<i>Trifolium dubium</i>		Y
FABACEAE	<i>Trifolium hirtum</i>	Rose clover	Y
FABACEAE	<i>Trifolium subterraneum</i>	Subclover	Y
CELASTRACEAE	<i>Tripterococcus brunonis</i>		
ORCHIDACEAE	<i>Thelymitra sp</i>		
TYPHACEAE	<i>Typha domingensis</i>		
ASPARAGACEAE	<i>Thysanotus patersonii</i>		
ASPARAGACEAE	<i>Thysanotus tenellus</i>		
APIACEAE	<i>Trachymene pilosa</i>		
HEMEROCALLIDACEAE	<i>Tricoryne elatior</i>		
ASTERACEAE	<i>Ursinia anthemoides</i>		Y
ASTERACEAE	<i>Vellereophyton dealbatum</i>		Y
POACEAE	<i>Vulpia myuros</i>		Y
CAMPANULACEAE	<i>Wahlenbergia capensis</i>		Y
XANTHORRHOEACEAE	<i>Xanthorrhoea preissii</i>		
<b>Count</b>	<b>149</b>		<b>37</b>

**Appendix F**

Recommendations Mapping

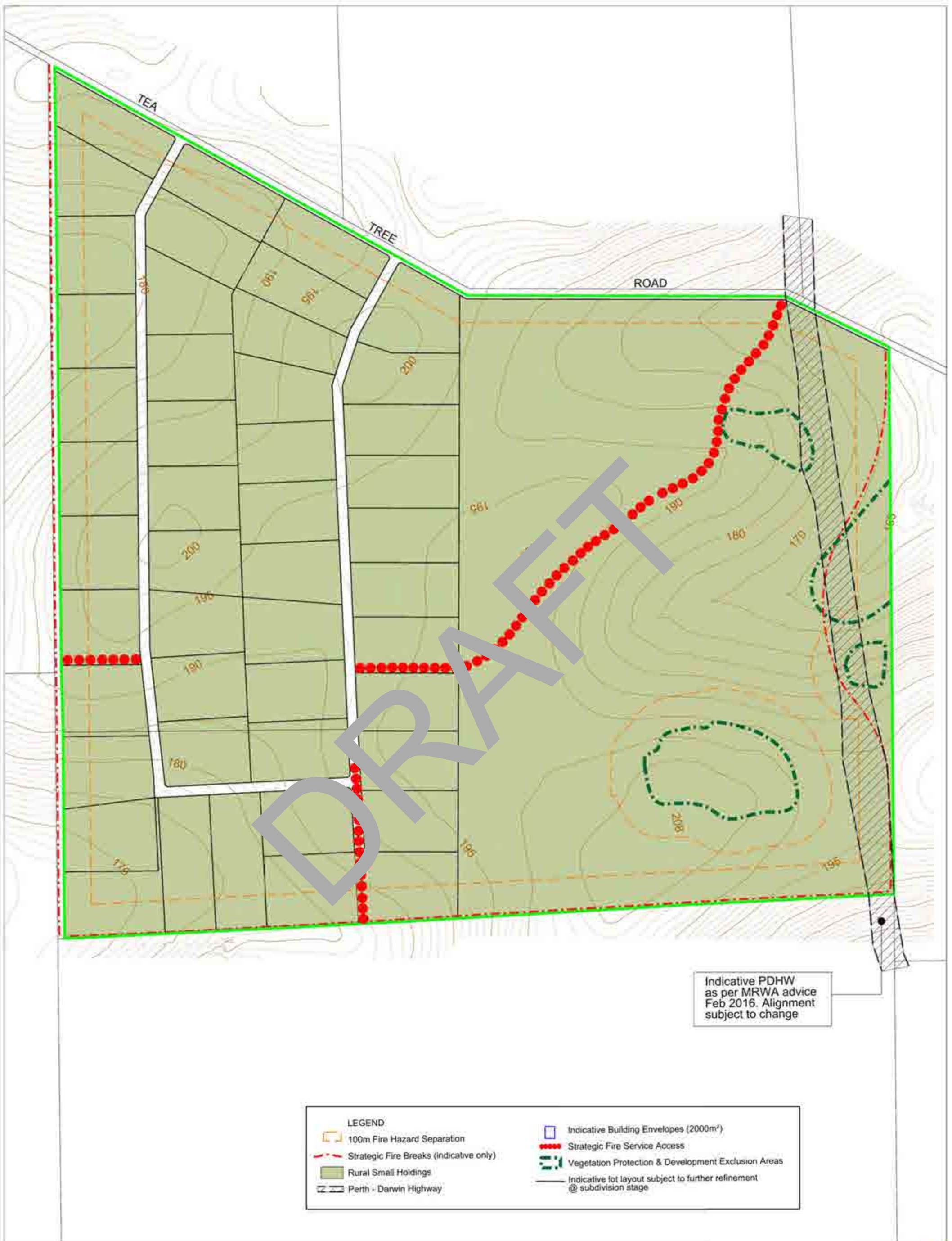






# APPENDIX 4

## DRAFT STRUCTURE PLAN



# APPENDIX 5

## Bushfire Management Plan

**Lots 1 and 2 Tea  
Tree Road,  
Bindoon WA**

# Bushfire Management Plan



13/06/2016

Kathryn Kinnear

Bio Diverse Solutions

**Page 127**



## DOCUMENT CONTROL

### TITLE

Lot 1 and 2 Tea Tree Road Bindoon Bushfire Management Plan

Author (s): Kathryn Kinnear

Reviewer (s): Steve Fernandez

Job No.: WHEL014

Client: Marou Property Development Pty Ltd

### REVISION RECORD

Revision	Summary	Revised By	Date
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Final	Client		15/3/12
Final	Issued to client with SP changes & review of legislation/guidelines	Kathryn Kinnear	17/04/2015
Final ID 24/8/2015	Updated SP	Kathryn Kinnear	24/08/2015
Final ID 13/6/2016	Updated to reflect new legislation	Kathryn Kinnear	13/6/2016

### **DISCLAIMER**

*The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959 – Building in Bushfire prone Areas, WAPC SPP3.7, Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.*



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APPENDIX E – BAL CONTOUR PLAN

APPENDIX F – DFES INFORMATION FOR THE HOMEOWNER

APPENDIX G - BUSHFIRE MANAGEMENT PLAN



## 1. Introduction

Marou Property Development Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a fire hazard assessment and prepare a Bushfire Management Plan to guide all future fire management for the proposed subdivision development of Lots 1 and 2 Tea Tree Road, Bindoon.

The basic requirements of any Bushfire Management Plan (BMP) is to identify potential issues or problems relating to environmental fire threats and recommend specific actions by certain persons, agencies, authorities and developers to ensure, as much as practical, that the lives and assets of the location are not put at undue threat from any unplanned fire event. A BMP takes into account various physical attributes of the land, including topographical and vegetation properties, local climatic impacts, past and current land use, past fire history and management practices, local authority fire management obligations, road access, water supplies, adjacent property and tenure, and future obligations by various parties should the subdivision application be successful.

Such planning takes into consideration standards and requirements specified in various documents such as Australian Standard (AS) 3959-2009, Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) and State Planning Policy 3.7 (WAPC, 2015). These plans and guidelines have developed to ensure uniformity to bushfire management with interpretation of onsite vegetation types, site design, and building standards.

### 1.1. Statutory Conditions

This Bushfire Management Plan (BMP) has been prepared for Lot 1 and 2 Tea Tree Road Bindoon (refer to Appendix A for location of subject site) to address fire management issues associated with the proposed Structure Plan (SP) and is consistent with State and Local Government planning instruments.

On the 7<sup>th</sup> December 2015 the *Fire and Emergency Services (Bush Fire Prone Areas) Order 2015; Planning and Development (Local Planning Scheme) Amendment Regulations 2015; Planning and Development Act 2005 State Planning Policy 3.7 - Planning in Bushfire Prone Areas* and the *Building Amendment Regulations (No.3)* were published in the WA Government Gazette. The Western Australian State Bushfire Prone Mapping was also publicly released.

This means that:

- **Emergency Services (Bush Fire Prone Areas) Order 2015:** 4 (1) *The areas of the state described in the Bushfire Prone Areas dataset are designated as bush fire prone areas.*
- **Planning and Development (Local Planning scheme) Amendment Regulations 2015:** *Planning regulations that instigates a planning action if a dwelling is located in the Bushfire Prone Area Mapping. Can be a site specific BAL Assessment, BAL Contour Map, Bushfire Hazard Assessment or a Bushfire Management Plan action. If BAL 12.5 to BAL 29 dwelling can go straight to Building Application. If BAL 40 or BAL FZ then the development goes back into the planning system for assessment.*
- **Planning and Development Act 2005 State Planning Policy 3.7 (SPP 3.7)- Planning in Bushfire Prone Areas:** *The intent of this policy is to implement effective, risk based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure. The application of SPP 3.7 applies to all higher order strategic planning documents, strategic planning proposals, subdivision and development applications located in designated bushfire prone areas.*
- **Building Amendment Regulations (No.3):** *Outlines the definition of the bushfire prone area as designated under the Fire and Emergency Services Act 1998 Regulation 31BA applicable building standards for buildings and incidental structures in bushfire prone areas.*

(WA Australian Government Gazette, 2015)

The publicly released bushfire prone mapping (Bushfire Prone Area Mapping, OBRM, 8/12/15) outlines the site to be Bushfire Prone as per the above regulations, as it is situated within 100m of

>1 ha of bushfire prone vegetation. Refer to extract from the Office of Bushfire Risk Management (OBRM) as released in December 2015 Appendix A.

This document and the recommendations contained are aligned to the following policy and guidelines:

- AS 3959-2009 “Construction of Buildings in Bushfire Prone Areas” current and endorsed standards;
- State Planning Policy 3.7 (SPP 3.7) Planning in Bushfire-Prone Areas (2015);
- Guidelines for Planning in Bushfire Prone Areas (2015);
- *Fire and Emergency Services (Bush Fire Prone Areas) Order 2015;*
- *Planning and Development (Local Planning Scheme) Amendment Regulations 2015;*
- *Bushfires Act 1954;* and
- Shire of Chittering Annual Fire Break Notice.

### **1.2. Suitably Qualified Bushfire Consultant**

This BMP has been prepared by Kathryn Kinnear (nee White), who has 10 years operational fire experience with the (formerly) DEC (1995-2005) and has the following accreditation in Bushfire Management:

- Incident Control Systems;
- Operations Officer;
- Prescribed Burning Operations;
- Fire and Incident Operations;
- Wildfire Suppression 1, 2 & 3;
- Structural Modules – Hydrants and hoses, Introduction to Structural Fires, and Fire extinguishers; and
- Ground Controller.

Kathryn Kinnear currently has the following Tertiary Qualifications:

- BAS Technology Studies & Environmental Management;
- Diploma Business Studies; and
- Graduate Diploma of Environmental Management.

Kathryn Kinnear is an accredited a Level 1 BAL Assessor (Accreditation No: BPAD30794) and is classified as an “Experienced Level 2/3 Practitioner” pending accreditation. Kathryn Kinnear is presently a member of Fire Protection Australia Association and a committee member of the Bushfire Subcommittee Western Australia. Kathryn is a suitably qualified Bushfire Practitioner to prepare this Bushfire Management Plan.

### **1.3. Other documents relating to this plan**

Other documents that have been prepared for this subdivision proposal which should be consulted when reading this plan include:

- Lot 1 and 2 Tea Tree Road Planning Report – Whelans (2015);
- Vegetation Assessment – Bio Diverse Solutions (2012); and
- Land Capability Report – Landform Research (2000).

## 2. Aims of this Plan

The aim of this Plan is to reduce the occurrence of, and minimise the impact of bushfires, thereby reducing the threat to life, property and the environment. This BMP has been prepared by Bio Diverse Solutions (Bushfire Consultants) with the “subject site” being Lots 1 and 2 Tea Tree Road, Bindoon see Appendix A.

### 2.1. Planning Context

The BMP has been prepared to support an Structure Plan (SP) at Lots 1 and 2 Tea Tree Road, Bindoon, refer to Appendix B.

### 2.2. Site inspection

To ensure that every aspect of the proposed subdivision meets the planning requirements as set in the Guidelines for Planning in Bushfire Protection (WAPC, 2015a), a site inspection was initially undertaken on the 13th October 2011 by Kathryn Kinnear (Bio Diverse Solutions) to assess the vegetation and the site conditions. A subsequent site visit was undertaken in March 2016 to assess any change in the classifiable vegetation to AS3959-2009.

The site was assessed as having an **Extreme- Moderate** Bushfire Hazard Level (BHL) due to internal and external patches of forest, woodland and scrub remnant native vegetation areas. Upon completion there will be internal (built/rural small holdings) areas of **Moderate - Low** BHL. Where a subdivision is located within an extreme or moderate BHL, the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) requires assessment to the bushfire protection criteria – a process where subdivisions are assessed for compliance to the criteria. The bushfire protection criteria (Appendix 4, WAPC, 2015a) are a performance based criteria in assessing bushfire risk management measures and they outline four “Elements”. The “Elements” which are to be met either through the objectives of the “Performance Principle” or “Acceptable Solutions” (WAPC, 2015a) for the subject site include:

- Element 1 - Location;
- Element 2 - Siting and design of development.
- Element 3 - Vehicular access; and
- Element 4 – Water.

(WAPC, 2015)

This BMP has been prepared to assess the site against the “Acceptable Solutions” of the bushfire protection criteria.

### 2.3. Objectives

The objectives of this BMP are:

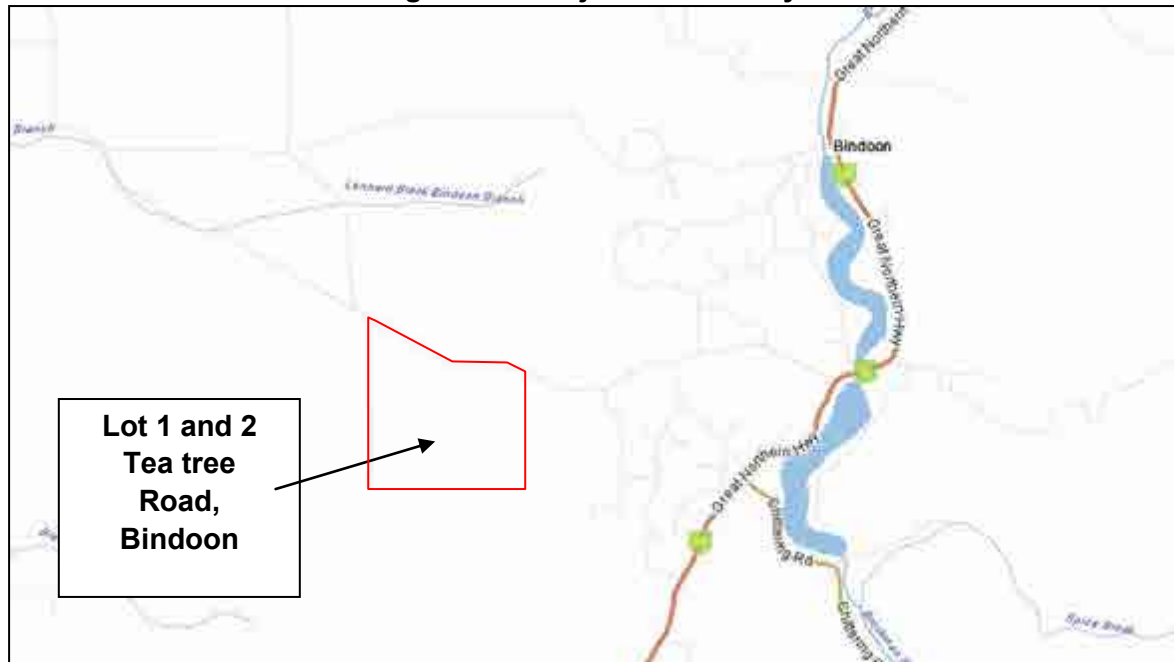
- Achieve consistency with objectives and policy measures of SPP 3.7 (WAPC, 2015b);
- Assess any building requirements to AS3959-2009 (current and endorsed standards) and BAL Construction;
- Assess the subdivision proposal against the Bushfire Protection Criteria Acceptable Solutions as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a);
- Understand and document the extent of the bushfire risk and hazards to the subject site
- Prepare bushfire mitigation and management measures of all land within the subject area with due regard to people, property, infrastructure and the environment;
- Nominate individuals and organisations responsible for bushfire management and associated works within the subject area; and
- Aligned to the recommended assessment procedure (SPP3.7, WAPC, 2015b) & Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) which evaluates the effectiveness and impact of proposed, as well as existing, bushfire risk management measures and strategies.

### 3. Description of the area

#### 3.1. Location

The subject site is located south of Tea Tree Road and east of Brennan Road, approximately 10 km's south of Bindoon town site in the municipality of the Shire of Chittering (SoC). The subject site is a 484ha rural lot which has been used for primarily for the grazing of stock. Please refer to Figure 1 below - Locality Map, and Site Location Mapping Appendix A.

**Figure 1 – Subject site locality**



#### 3.2. Development proposal

The development proposal includes the creation of 48 lots (47 Rural Small Holding zoning and 1 Rural zoning lot). The Rural Small Holding lots are ranging in size from 5.01ha to 5.44ha. In creating the subdivision the developer proposes to implement "Vegetative Corridors" to increase linkages to remnant vegetation from the north-south and east-west.

Please refer to the Structure Plan as provided by Whelans, Appendix B.



#### 4. Desktop Assessment – Regional Setting

##### 4.1. Current site land use

The site is currently 2 rural lots of predominantly cleared paddocks with grasslands and small isolated patches of remnant vegetation, newly installed vineyards and tagasaste plantation. Historically the subject area has been used for sheep and cattle grazing. An abandoned shack exists in Lot 1 (south west corner) and some shed buildings are located in Lot 2 associated with the rural activities. Please refer to Photograph 1 to 3 below.



**Photograph 1** – View of abandoned shack in Lot 1 (south west of subject area).



**Photograph 2** – View of shed infrastructure in Lot 2, associated with rural activities.



**Photograph 3** – View of stock on site.

##### 4.2. Climate

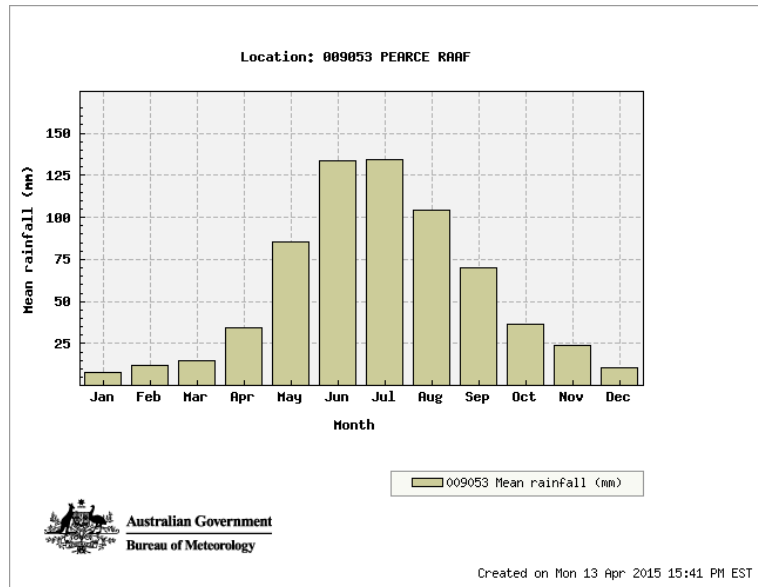
Bindoon has similar climate to Perth (75 Km away) and thus has been described as per Bureau of Meteorology (BoM) descriptions of Perth. Perth experiences a Mediterranean climate, characterised by hot, dry summers and mild, wet winters. These seasons extend into the autumn and spring months, which are transitional periods between the main seasons.

The climate of the region is strongly influenced by the position of the axis of the band of high pressure known as the sub-tropical ridge, and in the warmer months by the development in the easterlies to the north of the ridge of a trough of low pressure near the West Coast. For much of the year the ridge is located to the south allowing the east or south easterly winds to prevail. During the cooler months the ridge periodically moves to the north allowing cold fronts to pass over the west coast and deliver much of the annual rainfall. Sometimes these fronts interact with tropical cloud bands from the northwest and this can enhance the amount of rainfall produced.

#### 4.2.1. Rainfall

The annual mean rainfall of 678.3 mm (BoM, 2015) occurs on 119 rain days, of which 80% usually falls between May and September. Rain occurs on four days out of every seven on average during winter. Flooding is rare in Perth, however heavy rain may be produced by strong winter cold fronts or, less frequently, by summer storms or, more rarely, by decaying tropical cyclones. The highest daily rainfall is 120.6 mm recorded on 9 February 1992. In contrast to winter rainfall, the mean summer rainfall is just 36 mm on an average of 10 rain days. It is not unusual for there to be extended dry periods during the warmer months. Please refer to Pearce RAAF BoM rainfall records (closest climate statistics), Annual Rainfall graph below (Figure 2).

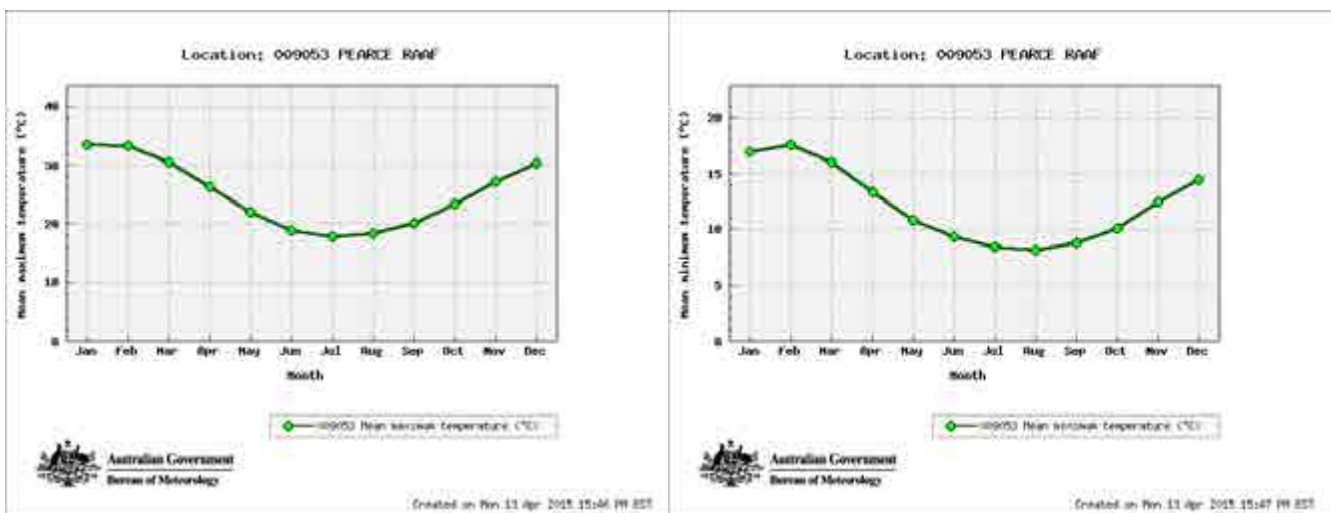
**Figure 2 – BoM Rainfall for Pearce (BoM) Station 9053**



#### 4.2.2. Temperature

Mean monthly air temperature range from 33.5°C in January to 17.8°C in July (BoM, 2015). Summer maximum temperatures are strongly dependent upon the arrival time of the reliable sea breezes. On some days the difference between the maximum temperatures on the coast and the eastern suburbs may exceed 10°C. Heatwaves are associated with strong easterly winds and the late arrival or absence of the sea breeze. The highest temperature ever recorded is 46.2°C, however, the temperature exceeds 40°C on only three days per year on average. The average minimum temperature ranges from just 8.2°C in August to 17.6°C in February (BoM, 2015). Temperatures below 5°C are not uncommon during any of the winter months. Please refer to average temperatures below for Gingin (40km away), Figure 3.

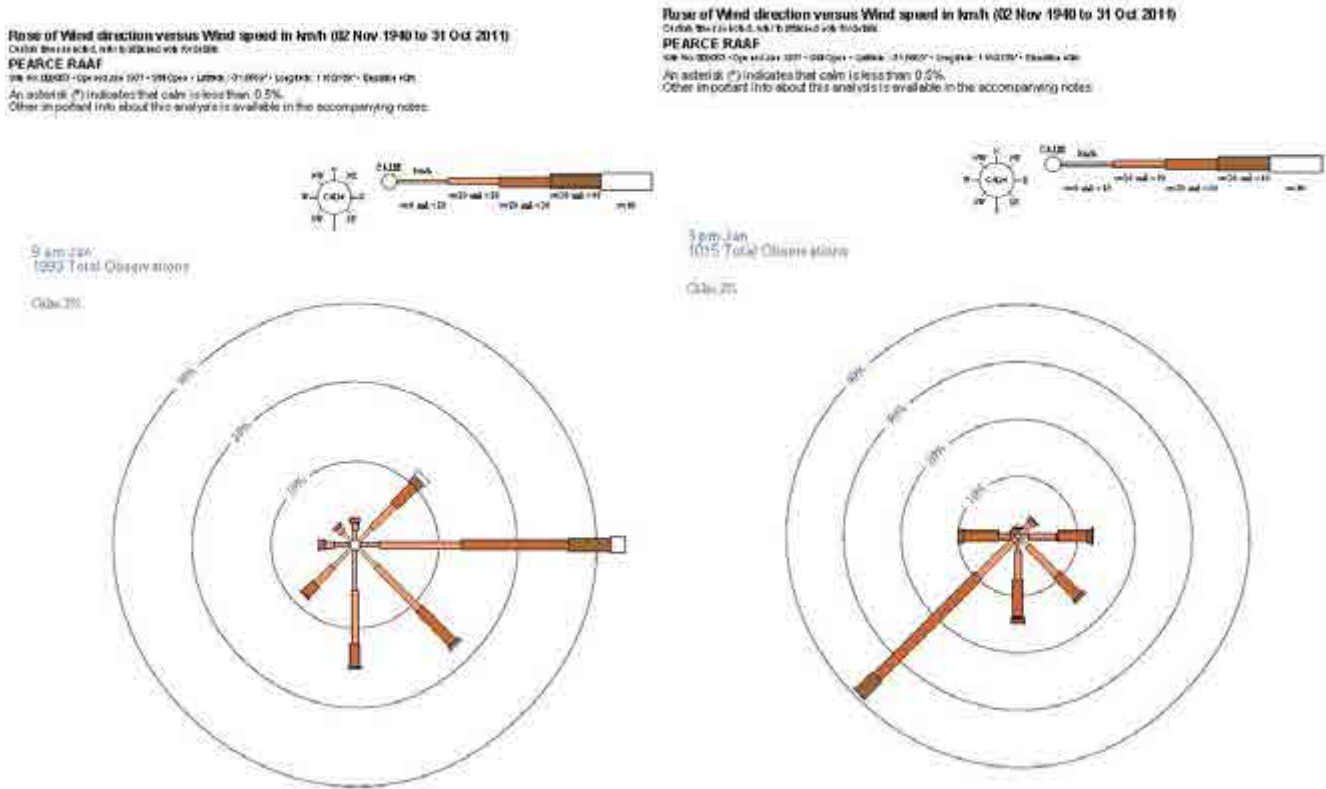
**Figure 3 – Average Temperatures BoM Pearce RAAF (BoM 9053)**



#### 4.2.3. Wind

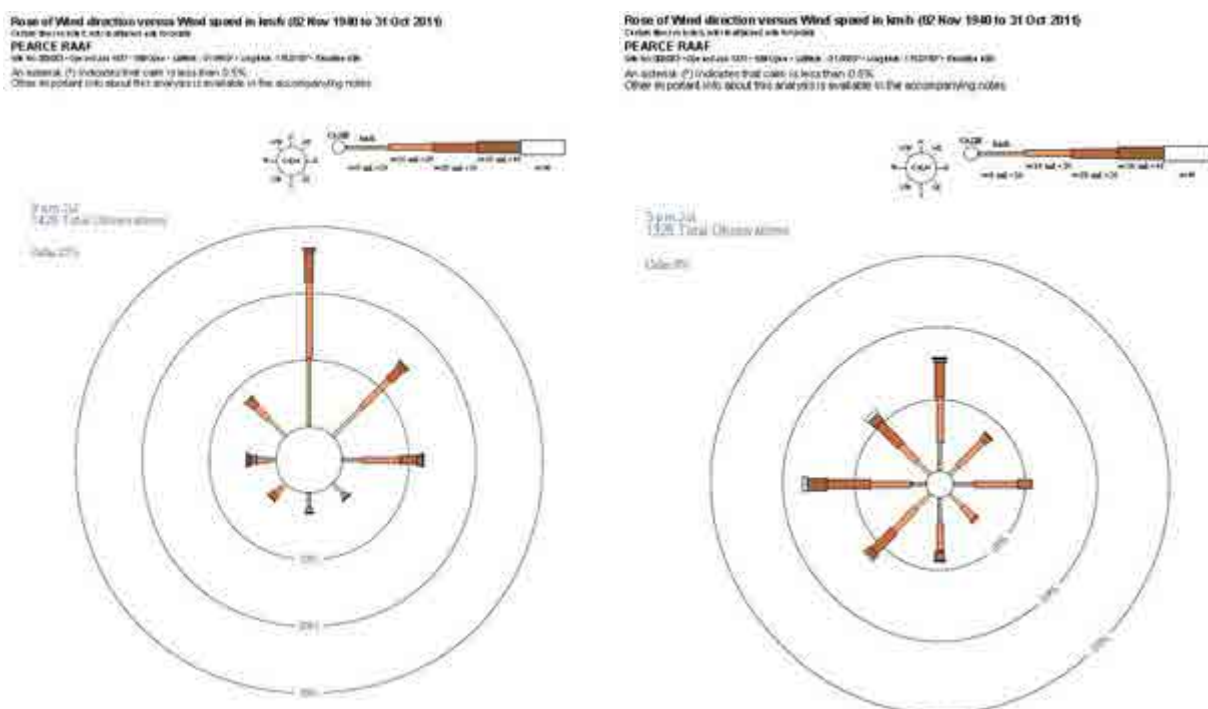
Winds are mainly easterly but varied in the warmer months by reliable afternoon sea breezes from the south west and in the cooler months by the westerlies that are associated with the bulk of the annual rainfall. Despite the occurrence of strong winds or gales, average wind speeds in winter are considerably lighter than in summer. Please refer to Figure 4 and 5 below.

**Figure 4 – Summer (Jan) wind rose 9am & 3pm BoM Pearce RAAF Stn**



(BoM, 2015)

**Figure 5– Winter (July) wind rose 9am & 3pm BoM Pearce RAAF Stn**



(BoM, 2015)

### 4.3. Prevalent Fire Weather

Fire weather is characterised by mid-level disturbances across the south west of Western Australia, bringing unstable atmospheric conditions (thunder and lightning) from the north or north-west wind directions. This is characteristic of “Extreme” Fire Weather conditions to the area with hot dry conditions prior to storm events. Risk of lightning strikes, spark ignition, arson and other causes of fire give rise to wild fires under these conditions.

Prevalent winds which most wildfire events occur in the region are from the north-west, east and north-east direction. Conditions tend to be dry with low relative humidity. High winds and excess fuels can lead to hazardous conditions for residents. Strong easterly and south westerly winds exist at the subject site during dry summer periods (Figure 4). These circumstances place residential housing under the most risk from bushfire events.

#### 4.3.1. Climate Change

Climate change is expected to impact on the future rainfall pattern of the area. It is recognised that the average rainfall has already declined by 20%-30% over the past few decades and that the long term impact of climate change may lead to a shift in rainfall, as well as dryer climatic conditions for the region. The long term changes are predicted to impact on the flora, fauna and water availability for the region. (Climate Commission 2010)

The Climate Commission (Climate Commission 2010) estimates that

*“...Rainfall patterns in Western Australia have changed over the last 40 years. There is significant evidence that climate change has contributed to the marked drying trend in the southwest of the state.”*

The construction of the proposed development is not predicted to be affected by sea-level rise, however could be affected from increased intensity rainfall events or extended drying periods. Increased extreme weather from climate change could affect fire frequency and behaviour in Western Australia (DEC, 2012), this BMP has been prepared to reduce the risk of bushfire on the proposed residential dwelling of the property.

### 4.4. Topography

The subject site is located in an undulating landscape on the Dandaragan Plateau with the average “Effective Slope” (as per AS3959-2009) slope for the site as 1.7 ° (assessed as an average over 5 slopes/100m) calculated to be < 5° and ranges between 1° and 3°. One metre contours indicate there are 2 hills in the western portion up to 201m AHD and one dominant ridge in the south east of the subject site upto 208m AHD. The lowest elevation of the site is in the east along the formation of a creek (upper catchment) at 168m AHD.




### 4.5. Bushfire fuels – Vegetation

The subject lies within the Swan IBRA bioregion. This bioregion is comprised of “*low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils.*” The area is located within the SWA1- Dandaragan Plateau. *The plateau is bordered by Derby and Dandaragan Faults. Cretaceous marine sediments are mantled by sands and laterites. Characterised by Banksia low woodland, Jarrah - Marri woodland, Marri woodland, and by scrub-heaths on laterite pavement and on gravelly sandplains.* (Hearn et al., 2002).

Detailed vegetation inventory was undertaken in the vegetation types identified on site (Bio Diverse Solutions, 2012). A total of 149 species was identified within 3 vegetation types. The vegetation types are shown over the page in Table 1 as described in 2012.



**Table 1 – Vegetation Types Identified on site (from Flora and Vegetation survey 2012)**

Vegetation Unit	Planning for Bushfire Protection (2010) Vegetation Type	Site Description	Photograph
<b>Medium woodland; jarrah-marri (EmCc)</b>	Type B - Woodland	Medium woodland of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i>	
<b>Mosaic Medium open woodland: jarrah, marri &amp; banksias (EmCcBa),</b>	Type B - Woodland	Medium open woodland: Jarrah & Marri, with low woodland Banksia/sparse woodland jarrah/marri	
<b>Cleared paddock areas</b>	Type G - Grassland	Open paddocks, cleared of native vegetation, occasional paddock trees Jarrah & Marri,	

(Bio Diverse Solutions, 2012)

The eastern portion of the subject area (in 2012) was predominantly pasture with little to no paddock trees. In 2016 site assessment revealed the eastern paddocks were continued to be grazed and managed in a low fuel state. The western area of the subject site was assessed in 2012 as being “grassland”, in 2016 it was noted this area has not been grazed in some time and is now predominantly classified as Woodland Type B, where the grasses are exceeding 200-.300mm, trees are exceeding 10% coverage and there is regrowth of scrubs and shrubs.

Internal to the site remnant patches of Jarrah/Marri Woodland occurs, which in 2012 (site first assessed) was generally lacking in midstorey and understorey species due to grazing of stock. In 2016 site assessment has again classified this as Woodland Type B, however the stock grazing has discontinued and this area is now more extensive across the internal site in eastern areas.

External to the site there is forest Type A (north, west and east). These areas are typically Jarrah, Casuarina and Marri mix with Banksia and shrub understoreys.






These vegetation types in 2016 are classified as per AS3959-2009 (Table 2.3) criteria as:

- **Forest (Type A)** – *Trees 10-30m high: 30-70% foliage cover (may include understorey of sclerophyllous low trees and tall scrubs or grass). Typically dominated by eucalypts.* Jarrah, Marri and Casuarina multilayered forests to the north, west and east external to the site.
- **Woodland (Type B)** – *Trees 10 -30 m in high; 10-30% foliage cover dominated by Eucalypts; understorey low trees to tall shrubs dominated by Acacia, Callitris or Casuarinas* (WAPC 2010); Jarrah/marri woodland and Mosaic Jarrah & Marri, with low woodland Banksia/sparse woodland Jarrah/Marri located adjacent and internal to the Subject Site in western areas – ungrazed for some time.
- **Scrub (Type D)** – *Shrubs greater than 2m high; 10-30% foliage cover with a mixed species composition.* Banksia scrub to the east of the subject site (external).
- **Grassland (Type G)** – *Open paddock areas, overstorey foliage <10%.* (WAPC 2010), open paddock areas located internal and adjacent to the Subject Site.


Please refer to Table 2 below showing vegetation types classified in March 2016 as per above and shown in Vegetation Classes Map Appendix C.

**Table 2 – Vegetation Classifications AS3959 -2009 Tea Tree Road**


Plot 1	Classification or Exclusion Clause	Forest Type A
		Jarrah/Marri low forest Multi-layered vegetation (fuels), grasses/sedges understorey, shrubs 1-3m midstorey Canopy >30% coverage Trees 10-12m High (30-70% vegetative/foliage cover). Fuel loading 25T/ha -35T/ha
<i>Photo ID: Photo 1 view of Forest Type A located north of Tea Tree Road in private property. View from Tea Tree Road from the south to north.</i>		
Plot 1 cont	Classification or Exclusion Clause	Forest Type A
		Casuarina/Jarrah/Marri low forest Multi-layered vegetation (fuels), grasses/sedges understorey, shrubs 1-3m midstorey Canopy >30% coverage Trees 10-12m High (>30-70% vegetative/foliage cover). Fuel loading 25T/ha -35T/ha
<i>Photo ID: Photo 2 view of Forest Type A located east of subject site in private property. View from eastern boundary from west to east.</i>		

Plot 1 cont	Classification or Exclusion Clause	Forest Type A
		<p>Casuarina/Jarrah/Marri low forest</p> <p>Multi-layered vegetation (fuels), grasses/sedges understorey, shrubs 1-3m midstorey</p> <p>Canopy &gt;30% coverage</p> <p>Trees 10-12m High (&gt;30-70% vegetative/foilage cover).</p> <p>Fuel loading 25T/ha -35T/ha</p>




*Photo ID: Photo 3 view of Forest Type A located north of the subject site in private property. View from Tea Tree road from south to north.*

Plot 2	Classification or Exclusion Clause	Woodland Type B
		<p>Jarrah/Marri Woodland</p> <p>Single -layered vegetation (fuels), grasses/sedges understorey</p> <p>Canopy &lt;30% coverage</p> <p>Trees 8-10m High (&lt;30% vegetative cover).</p> <p>Fuel loading less than 15T/ha</p>

*Photo ID: Photo 4 view of Woodland Type B to the east (internal) of the site view from Brennan road from the west to the east.*

Plot 2 cont	Woodland Type B	Classification or Exclusion Clause	Woodland Type B
			<p>Jarrah/Marri Woodland</p> <p>Single -layered vegetation (fuels), grasses/low sedges and Grass trees understorey (&lt;1m)</p> <p>Canopy &lt;30% coverage</p> <p>Trees 8-10m High (&lt;30% vegetative cover).</p> <p>Fuel loading 15T/ha</p>

*Photo ID: Photo 5 view of Woodland Type B to the east (internal) of the site. View from Brennan Road from the west to the east.*

<b>Plot 3</b>	<b>Classification or Exclusion Clause</b>	<b>Scrub Type D</b>
		<p>Banksia Woodland  Trees and shrubs 2-10m high  10-30% foliage cover  Canopy &lt;30% coverage  Small shrubs understorey (&lt;30% vegetative cover).  Fuel loading less than 15-25T/ha</p>
<i>Photo ID: Photo 6 view of Woodland Type B to the west of the site adjacent to Brennan Road. View from east to west.</i>		
<b>Plot 4</b>	<b>Grassland Type G</b>	<b>Classification or Exclusion Clause</b>
		<p>Grasses grazed by sheep  &lt;100mm high  Occasional trees (&lt;10%)</p>
<i>Photo ID: Photo 7 view of Grassland Type G internal to the site (central areas), view from Tea Tree Road to the south.</i>		
<b>Plot 4 cont</b>	<b>Classification or Exclusion Clause</b>	<b>Grassland Type G</b>
		<p>Grasses grazed by sheep  &lt;100mm high  Little to no trees</p>
<i>Photo ID: Photo 8 view of Grassland Type G internal to the site (eastern areas), view from tea Tree Road from the north west to south east</i>		



#### 4.6. Assets

The subject site is predominantly cleared of remnant vegetation, with some isolated remnant vegetation patches which have been grazed. The site is valued for its proximity to the Bindoon townsite and Perth city, remnant vegetation and sandy soils (where perennial horticulture i.e. vineyards are being established).

Once developed, the values which will be potentially affected by fire include:

- **Human lives:** It is likely that more than 110 people could be resident at the newly created subdivision;
- **Assets:** The development will contain dwellings and valuable infrastructure; and
- **Environmental Conservation Values:** the site has internal remnant (forest) vegetation areas in western portions of the site which have vegetation conservation values.

#### 4.7. Access

Vehicle access to the subject site is from Tree Road and Brennan Road in the west. An internal informal 4 x 4 track services paddocks and water supplies for grazing stock. Please refer to Photo 9 and 10 below



Photo 9 – View of Tea Tree Road to the north of the subject site



Photo 10 – View of Brennan Road to the west of the subject site

#### 4.8. Water Supply

There is presently no developed land within the subject site. Water is presently gained from a dam in the east and pumped via windmill across the property. Please refer to Photograph 11.



Photo 11 – View of dam in Lot 1 Tea Tree Road.

#### 4.9. Firebreaks

There are existing firebreaks to SoC required standards around the property, refer to Photo 12.



Photo 12 – View of existing firebreaks along perimeter of property.



## 5. Potential Fire Issues and Fire Risk

The bushfire hazard assessment provides a measure of the fire intensity and likelihood of bushfire attack measures on a dwelling, subdivision or residential area (Planning for Bushfire Protection, Edition 2 2010). This measure can provide an assessment of the land for suitability for residential construction and takes into account:

1. Vegetation Assessment – type and class in each direction;
2. Distance - between the predominant vegetation class and proposed building;
3. Topography and slope – with reference to accessibility; and
4. Land use – surrounding and internal to the proposal.

(Planning for Bushfire Protection, Edition 2, 2010)

The Vegetation type for the subject site (within 100m) has been classified as per AS3959-2009 as Forest Type A, Woodland Type B, Scrub Type D and Grassland Type G (as per vegetation classifications outlined in AS3959-2009, Table 2.3). The bushfire hazard Level (BHL) ratings have been assessed as per the methodology as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC 2015a). Please refer to Table 3 below.

**Table 3 – Bushfire Hazard Level (BHL) Categories**

Table 3: Hazard levels and characteristics

HAZARD LEVEL	CHARACTERISTICS
<b>Low</b>	<ul style="list-style-type: none"> <li>• devoid of standing vegetation (less than 0.25ha cumulative area);</li> <li>• areas which, due to climatic conditions or vegetation (e.g. rainforest), do not experience bushfires;</li> <li>• inner urban or suburban areas with maintained gardens and very limited standing vegetation (less than 0.25ha cumulative area);</li> <li>• low threat vegetation, including grassland managed in a minimal fuel condition (i.e. to a nominal height of 100mm), maintained lawns, vineyard and orchards; and</li> <li>• pasture or cropping areas with very limited standing vegetation that is shrubland, woodland or forest with an effective up slope*, on flat land or an effective down slope* of less than 10 degrees, for a distance greater than 100 metres.</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>• areas containing pasture or cropping with an effective down slope* in excess of 10 degrees for a distance greater than 100 metres;</li> <li>• unmanaged grasslands;</li> <li>• open woodlands;</li> <li>• open shrublands;</li> <li>• low shrubs on areas with an effective up slope*, on flat land or an effective down slope* of less than 10 degrees, for a distance greater than 100 metres or flat land;</li> <li>• suburban areas with some tree cover; and</li> <li>• forest and woodlands with a permanent grass understorey or at most, a scrub understorey structure consisting of multiple areas of &lt;0.25ha and not within 20 metres of each other or single areas of &lt;1ha and not within 100 metres of other scrub areas.</li> </ul>
<b>Extreme</b>	<ul style="list-style-type: none"> <li>• forests with a scrub understorey which is multi-tiered;</li> <li>• woodlands with a scrub understorey which is multi-tiered;</li> <li>• tall shrubs; and</li> <li>• any area of vegetation not otherwise categorised as low or moderate.</li> </ul>

(WAPC, 2015a)

### **Internal Bushfire Hazard Levels (BHL)**

The subject site has sustained vegetation clearing and grazing by sheep. In eastern areas of the site it is predominantly a cleared landscape representing a **“Low”** BHL as defined by Table 3 (WAPC, 2015a). In the western portions of the site the previously grazed areas has regenerated and now forms a Woodland Type B landscape which is a Moderate BHL (Open Woodlands). The Woodlands in the south west of the property are regenerating (still degraded from previous grazing) and are classified as a **“Moderate”** BHL as defined by Table 3 (WAPC, 2015).

There are low effective slopes for the site, with all slopes <5°. Refer to Bushfire Hazard Level Mapping, Appendix D.

**External Bushfire Hazard Level (BHL)**

Surrounding the subject site to the west, north and east west there is remnant bushland with cleared paddocks to the south. The predominant fire risk associated with the site is the adjacent Forests to the north, west and east which is an “**Extreme**” BHL as defined by Table 3 (WAPC, 2016). The external Woodland and Scrub vegetation are classified as a “**Moderate**” BHL as defined by Table 3 (WAPC, 2015).

Bushfire risk increases with slope, which with hot conditions can give rise to hot and intense fires in north (Summer mid-level disturbances) and easterly (prevailing summer) wind conditions. Slopes are generally low being <5° within 100m of the subject site.

The predominant extreme fire weather in summer conditions can give rise to flame and ember attack from north and north west wind directions (mid level disturbances) and from the east and south west (summer prevailing winds, see Figure 4).

Refer to Bushfire Hazard Level Mapping, Appendix D.

**Proposed Subdivision Fire Risk Rating**

The fire risk for this subdivision has been rated at **Extreme - Moderate BHL** as defined by Table 3 (WAPC, 2015).

Setback distances of over 100m from native vegetation (Bushfire Prone Vegetation) cannot be achieved for all the lots. Where 100m cannot be achieved from dwellings to Bushfire Prone Vegetation, the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) states that Building to Bushfire Attack Levels (BAL) and AS3959-2009 can apply to dwellings to assist in achieving “Acceptable Solutions” to the subdivision. Where a building is located within the State Gazetted Bushfire Prone Area Mapping (OBRM, 2015), the *Planning and Development (Local Planning Schemes) Amendment Regulations 2015* states that building to Bushfire Attack Levels (BAL) and AS3959-2009 is to apply to dwellings.

The subdivision (and proposed dwellings) will be located within 100m of Bushfire Prone vegetation and is located within the WA State Bushfire Prone Area (OBRM, 2015) mapping. The proposal will require assessment to the bushfire protection criteria as per the newly released “Guidelines for Planning in Bushfire Prone Areas” (WAPC, 2015a). These are outlined in Section 6 –**Assessment to Bushfire Protection Criteria**.

## 6. Bushfire Management/Mitigation Plan

The Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) outlines bushfire protection criteria which subdivisions and development proposals are assessed for compliance. The bushfire protection criteria (Appendix 4, WAPC, 2015) are a performance based criteria utilised to assess bushfire risk management measures and they outline four elements, being:

- Element 1: Location
- Element 2: Siting and Design of Development
- Element 3: Vehicle Access; and
- Element 4: Water

(WAPC, 2015)

The plan of subdivision for Lot 1 and 2 Tea Tree Road Chittering is required to meet the “Performance Principles” and/or “Acceptable Solutions” of each Element of the bushfire mitigation measures (WAPC, 2015). The site has been classified as having a “**Low- Moderate**” future internal bushfire hazard in the development/building areas, with adjacent “**Extreme**” and “**Moderate**” bushfire hazards (as per WAPC Guidelines, Table 3) due to the presence of Forest Type A, Woodland Type B, Scrub Type D and Grassland Type G. Effective Slopes under vegetation are variable across the site are low <5°.

The subdivision will be assessed against the bushfire protection criteria Acceptable Solutions for Elements A1, A2, A3 and A4. The following sections of this report outlines how the subdivision complies with the bushfire protection criteria Acceptable Solutions as per the newly released Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a).

### 6.1. Element 1: Location-

Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.

#### **Assessment to the Acceptable Solutions.**

**Acceptable Solution applied A1.1:** *the strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low Bushfire hazard level, or BAL-29.*

The subdivision can associated new dwellings can be located on BAL Low areas. The previously cleared areas (now regrowing from cessation in farm activities) can be slashed, mowed and maintained in a Low Fuel State (as per AS3959-2009 Clauses 2.2.3.2 (f)). The subdivision has a **Moderate- Extreme** rating due to the presence of remnant external Forest, Scrub and woodland areas (north, south and west). The bushfire hazard level is manageable and adequate setbacks can be achieved to 100m from these areas due to the large lots proposed. The large size lots (Rural Small Holding zoning) ranging from 5.01ha to 5.44ha allow for setbacks to bushfire hazards, therefore reducing the risk of bushfire to people, property and infrastructure. If dwellings do not located >100m from classifiable vegetation then building to AS3959-2009 will apply.

Subdivision is deemed to meet Acceptable Solution A1.1.

#### **6.1.1. Recommendations arising from assessment to this element**

The recommendations/conclusions from assessment to Element 1: Location concludes that the subdivision:

- Subdivision is deemed compliant to A1.1 due to :
  - BAL Allocation can apply of BAL-Low through re-clearing previously cleared areas.
  - If vegetation continues to re-grow without maintenance then BAL and building to AS3959-2009 will apply where 100m setbacks cannot be achieved.

## 6.2. Element 2: Siting and design of development

Intent: To ensure that the siting of development minimises the level of bushfire impact.

**Assessment to the Acceptable Solutions** – To achieve compliance with this Element using an Acceptable Solution, either or both acceptable solutions (A2.1 and A2.2) must be met that it satisfies Element 1.

The Acceptable Solutions which will be applied to this subdivision include:

- **A2.1: Asset Protection Zone (APZ):** Every building is surrounded by a 20m APZ (see Section 6.2.2).
- **A2.2 Hazard Separation:** Building to AS3959-2009 where setbacks of 100m cannot be achieved to Bushfire Prone Vegetation (see Section 6.2.1).

The subdivision will be assessed to the Acceptable Solutions for Element 2 as demonstrated in the following sections.

### 6.2.1. Asset Protection Zones (APZ) (Acceptable Solution A2.1)

#### Acceptable Solutions applied

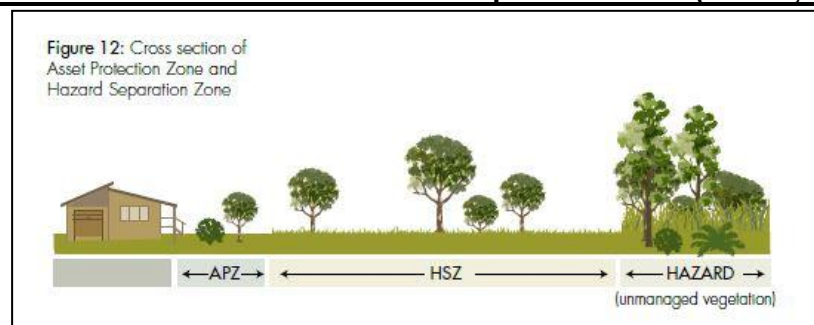
The aim of the Asset Protection Zone (APZ) is a low fuel area immediately surrounding a habitable building, and is designed to minimise the likelihood of flame contact with buildings (WAPC, 2015). APZ will minimise the risk of the building igniting, (thus protecting the occupants), and with the reduced fuel quantities, allow safer and more effective conditions for fire-fighters to contain wildfires. Roads, pathways, lawns, and other low hazard items should be placed within this zone to improve the effectiveness of the zone. The APZ are required in addition to HSZ (see Section 6.2.2).

Every building must be surrounded by a 20 metre wide APZ, this is deemed by WAPC (2015) as the minimum width to be constructed around all buildings as a “defendable zone”. Activity within the APZ (WAPC, 2015) for each individual dwelling must meet the following requirements:

- a) Width: 20 metres measured from any external wall of the building or building envelope;
- b) Location: within the boundaries of the lot on which the building is situated;
- c) Fine fuel load: reduced to and maintained at 2 tonnes per hectare;
- d) Trees (crowns) are a minimum of 10 metres apart
- e) Trees are low pruned at least to a height of 2 metres;
- f) No tall shrub or tree is located within 2 metres of a building;
- g) No tree crowns overhang the building;
- h) Fences and sheds within the APZ are constructed using non-combustible materials (e.g. colour bond iron, brick, limestone, metal post and wire); and
- i) Sheds within the APZ should not contain flammable materials.

An example of APZ from the “Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) is shown in Figure 6.

**Figure 6 – Asset Protection Zone and Hazard Separation Zone (WAPC, 2015)**



(WAPC, 2015 a)



All residences within the proposed subdivision can achieve the required 20m APZ within their respective boundaries. Information on long term maintenance of APZ for the homeowner, as recommended by DFES is provided in Appendix F.

### 6.2.2. Hazard Separation (Acceptable Solution A2.2)

BAL is the process for measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. The threat or risk of bushfire attack is assessed by an accredited BAL Assessor. BAL rating determinations are of 6 levels BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40, BAL-FZ. Building is generally not recommended in BAL-40 or BAL-FZ areas. The BAL rating is determined by the distance of the building to vegetation, slope and vegetation type adjacent to the dwelling. Refer to Figure 9 below.

**Figure 9 - BAL Construction levels in context**



(WAPC, 2015a)

Building design and construction to AS3959-2009 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself. The construction standards outlined in AS 3959-2009 provide reference to specific items of building and it is recommended that the future lot owner discuss these in detail with their builder or architect. Table 2 outlines some of the construction consideration to AS3959-2009 when building in bushfire prone areas. Construction standards are to be approved by the CoA prior to construction. Building to AS3959-2009 applies to buildings as defined in the Building Code of Australia (BCS).

**Table 2 – AS3959-2009 Construction Requirement (Example)**

Construction requirement AS3959-2009
Flooring systems
Supporting posts, columns, stumps, piers and
External Walls
Windows
External Doors
Vents and weep holes
Roof
Eaves
Fascia's
Gutters and downpipes
Veranda and decks
Service Pipes (water and gas)



The subdivision will comply to Acceptable Solution A2.2 by applying either a 100m Hazard Separation Zone (HSZ) (i.e. 100m setback) at the interface of the building and the bushfire hazard or a setback associated with BAL construction and AS3959-2009 as outlined in the BAL Contour Map outlined in Appendix E. No higher BAL allocation than BAL 12.5 needs to be applied to the dwellings.

**Table 3 – Minimum Setback Distances and Construction Standards**

BAL Rating	Vegetation Type	Distance to Vegetation	Construction
BAL 29	Woodland Type B	17-<25m	AS3959-2009 to apply
BAL 19	Woodland Type B	25-<35m	AS3959-2009 to apply
BAL 12.5	Woodland Type B	35-<100m	AS3959-2009 to apply
No BAL Rating Required	All Vegetation	>100 metres	No construction standards required

Vegetation is downslope and >0 to 5 Degrees (as per AS3959-2009).

**Notes on BAL Assessment:**

- **Sites affected by BAL will be subject to detailed feature survey and the mapping depicted in the BAL Mapping Appendix E is a guide, with accuracy to within 5m.**
- **If dwellings cannot achieve >100m from the adjacent vegetation then BAL Construction will apply as outlined in Table 3.**
- **BAL setback distances are measured from the edge of existing vegetation at time of feature survey and building construction approvals stages.**
- **Detailed assessment for BAL Construction as described in this document can be undertaken at construction stage by an accredited Bushfire Consultant with approval from the Shire of Chittering.**

A 100m HSZ from external Extreme and Moderate BHL can be achieved as shown on the SP Appendix B and the BAL Mapping Appendix E. The lots will require ongoing maintenance from the developer or will be subject to vegetation clearing by the new owners. If the lots remain unmaintained and continue to revegetate dwellings may require to be built to BAL and AS3959-2009 as per Table 3. This is indicated in the BAL Mapping Appendix E (see inset).

The developer will be responsible for the implementation of a notification on title pursuant to 70A of the *Transfer of Land Act 1893* with regard to the notification on title on lots alerting the future owners of the endorsed Bushfire Management Plan

**Assumptions made in BAL Contour Mapping:**

- Remnant vegetation in internal areas will be maintained as low fuel by the developer.
- A 100m HSZ (setback) will apply to the whole of development and be maintained by the developer prior to sale of lots and until lots are relinquished to new owners.
- The large rural lot to the east will be maintained as rural and grazed pastures.
- The remnant vegetation areas external to the site to the north, south and west adjacent to the subject site will remain "as is".

**6.2.3. Recommendations arising from assessment to this Element**

The recommendations/conclusions from assessment to Element 2: Siting and design; concludes that the subdivision:

- The Subdivision is deemed to be compliant with Element 2 by:
  - The application of a 20m APZ;
  - Clearing/maintenance of 100m HSZ (setback) for BAL Low; and

- If woodland Type B areas regenerate and 100m not achieved then building to BAL/AS3959-2009 as it applies to the dwelling;
- The developer will be responsible for the implementation of a notification on title pursuant to Section 70A of the Transfer of Land Act 1893 for all lots affected by an increase in construction standards consistent with a BAL rating/AS3959-2009 allocation to the lot, and alerting the prospective owner (s) of the lots and successors in title of the Bushfire Management Plan.
- It is recommended that the developer clear all the lots prior to sale to ensure the APZ and setbacks are demonstrated to the purchaser at time of sale. The APZ areas are to be as per the standards in Section 6.2.1 and these areas are regularly maintained by the developer until all land is relinquished to the new lot owner.
- Maintain 100m setback from dwellings and bushfire hazards at all times during staged construction and grasses maintained to <100mm at all times;
- The vegetation clearing required for the street verges, APZ and HSZ areas does allow for the retention of significant trees, these should be clearly marked for the developer prior to clearing operations on the site. Final placement of the dwellings on site (by new lot owners) may require further trees to be removed however this stage of tree removal should only be as per the standards of the APZ Section 6.2.1; and

Individual BAL assessments may be considered on the lots by the new owners when dwelling design/placement is known and can be undertaken at building approval stages with the engagement of an Accredited Level 1 BAL Assessor.

### 6.3. Element 3: Vehicle Access

Intent: To ensure that the vehicular access serving a subdivision/development is available during a bushfire event.

*Acceptable Solutions applied.*

The internal layout of the Subdivision's public roads and private access allows vehicles and other emergency vehicles to move through the subdivision at all times, meeting the Acceptable Solutions. Vehicle access technical standards as outlined in Table 4 are the minimum requirements from Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a). Refer to Table 4 and Bushfire Management Plan Appendix G.

**Table 4 – Vehicular Access Standards**

Standard	Public Roads	Fire Service Access Ways	Emergency Access Ways
Minimum trafficable	6 metres	4 metres	6 metres
Horizontal clearance	6 metres	6 metres	6 metres
Vertical clearance	4 metres	4 metres	4 metres
Maximum grades	1 in 10	1 in 10	1 in 10
Minimum weight capacity	15 tonnes	15 tonnes	15 tonnes
Maximum crossfall	1 in 33	1 in 33	1 in 33
Curves minimum inner	8.5 metres	8.5 metres	8.5 metres
Cul de sacs	N/A	N/A	N/A
Battle Axes	Not more than 600m	N/A	N/A
Private Driveways	Standard as roads if house >50m from road, passing bays every 200m for 20m.	N/A	N/A
Signage	Not required	Required	Must be signposted
Gates	Not required	Min width 3.6	Min width 3.6
Design and construction	Approved by relevant local government	Approved by relevant local government	Approved by relevant local government
Turn around areas	Every 500 metres, within 50 metres of the house and at water	Every 500 metres, within 50 metres of the house.	Not required

(WAPC, 2015a)

#### 6.3.1. Two Access Ways (A.3.1)

The SP design allows for two access points onto Tea Tree Road and an Emergency Access Way and Fire Service Access onto Brennan Road in the west and to southern firebreaks (in adjacent properties) to the south and meet the Acceptable Solution. Please refer to Bushfire Management Plan Appendix G.

#### 6.3.2. Public roads (A.3.2)

All internal public roads shall be constructed to acceptable standards (Refer to Table 4 – Vehicle Access Standards) and shall be detailed in Civil Engineering Designs. The Subdivision design allows for two way traffic and safe egress from the subdivision via a road network with 30m internal road reserves and meets the Acceptable Solution. Please refer to Bushfire Management Plan Appendix G.

**6.3.3. Cul de Sacs (A3.3)**

Cul-de-sacs will not exceed 200m in length and meet the Acceptable Solution.

**6.3.4. Battle Axes (A3.4)**

Battle Axes shall not exceed 600m, standards for road/street construction are as per Table 4 – Vehicle Access Standards. All Battle Axes proposed meet this requirement and meet the Acceptable Solution.

**6.3.5. Private Driveways (A3.5)**

Constructed driveways are to meet the requirements of Table 4. All driveways will be <50m from road to dwelling and will not require turnaround areas or passing pays, therefore meeting the Acceptable Solution.

**6.3.6. Emergency Access Ways (A3.6)**

Emergency Access Ways (“Fire Access”) will be from the northern side of the subdivision to Tea Tree Road, from Brennan Road to the west and to southern firebreaks (in adjacent properties) to the south. If the subdivision is staged, the Emergency Access Ways will be required to link through to Brennan Road and to Tea Tree Road, this will need to be via a hardened surface as per Table 4 - Vehicular Access Standards. The linking Emergency Access Way to Brennan Road will provide a trafficable surface for emergency access linking Brennan Road and the subdivision internal roads, and meet the Acceptable Solution. Please refer to the Please refer to Bushfire Management Plan Appendix G.

**6.3.7. Fire Service Access (A3.7)**

Fire Service Access (FSA) is proposed from the northern side of the subdivision to Tea Tree Road, from Brennan Road to the west and to southern firebreaks (in adjacent properties) to the south. These FSA’s to enable fire appliance ease of access through the subdivision for fire fighting operations, please refer to the Bushfire Management Plan- Appendix G. The road reserve through the subdivision enables light unit fire appliance and heavy unit (truck appliances) access in an emergency.

The linking Fire Service Access to Brennan Road will provide a trafficable surface for fire appliance access through the POS corridor (Shire land) linking Brennan Road and the subdivision internal roads. Please refer to the Please refer to Bushfire Management Plan Appendix G.

The minimum running surface and standards of construction roads is as per Planning for Bushfire Protection Edition 2 (2010), please refer to Table 4. Fire Service Access routes for this subdivision will:

- Link the road network;
- Be adequately signposted (see following section);
- Allow for two-way traffic (as per Table 4);
- Have a hardened surface (as per Table 4 standards); and
- Have erosion control measures in place such as culverts, stormwater contours/diversions, and native vegetation remediation/stabilisation at gully crossings.

If the subdivision is staged, the Fire Service Access Ways will be required to link through to Brennan Road, this must be via a hardened surface as per Table 4 - Vehicular Access Standards.

**6.3.8. Signage**

“Fire Service Access Ways” are to be sign posted where they adjoin public roads. DFES recommend the following wording for signage as appropriate:

- “Fire Service Access – No Public Access”; and
- “Emergency Access Only”.

An example of clear street signage is shown over the page in Photo13.



Photo 13 – Example of street/road signage clearly indicating emergency access/egress within the subdivision.

### 6.3.9. Gates

The use of gates to restrict public traffic on “Emergency Access Ways” is acceptable provided it is wide enough to accommodate 3.4 Heavy Duty Fire Appliances. Gate standards are to be as follows:

- Minimum width 3.6 metres;
- Approved by the Shire of Chittering;
- Emergency Access must not be locked; and
- Bollards should be installed to restrict vehicle movement around the gates where appropriate.

### 6.3.10. Individual Fire breaks (A3.8)

Internal fire breaks are required by the Shire of Chittering, refer to the current Fire Break Order (annually updated) from the Shire website:

<http://www.chittering.wa.gov.au/chittering-fire-services/fire-breaks-and-important-dates-to-remember.aspx>

As at 2014/15, the Shire of Chittering Firebreak Order states the following firebreaks would apply to this subdivision:

- ***All properties, including Rural Residential with land greater than equal or greater than 2 ha:*** Must clear a fire break of all flammable materials three metres (3) metres wide, with a four (4) metre vertical clearance along the inside of the boundary to the property.
- ***Land Greater than 120 ha:*** Must have a firebreak in such a position which divides the land into areas not exceeding 120 ha. An indication of how this can be achieved on the Rural Lot is shown in the BMP Appendix G.

Individual fire breaks will apply to lots 1-47 (Rural small holdings 5.01 to 5.44ha), with firebreaks for the larger Rural Lot (proposed lot 48) along existing fire breaks as shown in the BMP Appendix G.

The fire breaks are to be maintained to the standard of the Shire of Chittering's Town Planning Scheme No 6, Local Planning Policy No 21. This policy requires all firebreaks to be as stated above (3m wide with a 4m vertical clearance) for 4 wheel drive access. Where a Fire Access (Emergency Access Way) or road adjoins a property, an individual fire break is not required

Internal lot firebreaks should be designed to minimise soil erosion. For instance, firebreaks will generally avoid areas undergoing environmental remediation (Remnant Vegetation areas or Vegetative Corridors) and be installed around these areas. In areas of steep terrain, firebreaks can be created by spraying with chemicals, the path of a firebreak can be meandered to follow contours to reduce the risk of soil erosion from storm water.



#### 6.4. Element 4 Water

Intent: To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.

##### *Acceptable Solution applied*

Scheme water will not be provided to the subdivision. The Guidelines for Planning in Bushfire Prone Areas recommends rural small holdings to have the provision of a 50, 000L water tank (to a standard approved by the Shire of Chittering) every 25 residences and a hydrant installed. It is therefore required that a 100,000 L capacity should be applied at this subdivision (48 lots) at a central location. These structures will be located on public land and vested with the Shire of Chittering as subdivision clearance occurs.

The hydrant/water tank construction must meet the following standard specifications and have:

- Hardstand and turnaround area suitable for 3.4 Heavy Duty fire appliance;
- Fire water tanks to have level indicators installed;
- Valves and manifolds must be locked by the developer with a Shire Standard lock;
- AS approved fire hydrants;
- Must be capable of delivering 600 litres per minute via Engineers certification;
- Procedures to be put in place by the developer to ensure the tank is maintained at full capacity at all times;
- Be easily accessible with standard fire services hydrant and key; and
- Be identified by standard road and pole markings.

A recommended location for the tank and hardstand area is shown in the Bushfire Management Plan Appendix G. After the developer has completed all maintenance periods, it shall be the responsibility of the Shire of Chittering to maintain this facility.

As scheme water is not to be provided to individual houses, all buildings intended for residential use must include provision for the storage of water in tanks not less than 120,000 litres capacity, of which 10,000L is to be held in reserve for fire fighting purposes. All water tanks intended to reserve 10,000L for fire fighting purposes are required to install a 50mm male camlock fitting to the floor of the tank and the draw point for the residential purposes is to be 10,000L above the floor of the tank.

#### 6.5. Other Bushfire Mitigation Procedures

##### 6.5.1. Landscaping/Streetscaping Areas

Landscaping and Streetscaping areas subject to similar standards that apply to the APZ and the following minimum standards shall apply:

- Trees (crowns) a minimum of 10m apart (no continuous crowns);
- Trees should have no dead material within the plant's crown or on the bole;
- Fuel reduced to <2t/ha; and
- Shrubs should be no higher than 0.5 m.

##### 6.5.2. Staged Development

If the development is staged it should incorporate the following:

- Reduction of bushfire fuels in HSZ and APZ for each stage of construction of the subdivision and during maintenance periods;
- Maintenance of 100m HSZ to APZ standards – note grasses to be slashed and maintained to <100mm at all times.
- Construction of 2-way Emergency Access Way from Tea Tree Road to Brennan Road;
- Installation of Water Tank on public land (minimum of 50,000L/25 residences); and

- Maintenance of fire protection measures in public areas (gates, access, landscaped areas etc) until the developer has relinquished construction/maintenance responsibility of public use areas to the Shire of Chittering.

#### **6.5.3. Evaporative Air Conditioners**

Evaporative air conditioning units can catch fire as a result of embers from bushfire getting into the unit. These embers can then spread quickly through the home causing destruction. It can be difficult for fire-fighters to put out a fire in the roof spaces of homes. Information on Evaporative air conditioners is supplied in Appendix F of this document.

It is also recommended that home owners:

- Ensure that suitable external ember screens are placed on roof top mounted evaporative air conditioners compliant with AS3959-2009 (current and endorsed standards) and that the screens are checked annually.

## 7. Shire of Chittering Fire Protection Plan

The Shire of Chittering has the assistance of the Chittering Fire Services which is made up of six Volunteer Bush Fire Brigades. It has a Chief Bush Fire Control Officer and two Deputies. Five Brigades are fire fighting units and one is an incident support Brigade. Each fire fighting unit has three appliances suited to its area. The Incident Support Brigade supports the Incident Management Team at all fires when required.

Training and induction courses are held regularly and land owners are encouraged to attend these. For more information refer to their website:

<http://www.chitteringfireservices.org.au/>

Local Bush Fire Control Officers are allocated throughout the Shire depending on region, the latest Fire Break Order should be consulted from the Shire's website for contact details:

[www.chittering.wa.gov.au](http://www.chittering.wa.gov.au)

### 7.1. Fire Fighting Facilities

The subject area is in the Upper Chittering Bushfire Brigade District. Response times can vary depending on commitments of volunteers, fire events current at time and priority of the fire services in the south west of Western Australia during summer periods. DFES recommend that homeowners take care to prepare their individual dwellings for fire season and take precautions against fire as per the **"Bushfire Preparedness – Prepare. Act. Survive."**

It is generally acknowledged that during large wildfire events, local resources may not be able to respond to every dwelling due to strategic deployments of services, priorities within the area or state and/or present commitments of volunteers and resources.

The Chittering Fire Services has 3.4 and 2.4 heavy duty tankers (3000L and 2000L) and light tankers (fast attack 400L capacity). These are typical of Brigade units for fire fighting services within Western Australia.

The Chittering Fire Services' six bush fire brigades provide local fire services and have:

- 4 fire stations;
- Volunteer members;
- A communications and call out system;
- Protective clothing issue to volunteers; and
- DFES approved fire appliances.

### 7.2. Homeowner Protection

It is the responsibility of homeowners to protect their property from fire. DFES have readily available information online which can assist homeowners in their preparedness during fire season (October to May). The DFES website **"Bushfire Preparedness – Prepare. Act. Survive."** should be accessed by all owners in bushfire prone areas. A hard copy of the A4 book "Prepare. Act. Survive" can be found at local Shire of Chittering Offices or DFES offices, or downloaded off the above web address:

<http://www.dfes.wa.gov.au>

### 7.3. Bushfire Plan

Residents should prepare their own individual fire plans, as they need to make a commitment to develop a bushfire survival plan detailing preparations and actions to take if a bushfire threatens. When developing a bushfire survival plan, the following should be considered:

- If you plan to leave for a safer place - where will you go and how will you get there? Your safer place could be with friends and family, and may not be far away. Know where you will go and never 'wait and see'. Relocating at the last minute can be deadly
- Does your household include elderly relatives, young children, people with disabilities or illness? When, where and how will they be relocated? Who will care for them?
- What will you do with your pets and livestock?
- Can your home be defended? Is it in a location that makes it difficult or dangerous to actively defend? (refer to DFES's Homeowners Bushfire Survival Manual - PDF)
- Will your home provide shelter if you have to or decide to stay?
- Are you capable of defending your home without the support of fire fighters?
- Do you have the skills, knowledge and capacity to check for and put out spot fires for up to ten hours after the fire front has passed?
- Do you have the right equipment and resources to actively defend? (e.g. sufficient independent water supply of at least 20,000 litres and a petrol, diesel or generator powered pump capable of pumping 400 litres per minute)
- Will you cope with the noise and stress of a bushfire if you decide to actively defend? Being in a bushfire may be the most traumatic experience of your life.

(from DFES website, 2013)

By compiling information as outlined above, the individual lot owner can be prepared for their response in a bushfire emergency. Home owners should not rely on emergency personnel to attend their home and thus it is stressed to **prepare an individual bushfire emergency plan** regarding their intentions and property. This Bushfire Management Plan is **not** an individual bushfire emergency plan.

As noted in Section 6.0, building to AS3959-2009 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.

***AS3959-2009 disclaimer:*** *It should be borne in mind that the measures contained within this Standard (AS3959-2009) cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather condition.*

(AS3959, 2009)

Information is also available on the ABC Radio website to guide homeowners in the event of a fire emergency, such information includes:

Planning for an Emergency Bushfire:

- Survival Kit
- Fire Emergency Services
- Before a Bushfire
- During a Bushfire
- After a Bushfire

Refer to the following links for more information on how to prepare a bushfire plan:

<http://www.abc.net.au/news/emergency/?ref=front-page-slider-v2--emergencies>

It is also recommended that homeowners in bushfire prone areas understand the DFES Bushfire Warning System. A brief outline is shown over the page, however further detail should be sought from DFES website ([www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)) in a bushfire emergency.

### **Bushfire Warning System**

During a bushfire, emergency services will provide as much information as possible through a variety of channels.

### **Community Alerts**

DFES issues Community Alerts for bushfires that threaten lives and property.

The alert level changes to reflect the increasing risk to your life and the decreasing amount of time you have until the fire arrives. DFES issues the following bushfires warnings:

- **Advice**  
A fire has started but there is no immediate danger, this is general information to keep you informed and up to date with developments.
- **Watch and Act**  
A fire is approaching and conditions are changing, you need to leave or prepare to actively defend to protect you and your family.
- **Emergency Warning**  
You are in danger and you need to take immediate action to survive as you will be impacted by fire. An emergency warning may be supported with a siren sound called the Standard Emergency Warning Signal (SEWS).
- **All Clear**  
The danger has passed and the fire is under control, but you need to remain vigilant in case the situation changes. It may still not be safe to return home.

([www.dfes.wa.gov.au](http://www.dfes.wa.gov.au))





## 8. Summary

### 8.1. Overall Fire Threat

Marou Property Development Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a fire hazard assessment and prepare a Bushfire Management Plan to guide all future fire management for the proposed subdivision development of Lots 1 and 2 Tea Tree Road, Bindoon. The subdivision proposal is for approximately 47 lots to be created as Rural small holdings zoning (5.01ha to 5.44ha) and large 1 Rural Lot.

The subject site is predominantly cleared paddock areas in the east with some internal remnant vegetation patches with Forest/Woodland vegetation. The majority of the site has have been disturbed from previous land activities (clearing, grazing, agricultural pursuits). In 2016 site reassessment (since 2012) assessed the western paddock areas to be not grazed for some time and regenerating Woodland Type B. Adjacent to the subject site to the south, north and west is Forest Type A, Woodland Type B and Scrub type D in private property areas (as classified by AS3959-2009)

The subdivision has been rated as having an **Extreme - Moderate** Bushfire Hazard Level as defined by WAPC Guidelines, Table 3. The subdivision was assessed against the bushfire protection criteria Acceptable Solutions for Element A1, A2, A3 and A4 found that upon construction, the subdivision will comply with the bushfire protection criteria Acceptable Solutions as per the newly released Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015),

A summary includes:

- Subdivision is deemed to be compliant with “Acceptable Solutions” for Element A1, see Section 6.1;
- Subdivision is deemed compliant with “Acceptable Solutions” for Element A2, see Section 6.2;
- Subdivision is deemed compliant with “Acceptable Solutions” for Vehicles (Element), see Section 6.3; and
- Whole of subdivision compliant with “Acceptable Solutions” for Water (Element), see Section 6.4.

This BMP report provides details of the fire management strategies proposed to be implemented across the site as it is subdivided and developed to ensure adequate protection of life, property and biodiversity assets. To ensure the mitigation measures are implemented responsibilities are outlined in the following sections for the Future Lot Owner, Developer and SoC.

### 8.2. Future Lot Owners Responsibility

***It is recommended the Future Property Owners shall be responsible for the following:***

- To take measures to protect their own assets on their property, home owners should not rely on emergency personnel to attend their home and thus it is stressed to **prepare an individual bushfire emergency plan** regarding their intentions and property. This Bushfire Management Plan is **not** an individual bushfire emergency plan;
- Implement this document, Bushfire Management Plan of 1 and 2 Tea Tree Road Bindoon as it applies to their individual property;
- Ensure that APZ's are maintained to a minimum of 20 metres around all buildings (see Appendix F);
- Ensure that 100m setbacks (HSZ's) are maintained from the Woodland (internal) vegetation (bushfire) risks (see Appendix F);
- Ensure that their property is built to BAL/AS3959-2009 Building Standards if 100m setback cannot be achieved within their property from Woodland Type B;
- Provision for the storage of water in tanks not less than 120,000 litres capacity, of which 10,000L is to be held in reserve for fire fighting purposes;

- Ensuring that suitable external ember screens are placed on roof top mounted evaporative air conditioners compliant with AS3959-2009 (current and endorsed standards) and that the screens are checked annually; and
- Each property owner is to be made aware of:
  - Fire Management Plan,
  - A hard copy of the A4 book “Prepare. Act. Survive”,
  - Fire Control Information supplied by the Shire of Chittering; and
- It is the responsibility of the individual property owner to maintain in good order and condition APZ, HSZ and driveway standards. Future modifications other than requirements as set out in this Bushfire Management Plan can only be done with written agreement from the Shire of Chittering.

### 8.3. Developers Responsibility

Prior to development being given final approval by the Shire of Chittering, the Developer shall be required to carry out works that include the following but in respect to individual stages of development. Subsequent to the issue of final approval, the Developer shall have no further responsibilities to the provision of fire fighting facilities and bushfire management on individual lots that pass from their ownership.

***It is recommended that the Property Developer shall be responsible for the following:***

- Implement this document, Bushfire Management Plan of Lots 1 and 2 Tea Tree Road Bindoon as it applies to their development;
- Comply with standards as outlined by the Shire of Chittering and WAPC conditions of subdivision;
- Ensure that potential property owners are aware of this Bushfire Management Plan;
- Comply with minimum subdivision construction standards as outlined by this Bushfire Management Plan;
- Maintain fire protection measures in public areas (gates, access, landscaped areas etc) until the Developer has relinquished construction/maintenance responsibility of public use areas to the Shire of Chittering;
- Install a 100,000 L capacity water tank for fire fighting purposes located at a central location of the subdivision;
- Construct Access to the following standards as outlined in Table (4).

**Table 4 – Vehicular Access Standards**

Standard	Public Roads	Fire Service Access Ways	Emergency Access Ways
Minimum trafficable	6 metres	4 metres	6 metres
Horizontal clearance	6 metres	6 metres	6 metres
Vertical clearance	4 metres	4 metres	4 metres
Maximum grades	1 in 10	1 in 10	1 in 10
Minimum weight capacity	15 tonnes	15 tonnes	15 tonnes
Maximum crossfall	1 in 33	1 in 33	1 in 33
Curves minimum inner	8.5 metres	8.5 metres	8.5 metres
Cul de sacs	N/A	N/A	N/A
Battle Axes	Not more than 600m	N/A	N/A
Private Driveways	Standard as roads if house >50m from road, passing bays every 200m for 20m.	N/A	N/A
Signage	Not required	Required	Must be signposted
Gates	Not required	Min width 3.6	Min width 3.6
Design and construction	Approved by relevant local government	Approved by relevant local government	Approved by relevant local government

Turn around areas	Every 500 metres, within 50 metres of the house and at water tanks	Every 500 metres, within 50 metres of the house.	Not required
-------------------	--	--	--------------

(WAPC, 2015a)

- Install Signage and Gates of Fire Service Access (if required);
- Install signage for Emergency Access Ways (if required);
- Implement a notification on title under Section 70A of the *Transfer of Land Act 1983* notifying future lot owners about the BMP;
- Provide each prospective owner with:
  - Fire Management Plan,
  - A hard copy of the A4 book “*Prepare. Act. Survive*”; and
  - Fire Control Information supplied by the Shire of Chittering (Yearly advice Brochure updated annually).

#### 8.4. Shire of Chittering Responsibility

At approval and endorsement of this Bushfire Management Plan, the Shire of Chittering has statutory control and responsibility to ensure that aspects of the Plan and community fire safety are maintained.

***It is recommended the Shire of Chittering be responsible for the following:***

- Provide advice on standards and methods to achieve community fire protection to owners/occupiers of land.
- Ensure individual Property Owners maintain in good order and condition Emergency Access/Fire Access Ways building protection zones, hazard reduction zone and driveway standards.
- Maintain district Fire Fighting Facilities.
- Undertake Prescribed Burning (if required) and fuel reduction strategies to ensure a maximum of 8T/ha ground fuels on any internal public remnant vegetation (i.e. Vegetative corridor areas) in accordance with the *Bushfire Act 1954*.
- Ongoing management of any public areas will be the responsibility of the Shire of Chittering after the Developer has relinquished construction/maintenance responsibility.
- Maintain condition and working order of district water supplies and equipment for fire fighting purposes.

## 9. Checklist for compliance to and Guidelines for Planning in bushfire Prone Areas and State Planning Policy 3.7

### 9.1. Checklist to Compliance to Guidelines for Planning in Bushfire Prone Areas

The following checklist has been developed by Bio Diverse Solutions in response to the bushfire protection criteria as outlined in the recently released Guidelines for Planning in Bushfire prone Areas.

Checklist for proposal compliance and justification to Guidelines for Planning in Bushfire Prone Areas (2015) )			
<b>BDS Project Name</b>	BMP Lot 1 and 2 Tea Tree Road Chittering		
<b>BDS Job Number</b>	WHEL014		
<b>Date</b>	13/6/2016	<b>WAPC#</b>	n/a
<b>Client name</b>	Marou Property Development Pty Ltd	<b>Condition #</b>	n/a
<b>Bushfire Prone Area</b>	Yes	<b>Mapping</b>	Yes See App A
<b>Planning proposal</b>	Rural Subdivision	<b>Lots created</b>	48
1. Bushfire Protection Criteria Acceptable Solutions as defined by Guidelines for Planning for Bushfire Prone Areas (WAPC 2015).			
Element	Compliant to Acceptable Solution– Yes/No	Justification	
<b>Element 1 – Location</b>	Yes	Site will be classified as Extreme and Moderate bushfire hazard upon completion. Buildings built to BAL-Low and AS3959-2009, no higher building than BAL 12.5 required on (large sized lots) rural small holding lots. <b>Subdivision deemed to meet Acceptable Solution.</b>	
<b>Element 2 - Siting and design of development</b>	Yes Stages Stag	A2.1: APZ can be achieved within the lot boundaries due to large lots created <b>Subdivision deemed to meet Acceptable Solution</b> A2.2 Setbacks can be achieved and building no higher than BAL 12.5. Setbacks to BAL located within the lot boundary. Building to BAL –Low can occur on all lots. <b>Subdivision deemed to meet Acceptable Solution</b>	
<b>Element 3 - Vehicular access</b>	Yes	A3.1: Two access routes south to north and to west to Brennan Road A3.2 Public roads to meet minimum grades A3.3 Cul-de-sacs meet minimum grades A3.4 Battle axes meet minimum grades A3.5 Private Driveways meet minimum grades A3.6 EAW proposed and can meet minimum requirements. A3.7 FSA along public road network and EAW's. A3.8 Firebreaks/low fuel areas compliant to SoC requirements <b>Meets Acceptable Solution.</b>	
<b>Element 4 – Water</b>	Yes	Reticulated scheme water proposed. <b>Meets Acceptable Solution.</b>	
<b>Bushfire Hazard Assessment required</b>	Yes	See Section 5 and Appendix D of BMP.	
<b>BAL Contour required</b>	Yes	See Section 6 and Appendix E of BMP.	
<b>BMP required</b>	Yes	This BMP document assessed the proposal in detail to the bushfire protection criteria.	

## 9.2. Checklist to Compliance to SPP3.7 Policy Measures

The following checklist has been developed by Bio Diverse Solutions in response to the Policy measures as outlined in the recently released State Planning Policy 3.7

2. Policy measures SPP3.7		
Policy Measure	Applicable – Yes/No	Justification
6.1 - Higher order strategic planning documents in bushfire prone areas	No	Not applicable – not a high order planning document
6.2 – Strategic planning proposals, subdivision and development applications:	Yes	a) Subdivision proposal within a designated bushfire prone area, BAL and AS3959-2009 to apply where <100m of bushfire prone vegetation. BHL Extreme and Moderate adjacent to site, internal Moderate and Low BHL at completion of construction. No higher BAL construction than BAL Low or BAL 12.5 required. Large lots proposed.
6.3 - Information to accompany strategic planning proposals:	Yes	a) Results of BHL documented in BMP and prepared by an accredited Level 1 BAL Assessor and Experienced Level 2/3 Bushfire Planning Practitioner. b) BAL Contour Map documented in BMP and prepared by an accredited Level 1 BAL Assessor and Experienced Level 2/3 Bushfire Planning Practitioner. c) Assessment to guidelines indicated can meet all Elements assessed against Acceptable Solutions updated BMP would be required to document any changes for future planning stages.
6.4 - Information to accompany subdivision application	Yes	a) BAL Contour map provided and prepared by an Accredited Level 1 BAL Assessor and Experienced Level 2/3 Bushfire Planning Practitioner b) Bushfire hazard issues identified arising from BAL Contour Map buildings. Subdivision can be built to no higher allocation than BAL 12.5. c) Assessment to guidelines indicated can meet all Elements assessed against Acceptable Solutions. Update of BMP required to document any changes for future stages
6.5 Information to accompany Development applications	No	Not applicable – not a Development Application
6.6 Vulnerable or high-risk land uses	No	Not applicable – not a Vulnerable or high-risk land use.
6.7 Strategic Planning proposals, subdivision or development applications in areas where an extreme BHL and/or BAL-40 or BAL –FZ applies	No	No.
6.8 Advice of State/relevant authorities for emergency services sought	No	
6.9 Advice of State/relevant agencies/authorities	No	Flora and Fauna survey completed in 2012, vegetation cleared and degraded condition.



for environmental protection to be sought		
6.10 Bushfire conditions may be imposed	Yes	Building to BAL if dwelling situated within 100m of Bushfire Prone Vegetation.
6.11 Precautionary principle	No	Not applied

### 9.3. Recommendations/conclusions based on above checklists

A summary of the recommendations within this report is supplied below. This also forms the “upfront” and “ongoing” tasks which need to be completed for this project.

- Implementation of responsibilities of the developer (Section 8.3) will be undertaken by the developer/client via formal endorsement/release of this BMP plan. Agreeance to the responsibilities as outlined in Section 8.3 of this BMP is accepted by the developer/client by the provision of this document to approving agencies.
- Implementation of the responsibilities of the developer (Section 8.3) will not occur by the developer until a formal written approval/endorsement is given from the approving agency regarding the BMP.
- In the event the property passes ownership to a subsequent developer/owner the implementation of the endorsed/approved BMP (Section 8.3) should be conditioned by WAPC as a matter of the WAPC subdivision conditional process.
- The developer will be responsible for the implementation of a notification on title pursuant to Section 70A of the Transfer of Land Act 1893 for all lots affected by an increase in construction standards consistent with a BAL rating/AS3959-2009 allocation to the lot, and alerting owner (s) of the lots and successors in title of the Bushfire Management Plan.
- The BAL Contour Plan (Appendix E) is prepared at a point in time and it is recognised by Bio Diverse Solutions that the landscape may change post subdivision construction and over time. It is therefore recommended that a review of the BAL Contour Plan is undertaken post construction stages and prior to subdivision clearance stages; and/or the map is over 3 years from date of production and, if required, an updated BAL Contour Plan is provided to the CoA prior to conditional clearance of the bushfire management issues.
- Individual BAL assessments may be required on the lots by the new owners and can be considered at building approval stages with the engagement of an Accredited Level 1 BAL assessor.

Based on the above recommendations, Bio Diverse Solutions recommend the proposed subdivision can occur as documented in this BMP Plan. The BMP plan does not give recommendations in regards to detailed environmental (flora, fauna, soil etc) plans, town planning, engineering – civil, structural or building and feature survey requirements, these considerations would need to be addressed through other suitably qualified practitioners.

## 10. References

AS 3959-2009 Australian Standard, *Construction of buildings in bushfire-prone areas*, Building Code of Australia, Primary Referenced Standard, Australian Building Codes Board and Standards Australia.

Bureau of Meteorology Climate Data Gingin accessed June 2010 and April 2015:

<http://www.bom.gov.au/climate/data/index.shtml>

Keighrey, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA.

Bushfire Management Plan(2012) unpublished report prepared for Lot 1 and 2 Tea Tree Road, Bindoon. Bio Diverse Solutions, Albany WA.

Department of Fire and Emergency Services Authority WA (DFES) (2004) *The Homeowners Bush Fire Survival Manual*, Fourth Edition, Community Safety Division, Perth WA

Department of Fire and Emergency Services Website accessed April 2015:

<http://www.dfes.wa.gov.au>

Department of Planning Western Australia *Planning and Development (Bushfire Risk Management) Regulations 2014 and Development (Bushfire Risk Management) Regulations 2014* accessed from website February 2015 from:

[http://www.planning.wa.gov.au/dop\\_pub\\_pdf/bushfire\\_risk\\_mgt.pdf](http://www.planning.wa.gov.au/dop_pub_pdf/bushfire_risk_mgt.pdf)

Environmental Weeds Strategy for Western Australia (1999) Department of Environment and Conservation, Western Australia.

Hearn, H., Williams, K., Comer, S. and Beecham, B. (2002) SWAN 1 (SWA1 – Swan 1 subregion). Department Conservation and Land Management. Government of Western Australia.

Keighrey, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA.

Western Australian Planning Commission (WAPC) (2010) *Planning for Bushfire Protection Edition 2* Fire and Emergency Services Authority of Western Australia and Department for Planning and Infrastructure Western Australia.

Western Australian Planning Commission (WAPC) *Planning Bulletin 111/2013 Planning for Bushfire*.

Western Australian Planning Commission (WAPC) (2014) *Draft Planning for Bushfire Risk Management Guidelines*. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) (2015a) *Guidelines for Planning in Bushfire Prone Areas*. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) State Planning Policy 3.2 Planning in Bushfire Prone Areas. Department of Planning WA and Western Australian Planning Commission.

State Land Information Portal (SLIP) (2015) Map of Bushfire Prone Areas. Office of Bushfire Risk management (OBRM) data retrieved from:

<https://maps.slip.wa.gov.au/landgate/bushfireprone/>

**Appendices**

**Appendix A – Location**

**Appendix B – Structure Plan**

**Appendix C - Vegetation Classes Map**

**Appendix D –Bushfire Hazard Level Mapping**

**Appendix E – BAL Contour Plan**

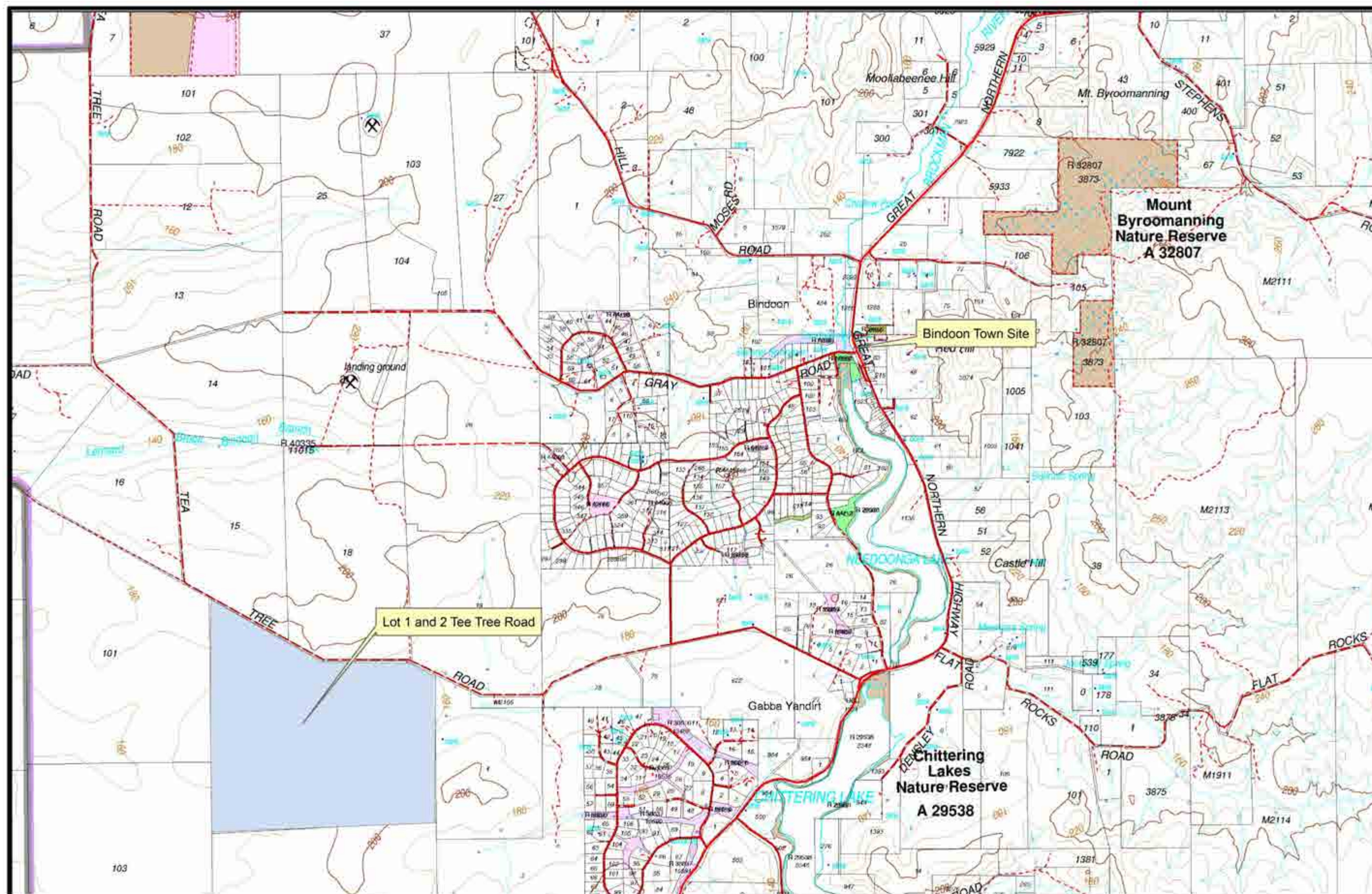
**Appendix F – DFES Information for the homeowner**

**Appendix G – Bushfire Management Plan**


**Appendix A**

Location Mapping





## Legend

 Subject area

Scale  
1:40000 @ A3



0 390 780 1,560 2,340 3,120 Meters



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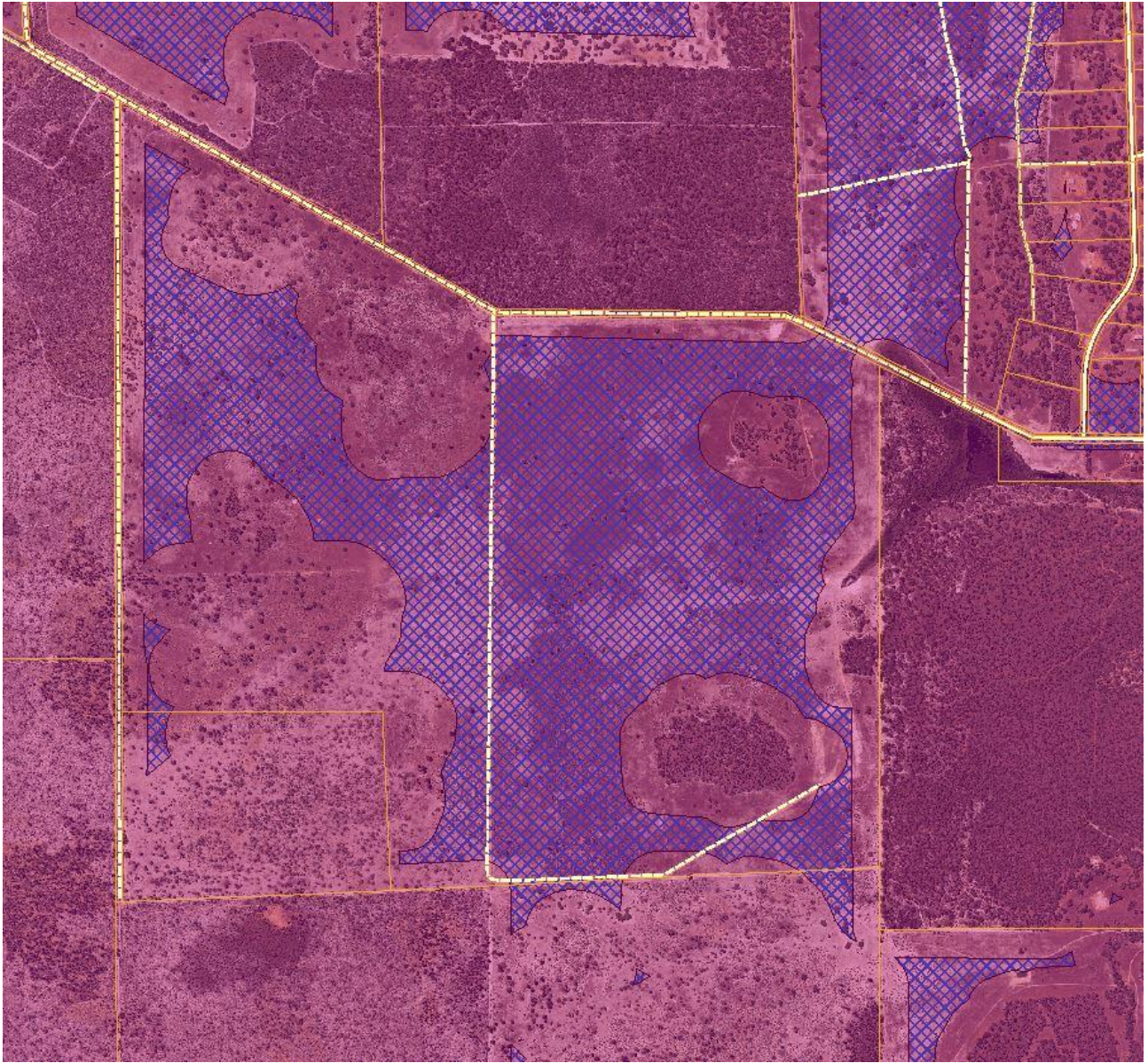
CLIENT Lot 1 and 2 Tee Tree Road  
Bindoon WA

## Location Mapping

STATUS	FILE	DATE
FINAL	WHEL014	13/06/2016



**OBRM BUSHFIRE PRONE MAPPING 7/12/15 & 20/5/2016**



<https://maps.slip.wa.gov.au/landgate/bushfireprone/>

(SLIP 2016)

**Appendix B**

Structure Plan

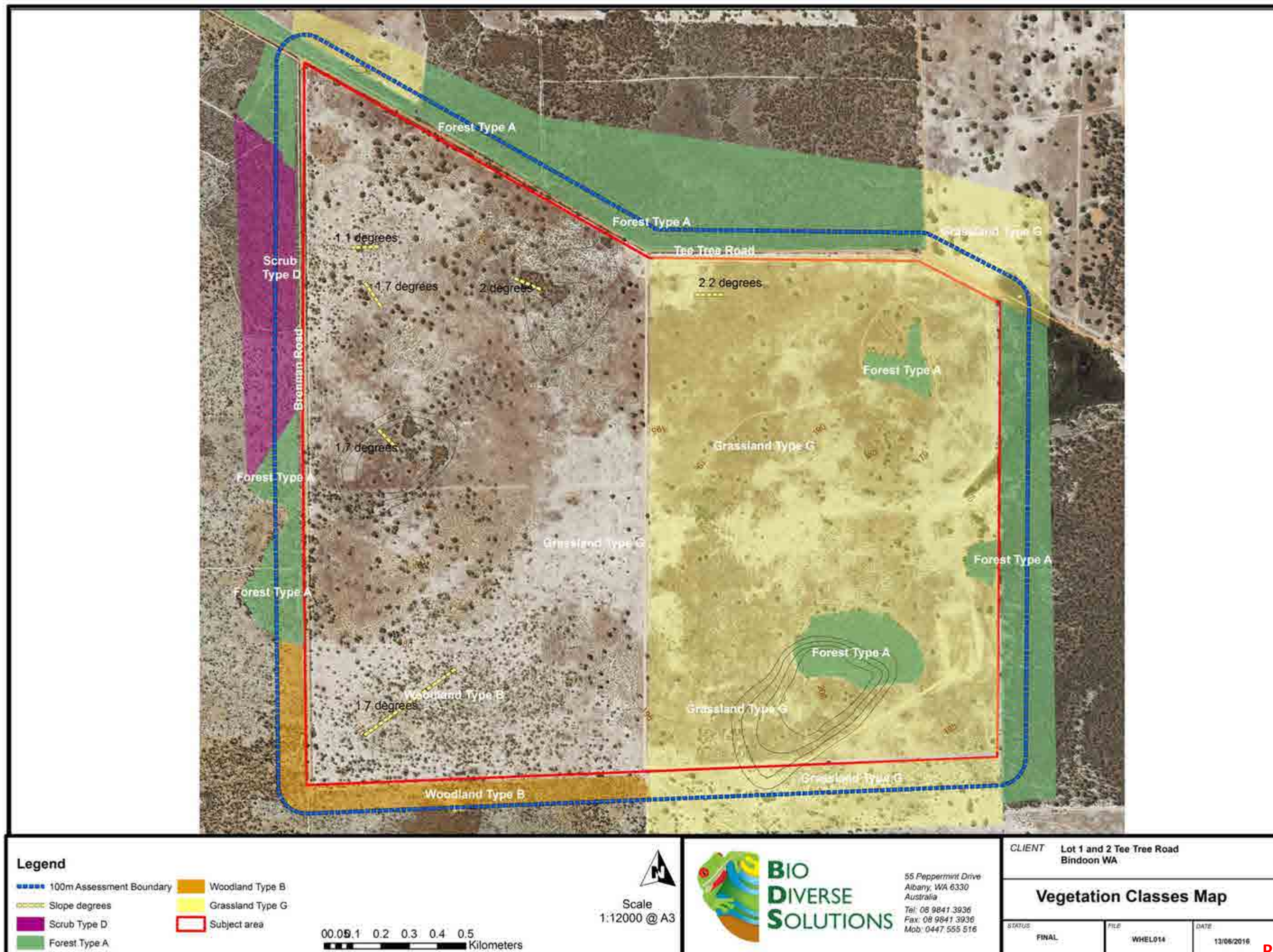




Appendix C

Vegetation Classes Map

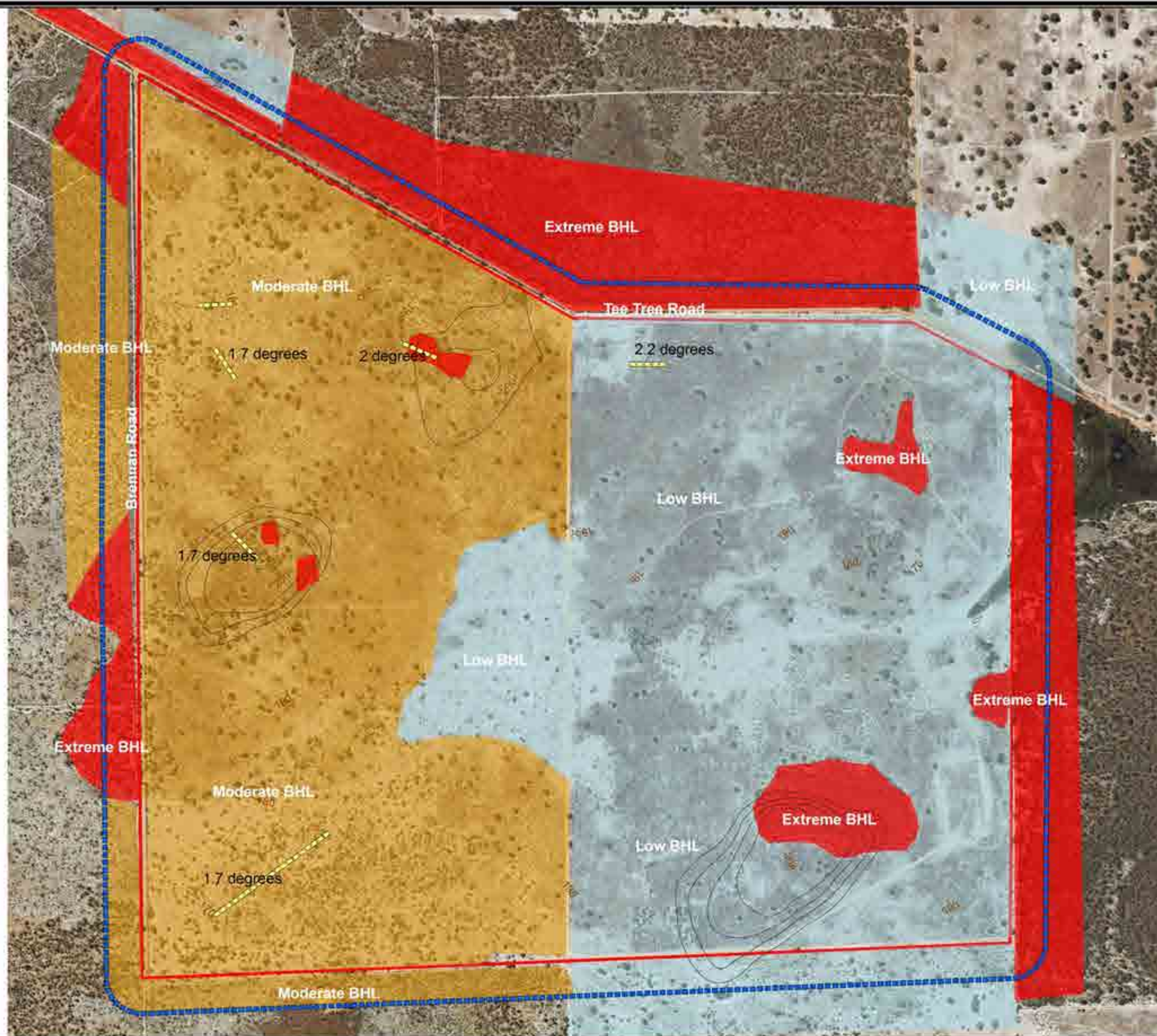






**Appendix D**

Bushfire Hazard Level (BHL) Mapping



### Legend

- 100m Assessment Boundary
- Slope degrees
- Extreme BHL
- Moderate BHL
- Low BHL
- Subject area

Scale  
1:12000 @ A3

0 0.1 0.2 0.4 0.6 0.8 1 Kilometers



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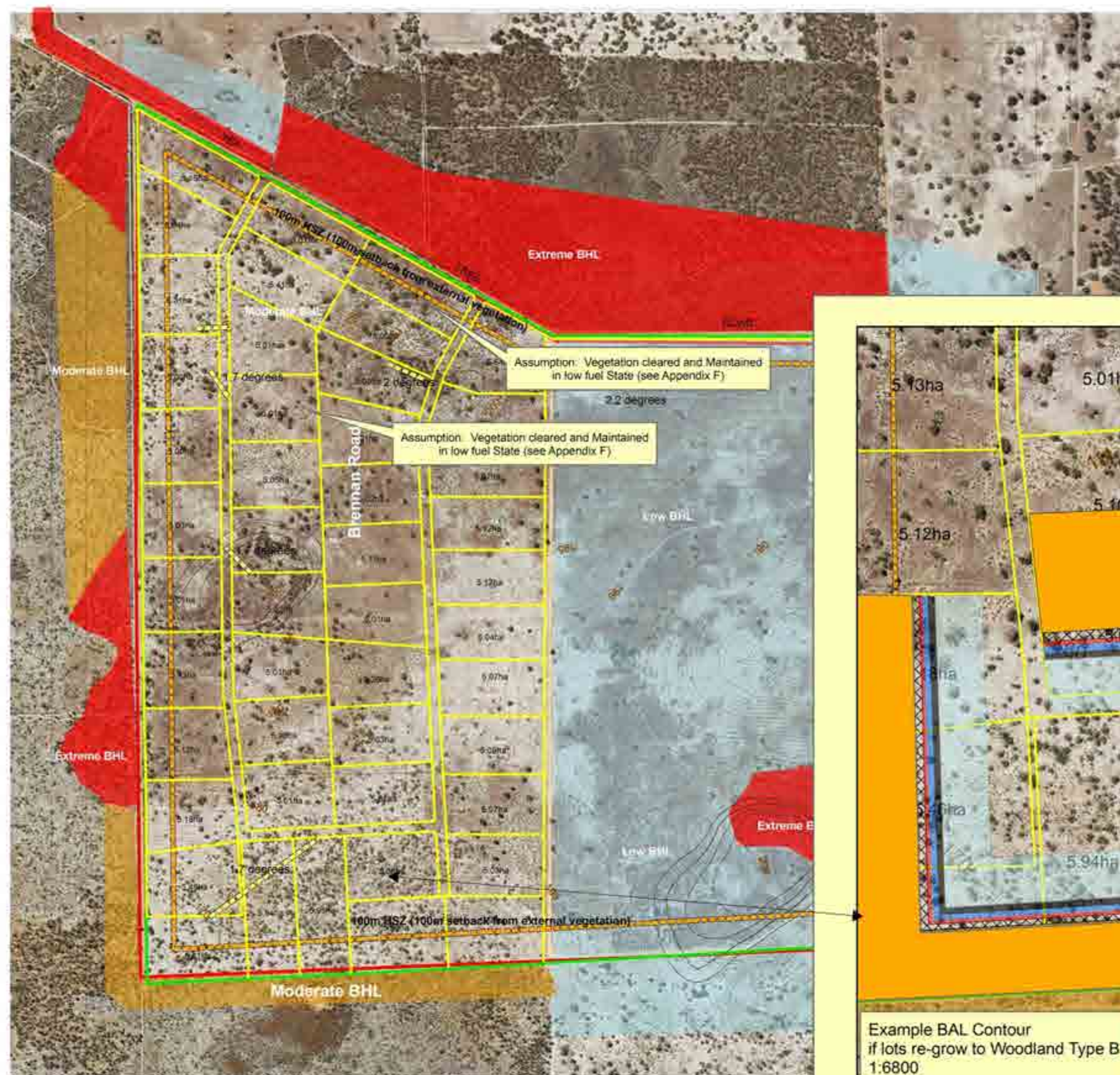
### Bushfire Hazard Level

STATUS	FILE	DATE
FINAL	WHEL014	13/04/2015

Appendix E

BAL Contour Plan





Example BAL Contour  
if lots re-grow to Woodland Type B  
1:6800

#### Legend

BAL 12.5 BAL 19 BAL 29 BAL 40 BAL FZ

#### Legend

100 HSZ Moderate BHL  
Slope degrees Low BHL  
Extreme BHL Subject area

0 0.1 0.2 0.4 0.6 0.8 1  
Kilometers

Scale  
1:12000 @ A3



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CLIENT Lot 1 and 2 Tee Tree Road  
Bindoon WA

#### BAL Contour Plan

STATUS	FILE	DATE
FINAL	WHEL014	13/04/2015



**Appendix F**

DFES information for the homeowner



## BUSHFIRE

## Building Protection Zones

FACTSHEET

02

ARE YOU  
BUSHFIRE  
READY?

areyouready.wa.gov.au

PREPARING YOUR HOME AND  
PROPERTY FOR A BUSHFIRE

You should prepare your home to survive the passage of a bushfire, even if your plan is to leave. A well prepared and constructed house is more likely to survive a bushfire than an unprepared one. Firefighters cannot defend every property and are unlikely to defend a poorly prepared property; remember their lives are at risk too.



## DID YOU KNOW?

**Firebreaks have a number of purposes.**

They are used to stop the spread of a bushfire and are also used by firefighters to gain access around all areas of your property and as a place from which to fight a fire.

Remember that firebreaks must be wide enough and have enough vertical clearance to let a firefighting truck pass.

Maintain your firebreaks to ensure your property can be defended during a fire.

- ☐ **Create a minimum 20 metre building protection zone** around your home and other buildings. This area needs to be cleared of all rubbish, long dry grass, bark and material that may catch fire.
- ☐ **Prune lower branches** (up to two metres off the ground) to stop a ground fire spreading into the canopy of the trees.
- ☐ **Clear vegetation** around your property to create a fire break, particularly the overhanging branches. Make sure you meet your local government's firebreak requirements.
- ☐ **Cut grass** to less than 10 centimetres high and prune shrubs to remove dead material.

For more information visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au) or contact **DFES Community Engagement** 9395 9816



Government of Western Australia  
Department of Fire & Emergency Services



**PREPARE ACT SURVIVE**



## Information Note

September 2014

# What is a Building Protection Zone?

### Key Points

- Fuel loads influence bushfire intensity.
- The lower the fire's intensity the less impact on the building.
- Creating a minimum 20 metre reduced fuel load area (building protection zone) will increase the protection of the building.
- Ember protection is important to protect the building.
- Constructing or retrofitting your home to meet the Australian Standard 3959 — *Construction of buildings in bushfire-prone areas*; and addressing bushfire risks in accordance with the *Planning for Bushfire Risk Management Guidelines* will ensure your house has the best bushfire protection.

### Definitions

- **Scrub crown** is the green, leaf material on the scrub plants.
- **Surface fire** is the fire burning the leaves and scrub on the top of the ground.
- **Mineral earth firebreak** is a firebreak without vegetation.
- **Ember attack** is where the bark and fine vegetation material is set alight, becomes airborne and is carried forward of the fire.

### Managing and reducing fuel loads

**Managing and reducing fuel loads for a minimum of 20 metres around a building will increase its likely survival from a bushfire.**

Known as the Building Protection Zone (BPZ), the aim of this area is to ensure that there will be no direct flame contact on the building from a bushfire. By utilising fuel management options it will also be possible to reduce the potential radiant heat impact on the building.



Above: Well prepared Building Protection Zone with reduced fuel.

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

- Maintaining a minimum 2 metre gap between trees and the building. Make sure that no trees overhang the house.
- Ensuring tree crowns are a minimum of 10 metres apart.
- Ensuring there is a gap between shrubs and buildings of three times their mature height.
- Ensuring shrubs aren't planted in clumps.
- Keeping the grass short and prune the scrub so that it is not dense, nor does it have fine, dead aerated material in the crown of the scrub.
- Raking up leaf litter and twigs under trees and remove trailing bark.
- Pruning lower branches (up to 2 metres off the ground) to stop a surface fire spreading to the canopy of the trees.
- Creating a mineral earth firebreak.
- Having your paths adjacent to the building and have your driveway placed so that it maximises the protection to the house.

Version 5, September 2014

For more information contact the Environmental Protection Branch on 93 95 9300 • email: [environment@dfes.wa.gov.au](mailto:environment@dfes.wa.gov.au) or visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)





- Storing firewood away from the building.
- Ensuring fences and sheds are constructed using non-combustible materials, but preferably not located in the BPZ.
- Keeping your gutters free of leaves and other combustible material.
- Ensuring gas bottles are secured and positioned so that they will vent away from the building, if subject to flame contact or radiant heat.

## Ember attack

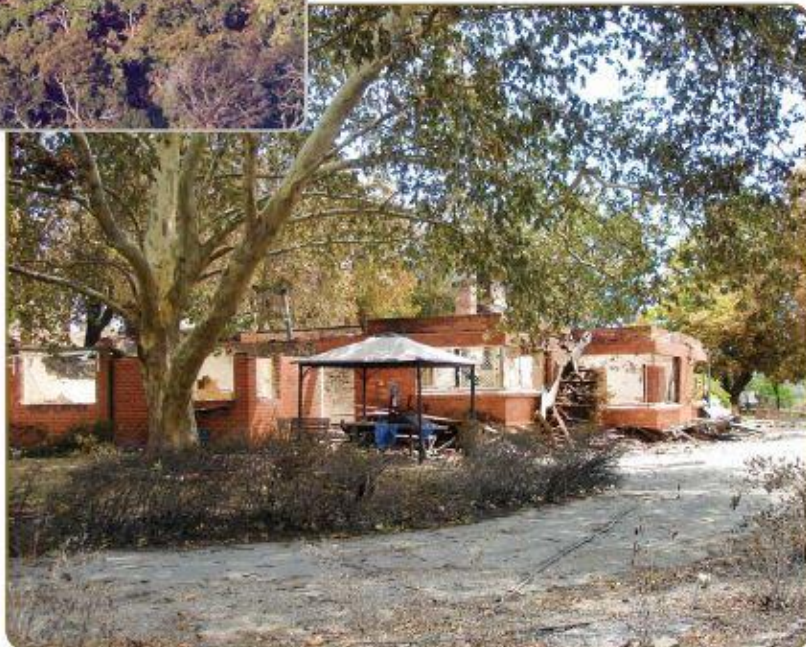
In a bushfire, most homes that are damaged or destroyed are from ember attack. These burning embers get into gaps within the building, such as into the roof cavity, and ignite the material within the cavity. It can take a number of hours before the burning becomes apparent and by that time the building may not be able to be saved.



**Above:** Reduced fuel in the Building Protection Zone contributed to the survival of this home in a bushfire.

**Right:** Home destroyed by bushfire, note the tree branches overhanging the house.

It is recommended that all homes that may be affected by embers be made ember proof. If a bushfire occurs in the general area, then the roof cavity and other crevices should be inspected to ensure that no embers have caused a fire. Be aware that there are electricity cables in the roof area and the introduction of water will be a safety issue.



**i** For more information contact the Environmental Protection Branch on 9395 9300, email: [environment@dfes.wa.gov.au](mailto:environment@dfes.wa.gov.au) or visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)



**BUSHFIRE****Evaporative Air Conditioners**

FACTSHEET

**08****ARE YOU  
BUSHFIRE  
READY?**

areyouready.wa.gov.au

**DID YOU KNOW?**

Your evaporative air conditioning unit can catch fire as a result of embers from bushfires, or even small back yard fires, getting into your unit. If a fire starts in your air conditioner, it can spread quickly throughout your home.

**If there is smoke nearby  
you should:**

- ☐ Run the air conditioner to wet the filter pads
- ☐ When smoke is over your home or ash starts to drop around your house, switch the air conditioner off
- ☐ If possible, continue to run water over the filter with the fan turned off
- ☐ If the water can't be run on its own, or if there is a power failure at the time, wet the air conditioner filter pads using a garden hose
- ☐ Keep checking your air conditioner and the area around your home for spot fires from embers until the danger has passed

It can be difficult for firefighters to put out a fire caused by embers getting into the roof space of your home. Knowing what to do to keep your evaporative air conditioner safe from fire can help save your property.

For more information on evaporative air conditioners see DFES Information Note on Ember Protection Screens.

**DID YOU KNOW?**

If you live within 500 metres of bushland and have a roof mounted evaporative air conditioning unit, your home may be at increased risk of ember attack.



**If your home does  
catch fire, leave your  
home and call 000  
immediately**

**WHAT IS EMBER ATTACK?**

Embers are pieces of burning bark, leaves or twigs that are carried by the wind around the main fire creating spot fires.

For more information visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au) or contact DFES Community Engagement 9395 9816



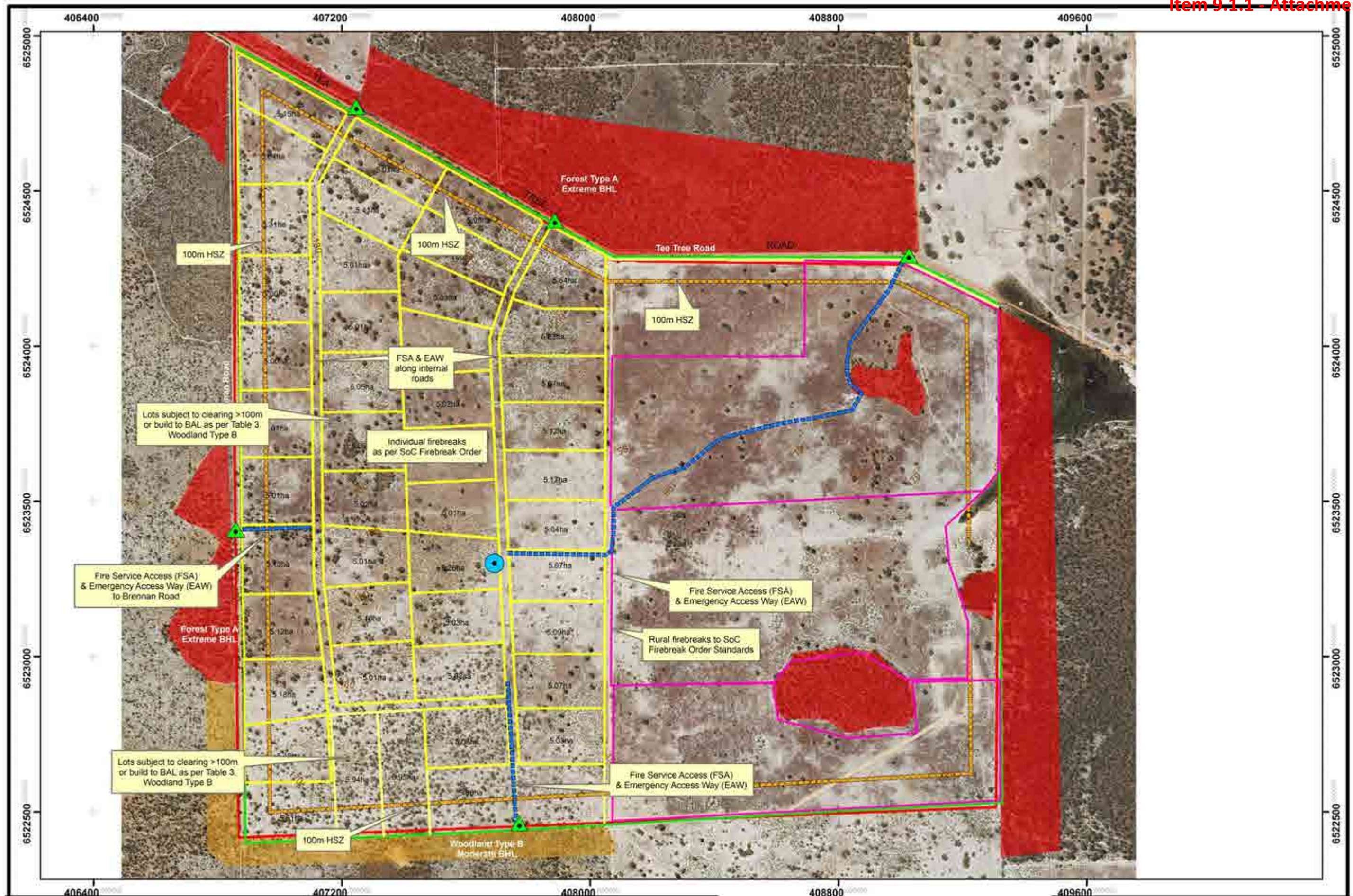
Government of Western Australia  
Department of Fire & Emergency Services

**PREPARE ACT SURVIVE**

**Appendix G**

Bushfire Management Plan





### Legend

- Access points
  - Water tank
  - Emergency & Fire Service Access
  - Outline Development Plan
  - Rural Firebreaks
  - 100 HSZ
  - Woodland Type B - Moderate Risks
  - Subject area
- Scale 1:11500 @ A3
- 0 100 200 400 600 800 1,000 Meters



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CLIENT Marou Property Group Pty Ltd  
Lot 1 and 2 Tee Tree Road  
Bindoon WA

### Bushfire Management Plan

STATUS	FILE	DATE
FINAL	WHEL014	13/6/2016



## APPENDIX 6

### Land Capability for On-site Effluent Disposal (October, 2015)

**LOTS 1 AND 2 TEA TREE ROAD, BINDOON**

**LAND CAPABILITY FOR  
ON-SITE EFFLUENT DISPOSAL**

**Prepared for**

**Marou Property Developments Pty Ltd**

c/- Whelans

PO Box 99

MT HAWTHORN WA 6915

Draft Report No. J15017

14 October 2015

**BAYLEY ENVIRONMENTAL SERVICES**

30 Thomas Street

**SOUTH FREMANTLE WA 6162**

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B	Water Analysis Results



## 1.0 INTRODUCTION

Marou Property Developments Pty Ltd plans to subdivide Lots 1 and 2 Tea Tree Rd, Bindoon (the subject land) into 47 five hectare rural smallholding lots and one balance lot of about 186ha. All lots will employ on-site effluent disposal.

Bayley Environmental Services was commissioned in August 2015 to investigate and report on the capability of the subject land to accommodate on-site effluent disposal. The investigations took place in September-October 2015 and included:

- drilling of nine boreholes across the site, focussing on areas of likely groundwater accumulation and/or drainage;
- installation of bores in three boreholes where groundwater was encountered;
- collection of soil samples from the boreholes and analysis for phosphorus retention index (PRI);
- measurement of depth to groundwater in the bores;
- collection and analysis of water samples from the bores;
- review of environmental information including aerial photography, topography, geology, soils, groundwater and previous reporting on the site by Landform Research (2000).

The conclusion from these investigations is that the subject land has a very high capability for on-site effluent disposal by conventional or alternative systems. Specifically:

- The site has low slopes (less than 10%; mostly less than 5%).
- The soils are deep, sandy and permeable with no confining layers such as clay or rock in the shallow profile.
- The water table is more than 6m deep over all but the eastern extremity of the site.
- All proposed lots have a large separation (>500m) to surface water bodies.

Details of the investigations and findings are presented below.

## 2.0 ENVIRONMENTAL CHARACTERISTICS

### 2.1 Topography and Landforms

The subject land is located on an elevated, undulating plateau at elevations for 160m AHD to 208m AHD. From high ground in the centre, west and south-east, the land falls away in broad valleys to the north-west, south-west, north-east and east. Figure 1 shows topographic contours of the site. Figure 2 shows an oblique aerial view.

The slope varies from about 10% in the steepest eastern valley to less than 1% in the centre of the site, with the slope averaging about 4% over the site.

### 2.2 Geology and Soils

#### 2.2.1 Overview

The subject land is located on the Dandaragan Plateau just west of the Darling Fault. The soils are predominantly sandy, with deep yellow and yellow-brown sands, earthy sands and gravelly sands on the slopes and leached grey sands in the valleys. Ferricrete cemented sandstone rock occurs on a few ridge tops.

Landform Research Pty Ltd (2000) described and mapped the soils in detail based on 47 shallow test pits across the subject site. Figure 1 shows the Landform Research soil mapping.

Drilling of nine boreholes across the site by Bayley Environmental Services in 2015 (Figure 1) found generally sandy soils with grey and grey-brown sands to about 1m over yellow and yellow-brown sands and earthy and clayey sands. Appendix A presents the soil logs from the drilling.

#### 2.2.2 Soil Permeability

The sandy soils have a high permeability, with no evidence of clay being found in the boreholes at less than 3m deep.

Landorm Research (2000) mapped ferricrete on some ridge tops and beneath the sandy soils of the valley slopes, but drilling in these areas in 2015 found no evidence of this beyond minor gravel to at least 6m depth.

#### 2.2.3 Phosphorus Retention Index

Soil samples from 1m depth in the boreholes were analysed for phosphorus retention index (PRI). This depth was generally at about the interface between the grey and grey-

brown surface soils and the yellow earthy subsoils, so the results would underestimate the PRI of the subsoils.

The analysis found low PRI across the site. Table 2.1 summarises the PRI results.

**Table 2.1 Phosphorus Retention Index**

<i>Site Figure 1)</i>	BB1	BB2	BB3	BB4	BB5	BB6	BB7	BB8	BB9
<i>PRI @ 1m</i>	0.5	0.6	0.9	0.3	0.3	0.4	0.5	1.4	0.9

## 2.3 Hydrology

### 2.3.1 Surface Drainage

The subject land lies across a drainage divide between Chandala Brook to the west and the Brockman River to the east, both tributaries of the Swan-Avon system.

Given the deep sandy soils and low slopes of the subject land, there is no defined surface drainage. Surface runoff would be limited to short-lived overland flow during and immediately after extreme rainfall.

Surface flow begins at the eastern boundary of the site, where a small drainage line rises and flows into the Brockman River via Lake Chittering. A soak dam has been constructed just inside the eastern boundary at the beginning of this drainage line.

### 2.3.2 Groundwater

Groundwater is present beneath the site and is expected to flow east and west from the central high ground in line with the prevailing topography. The groundwater intersects the ground surface in the soak at the eastern boundary and in another soak just outside the boundary at the north-east corner.

Over most of the site, the groundwater is at least 6m below the surface. The depth to groundwater is likely to exceed 30m in the higher parts of the site. Table 2.2 shows the depths to groundwater found by drilling and bore measurements in September 2015.

**Table 2.2 Depth to Groundwater**

<i>Site Figure 1)</i>	BB1	BB2	BB3	BB4	BB5	BB6	BB7	BB8	BB9
<i>Depth to Water (mbgl)</i>	>9	>6	>9	>6	1.16	4.10	>6	>6	1.09

### 2.3.3 Water Quality

Analysis of samples collected from the bores and the soak dam in September 2015 shows that the groundwater quality is high, with low salinity, near-neutral pH and low nutrient levels. Appendix B presents the full results of the water analysis.

## 3.0 LAND CAPABILITY ASSESSMENT

Land capability for on-site effluent disposal depends on a number of factors, some of which are mandated by the Health Department's *Country Sewerage Policy* (2002):

- slope (maximum 20%);
- depth to groundwater (minimum 0.5m);
- soil profile (minimum 1.2m of free-draining soil free of rocks, clay and other confining layers);
- soil permeability (sufficient to permit infiltration but not so great as to permit unrestricted flow);
- soil purification ability (able to effectively remove bacteria, nutrients etc. from effluent by soil filtration);
- separation from surface water bodies (30-100m, depending on soil and system type);
- flooding risk (not susceptible to inundation more than once every ten years); and
- development density (maximum 10 lots equivalent per hectare in unsewered towns).

The subject land meets all of these criteria, as detailed below.

#### *Slope*

The slope of the subject land is all less than 10% and mostly less than 5%.

#### *Groundwater Depth*

The shallowest groundwater was measured at 1.09m near the eastern boundary. Over most of the site the depth to groundwater is greater than 6m.

#### *Soil Profile*

The site has deep sandy soils with no significant confining layers. Although Landform Research (2000) found ferricrete gravel and rock on ridge tops, there are no building envelopes proposed in these areas and in any case the ferricrete (cemented sandstone) would likely be permeable and/or readily excavated.

#### *Soil Permeability*

The sandy soils would be readily permeable but not excessively so.



*Soil Purification Ability*

The deep earthy sand subsoils would ensure very effective removal of contaminants before the effluent reaches the water table. Although the PRI at 1m depth is low, the change in soil colour at most sites below this depth indicates that the subsoil PRI would be higher. Added to this, the large depth to groundwater will ensure effective uptake of phosphorus from effluent.

The exception to this is the eastern side of the subject land, where leached white sands and shallower groundwater (less than 2m) would require alternative treatment systems. However, the development plan shows no building envelopes within this zone.

*Separation from Water Bodies*

The nearest surface water bodies are the soak dam near the eastern boundary and the wetland just outside the north-eastern corner of the site. The nearest building envelopes are more than 500m from these water bodies.

*Flooding/Inundation Risk*

There is no risk of inundation anywhere on the subject land.

*Development Density*

The Country Sewerage Policy limits unsewered development in Bindoon to ten residences (or equivalent) per hectare. The total of 48 lots proposed on the subject land is equivalent to less than one residence per hectare.

**4.0 CONCLUSION**

This investigation has concluded that the subject land has very high capability to support on-site effluent disposal using conventional or alternative treatment systems for the development as proposed.

-

## Figures







0 200 metres  
Vertical exaggeration: 3x

Figure 2

OBLIQUE AERIAL VIEW



# **Appendix A**

## **Soil Logs**

# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB1
EASTING:	406974
NORTHING:	6522556
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	9m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>9m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Dark grey sand		
1 - 3.5	Pale brown-grey sand, paler and finer with depth		
4 - 4.5	Grey-brown sand with occasional gravel to 10mm		
5	Yellow-brown sand with occasional gravel to 10mm		
5.5	Brown-yellow sand with occasional gravel to 10mm		
6 - 7	Brown-yellow earthy sand with occasional gravel to 15mm		
7.5 - 9	Brown-yellow coarse sandy clay with occasional white clay lumps		



# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB2
EASTING:	407441
NORTHING:	6522958
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	6m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>6m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Grey sand		
1	Pale grey sand		
1.5	Very pale grey sand		
2 - 2.5	Cream sand		
3 - 3.5	Pale yellow-brown sand with occasional gravel to 15mm		
4	Yellow-brown sand with occasional gravel to 15mm		
4.5	Coarse yellow earthy sand with common gravel to 15mm		
5 - 6	Orange coarse clayey gritty sand		



# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB3
EASTING:	406954
NORTHING:	6524278
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	9m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>9m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Brown-grey sand		
1	Yellow-brown sand		
1.5 - 2	Yellow sand		
2.5 - 3	Yellow sand with occasional gravel to 10mm		
3.5	Yellow sand with occasional gravel to 20mm		
4	Brown-yellow coarse sand with gravel to 25mm		
4.5 - 6	Orange-brown-yellow earthy sand with gravel to 25mm		
6.5 - 7	Red gritty clayey sand		
7.5 - 9	Red gritty clayey sand, more clay		





# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB4
EASTING:	407365
NORTHING:	6524494
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	6m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>6m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Grey sand		
1	Very pale brown-grey sand, coarse		
1.5 - 2	Very pale grey sand, finer		
2.5 - 3	Pale yellow-brown sand with occasional gravel to 15mm		
3.5 - 5.5	Yellow-brown gravelly sand wo 20mm		
6	Red-brown earthy sand with gravel to 20mm		



# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB5
EASTING:	409178
NORTHING:	6523433
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	4.5m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	~1.25m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 2	Brown-grey sand, medium coarse, wet from ~1.25m		
2.5 - 3	Grey-brown sand, medium coarse		
3.5 - 4.5	Pale grey sand, medium coarse	Cased to 4.5m	



# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB6
EASTING:	408798
NORTHING:	6523380
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	6m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	4.5m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Grey sand		
1 - 1.5	Pale brown-grey sand		
2	Yellow sand with occasional gravel to 10mm		
2.5	Brown sand with gravel to 10mm		
3 - 5	Yellow earthy sand, wet from ~4.5m		
5.5	Pale yellow earthy sand		
6	Grey sandy clay	Cased to 6m	





# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB7
EASTING:	408836
NORTHING:	6524241
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	6m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>6m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Grey sand		
1 - 1.5	Yellow-brown sand		
2 - 6	Orange earthy sand, moist		





# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB8
EASTING:	408258
NORTHING:	6523954
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	6m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>6m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Yellow-brown sand		
1 - 1.5	Yellow sand		
2 - 6	Orange earthy sand, moist		



# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB9
EASTING:	409306
NORTHING:	6524134
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	4.5m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	~1.5m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Grey sand		
1 - 2	Pale grey sand, medium coarse, wet from ~1.5m		
2.5	Brown sand		
3 - 4	Grey-brown sand		
4.5	Dark brown earthy sand	Cased to 4.5m	



# **Appendix B**

## **Water Analysis Results**

**LABORATORY REPORT**

Bayley Environmental Services

ARL Job No: 15-7050

Revision: 00

Date: 9 October 2015

Metals in Water Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Aluminium - Dissolved	0.1	mg/L	<0.1	<0.1	<0.1	<0.1
Arsenic III	0.001	mg/L	<0.001	<0.001	<0.001	<0.001
Arsenic V	0.001	mg/L	<0.001	<0.001	<0.001	<0.001
Calcium - Dissolved	0.1	mg/L	1.3	1.1	1.7	1.4
Cadmium - Dissolved	0.002	mg/L	<0.002	<0.002	<0.002	<0.002
Chromium III	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Copper - Dissolved	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Iron - Dissolved	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Mercury - Dissolved	0.0002	mg/L	<0.0002	<0.0002	<0.0002	<0.0002
Potassium - Dissolved	0.1	mg/L	1.2	0.8	1.2	2.6
Magnesium - Dissolved	0.1	mg/L	2.6	3.1	6.5	8.4
Sodium - Dissolved	0.1	mg/L	35	31	89	78
Nickel - Dissolved	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Lead - Dissolved	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Zinc - Dissolved	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Total Nitrogen in Water Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Total Nitrogen	0.2	mg/L	5.9	3.8	4.1	4.2
TKN	0.2	mg/L	<0.2	<0.2	<0.2	<0.2
Total Phosphorus in Water Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Total Phosphorus	0.01	mg/L	0.05	0.02	0.09	0.03
Ions by Discrete Analyser Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Chloride	5	mg/L	55	21	120	100
Sulphate	1	mg/L	11	8	4	15
Filterable Reactive Phosphorus	0.01	mg/L	0.01	<0.01	0.01	<0.01
NO <sub>x</sub> -N	0.01	mg/L	5.9	3.8	4.1	4.2
Physical Parameters Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Acidity	5	mgCaCO <sub>3</sub> /L	32	88	32	20
Alkalinity	5	mgCaCO <sub>3</sub> /L	<5	<5	<5	8
Chromium (VI)	0.002	mg/L	<0.002	<0.002	<0.002	<0.002
Conductivity	0.01	mS/cm	0.15	0.12	0.43	0.37
Total Suspended Solids	5	mg/L	51	8	250	<5
pH	0.1	pH units	6.4	6.2	5.2	5.6
Misc. Inorganics in Water Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Hardness	5	mgCaCO <sub>3</sub> /L	14	18	31	30

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**Lots 1 and 2 Tea  
Tree Road,  
Bindoon WA**

# Bushfire Management Plan



13/06/2016

Kathryn Kinnear

Bio Diverse Solutions

**Page 208**

## DOCUMENT CONTROL

### TITLE

Lot 1 and 2 Tea Tree Road Bindoon Bushfire Management Plan

Author (s): Kathryn Kinnear

Reviewer (s): Steve Fernandez

Job No.: WHEL014

Client: Marou Property Development Pty Ltd

### REVISION RECORD

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Final ID 13/6/2016	Updated to reflect new legislation	Kathryn Kinnear	13/6/2016

### **DISCLAIMER**

*The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959 – Building in Bushfire prone Areas, WAPC SPP3.7, Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.*



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APPENDIX A – LOCATION MAPPING

APPENDIX B – STRUCTURE DEVELOPMENT PLAN

APPENDIX C – VEGETATION MAPPING

APPENDIX D – BUSHFIRE HAZARD LEVEL MAPPING

APPENDIX E – BAL CONTOUR PLAN

APPENDIX F – DFES INFORMATION FOR THE HOMEOWNER

APPENDIX G - BUSHFIRE MANAGEMENT PLAN



## 1. Introduction

Marou Property Development Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a fire hazard assessment and prepare a Bushfire Management Plan to guide all future fire management for the proposed subdivision development of Lots 1 and 2 Tea Tree Road, Bindoon.

The basic requirements of any Bushfire Management Plan (BMP) is to identify potential issues or problems relating to environmental fire threats and recommend specific actions by certain persons, agencies, authorities and developers to ensure, as much as practical, that the lives and assets of the location are not put at undue threat from any unplanned fire event. A BMP takes into account various physical attributes of the land, including topographical and vegetation properties, local climatic impacts, past and current land use, past fire history and management practices, local authority fire management obligations, road access, water supplies, adjacent property and tenure, and future obligations by various parties should the subdivision application be successful.

Such planning takes into consideration standards and requirements specified in various documents such as Australian Standard (AS) 3959-2009, Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) and State Planning Policy 3.7 (WAPC, 2015). These plans and guidelines have developed to ensure uniformity to bushfire management with interpretation of onsite vegetation types, site design, and building standards.

### 1.1. Statutory Conditions

This Bushfire Management Plan (BMP) has been prepared for Lot 1 and 2 Tea Tree Road Bindoon (refer to Appendix A for location of subject site) to address fire management issues associated with the proposed Structure Plan (SP) and is consistent with State and Local Government planning instruments.

On the 7<sup>th</sup> December 2015 the *Fire and Emergency Services (Bush Fire Prone Areas) Order 2015; Planning and Development (Local Planning Scheme) Amendment Regulations 2015; Planning and Development Act 2005 State Planning Policy 3.7 - Planning in Bushfire Prone Areas* and the *Building Amendment Regulations (No.3)* were published in the WA Government Gazette. The Western Australian State Bushfire Prone Mapping was also publicly released.

This means that:

- **Emergency Services (Bush Fire Prone Areas) Order 2015:** 4 (1) *The areas of the state described in the Bushfire Prone Areas dataset are designated as bush fire prone areas.*
- **Planning and Development (Local Planning scheme) Amendment Regulations 2015:** *Planning regulations that instigates a planning action if a dwelling is located in the Bushfire Prone Area Mapping. Can be a site specific BAL Assessment, BAL Contour Map, Bushfire Hazard Assessment or a Bushfire Management Plan action. If BAL 12.5 to BAL 29 dwelling can go straight to Building Application. If BAL 40 or BAL FZ then the development goes back into the planning system for assessment.*
- **Planning and Development Act 2005 State Planning Policy 3.7 (SPP 3.7)- Planning in Bushfire Prone Areas:** *The intent of this policy is to implement effective, risk based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure. The application of SPP 3.7 applies to all higher order strategic planning documents, strategic planning proposals, subdivision and development applications located in designated bushfire prone areas.*
- **Building Amendment Regulations (No.3):** *Outlines the definition of the bushfire prone area as designated under the Fire and Emergency Services Act 1998 Regulation 31BA applicable building standards for buildings and incidental structures in bushfire prone areas.*

(WA Australian Government Gazette, 2015)

The publicly released bushfire prone mapping (Bushfire Prone Area Mapping, OBRM, 8/12/15) outlines the site to be Bushfire Prone as per the above regulations, as it is situated within 100m of



>1 ha of bushfire prone vegetation. Refer to extract from the Office of Bushfire Risk Management (OBRM) as released in December 2015 Appendix A.

This document and the recommendations contained are aligned to the following policy and guidelines:

- AS 3959-2009 “Construction of Buildings in Bushfire Prone Areas” current and endorsed standards;
- State Planning Policy 3.7 (SPP 3.7) Planning in Bushfire-Prone Areas (2015);
- Guidelines for Planning in Bushfire Prone Areas (2015);
- *Fire and Emergency Services (Bush Fire Prone Areas) Order 2015;*
- *Planning and Development (Local Planning Scheme) Amendment Regulations 2015;*
- *Bushfires Act 1954;* and
- Shire of Chittering Annual Fire Break Notice.

### **1.2. Suitably Qualified Bushfire Consultant**

This BMP has been prepared by Kathryn Kinnear (nee White), who has 10 years operational fire experience with the (formerly) DEC (1995-2005) and has the following accreditation in Bushfire Management:

- Incident Control Systems;
- Operations Officer;
- Prescribed Burning Operations;
- Fire and Incident Operations;
- Wildfire Suppression 1, 2 & 3;
- Structural Modules – Hydrants and hoses, Introduction to Structural Fires, and Fire extinguishers; and
- Ground Controller.

Kathryn Kinnear currently has the following Tertiary Qualifications:

- BAS Technology Studies & Environmental Management;
- Diploma Business Studies; and
- Graduate Diploma of Environmental Management.

Kathryn Kinnear is an accredited a Level 1 BAL Assessor (Accreditation No: BPAD30794) and is classified as an “Experienced Level 2/3 Practitioner” pending accreditation. Kathryn Kinnear is presently a member of Fire Protection Australia Association and a committee member of the Bushfire Subcommittee Western Australia. Kathryn is a suitably qualified Bushfire Practitioner to prepare this Bushfire Management Plan.

### **1.3. Other documents relating to this plan**

Other documents that have been prepared for this subdivision proposal which should be consulted when reading this plan include:

- Lot 1 and 2 Tea Tree Road Planning Report – Whelans (2015);
- Vegetation Assessment – Bio Diverse Solutions (2012); and
- Land Capability Report – Landform Research (2000).

## 2. Aims of this Plan

The aim of this Plan is to reduce the occurrence of, and minimise the impact of bushfires, thereby reducing the threat to life, property and the environment. This BMP has been prepared by Bio Diverse Solutions (Bushfire Consultants) with the “subject site” being Lots 1 and 2 Tea Tree Road, Bindoon see Appendix A.

### 2.1. Planning Context

The BMP has been prepared to support an Structure Plan (SP) at Lots 1 and 2 Tea Tree Road, Bindoon, refer to Appendix B.

### 2.2. Site inspection

To ensure that every aspect of the proposed subdivision meets the planning requirements as set in the Guidelines for Planning in Bushfire Protection (WAPC, 2015a), a site inspection was initially undertaken on the 13th October 2011 by Kathryn Kinnear (Bio Diverse Solutions) to assess the vegetation and the site conditions. A subsequent site visit was undertaken in March 2016 to assess any change in the classifiable vegetation to AS3959-2009.

The site was assessed as having an **Extreme- Moderate** Bushfire Hazard Level (BHL) due to internal and external patches of forest, woodland and scrub remnant native vegetation areas. Upon completion there will be internal (built/rural small holdings) areas of **Moderate - Low** BHL. Where a subdivision is located within an extreme or moderate BHL, the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) requires assessment to the bushfire protection criteria – a process where subdivisions are assessed for compliance to the criteria. The bushfire protection criteria (Appendix 4, WAPC, 2015a) are a performance based criteria in assessing bushfire risk management measures and they outline four “Elements”. The “Elements” which are to be met either through the objectives of the “Performance Principle” or “Acceptable Solutions” (WAPC, 2015a) for the subject site include:

- Element 1 - Location;
- Element 2 - Siting and design of development.
- Element 3 - Vehicular access; and
- Element 4 – Water.

(WAPC, 2015)

This BMP has been prepared to assess the site against the “Acceptable Solutions” of the bushfire protection criteria.

### 2.3. Objectives

The objectives of this BMP are:

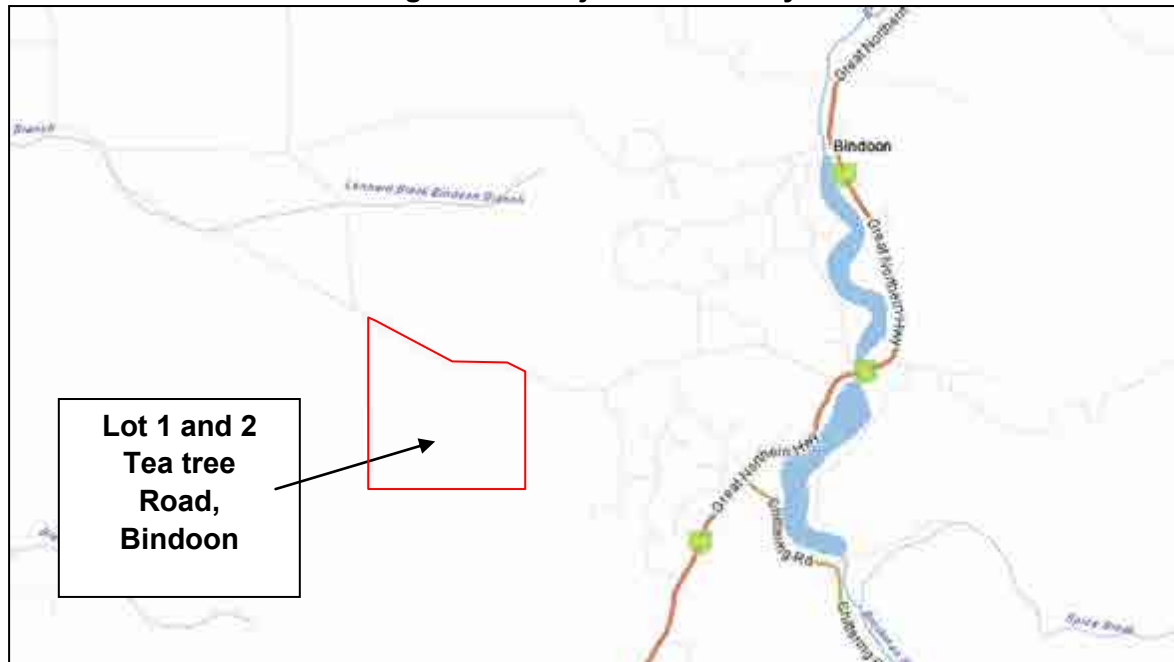
- Achieve consistency with objectives and policy measures of SPP 3.7 (WAPC, 2015b);
- Assess any building requirements to AS3959-2009 (current and endorsed standards) and BAL Construction;
- Assess the subdivision proposal against the Bushfire Protection Criteria Acceptable Solutions as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a);
- Understand and document the extent of the bushfire risk and hazards to the subject site
- Prepare bushfire mitigation and management measures of all land within the subject area with due regard to people, property, infrastructure and the environment;
- Nominate individuals and organisations responsible for bushfire management and associated works within the subject area; and
- Aligned to the recommended assessment procedure (SPP3.7, WAPC, 2015b) & Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) which evaluates the effectiveness and impact of proposed, as well as existing, bushfire risk management measures and strategies.

### 3. Description of the area

#### 3.1. Location

The subject site is located south of Tea Tree Road and east of Brennan Road, approximately 10 km's south of Bindoon town site in the municipality of the Shire of Chittering (SoC). The subject site is a 484ha rural lot which has been used for primarily for the grazing of stock. Please refer to Figure 1 below - Locality Map, and Site Location Mapping Appendix A.

**Figure 1 – Subject site locality**



#### 3.2. Development proposal

The development proposal includes the creation of 48 lots (47 Rural Small Holding zoning and 1 Rural zoning lot). The Rural Small Holding lots are ranging in size from 5.01ha to 5.44ha. In creating the subdivision the developer proposes to implement "Vegetative Corridors" to increase linkages to remnant vegetation from the north-south and east-west.

Please refer to the Structure Plan as provided by Whelans, Appendix B.

#### 4. Desktop Assessment – Regional Setting

##### 4.1. Current site land use

The site is currently 2 rural lots of predominantly cleared paddocks with grasslands and small isolated patches of remnant vegetation, newly installed vineyards and tagasaste plantation. Historically the subject area has been used for sheep and cattle grazing. An abandoned shack exists in Lot 1 (south west corner) and some shed buildings are located in Lot 2 associated with the rural activities. Please refer to Photograph 1 to 3 below.



**Photograph 1** – View of abandoned shack in Lot 1 (south west of subject area).



**Photograph 2** – View of shed infrastructure in Lot 2, associated with rural activities.



**Photograph 3** – View of stock on site.

##### 4.2. Climate

Bindoon has similar climate to Perth (75 Km away) and thus has been described as per Bureau of Meteorology (BoM) descriptions of Perth. Perth experiences a Mediterranean climate, characterised by hot, dry summers and mild, wet winters. These seasons extend into the autumn and spring months, which are transitional periods between the main seasons.

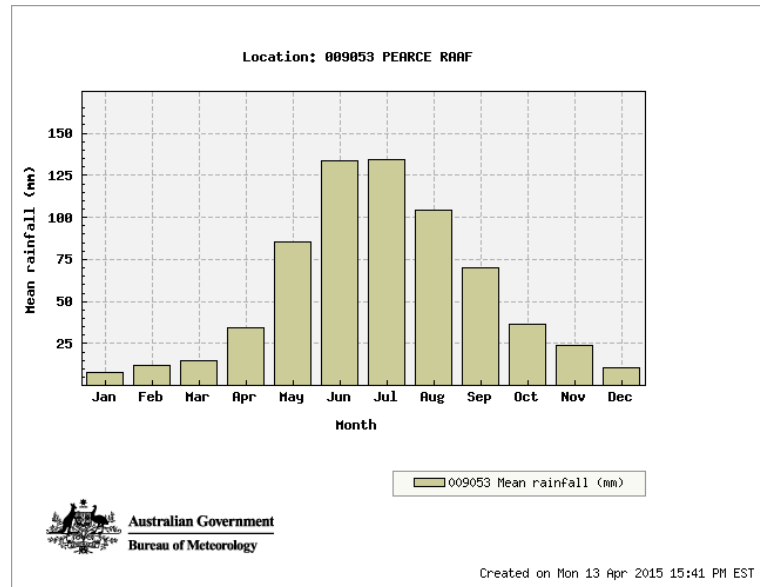
The climate of the region is strongly influenced by the position of the axis of the band of high pressure known as the sub-tropical ridge, and in the warmer months by the development in the easterlies to the north of the ridge of a trough of low pressure near the West Coast. For much of the year the ridge is located to the south allowing the east or south easterly winds to prevail. During the cooler months the ridge periodically moves to the north allowing cold fronts to pass over the west coast and deliver much of the annual rainfall. Sometimes these fronts interact with tropical cloud bands from the northwest and this can enhance the amount of rainfall produced.



#### 4.2.1. Rainfall

The annual mean rainfall of 678.3 mm (BoM, 2015) occurs on 119 rain days, of which 80% usually falls between May and September. Rain occurs on four days out of every seven on average during winter. Flooding is rare in Perth, however heavy rain may be produced by strong winter cold fronts or, less frequently, by summer storms or, more rarely, by decaying tropical cyclones. The highest daily rainfall is 120.6 mm recorded on 9 February 1992. In contrast to winter rainfall, the mean summer rainfall is just 36 mm on an average of 10 rain days. It is not unusual for there to be extended dry periods during the warmer months. Please refer to Pearce RAAF BoM rainfall records (closest climate statistics), Annual Rainfall graph below (Figure 2).

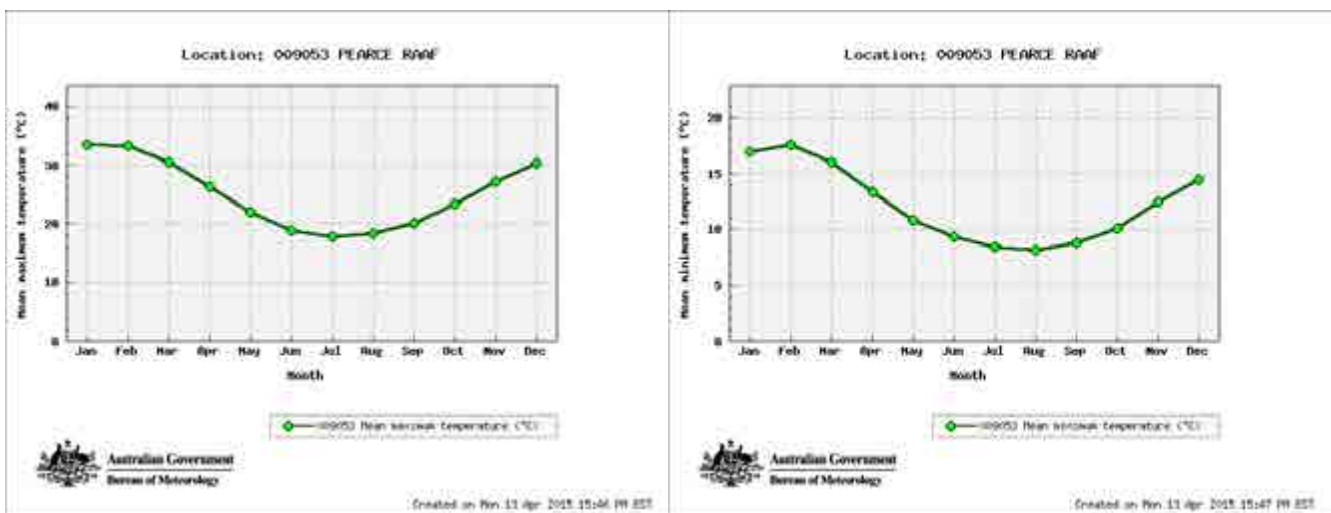
**Figure 2 – BoM Rainfall for Pearce (BoM) Station 9053**



#### 4.2.2. Temperature

Mean monthly air temperature range from 33.5°C in January to 17.8°C in July (BoM, 2015). Summer maximum temperatures are strongly dependent upon the arrival time of the reliable sea breezes. On some days the difference between the maximum temperatures on the coast and the eastern suburbs may exceed 10°C. Heatwaves are associated with strong easterly winds and the late arrival or absence of the sea breeze. The highest temperature ever recorded is 46.2°C, however, the temperature exceeds 40°C on only three days per year on average. The average minimum temperature ranges from just 8.2°C in August to 17.6°C in February (BoM, 2015). Temperatures below 5°C are not uncommon during any of the winter months. Please refer to average temperatures below for Gingin (40km away), Figure 3.

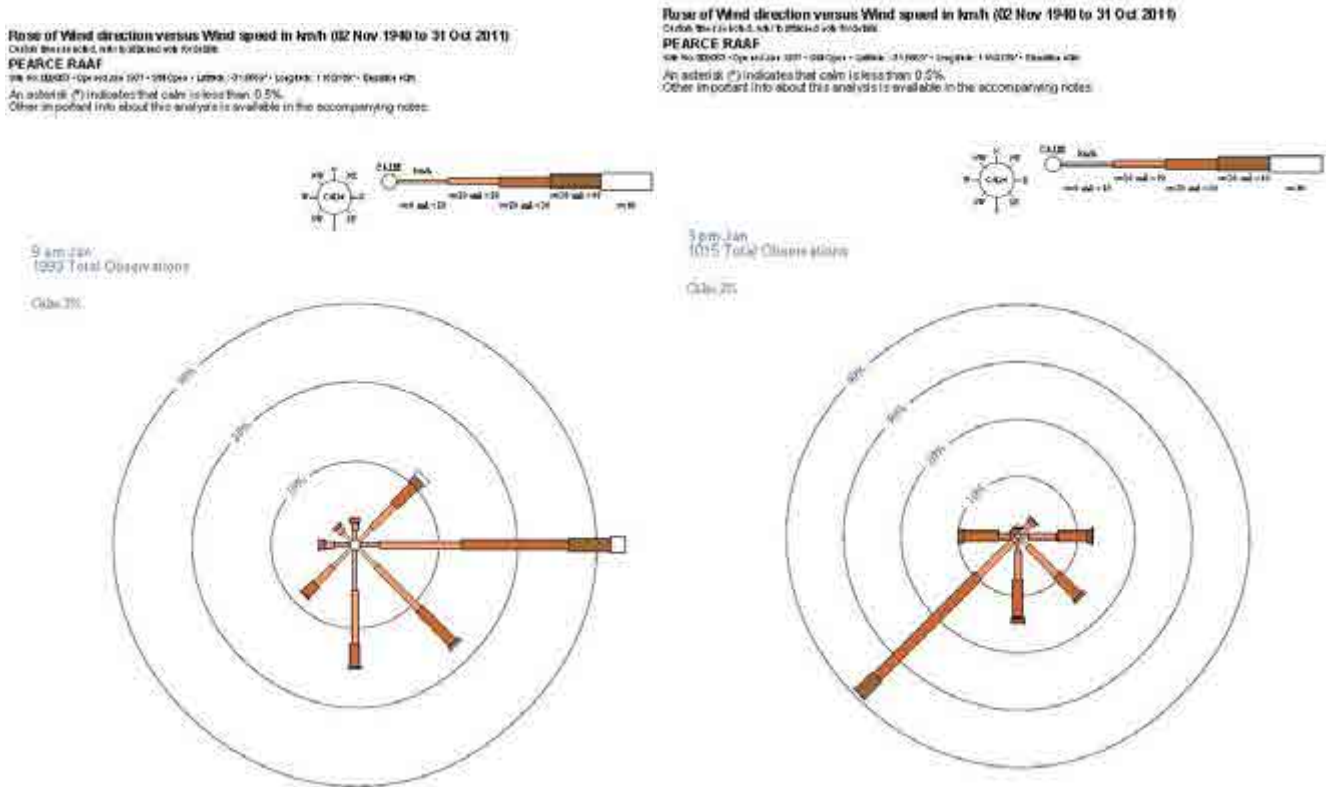
**Figure 3 – Average Temperatures BoM Pearce RAAF (BoM 9053)**



### 4.2.3. Wind

Winds are mainly easterly but varied in the warmer months by reliable afternoon sea breezes from the south west and in the cooler months by the westerlies that are associated with the bulk of the annual rainfall. Despite the occurrence of strong winds or gales, average wind speeds in winter are considerably lighter than in summer. Please refer to Figure 4 and 5 below.

**Figure 4 – Summer (Jan) wind rose 9am & 3pm BoM Pearce RAAF Stn**



### 4.3. Prevalent Fire Weather

Fire weather is characterised by mid-level disturbances across the south west of Western Australia, bringing unstable atmospheric conditions (thunder and lightning) from the north or north-west wind directions. This is characteristic of “Extreme” Fire Weather conditions to the area with hot dry conditions prior to storm events. Risk of lightning strikes, spark ignition, arson and other causes of fire give rise to wild fires under these conditions.

Prevalent winds which most wildfire events occur in the region are from the north-west, east and north-east direction. Conditions tend to be dry with low relative humidity. High winds and excess fuels can lead to hazardous conditions for residents. Strong easterly and south westerly winds exist at the subject site during dry summer periods (Figure 4). These circumstances place residential housing under the most risk from bushfire events.

#### 4.3.1. Climate Change

Climate change is expected to impact on the future rainfall pattern of the area. It is recognised that the average rainfall has already declined by 20%-30% over the past few decades and that the long term impact of climate change may lead to a shift in rainfall, as well as dryer climatic conditions for the region. The long term changes are predicted to impact on the flora, fauna and water availability for the region. (Climate Commission 2010)

The Climate Commission (Climate Commission 2010) estimates that

*“...Rainfall patterns in Western Australia have changed over the last 40 years. There is significant evidence that climate change has contributed to the marked drying trend in the southwest of the state.”*

The construction of the proposed development is not predicted to be affected by sea-level rise, however could be affected from increased intensity rainfall events or extended drying periods. Increased extreme weather from climate change could affect fire frequency and behaviour in Western Australia (DEC, 2012), this BMP has been prepared to reduce the risk of bushfire on the proposed residential dwelling of the property.

### 4.4. Topography




The subject site is located in an undulating landscape on the Dandaragan Plateau with the average “Effective Slope” (as per AS3959-2009) slope for the site as 1.7 ° (assessed as an average over 5 slopes/100m) calculated to be < 5° and ranges between 1° and 3°. One metre contours indicate there are 2 hills in the western portion up to 201m AHD and one dominant ridge in the south east of the subject site upto 208m AHD. The lowest elevation of the site is in the east along the formation of a creek (upper catchment) at 168m AHD.

### 4.5. Bushfire fuels – Vegetation

The subject lies within the Swan IBRA bioregion. This bioregion is comprised of “*low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils.*” The area is located within the SWA1- Dandaragan Plateau. *The plateau is bordered by Derby and Dandaragan Faults. Cretaceous marine sediments are mantled by sands and laterites. Characterised by Banksia low woodland, Jarrah - Marri woodland, Marri woodland, and by scrub-heaths on laterite pavement and on gravelly sandplains.* (Hearn et al., 2002).

Detailed vegetation inventory was undertaken in the vegetation types identified on site (Bio Diverse Solutions, 2012). A total of 149 species was identified within 3 vegetation types. The vegetation types are shown over the page in Table 1 as described in 2012.

**Table 1 – Vegetation Types Identified on site (from Flora and Vegetation survey 2012)**

Vegetation Unit	Planning for Bushfire Protection (2010) Vegetation Type	Site Description	Photograph
<b>Medium woodland; jarrah-marri (EmCc)</b>	Type B - Woodland	Medium woodland of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i>	
<b>Mosaic Medium open woodland: jarrah, marri &amp; banksias (EmCcBa),</b>	Type B - Woodland	Medium open woodland: Jarrah & Marri, with low woodland Banksia/sparse woodland jarrah/marri	
<b>Cleared paddock areas</b>	Type G - Grassland	Open paddocks, cleared of native vegetation, occasional paddock trees Jarrah & Marri,	

(Bio Diverse Solutions, 2012)

The eastern portion of the subject area (in 2012) was predominantly pasture with little to no paddock trees. In 2016 site assessment revealed the eastern paddocks were continued to be grazed and managed in a low fuel state. The western area of the subject site was assessed in 2012 as being “grassland”, in 2016 it was noted this area has not been grazed in some time and is now predominantly classified as Woodland Type B, where the grasses are exceeding 200-.300mm, trees are exceeding 10% coverage and there is regrowth of scrubs and shrubs.

Internal to the site remnant patches of Jarrah/Marri Woodland occurs, which in 2012 (site first assessed) was generally lacking in midstorey and understorey species due to grazing of stock. In 2016 site assessment has again classified this as Woodland Type B, however the stock grazing has discontinued and this area is now more extensive across the internal site in eastern areas.

External to the site there is forest Type A (north, west and east). These areas are typically Jarrah, Casuarina and Marri mix with Banksia and shrub understoreys.






These vegetation types in 2016 are classified as per AS3959-2009 (Table 2.3) criteria as:

- **Forest (Type A)** – *Trees 10-30m high: 30-70% foliage cover (may include understorey of sclerophyllous low trees and tall scrubs or grass). Typically dominated by eucalypts.* Jarrah, Marri and Casuarina multilayered forests to the north, west and east external to the site.
- **Woodland (Type B)** – *Trees 10 -30 m in high; 10-30% foliage cover dominated by Eucalypts; understorey low trees to tall shrubs dominated by Acacia, Callitris or Casuarinas* (WAPC 2010); Jarrah/marri woodland and Mosaic Jarrah & Marri, with low woodland Banksia/sparse woodland Jarrah/Marri located adjacent and internal to the Subject Site in western areas – ungrazed for some time.
- **Scrub (Type D)** – *Shrubs greater than 2m high; 10-30% foliage cover with a mixed species composition.* Banksia scrub to the east of the subject site (external).
- **Grassland (Type G)** – *Open paddock areas, overstorey foliage <10%.* (WAPC 2010), open paddock areas located internal and adjacent to the Subject Site.


Please refer to Table 2 below showing vegetation types classified in March 2016 as per above and shown in Vegetation Classes Map Appendix C.

**Table 2 – Vegetation Classifications AS3959 -2009 Tea Tree Road**


Plot 1	Classification or Exclusion Clause	Forest Type A
		Jarrah/Marri low forest Multi-layered vegetation (fuels), grasses/sedges understorey, shrubs 1-3m midstorey Canopy >30% coverage Trees 10-12m High (30-70% vegetative/foliage cover). Fuel loading 25T/ha -35T/ha
<i>Photo ID: Photo 1 view of Forest Type A located north of Tea Tree Road in private property. View from Tea Tree Road from the south to north.</i>		
Plot 1 cont	Classification or Exclusion Clause	Forest Type A
		Casuarina/Jarrah/Marri low forest Multi-layered vegetation (fuels), grasses/sedges understorey, shrubs 1-3m midstorey Canopy >30% coverage Trees 10-12m High (>30-70% vegetative/foliage cover). Fuel loading 25T/ha -35T/ha
<i>Photo ID: Photo 2 view of Forest Type A located east of subject site in private property. View from eastern boundary from west to east.</i>		

Plot 1 cont	Classification or Exclusion Clause	Forest Type A
		<p>Casuarina/Jarrah/Marri low forest</p> <p>Multi-layered vegetation (fuels), grasses/sedges understorey, shrubs 1-3m midstorey</p> <p>Canopy &gt;30% coverage</p> <p>Trees 10-12m High (&gt;30-70% vegetative/foilage cover).</p> <p>Fuel loading 25T/ha -35T/ha</p>




*Photo ID: Photo 3 view of Forest Type A located north of the subject site in private property. View from Tea Tree road from south to north.*

Plot 2	Classification or Exclusion Clause	Woodland Type B
		<p>Jarrah/Marri Woodland</p> <p>Single -layered vegetation (fuels), grasses/sedges understorey</p> <p>Canopy &lt;30% coverage</p> <p>Trees 8-10m High (&lt;30% vegetative cover).</p> <p>Fuel loading less than 15T/ha</p>

*Photo ID: Photo 4 view of Woodland Type B to the east (internal) of the site view from Brennan road from the west to the east.*

Plot 2 cont	Woodland Type B	Classification or Exclusion Clause	Woodland Type B
			<p>Jarrah/Marri Woodland</p> <p>Single -layered vegetation (fuels), grasses/low sedges and Grass trees understorey (&lt;1m)</p> <p>Canopy &lt;30% coverage</p> <p>Trees 8-10m High (&lt;30% vegetative cover).</p> <p>Fuel loading 15T/ha</p>

*Photo ID: Photo 5 view of Woodland Type B to the east (internal) of the site. View from Brennan Road from the west to the east.*

<b>Plot 3</b>	<b>Classification or Exclusion Clause</b>	<b>Scrub Type D</b>
		<p>Banksia Woodland  Trees and shrubs 2-10m high  10-30% foliage cover  Canopy &lt;30% coverage  Small shrubs understorey (&lt;30% vegetative cover).  Fuel loading less than 15-25T/ha</p>
<i>Photo ID: Photo 6 view of Woodland Type B to the west of the site adjacent to Brennan Road. View from east to west.</i>		
<b>Plot 4</b>	<b>Grassland Type G</b>	<b>Classification or Exclusion Clause</b>
		<p>Grasses grazed by sheep  &lt;100mm high  Occasional trees (&lt;10%)</p>
<i>Photo ID: Photo 7 view of Grassland Type G internal to the site (central areas), view from Tea Tree Road to the south.</i>		
<b>Plot 4 cont</b>	<b>Classification or Exclusion Clause</b>	<b>Grassland Type G</b>
		<p>Grasses grazed by sheep  &lt;100mm high  Little to no trees</p>
<i>Photo ID: Photo 8 view of Grassland Type G internal to the site (eastern areas), view from tea Tree Road from the north west to south east</i>		



#### 4.6. Assets

The subject site is predominantly cleared of remnant vegetation, with some isolated remnant vegetation patches which have been grazed. The site is valued for its proximity to the Bindoon townsite and Perth city, remnant vegetation and sandy soils (where perennial horticulture i.e. vineyards are being established).

Once developed, the values which will be potentially affected by fire include:

- **Human lives:** It is likely that more than 110 people could be resident at the newly created subdivision;
- **Assets:** The development will contain dwellings and valuable infrastructure; and
- **Environmental Conservation Values:** the site has internal remnant (forest) vegetation areas in western portions of the site which have vegetation conservation values.

#### 4.7. Access

Vehicle access to the subject site is from Tree Road and Brennan Road in the west. An internal informal 4 x 4 track services paddocks and water supplies for grazing stock. Please refer to Photo 9 and 10 below



Photo 9 – View of Tea Tree Road to the north of the subject site



Photo 10 – View of Brennan Road to the west of the subject site

#### 4.8. Water Supply

There is presently no developed land within the subject site. Water is presently gained from a dam in the east and pumped via windmill across the property. Please refer to Photograph 11.



Photo 11 – View of dam in Lot 1 Tea Tree Road.



#### 4.9. Firebreaks

There are existing firebreaks to SoC required standards around the property, refer to Photo 12.



Photo 12 – View of existing firebreaks along perimeter of property.

## 5. Potential Fire Issues and Fire Risk

The bushfire hazard assessment provides a measure of the fire intensity and likelihood of bushfire attack measures on a dwelling, subdivision or residential area (Planning for Bushfire Protection, Edition 2 2010). This measure can provide an assessment of the land for suitability for residential construction and takes into account:

1. Vegetation Assessment – type and class in each direction;
2. Distance - between the predominant vegetation class and proposed building;
3. Topography and slope – with reference to accessibility; and
4. Land use – surrounding and internal to the proposal.

(Planning for Bushfire Protection, Edition 2, 2010)

The Vegetation type for the subject site (within 100m) has been classified as per AS3959-2009 as Forest Type A, Woodland Type B, Scrub Type D and Grassland Type G (as per vegetation classifications outlined in AS3959-2009, Table 2.3). The bushfire hazard Level (BHL) ratings have been assessed as per the methodology as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC 2015a). Please refer to Table 3 below.

**Table 3 – Bushfire Hazard Level (BHL) Categories**

Table 3: Hazard levels and characteristics

HAZARD LEVEL	CHARACTERISTICS
<b>Low</b>	<ul style="list-style-type: none"> <li>• devoid of standing vegetation (less than 0.25ha cumulative area);</li> <li>• areas which, due to climatic conditions or vegetation (e.g. rainforest), do not experience bushfires;</li> <li>• inner urban or suburban areas with maintained gardens and very limited standing vegetation (less than 0.25ha cumulative area);</li> <li>• low threat vegetation, including grassland managed in a minimal fuel condition (i.e. to a nominal height of 100mm), maintained lawns, vineyard and orchards; and</li> <li>• pasture or cropping areas with very limited standing vegetation that is shrubland, woodland or forest with an effective up slope*, on flat land or an effective down slope* of less than 10 degrees, for a distance greater than 100 metres.</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>• areas containing pasture or cropping with an effective down slope* in excess of 10 degrees for a distance greater than 100 metres;</li> <li>• unmanaged grasslands;</li> <li>• open woodlands;</li> <li>• open shrublands;</li> <li>• low shrubs on areas with an effective up slope*, on flat land or an effective down slope* of less than 10 degrees, for a distance greater than 100 metres or flat land;</li> <li>• suburban areas with some tree cover; and</li> <li>• forest and woodlands with a permanent grass understorey or at most, a scrub understorey structure consisting of multiple areas of &lt;0.25ha and not within 20 metres of each other or single areas of &lt;1ha and not within 100 metres of other scrub areas.</li> </ul>
<b>Extreme</b>	<ul style="list-style-type: none"> <li>• forests with a scrub understorey which is multi-tiered;</li> <li>• woodlands with a scrub understorey which is multi-tiered;</li> <li>• tall shrubs; and</li> <li>• any area of vegetation not otherwise categorised as low or moderate.</li> </ul>

(WAPC, 2015a)

### **Internal Bushfire Hazard Levels (BHL)**

The subject site has sustained vegetation clearing and grazing by sheep. In eastern areas of the site it is predominantly a cleared landscape representing a **“Low”** BHL as defined by Table 3 (WAPC, 2015a). In the western portions of the site the previously grazed areas has regenerated and now forms a Woodland Type B landscape which is a Moderate BHL (Open Woodlands). The Woodlands in the south west of the property are regenerating (still degraded from previous grazing) and are classified as a **“Moderate”** BHL as defined by Table 3 (WAPC, 2015).

There are low effective slopes for the site, with all slopes <5°. Refer to Bushfire Hazard Level Mapping, Appendix D.

**External Bushfire Hazard Level (BHL)**

Surrounding the subject site to the west, north and east west there is remnant bushland with cleared paddocks to the south. The predominant fire risk associated with the site is the adjacent Forests to the north, west and east which is an “**Extreme**” BHL as defined by Table 3 (WAPC, 2016). The external Woodland and Scrub vegetation are classified as a “**Moderate**” BHL as defined by Table 3 (WAPC, 2015).

Bushfire risk increases with slope, which with hot conditions can give rise to hot and intense fires in north (Summer mid-level disturbances) and easterly (prevailing summer) wind conditions. Slopes are generally low being <5° within 100m of the subject site.

The predominant extreme fire weather in summer conditions can give rise to flame and ember attack from north and north west wind directions (mid level disturbances) and from the east and south west (summer prevailing winds, see Figure 4).

Refer to Bushfire Hazard Level Mapping, Appendix D.

**Proposed Subdivision Fire Risk Rating**

The fire risk for this subdivision has been rated at **Extreme - Moderate BHL** as defined by Table 3 (WAPC, 2015).

Setback distances of over 100m from native vegetation (Bushfire Prone Vegetation) cannot be achieved for all the lots. Where 100m cannot be achieved from dwellings to Bushfire Prone Vegetation, the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) states that Building to Bushfire Attack Levels (BAL) and AS3959-2009 can apply to dwellings to assist in achieving “Acceptable Solutions” to the subdivision. Where a building is located within the State Gazetted Bushfire Prone Area Mapping (OBRM, 2015), the *Planning and Development (Local Planning Schemes) Amendment Regulations 2015* states that building to Bushfire Attack Levels (BAL) and AS3959-2009 is to apply to dwellings.

The subdivision (and proposed dwellings) will be located within 100m of Bushfire Prone vegetation and is located within the WA State Bushfire Prone Area (OBRM, 2015) mapping. The proposal will require assessment to the bushfire protection criteria as per the newly released “Guidelines for Planning in Bushfire Prone Areas” (WAPC, 2015a). These are outlined in Section 6 –**Assessment to Bushfire Protection Criteria**.

## 6. Bushfire Management/Mitigation Plan

The Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) outlines bushfire protection criteria which subdivisions and development proposals are assessed for compliance. The bushfire protection criteria (Appendix 4, WAPC, 2015) are a performance based criteria utilised to assess bushfire risk management measures and they outline four elements, being:

- Element 1: Location
- Element 2: Siting and Design of Development
- Element 3: Vehicle Access; and
- Element 4: Water

(WAPC, 2015)

The plan of subdivision for Lot 1 and 2 Tea Tree Road Chittering is required to meet the “Performance Principles” and/or “Acceptable Solutions” of each Element of the bushfire mitigation measures (WAPC, 2015). The site has been classified as having a “**Low- Moderate**” future internal bushfire hazard in the development/building areas, with adjacent “**Extreme**” and “**Moderate**” bushfire hazards (as per WAPC Guidelines, Table 3) due to the presence of Forest Type A, Woodland Type B, Scrub Type D and Grassland Type G. Effective Slopes under vegetation are variable across the site are low  $<5^\circ$ .

The subdivision will be assessed against the bushfire protection criteria Acceptable Solutions for Elements A1, A2, A3 and A4. The following sections of this report outlines how the subdivision complies with the bushfire protection criteria Acceptable Solutions as per the newly released Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a).

### 6.1. Element 1: Location-

Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.

#### **Assessment to the Acceptable Solutions.**

**Acceptable Solution applied A1.1:** *the strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low Bushfire hazard level, or BAL-29.*

The subdivision can associated new dwellings can be located on BAL Low areas. The previously cleared areas (now regrowing from cessation in farm activities) can be slashed, mowed and maintained in a Low Fuel State (as per AS3959-2009 Clauses 2.2.3.2 (f)). The subdivision has a **Moderate- Extreme** rating due to the presence of remnant external Forest, Scrub and woodland areas (north, south and west). The bushfire hazard level is manageable and adequate setbacks can be achieved to 100m from these areas due to the large lots proposed. The large size lots (Rural Small Holding zoning) ranging from 5.01ha to 5.44ha allow for setbacks to bushfire hazards, therefore reducing the risk of bushfire to people, property and infrastructure. If dwellings do not located  $>100\text{m}$  from classifiable vegetation then building to AS3959-2009 will apply.

Subdivision is deemed to meet Acceptable Solution A1.1.

#### **6.1.1. Recommendations arising from assessment to this element**

The recommendations/conclusions from assessment to Element 1: Location concludes that the subdivision:

- Subdivision is deemed compliant to A1.1 due to :
  - BAL Allocation can apply of BAL-Low through re-clearing previously cleared areas.
  - If vegetation continues to re-grow without maintenance then BAL and building to AS3959-2009 will apply where 100m setbacks cannot be achieved.



## 6.2. Element 2: Siting and design of development

Intent: To ensure that the siting of development minimises the level of bushfire impact.

**Assessment to the Acceptable Solutions** – To achieve compliance with this Element using an Acceptable Solution, either or both acceptable solutions (A2.1 and A2.2) must be met that it satisfies Element 1.

The Acceptable Solutions which will be applied to this subdivision include:

- **A2.1: Asset Protection Zone (APZ):** Every building is surrounded by a 20m APZ (see Section 6.2.2).
- **A2.2 Hazard Separation:** Building to AS3959-2009 where setbacks of 100m cannot be achieved to Bushfire Prone Vegetation (see Section 6.2.1).

The subdivision will be assessed to the Acceptable Solutions for Element 2 as demonstrated in the following sections.

### 6.2.1. Asset Protection Zones (APZ) (Acceptable Solution A2.1)

#### Acceptable Solutions applied

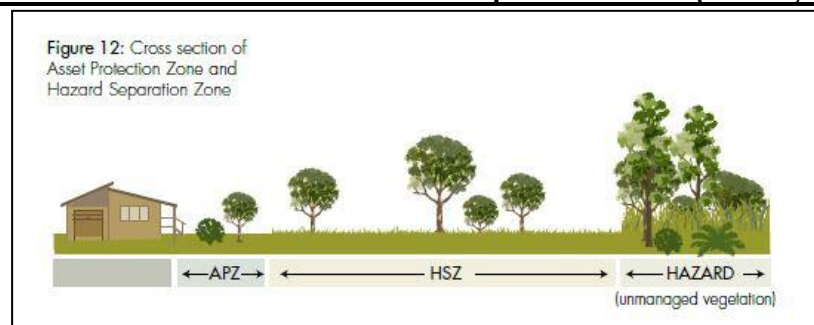
The aim of the Asset Protection Zone (APZ) is a low fuel area immediately surrounding a habitable building, and is designed to minimise the likelihood of flame contact with buildings (WAPC, 2015). APZ will minimise the risk of the building igniting, (thus protecting the occupants), and with the reduced fuel quantities, allow safer and more effective conditions for fire-fighters to contain wildfires. Roads, pathways, lawns, and other low hazard items should be placed within this zone to improve the effectiveness of the zone. The APZ are required in addition to HSZ (see Section 6.2.2).

Every building must be surrounded by a 20 metre wide APZ, this is deemed by WAPC (2015) as the minimum width to be constructed around all buildings as a “defendable zone”. Activity within the APZ (WAPC, 2015) for each individual dwelling must meet the following requirements:

- a) Width: 20 metres measured from any external wall of the building or building envelope;
- b) Location: within the boundaries of the lot on which the building is situated;
- c) Fine fuel load: reduced to and maintained at 2 tonnes per hectare;
- d) Trees (crowns) are a minimum of 10 metres apart
- e) Trees are low pruned at least to a height of 2 metres;
- f) No tall shrub or tree is located within 2 metres of a building;
- g) No tree crowns overhang the building;
- h) Fences and sheds within the APZ are constructed using non-combustible materials (e.g. colour bond iron, brick, limestone, metal post and wire); and
- i) Sheds within the APZ should not contain flammable materials.

An example of APZ from the “Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) is shown in Figure 6.

**Figure 6 – Asset Protection Zone and Hazard Separation Zone (WAPC, 2015)**



(WAPC, 2015 a)

All residences within the proposed subdivision can achieve the required 20m APZ within their respective boundaries. Information on long term maintenance of APZ for the homeowner, as recommended by DFES is provided in Appendix F.

### 6.2.2. Hazard Separation (Acceptable Solution A2.2)

BAL is the process for measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. The threat or risk of bushfire attack is assessed by an accredited BAL Assessor. BAL rating determinations are of 6 levels BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40, BAL-FZ. Building is generally not recommended in BAL-40 or BAL-FZ areas. The BAL rating is determined by the distance of the building to vegetation, slope and vegetation type adjacent to the dwelling. Refer to Figure 9 below.

**Figure 9 - BAL Construction levels in context**



(WAPC, 2015a)

Building design and construction to AS3959-2009 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself. The construction standards outlined in AS 3959-2009 provide reference to specific items of building and it is recommended that the future lot owner discuss these in detail with their builder or architect. Table 2 outlines some of the construction consideration to AS3959-2009 when building in bushfire prone areas. Construction standards are to be approved by the CoA prior to construction. Building to AS3959-2009 applies to buildings as defined in the Building Code of Australia (BCS).

**Table 2 – AS3959-2009 Construction Requirement (Example)**

Construction requirement AS3959-2009
Flooring systems
Supporting posts, columns, stumps, piers and
External Walls
Windows
External Doors
Vents and weep holes
Roof
Eaves
Fascia's
Gutters and downpipes
Veranda and decks
Service Pipes (water and gas)

The subdivision will comply to Acceptable Solution A2.2 by applying either a 100m Hazard Separation Zone (HSZ) (i.e. 100m setback) at the interface of the building and the bushfire hazard or a setback associated with BAL construction and AS3959-2009 as outlined in the BAL Contour Map outlined in Appendix E. No higher BAL allocation than BAL 12.5 needs to be applied to the dwellings.

**Table 3 – Minimum Setback Distances and Construction Standards**

BAL Rating	Vegetation Type	Distance to Vegetation	Construction
BAL 29	Woodland Type B	17-<25m	AS3959-2009 to apply
BAL 19	Woodland Type B	25-<35m	AS3959-2009 to apply
BAL 12.5	Woodland Type B	35-<100m	AS3959-2009 to apply
No BAL Rating Required	All Vegetation	>100 metres	No construction standards required

Vegetation is downslope and >0 to 5 Degrees (as per AS3959-2009).

**Notes on BAL Assessment:**

- **Sites affected by BAL will be subject to detailed feature survey and the mapping depicted in the BAL Mapping Appendix E is a guide, with accuracy to within 5m.**
- **If dwellings cannot achieve >100m from the adjacent vegetation then BAL Construction will apply as outlined in Table 3.**
- **BAL setback distances are measured from the edge of existing vegetation at time of feature survey and building construction approvals stages.**
- **Detailed assessment for BAL Construction as described in this document can be undertaken at construction stage by an accredited Bushfire Consultant with approval from the Shire of Chittering.**

A 100m HSZ from external Extreme and Moderate BHL can be achieved as shown on the SP Appendix B and the BAL Mapping Appendix E. The lots will require ongoing maintenance from the developer or will be subject to vegetation clearing by the new owners. If the lots remain unmaintained and continue to revegetate dwellings may require to be built to BAL and AS3959-2009 as per Table 3. This is indicated in the BAL Mapping Appendix E (see inset).

The developer will be responsible for the implementation of a notification on title pursuant to 70A of the *Transfer of Land Act 1893* with regard to the notification on title on lots alerting the future owners of the endorsed Bushfire Management Plan

**Assumptions made in BAL Contour Mapping:**

- Remnant vegetation in internal areas will be maintained as low fuel by the developer.
- A 100m HSZ (setback) will apply to the whole of development and be maintained by the developer prior to sale of lots and until lots are relinquished to new owners.
- The large rural lot to the east will be maintained as rural and grazed pastures.
- The remnant vegetation areas external to the site to the north, south and west adjacent to the subject site will remain "as is".

**6.2.3. Recommendations arising from assessment to this Element**

The recommendations/conclusions from assessment to Element 2: Siting and design; concludes that the subdivision:

- The Subdivision is deemed to be compliant with Element 2 by:
  - The application of a 20m APZ;
  - Clearing/maintenance of 100m HSZ (setback) for BAL Low; and

- If woodland Type B areas regenerate and 100m not achieved then building to BAL/AS3959-2009 as it applies to the dwelling;
- The developer will be responsible for the implementation of a notification on title pursuant to Section 70A of the Transfer of Land Act 1893 for all lots affected by an increase in construction standards consistent with a BAL rating/AS3959-2009 allocation to the lot, and alerting the prospective owner (s) of the lots and successors in title of the Bushfire Management Plan.
- It is recommended that the developer clear all the lots prior to sale to ensure the APZ and setbacks are demonstrated to the purchaser at time of sale. The APZ areas are to be as per the standards in Section 6.2.1 and these areas are regularly maintained by the developer until all land is relinquished to the new lot owner.
- Maintain 100m setback from dwellings and bushfire hazards at all times during staged construction and grasses maintained to <100mm at all times;
- The vegetation clearing required for the street verges, APZ and HSZ areas does allow for the retention of significant trees, these should be clearly marked for the developer prior to clearing operations on the site. Final placement of the dwellings on site (by new lot owners) may require further trees to be removed however this stage of tree removal should only be as per the standards of the APZ Section 6.2.1; and

Individual BAL assessments may be considered on the lots by the new owners when dwelling design/placement is known and can be undertaken at building approval stages with the engagement of an Accredited Level 1 BAL Assessor.



### 6.3. Element 3: Vehicle Access

Intent: To ensure that the vehicular access serving a subdivision/development is available during a bushfire event.

*Acceptable Solutions applied.*

The internal layout of the Subdivision's public roads and private access allows vehicles and other emergency vehicles to move through the subdivision at all times, meeting the Acceptable Solutions. Vehicle access technical standards as outlined in Table 4 are the minimum requirements from Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a). Refer to Table 4 and Bushfire Management Plan Appendix G.

**Table 4 – Vehicular Access Standards**

Standard	Public Roads	Fire Service Access Ways	Emergency Access Ways
Minimum trafficable	6 metres	4 metres	6 metres
Horizontal clearance	6 metres	6 metres	6 metres
Vertical clearance	4 metres	4 metres	4 metres
Maximum grades	1 in 10	1 in 10	1 in 10
Minimum weight capacity	15 tonnes	15 tonnes	15 tonnes
Maximum crossfall	1 in 33	1 in 33	1 in 33
Curves minimum inner	8.5 metres	8.5 metres	8.5 metres
Cul de sacs	N/A	N/A	N/A
Battle Axes	Not more than 600m	N/A	N/A
Private Driveways	Standard as roads if house >50m from road, passing bays every 200m for 20m.	N/A	N/A
Signage	Not required	Required	Must be signposted
Gates	Not required	Min width 3.6	Min width 3.6
Design and construction	Approved by relevant local government	Approved by relevant local government	Approved by relevant local government
Turn around areas	Every 500 metres, within 50 metres of the house and at water	Every 500 metres, within 50 metres of the house.	Not required

(WAPC, 2015a)

#### 6.3.1. Two Access Ways (A.3.1)

The SP design allows for two access points onto Tea Tree Road and an Emergency Access Way and Fire Service Access onto Brennan Road in the west and to southern firebreaks (in adjacent properties) to the south and meet the Acceptable Solution. Please refer to Bushfire Management Plan Appendix G.

#### 6.3.2. Public roads (A.3.2)

All internal public roads shall be constructed to acceptable standards (Refer to Table 4 – Vehicle Access Standards) and shall be detailed in Civil Engineering Designs. The Subdivision design allows for two way traffic and safe egress from the subdivision via a road network with 30m internal road reserves and meets the Acceptable Solution. Please refer to Bushfire Management Plan Appendix G.

**6.3.3. Cul de Sacs (A3.3)**

Cul-de-sacs will not exceed 200m in length and meet the Acceptable Solution.

**6.3.4. Battle Axes (A3.4)**

Battle Axes shall not exceed 600m, standards for road/street construction are as per Table 4 – Vehicle Access Standards. All Battle Axes proposed meet this requirement and meet the Acceptable Solution.

**6.3.5. Private Driveways (A3.5)**

Constructed driveways are to meet the requirements of Table 4. All driveways will be <50m from road to dwelling and will not require turnaround areas or passing pays, therefore meeting the Acceptable Solution.

**6.3.6. Emergency Access Ways (A3.6)**

Emergency Access Ways (“Fire Access”) will be from the northern side of the subdivision to Tea Tree Road, from Brennan Road to the west and to southern firebreaks (in adjacent properties) to the south. If the subdivision is staged, the Emergency Access Ways will be required to link through to Brennan Road and to Tea Tree Road, this will need to be via a hardened surface as per Table 4 - Vehicular Access Standards. The linking Emergency Access Way to Brennan Road will provide a trafficable surface for emergency access linking Brennan Road and the subdivision internal roads, and meet the Acceptable Solution. Please refer to the Please refer to Bushfire Management Plan Appendix G.

**6.3.7. Fire Service Access (A3.7)**

Fire Service Access (FSA) is proposed from the northern side of the subdivision to Tea Tree Road, from Brennan Road to the west and to southern firebreaks (in adjacent properties) to the south. These FSA’s to enable fire appliance ease of access through the subdivision for fire fighting operations, please refer to the Bushfire Management Plan- Appendix G. The road reserve through the subdivision enables light unit fire appliance and heavy unit (truck appliances) access in an emergency.

The linking Fire Service Access to Brennan Road will provide a trafficable surface for fire appliance access through the POS corridor (Shire land) linking Brennan Road and the subdivision internal roads. Please refer to the Please refer to Bushfire Management Plan Appendix G.

The minimum running surface and standards of construction roads is as per Planning for Bushfire Protection Edition 2 (2010), please refer to Table 4. Fire Service Access routes for this subdivision will:

- Link the road network;
- Be adequately signposted (see following section);
- Allow for two-way traffic (as per Table 4);
- Have a hardened surface (as per Table 4 standards); and
- Have erosion control measures in place such as culverts, stormwater contours/diversions, and native vegetation remediation/stabilisation at gully crossings.

If the subdivision is staged, the Fire Service Access Ways will be required to link through to Brennan Road, this must be via a hardened surface as per Table 4 - Vehicular Access Standards.

**6.3.8. Signage**

“Fire Service Access Ways” are to be sign posted where they adjoin public roads. DFES recommend the following wording for signage as appropriate:

- “Fire Service Access – No Public Access”; and
- “Emergency Access Only”.

An example of clear street signage is shown over the page in Photo13.



Photo 13 – Example of street/road signage clearly indicating emergency access/egress within the subdivision.

### 6.3.9. Gates

The use of gates to restrict public traffic on “Emergency Access Ways” is acceptable provided it is wide enough to accommodate 3.4 Heavy Duty Fire Appliances. Gate standards are to be as follows:

- Minimum width 3.6 metres;
- Approved by the Shire of Chittering;
- Emergency Access must not be locked; and
- Bollards should be installed to restrict vehicle movement around the gates where appropriate.

### 6.3.10. Individual Fire breaks (A3.8)

Internal fire breaks are required by the Shire of Chittering, refer to the current Fire Break Order (annually updated) from the Shire website:

<http://www.chittering.wa.gov.au/chittering-fire-services/fire-breaks-and-important-dates-to-remember.aspx>

As at 2014/15, the Shire of Chittering Firebreak Order states the following firebreaks would apply to this subdivision:

- ***All properties, including Rural Residential with land greater than equal or greater than 2 ha:*** Must clear a fire break of all flammable materials three metres (3) metres wide, with a four (4) metre vertical clearance along the inside of the boundary to the property.
- ***Land Greater than 120 ha:*** Must have a firebreak in such a position which divides the land into areas not exceeding 120 ha. An indication of how this can be achieved on the Rural Lot is shown in the BMP Appendix G.

Individual fire breaks will apply to lots 1-47 (Rural small holdings 5.01 to 5.44ha), with firebreaks for the larger Rural Lot (proposed lot 48) along existing fire breaks as shown in the BMP Appendix G.

The fire breaks are to be maintained to the standard of the Shire of Chittering's Town Planning Scheme No 6, Local Planning Policy No 21. This policy requires all firebreaks to be as stated above (3m wide with a 4m vertical clearance) for 4 wheel drive access. Where a Fire Access (Emergency Access Way) or road adjoins a property, an individual fire break is not required

Internal lot firebreaks should be designed to minimise soil erosion. For instance, firebreaks will generally avoid areas undergoing environmental remediation (Remnant Vegetation areas or Vegetative Corridors) and be installed around these areas. In areas of steep terrain, firebreaks can be created by spraying with chemicals, the path of a firebreak can be meandered to follow contours to reduce the risk of soil erosion from storm water.

#### 6.4. Element 4 Water

Intent: To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.

##### *Acceptable Solution applied*

Scheme water will not be provided to the subdivision. The Guidelines for Planning in Bushfire Prone Areas recommends rural small holdings to have the provision of a 50, 000L water tank (to a standard approved by the Shire of Chittering) every 25 residences and a hydrant installed. It is therefore required that a 100,000 L capacity should be applied at this subdivision (48 lots) at a central location. These structures will be located on public land and vested with the Shire of Chittering as subdivision clearance occurs.

The hydrant/water tank construction must meet the following standard specifications and have:

- Hardstand and turnaround area suitable for 3.4 Heavy Duty fire appliance;
- Fire water tanks to have level indicators installed;
- Valves and manifolds must be locked by the developer with a Shire Standard lock;
- AS approved fire hydrants;
- Must be capable of delivering 600 litres per minute via Engineers certification;
- Procedures to be put in place by the developer to ensure the tank is maintained at full capacity at all times;
- Be easily accessible with standard fire services hydrant and key; and
- Be identified by standard road and pole markings.

A recommended location for the tank and hardstand area is shown in the Bushfire Management Plan Appendix G. After the developer has completed all maintenance periods, it shall be the responsibility of the Shire of Chittering to maintain this facility.

As scheme water is not to be provided to individual houses, all buildings intended for residential use must include provision for the storage of water in tanks not less than 120,000 litres capacity, of which 10,000L is to be held in reserve for fire fighting purposes. All water tanks intended to reserve 10,000L for fire fighting purposes are required to install a 50mm male camlock fitting to the floor of the tank and the draw point for the residential purposes is to be 10,000L above the floor of the tank.

#### 6.5. Other Bushfire Mitigation Procedures

##### 6.5.1. Landscaping/Streetscaping Areas

Landscaping and Streetscaping areas subject to similar standards that apply to the APZ and the following minimum standards shall apply:

- Trees (crowns) a minimum of 10m apart (no continuous crowns);
- Trees should have no dead material within the plant's crown or on the bole;
- Fuel reduced to <2t/ha; and
- Shrubs should be no higher than 0.5 m.

##### 6.5.2. Staged Development

If the development is staged it should incorporate the following:

- Reduction of bushfire fuels in HSZ and APZ for each stage of construction of the subdivision and during maintenance periods;
- Maintenance of 100m HSZ to APZ standards – note grasses to be slashed and maintained to <100mm at all times.
- Construction of 2-way Emergency Access Way from Tea Tree Road to Brennan Road;
- Installation of Water Tank on public land (minimum of 50,000L/25 residences); and



- Maintenance of fire protection measures in public areas (gates, access, landscaped areas etc) until the developer has relinquished construction/maintenance responsibility of public use areas to the Shire of Chittering.

#### **6.5.3. Evaporative Air Conditioners**

Evaporative air conditioning units can catch fire as a result of embers from bushfire getting into the unit. These embers can then spread quickly through the home causing destruction. It can be difficult for fire-fighters to put out a fire in the roof spaces of homes. Information on Evaporative air conditioners is supplied in Appendix F of this document.

It is also recommended that home owners:

- Ensure that suitable external ember screens are placed on roof top mounted evaporative air conditioners compliant with AS3959-2009 (current and endorsed standards) and that the screens are checked annually.

## 7. Shire of Chittering Fire Protection Plan

The Shire of Chittering has the assistance of the Chittering Fire Services which is made up of six Volunteer Bush Fire Brigades. It has a Chief Bush Fire Control Officer and two Deputies. Five Brigades are fire fighting units and one is an incident support Brigade. Each fire fighting unit has three appliances suited to its area. The Incident Support Brigade supports the Incident Management Team at all fires when required.

Training and induction courses are held regularly and land owners are encouraged to attend these. For more information refer to their website:

<http://www.chitteringfireservices.org.au/>

Local Bush Fire Control Officers are allocated throughout the Shire depending on region, the latest Fire Break Order should be consulted from the Shire's website for contact details:

[www.chittering.wa.gov.au](http://www.chittering.wa.gov.au)

### 7.1. Fire Fighting Facilities

The subject area is in the Upper Chittering Bushfire Brigade District. Response times can vary depending on commitments of volunteers, fire events current at time and priority of the fire services in the south west of Western Australia during summer periods. DFES recommend that homeowners take care to prepare their individual dwellings for fire season and take precautions against fire as per the **"Bushfire Preparedness – Prepare. Act. Survive."**

It is generally acknowledged that during large wildfire events, local resources may not be able to respond to every dwelling due to strategic deployments of services, priorities within the area or state and/or present commitments of volunteers and resources.

The Chittering Fire Services has 3.4 and 2.4 heavy duty tankers (3000L and 2000L) and light tankers (fast attack 400L capacity). These are typical of Brigade units for fire fighting services within Western Australia.

The Chittering Fire Services' six bush fire brigades provide local fire services and have:

- 4 fire stations;
- Volunteer members;
- A communications and call out system;
- Protective clothing issue to volunteers; and
- DFES approved fire appliances.

### 7.2. Homeowner Protection

It is the responsibility of homeowners to protect their property from fire. DFES have readily available information online which can assist homeowners in their preparedness during fire season (October to May). The DFES website **"Bushfire Preparedness – Prepare. Act. Survive."** should be accessed by all owners in bushfire prone areas. A hard copy of the A4 book "Prepare. Act. Survive" can be found at local Shire of Chittering Offices or DFES offices, or downloaded off the above web address:

<http://www.dfes.wa.gov.au>

### 7.3. Bushfire Plan

Residents should prepare their own individual fire plans, as they need to make a commitment to develop a bushfire survival plan detailing preparations and actions to take if a bushfire threatens. When developing a bushfire survival plan, the following should be considered:

- If you plan to leave for a safer place - where will you go and how will you get there? Your safer place could be with friends and family, and may not be far away. Know where you will go and never 'wait and see'. Relocating at the last minute can be deadly
- Does your household include elderly relatives, young children, people with disabilities or illness? When, where and how will they be relocated? Who will care for them?
- What will you do with your pets and livestock?
- Can your home be defended? Is it in a location that makes it difficult or dangerous to actively defend? (refer to DFES's Homeowners Bushfire Survival Manual - PDF)
- Will your home provide shelter if you have to or decide to stay?
- Are you capable of defending your home without the support of fire fighters?
- Do you have the skills, knowledge and capacity to check for and put out spot fires for up to ten hours after the fire front has passed?
- Do you have the right equipment and resources to actively defend? (e.g. sufficient independent water supply of at least 20,000 litres and a petrol, diesel or generator powered pump capable of pumping 400 litres per minute)
- Will you cope with the noise and stress of a bushfire if you decide to actively defend? Being in a bushfire may be the most traumatic experience of your life.

(from DFES website, 2013)

By compiling information as outlined above, the individual lot owner can be prepared for their response in a bushfire emergency. Home owners should not rely on emergency personnel to attend their home and thus it is stressed to **prepare an individual bushfire emergency plan** regarding their intentions and property. This Bushfire Management Plan is **not** an individual bushfire emergency plan.

As noted in Section 6.0, building to AS3959-2009 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.

***AS3959-2009 disclaimer:*** *It should be borne in mind that the measures contained within this Standard (AS3959-2009) cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather condition.*

(AS3959, 2009)

Information is also available on the ABC Radio website to guide homeowners in the event of a fire emergency, such information includes:

Planning for an Emergency Bushfire:

- Survival Kit
- Fire Emergency Services
- Before a Bushfire
- During a Bushfire
- After a Bushfire

Refer to the following links for more information on how to prepare a bushfire plan:

<http://www.abc.net.au/news/emergency/?ref=front-page-slider-v2--emergencies>

It is also recommended that homeowners in bushfire prone areas understand the DFES Bushfire Warning System. A brief outline is shown over the page, however further detail should be sought from DFES website ([www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)) in a bushfire emergency.

### **Bushfire Warning System**

During a bushfire, emergency services will provide as much information as possible through a variety of channels.

### **Community Alerts**

DFES issues Community Alerts for bushfires that threaten lives and property.

The alert level changes to reflect the increasing risk to your life and the decreasing amount of time you have until the fire arrives. DFES issues the following bushfires warnings:

- **Advice**  
A fire has started but there is no immediate danger, this is general information to keep you informed and up to date with developments.
- **Watch and Act**  
A fire is approaching and conditions are changing, you need to leave or prepare to actively defend to protect you and your family.
- **Emergency Warning**  
You are in danger and you need to take immediate action to survive as you will be impacted by fire. An emergency warning may be supported with a siren sound called the Standard Emergency Warning Signal (SEWS).
- **All Clear**  
The danger has passed and the fire is under control, but you need to remain vigilant in case the situation changes. It may still not be safe to return home.

([www.dfes.wa.gov.au](http://www.dfes.wa.gov.au))





## 8. Summary

### 8.1. Overall Fire Threat

Marou Property Development Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a fire hazard assessment and prepare a Bushfire Management Plan to guide all future fire management for the proposed subdivision development of Lots 1 and 2 Tea Tree Road, Bindoon. The subdivision proposal is for approximately 47 lots to be created as Rural small holdings zoning (5.01ha to 5.44ha) and large 1 Rural Lot.

The subject site is predominantly cleared paddock areas in the east with some internal remnant vegetation patches with Forest/Woodland vegetation. The majority of the site has have been disturbed from previous land activities (clearing, grazing, agricultural pursuits). In 2016 site reassessment (since 2012) assessed the western paddock areas to be not grazed for some time and regenerating Woodland Type B. Adjacent to the subject site to the south, north and west is Forest Type A, Woodland Type B and Scrub type D in private property areas (as classified by AS3959-2009)

The subdivision has been rated as having an **Extreme - Moderate** Bushfire Hazard Level as defined by WAPC Guidelines, Table 3. The subdivision was assessed against the bushfire protection criteria Acceptable Solutions for Element A1, A2, A3 and A4 found that upon construction, the subdivision will comply with the bushfire protection criteria Acceptable Solutions as per the newly released Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015),

A summary includes:

- Subdivision is deemed to be compliant with “Acceptable Solutions” for Element A1, see Section 6.1;
- Subdivision is deemed compliant with “Acceptable Solutions” for Element A2, see Section 6.2;
- Subdivision is deemed compliant with “Acceptable Solutions” for Vehicles (Element), see Section 6.3; and
- Whole of subdivision compliant with “Acceptable Solutions” for Water (Element), see Section 6.4.

This BMP report provides details of the fire management strategies proposed to be implemented across the site as it is subdivided and developed to ensure adequate protection of life, property and biodiversity assets. To ensure the mitigation measures are implemented responsibilities are outlined in the following sections for the Future Lot Owner, Developer and SoC.

### 8.2. Future Lot Owners Responsibility

***It is recommended the Future Property Owners shall be responsible for the following:***

- To take measures to protect their own assets on their property, home owners should not rely on emergency personnel to attend their home and thus it is stressed to **prepare an individual bushfire emergency plan** regarding their intentions and property. This Bushfire Management Plan is **not** an individual bushfire emergency plan;
- Implement this document, Bushfire Management Plan of 1 and 2 Tea Tree Road Bindoon as it applies to their individual property;
- Ensure that APZ's are maintained to a minimum of 20 metres around all buildings (see Appendix F);
- Ensure that 100m setbacks (HSZ's) are maintained from the Woodland (internal) vegetation (bushfire) risks (see Appendix F);
- Ensure that their property is built to BAL/AS3959-2009 Building Standards if 100m setback cannot be achieved within their property from Woodland Type B;
- Provision for the storage of water in tanks not less than 120,000 litres capacity, of which 10,000L is to be held in reserve for fire fighting purposes;

- Ensuring that suitable external ember screens are placed on roof top mounted evaporative air conditioners compliant with AS3959-2009 (current and endorsed standards) and that the screens are checked annually; and
- Each property owner is to be made aware of:
  - Fire Management Plan,
  - A hard copy of the A4 book “Prepare. Act. Survive”,
  - Fire Control Information supplied by the Shire of Chittering; and
- It is the responsibility of the individual property owner to maintain in good order and condition APZ, HSZ and driveway standards. Future modifications other than requirements as set out in this Bushfire Management Plan can only be done with written agreement from the Shire of Chittering.

### 8.3. Developers Responsibility

Prior to development being given final approval by the Shire of Chittering, the Developer shall be required to carry out works that include the following but in respect to individual stages of development. Subsequent to the issue of final approval, the Developer shall have no further responsibilities to the provision of fire fighting facilities and bushfire management on individual lots that pass from their ownership.

***It is recommended that the Property Developer shall be responsible for the following:***

- Implement this document, Bushfire Management Plan of Lots 1 and 2 Tea Tree Road Bindoon as it applies to their development;
- Comply with standards as outlined by the Shire of Chittering and WAPC conditions of subdivision;
- Ensure that potential property owners are aware of this Bushfire Management Plan;
- Comply with minimum subdivision construction standards as outlined by this Bushfire Management Plan;
- Maintain fire protection measures in public areas (gates, access, landscaped areas etc) until the Developer has relinquished construction/maintenance responsibility of public use areas to the Shire of Chittering;
- Install a 100,000 L capacity water tank for fire fighting purposes located at a central location of the subdivision;
- Construct Access to the following standards as outlined in Table (4).

**Table 4 – Vehicular Access Standards**

Standard	Public Roads	Fire Service Access Ways	Emergency Access Ways
Minimum trafficable	6 metres	4 metres	6 metres
Horizontal clearance	6 metres	6 metres	6 metres
Vertical clearance	4 metres	4 metres	4 metres
Maximum grades	1 in 10	1 in 10	1 in 10
Minimum weight capacity	15 tonnes	15 tonnes	15 tonnes
Maximum crossfall	1 in 33	1 in 33	1 in 33
Curves minimum inner	8.5 metres	8.5 metres	8.5 metres
Cul de sacs	N/A	N/A	N/A
Battle Axes	Not more than 600m	N/A	N/A
Private Driveways	Standard as roads if house >50m from road, passing bays every 200m for 20m.	N/A	N/A
Signage	Not required	Required	Must be signposted
Gates	Not required	Min width 3.6	Min width 3.6
Design and construction	Approved by relevant local government	Approved by relevant local government	Approved by relevant local government

Turn around areas	Every 500 metres, within 50 metres of the house and at water tanks	Every 500 metres, within 50 metres of the house.	Not required
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(WAPC, 2015a)

- Install Signage and Gates of Fire Service Access (if required);
- Install signage for Emergency Access Ways (if required);
- Implement a notification on title under Section 70A of the *Transfer of Land Act 1983* notifying future lot owners about the BMP;
- Provide each prospective owner with:
  - Fire Management Plan,
  - A hard copy of the A4 book “*Prepare. Act. Survive*”; and
  - Fire Control Information supplied by the Shire of Chittering (Yearly advice Brochure updated annually).

#### 8.4. Shire of Chittering Responsibility

At approval and endorsement of this Bushfire Management Plan, the Shire of Chittering has statutory control and responsibility to ensure that aspects of the Plan and community fire safety are maintained.

***It is recommended the Shire of Chittering be responsible for the following:***

- Provide advice on standards and methods to achieve community fire protection to owners/occupiers of land.
- Ensure individual Property Owners maintain in good order and condition Emergency Access/Fire Access Ways building protection zones, hazard reduction zone and driveway standards.
- Maintain district Fire Fighting Facilities.
- Undertake Prescribed Burning (if required) and fuel reduction strategies to ensure a maximum of 8T/ha ground fuels on any internal public remnant vegetation (i.e. Vegetative corridor areas) in accordance with the *Bushfire Act 1954*.
- Ongoing management of any public areas will be the responsibility of the Shire of Chittering after the Developer has relinquished construction/maintenance responsibility.
- Maintain condition and working order of district water supplies and equipment for fire fighting purposes.

## 9. Checklist for compliance to and Guidelines for Planning in bushfire Prone Areas and State Planning Policy 3.7

### 9.1. Checklist to Compliance to Guidelines for Planning in Bushfire Prone Areas

The following checklist has been developed by Bio Diverse Solutions in response to the bushfire protection criteria as outlined in the recently released Guidelines for Planning in Bushfire prone Areas.

Checklist for proposal compliance and justification to Guidelines for Planning in Bushfire Prone Areas (2015) )			
<b>BDS Project Name</b>	BMP Lot 1 and 2 Tea Tree Road Chittering		
<b>BDS Job Number</b>	WHEL014		
<b>Date</b>	13/6/2016	<b>WAPC#</b>	n/a
<b>Client name</b>	Marou Property Development Pty Ltd	<b>Condition #</b>	n/a
<b>Bushfire Prone Area</b>	Yes	<b>Mapping</b>	Yes See App A
<b>Planning proposal</b>	Rural Subdivision	<b>Lots created</b>	48
1. Bushfire Protection Criteria Acceptable Solutions as defined by Guidelines for Planning for Bushfire Prone Areas (WAPC 2015).			
Element	Compliant to Acceptable Solution– Yes/No	Justification	
<b>Element 1 – Location</b>	Yes	Site will be classified as Extreme and Moderate bushfire hazard upon completion. Buildings built to BAL-Low and AS3959-2009, no higher building than BAL 12.5 required on (large sized lots) rural small holding lots. <b>Subdivision deemed to meet Acceptable Solution.</b>	
<b>Element 2 - Siting and design of development</b>	Yes Stages Stag	A2.1: APZ can be achieved within the lot boundaries due to large lots created <b>Subdivision deemed to meet Acceptable Solution</b> A2.2 Setbacks can be achieved and building no higher than BAL 12.5. Setbacks to BAL located within the lot boundary. Building to BAL –Low can occur on all lots. <b>Subdivision deemed to meet Acceptable Solution</b>	
<b>Element 3 - Vehicular access</b>	Yes	A3.1: Two access routes south to north and to west to Brennan Road A3.2 Public roads to meet minimum grades A3.3 Cul-de-sacs meet minimum grades A3.4 Battle axes meet minimum grades A3.5 Private Driveways meet minimum grades A3.6 EAW proposed and can meet minimum requirements. A3.7 FSA along public road network and EAW's. A3.8 Firebreaks/low fuel areas compliant to SoC requirements <b>Meets Acceptable Solution.</b>	
<b>Element 4 – Water</b>	Yes	Reticulated scheme water proposed. <b>Meets Acceptable Solution.</b>	
<b>Bushfire Hazard Assessment required</b>	Yes	See Section 5 and Appendix D of BMP.	
<b>BAL Contour required</b>	Yes	See Section 6 and Appendix E of BMP.	
<b>BMP required</b>	Yes	This BMP document assessed the proposal in detail to the bushfire protection criteria.	



## 9.2. Checklist to Compliance to SPP3.7 Policy Measures

The following checklist has been developed by Bio Diverse Solutions in response to the Policy measures as outlined in the recently released State Planning Policy 3.7

2. Policy measures SPP3.7		
Policy Measure	Applicable – Yes/No	Justification
6.1 - Higher order strategic planning documents in bushfire prone areas	No	Not applicable – not a high order planning document
6.2 – Strategic planning proposals, subdivision and development applications:	Yes	a) Subdivision proposal within a designated bushfire prone area, BAL and AS3959-2009 to apply where <100m of bushfire prone vegetation. BHL Extreme and Moderate adjacent to site, internal Moderate and Low BHL at completion of construction. No higher BAL construction than BAL Low or BAL 12.5 required. Large lots proposed.
6.3 - Information to accompany strategic planning proposals:	Yes	a) Results of BHL documented in BMP and prepared by an accredited Level 1 BAL Assessor and Experienced Level 2/3 Bushfire Planning Practitioner. b) BAL Contour Map documented in BMP and prepared by an accredited Level 1 BAL Assessor and Experienced Level 2/3 Bushfire Planning Practitioner. c) Assessment to guidelines indicated can meet all Elements assessed against Acceptable Solutions updated BMP would be required to document any changes for future planning stages.
6.4 - Information to accompany subdivision application	Yes	a) BAL Contour map provided and prepared by an Accredited Level 1 BAL Assessor and Experienced Level 2/3 Bushfire Planning Practitioner b) Bushfire hazard issues identified arising from BAL Contour Map buildings. Subdivision can be built to no higher allocation than BAL 12.5. c) Assessment to guidelines indicated can meet all Elements assessed against Acceptable Solutions. Update of BMP required to document any changes for future stages
6.5 Information to accompany Development applications	No	Not applicable – not a Development Application
6.6 Vulnerable or high-risk land uses	No	Not applicable – not a Vulnerable or high-risk land use.
6.7 Strategic Planning proposals, subdivision or development applications in areas where an extreme BHL and/or BAL-40 or BAL –FZ applies	No	No.
6.8 Advice of State/relevant authorities for emergency services sought	No	
6.9 Advice of State/relevant agencies/authorities	No	Flora and Fauna survey completed in 2012, vegetation cleared and degraded condition.

for environmental protection to be sought		
6.10 Bushfire conditions may be imposed	Yes	Building to BAL if dwelling situated within 100m of Bushfire Prone Vegetation.
6.11 Precautionary principle	No	Not applied

### 9.3. Recommendations/conclusions based on above checklists

A summary of the recommendations within this report is supplied below. This also forms the “upfront” and “ongoing” tasks which need to be completed for this project.

- Implementation of responsibilities of the developer (Section 8.3) will be undertaken by the developer/client via formal endorsement/release of this BMP plan. Agreeance to the responsibilities as outlined in Section 8.3 of this BMP is accepted by the developer/client by the provision of this document to approving agencies.
- Implementation of the responsibilities of the developer (Section 8.3) will not occur by the developer until a formal written approval/endorsement is given from the approving agency regarding the BMP.
- In the event the property passes ownership to a subsequent developer/owner the implementation of the endorsed/approved BMP (Section 8.3) should be conditioned by WAPC as a matter of the WAPC subdivision conditional process.
- The developer will be responsible for the implementation of a notification on title pursuant to Section 70A of the Transfer of Land Act 1893 for all lots affected by an increase in construction standards consistent with a BAL rating/AS3959-2009 allocation to the lot, and alerting owner (s) of the lots and successors in title of the Bushfire Management Plan.
- The BAL Contour Plan (Appendix E) is prepared at a point in time and it is recognised by Bio Diverse Solutions that the landscape may change post subdivision construction and over time. It is therefore recommended that a review of the BAL Contour Plan is undertaken post construction stages and prior to subdivision clearance stages; and/or the map is over 3 years from date of production and, if required, an updated BAL Contour Plan is provided to the CoA prior to conditional clearance of the bushfire management issues.
- Individual BAL assessments may be required on the lots by the new owners and can be considered at building approval stages with the engagement of an Accredited Level 1 BAL assessor.

Based on the above recommendations, Bio Diverse Solutions recommend the proposed subdivision can occur as documented in this BMP Plan. The BMP plan does not give recommendations in regards to detailed environmental (flora, fauna, soil etc) plans, town planning, engineering – civil, structural or building and feature survey requirements, these considerations would need to be addressed through other suitably qualified practitioners.

## 10. References

AS 3959-2009 Australian Standard, *Construction of buildings in bushfire-prone areas*, Building Code of Australia, Primary Referenced Standard, Australian Building Codes Board and Standards Australia.

Bureau of Meteorology Climate Data Gingin accessed June 2010 and April 2015:

<http://www.bom.gov.au/climate/data/index.shtml>

Keighrey, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA.

Bushfire Management Plan(2012) unpublished report prepared for Lot 1 and 2 Tea Tree Road, Bindoon. Bio Diverse Solutions, Albany WA.

Department of Fire and Emergency Services Authority WA (DFES) (2004) *The Homeowners Bush Fire Survival Manual*, Fourth Edition, Community Safety Division, Perth WA

Department of Fire and Emergency Services Website accessed April 2015:

<http://www.dfes.wa.gov.au>

Department of Planning Western Australia *Planning and Development (Bushfire Risk Management) Regulations 2014 and Development (Bushfire Risk Management) Regulations 2014* accessed from website February 2015 from:

[http://www.planning.wa.gov.au/dop\\_pub\\_pdf/bushfire\\_risk\\_mgt.pdf](http://www.planning.wa.gov.au/dop_pub_pdf/bushfire_risk_mgt.pdf)

Environmental Weeds Strategy for Western Australia (1999) Department of Environment and Conservation, Western Australia.

Hearn, H., Williams, K., Comer, S. and Beecham, B. (2002) SWAN 1 (SWA1 – Swan 1 subregion). Department Conservation and Land Management. Government of Western Australia.

Keighrey, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA.

Western Australian Planning Commission (WAPC) (2010) *Planning for Bushfire Protection Edition 2* Fire and Emergency Services Authority of Western Australia and Department for Planning and Infrastructure Western Australia.

Western Australian Planning Commission (WAPC) *Planning Bulletin 111/2013 Planning for Bushfire*.

Western Australian Planning Commission (WAPC) (2014) *Draft Planning for Bushfire Risk Management Guidelines*. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) (2015a) *Guidelines for Planning in Bushfire Prone Areas*. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) State Planning Policy 3.2 Planning in Bushfire Prone Areas. Department of Planning WA and Western Australian Planning Commission.

State Land Information Portal (SLIP) (2015) Map of Bushfire Prone Areas. Office of Bushfire Risk management (OBRM) data retrieved from:

<https://maps.slip.wa.gov.au/landgate/bushfireprone/>

**Appendices**

**Appendix A – Location**

**Appendix B – Structure Plan**

**Appendix C - Vegetation Classes Map**

**Appendix D –Bushfire Hazard Level Mapping**

**Appendix E – BAL Contour Plan**

**Appendix F – DFES Information for the homeowner**

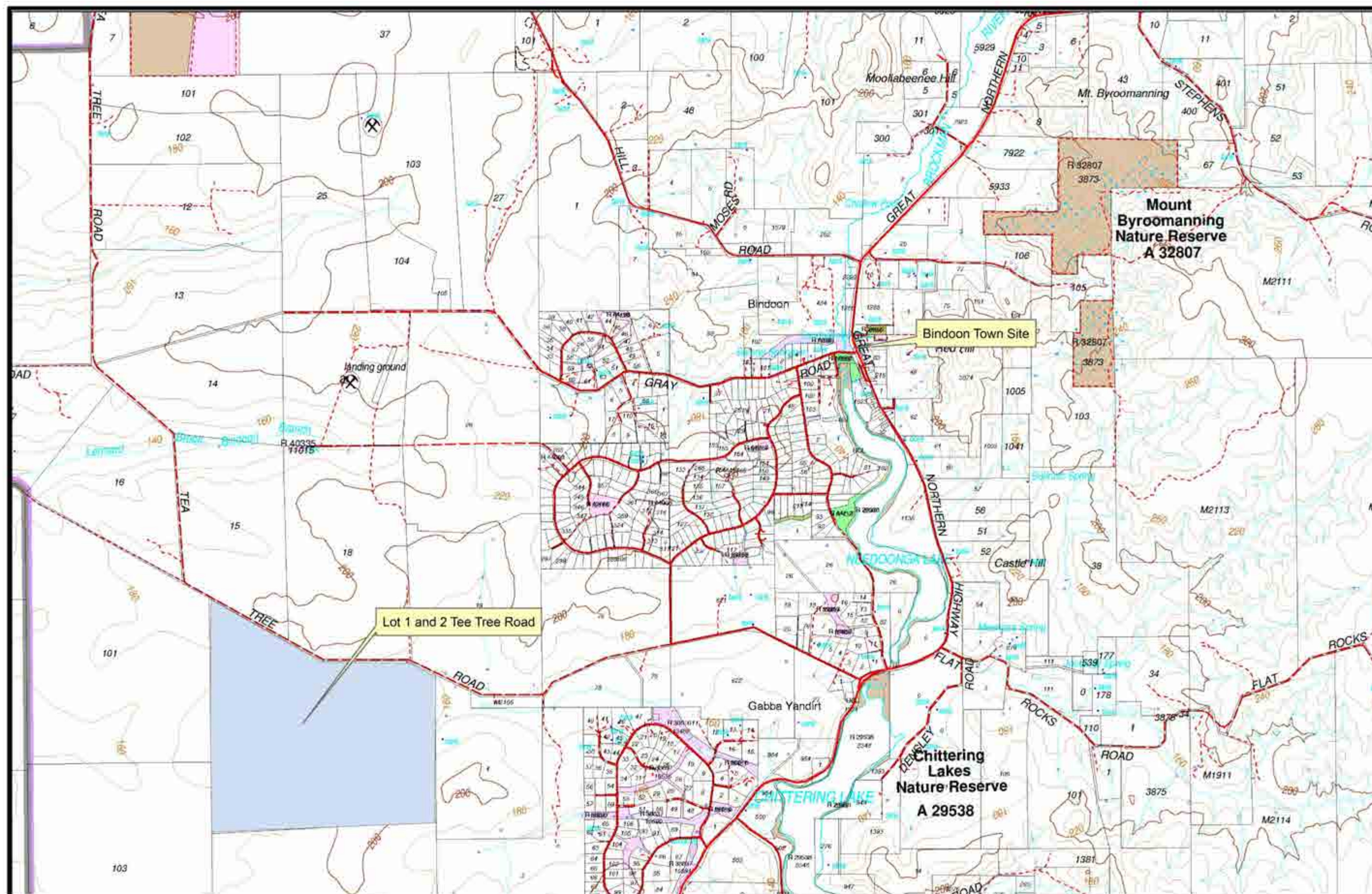
**Appendix G – Bushfire Management Plan**




Appendix A

Location Mapping





## Legend

 Subject area

Scale  
1:40000 @ A3



0 390 780 1,560 2,340 3,120 Meters



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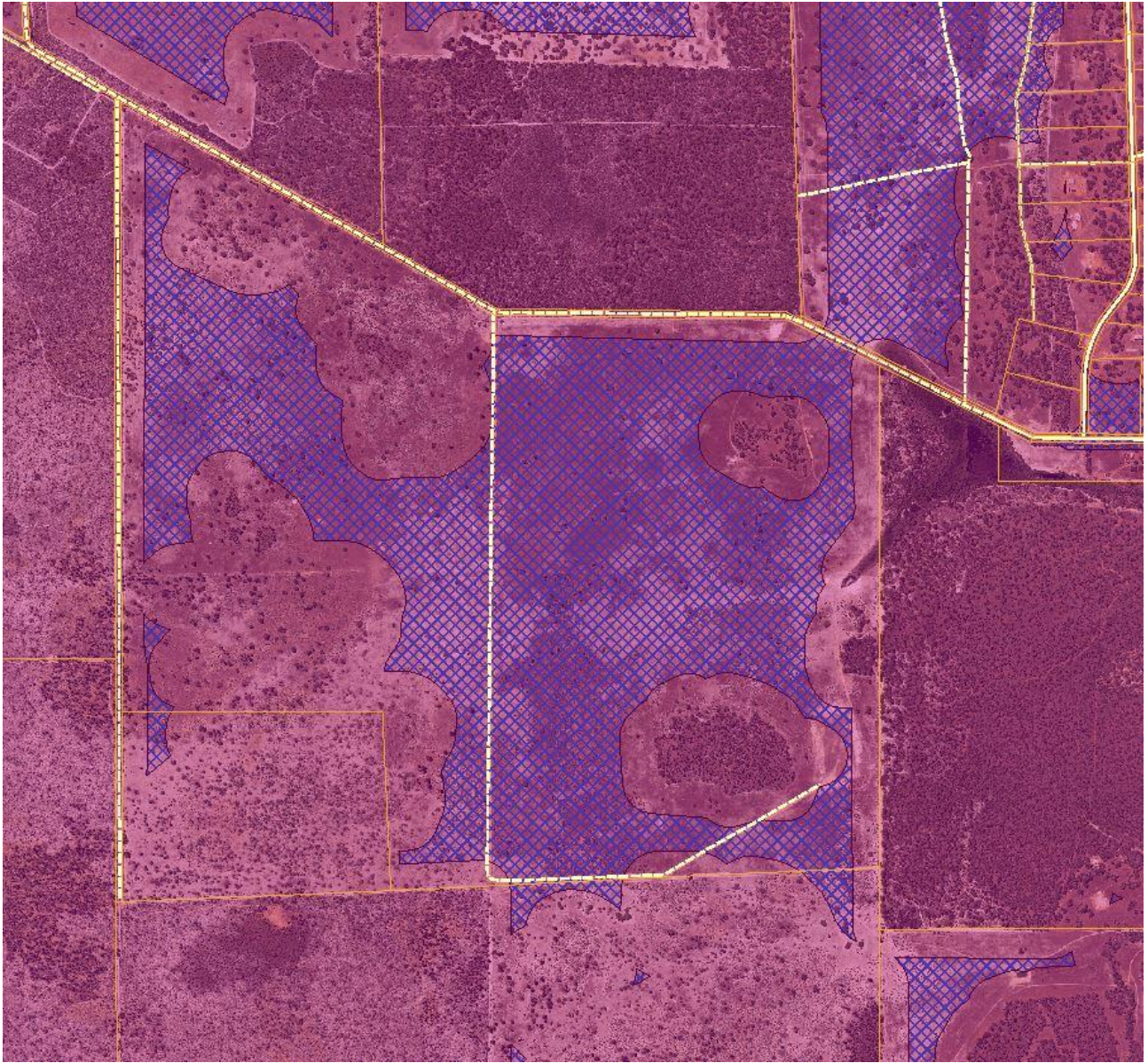
CLIENT Lot 1 and 2 Tee Tree Road  
Bindoon WA

## Location Mapping

STATUS	FILE	DATE
FINAL	WHEL014	13/06/2016



**OBRM BUSHFIRE PRONE MAPPING 7/12/15 & 20/5/2016**



<https://maps.slip.wa.gov.au/landgate/bushfireprone/>

(SLIP 2016)

Appendix B

Structure Plan

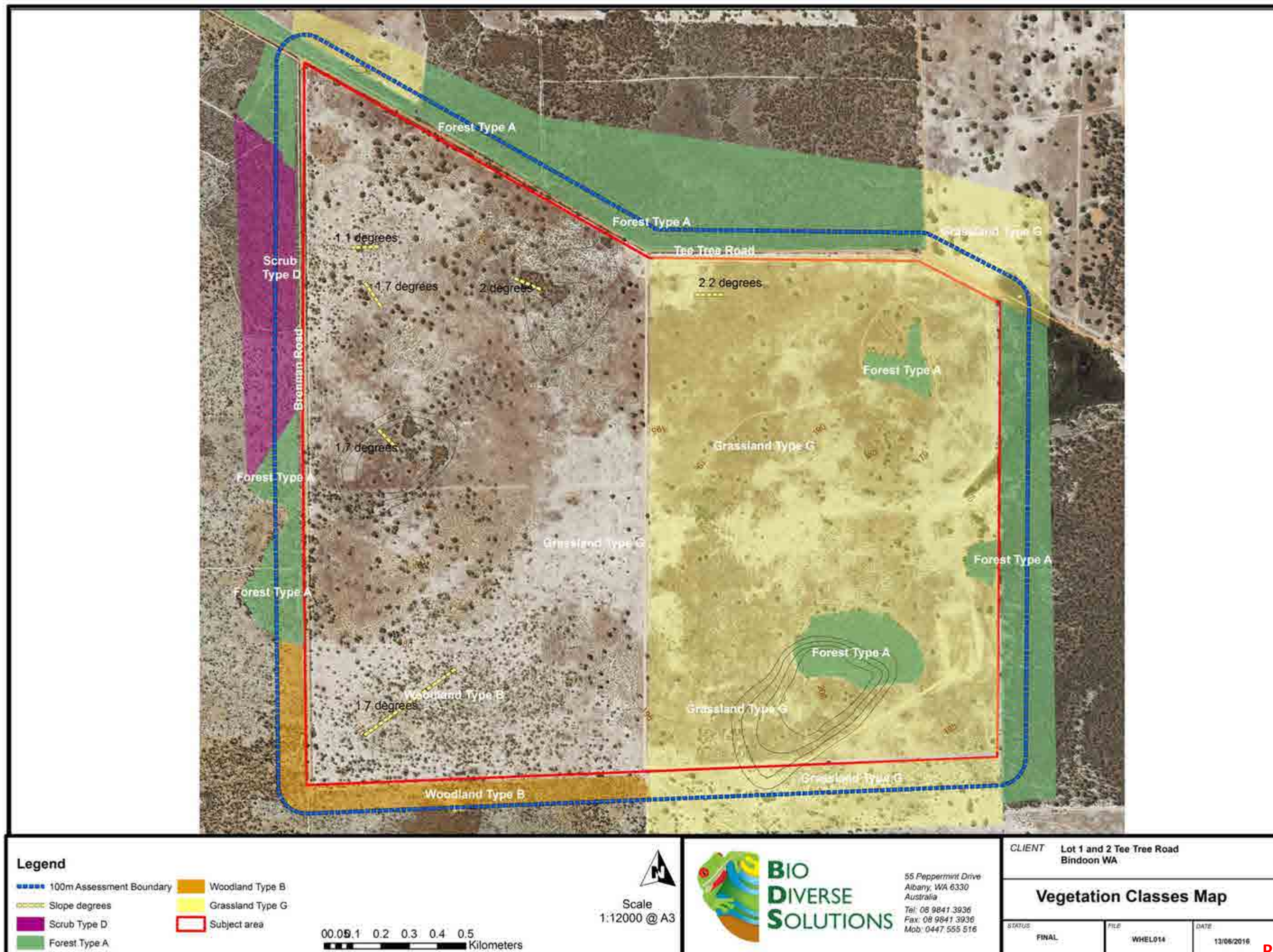




**Appendix C**

Vegetation Classes Map



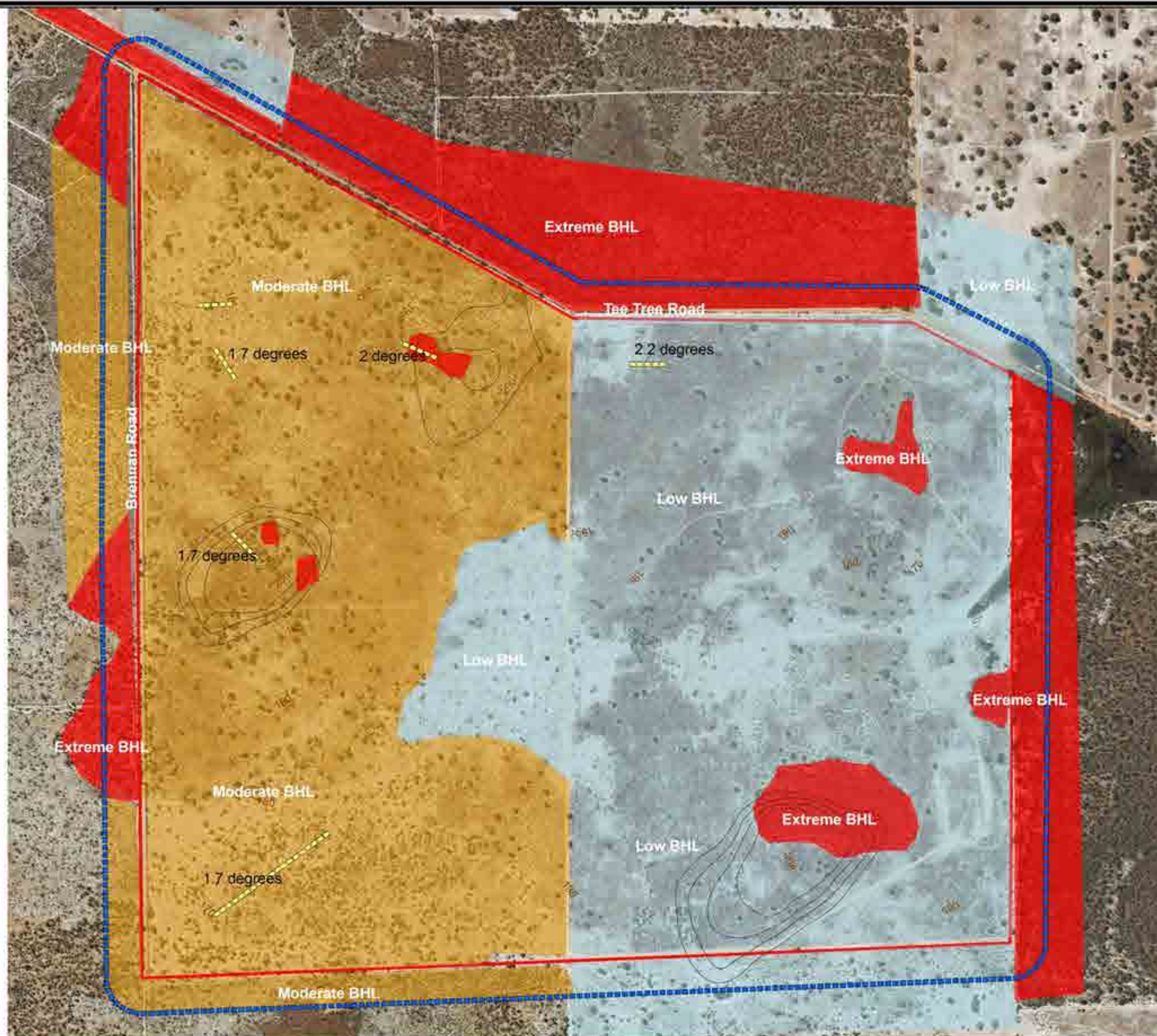




**Appendix D**

Bushfire Hazard Level (BHL) Mapping





### Legend

- 100m Assessment Boundary
- Slope degrees
- Extreme BHL
- Moderate BHL
- Low BHL
- Subject area

Scale  
1:12000 @ A3

0 0.1 0.2 0.4 0.6 0.8 1 Kilometers



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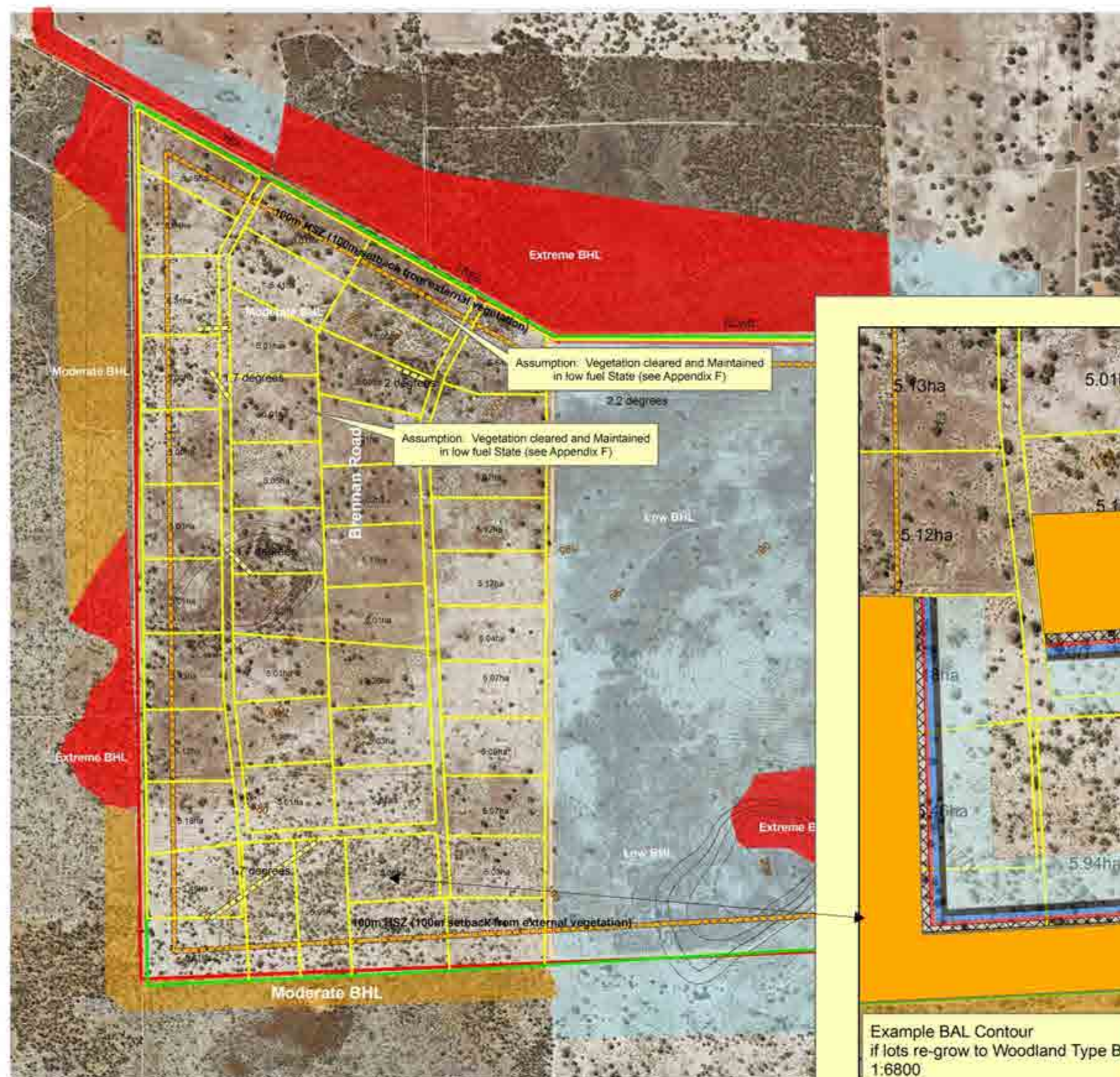
### Bushfire Hazard Level

STATUS	FILE	DATE
FINAL	WHEL014	13/04/2015

Appendix E

BAL Contour Plan





Example BAL Contour  
if lots re-grow to Woodland Type B  
1:6800

#### Legend

BAL 12.5 BAL 19 BAL 29 BAL FZ  
BAL 40

#### Legend

100 HSZ Moderate BHL  
Slope degrees Low BHL  
Extreme BHL Subject area

0 0.1 0.2 0.4 0.6 0.8 1  
Kilometers

Scale  
1:12000 @ A3



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CLIENT Lot 1 and 2 Tee Tree Road  
Bindoon WA

#### BAL Contour Plan

STATUS	FILE	DATE
FINAL	WHEL014	13/04/2015



**Appendix F**

DFES information for the homeowner



## BUSHFIRE

## Building Protection Zones

FACTSHEET

02

ARE YOU  
BUSHFIRE  
READY?

areyouready.wa.gov.au

PREPARING YOUR HOME AND  
PROPERTY FOR A BUSHFIRE

You should prepare your home to survive the passage of a bushfire, even if your plan is to leave. A well prepared and constructed house is more likely to survive a bushfire than an unprepared one. Firefighters cannot defend every property and are unlikely to defend a poorly prepared property; remember their lives are at risk too.



## DID YOU KNOW?

**Firebreaks have a number of purposes.**

They are used to stop the spread of a bushfire and are also used by firefighters to gain access around all areas of your property and as a place from which to fight a fire.

Remember that firebreaks must be wide enough and have enough vertical clearance to let a firefighting truck pass.

Maintain your firebreaks to ensure your property can be defended during a fire.

- ☐ **Create a minimum 20 metre building protection zone** around your home and other buildings. This area needs to be cleared of all rubbish, long dry grass, bark and material that may catch fire.
- ☐ **Prune lower branches** (up to two metres off the ground) to stop a ground fire spreading into the canopy of the trees.
- ☐ **Clear vegetation** around your property to create a fire break, particularly the overhanging branches. Make sure you meet your local government's firebreak requirements.
- ☐ **Cut grass** to less than 10 centimetres high and prune shrubs to remove dead material.

For more information visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au) or contact **DFES Community Engagement** 9395 9816



Government of Western Australia  
Department of Fire & Emergency Services



**PREPARE ACT SURVIVE**



## Information Note

September 2014

# What is a Building Protection Zone?

### Key Points

- Fuel loads influence bushfire intensity.
- The lower the fire's intensity the less impact on the building.
- Creating a minimum 20 metre reduced fuel load area (building protection zone) will increase the protection of the building.
- Ember protection is important to protect the building.
- Constructing or retrofitting your home to meet the Australian Standard 3959 — *Construction of buildings in bushfire-prone areas*; and addressing bushfire risks in accordance with the *Planning for Bushfire Risk Management Guidelines* will ensure your house has the best bushfire protection.

### Definitions

- Scrub crown** is the green, leaf material on the scrub plants.
- Surface fire** is the fire burning the leaves and scrub on the top of the ground.
- Mineral earth firebreak** is a firebreak without vegetation.
- Ember attack** is where the bark and fine vegetation material is set alight, becomes airborne and is carried forward of the fire.

### Managing and reducing fuel loads

**Managing and reducing fuel loads for a minimum of 20 metres around a building will increase its likely survival from a bushfire.**

Known as the Building Protection Zone (BPZ), the aim of this area is to ensure that there will be no direct flame contact on the building from a bushfire. By utilising fuel management options it will also be possible to reduce the potential radiant heat impact on the building.



Above: Well prepared Building Protection Zone with reduced fuel.

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

- Maintaining a minimum 2 metre gap between trees and the building. Make sure that no trees overhang the house.
- Ensuring tree crowns are a minimum of 10 metres apart.
- Ensuring there is a gap between shrubs and buildings of three times their mature height.
- Ensuring shrubs aren't planted in clumps.
- Keeping the grass short and prune the scrub so that it is not dense, nor does it have fine, dead aerated material in the crown of the scrub.
- Raking up leaf litter and twigs under trees and remove trailing bark.
- Pruning lower branches (up to 2 metres off the ground) to stop a surface fire spreading to the canopy of the trees.
- Creating a mineral earth firebreak.
- Having your paths adjacent to the building and have your driveway placed so that it maximises the protection to the house.

Version 5, September 2014

For more information contact the Environmental Protection Branch on 93 95 9300 • email: [environment@dfes.wa.gov.au](mailto:environment@dfes.wa.gov.au) or visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)





- Storing firewood away from the building.
- Ensuring fences and sheds are constructed using non-combustible materials, but preferably not located in the BPZ.
- Keeping your gutters free of leaves and other combustible material.
- Ensuring gas bottles are secured and positioned so that they will vent away from the building, if subject to flame contact or radiant heat.

## Ember attack

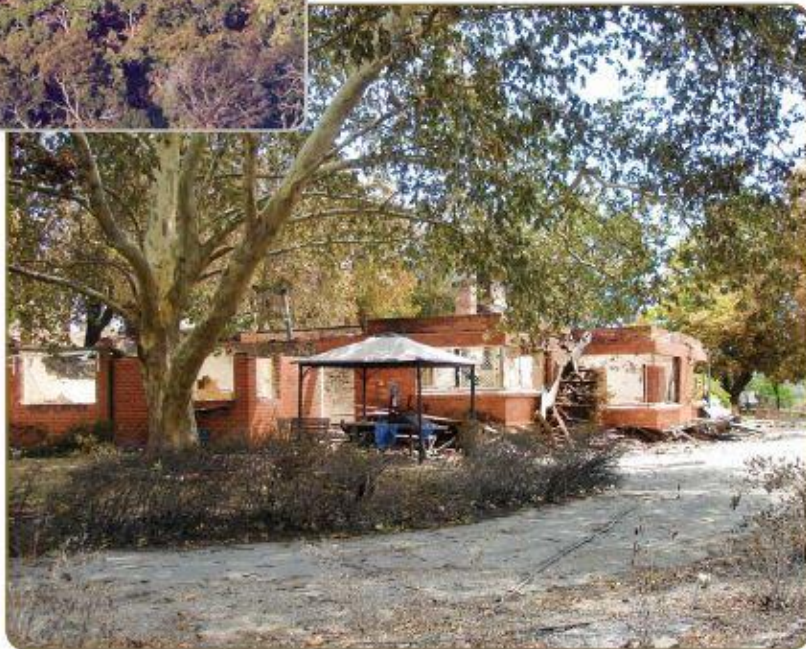
In a bushfire, most homes that are damaged or destroyed are from ember attack. These burning embers get into gaps within the building, such as into the roof cavity, and ignite the material within the cavity. It can take a number of hours before the burning becomes apparent and by that time the building may not be able to be saved.



**Above:** Reduced fuel in the Building Protection Zone contributed to the survival of this home in a bushfire.

**Right:** Home destroyed by bushfire, note the tree branches overhanging the house.

It is recommended that all homes that may be affected by embers be made ember proof. If a bushfire occurs in the general area, then the roof cavity and other crevices should be inspected to ensure that no embers have caused a fire. Be aware that there are electricity cables in the roof area and the introduction of water will be a safety issue.



**i** For more information contact the Environmental Protection Branch on 9395 9300, email: [environment@dfes.wa.gov.au](mailto:environment@dfes.wa.gov.au) or visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)



**BUSHFIRE****Evaporative Air Conditioners****FACTSHEET  
08****ARE YOU  
BUSHFIRE  
READY?**

areyouready.wa.gov.au

**DID YOU KNOW?**

Your evaporative air conditioning unit can catch fire as a result of embers from bushfires, or even small back yard fires, getting into your unit. If a fire starts in your air conditioner, it can spread quickly throughout your home.

**If there is smoke nearby  
you should:**

- ☐ Run the air conditioner to wet the filter pads
- ☐ When smoke is over your home or ash starts to drop around your house, switch the air conditioner off
- ☐ If possible, continue to run water over the filter with the fan turned off
- ☐ If the water can't be run on its own, or if there is a power failure at the time, wet the air conditioner filter pads using a garden hose
- ☐ Keep checking your air conditioner and the area around your home for spot fires from embers until the danger has passed

It can be difficult for firefighters to put out a fire caused by embers getting into the roof space of your home. Knowing what to do to keep your evaporative air conditioner safe from fire can help save your property.

For more information on evaporative air conditioners see DFES Information Note on Ember Protection Screens.

**DID YOU KNOW?**

If you live within 500 metres of bushland and have a roof mounted evaporative air conditioning unit, your home may be at increased risk of ember attack.



**If your home does  
catch fire, leave your  
home and call 000  
immediately**

**WHAT IS EMBER ATTACK?**

Embers are pieces of burning bark, leaves or twigs that are carried by the wind around the main fire creating spot fires.

For more information visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au) or contact DFES Community Engagement 9395 9816



Government of Western Australia  
Department of Fire & Emergency Services

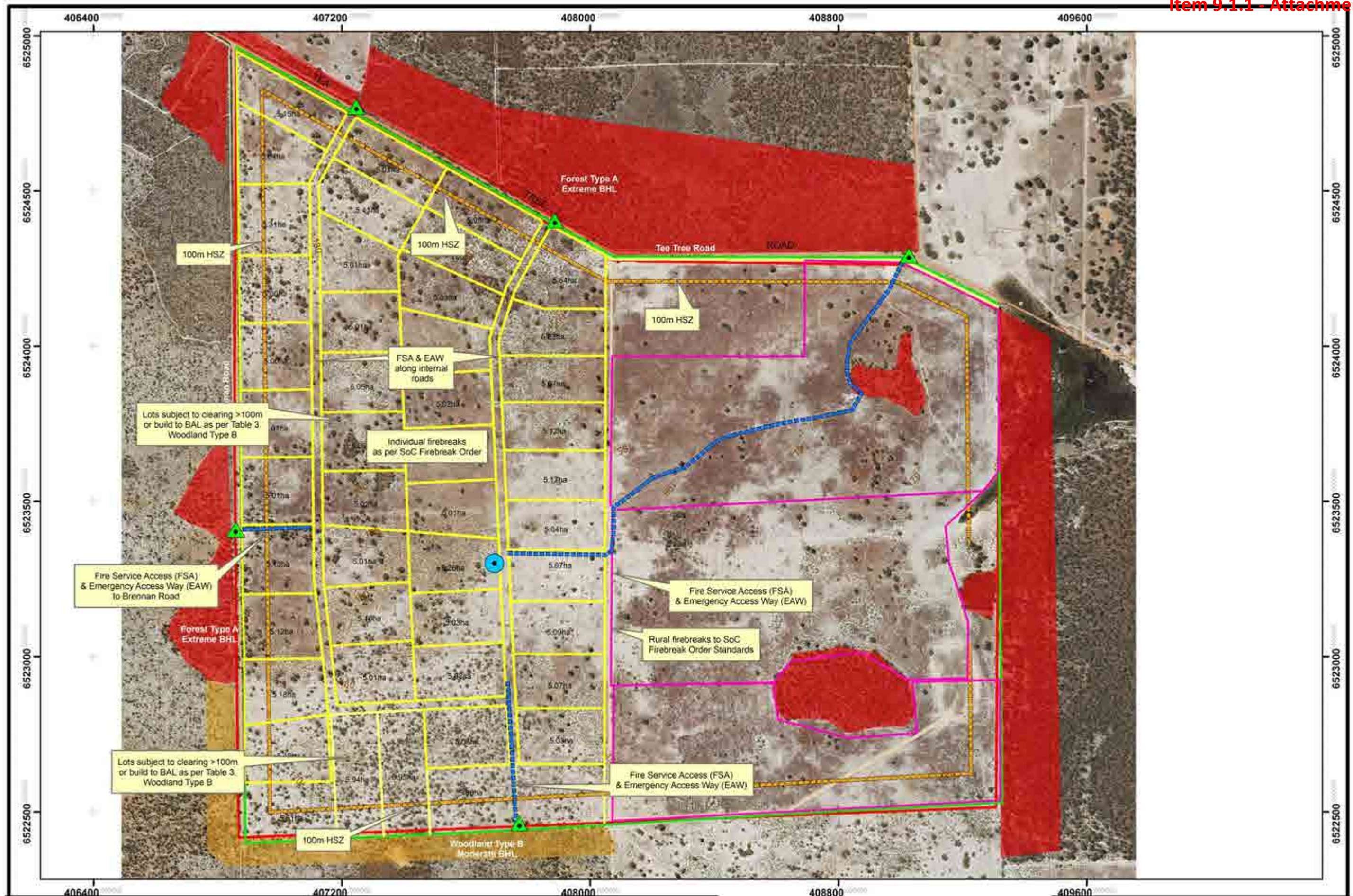
**PREPARE ACT SURVIVE**



**Appendix G**

Bushfire Management Plan





### Legend

- Access points
  - Water tank
  - Emergency & Fire Service Access
  - Outline Development Plan
  - Rural Firebreaks
  - 100 HSZ
  - Woodland Type B - Moderate Risks
  - Subject area
- Scale 1:11500 @ A3
- 0 100 200 400 600 800 1,000 Meters



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CLIENT Marou Property Group Pty Ltd  
Lot 1 and 2 Tee Tree Road  
Bindoon WA

### Bushfire Management Plan

STATUS	FILE	DATE
FINAL	WHEL014	13/6/2016



# LOTS 1 & 2 TEA TREE ROAD, BINDOON LOCAL STRUCTURE PLAN



Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



# LOTS 1 & 2 TEA TREE ROAD BINDOON LOCAL STRUCTURE PLAN

LOTS 1 & 2 TEA TREE ROAD, BINDOON  
SHIRE OF CHITTERING

PREPARED FOR  
MAROU PROPERTY DEVELOPMENTS PTY LTD

BY



July 2016

Revision 1.0



**Shire of Chittering**  
 Lots 1 & 2 Tea Tree road, Bindoon



## **CERTIFICATION OF APPROVED STRUCTURE PLAN**

This structure plan is prepared under the provisions of the Shire of Chittering Town Planning Scheme No.6.

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON:

(Date) \_\_\_\_\_

Signed for and on behalf of the Western Australian Planning Commission:

\_\_\_\_\_

An officer of the Commission duly authorised by the Commission pursuant to section 16 of the Planning and Development Act 2005 for that purpose, in the presence of:

\_\_\_\_\_ Witness

\_\_\_\_\_ Date

\_\_\_\_\_ Date of Expiry

**Shire of Chittering**  
 Lots 1 & 2 Tea Tree road, Bindoon



## TABLE OF AMENDMENTS

Amendment No.	Summary of the Amendment	Amendment Type	Date approved by WAPC

## EXECUTIVE SUMMARY

### *Purpose*

This Local Structure Plan (LLSP) has been prepared for Lots 1 & 2 Tea Tree Road, Bindoon. The land the subject of this LSP comprises (2) lots located approximately 7 kilometres south-west of the Bindoon townsite and approximately 85 kilometres north-east of Perth. The LLSP area abuts the southern boundary of the Bindoon Development Precinct.

This LLSP provides the planning framework to guide and facilitate the development of 483.9 hectares of land in line with the 'Rural Smallholdings' zone as per the provisions of the Shire of Chittering Town Planning Scheme No. 6 (TPS6).

The LLSP will form part of a future settlement growth area within close proximity to the Bindoon townsite and provide for a transitional land use between 'Agricultural Resource' lots to the south and west and rural residential land use to the north and east.

### *Structure Plan Summary Table*

Item	
Total area covered by the structure plan	483.9 hectares
List of land uses proposed by structure plan - Net Rural Smallholdings <sup>a</sup>	468.26 hectares
Estimated Lot Yield	48
Estimated number of dwellings	48
Estimated population	110
Number of high schools	0
Number of primary schools	0
Estimated retail floor LSPace (if appropriate)	0m <sup>2</sup>
Estimated employment provided (no. of jobs)	0
Number and area of public opens LSPace	
- No Open LSPace Allocation	0 hectares

<sup>a</sup> The 'Net Rural Smallholdings' area excludes all proposed roads and road widening of Tea Tree Road.

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**Shire of Chittering**  
 Lots 1 & 2 Tea Tree road, Bindoon



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**Shire of Chittering**  
 Lots 1 & 2 Tea Tree road, Bindoon



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## PART ONE (IMPLEMENTATION)

### 1.0 STRUCTURE PLAN AREA

The Structure Plan is identified as the *Lots 1 & 2 Tea Tree Road, Structure Plan* (Plan No. 11763-13 Rev .3) (also refer to **Plan 1**).

This Structure Plan shall apply to the land contained within the inner edge of the line denoting the structure plan boundary on the Structure Plan Map.

### 2.0 OPERATION

The date the LLSP comes into effect is the date the LLSP is approved by the Western Australian Planning Commission as set out in the Structure Plan - Certification Page.

### 3.0 STAGING

The LLSP is proposed to be developed in multiple stages in line with market demand. There are no LLSP specific triggers for staging of development. Servicing will be extended with each of the individual stages of development.

### 4.0 SUBDIVISION AND DEVELOPMENT REQUIREMENTS

4.1	Land Use & Permissibility	<p>The LLSP Map outlines the Zones and Reserves applicable within the LLSP Area and these will guide future subdivision and development of the land.</p> <p>Land use permissibility within the LLSP Area shall generally be in accordance with the corresponding Zone under the Shire of Chittering Town Planning Scheme No. 6 (TPS6).</p>
4.2	Residential Density	<ol style="list-style-type: none"> <li>1. Residential densities applicable to the LLSP Area shall be those residential densities shown on the LLSP Map.</li> <li>2. The LLSP shall provide for a 1 dwelling per 'Rural Small Holdings' lot at subdivision approval stage.</li> </ol>

**Shire of Chittering**  
 Lots 1 & 2 Tea Tree road, Bindoon



4.3	Notifications on Title	<p>In reLSpect of applications for the subdivision of land the Shire of Chittering shall recommend to the Western Australian Planning Commission that a condition be imposed on the grant of subdivision approval for a notification to be placed on the Certificate(s) of Title(s) to advise of the following:</p> <ol style="list-style-type: none"> <li>1. Land or lots deemed to be affected by a Bush Fire Hazard as identified in the Bushfire Management Plan contained within Appendix 4.</li> <li>2. Building setbacks and construction standards required to achieve a Bushfire Attack Level 12.5 or lower in accordance with Australian Standards (AS3959-2009): Construction of buildings in bushfire prone areas.</li> </ol>
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LEGEND	
	100m Fire Hazard Separation
	Strategic Fire Breaks (indicative only)
	Rural Small Holdings
	Perth - Darwin Highway
	Indicative Building Envelopes (2000m <sup>2</sup> )
	Strategic Fire Service Access
	Vegetation Protection & Development Exclusion Areas
	Indicative lot layout subject to further refinement @ subdivision stage

LEGEND	
	Contours
	Existing Boundary
	Proposed Boundary
	Application Area

# PLAN 1: STRUCTURE PLAN LOTS 1 & 2 TEATREE ROAD BINDOON

Plan No.: 11763-13  
Revision: REV.3  
Scale: 1:10000@A3



Suite 4 First Floor 40 Havelock Road Osborne Park WA 6017 www.whelans.com.au

DATE DRAWN: 15/07/2016  
DRAWN BY: CdeL  
CHECKED BY: SF  
FILE: 11002 structure plan teatree.qxd  
V: 04/15/16  
H: DATUM: MGA86 101

## PART TWO (EXPLANATORY SECTION)

### 1.0 INTRODUCTION

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#### 1.1 Purpose & Background

This Report has been prepared on behalf of the landowner, Marou Developments Pty Ltd, of Lots 1 & 2 Tea Tree Road, Bindoon (herein referred as the "subject site"). The Report details the proposed Structure Plan (**PLAN 1**), as it relates to the Lots 1 & 2 Tea Tree Road, Bindoon covering an area of 483.9 hectares.

This LSP has been lodged over the subject site in conjunction with the recent scheme amendment No.56 to TPS6 that made application for part of Lot 1 and Lot 2 to alter the zone from 'Agricultural Resource' to 'Rural Smallholding'. This application was initiated at the ordinary meeting of the Council on the 18<sup>th</sup> November 2015.

The proposed Tea Tree Road LSP reflects contemporary planning principles and practice. The LSP has been prepared in accordance with Clause 5.19 of TPS6. This is required under the subject site's proposed zoning 'Rural Smallholdings' as per Clause 5.8.1 of TPS6. The LSP has also been prepared in accordance with the Structure Plan Framework as per the requirements of the *Planning and Development (Local Planning Schemes) Regulations 2015*.

A comprehensive site analysis has been undertaken to inform the preparation of the LSP. As part of the analysis, the subject site was investigated for areas of natural significance or biodiversity (i.e. locations of significant vegetation). These have been identified and retained, and will contribute to the establishment of a sense of place. As discussed further, a mechanism for appropriate ownership and management of these assets is proposed. There has also been an indicative Perth-Darwin Highway reserve located at the eastern boundary in anticipation of this freight corridor. At present the exact location of the Highway has not been finalised, however its location has been acknowledged and considered in the development of this LSP.

The LSP report provides justification for the proposed future subdivision over the subject site in its local and wider context. Once approved, the LSP will provide guidance for rural development of the subject site and establish a context for the consideration and eventual approval of applications for subdivision. The various Tea Tree Road Technical Reports contained in the Appendices should be read in conjunction with this LSP Report.

## 2.0 SITE CONTEXT AND DESCRIPTION

### 2.1 Location

The subject site is situated within the locality of Bindoon and is approximately 7 km south west of the Bindoon Town Centre. (see **Figure 1 – Location Plan**). The subject site comprises two parcels, with Lot 2 being situated in the south east corner of Lot 2 and has road frontage to Brennan Road. Lot 1 is the larger of the 2 lots with its major frontage to Tea Tree Road.

The subject site is surrounded on all sides by 'Agricultural Resource' zoned land that is more heavily wooded than the subject site.

There are two areas, one to the north west and one to the south west, both zoned as 'Rural Residential' land that have been significantly developed with smaller rural use lots.

### 2.2 Landownership

The LSP area contains (2) land parcels in ownership of Mikail and Iaroslava Marouchtchak. The legal description and area of each land parcel is set out in Table 1 below.

Table 1. Land description and area of lots comprising subject site

Lot	Plan	Volume	Folio	Area (ha)
1	41201	2618	80	433.81
2	41201	2618	81	50.09
<b>TOTAL</b>				<b>483.90</b>

**Figure 2 – Aerial View** shows the cadastral boundaries of the lots that form the LSP area.

### 2.3 Existing Land Use

The subject site has an area of 483.9 hectares and in the past it has been used for grazing with occasional cereal and lupin crops. Most of the land has been cleared for

agricultural pursuits but there are some stands of remnant vegetation left on the property. The property is currently being used for grazing. Rows of *Tagasaste* have been planted in the past in the central area of the subject site by the landowner as supplementary stock feed.

Figure 2 – Aerial View provides an aerial overview of the subject site and the distinct area of subdivision and development that has occurred in proximity to Ocean Heights Estate.

## 2.4 Surrounding Context

The predominant surrounding land use is rural based, comprising of agricultural activities and rural residential living (refer to **Figure 2**). To the east of the subject land (excluding neighbouring Lot 4) many of the original rural properties in the area have been subdivided into predominantly 2.0 – 2.5 hectare lots supporting rural-residential living, with some larger 3 - 4 hectare lots within those developments. The neighbouring land uses to the south, north, east and west are predominantly large agricultural lots or undeveloped land containing remnant vegetation.

Lot 101 to the west has been recently rezoned to 'Rural Conservation' with approval for cluster rural residential development. On the opposite side of Tea Tree Road to the north is the new Parkwood Springs Estate which has been approved and subdivided into 4 hectare rural residential lots.

The subject site is strategically located to provide a transitional land use between 'Rural Conservation' and 'Agricultural Resource' land and the rural-residential living precincts to the east.

## 2.5 Opportunities and Constraints

A Land Capability Assessment (**Appendix 1**) was undertaken by Landform Research in May 2000. The assessment was based on field analysis on 3 May 2000, 48 soil auger holes, geological and hydrological mapping, knowledge of the area, aerial photography interpretation and published information.

Opportunities and constraints have been identified from the Land Capability Assessment. Opportunity exists to create a unique rural smallholdings development which is site specific and relevant to its local context. The following are some of the opportunities identified for the subject land:

### Opportunities

- Proximity to Bindoon Townsite - The subject land is only 7 kilometres south-west of Bindoon townsite and all its services and amenities.
- Availability of Groundwater - The white sand filled valleys contain abundant accessible groundwater of high quality with the greatest volumes of groundwater



being in the central east valley. The landowner currently has a licensed bore approved by Department of Water.

- Vineyard - Soils have potential for cottage and perennial horticulture, particularly on the eastern side where there is good sources of groundwater. The landowner has obtained a license from Department of Water to extract groundwater for the proposed vineyard in the north-east of the property however the exact location of this vineyard is dependent on the location of the Perth-Darwin Highway.
- Soils high in phoLSPhorous retention - The presence of yellow sand with good phoLSPhorous retention over most of the site is suitable for on-site wastewater treatment.
- Ridges Views - The form of ridges provide visual screening as well as aesthetical values such as views and cooling breezes in summer.

#### Constraints

- There are limited land and environmental constraints for the site which would preclude development of the site for rural smallholding land use.
- Soak/Dam - There is a small soak/dam near the eastern boundary which will limit development and setback of residences from the wetland area, for instance, nominal Department of Environment and Conservation 100m buffer for effluent diLSPosal from soak/dam wetland.
- The exact future alignment of the Perth-Darwin Highway is not yet know and as such currently only the indicative alignment dictates the eastern boundary of the proposed change of zone over the subject site.

The main opportunities and constraints for the site are shown in **Appendix 2** Opportunities and Constraints plan.

## 2.6 *Topography*

The land varies from two main ridges at just over 210m AHD in the south east corner and 205m AHD in the central west dropping to 175m in a gentle valley in the south western corner and 163m on the central eastern boundary.

## 2.7 *Geology and Soils*

Quartz sands cover the majority of the property with leaching of sand to white sand occurring in the valleys. The main soil types found on the subject land are Leached Sand over Gravel, Leached White Sand, Yellow Sand and Ferricrete and Gravel, which are typical for its position in the landscape. These sands are described as free draining calcareous sand of high permeability.

Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



(Above) Typical view of white sands found on the property

## 2.8 *Acid Sulfate Soils*

There is no risk of exposure to Acid Sulphate soils in this area.

## 2.9 *Hydrology*

### Groundwater

Groundwater drains from each catchment, which is defined by the ridges found on the subject land, with the greatest volume of groundwater in the central east valley. The landowner has stated that the groundwater bore on the property is at a depth of around 30 metres.

### Surface Water

Surface drainage is minimal due to the permeability of the soil. The only natural expression of surface water within the development site is a small flow emanating from the soak/dam in the central east. The direction of flow is east and surface drainage ultimately enters into Lake Chittering about 3 kilometres to the east of the subject land. There is no evidence of surface salinity and the Land Capability Assessment concluded that it is unlikely that salinity will be an issue in the future even though the land has been excessively cleared.

### Wetlands

There are no natural wetlands or sumplands within the subject site. As mentioned above, there is a soak or dam in the eastern portion of the development site which

feeds into a series of soaks and a dampland on the neighbouring eastern property. For the subject land, infiltration at source is the dominant hydrological characteristic in the pre-development catchment.

## 2.10 Vegetation & Flora

The subject land has been predominantly cleared apart from scattered remnant stands of trees. The main vegetation on the site can be described as tree remnants of Eucalyptus woodlands. Some of the gravel ridges have largely been left as remnant vegetation, but have been subjected to grazing to the extent that the vegetation diversity of LSPecies is limited both in numbers and density in most areas. The leached white sands in the west and south have been allowed to regenerate with there being evidence of some native LSPecies repopulating some areas of the property.

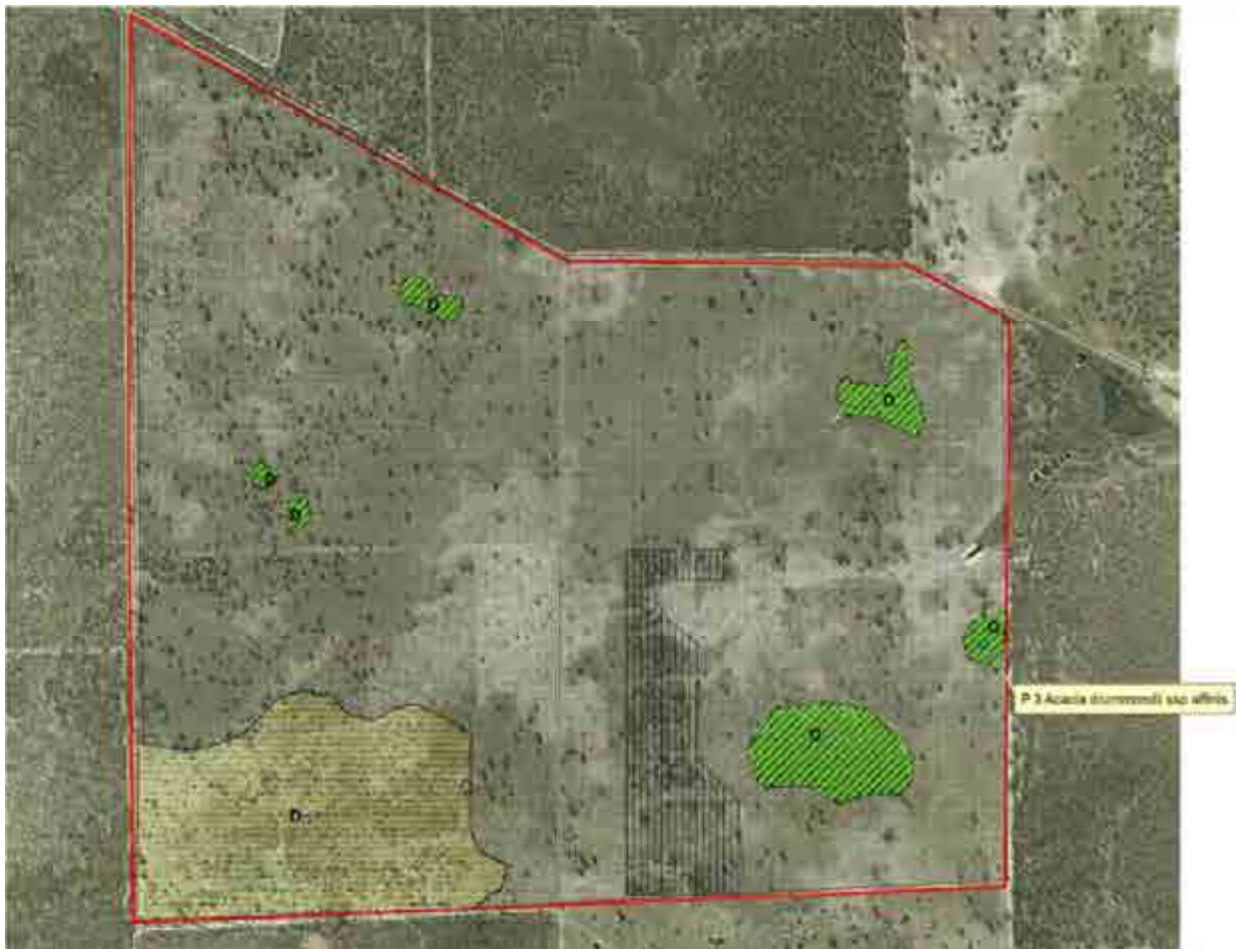
Landform Research in its Land Capability Assessment report made these comments on flora and vegetation on the property

*"...Tagasaste has been planted in the central south on leached and yellow sands. The main vegetation on the site are tree remnants of Eucalypt woodlands. The following partial community types are represented by scattered Eucalypts and taller shrubs: Jarrah – Marri (Eucalyptus marginata, E. calophylla) Woodland occurs on the ferricrete/gravel and duricrust, grading into Jarrah Woodland where duricrust becomes significant and the soil more shallower. Marri Woodland was the dominant original vegetation on the yellow sand but changes to Pricklebark (E. tottiana) Woodland and remnant Banksia Woodland as the sand becomes more leached to the south west. Juncas pallidus occurs on wet pasture areas with the introduced Isolepis prolifera associated with the wet area around the soak in the central east. No evidence of dieback disease was noted." [page 4].*

The 2011 LSPring Flora and Vegetation Survey (Bio Diverse Solutions, 2012) (**Appendix 3**) identified the presence of Priority 3 LSPecies (*Acacia drummondii* sLSP *affinis*) in the eastern portion of the development site.

The Survey recommends that development is restricted in this area and the remnant vegetation area containing Priority 3 LSPecies *Acacia drummondii* sLSP *affinis* is fenced to exclude stock in order to maintain habitat for the flora LSPecies. As part of this LSP no development is proposed for the eastern portion of the development site and therefore the P3 flora LSPecies in this area will be retained and fenced off within a large lifestyle lot.

Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



### Legend

- |   |                        |
|---|------------------------|
| P 3 <i>Acacia drummondii</i> ssp <i>affinis</i> | Tagasaste plantation   |
| Jarrah - Marri JmCc                             | Cleared Paddock Areas  |
| Mosaic Jarrah - Marri - Banksia JmCcBa          | Subject area           |
| G - Good Condition                              | D - Degraded Condition |

Location of Priority 3 Flora *Acacia drummondii* sLSP *affinis* in the eastern portion of the subject site to be fenced and retained.



Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



(Above) View of artificial re-growth *Tagasaste* rows near the central part of the site used to supplement livestock feed

(Below) Typical parkland cleared areas of the subject site with remnant eucalyptus trees



## 2.11 Fauna

The only remnant vegetation on the subject site is the scattered trees and native vegetation pockets on the ridges. Due to the clearing of the land there is limited natural habitat for fauna. The trees on the development site potentially provide habitat for birds, however, no Carnaby Black Cockatoos were observed during site inspections.

Wherever possible, significant healthy trees will be preserved as part of development of the site. Kangaroos are frequent and reptiles are likely to be found on the subject site, including skinks, goannas and snakes that are local to the area. Feral animals such as rabbits and foxes are also likely to be found on the subject site.

Plantings and revegetation can form linkages between remnant pockets of vegetation and to the more substantial remnant vegetation on surrounding neighbouring properties. It is likely that the development subject site attracts fauna that migrates between the surrounding remnant vegetated areas that have been assessed as important biodiversity areas under the Shire's Biodiversity Strategy.

## 2.12 Indigenous & European Heritage

### Indigenous Heritage

A search of the Department of Indigenous Affairs (DIA) Aboriginal Heritage Inquiry System indicates there are no registered Aboriginal Heritage sites within the development site.

It is important to note that the database of heritage sites held by the DIA is not comprehensive and there exists the potential for unknown sites of Indigenous heritage significance to be located inside or within close proximity to the subject land.

Archaeological monitoring is recommended for any eventual excavation works as part of subdivision and development. The process for protecting Indigenous heritage sites and considering proposals that may impact a known site is set out under the *Aboriginal Heritage Act 1972*. The Act protects all Aboriginal sites in WA whether they are known to the DIA or not.

### European Heritage

There are no places or sites of cultural significance within the subject site area under the Shire of Chittering Municipal Heritage Inventory and State Heritage Register.

## 3.0 KEY PLANNING FRAMEWORK

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### STATE & REGIONAL PLANNING

#### 3.1 *SPP.2.5 'Agricultural and Rural Land Use Planning'*

For lot sizes in Rural Smallholdings, LSPP 2.5 sets out a range of 4ha – 40ha in size. The Policy recommends that a Rural Smallholding zone focus on providing rural living and rural lifestyle land use. LSPP 2.5 generally requires proposals for Rural Smallholdings to be consistent with Local Planning Strategies and located in areas where bushfire risk is not extreme and there is no significant topography, environment, or servicing constraints. The subject site is well suited for Rural Smallholdings zone and this will be further discussed in the report.

#### 3.2 *SPP.5.4 'Road and Rail Transport Noise and Freight Considerations in Land Use Planning'*

This Policy seeks to protect the community from unreasonable levels of transport noise by establishing a standardised set of criteria to be used in the assessment of developments close to transport corridors and to protect freight corridors from incompatible urban encroachment.

In relation to this LSP and future subdivision, the 5 – 6 ha lots proposed for development will be set on the western side of the subject site. As per clause 5.6 of SPP 5.4 this is an appropriate form of noise mitigation to separate noise-sensitive land uses more than 900m from the potential noise generated by the Perth-Darwin Highway.

Any noise sensitive buildings set on the large lifestyle lot will also require a set back from the Highway of no less than a minimum 300m limit. It is anticipated that noise studies will only be required as part of a planning application for noise sensitive buildings constructed closer to the Perth-Darwin Highway than a 300m offset or in the event of future structure planning on the large lifestyle lot.

#### 3.3 *Shire of Chittering Local Planning Strategy 2004*

The Shire of Chittering Local Planning Strategy 2004 (LPS) was endorsed by the Shire of Chittering and Western Australian Planning Commission as a planning instrument to guide land uses and subsequent development within the Shire for the period 2001 – 2015.

The LPS identifies the subject site as suitable for 'Rural Retreat – Priority Development Area' development (with minimum lot size of 10 hectares). However, as per the proposed scheme amendment No. 56 to TPS6 the subject site is shown to be better suited for 'Rural Smallholdings'.

### 3.4 *Shire of Chittering Local Planning Strategy Update 2010*

The Shire of Chittering Draft Local Planning Strategy Update 2010 proposes modifications to the LSP 2004. It is noted that Lots 1 & 2 Tea Tree road are retained under the draft Local Planning Strategy Update 2010 as 'Rural Retreat'. In order for this LSP to proceed the draft LPS will need to be amended to reflect scheme amendment No.56 that proposes the zone be altered to 'Rural Smallholdings'.

## LOCAL PLANNING

### 3.5 *Shire of Chittering Town Planning Scheme No.6*

The subject land is currently zoned 'Agricultural Resource' under TPS6. A change of zone of the subject land from 'Agricultural Resource' to 'Rural Smallholdings' will accommodate the proposed LSP. Scheme amendment No.56 applied for this change and was initiated by the Council at the Ordinary Meeting on the 18<sup>th</sup> November 2015.

This LSP is required as a prerequisite to subdivision and/or development in order to provide an appropriate planning framework to guide decision making regarding subdivision and/or development approval.

### 3.6 *Local Planning Policy No.21- Fire Management*

This policy applies to all land zoned Rural Residential, Rural Retreat and Rural Smallholdings under TPS6. A Bushfire Management Plan has been prepared in accordance with the Policy for this LSP and is provided for in **Appendix 4**.

### 3.7 *Local Planning Policy No.32 – Development Plans*

For development of the subject site, the policy requires preparation of an Outline Development Plan (or Structure Plan) which considers the proposed subdivision of land and assembly of elements including road layout, configuration of proposed lots, provision of infrastructure, public open space and fire risk assessment/management.

Under the policy, a minimum lot size of 5 hectares is applied to the 'Rural Smallholdings' zone. This LSP document demonstrates how the subject site could be subdivided/developed under a 'Rural Smallholdings' zone.



## 4.0 LOCAL STRUCTURE PLAN

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### 4.1 *LSP Rural Smallholdings Design Rationale*

#### Vegetation Clearing

The subject site has historically been cleared for grazing and does not form part of environmentally sensitive areas as identified in the Shire of Chittering Local Biodiversity Strategy.

#### Suitability of Rural Smallholdings Lot Size

The subject site is generally within a transitional area between rural residential development to the east and agricultural lots to the west. The proposed 'Rural Smallholdings' lots would provide opportunity for minimum lot size of 5 hectares, which would not be out of keeping with the character of the area. To the east of the development site there are existing and planned rural residential developments.

Parkwood Springs Estate to the north is zoned 'Rural Residential' with lot sizes of 4 hectares. The neighbouring land to the west (Lot 101 Tea Tree road) is zoned 'Rural Conservation' with a WAPC conditional approval for (cluster subdivision, providing for lot sizes of 5000m<sup>2</sup>).

Market sounding indicates that the community prefers lot sizes in this locality to be generally around 1 – 5 hectares. For the majority, larger lot sizes above 5 hectares are not preferable, due to issues of land maintenance.

Further, lot sizes around 4 – 5 hectares are sufficient to provide a rural lifestyle and amenity. From a perspective of landowner maintenance (i.e. sustainable land management practice), a 4 - 5 hectare lot size (i.e. generally the size of a primary school site) is reasonably manageable, for inexperienced prospective landowners seeking a *tree change*, or those wishing to downsize.

Generally speaking larger lot sizes (i.e. 10 hectares or greater) attracts less market and community demand. Accordingly, the Proponent requests the 'Small Ruralholdings' lots in lieu of a 'Rural Retreat' sized lots, to create opportunity to provide a more appropriate lot product to meet community demand and expectations.

#### Land Supply and Population Growth

As per the Shire of Chittering *Strategic Community Plan 2012-2022* the population of the Shire is predicted to double by 2026. Added to this will be a significant increase in the range of the 35-69 years of age cohort. This will increase demand for a variety housing that will allow tree change, low land maintenance lifestyle options. The *Strategic Community Plan* acknowledges that future lifestyle choice for the increased population

will require an increased availability of varied lot sizes to meet the needs of the community now and into the long term.

Added pressure is presumed to be generated on the local land availability with the development of the Perth-Darwin Highway and the increased employment opportunities generated by the developing Muchea Employment Node.

#### Perth-Darwin Highway

The Perth-Darwin Highway is expected to be completed in approximately 2019. With the creation of this new bypass opportunities will arise in the form of improved access to the subject site and added points of egress in the event of emergency evacuation due to bushfire. There is also the added connectivity to the Bindoon Townsite the future Muchea Employment area and the reduced travel time into the Perth metropolitan area.

At the time of incorporation of the Perth-Darwin Highway alignment into the scheme amendment document (February 2016) the exact alignment had not been finalised. All land within the proposed road reserve and to the east of the Perth-Darwin Highway alignment will not be intended to change zone under Scheme Amendment No. 56. This is to acknowledge that land on the eastern side of the proposed highway will not be viable for further intensification of development.

## 4.2 Local Planning Strategy 2004 (LPS)

The Shire of Chittering LPS identifies the subject site as future 'Rural Retreat', however, the subject site falls outside designated Rural Retreat Precincts as per [Figure 8 in the LPS] (as shown in **Figure 3**).

The LPS identifies Small Ruralholding Precincts to be located further away from Bindoon townsite as per [Figure 7 in the LPS] (as shown in **Figure 4**). It is considered that the subject site has merit in providing 'Rural Smallholdings' lots, in relative proximity to Bindoon townsite.

The Shire's LPS identifies Rural Residential Precincts as per [Figure 6 in the LPS] (refer to **Figure 5**). The subject site falls within a portion of the Chittering Heights Estate/Odelon Estate Precinct with the balance of the subject site abutting this Precinct and the Country Club Estate Precinct to the north-east.

The proposed LSP over the subject site provides a suitable transition between the rural residential to the east and larger agricultural lots to the west (including the western neighbouring 'Rural Conservation' lot).

## 4.3 Other Considerations

The objectives of the 'Rural Smallholdings' zone are set out in Clause 4.2.4 under the Shire of Chittering TPS 6, which states:

*"To preserve productive land suitable for intensive horticulture and other compatible productive rural uses in a sustainable manner.*

*To protect the landform and landscape values of the district against despoliation and land degradation.*

*To provide lots with a minimum size of 5ha."*

This LSP demonstrates the suitability of the subject site to meet the objectives of the 'Rural Smallholdings' zone, in that:

- (i) The proposed lifestyle lot, on the eastern side of the subject site, is site responsive and takes advantage of the good agricultural soils and groundwater supply on this side of the property, for proposed horticultural use (i.e. vineyard with potential tourist use).
- (ii) 'Rural Smallholding' lifestyle lots (i.e. 5 hectares in size) respond to community demand and expectations. The lots provide opportunity for prospective landowners to plant trees and vegetation (or manage re-growth of areas within the lot), as an overall lot size of 5 hectares is not considered too large an area for inexperienced landowners to manage.
- (iii) Providing an attractive and interesting rural development for people to live in, particularly with the possible development of a vineyard on the larger eastern lot (to be retained by the landowner) with future tourist accommodation and function/reception overlooking an artificial lake (re-contouring/location of the existing soak/dam) to create a sense of community and identity.
- (v) The proposed 'Rural Smallholdings' lots are considered appropriate given that the majority of the subject site has already been historically cleared for grazing and there are no significant biodiversity areas within the subject site. Neither would the proposal require extensive and significant clearing of existing vegetation for building envelopes as the site has already been cleared and 5 hectare lot sizes allow areas outside of the nominated building envelope (i.e. 3,000m<sup>2</sup>) to potentially re-grow, subject to bushfire management.
- (vi) Smaller rural lot sizes work better on cleared land creating opportunities for rehabilitation and reduced risks associated with bush fires, compared with smaller lots in more densely vegetated areas.

#### 4.4 Rural Densities and Yield

The LSP provides for approximately 48 Lots with a large lifestyle lot on the eastern side of the subject site. The development site could accommodate an ultimate population of approximately 130 people.

The 'Rural Smallholdings' lots provide an opportunity for smaller lot sizes responsive to the site's location. The lots provide opportunities for lifestyle choice lots, in a rural setting. Table 2 provides an estimate of the lots sizes applicable to the design of this LSP

As per Clause 5.7 of TPS6 only one dwelling per lot is permitted in the designated building envelope. The Local Government may permit ancillary accommodation providing it is located within the building envelope.

Table 2. Estimate of the residential dwelling yield of the LSP

RESIDENTIAL LOT SIZE	DENSITY	YIELD	HOUSING TYPES
5 – 6ha	Rural Smallholdings	47	Single Dwellings
>10ha	Rural Smallholdings	1	Single Dwellings
<b>LSP Estimated Potential Dwelling Yield</b>		<b>48</b>	

#### 4.5 Structure Plan Land Uses

The proposed land uses for the 'Rural Smallholdings' zone as set out in TPS6 will guide the permissible uses set out in the LSP over the subject site. Following is a list of the permissible uses that will be allowed in the LSP area:

Table 3. Permissible land uses in the LSP

Use Class	Permissibility with in the Rural Smallholdings zone
Agriculture - Intensive	A
Ancillary Accommodation	D
Animal Establishment	A
Aquaculture	A
Arts & Crafts Centre	A
Bed and Breakfast	D
Civic Use	D
Community Purpose	D
Family Daycare	D
Farmstay	A
Home Business	P
Industry - Cottage	D
Industry - Rural	A
Public Utility	D
Reception Centre	A
Residential Building	D
Rural Pursuit	D
Single House	P



**Shire of Chittering**  
 Lots 1 & 2 Tea Tree road, Bindoon



Stable	D
Telecommunications Infrastructure	A
Wayside Stall	D

Note 1 - "permissibility of uses to be included in the scheme by amendment when land is zoned for this purpose"

'P' means the use is permitted in the Scheme providing the use complies with the relevant development standards and requirements of the Scheme.

'D' means the use is not permitted unless the Local Government has exercised its discretion by granting Planning Approval.

'A' means that the use is not permitted unless the Local Government has exercised its discretion by granting Planning Approval after giving special notice in accordance with clause 9.4 of TPS6.

#### 4.6 *Integration with Surrounding Land Uses*

The LSP has been designed to connect into existing and proposed development on neighbouring landholdings. The strategic location of the subject site allows for a transition of lots sizes from the 'Agricultural Resource' and 'Rural Conservation' land and the smaller rural-residential lots to the east.

The proposed 'Rural Smallholdings' lots provides an opportunity for minimum lot size of 5 hectares, which is not out of keeping with the character of the area. Parkwood Springs Estate to the north and is zoned 'Rural Residential' with lot sizes of 4 hectares. The neighbouring land to the west (Lot 101 Tea Tree Road) is zoned 'Rural Conservation' with a WAPC conditional approval for (cluster subdivision, providing for lot sizes of 5000m<sup>2</sup>).

The subject site is in a unique location between pockets of environmentally sensitive areas as identified in the Shire of Chittering Local Biodiversity Strategy. In particular, the subject site is surrounded by Indicative High Conservation Value Areas (IHCVA) as shown in **Figure 7** in proximity to the subject site. 'Rural Smallholding' lots provide opportunity for proLSPective landowners to plant trees and vegetation (or manage re-growth of areas within the lot), as an overall lot size of 5 hectares is not considered too large an area for inexperienced landowners to manage. This ability to manage and reinstate vegetation on the lots will assist in reintegrating the subject site with its surrounding landscape.

## 5.0 SUSTAINABLE DESIGN

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### 5.1 Water Re-Use and Storage

All lots within the LSP will comply with Clause 5.8.5 of TPS6 in terms of water storage and retention on site, the details regarding the rainwater retention and the size of the tank will be discussed in further detail. In addition to this as per Clause 5.8.12:

*All buildings intended for residential use must include a water re-use/recycling system/s (such as grey water) that is to be installed to the satisfaction of Council and the appropriate State government environmental agencies.*

### 5.2 Land Management and Vegetation Protection

As per Clause 5.8.6 of TPS6 the following provision are made in this LSP for management vegetation and water resources with the subject site:

- All earthworks and construction of dwellings will be conducted in a way that will minimise the disturbance of existing vegetation, minimise soil tillage and where required apply stormwater management practices to the satisfaction of the Council.
- Landowners will maintain the land, watercourses or drainage swales in a manner that will not degrade the land or vegetation on the subject site. Buffers will be applied to limit stock access to these areas to minimise degradation.
- Where required by Council remedial works including replanting and revegetation will be conducted for the purpose of environmental protection. This may include enhancing the rural amenity by requiring the planting of understorey trees, or groups of trees, in areas deficient of vegetation. This will be assessed as part of any planning approvals within the LSP.
- No clearing is permitted, without planning consent, within areas of vegetation protection or revegetation as depicted on the LSP – unless those trees are dead, diseased or present a danger to property.

## 6.0 MOVEMENT NETWORK

### 6.1 Current Road Network

#### Site Accessibility & upgrading of Tea Tree Road

The subject site is accessible via Tea Tree Road, which has been sealed up to Parkwood Springs Estate providing bitumen access to that development. Further west of Parkwood Springs Estate Tea Tree Road is trafficable but constructed gravel. Brennan Road along the western boundary of the subject site is also trafficable gravel road.

The 'Rural Smallholdings' subdivision will require the upgrading (to bitumen standard) of Tea Tree Road along the frontage of the subject site. Brennan Road potentially can remain as a gravel trafficable road providing a secondary access point to the subject site. The primary access to the subject site would be Tea Tree Road.

Part of the upgrading of Tea Tree Road will require extension of the bitumen seal from Parkwood Springs Estate to the north-east corner of the subject site. Of particular significance will be the need to upgrade the drainage crossing of the natural surface drainage line on the northern side of Tea Tree Road to the southern wetland area in neighbouring Lot 4 to the east. At present the water flow across Tea Tree Road is uncontrolled and creates a water hazard and erosion issue.



Natural surface water drainage across Tea Tree Road opposite wetland area in Lot 4 – image taken in summer

Upgrading of the road by the developer will necessitate installation of a suitable culvert to allow the natural surface drainage to pass under Tea Tree Road to the wetland within Lot 4.

Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



Upgrade to Tea Tree Road as part of Parkwood Springs Estate development

## 6.2 *Proposed Movement Network - Roads*

The design of the LSP over the subject site will see a loop road constructed with two intersections terminating at Tea Tree Road. The proposed road width is 30m to allow for large vehicles to pass easily. This loop road is proposed for the western side of the subject site with no other roads proposed for the LSP.



## 7.0 LOCAL WATER MANAGEMENT

### 7.1 *Groundwater*

Groundwater drains from each catchment, which is defined by the ridges found on the subject land, with the greatest volume of groundwater in the central east valley. The landowner has stated that the groundwater bore on the property is at a depth of around 30 metres.

### 7.2 *Surface water*

Surface drainage is minimal due to the permeability of the soil. The only natural expression of surface water within the development site is a small flow emanating from the soak/dam in the central east. The direction of flow is east and surface drainage ultimately enters into Lake Chittering about 3 kilometres to the east of the subject land. There is no evidence of surface salinity and the Land Capability Assessment concluded that it is unlikely that salinity will be an issue in the future even though the land has been excessively cleared.

### 7.3 *Wetlands*

There are no natural wetlands or sump lands within the subject site. As mentioned above, there is a soak or dam in the eastern portion of the development site which feeds into a series of soaks and a dampland on the neighbouring eastern property. For the subject land, infiltration at source is the dominant hydrological characteristic in the pre-development catchment.

## 8.0 BUSHFIRE MANAGEMENT PLAN

A Bushfire Hazard Assessment (BHA) has been undertaken to inform the proposed Local Scheme Amendment No. 56 and the LSP design and recommends appropriate bushfire management response and measures. The Bushfire Management Plan was reviewed to reflect new legislation and updated in June 2016.

Overall, the Bushfire Management Plan (**Appendix 4**) including BHA categorises the subject site as having an 'Extreme - Moderate' Bushfire Hazard level. The Bushfire Management Plan recommends a number of fire management measures be undertaken to address the risk of bushfire to property and persons within and adjacent to the ODP area. The risk of bushfire is to be generally managed in terms of implementation of the following:

- A detailed Bushfire Management Plan (BMP) being prepared and endorsed at the subdivision stage. The subdivision will comply with the bushfire protection criteria Acceptable Solutions as per the newly released Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015);
- Ensure that dwellings are built to BAL/AS3959-2009 Building Standards if 100m setback cannot be achieved within their property from Woodland Type B;
- Section 70A notifications on title advising prospective residents in areas which are affected by the Bushfire Management Plan;
- Identification and maintenance of APZ's (i.e. low fuel loading) of 20 metres of any habitable building in areas adjacent to or within proximity to 'extreme - high fire risk areas' as identified in the Fire Management Plan;
- Construction of road system which provides for two access points onto Tea Tree Road and an Emergency Access Way and Fire Service Access onto Brennan Road in the west and to southern firebreaks (in adjacent properties) to the south and meet the Acceptable Solution;

The subdivision will comply with an Acceptable Solution by applying either a 100m Hazard Separation Zone (HSZ) at the interface of the building and the bushfire hazard or a setback associated with BAL construction and AS3959-2009 as outlined in the BAL Contour Map outlined in attached BMP. It has been advised that no higher BAL allocation than BAL 12.5 needs to be applied to the dwellings.

## 9.0 INFRASTRUCTURE & SERVICING

In 2009 SMEC Urban civil engineering consultants reviewed the subject site for potential to accommodate proposed rural smallholdings development of the property and concluded that there are no significant constraints that would preclude development of the subject land in terms of servicing for a rural smallholdings development. With the current subdivision and development occurring at Parkwood Springs Estate, services have been extended and are now closer to the subject site than beforehand.

### 9.1 Earthworks

The subject land has no severely sloping areas which would present any significant engineering constraints for road construction. The proposed road levels will be designed to match (where practical) the existing ground levels to minimise earthworks. No earthworks are proposed to be undertaken to the proposed lots.

Some earthworks will be required for the new subdivision roads and strategic firebreak access routes within the subject site to accommodate subdivision. Aside from road works, consideration may be given to improving the storage capacity of the existing soak on the property for water supply (e.g. vineyard) and aesthetical purposes. This would require separate development approval from the Shire depending on the nature of the works.

There may also be a requirement for excavation within the building envelope areas for the construction of dwellings and on-site effluent disposal, depending upon ease of excavation. This would be subject to individual geotechnical investigations and assessment for development areas.

### 9.2 Roads

Tea Tree Road is a single carriageway road providing existing access to the subject site. Tea Tree Road is currently a constructed bitumen road up to the Parkwood Estate (Lot 9502) and west onwards the road is a trafficable gravel road. As part of subdivision and development of the subject site, the section of Tea Tree Road along the frontage of the subject site would need to be constructed to a standard of the Shire's satisfaction.

Brennan Road abutting the western boundary of the subject site is a single carriageway trafficable gravel road, which extends from Tea Tree Road and terminates at the south-west boundary of Lot 2. This road would not be required to be constructed to bitumen standard, however, as outlined in the Bushfire Management Plan, Brennan Road provides an alternative access route.

### 9.3 On Site Effluent Disposal – Nutrient Management

There is no reticulated sewerage in this area and it is proposed that wastewater management be accommodated by on-site effluent disposal units. Across the development site, the yellow sands and ferricrete soils that are found have high phosphate absorbing qualities. This is based on the level of sesquioxides and clay at depth and the depth to water tables. The leached white sand on the western ridges frequently overlies yellow sand, gravel and ferricrete at depths of approximately one metre.

All yellow sand, loam, gravel and duricrust soils on the subject site are capable of supporting conventional effluent disposal systems, with the exception of the leached white sands in lower lying areas mainly found in the eastern part of the development site, particularly around the soak. These are contained within the proposed larger eastern lot in the draft Structure Plan.

The Land Capability Assessment report recommends a 100m setback for on-site effluent disposal systems from the existing soak, however under the draft development plan no lots are proposed within the eastern half of the subject site.

Late winter groundwater monitoring and laboratory soil testing confirms the site's suitability to support on-site effluent disposal. For more details on geotechnical and nutrient management (effluent disposal), refer to the Land Capability Assessment report (Appendix 1) and Land Capability for On-Site Effluent Disposal (Appendix 5).

### 9.4 Water Supply

There is no reticulated water supply in the nearby area and there are no plans to provide reticulated water to this area. Development on each proposed lot will provide a 120KL water storage tank for potable water.

Rainwater harvesting shall be in accordance with the Shire of Chittering Town Planning Scheme Clause 5.8.5 "Non-Potable Water Supply", whereby rainfall harvesting using rain surface runoff collection areas shall be as follows:

*"Where rainfall is to be used as the predominate source for a water storage tank, the minimum collection area, in terms of rain surface runoff, to service the tank, is to be provided. The collection area will normally comprise of the roof area of structures on the lot and may include the dwelling, outbuildings and any other structure capable of collecting and directing water into the tank.*

*The size of the collection area is to be based on the following calculation:*

*Collection area (m<sup>2</sup>) = 120,000 divided by (0.85 x (local rainfall – 24mm))*

*Where:*

- *Collection area (m<sup>2</sup>) is the minimum area for rain surface runoff that is required to service the water tank.*



- 120,000 is the minimum size of the water tank in litres (unless Council has determined an alternative size in accordance with the Scheme).
- 0.85 is the efficiency of the collection (a minimum of 85% of the water will be collected).
- Local rainfall is the average annual mean rainfall measured in millimeters (mm) guided by the nearest collection point provided by the Bureau of Meteorology.
- 24mm is the anticipated loss through absorption and wetting of materials based on 2mm a month."

Projections using the WAPC rainfall catchment calculator and mean rainfall levels from the Bindoon area show that sufficient rain harvesting is possible to service the intended zone for both potable indoor/outdoor and firefighting water requirements. Adequate water supply will require a minimum 516m<sup>2</sup> roof surface area per lot for water harvesting.

## 9.5 Power

There is existing power supply infrastructure in the vicinity of the proposed development and the subdivision would be supplied with underground high and low voltage power, including provision of transformers and switchgear around the development site. The required extensions and upgrades necessary to facilitate 'Rural Smallholdings' subdivision and development would be subject to consultations with the relevant servicing authorities at the time of subdivision.

## 9.6 Telecommunications

There is existing telecommunication infrastructure available along Tee Tree Road and preliminary consultation with Telstra by SMEC Urban indicates that it is possible to connect to this service. Additional cabling will need to be provided to service the subdivision.

## 9.7 Gas

Reticulated gas is not an available service within the area.

## 10.0 STAGING AND ANTICIPATED TIMEFRAMES

Subdivision and development is likely to be influenced by market demand. At present, it is likely that the developer will apply for subdivision approval to create lots in the northwest of the development site adjacent to Tea Tree Road. With the first stage of development the discussed upgrade and widening of Tea Tree Road will need to occur.

The LSP design is capable of being delivered within approximately five stages with an expected time frame of 3 to 10 years. Key infrastructure servicing will be extended to provide supply to each individual stage as they come to fruition.

## 11.0 CONCLUSION

The proposed LSP seeks to allow the creation of a Rural Smallholding estate within close proximity to the Bindoon townsite. The estate will introduce 47 rural lifestyle lots into the area with an approximate increase to the local population of 110 residents. These Rural Smallholdings lots will make good use of the land as well as providing for a transition of lot sizes from the Rural Residential lots to the east and the Agricultural Resource land to the west.

With the LSP there will also be a single larger lot that will be retained by the current landowner for development as a vineyard with the added benefits of tourism and commercial uses such as possible bed and breakfast accommodation. This lot will also act as setback from the proposed Perth-Darwin Highway limiting its effect on visual and noise amenity of the smaller lots to the west.

The environmental attributes of the subject site are such that it has been degraded over time by continual grazing. Subdivision under the proposed LSP will allow for management and replanting of vegetation as well as bushfire management of smaller lots. There are no major groundwater or drainage issues allowing for on-site effluent disposal.

Once adopted, the LSP will provide a framework to guide future subdivision and development of the subject land.

Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



## FIGURES



Plan No : 11763-12  
Revision : REV.0  
Scale : NTS@A4



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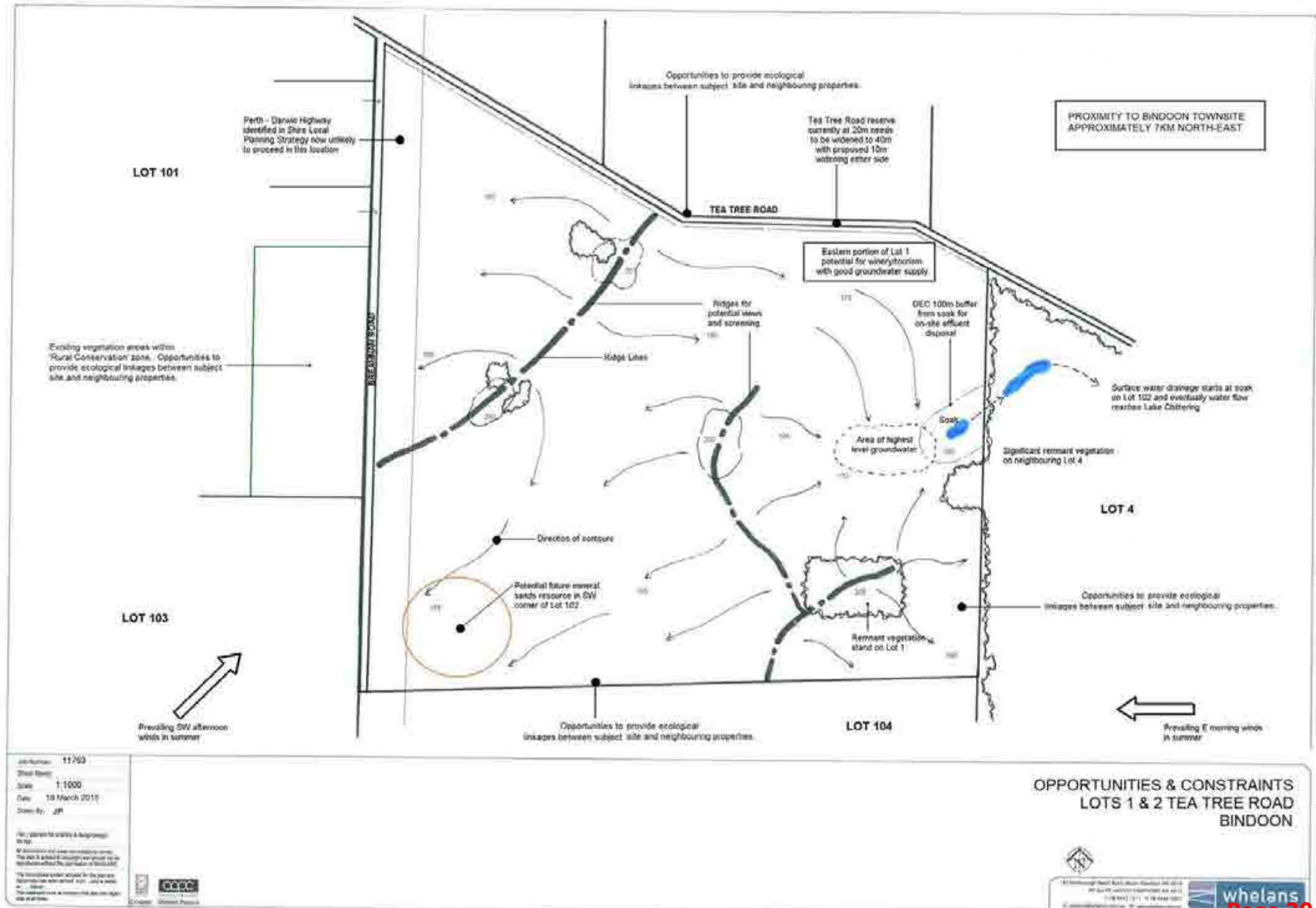
Suite 4 First Floor 40 Huxley Road Oudumb Park WA 6517 www.whelan.com.au

# LOCATION PLAN LOTS 1 & 2 TEATREE ROAD BINDOON



DRAWN 01/02/2016  
DRAWN: Cdel  
CHECKED BY: SP  
FILE: 1503 Location Plan  
VDATUM AND  
VDATUM: MGA84 (50)





Shire of Chittering – Local Planning Strategy, 2001 - 2015

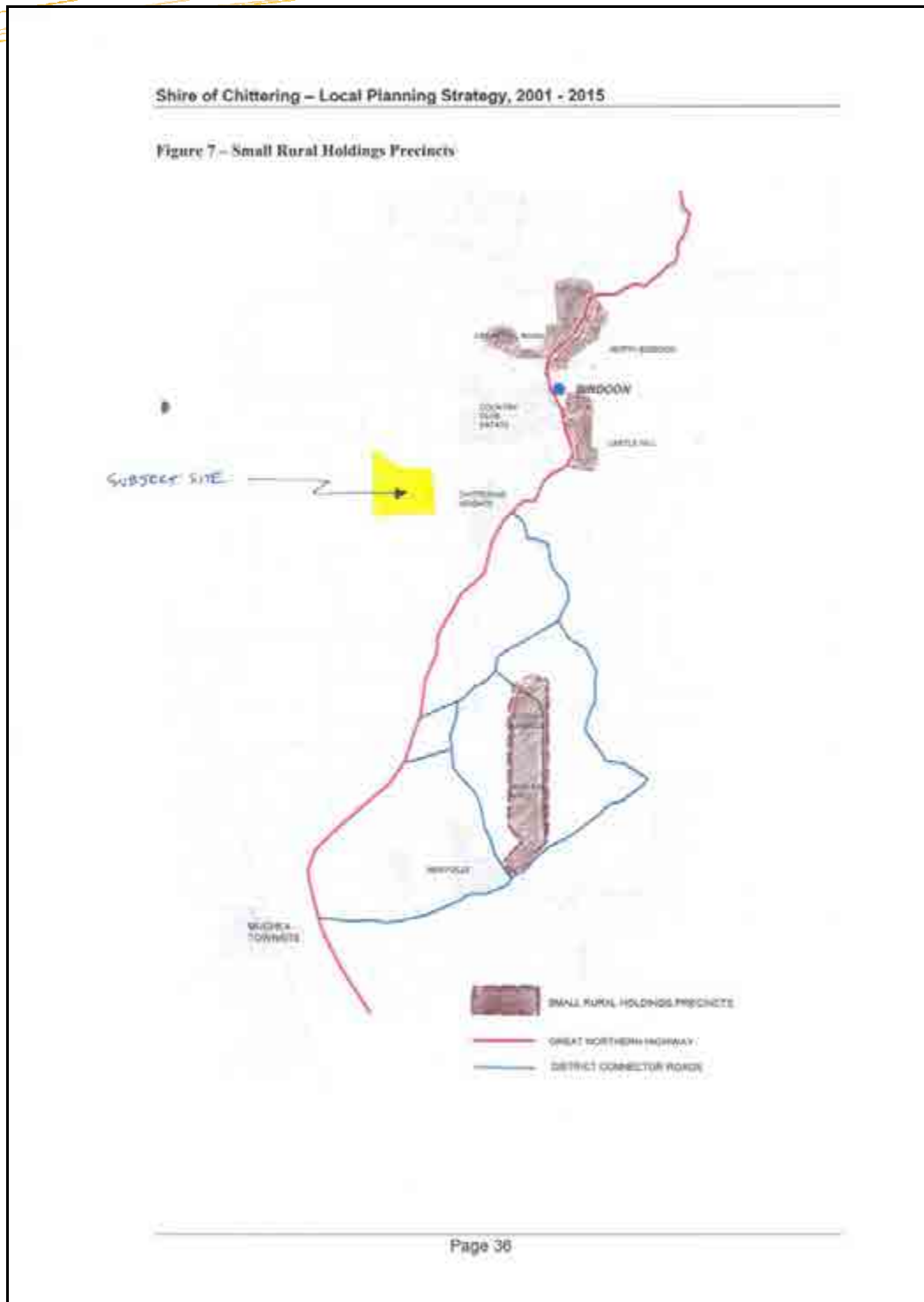
Figure 8 – Rural Retreat Precincts



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(Source: Shire of Chittering Local Planning Strategy, 2004 - modified)

FIGURE 3  
LPS RURAL RETREAT PRECINCTS



(Source: Shire of Chittering Local Planning Strategy, 2004 - modified)

FIGURE 4  
LPS RURAL SMALLHOLDINGS PRECINCTS







FIGURE 6  
HYPOTHETICAL RURAL RETREAT SUBDIVISION



(Source: Landgate - modified)

FIGURE 7  
ECOLOGICAL LINKAGES

Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



## APPENDIX 1 – ENVIRONMENTAL ASSESSMENT REPORT

# **LAND CAPABILITY ASSESSMENT**

**LOT 102 TEATREE ROAD**

**CHITTERING**

**Prepared by**

**LANDFORM RESEARCH**

**25 Heather Road  
Roleystone**

**MAY 2000**

**Note:** This is not the original cover page for the Landform Research Report and has been prepared for identification purposes only.



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## **PLANS**

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## **PHOTOGRAPHS**

Aerial photography  
General view across central north east of Lot 102  
Regrowth of native vegetation in the south west  
Soak on eastern boundary  
Yellow sands that underly most of the site

## 1.0 INTRODUCTION

This study of Lot 102 Tee Tree Road, Chittering, was carried out to assess the current environmental status of the land, determine the land capability, and identify particular land uses suited to the site. The environmental management of the potential land uses was also considered. The assessment was based on a field analysis on 3 May 2000, 48 soil auger holes, geological and hydrological mapping, knowledge of the area, aerial photography interpretation and published information.

The site lies approximately 7.0 km south of Bindoon townsite, on the southern side of Tee Tree Road. The western boundary of Lot 102 will be slightly altered and moved eastwards when the planned Perth Darwin Highway is constructed. This will reduce the size of the lot by perhaps 40 hectares.

The current area of Lot 102 is 483.9 hectares.

## 2.0 EXISTING ENVIRONMENT

### 2.1 Geology and Geomorphology

The land varies from two main ridges at just over 210 metres in the south east corner and 205 in the central west dropping to 175 metres in a gentle valley in the south western corner and 163 metres on the central eastern boundary. Lot 102 straddles the divide between the east flowing streams and the west flowing streams.

The site lies at or just west of the Darling Fault, based on field geology on adjoining properties and gravity interpretation from the 1 : 250 000 Perth Geology Sheet, WA Geological Survey.

No rocks of the Chittering Metamorphic Belt occur on site, with the main rock type being remnants of a ferricrete cemented sandstone of alluvial origin that caps the ridges across the site. These may possibly have formed prior to the Eocene, and were slightly uplifted in the Late Eocene uplift which changed river patterns in the south west of Western Australia. This rock is resistant to erosion and this resistance has resulted in the formation of the ridges.

Deep yellow sands cover the remainder of the property. These sands are quartz sands of aeolian (wind deposition) origin or have been reworked by winds. They are earthy at depth and may have originally contained feldspar, which has now weathered to clay. Leaching of the sand to white sand, occurs in the valleys.

As the site appears to be west of the Darling Fault it is interpreted to be underlain by Cretaceous sediments on top of Mesozoic and Palaeozoic sediments of the Perth Basin.

## 2.2 Soils

The soils of the site reflect their position in the landscape and the underlying geology.

Resistant ferricrete with minor associated gravel is exposed on the higher elevations of the ridges with. Yellow sands cover the lower elevations and valleys, becoming thicker and more leached towards the stream valley floors.

The sand can be divided into three main types based on the colour, composition and fertility. Fertility is assessed as showing better pasture growth on aerial photography 1996 – 98.

Soil types are;

- Ferricrete and Gravel
- Leached Sand over Gravel
- Earthy Yellow Sand
- Yellow Sand
- Leached White Sand

**Ferricrete and Gravel** caps the ridges. The laterite duricrust restricts root penetration ensuring that the soil has very low capability. In general these soils have not been cleared.

**Leached Sand over Ferricrete** occurs on the upper slopes where grey sand over white or cream sand is generally 300 mm to 1000 mm thick over ferricrete. The soils are relatively infertile but the ferricrete influences soil fertility as shown by aerial photography by having better nutrient and water retention at depth. White sand deeper than 1000 mm, even if ferricrete does occur at depth, is of even lower fertility and is labelled Leached White Sand.

Hole 3	Central east
0 – 70 mm	Dark grey quartz sand
70 – 360 mm	Cream sand
360 – 880 mm	Pale yellow sand
880 mm	Ferricrete gravel
End of hole at 880 mm	

**Earthy Yellow Sand** occurs on the upper and mid slopes particularly in the central north. The sand has a thin grey surface horizon over dark yellow sand that is predominantly earthy, with small amounts of clay increasing with depth from a horizon that varies from near the surface to over 1000 mm. These soils are shown by aerial photography of pasture quality to be the most fertile on site with good broad acre and perennial horticulture capability (provided sufficient water is available). The clay and goethite increase the water and nutrient retention of the profile, which is moderate.

Hole 12 South eastern corner	
0 – 100 mm	Grey quartz sand
100 – 1 560 mm	Yellow sand becoming darker with depth
1 560 – 1 970 mm	Dark yellow earthy sand
End of hole at 1 970 mm	



**Yellow Sand** occurs on the mid slopes where leaching has occurred. Its colour varies from cream to yellow in the upper horizons depending on the amount of goethite present. Clay has generally been removed from the upper metre of the soil profile. Leaching of the upper horizons reduces the fertility but the nutrient retention of the profile remains high for effluent disposal based on the depth of the soil.

Hole 47	Central north western corner
0 – 120 mm	Grey quartz sand
120 – 560 mm	Cream to pale yellow sand
560 - > 1 000 mm	Yellow quartz sand
End of hole 1 000 mm	

**Leached White Sand** is a leached white quartz sand formed from the removal of the yellow brown goethite covering from the quartz grains. These occupy the valley floors from the south west through to the eastern edge, and a patch in the north west. The leached sand contains in excess of 1 to 2 metres of white sand over yellow sand at depth. These soils have low to very low soil fertility and capability. In more recent times native vegetation on these soils has been allowed to regrow because of the low fertility in the west.

The areas of lowest elevation are wetter and thus are more capable for agricultural activity

Hole 28	Central south western corner
0 – 110 mm	Grey quartz sand
110 - > 1 300 mm	White quartz sand grading to cream quartz sand
End of hole 1 300 mm	

## 2.3 Climate

The climate of the area is typically Mediterranean with warm to hot dry summers followed by cool to mild wet winters. Data is recorded at Bindoon.

Summer maximum temperatures range from about 33 °C in the hottest months down to between 17 - 18 °C in winter. Minima range from 17 °C in summer down to 7 °C in winter. Rainfall at Bindoon averages about 795 mm.

Wind directions are predominantly from the east on summer mornings and south west in the afternoon depending on the arrival of the sea breeze. Winter winds are more variable.

## 2.4 Hydrology

Surface drainage is minimal due to the permeability of the soil, with only a small flow emanating from the soak/dam in the central east, draining to the east to ultimately enter Lake Chittering.

Groundwater drains from each catchment, defined by the ridge highs of the basement, with the volume being directly proportional to the size of the catchment and depth of sand. Therefore the greatest volumes of groundwater are in the central east valley and the south west. Water is available in the north but quantities will be reduced because the area of catchment is less.

Salinity levels are low, being 70 mSm in the soak on the eastern boundary, and 50 mSm in the bore in the centre of the site (potable water is <170 mSm). The current owner stated that the bore was at a depth of 30 metres.

There is no evidence of surface salinity and, considering the extent of clearing, and the depth to underlying sediments, it is unlikely that salinity will be expressed in the surface soils in the future.

## 2.5 Vegetation

The sandy soils are predominantly cleared apart from scattered trees which have mostly been retained. The gravel ridges have largely been left as remnant vegetation, but have been grazed to the extent that species are restricted in richness and density in most areas. The leached white sands in the west and south west have been allowed to regenerate and some indigenous species are now gaining a hold in these areas.

It was not possible to search for Rare and Declared species because of seasonal factors. *Acacia anomala*, a Declared Rare Plant, may possibly occur in the area but would be restricted to the ferricrete ridges which are recommended to remain as remnant vegetation.

Tagasaste has been planted in the central south on leached and yellow sands.

The main vegetation on the site are tree remnants of Eucalypt woodlands. The following partial community types are represented by scattered Eucalypts and taller shrubs;

**Jarraah-Marri** (*Eucalyptus marginata*, *E. calophylla*) Woodland occurs on the ferricrete/gravel and duricrust, grading into Jarraah Woodland where duricrust becomes significant and the soil more shallow. Marri Woodland was the dominant original vegetation on the yellow sand but changes to **Pricklebark** (*E. tottiana*) Woodland and remnant **Banksia Woodland** as the sand becomes more leached to the south west.

*Juncus pallidus* occurs on wet pasture areas with the introduced *Isolepis prolifera* associated with the wet area around the soak in the central east.

No evidence of dieback disease was noted.

Species noted during the site inspection are listed, with their most common habitat noted,

	Ferricrete Ridge remnants	Sand areas
<i>Allocasuarina humilis</i>		X
<i>Baeckea camphorsmae</i>	X	
<i>Banksia grandis</i>	X	
<i>Banksia menziesii</i>	X	
<i>Bossiaea eriocarpa</i>		X
<i>Calothamnus quadrifidus</i>	X	
<i>Conostephium pendulum</i>		X
<i>Conostephium pendulum</i>		X
<i>Daviesia incrassata</i>	X	X
<i>Daviesia triflora</i>		X
<i>Drosera pallida</i>	X	
<i>Dryandra lindleyana</i>	X	
<i>Dryandra sessilis</i>	X	
<i>Eremaea pauciflora</i>		X
<i>Eucalyptus calophylla</i>	X	
<i>Eucalyptus marginata</i>	X	
<i>Eucalyptus tottiana</i>		X
<i>Gastrolobium calycinum</i>	X	X
<i>Grevillea synaphea</i>	X	
<i>Haemodorum spicatum?</i>	X	
<i>Hakea lissocarpha</i>	X	
<i>Hibbertia cuneiformis</i>		X
<i>Hibbertia huegelii</i>	X	
<i>Hibbertia hypericoides</i>	X	X
<i>Hibbertia lasiopus</i>	X	
<i>Isolepis prolifera</i>		X
<i>Jacksonia floribunda</i>		X
<i>Juncus pallidus</i>		X
<i>Lepidosperma angustifolium</i>	X	X
<i>Lyginia barbata</i>		X
<i>Mesomelaena stygia</i>		X
<i>Mesomelaena tetragona</i>	X	
<i>Nuytsia floribunda</i>		X
<i>Patersonia juncea</i>		X
<i>Petrophile semuriae</i>		X
<i>Petrophile striata</i>	X	
<i>Petrophile linearis</i>		X
<i>Stirlingia latifolia</i>		X
<i>Styphelia tenuiflora</i>	X	
<i>Synaphea spinulosa?</i>		X
<i>Xanthorrhoea gracilis</i>		X
<i>Xanthorrhoea preissii</i>	X	

### 3.0 LAND CAPABILITY

#### The opportunities of the site are:

- Shallow ground water of high quality through the central and eastern parts of the site.
- Proximity to Bindoon.
- The presence of cottage and perennial horticulture in the Bindoon-Chittering area which could be extended to this site.
- The potential to further develop tourism in the Bindoon-Chittering area.
- Proximity to the proposed Perth to Darwin Highway.
- Remnant vegetation on the ridge areas.
- The presence of yellow sand over most of the site, which has good phosphorous retention in its profile.
- The form of the ridges which provide visual screening as well as increasing the aesthetics of the site.
- The presence of the wetland/soak in the central east.

#### The constraints on the site are:

- The poor quality of the ferricrete soils.
- A lack of supplementary water supplies over the ridge areas.
- Potential for wind erosion on the sandy soils.
- Shallow ground water that could be altered through in-appropriate land use.
- The presence of significant shallow groundwater flows that form the start of a water flow to Lake Chittering.
- The presence of significant areas of leached white sand that has very low agricultural capability and susceptibility to wind erosion.

### 3.1 Water Availability

The shallow sand filled valleys contain abundant shallow ground water, particularly in the central eastern parts. The groundwater drains from each catchment as defined by the ridges with the volume being directly proportional to the size of the catchment and depth of sand. Therefore the greatest volumes of groundwater are in the central east valley and the south west with lesser flows in the north and north west.

The nature of the site may however permit water to be available from depths of about 30 metres on the ridges which is slightly above the elevation of the shallow groundwater in the valleys.

Salinity levels are low, being 50 - 70 mSm which is potable (potable water is <170 mSm). Potability could be restricted in some areas by elevated iron levels.

Catchment on the site is difficult to estimate, but with a rainfall of 795 mm perhaps 15% of precipitation may reach the water table based on the depth to groundwater. If this was the case a recharge of 1 200 kL per hectare may be possible. Quantities will need to be proven in the field prior to any large scale development being undertaken. The soak in the east may have a catchment of 25 hectares which could result in available water of 30 000 kL/year. This volume of water would be sufficient for 10 hectares of olives. A similar volume may be available in the south western corner.



With the location of the site on or just west of the Darling Fault, there is potential for deep groundwater. However contact with Water and Rivers Commission officers reveals that potential aquifers are not available and any supplies of deep groundwater are small and unlikely to be sufficient for agricultural land uses apart from stock supplies and minor perennial horticulture.

Lot 102 lies within the Gingin Groundwater Area and thus licences are required for both deep and superficial aquifers. Apart from maintenance of environmental flows, licences are likely to be available for extraction from the superficial aquifers.

### 3.2 Soil Types

Soil types range from moderate for many agricultural activities on the earthy yellow sands to low and very low on the leached white sands and areas of ferricrete outcrop. The better soils can be identified from aerial photography and field observation to be significantly better than the leached sand over gravel and the yellow sands.

Perennial horticulture such as olives is suitable for the earthy sands with wine or dried grapes in selected areas of earthy sands. These sands will however require irrigation and improvement through the addition of organic matter. The leached sand over ferricrete, whilst being better than leached white sands, has low capability for more intensive agriculture and is probably better planted to perennial pasture and stock feed shrubs such as *Tagasaste*.

The ferricrete gravels of the ridges have low capability for agriculture and should not be cleared.

See attached Land Capability maps.

### 3.3 On Site Effluent Disposal - Nutrient Management

The yellow sands and ferricrete soils have high phosphate adsorbing qualities based on the level of sesquioxides and clay at depth and the depth to water tables. Even the leached white sands on the ridges frequently overlies yellow sand, gravel and ferricrete at depths of a metre or so.

All yellow sand, loam, gravel and duricrust soils are capable of supporting conventional effluent disposal systems with the exception of the low elevation leached white sands which should be excluded from effluent disposal or will require alternative waste water disposal systems to ensure workable waste water disposal. 4.6 Nutrient Management-Effluent Disposal

### 3.4 Basic Raw Materials

There are supplies of sand on Lot 102. The earthy sand has potential as "bricks" sand and the leached sand potential for fill sand. Currently the market for these sands is low but in the future this will increase as the rate of development increases in the area.

Whether this sand should be retained for future use in the construction industry is debatable bearing in mind the long time frames for markets to increase. As the majority of land in the Bindoon area is broad acre land on which similar sand resources occur this site may not be

required. A larger lot in the south western corners could be set aside to protect sand resources if required. This area is currently being allowed to slowly revegetate to indigenous species.

### **3.5 Stocking Rates**

The leached white sands have stocking rates of less than 1 DSE (one dry sheep equivalent per hectare if maintained on site all year round) if they are dry and not located on the lower elevations where summer moisture is available. Yellow sands have a slightly higher stocking rate of 3 to 5 depending on the soil, geomorphic position and availability of water for pasture management. A horse is rated as equivalent to 12 DSE.

The ferricrete ridges should not be stocked because of their poor pasture growth and difficulty with management.

The availability of water for summer irrigation pasture improvements and the use of perennial species can increase stocking rates significantly on all soil types.

Wind erosion of the site is currently moderate but could be extensive if adequate vegetation cover was not maintained. Care must be taken with the yellow sand leached sands which can easily blow when disturbed in summer.

## 4.0 POTENTIAL LAND USES

### 4.1 Current Land Uses

In the recent past the property has been used for grazing with occasional cereal and lupin crops. Currently the site is used for grazing.

### 4.2 Potential Land Uses

Some parts of Lot 102 are capable of more intensive land use provided groundwater is available as interpreted and observed around the soak in the east and the south western corner. There is a good opportunity to develop parts of Lot 102 as small scale perennial horticulture to complement other activities in the Bindoon-Chittering area such as tourism.

There is always a divergence of opinion on what is the best use for land such as this. The best soils are also the best soils for perennial horticulture and hobby rural blocks as they are least likely to degrade. On the other hand it is a more sustainable option to nominate areas where soils are known to be good as blocks suitable for perennial horticulture. This preserves the best soil and water resources for viable rural activities. Land of lower quality can then be used for hobby agriculture.

- Perennial crops are well suited to the region such as olives, essential oils, carob beans, nuts, floriculture, stone, citrus fruit and grapes on the better earthy yellow sands with water available.
- Aquaculture for yabbies, trout and marron in fresh water dams and tanks is unlikely to be viable because of the potential for nutrient loss and lack of suitable material for dam construction.
- Floriculture could be based on either indigenous flora such as Geraldton Wax, Banksias, Smoke Bushes, Eucalypts, Kangaroo Paws, Honey Myrtles, or exotics like Proteas on better soils.
- Some small areas are suited to cottage industries such as lavender, herbs and the like which require small areas and supplies of fresh water. These would compliment the local tourist craft and cottage industries.
- Perfume, essential oils and essences could be incorporated into cottage and craft industries to become a focus of tourism
- On the other hand intensive stocking is not appropriate because of the potential for soil erosion. However alternative stock such as emus and ostriches, may be sustainable because of the quality of the soils, provided adequate soil cover is maintained.

### 4.3 Agroforestry

Agroforestry is the intermingling production of agricultural produce with forestry produce. This could either take the form of alley type farming or the growth of small plantations developed as crop diversification, which may allow selected livestock to graze the understorey to reduce the weed and grass competition, while also preventing a fire hazard.

The trees can be selected to provide summer fodder, shelter belts, wind breaks, honey production, and wildlife habitats, depending on the trees used. This type of landuse could be the grazing of stock within the pine plantation following thinning to allow more light and the growth of pasture species.

#### Plantation Crops

Radiata Pines, Pinaster Pines, Tasmanian Blue Gums, Eucalyptus oil production may be possible. Other species may also be possible following research and the establishment of markets such as Blackwood *Acacia melanoxylon*, Spotted Gum *Eucalyptus maculata* and White Cypress *Callitris columellaris* and there may well be other suitable trees available as current and future research investigates and improves Australia's flora. The rainfall of 795 mm meets the criteria for these tree crops with perhaps Pinaster Pines being the most likely.

#### Plant Oil Production

There is great potential for the use of eucalyptus oil as a biodegradable industrial solvent. Recent advancements in bulk harvesting and processing, combined with development of high yielding clone varieties, allow oil mallee to be planted as double rows of trees one machine width apart. Planting density is typically 1100 to 1300 trees per hectare although this site is unlikely to have sufficient area for a viable industry.

The importation of essential oils increases annually and was near \$8 million in 1988/89. Oil production from genera such as *Leptospermum*, *Melaleuca*, *Kunzea*, *Eucalyptus* and *Baeckea* can provide a source of steam volatile oil that has uses in the perfume, flavouring, antiseptic and veterinary industries. Generally these species require large quantities of water and would only be sustainable on the lower slopes in the eastern portion of the site where irrigation is available. These generally need to be large mechanised operations extending over 10 or more hectares.

### 4.4 Viticulture

Viticulture encompasses both table grapes, wine and dried fruit production. The market is expanding for grape products for the local and export markets. Vineyards have already been established in the general area, but normally on the better loam soils. The earthy yellow sands have lower potential than the loam soils in other parts of the Bindoon area but have potential to provide a variation in both the type of grape and quality of the wine produced, which may be exploitable.

#### Table Grapes

Table grapes are grown with summer irrigation to increase the size of the berry. When correctly established table grape production from 1 - 2 hectares can be viable with crops producing up to 30 tonnes per hectare. Trellising and protection from birds is essential and increases establishment



costs to \$50 000 per hectare. The valley slopes on the earthy yellow soils are well suited to table grapes. Table grapes will need to be regularly irrigated but wine and currant grapes may not require daily watering. Trickle or micro-sprinkler fertigation systems are preferred.

### **Wine Grapes**

Wine grapes require less summer water but need to be actively growing to allow good sugar production whilst at the same time maintaining the flavour and aroma compounds that are essential to good wines. Rainfall during the ripening period will cause sudden swelling and cracking of the grapes and encourage fungal attack as will high humidity. Frost is of low potential in this area.

North facing slopes are preferred as these maintain higher night temperatures in the soils. Wind is to be avoided and therefore the gently sloping valleys slopes are highly suitable particularly in the east.

Yields can be 5 - 15 t/ha depending on the level of irrigation with the lower yielding vineyards producing better wine because of increased flavour. A minimum area of about 4 - 8 ha of grapes is normally required for a small viable winery but there are markets for grapes produced by smaller operations which can be sold to existing wine makers in the Chittering/Bindoon area. Water requirements are lower than for table grapes and can be from 2 000 - 3 000 kL/hectare/year. In Wandering wine grapes are grown with only 600 kL per hectare because of the lack of water, but if available at least 1 200 kL per hectare is desirable. However a minimum of 3 000 kL per hectare should be planned for.

Typical vineyards in the Perth hills produce small quantities of wine, for example Avalon, Glen Forrest (100 cases annually from 2.5 hectares), Darlington Estate, Darlington (2000 cases annually), Piesse Brook, Bickley (1000 cases annually from 4 hectares). Olive Farm has 12 hectares with 11 varieties of grapes producing only 4 000 cases annually.

Smaller vineyards such as these normally pre-purchase grapes from quality vineyards. For example Aquila Estate is developed on similar yellow sand at Carabooda. It has only 4 hectares of vines but purchases grapes under long term contract from other areas such as Margaret River.

The current price for grapes varies from \$700 to \$1 500 per tonne, with say an average price of \$1 200 for high quality wine grapes at an average production of perhaps 6 t/ha. Greater tonnages per hectare do not normally command as high prices. For example at 15 tonnes per hectare a price of only \$700 per tonne may be paid. With increased plantings in recent years top quality grapes will always attract a premium but can only be produced where water is restricted or manipulated. Therefore grapes can generate about \$7 000 - 9 000 per hectare, making a viable income on relatively small vineyards of 8 hectares. In addition it is generally recognised in the industry that a family is capable of working 5 - 8 hectares of vines as a family operation with additional labour only required at picking time.

Recent research by CSIRO has shown that two fertigation lines alternatively used will enhance yield, reduce water consumption by half and produce better quality grapes.

### **Dried Grapes**

There is increased interest in dried fruit, of high quality and extensive plantings have now been made in the eastern states. These must be planted to enable full mechanisation. Dried sultanas

and currents can attract \$1000 per tonne for high quality fruit with a production of 10 tonnes dried fruit per hectare. The plantings in the eastern states are in the order of 200 hectares but smaller mechanised plantings and co-operatives are possible.

#### 4.5 Other Crops

##### Herbs

Herbs have a high potential to form the basis of cottage or commercial industries. The potential for herbs is growing because of increasing world wide use and the fact that Australia currently imports over 90% of its herb needs. Herbs are used for food flavourings, pharmaceuticals, essential oils and insecticides. Many herbs could potentially be grown but as some require different climatic conditions, research is needed into the selection of the most appropriate species for the area. These are normally grown on a larger scale using mechanised harvesting. For example profit margins of about \$1 200 per hectare would dictate a large operation unsuited to this site (Hyde 1998).

##### Essential Oils

There are many essential oils such as the tree crops (discussed under trees) and a wide variety of oils derived from herbs. Nearly \$3 million peppermint oil and nearly \$5 million of other oils were imported in 1988/89 although production has since commenced in the eastern states. These would fit very well into the current agricultural trends in Bindoon and could supply some of the local markets.

Examples include lemon, rose and peppermint oils from pelargoniums and lemon from lemon grass. Large mechanised operations are normally required for other than hobby incomes and these will be restrained by the slopes on this site.

##### Lavender

On the other hand Lavender has large potential markets for oil production or as heads of dried lavender. Dried lavender heads return \$18 to \$22 per kg. Stems of lavender sell for \$1.50 to \$2.00 per bunch wholesale with up to 10 bunches per bush and 3 000 - 5 000 bushes per hectare depending on the level of mechanisation. Selling stems and value added products could make a 2 hectare operation viable.

A variety of methods of extraction such as steam distillation, maceration and expression can be used to extract oils. Larger areas are required when oil is produced.

Soils are suited to production, and *Lavandula stoechas* is growing wild on the site.

#### 4.6 Freshwater Aquaculture

Aquaculture for yabbies, trout and marron in fresh water dams and tanks is unlikely to be viable because of the potential for nutrient loss and lack of suitable material for dam construction.

#### 4.7 Floriculture

Almost any native or exotic species suited to Mediterranean climates could be grown on the earthy yellow sands using water taken from the central drainage lines, and the plants watered by trickle irrigation. Water increases the quality and quantity of the blooms. Typical species could be Geraldton Wax, kangaroo paws, smoke bush, many of the Myrtaceae, Banksias, Verticordias (feather flowers) and other genera.

Floriculture can vary from native plants requiring low levels of water to exotics that require similar amounts to vegetables (up to 10,000 m<sup>3</sup>/ha). Depending on the species grown there should be sufficient water for a viable operation.

Dieback disease is a major concern for the industry as many species of wildflowers are susceptible.

Using suitable management techniques such as fertilising, pruning and removal of competitors, floriculture can return between \$1 000/ha to \$2 500/ha. The current market for flowers is the east coast of Australia and overseas, where markets are growing and new markets are being sought.

Almost any native or exotic species suited to Mediterranean climates could be grown on the site with water taken from the central drainage lines and the plants watered by trickle irrigation. Water increases the quality and quantity of the blooms. Typical species could be Geraldton Wax, kangaroo paws, smoke bush, many of the Myrtaceae, Banksias, Verticordias (feather flowers) and other genera. The local *Boronia megastigma* is particularly suited and commands high prices when sold by the bunch.

Using suitable management techniques such as fertilising, pruning and removal of competitors, floriculture can return between \$1 000/ha to \$30 000/ha depending on the variety. The current market for flowers is the east coast of Australia and overseas, where markets are growing and new markets are being sought. Areas of 2 to 20 hectares can be viable depending on the species.

It is not uncommon for floriculture to be able to generate a viable or good hobby farm income on 2 hectares, for example Proteas, Lavender, Melaleuca and Eucalypts foliage, bulbs, Chrysanthemum, Roses, whereas some other species may require larger areas.

Some examples of areas required for a potentially viable income;

Lavender, roses, Chrysanthemum,	1 - 2 hectares
Banksias, bulbs	2 - 5 hectares
Boronia, Melaleuca and Eucalyptus foliage	2 - 3 hectares
Flannel Flowers	1 - 2 hectares
Geraldton Wax	1 - 2 hectares
Kangaroo Paws	2 - 3 hectares
Proteas	2 - 4 hectares

The most prospective areas are the yellow sands of the central north and east.

#### 4.8 Fruit Trees/Perennial Horticulture

Perennial horticulture can include citrus, nut crops, olives, stone fruit, apples and the like. Again the area required to produce a viable income or hobby income will vary with the species grown, however for most perennial fruit such as apples and stone fruit a minimum of 5 - 10 hectares is required. Some speciality fruit such as Kiwi Fruit, passion fruit and others can generate a viable income from 2 - 3 hectares.

**Stone Fruit, Citrus** and some other perennial crops require much higher water usage of up to 10 000 kL per hectare which will restrict them to the eastern and possibly south western edges where earthy yellow sands occur near available water.

The earthy yellow sands, whilst capable of growing citrus trees, are not as good as the loam soils utilised in other parts of the Bindoon area..

**Olives** are suited to long, warm, dry summers with temperature ranges of 31 to 38 degrees C. A winter chill factor of 10 to 12 degrees mean temperature suggests that inland and southern areas are more suitable. Mature trees under irrigation produce 50 kg per year whilst non irrigated trees can be expected to produce half this amount. The Australian market is large and growing for both fruit and oil. In 1996/97 \$100 million olive oil and fruit were imported but significant plantings have been made Australia wide in the last year or two. Today the world market is satisfied so export potential could be restricted.

The most suitable soils for olives are the earthy sands. Irrigation of only 3 000 kL/hectare/year is required for table fruit but this can be reduced to increase the intensity of the flavours. Premium quality oil is probably where the best market potential lies but will need good marketing efforts and/or value adding to make any plantings viable. Depending on the variety and type of value adding 2 - 20 hectares of olives can produce a viable income. For example at Margaret River Stellar Ridge winery is trialing value added olive products that can produce a viable income from one hectare of olives.

##### Nut Crops

Nuts require conditions similar to those for fruit trees however most are popular with parrots and cockatoos and thus will require protection if they are to be grown successfully.

**Almonds** are more suited to the site and may not require summer water.

**Pecans** and **Walnuts** need deep, well drained soils and moisture throughout the year, particularly from spring to mid-summer. They could form part time incomes from small lots.

Other nut crops that have potential are as follows: **Pistachio, Quandong, Bunya Pine, Ginkgo, Jojoba, Manula and Tung**. (Suitability details should be obtained from the Department of Agriculture W.A.).

#### 4.9 Alternative Stocking

Whilst, traditionally, areas such as this have been used for cattle there are several alternative animals that can be raised on small holdings because they command higher values and are easier



on soils. In general intensive stocking is not suitable for this site because of the steeper slopes and potential for nutrients to run off in surface flows.

**Emus and Ostriches** can be stocked at much higher stocking rates than hoofed animals because they are "easy" on the soil and are less likely to lead to soil degradation. Viable emu or ostrich businesses have been established on as small as 2 - 5 hectares. At this level they do not have the same environmental impact in terms of odour and soil degradation as other stock and do not need large buffers such as pigs. For example there are operations on Armadale Road, Forrestdale and at North Dandalup on small holdings adjacent to dwellings. Currently the price of these birds is depressed but with development is likely to turn around at some time in the future. There are some indications in the eastern states of increased interest in ostriches. However emus and ostriches on small rural holdings may have the potential to lead to nutrient loss from leached soils and thus suitable nutrient management techniques may need to be incorporated into any commercial venture depending on the location.

**Alpacas and Llamas** have soft hooves and are also suitable for stocking at higher than traditional rates. They command high prices and studs can be sustained on small lots down to 5 hectares or less. Currently these studs are aimed at the pet and stud markets, but the fleece commands high value and, as the cost of the animals reduces through increased numbers of animals, a balance will be reached where commercial production will occur.

An Alpaca stud currently operates on the Toodyay - Northam Road near Northam.

Small studs of **Goats** with premium fleece characteristics such as Angoras and Mohair are possible in addition to use as hobby activities. **Milking Sheep and Goat** operations, with the consequent production of small volumes of cheese, can be operated on small holdings, although supplies of fresh water for processing may prove limiting in some areas. At high stocking rates these have high potential to lead to soil degradation from wind erosion through hoof damage to pasture. The same situation exists for deer.

**Small cattle such as Dexter and Lowline** require less land and command higher prices as stud animals. These breeds are very well suited to small rural holdings because they are easy to manage and do not require the equipment and fencing needed for larger breeds. There is a growing market for small cattle on small rural holdings and the owners of these holdings normally have the funds to pay the higher prices required.

**Miniature Horses** have similar qualities and are just at the stage of developing a pet market for small rural holdings.

## 5.0 GEOTECHNICAL CONSIDERATIONS

### 5.1 House and Road Construction - Foundation Stability

Foundation stability for roads is high for all soils.

Foundation stability for dwellings is also high in all areas (AS 2870 Site Class A). The area around the soak in the central east is not suitable for dwellings or waste water disposal because of the leached sands and elevated water tables.

	GEOTECHNICAL FACTOR	MANAGEMENT
5.1.1	Foundation stability	<ul style="list-style-type: none"> <li>Foundation stability is AS 2870 Class A</li> </ul>

### 5.2 Drainage and Flood Risk

All areas apart from adjacent to the soak and the north eastern corner adjacent to the road are well drained.

There is no evidence of potential flooding.

	GEOTECHNICAL ISSUE	MANAGEMENT
5.2.1	Flood risk	<ul style="list-style-type: none"> <li>There should be adequate setback of 100 metres from the soak in the central east.</li> </ul>

## 6.0 ENVIRONMENTAL MANAGEMENT

The following items are identified as the most likely to impact on the environment. These items can be managed by the implementation of the management recommendations. Other items are unlikely to impact or the impact is regarded as small.

However the nature of the environmental management will depend on the nature of the subdivision proposed. Some areas of subdivision are proposed on the attached maps, but these are suggestions and will depend on planning issues. Thus the list of environmental management recommendations will act as a general guideline on how to achieve an environmentally sensitive development.

### 6.1 Aesthetics

The undulating nature of the site, and the low ridges, increase the aesthetic quality of the site as well as helping to reduce the impact of developments by providing sufficient screening. However the northern portion of the site is visible from Tee Tree Road and the Western portion will be visible from the planned Perth - Darwin Highway.

The colour and style of dwellings and other structures could be visually compatible with the area and to this end developments should be coloured, painted or colour bond sheeting used. The use of grey galvanised or zinc/alum sheeting should be avoided unless as an integral part of a development such as a roof on a "country style" home or shielded from key sight lines.

Alteration to existing view scapes from Tee Tree Road can be kept to manageable levels through the listed actions.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.1.1.	Remnant vegetation and trees	<ul style="list-style-type: none"> <li>Development should include preservation of existing trees and vegetation by the sympathetic location of building envelopes.</li> <li>Trees should be preserved and protected from grazing pressure.</li> <li>Additional trees could be planted in strategic clumps to protect the views.</li> <li>Development should be restricted by a 100 metre setback from the soak.</li> </ul>
6.1.2	Setbacks	<ul style="list-style-type: none"> <li>Developments should be set back 100 metres from Tee Tree Road.</li> </ul>
6.1.3	Dwellings, fences and other developments are to be aesthetically compatible with the area.	<ul style="list-style-type: none"> <li>Restrictions could be placed on the use of visually non compatible materials.</li> </ul>

### 6.2 Subdivision Layout and Buffers

Lot sizes will depend on planning issues in addition to the land capability. Suggested lot sizes and potential land uses are shown on the attached maps.

It is preferred that smaller lots are clustered to assist servicing and buffer requirements. These should be located in areas which have lower soil capability but yet capable of pasture management through the use of groundwater. The best water sources could be utilised for

perennial horticulture and should thus be preserved on agricultural lots of 10 to 20 hectares to retain potential viable agricultural land.

A larger lot could be retained to protect sand resources in the south western corner but these resources are unlikely to be required for many years, and alternative resources occur on broad acre agricultural land to the west. In addition as this area of white sand is currently undergoing slow regeneration the best solution is likely to be to allow this process to continue. Therefore larger lots of 20 to 40 hectares are probably the best alternative. To preserve the sand a large lot could be retained as one broad acre lot.

One issue with lot sizes is the potential buffer between broad acre farmland and the creation of smaller lots. The land to the west, half of the south and east is uncleared remnant vegetation on soils of low land capability. It is unlikely that this vegetation will ever be cleared and will form a buffer.

The predominant winds are mainly from the east on summer mornings and south west in the afternoons. Winter winds are more variable.

A recent document relating to the potential conflict of horticulture and dwellings is the Draft Environmental Code of Practice for Vineyards, jointly prepared by Agriculture WA, Department of Environment Protection, Water and Rivers Commission, Grape Growers Association and the Wine Industry of WA.

The Draft Environmental Code of Practice recognises that buffers are related to aspects of the site conditions and land uses. Under spray drift, the Code of Practice quotes Spillman 1988 who stated that under research and subsequent modeling for aerial spray equipment (non-hooded) there was negligible drift 300 metres downwind. Based on that research a minimum distance was accepted as 300 metres where open ground applies but this can be reduced with the use of effective tree buffers and can be as low as 40 metres in the case of small vineyards. The Review of Agricultural Chemical Spray Drift, 1993, Coordinating Committee on Agricultural Chemicals, also recognised the potential for screening trees to reduce spray drift and the desirable use of "shelter belts" (p19).

As the only portion of land adjacent to broad acre farm land is in the south buffers are not necessary over the majority of Lot 102. In the south east the prevailing winds do not blow from the south and a setback of 100 metres for dwellings together with tree planting along this section of the boundary will provide protection.

	ENVIRONMENTAL ISSUE	MANAGEMENT
6.2.1	Subdivision design	<ul style="list-style-type: none"> <li>• Buffers are not required round most of the boundary because it adjoins remnant vegetation which is unlikely to be cleared.</li> <li>• A setback of 100 metres from the boundary in the south east together with tree planting along the cleared boundary will provide separation between broad acre land and any development.</li> <li>• Setbacks of 100 metre from roads are recommended.</li> <li>• Building envelopes should be located 100 metres from the soak in the central east.</li> </ul>



### 6.3 Flora and Fauna

The only remnant vegetation on the site is the scattered trees and the ridge tops. These should be retained and incorporated into any further plantings. Plantings and revegetation can form linkages as shown on the attached plans. Fauna will be advantaged by the planting of additional vegetation on newly created lots.

The natural regrowth on the leached sands in the west should be encouraged to regrow because these areas have very low soil capability and are highly susceptible to wind erosion. This is the current plan for these soils.

The wetland/soak should be protected.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.3.1	Remnant trees	• Trees should be protected from grazing pressure.
6.3.2	Remnant vegetation	• Roadside vegetation should be retained and local species used in any planting of the roadside.
6.3.3	Weeds	• As the site is cleared pasture weeds will not be an issue apart from the need for lot owners to control Declared weeds such as Skeleton Weed that has been recorded on the site in the past.
6.3.4	Fauna	• Fauna are likely to increase with development of small rural holdings.
6.3.5	Nearby remnant vegetation	• Cats are difficult to control and education is the most satisfactory method, through Shire of Chittering, local newsletters etc. • Dogs can be controlled through Council bylaws and public education.
6.3.6	Wetland/soak	• Development should be restricted by a 100 metre setback from the wetland/soak.

### 6.4 Water Quality - Lake Chittering

Lot 102 forms part of the catchment for the stream line running east to Lake Chittering, a System 6 nominated reserve. A soak on the central eastern boundary is the start of one tributary of this drainage line. The main issue is to prevent the level of nutrients or salinity from rising in this water flow and to ensure that sufficient water continues to flow from Lot 102 to maintain the stream and wetland functions.

Perennial horticulture associated with commercial operations and cottage industries will use potentially less water than annual horticulture and is better suited to the site, based on soil types, and will use significantly less nutrient usages.

Set backs from the soak should be 100 metres for developments and 50 metres for perennial horticulture. Water flows can be protected under the revised Rights in Water and Irrigation Act which will be implemented in the near future, where licences will be required to take water.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.4.1	Lake Chittering	<ul style="list-style-type: none"> <li>Water flows can be maintained at adequate levels through encouragement of perennial agricultural activities, the restriction on intensive annual horticulture and the proposed changes to the Rights in Water and Irrigation Act.</li> <li>Larger lot sizes on the leached sands, potential nutrient calculations and soil assessments, suggest that potential nutrient losses from the proposed land uses will be minimal if at all.</li> <li>There is no evidence of salinity on site and the underlying geology and hydrology suggest that salinity will not increase with development.</li> </ul>
6.4.2	Soak	<ul style="list-style-type: none"> <li>Covered under Lake Chittering above.</li> <li>Development are recommended to be restricted by a 100 metre setback from the soak with a 50 metre buffer for perennial horticulture.</li> </ul>

## 6.5 Heritage

Heritage issues concern the management of flora and mature trees.

	ENVIRONMENTAL ISSUE	MANAGEMENT
6.5.1	Archaeological sites	<ul style="list-style-type: none"> <li>There are no sites known to the Department of Aboriginal Affairs.</li> </ul>
6.5.2	Potential aboriginal sites	<ul style="list-style-type: none"> <li>Aboriginal sites are protected under the Aboriginal Protection Act.</li> </ul>

## 6.6 Nutrient Management - Effluent Disposal

Phosphorous is the main nutrient implicated in algal blooms in waterways. Nitrates can be bound to organic matter in the soil and lost through soil micro flora under anoxic conditions.

Nitrogenous substances are also taken up by vegetation or lost through volatilisation of ammonia. In leached sands with shallow groundwater, such as near the soak, the movement to the water table can be too fast for microbial activity to occur and thus setbacks are required.

The impact of nutrients is low in deep yellow sands for broad acre agricultural activities. In most areas, apart from the valley floors in the east and west, leached sands are underlain by yellow sand, or ferricrete, which increases the phosphorous retention capability. Phosphorous is adsorbed onto the yellow/brown goethite on the sand grains and in the ferricrete together with the 1 -- 3% clay within the earthy sands. Phosphate retention capability must consider the whole soil profile which on the higher elevations is up to 30 metres to the water table, reducing down slope. Even five metres of sand with a low phosphate retention (PRI 5) is capable of retaining 60 kg of phosphorous per m<sup>2</sup>.

The main issue with effluent disposal in subdivisions such as this is the design and placement of the systems to ensure that they work and provide adequate microbial purification rather than nutrient loss.

Yellow sands are recognised for their ability in managing nutrients in a number of published documents, for example SPP2 Peel-Harvey Estuary.

Appleyard S J 1993, *Explanatory Notes for the Groundwater Vulnerability to Contamination Maps of the Perth Basin*, Department of Minerals and Energy, 1993/6, shows the site as having Very Low Vulnerability to contaminate the deep aquifers of the Swan Coastal Plain.

Poinke established that the risk of phosphate loss from coloured sands such as those on the site are very effective at retaining phosphorous. Poinke et al, *Effect of Irrigated Horticultural Cropping on Groundwater Quality: Swan Coastal Plain, Western Australia*, CSIRO Water Resources Series No 2. Lantzke, 1997, *Phosphorous and nitrate loss from horticulture on the Swan Coastal Plain*, Agriculture WA

All soils are capable of supporting conventional effluent disposal systems with the exception of the small low lying areas adjacent to the soak, and will comply with the Government Sewerage Policy (metropolitan area).

There should be a 100 metre setback from the soak which complies with Water and Rivers Commission recommendations.

#### Nutrient Loadings

The leached white sands have stocking rates of less than 1 DSE (one dry sheep equivalent per hectare if maintained on site all year round) if they are dry and not located on the lower elevations where summer moisture is available. Yellow sands have a slightly higher stocking rate of 3 to 5 depending on the soil, geomorphic position and availability of water for pasture management.

The current input of nutrients will be predominantly from fertiliser applications and legume pasture.

Land Use	Kg/P/hectare/year	Kg/N/hectare/year
Carnations	80	1 920
Vegetables	80 - 340	400 - 900
Citrus	30 - 73	68 - 102
Olives	20 - 40	40 - 80
4 DSE/ha	6	40
1 horse	11	60
Domestic waste water of one household	5 - 6	18

Agriculture WA, 1990, *Horticulture and the environment*, Misc Pub 20/90.

Lantzke N, 1997, *Phosphorous and nitrate loss from horticulture on the Swan Coastal Plain*, Agriculture WA, Misc Pub 16/97.

Estimations of the impact of the nutrient loading can only be made based on denitrification, volatilisation of ammonia, recycling, uptake by vegetation and phosphate absorption by clays and sesqui-oxides.

The greatest input of phosphorous can come from the keeping of stock in confined areas such as a stable, or intensive annual horticulture. This may lead to soil degradation through wind erosion and dust generation and is not recommended.

Potential loss of nutrients from pasture and less intensive/perennial horticulture such as grapes, depends on the fertiliser application regime and the quality of the soils. This would not normally lead to nutrient losses, with the exception of applications applied to the lower lying leached sands.

A typical conventional septic system releases 5.5 kg P/year and 18 kg N/year. However allowing for six chickens, a dog and cat and a 250 m<sup>2</sup> area of fertilised horticulture, a further loading of 12.3 kg N/year and 5.2 kg P/year can be added for the dwelling area. (Data from Select Committee on Metropolitan Development and Groundwater Supplies, Legislative Assembly 1994 and Nitrate management in the Jandakot UWPCA, Dames and Moore, undated). One horse is estimated at 60 kg N/year and 11 kg P/year.

Typical nutrient loadings that can be expected from the various soil types

Soil type	Possible lot size and activity	Nitrogen loading per hectare	Phosphorus loading per hectare	Likely nutrient scenario
Yellow sands	Current maximum stocking rate 5 DSE per hectare	50.30 kg N/ha/year	7.35 kg P/ha/year	Unlikely to be nutrient export
Leached sands with yellow sand or ferricrete at depth	2 ha conventional septic system 1 ha cottage garden	65.2 kg N/ha/year	20.4 kg P/ha/year	Unlikely to be nutrient export
Yellow sands	Estimated average potential stocking rate 4 - 5 DSE per hectare for a 3 hectare block and conventional septic system.	30.1 kg N/ha/year	7.2 kg P/ha/year	Unlikely to be nutrient export
Yellow sands	10 hectares olives, no stock and conventional septic system.	83.0 kg N/ha/year	41.1 kg P/ha/year	Unlikely to be nutrient export.
Yellow sands	20 hectares no stock and conventional septic system.	81.5 kg N/ha/year	40.6 kg P/ha/year	Unlikely to be nutrient export.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.6.1	Effluent disposal	<ul style="list-style-type: none"> <li>All soil types are suitable for conventional septic systems with the exception of the area adjacent to the soak</li> <li>There should be no more than one effluent disposal unit per lot.</li> </ul>
6.6.2	Land use and stocking	<ul style="list-style-type: none"> <li>Intensive agricultural pursuits such as piggeries and feed lotting should not be permitted.</li> <li>Any stocking should be to Agriculture WA recommendations.</li> <li>Lots sizes suggested take into account the potential for nutrient loss and Agriculture WA stocking rates.</li> </ul>



## 6.7 Drainage, Salinity and Flood Risk

All areas are well drained.

There is little potential for salinity increases in the soak on the eastern boundary.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.7.1	Potential flooding	• There is no risk of flooding.
6.7.2	Salinity	• No action required.

## 6.8 Mature Trees

Trees should be protected and developments located at sufficient distance to ensure dwellings are not subjected to risk associated with falling limbs or trees blown over.

	ENVIRONMENTAL ISSUE	MANAGEMENT
6.8.1.	Mature trees	• Developments should be located at sufficient distance to ensure dwellings are not subjected to risk associated with falling limbs or trees blown over.

## 6.9 Wind and Water Erosion

The potential for wind erosion is high on the sands, although yellow sands are capable of growing better pasture which must be maintained throughout the year. Wind erosion can also be reduced through the use of irrigation, wind breaks, planting perennial species such as tagasaste, and stock matched to the quality of pasture. Sometimes dust can be more of a problem than actual erosion when for example a horse is kept in a small paddock or stables.

In the west on the leached white sands indigenous vegetation is being allowed to regrow as a means of managing soil erosion. This is a successful method of land management, but does take the area out of production.

Potential water erosion is low apart from non wetting sloping sands.

	ENVIRONMENTAL ISSUE	MANAGEMENT
6.9.1	Soil erosion	<ul style="list-style-type: none"> <li>• Adequate vegetation cover should be maintained on all soils throughout the year.</li> <li>• Stocking rates should be matched to pasture conditions.</li> </ul>

## 6.10 Fire Control

Fire Control falls under the Bush Fires Control Act (as amended) and the Shire of Chittering.

Fire management will depend on lot sizes and permitted land uses. As the site is cleared with scattered trees, fire risk is reduced, although grass fires can produce high hazard given the right conditions. Fire risk is normally reduced through subdivision design, reduction in fuel by burning off or other means, the design and maintenance of strategic firebreaks, the availability of machinery and water to fight fires and the provision of emergency escapes.

The fire risk to property will increase following subdivision so it is important that the risk is minimised. Existing and new water sources will be able to be used for fire fighting and the roads will act as firebreaks together with the creation of new firebreaks as required.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.10.1	Fire Risk	<ul style="list-style-type: none"> <li>Increased access, firebreaks and water points will assist fire reduction risk.</li> <li>The roads will act as fire breaks.</li> </ul>

## 6.11 Social Impact

Social impact of the proposed sub division will be minimal but will be positive by bringing additional people to Bindoon/Chittering.

There is potential for this site to be developed for cottage industries, craft and other small scale tourism activities which will be valuable additions to the Bindoon/Chittering area.

	ENVIRONMENTAL FACTOR	MANAGEMENT
6.11.1	Social Impact	None required.

## 7.0 CONCLUSIONS

Lot 102 lies approximately 7.0 km south of Bindoon townsite, on the southern side of Tee Tree Road. The western boundary of Lot 102 will be slightly altered and moved eastwards when the planned Perth Darwin Highway is constructed. This will reduce the size of the lot by perhaps 40 hectares.

Lot 102, therefore, with its location adjacent to the proposed Perth Darwin Highway and proximity to Bindoon, is well placed for subdivision into a creative range of lots and landuses.

The subdivision of Lot 102 Tee Tree Road, Chittering has the potential to be a valuable addition to the local community and tourism industry. The soils and supplies of water provide high capability for some new and creative activities on smaller lot sizes provided the land management issues on the less capable soils are met.

Parts of Lot 102 are capable of sustaining small rural holdings ranging in size from 2.0 – 5.0 hectares in a cluster with the balance taken up by larger lots. The best agricultural land is in the east because of available water and could be protected in larger 10 and 20 hectares lots. On the other hand leached white sands are better left to allow regrowth of indigenous vegetation as is occurring.

Other lots are better suited to hobby, perennial horticulture or conservation lots because only domestic/stock supplies of groundwater are likely to be available.

The management actions listed under Environmental Management, Geotechnical Considerations, and the opportunities and constraints, are to provide guidance for subdivision design, and the development of conditions.

Any environmental issues identified can be managed through subdivision design and normal conditions that are placed on subdivision and developments.

  
Lindsay Stephens

Soil Characteristics	Ferricrete and Gravel	Leached Sand over Ferricrete	Earthy Yellow Sand	Yellow Sand	Leached White Sand
Location	On the higher elevations and ridges	Flanks or slopes adjacent to the ridges	Upper catchment	Upper catchment	Gentle valleys
Topsoil Texture	Yellow brown gravel and duricrust	Grey quartz sand	Grey quartz sand and yellow sand	Grey quartz sand and yellow sand	Grey quartz sand
Subsoil Texture	Yellow brown gravel and duricrust over loam-clays at depth	White sand over gravel and duricrust at depths of up to 1000 mm	Cream sand over yellow sand at shallow depth	Cream sand over yellow sand at shallow depth	Leached white sand over yellow/orange/brown sand at 1 meter or so.
Stone	Duricrust a major component of ridge tops	Nil	Nil	Nil	Nil
Gravel	Major component	Minor	Minor gravel	Minor gravel	Minor
Depth to Bedrock	Ferricrete over deep sediments	Ferricrete at < 1 metre over deep sediments duricrust may occur at 1 or 2 metres	Deep sediments	Deep sediments	Deep sediments
Hardpan	Ferricrete	Ferricrete at depth	Traffic hardpans possible	Traffic hardpans unlikely	Unlikely to develop
PH	Acidic to neutral	Acidic to neutral	Acidic to neutral	Acidic to neutral	Acidic to neutral
Salinity	Low	Low	Low	Low	Low
Soil Permeability	High	High	High	High	High
Soil Shrinkage	Very low	Very low	Very low	Very low	Very low



Land Qualities	Ferricrete and Gravel	Leached Sand over Ferricrete	Earthy Yellow Sand	Yellow Sand	Leached White-Sand
Slope	Gentle	Gentle to moderate	Gentle to moderate	Gentle	Gentle
Slope Stability	High	High	High	High	High
Wind Erosion Risk	Low	High	Moderate to high	Moderate to high	Moderate to high
Water Erosion Risk	Low	Low	Low	Low	Low
Drainage	Well drained	Well drained	Well drained	Well drained	Well drained
Moisture Availability	Very low	Very low	Moderate	Low - moderate	Very low
Water Logging	Nil	Nil	Nil	Nil	Adjacent to the soak
Wetability	Moderate	Non wetting at times	Non wetting at times	Non wetting at times	Non wetting at times
Flood Risk	Nil	Nil	Nil	Nil	Nil
Surface Water - Availability/Quality	Nil	Nil	Nil	Nil	Only at soak
Ground Water - Availability/Quality	Low potential	Low potential	Low potential	Low to moderate	Low to moderate
Salinity Risk	Low	Low	Low	Low	Low
Microbial Purification	Moderate to high based on soil depth	Moderate to high based on soil depth	Moderate to high based on soil depth	Moderate - high	Moderate to low
Water Pollution Risk	Low	Low	Low	Low	Low - moderate
Soil Profile; Phosphate absorption	High on the proportion of iron oxides and depth of soils	High based on ferricrete at depth	Moderate to high based on depth of yellow sand and presence of clay	Moderate based on depth of yellow sand	Low based on yellow sand at depth
Soil Profile; Nitrogen Removal	Low to moderate depending on the degree of anoxic conditions	Low to moderate depending on the degree of anoxic conditions	Moderate depending on the degree of anoxic conditions	Low to moderate depending on the degree of anoxic conditions	Low to moderate depending on the degree of anoxic conditions
Existing Degradation	Largely uncleared	Cleared	Cleared	Cleared	Cleared

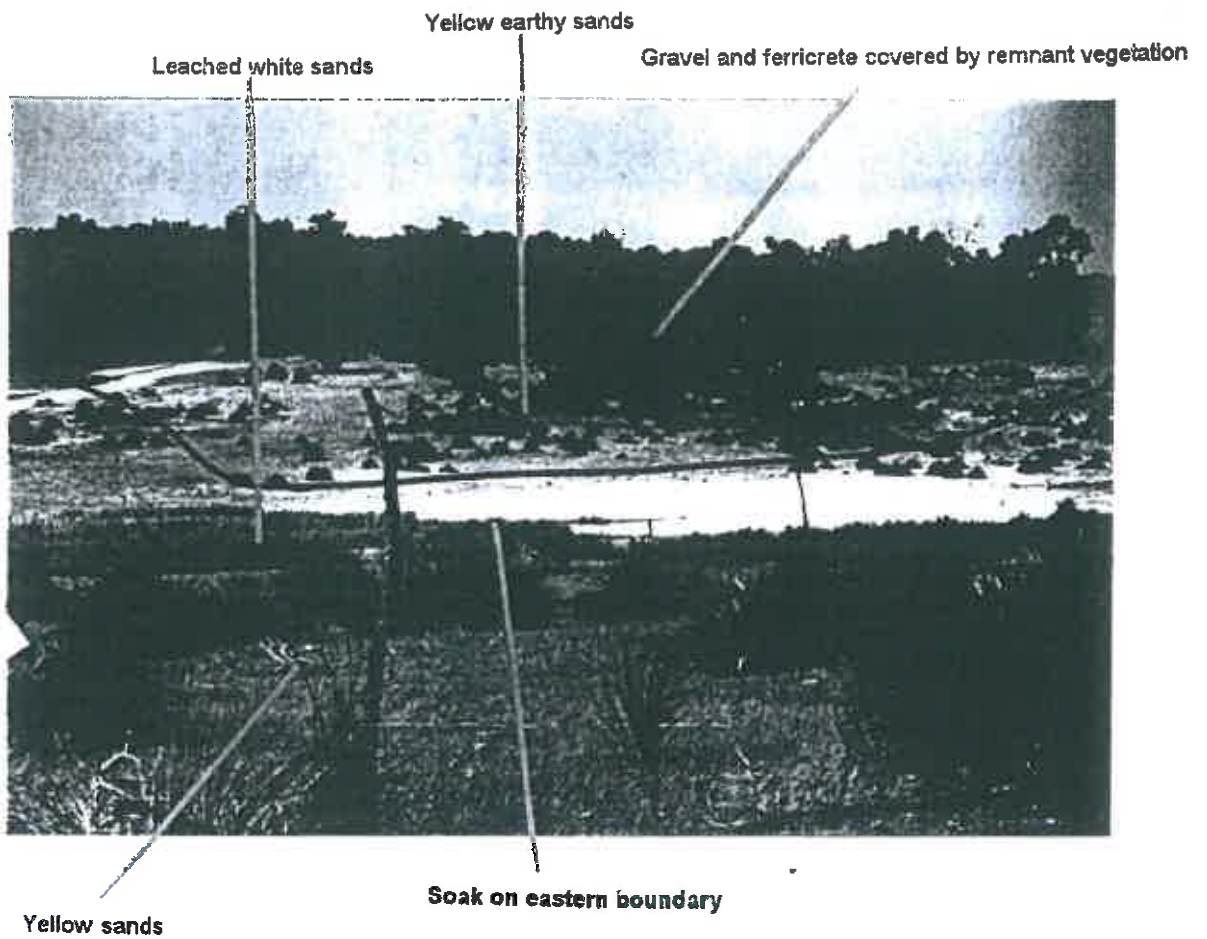


**General view across the central north east of Lot 102**

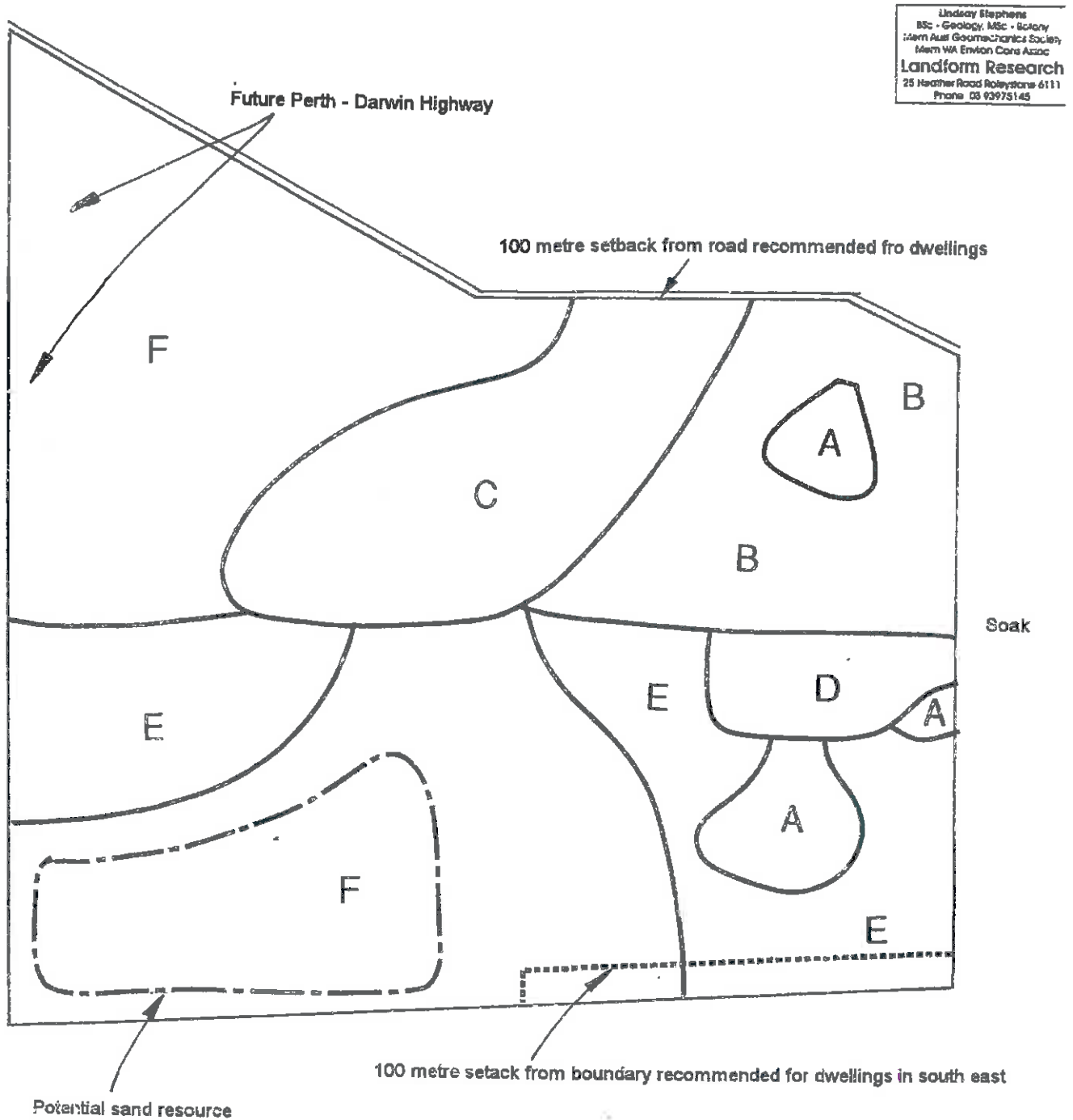


**Regrowth of native vegetation in the south west**





Yellow sands that underly most of the site



## POTENTIAL LAND USES

### Lot 102 Tee Tree Road, Bindoon

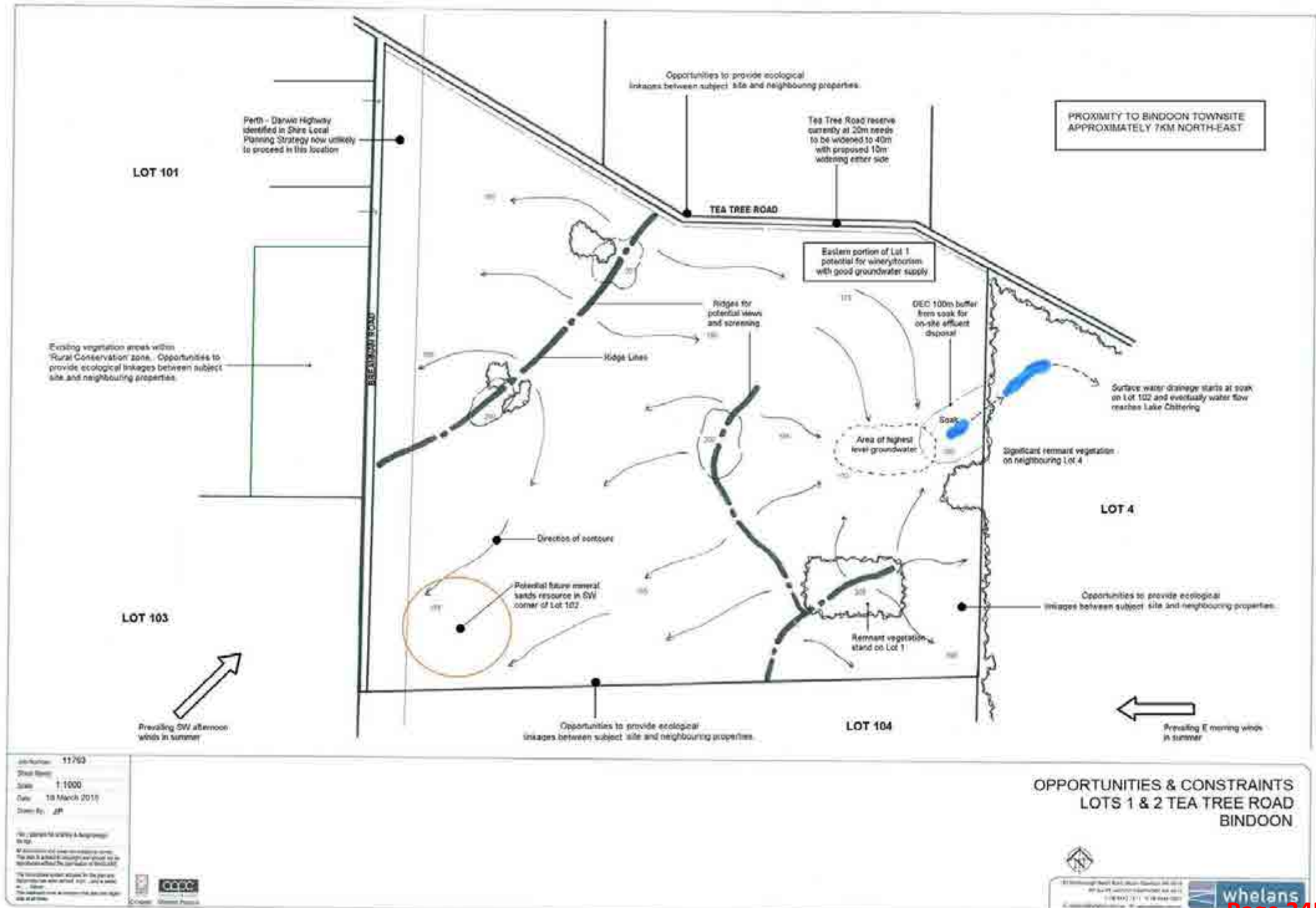
	Possible Land Use	Soil Type	Possible Lot Sizes	Water Availability
A	Conservation	Ferricrete rock and gravel	< 5 ha	Very low
B	Rural Living	Yellow sand	2 - 5 ha	Water may be available and should be restricted to 1 500 kL per lot
C	Perennial Horticulture/hobby	Earthy and yellow sands	10 ha	Stock water, insufficient for irrigation
D	Perennial horticulture	Earthy and yellow sands	10 - 20 ha	Water available for irrigation of crops. Perhaps >10 ha perennial horticulture possible
E	Hobby	Yellow sands and sand over ferricrete	5 - 10 ha	Water may be available and should be restricted to 1 500 kL per lot
F	Large hobby and conservation lots	Leached sands and sand over ferricrete	10 - 20 ha	Stock water likely to be available



Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



## APPENDIX 2 – OPPORTUNITIES AND CONSTRAINTS MAP



Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



## APPENDIX 3 – SPRING FLORA SURVEY

# Lot 1 and 2 Tea Tree Road, Bindoon WA

## Spring Flora and Vegetation Survey



Kathryn Kinnear

Bio Diverse Solutions

15/3/2012





## DOCUMENT CONTROL

### TITLE

Lot 1 and 2 Tee Tree Road Bindoon Spring Flora and Vegetation Syrvey

Author (s) : Kathryn Kinnear

Reviewer (s) :

Job No. : WHEL014

Client : Marou Property Development Pty Ltd

### REVISION RECORD

REVISION	SUMMARY	REVISED BY	DATE
DRAFT	CLIENT REVIEW	WHELANS	14/2/2012
FINAL	CLIENT		15/3/2012



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## 1. Introduction

Bio Diverse Solutions was commissioned to undertake a Spring Flora and Vegetation Survey of Lot 1 and 2 Tee Tree Road Bindoon as part of investigations requested from Whelans in support of a proposal to rezone a portion of the land for Rural Residential purposes. The Spring Flora and Vegetation Survey is required by the Western Australian Planning Commission (WAPC) to assist with the rezoning process. The survey is aligned to Environmental Protection Authority (EPA) *Guidance Statement number 51: Terrestrial Flora and Vegetation Surveys*.

This report details the vegetation types on site, provides a flora inventory for the site, an assessment of Threatened Flora, and recommendations for management of the proposed land use.

### 1.1. Alignment to Legislation, Policy and Guidelines

In assessing the property, Bio Diverse Solutions has prepared this report aligned to the following legislation, please refer to Table 1 below.

**Table 1–Government Legislation Applicable to the Proposal**

Legislation	Responsible Government Agency	Aspect
<i>Agricultural and Related Resources Protection Act 1976</i>	Department of Agriculture, Western Australia	Weeds and feral pest animals
<i>Conservation and Land Management Act 1984</i>	Department of Environment and Conservation	Wetlands/Flora and fauna / habitat /weeds / pests / diseases
<i>Environmental Protection Act 1986 (Part IV)</i>	Office of the Environmental Protection Authority	Assessment and Management Environmental Impact
<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>	Department of Environment and Conservation	Clearing of native vegetation
<i>Local Government Act 1995</i>	Shire of Chittering	Development approvals, Building approvals
<i>Soil and Land Conservation Act 1945</i>	Department of Agriculture and Food	Protection of soil resources
<i>Wildlife Conservation Act 1950</i>	Department of Environment and Conservation	Protection of indigenous wildlife
<i>The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).</i>	The Commonwealth Department of Sustainability, Environment, Water, Population and Communities	Protection of Vulnerable and Threatened species of national significance
<i>Country Areas Water Supply Act 1947 (WA) (CAWS Act).</i>	Department of Water, Water Corporation WA	Protection of water source areas and drinking water catchments.

### 1.2. Spring Flora and Vegetation Survey Method

This study was undertaken in October 2011 in spring conditions and has included desktop analysis and site survey of the site vegetation.

Desktop analysis included a number of resources reviewed, including:

- Database searches of the DEC Threatened Flora Database and review of Threatened Flora plant species for location, habitat and growth form;
- General texts including Native Vegetation WA (Shepherd *et al* 2002), A Biodiversity Audit of WA (Hearn *et al.*, 2002), and Local Biodiversity Strategy Shire of Chittering (SoC, 2010);
- Public available databases (Florabase, SLIP, WALIS, ASRIS etc);
- Review of species form, growth and habitat at the DEC State herbarium; and
- Overlay of GIS datasets (DEC Pre-European Vegetation extent and Department of Water (DoW) 250K Hydrogeology).

Site Survey included:

- The survey area was approximately 484 ha, with the majority of the site cleared. Remnant vegetation patches were traversed on foot and intensively sampled, a list of dominant flora species present (native and exotic) was compiled as seen; samples or photographs were collected for unfamiliar species;
- Threatened Flora searches as listed by DEC was undertaken in known locations and probable habitat types;
- Specimens collected were pressed, dried and identified;
- Specialist texts were used to identify specimens (Wheeler *et al*, 2002) with some checked against examples in the reference herbarium. The authority for taxonomic names was DEC's Florabase website as of November 2011;
- Assessment of vegetation types present and vegetation condition; and
- Herbarium verification for Threatened Species as required.

Vegetation condition was assessed to the following criteria:

- Pristine: Pristine or nearly so, no obvious signs of disturbance;
- Excellent: Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species;
- Very good: Vegetation structure altered, obvious signs of disturbance;
- Good: Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate to it;
- Degraded: Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management; and
- Completely Degraded: The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

(Keighery, 1994)

### 1.3. Other documents relating to this plan

Other unpublished documents that have been prepared for this development proposal which should be consulted when reading this plan include:

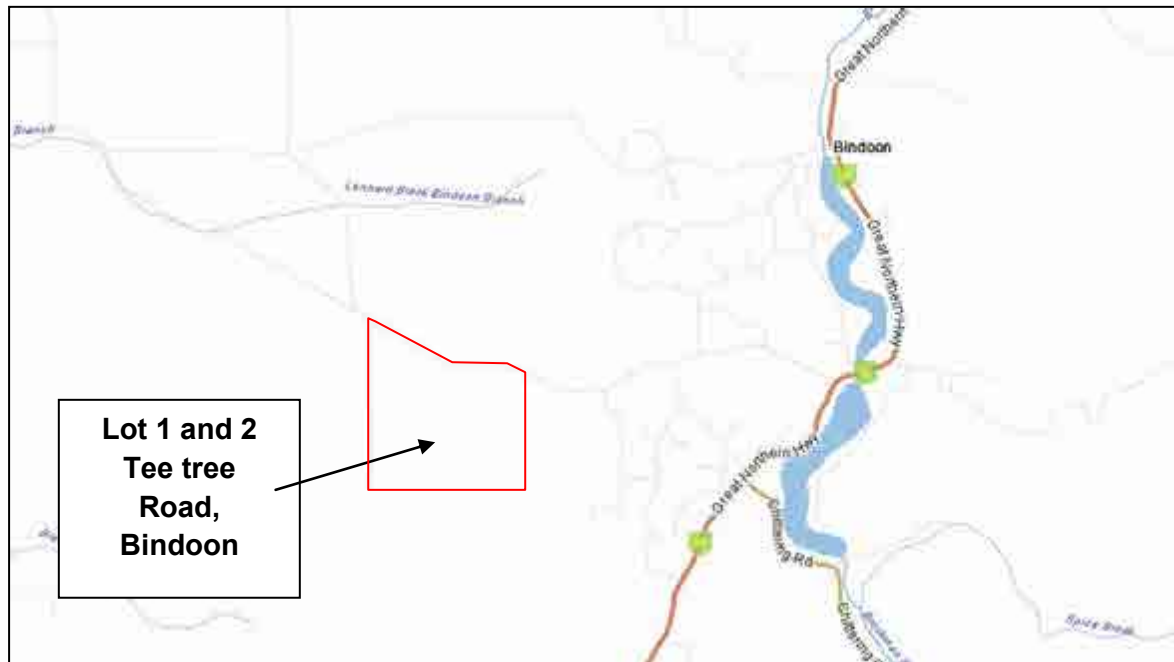
- Outline Development Plan -Whelans (2012) ?
- Land Capability Report – Landform Research (2000)
- Fire Management Plan – Bio Diverse Solutions (2012)
- Stormwater Management Plan – Whelans/SMEC (2012)



## 2. Site details

The subject site is located south of Tee Tree Road and east of Brennan Road, approximately 10 km's south of Bindoon town site in the municipality of the Shire of Chittering. The subject site is a 48ha rural lot which has been used for grazing of stock. Please refer to Figure 1 below - Locality Map, and Site Location Mapping Appendix A.

**Figure 1 – Subject site locality**



### 2.1. Development proposal

The applicant is seeking to rezone the subject area for 'Rural Retreat'. The "Spring Flora and Vegetation Survey" has been undertaken prior the WAPC assessment for rezoning, to verify the floristic conditions on site and gives recommendations for any proposed development.

The development proposal includes the creation of 44 Rural Retreat Lots. In creating the subdivision the developer proposes to implement "Vegetative Corridors" to increase linkages to remnant vegetation from the north-south and east-west.

Please refer to the Outline Development Guide Plan as provided by Whelans, Appendix B.

### 3. Desktop Assessment – Regional Setting

#### 3.1. Current site land use

The site is currently 2 rural lots of predominantly cleared paddocks with grasslands and small isolated patches of remnant vegetation, newly installed vineyards and tagasaste plantation. Historically the subject area has been used for sheep and cattle grazing. An abandoned shack exists in 1 (south west corner) and some shed buildings are located in Lot 2 associated with the rural activities. Please refer to Photograph 1 and 2 below.



**Photograph 1** – View of abandoned shack in Lot 1 (south west of subject area)



**Photograph 2** – View of shed infrastructure in Lot 2, associated with rural activities.

#### 3.2. Climate

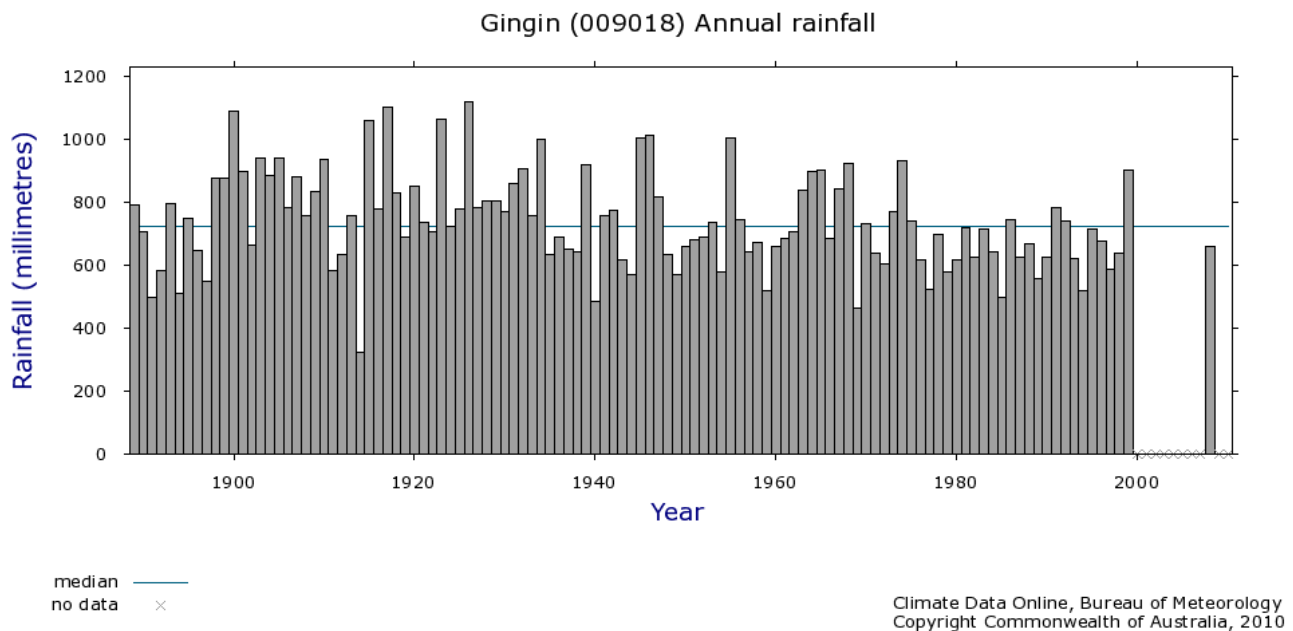
Bindoon has similar climate to Perth (75 Km away) and thus has been described as per Bureau of Meteorology descriptions of Perth. Perth experiences a Mediterranean climate, characterised by hot, dry summers and mild, wet winters. These seasons extend into the autumn and spring months, which are transitional periods between the main seasons.

The climate of the region is strongly influenced by the position of the axis of the band of high pressure known as the sub-tropical ridge, and in the warmer months by the development in the easterlies to the north of the ridge of a trough of low pressure near the West Coast. For much of the year the ridge is located to the south allowing the east or southeasterly winds to prevail. During the cooler months the ridge periodically moves to the north allowing cold fronts to pass over the west coast and deliver much of the annual rainfall. Sometimes these fronts interact with tropical cloud bands from the northwest and this can enhance the amount of rainfall produced.

##### 3.2.1. Rainfall

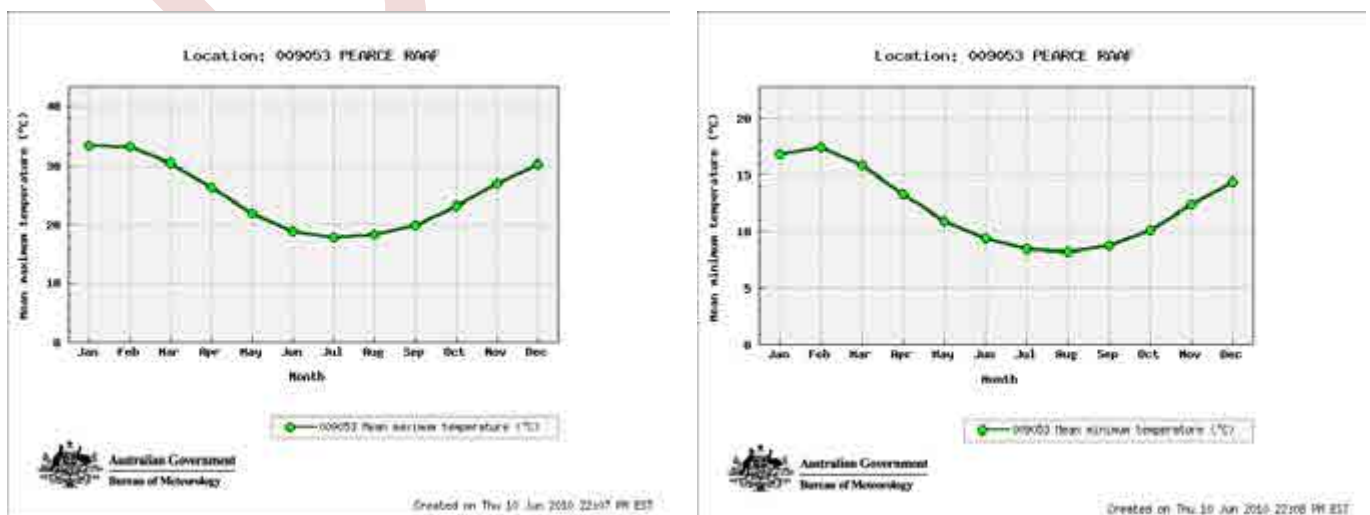
Of the annual mean rainfall of 869 mm, which occurs on 119 rain days, about 80% usually falls between May and September. Rain occurs on four days out of every seven on average during winter. Flooding is rare in Perth, however heavy rain may be produced by strong winter cold fronts or, less frequently, by summer storms or, more rarely, by decaying tropical cyclones. The highest daily rainfall is 120.6 mm recorded on 9 February 1992.

In contrast to winter rainfall, the mean summer rainfall is just 36 mm on an average of 10 rain days. It is not unusual for there to be extended dry periods during the warmer months. Please refer to Gingin Annual Rainfall graph over the page (Figure 2).

**Figure 2 – BoM Rainfall for Gingin Station**

### 3.2.2. Temperature

Mean monthly air temperature range from 31°C in February to 18°C in July and August. Summer maximum temperatures are strongly dependent upon the arrival time of the reliable sea breezes. On some days the difference between the maximum temperatures on the coast and the eastern suburbs may exceed 10°C. Heatwaves are associated with strong easterly winds and the late arrival or absence of the sea breeze. The highest temperature ever recorded is 46.2°C, however, the temperature exceeds 40°C on only three days per year on average. The average minimum temperature ranges from just 8°C in July and August to 17°C in January and February. Temperatures below 5°C are not uncommon during any of the winter months. The lowest temperature ever recorded at Perth Airport is -1.1. Please refer to average temperatures below for Gingin (40km away), Figure 3.

**Figure 3 – Average Temperatures BoM**

### 3.2.3. Wind

Winds are mainly easterly but varied in the warmer months by reliable afternoon sea breezes from the south west and in the cooler months by the westerlies that are associated with the bulk of the annual rainfall. Despite the occurrence of strong winds or gales, average wind speeds in winter are considerably lighter than in summer.

### 3.2.4. Climate Change

Climate change is expected to impact on the future rainfall pattern of the area. It is recognised that the average rainfall has already declined by 20%-30% over the past few decades and that the long term impact of climate change may lead to a shift in rainfall, as well as dryer climatic conditions for the region. The long term changes are predicted to impact on the flora, fauna and water availability for the region. (Climate Commission 2010)

The Climate Commission (Climate Commission 2010) estimates that  
*"...Rainfall patterns in Western Australia have changed over the last 40 years. There is significant evidence that climate change has contributed to the marked drying trend in the southwest of the state."*

The construction of the proposed development is not predicted to be affected by sea-level rise, however could be affected from increased intensity rainfall events or extended drying periods. The findings from the Land Capability Report (Landform Research 2000) recommends 100m setback from the soak in the central east area. This will ensure that any flooding or high rainfall periods do not affect infrastructure and that any watershed from the development from increased intensity rainfall events does not affect the Chittering River catchment area.

### 3.3. Topography and Slope

The subject site is located in an undulating landscape on the Dandaragan Plateau with the average slope for the site (assessed as an average over 4 slopes 100m in distance) calculated to be less than 5° and range between 1° and 3°. One metre contours indicate there are 2 hills in the western portion up to 201m AHD and one dominant ridge in the south east of the subject site up to 208m AHD. The lowest elevation of the site is in the east along the formation of a creek upper catchment at 168m AHD.

### 3.4. Geology and Site Soils

Australian Geoscience Mapping indicates the site is from the Pleistocene (Recent) Period (**Qpo**): **colluviums, soil and undifferentiated sand cover over laterite of Coastal plain, includes minor alleviated areas** (AGM, 1984). The subject site lies west of the Darling Scarp, within the Dandaragan trough of the Perth basin landform system.

### 3.5. Vegetation Types

The subject lies within the Swan IBRA bioregion. This bioregion is comprised of *"low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils."* The area is located within the SWA1- Dandaragan Plateau *The plateau is bordered by Derby and Dandaragan Faults. Cretaceous marine sediments are mantled by sands and laterites. Characterised by Banksia low woodland, Jarrah - Marri woodland, Marri woodland, and by scrub-heaths on laterite pavement and on gravelly sandplains.* (Hearn et al., 2002).

The vegetation has been mapped on a broad scale by Beard (Shepherd et al 2002) in the 1970's, where a system was devised for state-wide mapping and vegetation classification based on geographic, geological, soil, climate structure, life form and vegetation characteristics (Sandiford and Barrett 2010).

A GIS search of Beards vegetation classification for general area places the site within 2 broad Vegetation Associations for the site:



**System Association: Gingin 1027**

- Vegetation Association Number: 1027
- Vegetation Description: *Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia/Medium sparse woodland; jarrah & marri.*

(Source DEC Pre-European Vegetation GIS dataset)

**3.6. Threatened Flora Search**

A search of the DEC Threatened Flora Database within 5km of the subject area was undertaken a summary shown in Table 2 below and as provided by DEC in Appendix C.

**Table 2 – Threatened Flora Database Search Summary**

SPECIES	CONSERVATION CODE
<i>Acacia drummondii</i> subsp. <i>affinis</i>	3
<i>Acacia pulchella</i> var. <i>reflexa</i> <i>acuminate bracteole variant</i> (R.J. Cumming 882)	3
<i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>	3
<i>Astroloma</i> sp. <i>Cataby</i> (E.A. Griffin 1022)	4
<i>Chamelaucium</i> sp. <i>Gingin</i> (N.G. Marchant 6)	T
<i>Cyanicula ixioides</i> subsp. <i>candida</i>	2
<i>Gastrolobium nudum</i>	2
<i>Grevillea corrugata</i>	T
<i>Hypocalymma</i> sp. <i>Tea Tree Road</i> (O. Davies OD 171)	1
<i>Oxymyrrhine coronata</i>	4
<i>Ptychosema pusillum</i>	T
<i>Tetratheca pilifera</i>	3
<i>Verticordia rutilastra</i>	3

Under the *Wildlife Conservation Act 1950*, the Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection. Schedules 1 and 2 deal with those that are threatened and that are presumed extinct, respectively.

Definitions of Threatened Flora under the *Wildlife Conservation Act 1950* are as follows:

- **T: Threatened Flora (Declared Rare Flora — Extant)**  
Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the *Wildlife Conservation Act 1950*).  
Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria:  
CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild  
EN: Endangered – considered to be facing a very high risk of extinction in the wild  
VU: Vulnerable – considered to be facing a high risk of extinction in the wild.
- **X: Presumed Extinct Flora (Declared Rare Flora — Extinct)**  
Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 under the *Wildlife Conservation Act 1950*).

Taxa that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora List under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Taxa that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Conservation Dependent species are placed in Priority 5.

- **Priority 1** - Poorly known Taxa. Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. Priority 1 taxa may include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey;
- **Priority 2** - Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey;
- **Priority 3** - Poorly Known Taxa. Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey;
- **Priority 4** - Rare Taxa. Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years; and
- **Priority 5** - Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.

Based on the desktop assessment that has been conducted above, several Priority and Threatened Species could be present within the vicinity of Lot 1 and 2 Tee Tree Road Bindoon. A detailed site search was undertaken to assess the site for the above listed flora species (Table 2, Page 10).

#### 4. Site Assessment

Site flora survey and intensive Threatened Flora survey was undertaken at the proposed development areas and remnant vegetation areas, this was undertaken on the 13<sup>th</sup> October 2011. This is the spring flowering period, and considered the appropriate time of year to capture most flowering species for positive identification.

##### 4.1. Methodology

The survey area is defined as Lot 1 and 2 Tee Tree Road Bindoon, with the whole property mapped for vegetation types and intensive flora sampling for Threatened Flora in possible habitat types and remnant vegetation areas.

The remnant vegetation areas were traversed on foot and a list of dominant flora species present (native and exotic) was compiled as seen; samples or photographs were collected for unfamiliar species. Specimens collected were pressed, dried and identified. Specialist texts were used to identify specimens (Wheeler *et al*, 2002) with some checked against examples in the reference herbarium at the DEC Albany Regional Herbarium for confirmation. The authority for taxonomic names was DEC's Florabase website as of November 2011.

Intensive survey was undertaken for Threatened Flora species, with follow up identification at the DEC State Herbarium. Areas were searched for Threatened Flora adjacent to known populations and likely habitat for specific species. Vegetation condition was assessed during the field survey. Vegetation condition was assessed using the vegetation condition scale as per Keighery (1994).

##### 4.2. Vegetation

Detailed vegetation inventory was undertaken in the vegetation types identified on site. A total of 149 species was identified within 3 vegetation types. The vegetation types are shown below in Table 3.

**Table 3 – Vegetation Types Identified on site**




Vegetation Unit	Beards Vegetation Association	Site Unit Description	Photograph
Medium woodland; jarrah-marri (EmCc)	965	Medium woodland of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i>	

Table 3 cont.

Vegetation Unit	Beards Vegetation Association	Site Unit Description	Photograph
<b>Mosaic Medium open woodland: jarrah, marri &amp; banksias (EmCcBa),</b>	1027	Medium open woodland: Jarrah & Marri, with low woodland Banksia/sparse woodland jarrah/marri	
<b>Cleared paddock areas</b>	N/A	Open paddocks, cleared of native vegetation, occasional paddock trees Jarrah & Marri,	

A map of the vegetation types identified on site is shown in Appendix D. Descriptions and Photographs of each vegetation type are given in the following sections.

#### 4.3. Marri Jarrah (EmCc)

Shepard *et al.* (2002) estimate the pre-European extent of 965: Medium woodland; Jarrah – Marri was 114,948ha, with a current area of 5,415ha. It is estimated that 36% of this vegetation type is represented in national parks, nature reserves and state forest and 10.2% is represented in other reserves. The subject site comprised of approximately 20% of this vegetation type which was identified as small isolated remnant areas which had not been previously cleared in the eastern side of the subject area. Please refer to Appendix D– Vegetation Mapping.

The dominant overstorey species in this vegetation type are: *Eucalyptus marginata*, jarrah; and *Corymbia calophylla*, marri. These species form a mosaic of Medium to Low Open Forest with tree height between 15 to 30m. Jarrah comprises between 30-70% of the canopy cover and marri comprise 2-10% canopy cover. Banksia grandis, *Allocasuarina humilis*, occasional *Eucalyptus tottiana* (Coastal Blackbutt), *Banksia sessilis* var. *Sessilis*, *Xanthorrhoea preissii* and *Hakea lissocarpa* were the dominant second storey species within this vegetation complex, and represent 10-30% vegetation cover. These species were shrubs 1- 2m. The midstorey species were generally less dominant due to the vegetation being grazed. Please refer to Photographs 5 and 6.





**Photograph 5** – View along eastern boundary of subject site in Jarrah/Marri vegetation type, Good Condition.



**Photograph 6** – View of Jarrah/Marri in south east of subject site, the largest remnant patch, Good condition.

Other species identified within this cover class (1m to greater than 2m in height) include: *Anigozanthos humilis*; *Austrodanthonia occidentalis*, *Baeckea grandiflora*; *Caladenia flava* *Drosera erythrorhiza*; *Elythranthera brunonis*, *Haemodorum venosum*; *Kennedia prostrata*, *Lomandra caespitosa*, *Neurachne alopecuroidea*, *Petrophile striata*; *Stylidium hispidum*; *Stylidium calcaratum*; *Trachymene pilosa*, and *Tricoryne elatior*. The sedge and herb storey in this vegetation complex has 10-30% cover depending on the amount of grazing the vegetation has sustained. The majority of species were less than 1m in height. Please refer to Appendix D – Flora Species List.

The Medium Woodland vegetation type is generally considered to be in “Disturbed” condition: “Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate to it;” (Keighery, 1994). Some areas of “Good Condition”: *Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate to it;* (Keighery, 1994), occurs in the eastern extent of the remnant vegetation areas. Refer to Mapping Appendix D.

#### 4.4. Mosaic: open woodland: Jarrah & Marri, with low woodland *Banksia*/sparse woodland jarrah/marri (EmCcBa)

Shepard *et al.* (2002) estimate the pre-European extent of Vegetation Type 1027 open woodland: Jarrah & Marri, with low woodland *Banksia*/sparse woodland jarrah/marri was 46,748ha, with a current area of 16,423ha. It is estimated that 30.1% of this vegetation type is represented in national parks, nature reserves and state forest, and 0% is represented in other reserves. Lot 1 (south west of subject area) is comprised of approximately 90% of this vegetation type, although is in a much degraded form due to clearing and grazing of stock. Please refer to Appendix D – Vegetation Mapping.

The overstorey in this vegetation type is dominated by a mosaic of *Eucalyptus marginata*, jarrah; *Corymbia calophylla*, marri, and *Banksia attenuata*; Slender *Banksia* and occasional *Eucalyptus tottiana*, Coastal Blackbutt and *Nuytsia floribunda*; Australian Christmas Tree, comprising to 10-60% cover depending on disturbance. The dominant shrubland species in this vegetation type are: *Pteridium esculatum*, bracken, *Adenanthos cygnorum*, *Astroloma xerophyllum*, *Bossiaea eriocarpa*, *Centrolepis drummondiana*, *Daviesia nudiflora*, *Hakea ruscifolia*, *Hibbertia hypericoides*,

*Lechenaultia floribunda* *Jacksonia floribunda*, *Patersonia occidentalis*, and *Synaphea spinulosa* which comprise 0-30% cover depending on disturbance. Please refer to Photograph 7 below.



**Photograph 7** – View of Mosaic: jarrah, marri, banksias woodland in sandy soils in south west of subject area.

This vegetation type which has been disturbed is generally considered to be in “Degraded” condition: *“Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management”*. (Keighery, 1994).

#### 4.5. Paddock Grasslands (G)

The cleared areas form approximately 70% of the property. This vegetation type is considered to be in a “Completely Degraded” condition: *“The structure of the vegetation is no longer intact and the area is completely or almost completely without native species”* (Keighery, 1994). This area can be described as Parkland Cleared, and may have been cleared in the past for the purposes of farming and agricultural use. Vegetation is primarily composed of environmental (non aggressive) weed species with isolated trees of *E.marginata* and *C.calophylla* and some areas of tagsaste plantations.

Please refer to Photograph 8 and 9 below, and Vegetation Mapping Appendix D.



**Photograph 8** – View to the west from eastern paddocks



**Photograph 6** – View of isolated Jarrah/Marri trees in cleared paddock areas.

#### 4.6. Recommendations

Based on the site survey, it is therefore recommended:

- The development is restricted to areas previously disturbed.
- Intact native vegetation in “Good” Condition should be retained to preserve biodiversity and habitat;
- Clearing of any native vegetation should be restricted to existing cleared areas and should not extend into current remnant vegetation patches; and
- Vegetation should be fenced from stock.

#### 4.7. Threatened Flora

A search of the DEC Threatened (Declared Rare) Flora and WA Herbarium Databases was undertaken with the Species and Communities Branch of DEC. Please refer to Report in Appendix C. The database search revealed a possible 13 species could be located within 5km of the subject area.

The subject site was intensively searched in remnant vegetation areas for Threatened Flora species, as listed in Table 2 and Appendix C. Searches were undertaken in walked, sweeping transects searching all of the remnant vegetation areas for a minimum of 100m outside of vegetation areas.

Site searches revealed the presence of Priority Flora species (*Acacia drummondii* ssp *affinis*), Priority 3 pursuant to Subsection 2 of Section 23F of the *Wildlife Conservation Act 1950*. Please refer to Vegetation Mapping Appendix D.

No species of Declared Rare Flora (DRF) was located on site.

It is therefore recommended:

- The development is restricted to areas previously cleared, and the remnant vegetation area containing the Priority 3 species *Acacia drummondii* ssp *affinis* is fenced to exclude stock to maintain habitat for the species.

#### 4.8. Environmentally Sensitive Areas and Threatened Ecological Communities

There are no Environmentally Sensitive Areas on the subject site or adjacent to Lot 1 and 2 Tee Tree Road, Bindoon.

A search for Threatened Ecological Communities (TECs) within the Swan (SWA2) IBRA bioregion on the SLIP portal database found that there are no TECs present on the subject site.

#### 4.9. Weeds

In 1976 the Agriculture Protection Board introduced legislation to control weeds – the *Agriculture and Related Resources Protection Act 1976*. This legislation sets out “declared” plants and legal obligations to landowners in regards to these species. If a plant is declared then landowners are obliged to control that plant on their properties.

Environmental Weeds are defined by the “Environmental Weeds Strategy for Western Australia” (1999) as “plants that establish themselves in natural ecosystems and proceed to modify natural processes, usually adversely, resulting in the decline of the communities they invade”. At present there is no legislation governing management of Environmental Weeds, landowners are encouraged to control movement and restrict further spread of these species.

Any plant other than a declared plant can be prescribed as a “Pest Plant”, under Section 109 of the *Agriculture and Related Resources Protection Act 1976*. Typically these are prescribed whereby the occurrence of these may adversely affect property values, comfort or convenience of the inhabitants of a particular district.

The Act states (6) (1) “The council may serve on the owner or occupier of private land...a duly completed notice...requiring him/her to destroy eradicate, or otherwise control any pest plant on that land”(Agriculture and Related Resources Protection Act 1976).

Thirty eight weed species in total were recorded, excepting the Pink Gladiolus (*Gladiolus caryophyllaceus*), the majority of these weeds are non aggressive in nature, refer to Table 3.

**Table 3 – Weed species present on site**

Family	Species	Common Name
POACEAE	<i>Avena sp.</i>	Wild oats
BRASSICACEAE	<i>Brassica tournefortii</i>	
POACEAE	<i>Bromus diandrus</i>	
MYRTACEAE	<i>Callistemon x citrinus</i>	
FABACEAE	<i>Chamaecytisus palmensis</i>	Tagasaste
ASTERACEAE	<i>Cotula coronopifolia</i>	Waterbuttons
CYPERACEAE	<i>Cyperus brevifolius</i>	
CYPERACEAE	<i>Cyperus tenuiflorus</i>	
ORCHIDACEAE	<i>Disa bracteata</i>	
SCROPHULARIACEAE	<i>Dischisma arenarium</i>	
POACEAE	<i>Ehrharta longiflora</i>	Annual Veldt Grass
GERANIACEAE	<i>Erodium botrys</i>	
IRIDACEAE	<i>Gladiolus caryophyllaceus</i>	Pink gladiolus
ASTERACEAE	<i>Helichrysum luteoalbum</i>	
ASTERACEAE	<i>Hypochaeris glabra</i>	
CYPERACEAE	<i>Isolepis marginata</i>	
CYPERACEAE	<i>Isolepis prolifera</i>	
FABACEAE	<i>Lotus subbiflorus</i>	
FABACEAE	<i>Ornithopus compressus</i>	
FABACEAE	<i>Ornithopus sativus</i>	
OROBANCHACEAE	<i>Orobanche minor</i>	
SCROPHULARIACEAE	<i>Parentucellia viscosa</i>	
POACEAE	<i>Pentaschistis airoides</i>	
POLYGONACEAE	<i>Persicaria decipiens</i>	
CARYOPHYLLACEAE	<i>Petrorhagia dubius</i>	
POACEAE	<i>Polypogon monspeliensis</i>	Annual beardgrass
IRIDACEAE	<i>Romulea rosea</i>	Guildford grass
ASTERACEAE	<i>Sonchus asper</i>	
ASTERACEAE	<i>Sonchus oleraceus</i>	Sowthistle
FABACEAE	<i>Trifolium arvense</i>	Hare's foot clover
FABACEAE	<i>Trifolium dubium</i>	
FABACEAE	<i>Trifolium hirtum</i>	Rose clover
FABACEAE	<i>Trifolium subterraneum</i>	Subclover
ASTERACEAE	<i>Ursinia anthemoides</i>	
ASTERACEAE	<i>Vellereophyton dealbatum</i>	
POACEAE	<i>Vulpia myuros</i>	
CAMPANULACEAE	<i>Wahlenbergia capensis</i>	

The weed species identified are not “Declared” weeds under the *Agricultural and Related Resources Protection Act 1976*, and are environmental weeds which should be restricted from movement off-site and further into any adjacent vegetation. The Pink Gladiolus (*Gladiolus*



*caryophyllaceus*) is aggressive and is present within the remnant native vegetation on the eastern boundary of the subject site. It is recommended this species is targeted for control and eradication from the area to allow native species to establish.

Skeleton Weed (*Chondrilla juncea*) has been recorded on site, however no species were located during vegetation survey. Skeleton Weed is a Declared plant. Management strategies for this species include:

- P1 – Plants which cannot be introduced or spread; and
- P4 – Containment, plants should be prevented from further spread.

***Skeleton Weed Control Method - Report any plants to the Department of Agriculture and Food (DAFWA)***

All plants found must be reported immediately to Agriculture Western Australia or District Agriculture Protection officers to be dealt with under the Skeleton Weed Eradication Project.

It is therefore recommended:

- Weeds should be controlled on-site and restricted from movement offsite, this can be undertaken by ensuring machines are clean on entry and exit when disturbing any soils or vegetative matter;
- The Pink Gladiolus (*Gladiolus caryophyllaceus*) is targeted for eradication in the eastern remnant vegetation area; and
- Continue monitoring the subject area for occurrences of the Declared plant Skeleton Weed (*Chondrilla juncea*) and if located report to DAFWA.

## 5. Discussion

The Shire of Chittering have a Local Biodiversity Strategy which aims to conserve existing native vegetation and extend linkages to further protect vegetation complexes and values. The subject site is not located in a Priority area or contains a Priority Vegetation Complex.

The Priority areas of native vegetation (SOC, 2010) include:

- Natural areas with vegetation complexes under represented regionally and locally, within and outside the IHCVAs;
- Adequate buffers to significant flora, fauna and ecological communities;
- Adequate buffers to creeklines and other wetlands;
- Vegetation that provides habitat to Carnaby's black cockatoos;
- Patches of native vegetation that form a regional or local ecological linkage;
- Buffers to formal conservation reserves as well as private properties with voluntary management agreements through Land for Wildlife and conservation reserves or similar; and
- High conservation value roadside remnant vegetation.

The vegetation on site supports possible habitat and feed trees for the Carnaby's Black Cockatoo and Baudin's Cockatoo these species are presently protected Federally and under State legislation.

### **Status:**

Carnaby's Black Cockatoo: Wildlife Conservation (Specially Protected Fauna) Notice 2010 - Schedule 1 Endangered: EPBC Act Endangered; Forest Red-Tailed Black Cockatoo: Wildlife Conservation (Specially Protected Fauna) Notice 2010 Schedule 1 - Vulnerable: EPBC Act Vulnerable;.

A survey of possible habitat trees and feed trees was not undertaken within the scope of these works. It is possible that isolated trees in paddock areas could be frequented by these species. A survey of trees which are going to be removed in the paddock areas (i.e for road or fencing infrastructure) should be undertaken and referral to the Federal Department of Sustainability, Environment, Water, Population and Communities may be required depending on the outcome.

The subject site supports remnant native vegetation patches in the east of the site which is in "Good" Condition which, if fenced from stock, would recover to "Excellent Condition without any further revegetation. The protection of these areas would provide an increase in the biodiversity values of the local area, meeting one of the aims of the Shire of Chittering Biodiversity Strategy.

It is recommended to the client that the following is implemented at Subdivision to ensure the existing Biodiversity values are achieved and future values for the area are achieved:

1. Protect the Priority 3 species *Acacia drummondii ssp affinis*, and provide further suitable habitat for the species in the future by fencing the area from stock;
2. Increase the local Biodiversity by creating north-south and east-west micro corridors.
3. The remnant vegetation areas in the east should be fenced to exclude stock in an effort to increase the biodiversity within these areas and encourage regeneration.
4. A survey of current habitat and feed trees of the Carnaby's and Red tailed black cockatoo occur of any trees >500mm diameter.
5. Applying Development Exclusion Zones over remnant vegetation areas in 'Good Condition' to ensure the long term protection of these areas. A notification on title should be applied to ensure if the land is sold this is known to prospective buyers.

These recommendations have been mapped across the site and is shown in Appendix F – Recommendations Mapping.

## 6. Conclusion

Bio Diverse Solutions was commissioned to undertake a Spring Flora and Vegetation Survey of Lot 1 and 2 Tee Tree Road Bindoon as part of investigations requested from Whelans in support of a proposal to rezone land for Rural Residential purposes. The Spring Flora and Vegetation Survey is required by the Western Australian Planning Commission (WAPC) to assist with the rezoning process. The survey is aligned to Environmental Protection Authority (EPA) *Guidance Statement number 51: Terrestrial Flora and Vegetation Surveys*.

This report details the vegetation types on site, gives a flora inventory, an assessment of Threatened Flora and recommendations for future management of the proposed Rural Residential Development land use. The assessment of the site involved desktop assessment by review of the GIS datasets mapping (DoW, DEC), review of DEC Threatened Flora Database, review of literature sources, searches of Florabase and associated reference texts.

The survey area was approximately 484 ha, with the majority of the site cleared for agricultural use, intensive survey was undertaken in remnant vegetation patches via traversing on foot. Physical survey was undertaken in the spring flowering period on the 13<sup>th</sup> October 2011, which is considered the appropriate time of year for positively identifying plant species. Site survey included sweeping transects across the whole site, remnant vegetation areas, and further intensive searches for Threatened Flora at probable habitat types.

A total of three Vegetation types were identified on site, being:

- Medium woodland; jarrah-marri (EmCc);
- Mosaic: Medium open woodland: Jarrah & Marri, with low woodland Banksia/sparse woodland jarrah/marri; and
- Grassland areas: bare paddock areas.

One Priority species as listed by the Wildlife Conservation Act 1950 was located within a remnant vegetation area in the east. This area is not proposed to be disturbed as part of the subdivision development.

The proposed development is utilising already cleared/disturbed areas for infrastructure requirements, with some removal of isolated paddock trees for road/infrastructure requirements. The vegetation in these areas was considered to be in Completely Degraded Condition. It is not anticipated that this development will impact the remnant vegetation areas which are in Good Condition.

The findings in this report are based on the implementation of the following recommendations:

1. Protect the Priority 3 species *Acacia drummondii ssp affinis*, and provide further suitable habitat for the species in the future by fencing the area from stock;
2. Increase the local biodiversity by creating north-south and east-west micro corridors, by linking to the remnant vegetation patches in the east of the subject site and through the north of existing Lot 1;
3. The remnant vegetation areas in the east should be fenced to exclude stock in an effort to increase the biodiversity within these areas and encourage regeneration;
4. A survey of current habitat and feed trees of the Carnaby's and Red tailed black Cockatoo occur of any trees >500mm diameter, depending on the outcome of the survey, possible referral may be required to the Federal Department of Sustainability, Environment, Water, Population and Communities;
5. Applying Development Exclusion Zones over remnant vegetation areas in 'Good Condition' to ensure the long term protection of these areas. A notification on title should be applied to ensure if the land is sold this is known to prospective buyers.

6. Weeds should be controlled on-site and restricted from movement offsite, this can be undertaken by ensuring machines are clean on entry and exit when disturbing any soils or vegetative matter;
7. The Pink Gladiolus (*Gladiolus caryophyllaceus*) is targeted for eradication in the eastern remnant vegetation area; and
8. Continue monitoring the subject area for occurrences of the Declared plant Skeleton Weed (*Chondrilla juncea*) and if located report to DAFWA.

If the above recommendations are implemented the property would assist in achieving the following goals from the Shire of Chittering's local Biodiversity Strategy:

1. **Goal 1 – Retention of natural areas:** through the fencing of all the “Good Condition” vegetation areas and providing linkages to adjacent remnant vegetation.
2. **Goal 2 – Protection of natural areas:** in remnant vegetation areas place “Development Exclusion” and notification on title top prospective buyers.

Bio Diverse Solutions conclude that if the listed recommendations are implemented by the client, the development of rural residential on Lot 1 and 2 Tee Tree Road Bindoon can be implemented sustainably and in an environmentally sound manner.

It is further recommended that if the construction of this development is not undertaken within 5 years of this survey, after that time the Spring Survey should be re-conducted to verify/confirm absence/presence of Threatened Flora species adjacent to proposed disturbance areas.



## 7. References

Australian Geoscience Mapping (1984) Map series S50-14 Part of Sheet S150-13, Mt Barker to Perth.

Beard's Vegetation Classification dataset, 1:3,000,000 digital representation of Beard's vegetation map of the state of Western Australia.

Bureau of Meteorology Climate Data Gingin accessed December 2011:

<http://www.bom.gov.au/climate/data/index.shtml>

Climate Commission (2010) Climate Change Impacts, website accessed 15-11-11 from

<http://climatecommission.gov.au/topics/western-australia-climate-change-impacts/>

Commonwealth of Australia (1996) *The National Strategy for the Conservation of Australia's Biological Diversity*. Department of Environment, Sport and Territories, Canberra, ACT. Department of Environment and Conservation (DEC) (2006) *List of Threatened Ecological Communities on the Department of Environment and Conservation's Threatened Ecological Community (TEC) Database endorsed by the Minister for Environment, Species and Communities Branch*.

Department of Environment and Conservation (DEC) (2008) *Priority Ecological Communities for Western Australia*.

Department of Sustainability, Environment, Water, Population and Communities (2011) *Environment Protection and Biodiversity Conservation Act 1999 draft referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered), Calyptorhynchus latirostris Baudin's cockatoo (vulnerable), Calyptorhynchus baudinii Forest red-tailed black cockatoo (vulnerable)*. Commonwealth of Australia.

Environmental Protection Authority (EPA) (2002) *Terrestrial Biological Surveys as an Element of Biodiversity Protection*, Position Statement No. 3, March 2002.

EPA (2004) *Guidance for the Assessment of Environmental Factors, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*, Guidance Statement No 51 June 2004;

Gardner, C.A. (1979) *Eucalypts of Western Australia*, Western Australian Department of Agriculture, Bulletin 4013.

Hearn, R., Williams, K. and Comer, S. (2002) *Swan (SWA- Swan)*, A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002, Department of Conservation and Land Management.

Hussey, B.M.J., Keighery, E.J., Coussens, R.D., Dodd, J. and Lloyd, S.G. (1997) *Western Weeds A Guide to the Weeds of Western Australia*, The Weeds Society of WA Inc.

Keighery, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA.

Lindenmayer, D. and Burgman, M. (2005) *Practical Conservation Biology*, CSIRO Publishing, Victoria, Australia.

Moore, J. and Wheeler, J. *Southern Weeds and Their Control*, Department of Agriculture.

Sandiford, E.M. and Barrett, S. (2010). *Albany Regional Vegetation Survey, Extent Type and Status, A project funded by the Western Australian Planning Commission (EnviroPlanning "Integrating NRM into Land Use Planning" and State NRM Program)*, South Coast Natural

*Resource Management Inc. and City of Albany for the Department of Environment and Conservation.* Unpublished report. Department of Environment and Conservation, Western Australia.

Shire of Chittering (2010) Local Biodiversity Strategy, Shire of Chittering, Bindoon WA.  
Wheeler, J, Marchant, N. and Lewington, M., (2002) *Flora of the South West, Volume 1 & 2*, Australian Biological Resources Study, University of Western Australia.

**Appendices**

**Appendix A – Location Mapping**

**Appendix B – Outline Development Plan**

**Appendix C – DEC Threatened Flora Report**

**Appendix D – Vegetation Mapping**

**Appendix E – Flora Species List**

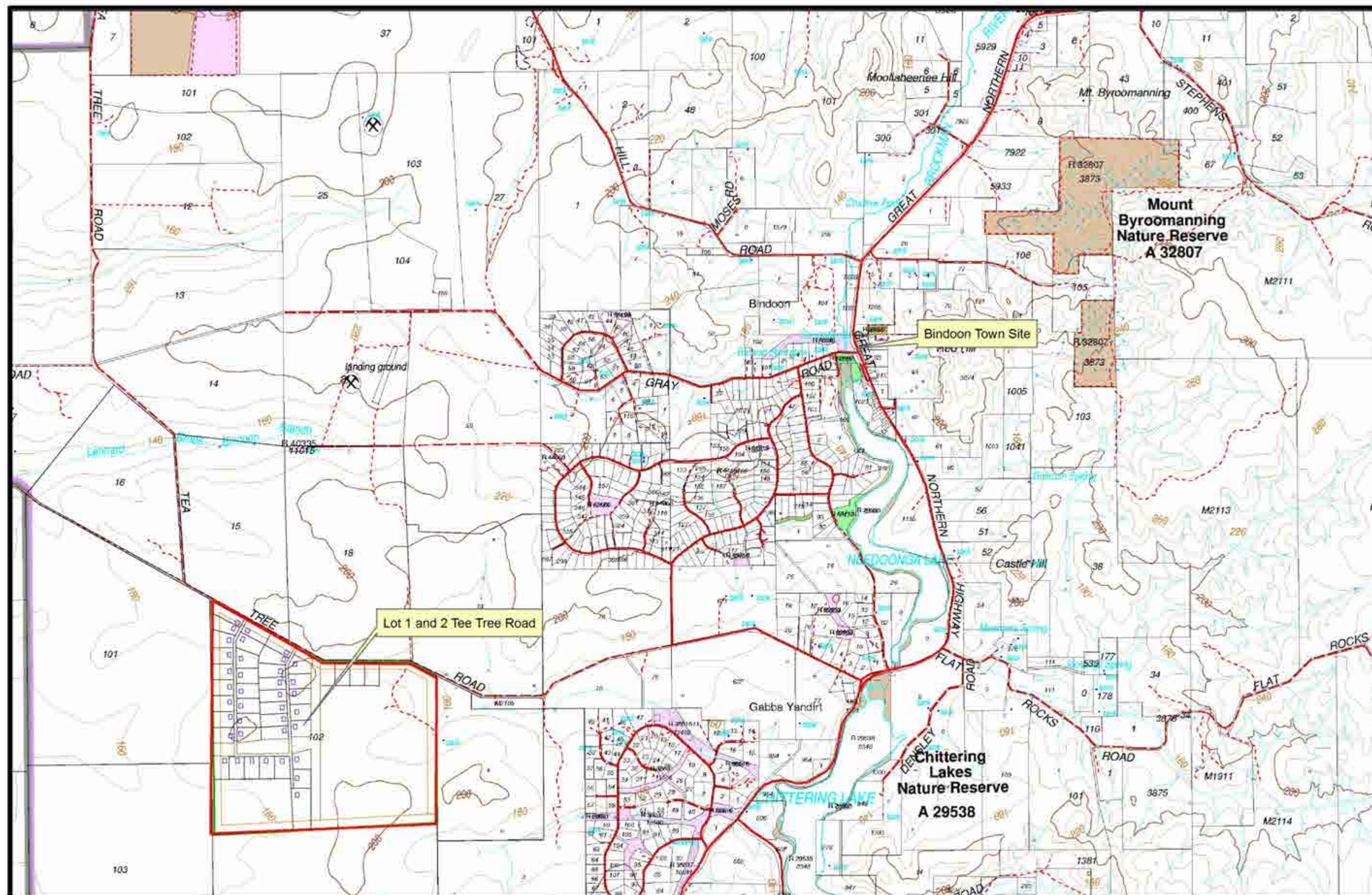
**Appendix F – Recommendations Mapping**

Appendix A

Location Mapping







## Legend

Subject area

Scale  
1:40000 @ A3



0 390 780 1,560 2,340 3,120 Meters



**BIO  
DIVERSE  
SOLUTIONS**

55 Peppermint Drive  
Albany, WA 6330  
Australia  
Tel: 08 9841 3936  
Fax: 08 9841 3936  
Mob: 0447 555 516

CLIENT Lot 1 and 2 Tee Tree Road  
Bindoon WA

## Location Mapping

STATUS	FILE	DATE
FINAL	WHEL014	20/01/2012



**Appendix B**

**Outline Development Guide Plan**

**Whelans**

10m road widening of Tea Tree Road

Dwelling construction within 100m FHS to be BAL 12.5

Brennan Road as Strategic Fire Break

Proposed subdivision roads 30m wide

Public open space corridors to link areas of high biodiversity

Retention of windmill on Lot 31

Landowner to retain balance lot for winery and possible incidental tourism uses

Emergency and Fire Service access within POS

Future site for Ukrainian Youth Camp

#### ADOPTION

Adopted by resolution of the Council of the Shire of Chittering and the Ordinary meeting of Council held on the day of 2012 and the seal of the municipality was pursuant to the resolution hereto affixed in the presence of:

President

Chief Executive Officer

Date

Job Number: 11763

Sheet Name: 11763-6

Scale: 1:1500 @ A3

Date: 15/3/2012

Drawn By: SJF

Checked by: JEP

File: s:\Projects\11763\planning\drawings & design\design\11763 outline develop plan.dgn

All dimensions and areas are subject to survey

This plan is subject to copyright and should not be reproduced without the permission of WHELAN

The Coordinate system adopted for this plan and digital data has been derived from Landgate SCRS and is based on MGRS Datum, June 2000

This document must accompany the plan and digital data at all times



**PUBLIC OPEN SPACE**  
Total Site Area of Lots 1 & 2 = 483 hectares  
Public Open Space provided = 48 hectares (10%)

**DEVELOPMENT PLAN LOT YIELD**  
Total No. lots proposed = 44  
(including indicative lots on Tea Tree Rd)



(a) Development Plan  
This Development Plan has been approved by the Council and the Western Australian Planning Commission. Subdivision and development should generally be in accordance with the Plan.

(b) Development Requirements and 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 Retreat zone apply.

(c) Vegetation Preservation  
No clearing is permitted without Planning Consent, within areas of Vegetation Protection and fire-vegetation as depicted on the Development Plan - unless those trees are dead, diseased or present danger to property.

(d) Building Envelopes  
Buildings, water tanks and waste disposal are to be contained within an area not to exceed a maximum of 2,000 sqm without the prior approval of Council. Building envelopes are to be setback from cadastral boundaries as follows:

Highways	100 metres
Road	20 metres
Yard	20 metres
Side	15 metres

If the site is to have a sand pad for the proposed dwelling greater than 0.5 metres above natural ground level, then for every 0.5 metres or height above natural ground level, setback distances are to be increased by 2 metres.

(e) Fencing  
In accordance with Local Planning Policy No. 22 "Fences", within a lot the construction of a fence around the building envelope, any previously cleared area and adjoining an authorised firebreak, is permitted. Elsewhere, no boundary fences are permitted in vegetation protection areas identified on the Development Plan, without planning consent of the Council.

(f) Crossovers  
The construction of a crossover to each lot is to be in accordance with Council's specifications.

(g) 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 the lighting purposes and fitted with a standard 50mm male Camlock valve.

(h) Land Management  
The maintenance of any drainage swales, easements, fire breaks and vegetation protection and re-vegetation areas is the responsibility of the owner/occupier.

(i) Bore, Dams and Water Courses  
The sinking of bores, construction of dams and extraction of surface water is not permitted without the approval of the Council and relevant State Government department.

(j) Fire Control  
Strategic Fire Breaks as shown on the Development Plan will be constructed by the Developer and are to be maintained by the owner/occupier to the satisfaction of the Chief Executive Officer and the Fire and Emergency Services Authority, in accordance with Local Planning Policy No. 21 "Fire Management Plans".

(k) Permitted Uses  
In considering development and subdivision of the land, the requirements of the Shire of Chittering Town Planning Scheme No. 6 for the Rural Retreat zone apply. 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.

(l) Stocking Restrictions  
Grazing animals are to be restricted to avoid overgrazing in accordance with Local Planning Policy No. 24 "Stocking Rates and Keeping of Animals".

(m) Domestic Pests  
The keeping of domestic cats shall be prohibited.

(n) Roofing Materials  
All buildings shall be constructed with roofs of non-reflective materials.

(o) Waste Disposal  
Where indicated on the Development Plan, alternative treatment units are required for effluent disposal.

(p) 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.

(q) 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 Plan and Fire Management Plan.

## OUTLINE DEVELOPMENT PLAN LOTS 1 & 2 TEA TREE ROAD BINDOON



1000 0 1000 2000 4000 6000 750

133 Scarborough Beach Road, Mount Hawthorn WA 6016

PO Box 99, WHELAN TOWN PLANNING WA 6016

T: 08 9440 1311 F: 08 9440 3301

E: whelan@whelan.com.au W: www.whelan.com.au

**Appendix C**

DEC Threatened Flora

Database Search





Department of  
**Environment and Conservation**

*Our environment, our future*



Your Ref:

Our Ref: **23-1011FL**

Enquiries: Jessica Donaldson

Phone: (08) 9334 0123

Fax: (08) 9334 0278

Email: [jessica.donaldson@dec.wa.gov.au](mailto:jessica.donaldson@dec.wa.gov.au)

**Bio Diverse Solutions**

55 Peppermint Drive  
Albany WA 6330

Attention: Kathryn Kinnear

Dear Kathryn Kinnear,

**REQUEST FOR RARE FLORA INFORMATION**

I refer to your request of 03 October 2011 for Threatened Flora information in the Bindoon area. The search was conducted within a 5km radial area from the central coordinates you submitted.

A search was undertaken for this area of **(1)** the Department's *Threatened (Declared Rare) Flora* database (for results, *if any*, see "DEFL" – coordinates are GDA94), **(2)** the *Western Australian Herbarium Specimen* database for priority species opportunistically collected in the area of interest (for results, *if any*, see "WAHERB" – coordinates are GDA94 – see condition number 9 in the attached 'Conditions in Respect of Supply' and **(3)**, the Department's *Declared Rare and Priority Flora List* [this list is searched using 'place names'. This list, which may also be used as a species target list, contains species that are declared rare (Conservation Code R or X for those presumed to be extinct), poorly known (Conservation Codes 1, 2 or 3), or require monitoring (Conservation Code 4) – for results, *if any*, see "DP List"]. The results are attached electronically to this email.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the seventh point, which refers to the requirement to undertake field investigations for the accurate determination of rare flora occurrence at a site. *The information supplied should be regarded as an indication only of the rare flora that may be present and may be used as a target list in any surveys undertaken.*

The information provided does not preclude you from obtaining and complying with, where necessary, land clearing approvals from other agencies.

An invoice for \$300 (plus GST) to supply this information will be forwarded.

It would be appreciated if any populations of rare flora you encounter in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss rare flora management, please contact Dr Ken Atkins, Manager, Species and Communities Branch, on (08) 9334 0455.

Yours faithfully

Jessica Donaldson

.....  
for Keiran McNamara  
DIRECTOR GENERAL

7 October 2011

**Species and Communities Branch**

17 Dick Perry Ave, Technology Park, Kensington

Phone: (08) 9334 0455 Fax: (08) 9334 0278

Locked Bag 104, Bentley Delivery Centre, Bentley, Western Australia 6983

[www.dec.wa.gov.au](http://www.dec.wa.gov.au)

## DEPARTMENT OF ENVIRONMENT AND CONSERVATION

### RARE FLORA INFORMATION

#### CONDITIONS IN RESPECT OF SUPPLY OF INFORMATION

1. All requests for data to be made in writing to the Director General, Department of Environment and Conservation, Attention: Threatened Flora Database Officer, Species and Communities Branch.
2. The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided, without the prior written consent of the Director General, Department of Environment and Conservation.
3. Specific locality information for Declared Rare Flora is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for DRF may not be used in public reports without the written permission of the Director General, Department of Environment and Conservation. Publicly available reports may only show generalised locations or, where necessary, show specific locations without identifying species. The Department is to be contacted for guidance on the presentation of rare flora information.
4. Note that the Department of Environment and Conservation respects the privacy of private landowners who may have rare flora on their property. Rare flora locations identified in the data as being on private property should be treated in confidence, and contact with property owners made through the Department of Environment and Conservation.
5. Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data provided, they may be present. The Department of Environment and Conservation accepts no responsibility for this.
6. Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.
- 7. It should be noted that the supplied data do not necessarily represent a comprehensive listing of the rare flora of the area in question. Its comprehensiveness is dependant on the amount of survey carried out within the specified area. The receiving organisation should employ a botanist, if required, to undertake a survey of the area under consideration.**
8. Acknowledgment of the Department of Environment and Conservation as source of the data is to be made in any published material. The unique reference number that is given upon the request for information should be quoted. Copies of all such publications are to be forwarded to the Department of Environment and Conservation, Attention: The Manager, Species and Communities Branch.
9. The development of the PERTH Herbarium database was not originally intended for electronic mapping (eg. GIS ArcView). The latitude and longitude coordinates for each entry are not verified prior to being databased. It is only in recent times that collections have been submitted to PERTH with GPS recorded in latitude and longitude coordinates. Therefore, be aware when using this data in ArcView that some records may not plot to the locality description given with each collection.

#### Species and Communities Branch

17 Dick Perry Ave, Technology Park, Kensington

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Locked Bag 104, Bentley Delivery Centre, Bentley, Western Australia 6983

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**THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

**DECLARED RARE AND PRIORITY FLORA LIST**

for Western Australia

**CONSERVATION CODES**

**R: Declared Rare Flora - Extant Taxa**

**Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.**

**X: Declared Rare Flora - Presumed Extinct Taxa**

**Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.**

**1: Priority One - Poorly known Taxa**

**Taxa which are known from one or a few (generally <5) populations which are under threat**, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

**2: Priority Two - Poorly Known Taxa**

**Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat** (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

**3: Priority Three - Poorly Known Taxa**

**Taxa which are known from several populations, and the taxa are not believed to be under immediate threat** (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

**4: Priority Four - Rare Taxa**

**Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors.** These taxa require monitoring every 5-10 years.

Note, the need for further survey of poorly known taxa is prioritised into the three categories depending on the perceived urgency for determining the conservation status of those taxa, as indicated by the apparent degree of threat to the taxa based on the current information.

**Species and Communities Branch**

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Phone: (08) 9334 0455 Fax: (08) 9334 0278

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## ABBREVIATIONS USED IN THREATENED FLORA DATABASE PRINTOUTS

**VESTING**

AAP	Aboriginal Planning Authority
AGR	Chief Executive, Dep. of Agriculture
ALT	Aboriginal Land Trust
APB	Agricultural Protection Board of WA
BGP	Botanical Gardens & Parks Authority
BSA	Boy Scouts Association
CC	Conservation Commission – NPNCA - LFC
CGT	Crown Grant in Trust
COM	Commonwealth of Australia
CRO	Crown Freehold-Govt Ownership
CRW	Crown
DAG	Dep. of Agriculture
DOW	Dep. of Water
DPI	Dep. of Planning & Infrastructure
EXD	Exec Direc CALM
FES	Fire and Emergency Services Aust.
HOW	Dep. of Housing/State Housing Commission
ILD	Industrial Lands Develop. Auth
LAC	LandCorp
MAG	Minister for Agriculture
MBC	Metropolitan Cemeteries Board
MED	Ministry of Education
MHE	Minister for Health
MIN	Minister for Mines
MPL	Ministry for Planning
MPR	Minister for Prisons
MRD	Main Roads WA
MTR	Minister for Transport
MWA	Minister for Water Resources
MWO	Minister for Works
NAT	Natural Trust of Australia WA
NON	Not Vested
PLB	Pastoral Lands Board
PRI	Private/Freehold
RAI	Public Transport Authority
REL	Religious Organisation
SEC	Synergy (ex Western Power)
SHI	Shire
SPC	State Planning Commission
SWA	State of Western Australia
TEL	Telstra
UNK	Unknown
WAT	Water Corporation
WEL	Minister Community Welfare
WRC	Water & Rivers Commission
XPL	Ex-Pastoral Lease

**PURPOSES**

ABR	Aboriginal Reserve
ACC	Access Track
AER	Aerodrome
AIR	Airport
ARS	Agricultural Research Station
BAP	Baptist Union of WA
CAM	Camping
CAR	Caravan park
CEM	Cemetery
CFA	Conservation of Fauna
CFF	Conservation Of Flora & Fauna
CFL	Conservation of Flora
CHU	Church
CPK	Car Park
CMN	Communications
COM	Common

CON	Conservation Park
DEF	Defence
DRA	Drain
EDE	Educational Endowment
EDU	Educational purposes UWA
ENE	Enjoyment of Natural Environ.
EXC	Excepted from sale
EXL	Exploration Lease
EXP	Experimental Farm
FIR	Firing Range
FOR	State Forest
GE	General Lease
GHA	Grain Handling
GOL	Golf
GRA	Gravel Pit
GVT	Government Requirements
HAR	Harbour Purposes
HEP	Heritage Purposes
HER	Heritage trail
HOS	Hospital
KEN	Kennels
LPR	Landscape Protection
MIN	Mining lease
MUN	Municipal Purposes
NPK	National Park
NRE	Nature Reserve
OTH	Other
PAR	Parkland (& Recreation)
PAS	Pastoral lease
PFF	Protection of Flora & Fauna
PFL	Protection of Flora
PIC	Picnic ground
PLA	Plantation
POS	Public Open Space
PRS	Prison site
PUR	Purchase Lease
PUT	Public Utility
QUA	Quarry
RAD	Radio Station
RAC	Racecourse
REC	Recreation
REH	Rehabilitation/Re-establish Native Plants
RRE	Railway Reserve
RUB	Rubbish
SAN	Sand
SCH	School-site
SET	Settlers requirements
SHI	Shire Requirements
SHO	Showgrounds
SNN	Sanitary
SOI	Soil Conservation
STO	Stopping place
TIM	Timber
TOU	Tourism
TOW	Town-site
TRA	Training Ground
TRI	Trig station
UCL	Unallocated Crown Land
UNK	Unknown
VER	Road Verge
VPF	Vermin Proof Fence
WAT	Water
WLS	Wildlife Sanctuary
WOO	Firewood



**DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DECLARED RARE AND PRIORITY FLORA LIST  
16 September 2010**

SPECIES / TAXON	CONS CODE	DEC REGION	DISTRIBUTION	FLOWER PERIOD
<i>Acacia browniana</i> var. <i>glaucescens</i>	2	MW,SW	Bindoon, Julimar, Mogumber	
<i>Acacia drummondii</i> subsp. <i>affinis</i>	3	MW,SW	Bindoon, Muchea, Julimar, Wannamal, Mullewa, New Norcia, Drummond NR	
<i>Acacia pulchella</i> var. <i>reflexa</i> acuminate bracteole variant (RJ Cumming 882)	3	SW	Wannamal, Bindoon, York, Boonanarring	
<i>Adenanthos cygnorum</i> subsp. <i>chamaephyton</i>	3	SW,SR	Chidlow, Mundaring, Collie, Bindoon, Muchea, Sawyers Valley	
<i>Asteridea gracilis</i>	3	SW,SC	Gosnells, Mt Saddleback, South Stirling, Gordon Inlet, Bindoon, Helena Valley	Sep-Oct
<i>Asterolasia nivea</i>	T	SW	Bindoon	Aug-Oct
<i>Astroloma</i> sp. <i>Cataby</i> (EA Griffin 1022)	4	MW,SW	Eneabba, Gairdner Range, Cataby, Calingiri, Bindoon, New Norcia	Feb-Jul
<i>Astroloma</i> sp. <i>Nannup</i> (RD Royce 3978)	4	SR,SW,WA	Bindoon, Forest Grove, Nannup, Scott River, Careys Flat, Manjimup (Barlee Brook), Witchcliffe, Abba River, Margaret River	Apr-Jun
<i>Calothamnus pachystachyus</i>	4	MW,SW	Bindoon, Mogumber, New Norcia	Aug-Oct
<i>Commersonia</i> sp. Bindoon (CF Wilkins & F & J Hort CW 2155)	1	SW	Bindoon	
<i>Conostylis caricina</i> subsp. <i>elachys</i>	1	WB,SW	Gunyidi, Goomalling, Dowerin, Bindoon	Aug,Sep
<i>Cyanicula ixioides</i> subsp. <i>candida</i>	2	SW	Bindoon, Smiths Mill, York, Wooroloo	Sep-Oct
<i>Drosera sewelliae</i>	1	SW	Lower Chittering, Julimar	Oct
<i>Eucalyptus exilis</i>	4	MW,WB,SW	Mt Lesueur, Coorow, Boyagin Rock, Wandering, Bindoon, Gunapin, Coomallo NR, Beverley	Dec-Apr
<i>Gastrolobium crispatum</i>	1	SW	Bindoon, Julimar, Gidgegannup, Mt Byroomanning	Oct
<i>Goodenia arthrotricha</i>	T	SW,MW	Wannamal, Moora, Ellis Brook, Bindoon	Nov,Dec
<i>Grevillea corrugata</i>	T	SW	Bindoon	Aug-Sep
<i>Grevillea drummondii</i>	4	MW,SW	Bindoon, Hay Flat, New Norcia, Yandan Hill	Jun-Oct
<i>Grevillea florida</i>	3	MW,SW	Bindoon, New Norcia, Cataby	Jul-Sep
<i>Hibbertia glomerata</i> subsp. <i>ginginensis</i>	1	SW	Gingin, Bindoon	Jul-Sep
<i>Hibbertia miniata</i>	4	SW	Hay Flat, Bindoon Hill, Julimar, Wannamal	Jul-Oct
<i>Hypocalymma</i> sp. Tea Tree Road (O. Davies OD 171)	1	SW	Bindoon	
<i>Hypocalymma sylvestre</i>	1	SW	Chittering	Aug-Oct
<i>Johnsonia inconspicua</i>	3	SR,SW	South of Carbunup, Yelverton, Bindoon, Julimar, Quindalup	Nov
<i>Lasiopetalum</i> sp. Toodyay (F. Hort 2689)	1	SW	Wannamal, Bindoon Training Area	Sep
<i>Lechenaultia magnifica</i>	1	SW,WB	Bindoon, Julimar SF, Calingiri, Gingin	Nov
<i>Oxymyrrhine coronata</i>	4	SW	Chittering, Bullsbrook, Avon Valley	Dec,Jan
<i>Persoonia sulcata</i>	4	SW,WB,MW	John Forrest N.P., Wongamine N.R., Bindoon, Dardadine, Calingiri	Sep-Nov
<i>Petrophile plumosa</i>	3	MW,SW	Bindoon, Mogumber, New Norcia	Jul-Nov
<i>Schoenus griffinianus</i>	3	MW,WB,SW	Eneabba, Wongan Hills, Greenough, Chittering, Hazelmere, Wanneroo	Oct-Nov

**DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DECLARED RARE AND PRIORITY FLORA LIST  
16 September 2010**

SPECIES / TAXON	CONS CODE	DEC REGION	DISTRIBUTION	FLOWER PERIOD
<i>Senecio gilbertii</i>	1	SW,SR	Bindoon, York, Wooroloo, Wilga, Gooseberry Hill	Sep-Nov
<i>Spirogardnera rubescens</i>	T	MW,SW	Bindoon-Eneabba, Alexander Morrison NP	Aug-Nov
<i>Stylidium cymiferum</i>	3	MW,SW	Calingiri, Bindoon, Chittering, Toodyay	Oct
<i>Stylidium glabrifolium</i>	2	SW	Bindoon	Oct
<i>Synaphea grandis</i>	4	MW,SW	Wannamal, New Norcia, Julimar, Mucnea, Bindoon, Gingin	Oct-Nov
<i>Synaphea panhesya</i>	1	SW	Bindoon, Mogumber	Aug-Sep
<i>Tetratheca similis</i>	3	SW	Bindoon, Mt Dale area, Wandoo CP	Aug-Sep
<i>Verticordia serrata</i> var. <i>Udumung</i> (D Hunter & B Yarran 941006)	2	SW	Bindoon	Oct

OID SHEET_NO	SPECIES	20_1011_WAHERB		VEGETATION	LOCALITY	LAT	LONG_	DATE_
		CONSCODE	SITE					
PERTH 00319244	Acacia drummondii subsp. affinis	3	On hillside in latetitic gravel.		22.5 km from Bullsbrook East towards Chittering	-31.4642	116.025	02 08 1973
PERTH 07215134	Acacia drummondii subsp. affinis	3	On high ground between the highway and lake.	Remnant woodland. Contiguous with fringing vegetation on la	Site 7, Great Northern Highway, S of Bindoon	-31.4167	116.0833	09 2005
PERTH 00342750	Acacia pulchella var. reflexa acuminate bracteole varian	3	Road verge.	Eucalyptus calophylla-wandoo woodland.	8 km (5 miles) from Bindoon towards Toodyay	-31.4519	116.09	05 09 1981
PERTH 1616188	Adenanthos cygnorum subsp. chamaephyton	3	Low upland, well drained; shallow grey sand over laterite,	Low Heath C over Low Heath D (Scheme of Muir 1977); Alloca	Private Property, 6.4 km at 250degrees from Bindoon	-31.409	116.0348	24 11 1990
PERTH 07215126	Adenanthos cygnorum subsp. chamaephyton	3	On slope above the highway, adjacent to totally cleared pa	Isolated remnant woodland. Good understorey diversity rema	Site 10, Great Northern Highway, S of Bindoon	-31.4167	116.0833	09 2005
PERTH 01297473	Astroloma sp. Cataby (E.A. Griffin 1022)	4	Yellow gravel soil.	Forest.	7 miles from Bindoon, 50 miles NE of Perth	-31.3833	116.0833	27 04 1957
PERTH 07782160	Chamelaucium sp. Gingin (N.G. Marchant 6)	T	Slope, dry red-brown gravel.	No associated species.	Lot 439 Breera Road, Gingin, lot number on front entry gate shown as 4!	-31.4401	115.9693	03 09 2007
PERTH 847917	Cyanicula ixioiodes subsp. candida	2		Eucalyptus wandoo and E. calophylla woodland over formerly	9 km NNE of Bindoon, access off Stevenson Road	-31.3833	116.0833	21 09 1986
PERTH 01052683	Gastrolobium nudum	2			Chittering	-31.4414	116.0964	25 09 1956
PERTH 04360745	Grevillea corrugata	T	In gravelly loam.	Beside road in eucalypt forest. Disturbed verge.	Julimar road, 1.3 km from Chittering road, c. 10 km S of Bindoon	-31.4333	116.0667	04 10 1992
PERTH 04360753	Grevillea corrugata	T	In gravelly loam.	Beside road in eucalypt forest. Disturbed verge.	Julimar road, 1.3 km from Chittering road, c. 10 km S of Bindoon	-31.4333	116.0667	04 10 1992
PERTH 04360761	Grevillea corrugata	T	In gravelly loam.	Beside road in eucalypt forest. Disturbed verge.	Julimar road, 1.3 km from Chittering road, c. 10 km S of Bindoon	-31.4333	116.0667	04 10 1992
PERTH 07739028	Hypocalymma sp. Tea Tree Road (O. Davies OD 171)	1	Gentle slope. Damp, brown sand-loam-gravel over laterite.	Low Heath D. Hibbertia hypericoides var. hypericoides, Pentas	In property of Tea Tree Road, Bindoon	-31.4417	116.0547	22 11 2007
PERTH 03259951	Oxymyrrhine coronata	4	Lateritic gravel.	Marginal Jarrah/Wandoo forest.	3.5 km SE of Keating road, Chittering	-31.4414	116.0964	10 12 1981
PERTH 07782152	Ptychosema pusillum	T	Slope, dry white sand.	Low Woodland B over Low Heath Cover Herbs. Banksia menze	Lot 439 Breera Road, Gingin, Plants at NE corner of property on fire brea	-31.4383	115.9716	18 09 2007
PERTH 08202931	Tetratheca pilifera	3	Slope, breakaway. Gully, drainage line. Dry - moist brown li	Eucalyptus wandoo fringing shrubland. Associated species: Tr	350 Bindoon Spring Road, ca 750 m E of the farmhouse, Toodyay Wes	-31.4137	116.0723	08 10 2009
PERTH 07835302	Verticordia rutilastra	3	Sand, flat, private property.	Low Open Woodland of Eucalyptus todiana and Banksia attar	Lot 26 Ioppolo Road, Dandragan Plateau	-31.4548	115.9904	12 10 2008

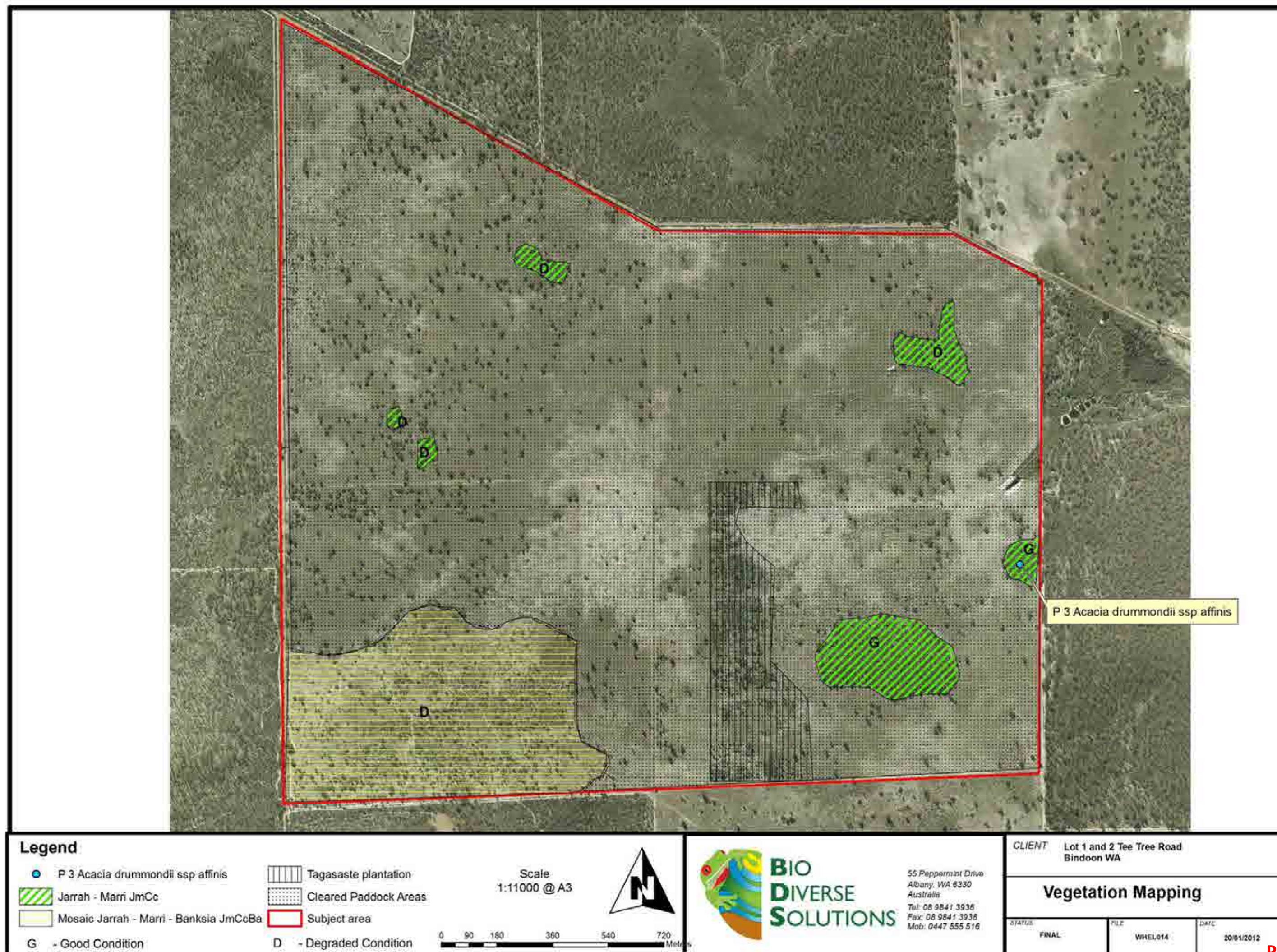
23_1011 DEFL												
OID_	SHEET	SPNAME	CONSVCOE	POPID1	POPID2	GDA94LAT	GDA94LONG	VESTING	PURPOSE1	PURPOSE2	STATUS	OWNERDATE
	25616	Acacia drummondii subsp. affinis		3	16	-31.41667	116.08333	UNK	UNK			1/09/2005 0:00
	9630	Adenanthos cygnorum subsp. chamaephyton		3	3 A	-31.40322	116.08842	MRD	GRA			26/10/1996 0:00
	9631	Adenanthos cygnorum subsp. chamaephyton		3	3 B	-31.40322	116.08897	SHI	OTH			26/10/1996 0:00
	9632	Adenanthos cygnorum subsp. chamaephyton		3	3 C	-31.40349	116.08869	SHI	VER			26/10/1996 0:00
	9636	Adenanthos cygnorum subsp. chamaephyton		3	3 D	-31.41294	116.09147	SHI	VER			26/10/1996 0:00
	9639	Adenanthos cygnorum subsp. chamaephyton		3	4	-31.43016	116.07814	MRD	VER			26/10/1996 0:00
	9655	Adenanthos cygnorum subsp. chamaephyton		3	11	-31.40905	116.03481	PRI				24/11/1990 0:00
	25678	Adenanthos cygnorum subsp. chamaephyton		3	20	-31.40906	116.03481	PRI				24/11/1990 0:00
	27496	Chamelaucium sp. Gingin (N.G. Marchant 6)	T		7	-31.44006	115.96925	PRI				3/09/2007 0:00
	27494	Ptychosema pusillum	T		3	-31.43828	115.97161	PRI				3/09/2007 0:00



**Appendix D**

Vegetation Mapping







**Appendix E**

Flora Species List

**Flora species list**

Family	Species	Common Name	Weed
FABACEAE	<i>Acacia barbinervis ssp barbinervis</i>		
FABACEAE	<i>Acacia drummondii ssp affinis</i>	P3 #319	
FABACEAE	<i>Acacia pulchella</i>		
FABACEAE	<i>Acacia pulchella var. pulchella</i>		
PROTEACEAE	<i>Adenanthos cygnorum</i>		
ASTERACEAE	<i>Angianthus tomentosus</i>		
HAEMODORACEAE	<i>Anigozanthos humilis</i>	Cats paw	
CASUARINACEAE	<i>Allocasuarina humilis</i>		
ERICACEAE	<i>Astroloma pallidum</i>		
ERICACEAE	<i>Astroloma xerophyllum</i>		
POACEAE	<i>Austrostipa compressa</i>		
POACEAE	<i>Austrodanthonia occidentalis</i>		
POACEAE	<i>Avena sp.</i>	Wild oats	Y
MYRTACEAE	<i>Babingtonia camphorosmae</i>		
MYRTACEAE	<i>Baeckea crispiflora var. tenuior</i>		
MYRTACEAE	<i>Baeckea grandiflora</i>		
PROTEACEAE	<i>Banksia attenuata</i>		
PROTEACEAE	<i>Banksia dallanneyi var. dallanneyi</i>		
PROTEACEAE	<i>Banksia grandis</i>		
PROTEACEAE	<i>Banksia sessilis var. sessilis</i>		
CYPERACEAE	<i>Baumea rubiginosa</i>		
RUTACEAE	<i>Boronia ramosa ssp anethifolia</i>		
FABACEAE	<i>Bossiaea eriocarpa</i>		
BRASSICACEAE	<i>Brassica tournefortii</i>		Y
POACEAE	<i>Bromus diandrus</i>		Y
COLCHICEAE	<i>Burchardia congesta</i>		
HEMEROCALLIDACEAE	<i>Caesia micrantha</i>		
ORCHIDACEAE	<i>Caladenia flava</i>		
PORTULACACEAE	<i>Calandrinia corrigioloides</i>		
MYRTACEAE	<i>Callistemon x citrinus</i>		Y
LAURACEAE	<i>Cassytha flava</i>		
CENTROLEPIDACEAE	<i>Centrolepis drummondiana</i>		
FABACEAE	<i>Chamaecytisus palmensis</i>	Tagasaste	Y
ASPARAGACEAE	<i>Chamaescilla corymbosa</i>	Blue squills	
PROTEACEAE	<i>Conospermum stoechadis</i>		
HAEMODORACEAE	<i>Conostylis setosa</i>		
MYRTACEAE	<i>Corymbia calophylla</i>	Marri	
ASTERACEAE	<i>Cotula coronopifolia</i>	Waterbuttons	Y
CRASSULACEAE	<i>Crassula exserta</i>		
CYPERACEAE	<i>Cyperus brevifolius</i>		Y
CYPERACEAE	<i>Cyperus tenuiflorus</i>		Y
FABACEAE	<i>Daviesia decurrens</i>		



Family	Species	Common Name	Weed
FABACEAE	<i>Daviesia nudiflora</i>		
FABACEAE	<i>Daviesia preissii</i>		
FABACEAE	<i>Daviesia triflora</i>		
RESTIONACEAE	<i>Desmocladius fascicularis</i>		
ASPARAGACEAE	<i>Dichopogon capillipes</i>		
ORCHIDACEAE	<i>Disa bracteata</i>		Y
SCROPHULARIACEAE	<i>Dischisma arenarium</i>		Y
DROSERACEAE	<i>Drosera erythrorhiza</i>		
DROSERACEAE	<i>Drosera glanduligera</i>		
DROSERACEAE	<i>Drosera macrantha</i>		
DROSERACEAE	<i>Drosera pallida</i>		
POACEAE	<i>Ehrharta longiflora</i>	Annual Veldt Grass	Y
ORCHIDACEAE	<i>Elythranthera brunonis</i>	Enamel Orchid	
MYRTACEAE	<i>Eremaea pauciflora</i>		
GERANIACEAE	<i>Erodium botrys</i>		Y
MYRTACEAE	<i>Eucalyptus marginata</i>	Jarrah	
MYRTACEAE	<i>Eucalyptus todtiana</i>		
PROTEACEAE	<i>Grevillea synapheae</i>		
IRIDACEAE	<i>Gladiolus caryophyllaceus</i>	Pink gladiolus	Y
FABACEAE	<i>Gompholobium knightianum</i>		
FABACEAE	<i>Gompholobium tomentosum</i>		
HAEMODORACEAE	<i>Haemodorum venosum</i>		
PROTEACEAE	<i>Hakea lissocarpha</i>		
PROTEACEAE	<i>Hakea ruscifolia</i>		
ASTERACEAE	<i>Helichrysum luteoalbum</i>		Y
DILLENIACEAE	<i>Hibbertia huegelii</i>		
DILLENIACEAE	<i>Hibbertia hypericoides</i>		
DILLENIACEAE	<i>Hibbertia lasiopus</i>		
DILLENIACEAE	<i>Hibbertia racemosa</i>		
DILLENIACEAE	<i>Hibbertia subvaginata</i>		
ASTERACEAE	<i>Hyalospermum cotula</i>		
ASTERACEAE	<i>Hypochaeris glabra</i>		Y
CYPERACEAE	<i>Isolepis marginata</i>		Y
CYPERACEAE	<i>Isolepis prolifera</i>		Y
FABACEAE	<i>Isotropis cuneiformis</i>		
FABACEAE	<i>Jacksonia floribunda</i>		
FABACEAE	<i>Jacksonia sternbergiana</i>		
JUNCACEAE	<i>Juncus pallidus</i>		
JUNCACEAE	<i>Juncus planifolius</i>		
FABACEAE	<i>Kennedia prostrata</i>		
MYRTACEAE	<i>Kunzea glabrescens</i>		
ASTERACEAE	<i>Lagenophora huegelii</i>		
GOODENIACEAE	<i>Lechenaultia biloba</i>		
GOODENIACEAE	<i>Lechenaultia floribunda</i>		

Family	Species	Common Name	Weed
ORCHIDACEAE	<i>Leporella fimbriata</i>	Hare orchid	
MYRTACEAE	<i>Leptospermum erubescens</i>		
MYRTACEAE	<i>Leptospermum spinescens</i>		
ERICACEAE	<i>Leucopogon nutans</i>		
ERICACEAE	<i>Leucopogon propinquus</i>		
CAMPANULACEAE	<i>Lobelia rhombifolia</i>		
ASPARAGACEAE	<i>Lomandra caespitosa</i>		
ASPARAGACEAE	<i>Lomandra hermaphrodita</i>		
ASPARAGACEAE	<i>Lomandra preissii</i>		
ASPARAGACEAE	<i>Lomandra sericea</i>		
FABACEAE	<i>Lotus subbiflorus</i>		Y
ZAMIACEAE	<i>Macrozamia reidlei</i>		
MYRTACEAE	<i>Melaleuca preissiana</i>		
MYRTACEAE	<i>Melaleuca trichophylla</i>		
RESTIONACEAE	<i>Mesomelaena pseudostygia</i>		
POACEAE	<i>Neurachne alopecuroides</i>		
LORANTHACEAE	<i>Nuytsia floribunda</i>		
FABACEAE	<i>Ornithopus compressus</i>		Y
FABACEAE	<i>Ornithopus sativus</i>		Y
OROBANCHACEAE	<i>Orobanche minor</i>		Y
SCROPHULARIACEAE	<i>Parentucellia viscosa</i>		Y
IRIDACEAE	<i>Patersonia occidentalis</i>		
GERANIACEAE	<i>Pelargonium capitatum</i>		
POACEAE	<i>Pentaschistis airoides</i>		Y
POLYGONACEAE	<i>Persicaria decipiens</i>		Y
PROTEACEAE	<i>Petrophile linearis</i>		
PROTEACEAE	<i>Petrophile macrostachya</i>		
PROTEACEAE	<i>Petrophile striata</i>		
CARYOPHYLLACEAE	<i>Petrorhagia dubius</i>		Y
RUTACEAE	<i>Philothea spicata</i>		
LOGANIACEAE	<i>Phyllanthus paradoxum</i>		
EUPHORBIACEAE	<i>Phyllanthus calycinus</i>		
ASTERACEAE	<i>Podothea gnaphalioides</i>		
POACEAE	<i>Polypogon monspeliensis</i>	Annual beardgrass	Y
ORCHIDACEAE	<i>Pterostylis nana</i>		
ORCHIDACEAE	<i>Pterostylis vittata</i>		
ORCHIDACEAE	<i>Pyrorchis nigricans</i>		
ASTERACEAE	<i>Rhodanthe citrina</i>		
IRIDACEAE	<i>Romulea rosea</i>	Guildford grass	Y
MYRTACEAE	<i>Scholtzia involucreta</i>		
ASTERACEAE	<i>Sonchus asper</i>		Y
ASTERACEAE	<i>Sonchus oleraceus</i>	Sowthistle	Y
STYLIDACEAE	<i>Stylidium hispidum</i>		
STYLIDACEAE	<i>Stylidium calcaratum</i>		

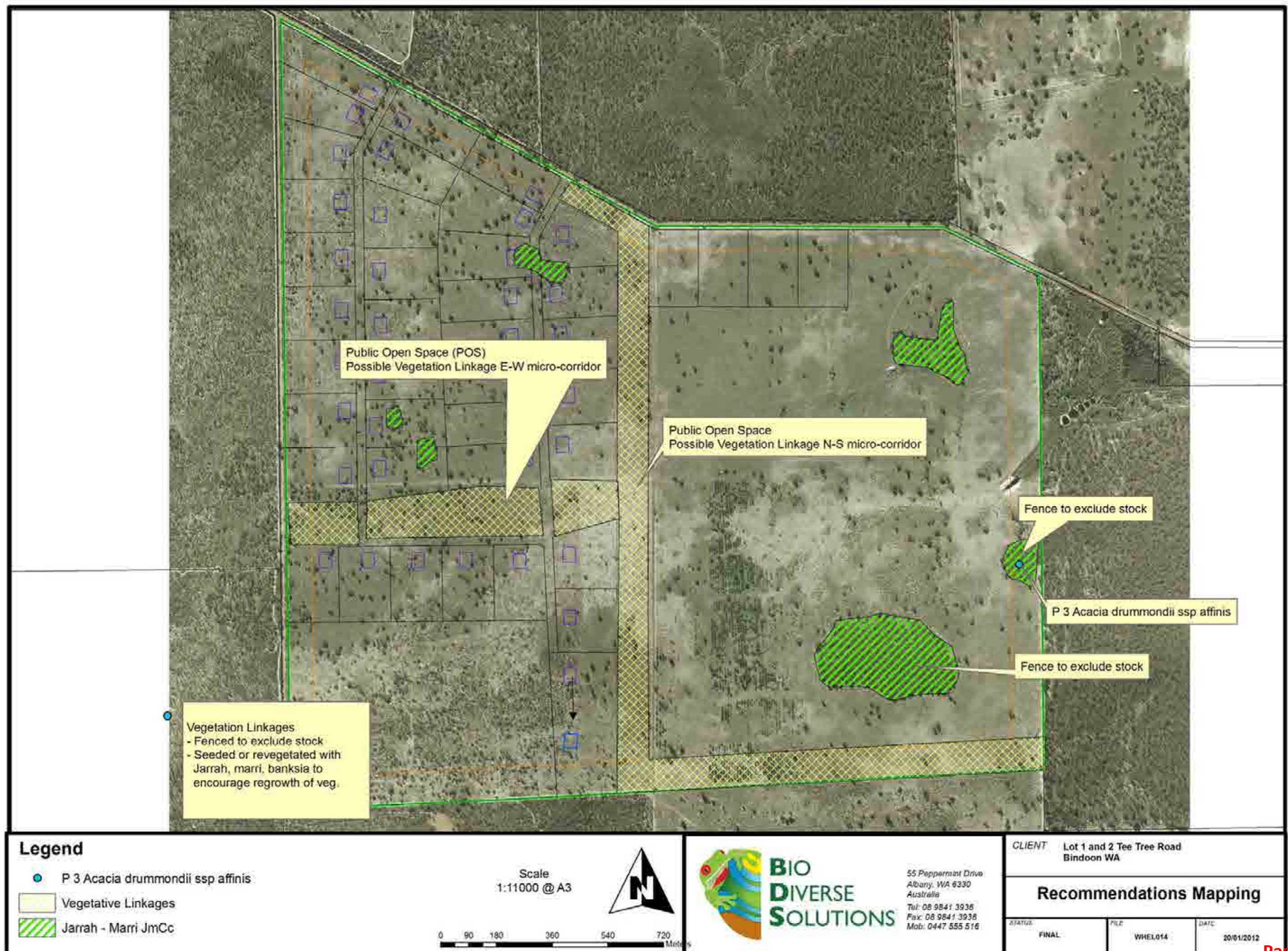
Family	Species	Common Name	Weed
PROTEACEAE	<i>Synaphea spinulosa</i>		
CYPERACEAE	<i>Tetraria octandra</i>		
TREMANDRACEAE	<i>Tetradlea hirsuta</i>		
FABACEAE	<i>Trifolium arvense</i>	Hare's foot clover	Y
FABACEAE	<i>Trifolium dubium</i>		Y
FABACEAE	<i>Trifolium hirtum</i>	Rose clover	Y
FABACEAE	<i>Trifolium subterraneum</i>	Subclover	Y
CELASTRACEAE	<i>Tripterococcus brunonis</i>		
ORCHIDACEAE	<i>Thelymitra sp</i>		
TYPHACEAE	<i>Typha domingensis</i>		
ASPARAGACEAE	<i>Thysanotus patersonii</i>		
ASPARAGACEAE	<i>Thysanotus tenellus</i>		
APIACEAE	<i>Trachymene pilosa</i>		
HEMEROCALLIDACEAE	<i>Tricoryne elatior</i>		
ASTERACEAE	<i>Ursinia anthemoides</i>		Y
ASTERACEAE	<i>Vellereophyton dealbatum</i>		Y
POACEAE	<i>Vulpia myuros</i>		Y
CAMPANULACEAE	<i>Wahlenbergia capensis</i>		Y
XANTHORRHOEACEAE	<i>Xanthorrhoea preissii</i>		
<b>Count</b>	<b>149</b>		<b>37</b>

**Appendix F**

Recommendations Mapping









Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



## APPENDIX 4 – BUSHFIRE MANAGEMENT PLAN

**Lots 1 and 2 Tea  
Tree Road,  
Bindoon WA**

# Bushfire Management Plan



13/06/2016

Kathryn Kinnear

Bio Diverse Solutions

**Page 394**

## DOCUMENT CONTROL

### TITLE

Lot 1 and 2 Tea Tree Road Bindoon Bushfire Management Plan

Author (s): Kathryn Kinnear

Reviewer (s): Steve Fernandez

Job No.: WHEL014

Client: Marou Property Development Pty Ltd

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Final ID 13/6/2016	Updated to reflect new legislation	Kathryn Kinnear	13/6/2016

### **DISCLAIMER**

*The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959 – Building in Bushfire prone Areas, WAPC SPP3.7, Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.*



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APPENDIX G - BUSHFIRE MANAGEMENT PLAN



## 1. Introduction

Marou Property Development Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a fire hazard assessment and prepare a Bushfire Management Plan to guide all future fire management for the proposed subdivision development of Lots 1 and 2 Tea Tree Road, Bindoon.

The basic requirements of any Bushfire Management Plan (BMP) is to identify potential issues or problems relating to environmental fire threats and recommend specific actions by certain persons, agencies, authorities and developers to ensure, as much as practical, that the lives and assets of the location are not put at undue threat from any unplanned fire event. A BMP takes into account various physical attributes of the land, including topographical and vegetation properties, local climatic impacts, past and current land use, past fire history and management practices, local authority fire management obligations, road access, water supplies, adjacent property and tenure, and future obligations by various parties should the subdivision application be successful.

Such planning takes into consideration standards and requirements specified in various documents such as Australian Standard (AS) 3959-2009, Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) and State Planning Policy 3.7 (WAPC, 2015). These plans and guidelines have developed to ensure uniformity to bushfire management with interpretation of onsite vegetation types, site design, and building standards.

### 1.1. Statutory Conditions

This Bushfire Management Plan (BMP) has been prepared for Lot 1 and 2 Tea Tree Road Bindoon (refer to Appendix A for location of subject site) to address fire management issues associated with the proposed Structure Plan (SP) and is consistent with State and Local Government planning instruments.

On the 7<sup>th</sup> December 2015 the *Fire and Emergency Services (Bush Fire Prone Areas) Order 2015; Planning and Development (Local Planning Scheme) Amendment Regulations 2015; Planning and Development Act 2005 State Planning Policy 3.7 - Planning in Bushfire Prone Areas* and the *Building Amendment Regulations (No.3)* were published in the WA Government Gazette. The Western Australian State Bushfire Prone Mapping was also publicly released.

This means that:

- **Emergency Services (Bush Fire Prone Areas) Order 2015:** 4 (1) *The areas of the state described in the Bushfire Prone Areas dataset are designated as bush fire prone areas.*
- **Planning and Development (Local Planning scheme) Amendment Regulations 2015:** *Planning regulations that instigates a planning action if a dwelling is located in the Bushfire Prone Area Mapping. Can be a site specific BAL Assessment, BAL Contour Map, Bushfire Hazard Assessment or a Bushfire Management Plan action. If BAL 12.5 to BAL 29 dwelling can go straight to Building Application. If BAL 40 or BAL FZ then the development goes back into the planning system for assessment.*
- **Planning and Development Act 2005 State Planning Policy 3.7 (SPP 3.7)- Planning in Bushfire Prone Areas:** *The intent of this policy is to implement effective, risk based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure. The application of SPP 3.7 applies to all higher order strategic planning documents, strategic planning proposals, subdivision and development applications located in designated bushfire prone areas.*
- **Building Amendment Regulations (No.3):** *Outlines the definition of the bushfire prone area as designated under the Fire and Emergency Services Act 1998 Regulation 31BA applicable building standards for buildings and incidental structures in bushfire prone areas.*

(WA Australian Government Gazette, 2015)

The publicly released bushfire prone mapping (Bushfire Prone Area Mapping, OBRM, 8/12/15) outlines the site to be Bushfire Prone as per the above regulations, as it is situated within 100m of

>1 ha of bushfire prone vegetation. Refer to extract from the Office of Bushfire Risk Management (OBRM) as released in December 2015 Appendix A.

This document and the recommendations contained are aligned to the following policy and guidelines:

- AS 3959-2009 “Construction of Buildings in Bushfire Prone Areas” current and endorsed standards;
- State Planning Policy 3.7 (SPP 3.7) Planning in Bushfire-Prone Areas (2015);
- Guidelines for Planning in Bushfire Prone Areas (2015);
- *Fire and Emergency Services (Bush Fire Prone Areas) Order 2015;*
- *Planning and Development (Local Planning Scheme) Amendment Regulations 2015;*
- *Bushfires Act 1954;* and
- Shire of Chittering Annual Fire Break Notice.

### **1.2. Suitably Qualified Bushfire Consultant**

This BMP has been prepared by Kathryn Kinnear (nee White), who has 10 years operational fire experience with the (formerly) DEC (1995-2005) and has the following accreditation in Bushfire Management:

- Incident Control Systems;
- Operations Officer;
- Prescribed Burning Operations;
- Fire and Incident Operations;
- Wildfire Suppression 1, 2 & 3;
- Structural Modules – Hydrants and hoses, Introduction to Structural Fires, and Fire extinguishers; and
- Ground Controller.

Kathryn Kinnear currently has the following Tertiary Qualifications:

- BAS Technology Studies & Environmental Management;
- Diploma Business Studies; and
- Graduate Diploma of Environmental Management.

Kathryn Kinnear is an accredited a Level 1 BAL Assessor (Accreditation No: BPAD30794) and is classified as an “Experienced Level 2/3 Practitioner” pending accreditation. Kathryn Kinnear is presently a member of Fire Protection Australia Association and a committee member of the Bushfire Subcommittee Western Australia. Kathryn is a suitably qualified Bushfire Practitioner to prepare this Bushfire Management Plan.

### **1.3. Other documents relating to this plan**

Other documents that have been prepared for this subdivision proposal which should be consulted when reading this plan include:

- Lot 1 and 2 Tea Tree Road Planning Report – Whelans (2015);
- Vegetation Assessment – Bio Diverse Solutions (2012); and
- Land Capability Report – Landform Research (2000).

## 2. Aims of this Plan

The aim of this Plan is to reduce the occurrence of, and minimise the impact of bushfires, thereby reducing the threat to life, property and the environment. This BMP has been prepared by Bio Diverse Solutions (Bushfire Consultants) with the “subject site” being Lots 1 and 2 Tea Tree Road, Bindoon see Appendix A.

### 2.1. Planning Context

The BMP has been prepared to support an Structure Plan (SP) at Lots 1 and 2 Tea Tree Road, Bindoon, refer to Appendix B.

### 2.2. Site inspection

To ensure that every aspect of the proposed subdivision meets the planning requirements as set in the Guidelines for Planning in Bushfire Protection (WAPC, 2015a), a site inspection was initially undertaken on the 13th October 2011 by Kathryn Kinnear (Bio Diverse Solutions) to assess the vegetation and the site conditions. A subsequent site visit was undertaken in March 2016 to assess any change in the classifiable vegetation to AS3959-2009.

The site was assessed as having an **Extreme- Moderate** Bushfire Hazard Level (BHL) due to internal and external patches of forest, woodland and scrub remnant native vegetation areas. Upon completion there will be internal (built/rural small holdings) areas of **Moderate - Low** BHL. Where a subdivision is located within an extreme or moderate BHL, the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) requires assessment to the bushfire protection criteria – a process where subdivisions are assessed for compliance to the criteria. The bushfire protection criteria (Appendix 4, WAPC, 2015a) are a performance based criteria in assessing bushfire risk management measures and they outline four “Elements”. The “Elements” which are to be met either through the objectives of the “Performance Principle” or “Acceptable Solutions” (WAPC, 2015a) for the subject site include:

- Element 1 - Location;
- Element 2 - Siting and design of development.
- Element 3 - Vehicular access; and
- Element 4 – Water.

(WAPC, 2015)

This BMP has been prepared to assess the site against the “Acceptable Solutions” of the bushfire protection criteria.

### 2.3. Objectives

The objectives of this BMP are:

- Achieve consistency with objectives and policy measures of SPP 3.7 (WAPC, 2015b);
- Assess any building requirements to AS3959-2009 (current and endorsed standards) and BAL Construction;
- Assess the subdivision proposal against the Bushfire Protection Criteria Acceptable Solutions as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a);
- Understand and document the extent of the bushfire risk and hazards to the subject site
- Prepare bushfire mitigation and management measures of all land within the subject area with due regard to people, property, infrastructure and the environment;
- Nominate individuals and organisations responsible for bushfire management and associated works within the subject area; and
- Aligned to the recommended assessment procedure (SPP3.7, WAPC, 2015b) & Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) which evaluates the effectiveness and impact of proposed, as well as existing, bushfire risk management measures and strategies.

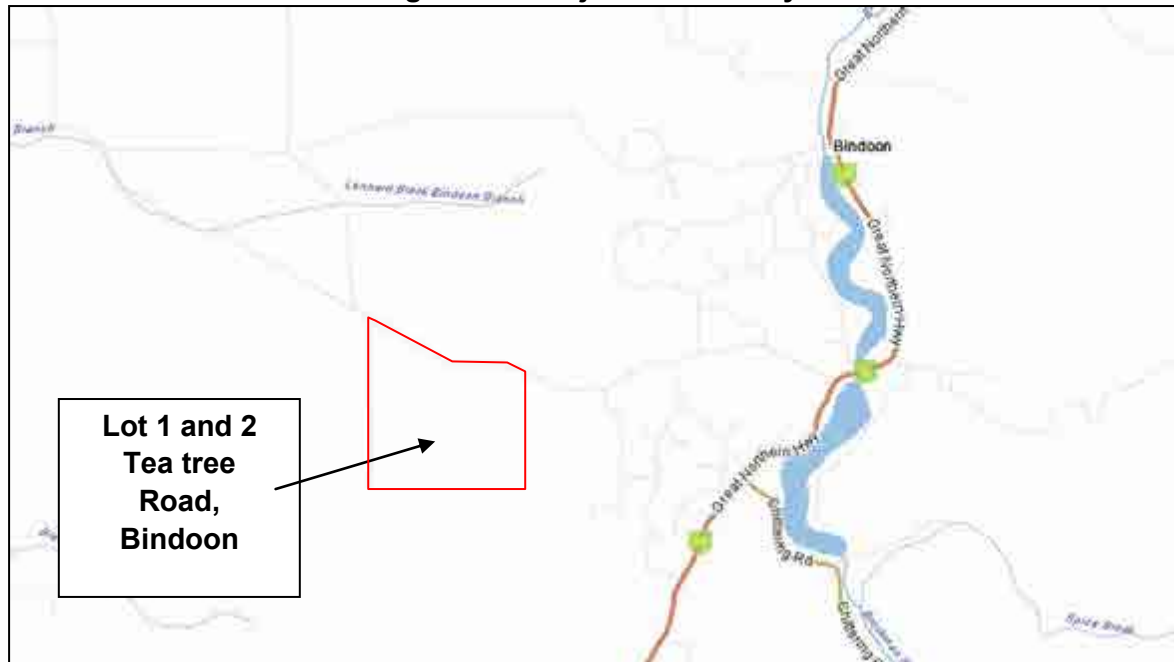


### 3. Description of the area

#### 3.1. Location

The subject site is located south of Tea Tree Road and east of Brennan Road, approximately 10 km's south of Bindoon town site in the municipality of the Shire of Chittering (SoC). The subject site is a 484ha rural lot which has been used for primarily for the grazing of stock. Please refer to Figure 1 below - Locality Map, and Site Location Mapping Appendix A.

**Figure 1 – Subject site locality**



#### 3.2. Development proposal

The development proposal includes the creation of 48 lots (47 Rural Small Holding zoning and 1 Rural zoning lot). The Rural Small Holding lots are ranging in size from 5.01ha to 5.44ha. In creating the subdivision the developer proposes to implement "Vegetative Corridors" to increase linkages to remnant vegetation from the north-south and east-west.

Please refer to the Structure Plan as provided by Whelans, Appendix B.

#### 4. Desktop Assessment – Regional Setting

##### 4.1. Current site land use

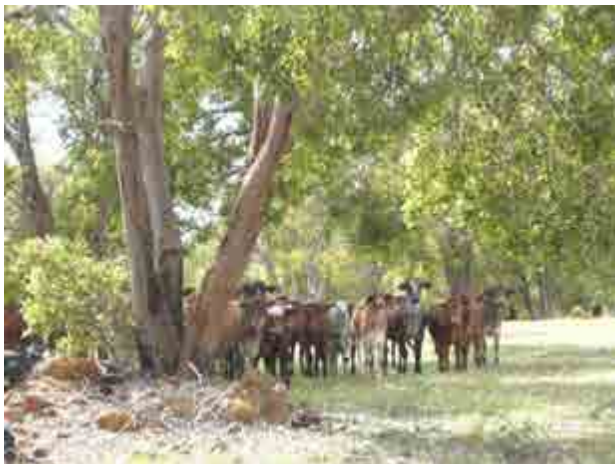
The site is currently 2 rural lots of predominantly cleared paddocks with grasslands and small isolated patches of remnant vegetation, newly installed vineyards and tagasaste plantation. Historically the subject area has been used for sheep and cattle grazing. An abandoned shack exists in Lot 1 (south west corner) and some shed buildings are located in Lot 2 associated with the rural activities. Please refer to Photograph 1 to 3 below.



**Photograph 1** – View of abandoned shack in Lot 1 (south west of subject area).



**Photograph 2** – View of shed infrastructure in Lot 2, associated with rural activities.



**Photograph 3** – View of stock on site.

##### 4.2. Climate

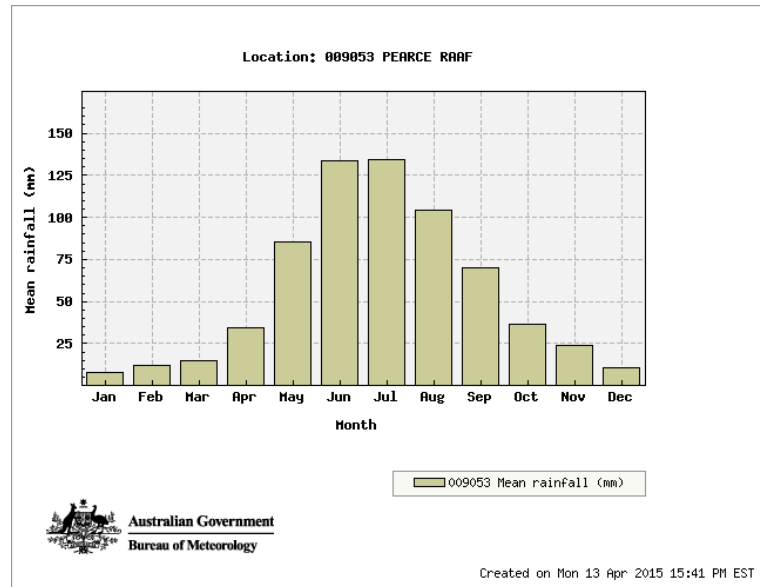
Bindoon has similar climate to Perth (75 Km away) and thus has been described as per Bureau of Meteorology (BoM) descriptions of Perth. Perth experiences a Mediterranean climate, characterised by hot, dry summers and mild, wet winters. These seasons extend into the autumn and spring months, which are transitional periods between the main seasons.

The climate of the region is strongly influenced by the position of the axis of the band of high pressure known as the sub-tropical ridge, and in the warmer months by the development in the easterlies to the north of the ridge of a trough of low pressure near the West Coast. For much of the year the ridge is located to the south allowing the east or south easterly winds to prevail. During the cooler months the ridge periodically moves to the north allowing cold fronts to pass over the west coast and deliver much of the annual rainfall. Sometimes these fronts interact with tropical cloud bands from the northwest and this can enhance the amount of rainfall produced.

#### 4.2.1. Rainfall

The annual mean rainfall of 678.3 mm (BoM, 2015) occurs on 119 rain days, of which 80% usually falls between May and September. Rain occurs on four days out of every seven on average during winter. Flooding is rare in Perth, however heavy rain may be produced by strong winter cold fronts or, less frequently, by summer storms or, more rarely, by decaying tropical cyclones. The highest daily rainfall is 120.6 mm recorded on 9 February 1992. In contrast to winter rainfall, the mean summer rainfall is just 36 mm on an average of 10 rain days. It is not unusual for there to be extended dry periods during the warmer months. Please refer to Pearce RAAF BoM rainfall records (closest climate statistics), Annual Rainfall graph below (Figure 2).

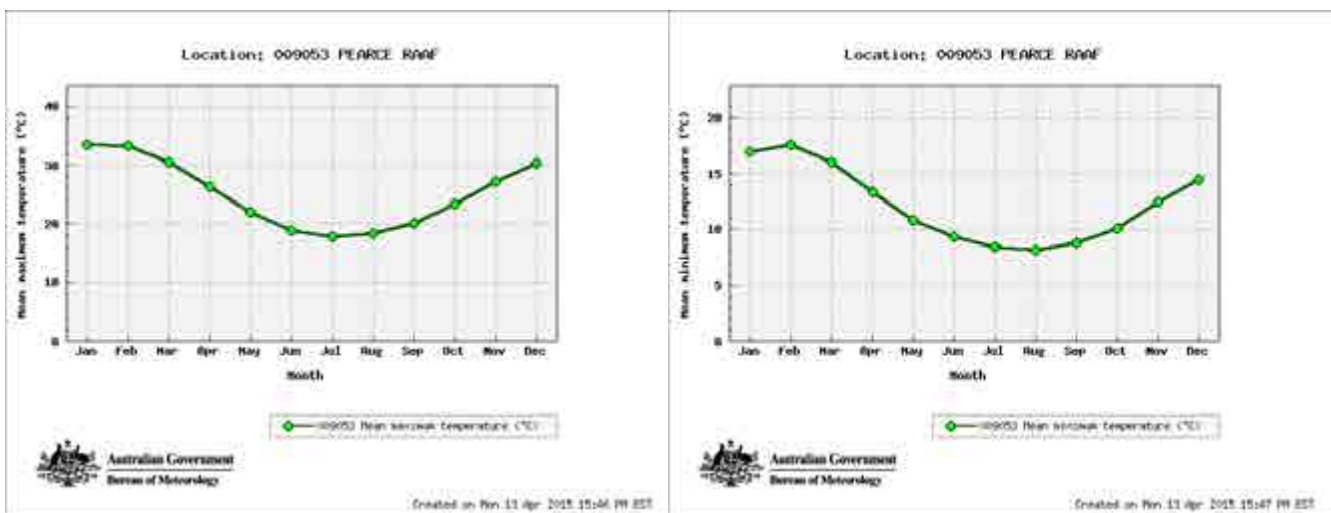
**Figure 2 – BoM Rainfall for Pearce (BoM) Station 9053**



#### 4.2.2. Temperature

Mean monthly air temperature range from 33.5°C in January to 17.8°C in July (BoM, 2015). Summer maximum temperatures are strongly dependent upon the arrival time of the reliable sea breezes. On some days the difference between the maximum temperatures on the coast and the eastern suburbs may exceed 10°C. Heatwaves are associated with strong easterly winds and the late arrival or absence of the sea breeze. The highest temperature ever recorded is 46.2°C, however, the temperature exceeds 40°C on only three days per year on average. The average minimum temperature ranges from just 8.2°C in August to 17.6°C in February (BoM, 2015). Temperatures below 5°C are not uncommon during any of the winter months. Please refer to average temperatures below for Gingin (40km away), Figure 3.

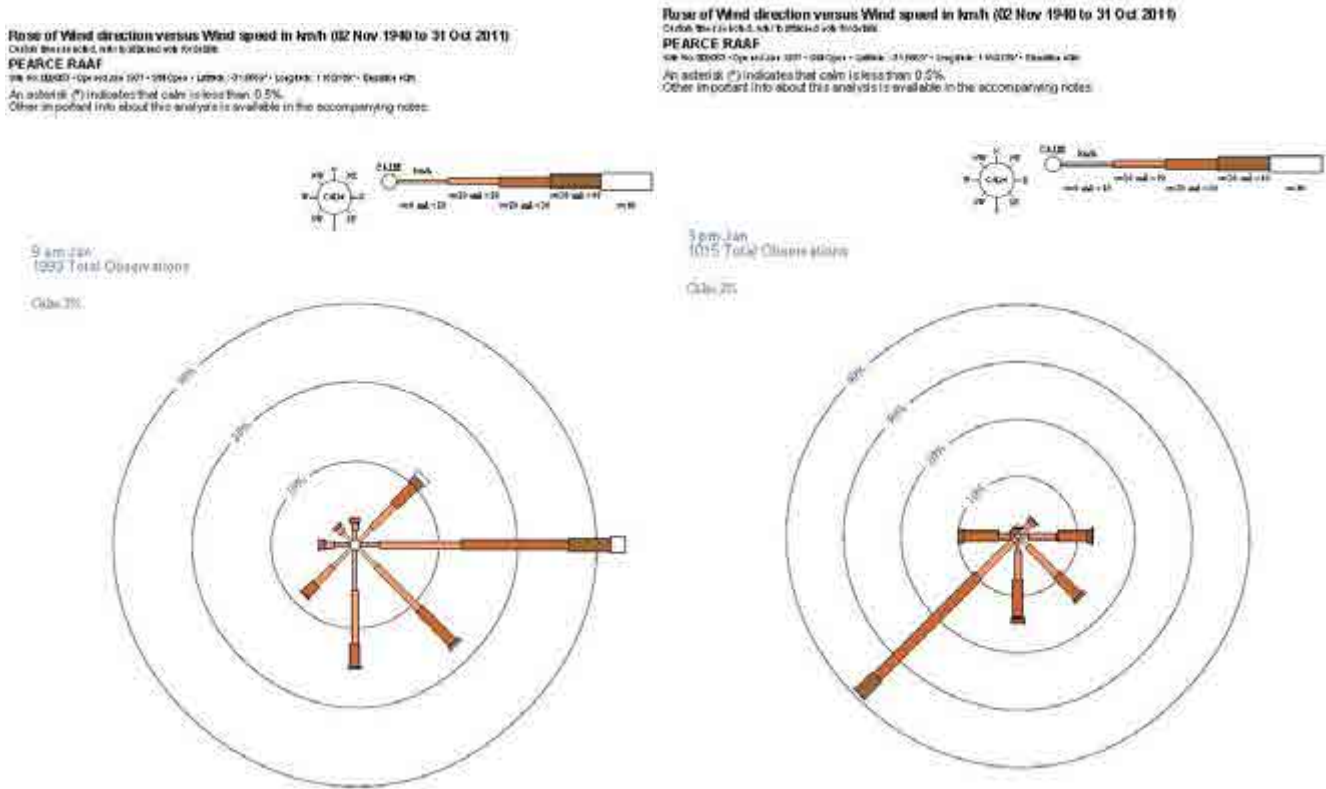
**Figure 3 – Average Temperatures BoM Pearce RAAF (BoM 9053)**



#### 4.2.3. Wind

Winds are mainly easterly but varied in the warmer months by reliable afternoon sea breezes from the south west and in the cooler months by the westerlies that are associated with the bulk of the annual rainfall. Despite the occurrence of strong winds or gales, average wind speeds in winter are considerably lighter than in summer. Please refer to Figure 4 and 5 below.

**Figure 4 – Summer (Jan) wind rose 9am & 3pm BoM Pearce RAAF Stn**





### 4.3. Prevalent Fire Weather

Fire weather is characterised by mid-level disturbances across the south west of Western Australia, bringing unstable atmospheric conditions (thunder and lightning) from the north or north-west wind directions. This is characteristic of “Extreme” Fire Weather conditions to the area with hot dry conditions prior to storm events. Risk of lightning strikes, spark ignition, arson and other causes of fire give rise to wild fires under these conditions.

Prevalent winds which most wildfire events occur in the region are from the north-west, east and north-east direction. Conditions tend to be dry with low relative humidity. High winds and excess fuels can lead to hazardous conditions for residents. Strong easterly and south westerly winds exist at the subject site during dry summer periods (Figure 4). These circumstances place residential housing under the most risk from bushfire events.

#### 4.3.1. Climate Change

Climate change is expected to impact on the future rainfall pattern of the area. It is recognised that the average rainfall has already declined by 20%-30% over the past few decades and that the long term impact of climate change may lead to a shift in rainfall, as well as dryer climatic conditions for the region. The long term changes are predicted to impact on the flora, fauna and water availability for the region. (Climate Commission 2010)

The Climate Commission (Climate Commission 2010) estimates that

*“...Rainfall patterns in Western Australia have changed over the last 40 years. There is significant evidence that climate change has contributed to the marked drying trend in the southwest of the state.”*

The construction of the proposed development is not predicted to be affected by sea-level rise, however could be affected from increased intensity rainfall events or extended drying periods. Increased extreme weather from climate change could affect fire frequency and behaviour in Western Australia (DEC, 2012), this BMP has been prepared to reduce the risk of bushfire on the proposed residential dwelling of the property.

### 4.4. Topography




The subject site is located in an undulating landscape on the Dandaragan Plateau with the average “Effective Slope” (as per AS3959-2009) slope for the site as 1.7 ° (assessed as an average over 5 slopes/100m) calculated to be < 5° and ranges between 1° and 3°. One metre contours indicate there are 2 hills in the western portion up to 201m AHD and one dominant ridge in the south east of the subject site upto 208m AHD. The lowest elevation of the site is in the east along the formation of a creek (upper catchment) at 168m AHD.

### 4.5. Bushfire fuels – Vegetation

The subject lies within the Swan IBRA bioregion. This bioregion is comprised of “*low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils.*” The area is located within the SWA1- Dandaragan Plateau. *The plateau is bordered by Derby and Dandaragan Faults. Cretaceous marine sediments are mantled by sands and laterites. Characterised by Banksia low woodland, Jarrah - Marri woodland, Marri woodland, and by scrub-heaths on laterite pavement and on gravelly sandplains.* (Hearn et al., 2002).

Detailed vegetation inventory was undertaken in the vegetation types identified on site (Bio Diverse Solutions, 2012). A total of 149 species was identified within 3 vegetation types. The vegetation types are shown over the page in Table 1 as described in 2012.

**Table 1 – Vegetation Types Identified on site (from Flora and Vegetation survey 2012)**

Vegetation Unit	Planning for Bushfire Protection (2010) Vegetation Type	Site Description	Photograph
<b>Medium woodland; jarrah-marri (EmCc)</b>	Type B - Woodland	Medium woodland of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i>	
<b>Mosaic Medium open woodland: jarrah, marri &amp; banksias (EmCcBa),</b>	Type B - Woodland	Medium open woodland: Jarrah & Marri, with low woodland Banksia/sparse woodland jarrah/marri	
<b>Cleared paddock areas</b>	Type G - Grassland	Open paddocks, cleared of native vegetation, occasional paddock trees Jarrah & Marri,	

(Bio Diverse Solutions, 2012)

The eastern portion of the subject area (in 2012) was predominantly pasture with little to no paddock trees. In 2016 site assessment revealed the eastern paddocks were continued to be grazed and managed in a low fuel state. The western area of the subject site was assessed in 2012 as being “grassland”, in 2016 it was noted this area has not been grazed in some time and is now predominantly classified as Woodland Type B, where the grasses are exceeding 200-.300mm, trees are exceeding 10% coverage and there is regrowth of scrubs and shrubs.

Internal to the site remnant patches of Jarrah/Marri Woodland occurs, which in 2012 (site first assessed) was generally lacking in midstorey and understorey species due to grazing of stock. In 2016 site assessment has again classified this as Woodland Type B, however the stock grazing has discontinued and this area is now more extensive across the internal site in eastern areas.



External to the site there is forest Type A (north, west and east). These areas are typically Jarrah, Casuarina and Marri mix with Banksia and shrub understoreys.


These vegetation types in 2016 are classified as per AS3959-2009 (Table 2.3) criteria as:

- **Forest (Type A)** – *Trees 10-30m high: 30-70% foliage cover (may include understorey of sclerophyllous low trees and tall scrubs or grass). Typically dominated by eucalypts.* Jarrah, Marri and Casuarina multilayered forests to the north, west and east external to the site.
- **Woodland (Type B)** – *Trees 10 -30 m in high; 10-30% foliage cover dominated by Eucalypts; understorey low trees to tall shrubs dominated by Acacia, Callitris or Casuarinas* (WAPC 2010); Jarrah/marri woodland and Mosaic Jarrah & Marri, with low woodland Banksia/sparse woodland Jarrah/Marri located adjacent and internal to the Subject Site in western areas – ungrazed for some time.
- **Scrub (Type D)** – *Shrubs greater than 2m high; 10-30% foliage cover with a mixed species composition.* Banksia scrub to the east of the subject site (external).
- **Grassland (Type G)** – *Open paddock areas, overstorey foliage <10%.* (WAPC 2010), open paddock areas located internal and adjacent to the Subject Site.


Please refer to Table 2 below showing vegetation types classified in March 2016 as per above and shown in Vegetation Classes Map Appendix C.

**Table 2 – Vegetation Classifications AS3959 -2009 Tea Tree Road**


Plot 1	Classification or Exclusion Clause	Forest Type A
		Jarrah/Marri low forest Multi-layered vegetation (fuels), grasses/sedges understorey, shrubs 1-3m midstorey Canopy >30% coverage Trees 10-12m High (30-70% vegetative/foliage cover). Fuel loading 25T/ha -35T/ha
<i>Photo ID: Photo 1 view of Forest Type A located north of Tea Tree Road in private property. View from Tea Tree Road from the south to north.</i>		
Plot 1 cont	Classification or Exclusion Clause	Forest Type A
		Casuarina/Jarrah/Marri low forest Multi-layered vegetation (fuels), grasses/sedges understorey, shrubs 1-3m midstorey Canopy >30% coverage Trees 10-12m High (>30-70% vegetative/foliage cover). Fuel loading 25T/ha -35T/ha
<i>Photo ID: Photo 2 view of Forest Type A located east of subject site in private property. View from eastern boundary from west to east.</i>		

Plot 1 cont	Classification or Exclusion Clause	Forest Type A
		<p>Casuarina/Jarrah/Marri low forest</p> <p>Multi-layered vegetation (fuels), grasses/sedges understorey, shrubs 1-3m midstorey</p> <p>Canopy &gt;30% coverage</p> <p>Trees 10-12m High (&gt;30-70% vegetative/foilage cover).</p> <p>Fuel loading 25T/ha -35T/ha</p>

*Photo ID: Photo 3 view of Forest Type A located north of the subject site in private property. View from Tea Tree road from south to north.*




Plot 2	Classification or Exclusion Clause	Woodland Type B
		<p>Jarrah/Marri Woodland</p> <p>Single -layered vegetation (fuels), grasses/sedges understorey</p> <p>Canopy &lt;30% coverage</p> <p>Trees 8-10m High (&lt;30% vegetative cover).</p> <p>Fuel loading less than 15T/ha</p>

*Photo ID: Photo 4 view of Woodland Type B to the east (internal) of the site view from Brennan road from the west to the east.*

Plot 2 cont	Woodland Type B	Classification or Exclusion Clause	Woodland Type B
			<p>Jarrah/Marri Woodland</p> <p>Single -layered vegetation (fuels), grasses/low sedges and Grass trees understorey (&lt;1m)</p> <p>Canopy &lt;30% coverage</p> <p>Trees 8-10m High (&lt;30% vegetative cover).</p> <p>Fuel loading 15T/ha</p>

*Photo ID: Photo 5 view of Woodland Type B to the east (internal) of the site. View from Brennan Road from the west to the east.*



<b>Plot 3</b>	<b>Classification or Exclusion Clause</b>	<b>Scrub Type D</b>
		<p>Banksia Woodland</p> <p>Trees and shrubs 2-10m high</p> <p>10-30% foliage cover</p> <p>Canopy &lt;30% coverage</p> <p>Small shrubs understorey (&lt;30% vegetative cover).</p> <p>Fuel loading less than 15-25T/ha</p>
<i>Photo ID: Photo 6 view of Woodland Type B to the west of the site adjacent to Brennan Road. View from east to west.</i>		
<b>Plot 4</b>	<b>Grassland Type G</b>	<b>Classification or Exclusion Clause</b>
		<p>Grasses grazed by sheep</p> <p>&lt;100mm high</p> <p>Occasional trees (&lt;10%)</p>
<i>Photo ID: Photo 7 view of Grassland Type G internal to the site (central areas), view from Tea Tree Road to the south.</i>		
<b>Plot 4 cont</b>	<b>Classification or Exclusion Clause</b>	<b>Grassland Type G</b>
		<p>Grasses grazed by sheep</p> <p>&lt;100mm high</p> <p>Little to no trees</p>
<i>Photo ID: Photo 8 view of Grassland Type G internal to the site (eastern areas), view from tea Tree Road from the north west to south east</i>		

#### 4.6. Assets

The subject site is predominantly cleared of remnant vegetation, with some isolated remnant vegetation patches which have been grazed. The site is valued for its proximity to the Bindoon townsite and Perth city, remnant vegetation and sandy soils (where perennial horticulture i.e. vineyards are being established).

Once developed, the values which will be potentially affected by fire include:

- **Human lives:** It is likely that more than 110 people could be resident at the newly created subdivision;
- **Assets:** The development will contain dwellings and valuable infrastructure; and
- **Environmental Conservation Values:** the site has internal remnant (forest) vegetation areas in western portions of the site which have vegetation conservation values.

#### 4.7. Access

Vehicle access to the subject site is from Tree Road and Brennan Road in the west. An internal informal 4 x 4 track services paddocks and water supplies for grazing stock. Please refer to Photo 9 and 10 below



Photo 9 – View of Tea Tree Road to the north of the subject site



Photo 10 – View of Brennan Road to the west of the subject site

#### 4.8. Water Supply

There is presently no developed land within the subject site. Water is presently gained from a dam in the east and pumped via windmill across the property. Please refer to Photograph 11.



Photo 11 – View of dam in Lot 1 Tea Tree Road.

#### 4.9. Firebreaks

There are existing firebreaks to SoC required standards around the property, refer to Photo 12.



Photo 12 – View of existing firebreaks along perimeter of property.

## 5. Potential Fire Issues and Fire Risk

The bushfire hazard assessment provides a measure of the fire intensity and likelihood of bushfire attack measures on a dwelling, subdivision or residential area (Planning for Bushfire Protection, Edition 2 2010). This measure can provide an assessment of the land for suitability for residential construction and takes into account:

1. Vegetation Assessment – type and class in each direction;
2. Distance - between the predominant vegetation class and proposed building;
3. Topography and slope – with reference to accessibility; and
4. Land use – surrounding and internal to the proposal.

(Planning for Bushfire Protection, Edition 2, 2010)

The Vegetation type for the subject site (within 100m) has been classified as per AS3959-2009 as Forest Type A, Woodland Type B, Scrub Type D and Grassland Type G (as per vegetation classifications outlined in AS3959-2009, Table 2.3). The bushfire hazard Level (BHL) ratings have been assessed as per the methodology as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC 2015a). Please refer to Table 3 below.

**Table 3 – Bushfire Hazard Level (BHL) Categories**

Table 3: Hazard levels and characteristics

HAZARD LEVEL	CHARACTERISTICS
<b>Low</b>	<ul style="list-style-type: none"> <li>• devoid of standing vegetation (less than 0.25ha cumulative area);</li> <li>• areas which, due to climatic conditions or vegetation (e.g. rainforest), do not experience bushfires;</li> <li>• inner urban or suburban areas with maintained gardens and very limited standing vegetation (less than 0.25ha cumulative area);</li> <li>• low threat vegetation, including grassland managed in a minimal fuel condition (i.e. to a nominal height of 100mm), maintained lawns, vineyard and orchards; and</li> <li>• pasture or cropping areas with very limited standing vegetation that is shrubland, woodland or forest with an effective up slope*, on flat land or an effective down slope* of less than 10 degrees, for a distance greater than 100 metres.</li> </ul>
<b>Moderate</b>	<ul style="list-style-type: none"> <li>• areas containing pasture or cropping with an effective down slope* in excess of 10 degrees for a distance greater than 100 metres;</li> <li>• unmanaged grasslands;</li> <li>• open woodlands;</li> <li>• open shrublands;</li> <li>• low shrubs on areas with an effective up slope*, on flat land or an effective down slope* of less than 10 degrees, for a distance greater than 100 metres or flat land;</li> <li>• suburban areas with some tree cover; and</li> <li>• forest and woodlands with a permanent grass understorey or at most, a scrub understorey structure consisting of multiple areas of &lt;0.25ha and not within 20 metres of each other or single areas of &lt;1ha and not within 100 metres of other scrub areas.</li> </ul>
<b>Extreme</b>	<ul style="list-style-type: none"> <li>• forests with a scrub understorey which is multi-tiered;</li> <li>• woodlands with a scrub understorey which is multi-tiered;</li> <li>• tall shrubs; and</li> <li>• any area of vegetation not otherwise categorised as low or moderate.</li> </ul>

(WAPC, 2015a)

### **Internal Bushfire Hazard Levels (BHL)**

The subject site has sustained vegetation clearing and grazing by sheep. In eastern areas of the site it is predominantly a cleared landscape representing a **“Low”** BHL as defined by Table 3 (WAPC, 2015a). In the western portions of the site the previously grazed areas has regenerated and now forms a Woodland Type B landscape which is a Moderate BHL (Open Woodlands). The Woodlands in the south west of the property are regenerating (still degraded from previous grazing) and are classified as a **“Moderate”** BHL as defined by Table 3 (WAPC, 2015).

There are low effective slopes for the site, with all slopes <5°. Refer to Bushfire Hazard Level Mapping, Appendix D.



**External Bushfire Hazard Level (BHL)**

Surrounding the subject site to the west, north and east west there is remnant bushland with cleared paddocks to the south. The predominant fire risk associated with the site is the adjacent Forests to the north, west and east which is an “**Extreme**” BHL as defined by Table 3 (WAPC, 2016). The external Woodland and Scrub vegetation are classified as a “**Moderate**” BHL as defined by Table 3 (WAPC, 2015).

Bushfire risk increases with slope, which with hot conditions can give rise to hot and intense fires in north (Summer mid-level disturbances) and easterly (prevailing summer) wind conditions. Slopes are generally low being <5° within 100m of the subject site.

The predominant extreme fire weather in summer conditions can give rise to flame and ember attack from north and north west wind directions (mid level disturbances) and from the east and south west (summer prevailing winds, see Figure 4).

Refer to Bushfire Hazard Level Mapping, Appendix D.

**Proposed Subdivision Fire Risk Rating**

The fire risk for this subdivision has been rated at **Extreme - Moderate BHL** as defined by Table 3 (WAPC, 2015).

Setback distances of over 100m from native vegetation (Bushfire Prone Vegetation) cannot be achieved for all the lots. Where 100m cannot be achieved from dwellings to Bushfire Prone Vegetation, the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) states that Building to Bushfire Attack Levels (BAL) and AS3959-2009 can apply to dwellings to assist in achieving “Acceptable Solutions” to the subdivision. Where a building is located within the State Gazetted Bushfire Prone Area Mapping (OBRM, 2015), the *Planning and Development (Local Planning Schemes) Amendment Regulations 2015* states that building to Bushfire Attack Levels (BAL) and AS3959-2009 is to apply to dwellings.

The subdivision (and proposed dwellings) will be located within 100m of Bushfire Prone vegetation and is located within the WA State Bushfire Prone Area (OBRM, 2015) mapping. The proposal will require assessment to the bushfire protection criteria as per the newly released “Guidelines for Planning in Bushfire Prone Areas” (WAPC, 2015a). These are outlined in Section 6 –**Assessment to Bushfire Protection Criteria**.

## 6. Bushfire Management/Mitigation Plan

The Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) outlines bushfire protection criteria which subdivisions and development proposals are assessed for compliance. The bushfire protection criteria (Appendix 4, WAPC, 2015) are a performance based criteria utilised to assess bushfire risk management measures and they outline four elements, being:

- Element 1: Location
- Element 2: Siting and Design of Development
- Element 3: Vehicle Access; and
- Element 4: Water

(WAPC, 2015)

The plan of subdivision for Lot 1 and 2 Tea Tree Road Chittering is required to meet the “Performance Principles” and/or “Acceptable Solutions” of each Element of the bushfire mitigation measures (WAPC, 2015). The site has been classified as having a “**Low- Moderate**” future internal bushfire hazard in the development/building areas, with adjacent “**Extreme**” and “**Moderate**” bushfire hazards (as per WAPC Guidelines, Table 3) due to the presence of Forest Type A, Woodland Type B, Scrub Type D and Grassland Type G. Effective Slopes under vegetation are variable across the site are low <5°.

The subdivision will be assessed against the bushfire protection criteria Acceptable Solutions for Elements A1, A2, A3 and A4. The following sections of this report outlines how the subdivision complies with the bushfire protection criteria Acceptable Solutions as per the newly released Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a).

### 6.1. Element 1: Location-

Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.

#### **Assessment to the Acceptable Solutions.**

**Acceptable Solution applied A1.1:** *the strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low Bushfire hazard level, or BAL-29.*

The subdivision can associated new dwellings can be located on BAL Low areas. The previously cleared areas (now regrowing from cessation in farm activities) can be slashed, mowed and maintained in a Low Fuel State (as per AS3959-2009 Clauses 2.2.3.2 (f)). The subdivision has a **Moderate- Extreme** rating due to the presence of remnant external Forest, Scrub and woodland areas (north, south and west). The bushfire hazard level is manageable and adequate setbacks can be achieved to 100m from these areas due to the large lots proposed. The large size lots (Rural Small Holding zoning) ranging from 5.01ha to 5.44ha allow for setbacks to bushfire hazards, therefore reducing the risk of bushfire to people, property and infrastructure. If dwellings do not located >100m from classifiable vegetation then building to AS3959-2009 will apply.

Subdivision is deemed to meet Acceptable Solution A1.1.

#### **6.1.1. Recommendations arising from assessment to this element**

The recommendations/conclusions from assessment to Element 1: Location concludes that the subdivision:

- Subdivision is deemed compliant to A1.1 due to :
  - BAL Allocation can apply of BAL-Low through re-clearing previously cleared areas.
  - If vegetation continues to re-grow without maintenance then BAL and building to AS3959-2009 will apply where 100m setbacks cannot be achieved.

## 6.2. Element 2: Siting and design of development

Intent: To ensure that the siting of development minimises the level of bushfire impact.

**Assessment to the Acceptable Solutions** – To achieve compliance with this Element using an Acceptable Solution, either or both acceptable solutions (A2.1 and A2.2) must be met that it satisfies Element 1.

The Acceptable Solutions which will be applied to this subdivision include:

- **A2.1: Asset Protection Zone (APZ):** Every building is surrounded by a 20m APZ (see Section 6.2.2).
- **A2.2 Hazard Separation:** Building to AS3959-2009 where setbacks of 100m cannot be achieved to Bushfire Prone Vegetation (see Section 6.2.1).

The subdivision will be assessed to the Acceptable Solutions for Element 2 as demonstrated in the following sections.

### 6.2.1. Asset Protection Zones (APZ) (Acceptable Solution A2.1)

#### Acceptable Solutions applied

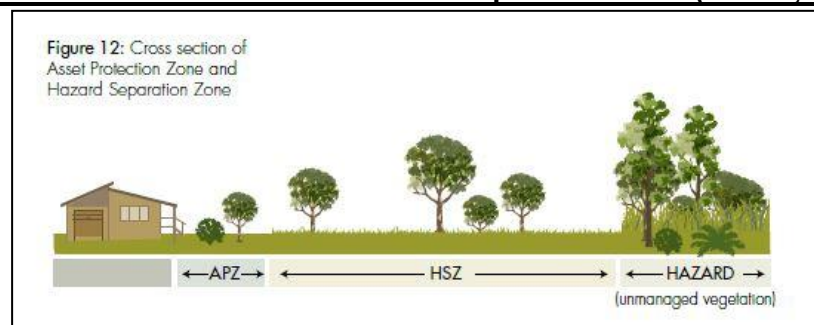
The aim of the Asset Protection Zone (APZ) is a low fuel area immediately surrounding a habitable building, and is designed to minimise the likelihood of flame contact with buildings (WAPC, 2015). APZ will minimise the risk of the building igniting, (thus protecting the occupants), and with the reduced fuel quantities, allow safer and more effective conditions for fire-fighters to contain wildfires. Roads, pathways, lawns, and other low hazard items should be placed within this zone to improve the effectiveness of the zone. The APZ are required in addition to HSZ (see Section 6.2.2).

Every building must be surrounded by a 20 metre wide APZ, this is deemed by WAPC (2015) as the minimum width to be constructed around all buildings as a “defendable zone”. Activity within the APZ (WAPC, 2015) for each individual dwelling must meet the following requirements:

- a) Width: 20 metres measured from any external wall of the building or building envelope;
- b) Location: within the boundaries of the lot on which the building is situated;
- c) Fine fuel load: reduced to and maintained at 2 tonnes per hectare;
- d) Trees (crowns) are a minimum of 10 metres apart
- e) Trees are low pruned at least to a height of 2 metres;
- f) No tall shrub or tree is located within 2 metres of a building;
- g) No tree crowns overhang the building;
- h) Fences and sheds within the APZ are constructed using non-combustible materials (e.g. colour bond iron, brick, limestone, metal post and wire); and
- i) Sheds within the APZ should not contain flammable materials.

An example of APZ from the “Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015) is shown in Figure 6.

**Figure 6 – Asset Protection Zone and Hazard Separation Zone (WAPC, 2015)**



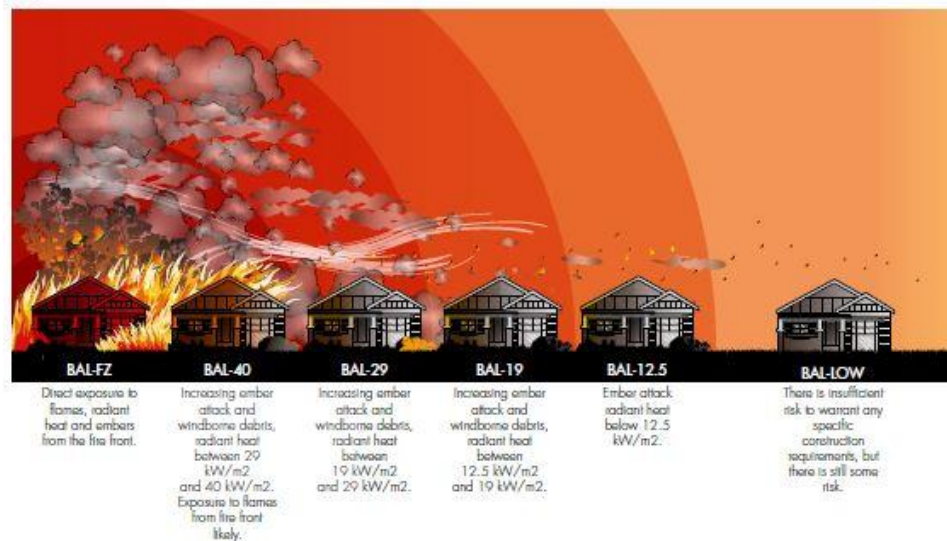
(WAPC, 2015 a)

All residences within the proposed subdivision can achieve the required 20m APZ within their respective boundaries. Information on long term maintenance of APZ for the homeowner, as recommended by DFES is provided in Appendix F.

### 6.2.2. Hazard Separation (Acceptable Solution A2.2)

BAL is the process for measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. The threat or risk of bushfire attack is assessed by an accredited BAL Assessor. BAL rating determinations are of 6 levels BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40, BAL-FZ. Building is generally not recommended in BAL-40 or BAL-FZ areas. The BAL rating is determined by the distance of the building to vegetation, slope and vegetation type adjacent to the dwelling. Refer to Figure 9 below.

**Figure 9 - BAL Construction levels in context**



(WAPC, 2015a)

Building design and construction to AS3959-2009 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself. The construction standards outlined in AS 3959-2009 provide reference to specific items of building and it is recommended that the future lot owner discuss these in detail with their builder or architect. Table 2 outlines some of the construction consideration to AS3959-2009 when building in bushfire prone areas. Construction standards are to be approved by the CoA prior to construction. Building to AS3959-2009 applies to buildings as defined in the Building Code of Australia (BCS).

**Table 2 – AS3959-2009 Construction Requirement (Example)**

Construction requirement AS3959-2009
Flooring systems
Supporting posts, columns, stumps, piers and
External Walls
Windows
External Doors
Vents and weep holes
Roof
Eaves
Fascia's
Gutters and downpipes
Veranda and decks
Service Pipes (water and gas)



The subdivision will comply to Acceptable Solution A2.2 by applying either a 100m Hazard Separation Zone (HSZ) (i.e. 100m setback) at the interface of the building and the bushfire hazard or a setback associated with BAL construction and AS3959-2009 as outlined in the BAL Contour Map outlined in Appendix E. No higher BAL allocation than BAL 12.5 needs to be applied to the dwellings.

**Table 3 – Minimum Setback Distances and Construction Standards**

BAL Rating	Vegetation Type	Distance to Vegetation	Construction
BAL 29	Woodland Type B	17-<25m	AS3959-2009 to apply
BAL 19	Woodland Type B	25-<35m	AS3959-2009 to apply
BAL 12.5	Woodland Type B	35-<100m	AS3959-2009 to apply
No BAL Rating Required	All Vegetation	>100 metres	No construction standards required

Vegetation is downslope and >0 to 5 Degrees (as per AS3959-2009).

**Notes on BAL Assessment:**

- **Sites affected by BAL will be subject to detailed feature survey and the mapping depicted in the BAL Mapping Appendix E is a guide, with accuracy to within 5m.**
- **If dwellings cannot achieve >100m from the adjacent vegetation then BAL Construction will apply as outlined in Table 3.**
- **BAL setback distances are measured from the edge of existing vegetation at time of feature survey and building construction approvals stages.**
- **Detailed assessment for BAL Construction as described in this document can be undertaken at construction stage by an accredited Bushfire Consultant with approval from the Shire of Chittering.**

A 100m HSZ from external Extreme and Moderate BHL can be achieved as shown on the SP Appendix B and the BAL Mapping Appendix E. The lots will require ongoing maintenance from the developer or will be subject to vegetation clearing by the new owners. If the lots remain unmaintained and continue to revegetate dwellings may require to be built to BAL and AS3959-2009 as per Table 3. This is indicated in the BAL Mapping Appendix E (see inset).

The developer will be responsible for the implementation of a notification on title pursuant to 70A of the *Transfer of Land Act 1893* with regard to the notification on title on lots alerting the future owners of the endorsed Bushfire Management Plan

**Assumptions made in BAL Contour Mapping:**

- Remnant vegetation in internal areas will be maintained as low fuel by the developer.
- A 100m HSZ (setback) will apply to the whole of development and be maintained by the developer prior to sale of lots and until lots are relinquished to new owners.
- The large rural lot to the east will be maintained as rural and grazed pastures.
- The remnant vegetation areas external to the site to the north, south and west adjacent to the subject site will remain "as is".

**6.2.3. Recommendations arising from assessment to this Element**

The recommendations/conclusions from assessment to Element 2: Siting and design; concludes that the subdivision:

- The Subdivision is deemed to be compliant with Element 2 by:
  - The application of a 20m APZ;
  - Clearing/maintenance of 100m HSZ (setback) for BAL Low; and

- If woodland Type B areas regenerate and 100m not achieved then building to BAL/AS3959-2009 as it applies to the dwelling;
- The developer will be responsible for the implementation of a notification on title pursuant to Section 70A of the Transfer of Land Act 1893 for all lots affected by an increase in construction standards consistent with a BAL rating/AS3959-2009 allocation to the lot, and alerting the prospective owner (s) of the lots and successors in title of the Bushfire Management Plan.
- It is recommended that the developer clear all the lots prior to sale to ensure the APZ and setbacks are demonstrated to the purchaser at time of sale. The APZ areas are to be as per the standards in Section 6.2.1 and these areas are regularly maintained by the developer until all land is relinquished to the new lot owner.
- Maintain 100m setback from dwellings and bushfire hazards at all times during staged construction and grasses maintained to <100mm at all times;
- The vegetation clearing required for the street verges, APZ and HSZ areas does allow for the retention of significant trees, these should be clearly marked for the developer prior to clearing operations on the site. Final placement of the dwellings on site (by new lot owners) may require further trees to be removed however this stage of tree removal should only be as per the standards of the APZ Section 6.2.1; and

Individual BAL assessments may be considered on the lots by the new owners when dwelling design/placement is known and can be undertaken at building approval stages with the engagement of an Accredited Level 1 BAL Assessor.

### 6.3. Element 3: Vehicle Access

Intent: To ensure that the vehicular access serving a subdivision/development is available during a bushfire event.

*Acceptable Solutions applied.*

The internal layout of the Subdivision's public roads and private access allows vehicles and other emergency vehicles to move through the subdivision at all times, meeting the Acceptable Solutions. Vehicle access technical standards as outlined in Table 4 are the minimum requirements from Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a). Refer to Table 4 and Bushfire Management Plan Appendix G.

**Table 4 – Vehicular Access Standards**

Standard	Public Roads	Fire Service Access Ways	Emergency Access Ways
Minimum trafficable	6 metres	4 metres	6 metres
Horizontal clearance	6 metres	6 metres	6 metres
Vertical clearance	4 metres	4 metres	4 metres
Maximum grades	1 in 10	1 in 10	1 in 10
Minimum weight capacity	15 tonnes	15 tonnes	15 tonnes
Maximum crossfall	1 in 33	1 in 33	1 in 33
Curves minimum inner	8.5 metres	8.5 metres	8.5 metres
Cul de sacs	N/A	N/A	N/A
Battle Axes	Not more than 600m	N/A	N/A
Private Driveways	Standard as roads if house >50m from road, passing bays every 200m for 20m.	N/A	N/A
Signage	Not required	Required	Must be signposted
Gates	Not required	Min width 3.6	Min width 3.6
Design and construction	Approved by relevant local government	Approved by relevant local government	Approved by relevant local government
Turn around areas	Every 500 metres, within 50 metres of the house and at water	Every 500 metres, within 50 metres of the house.	Not required

(WAPC, 2015a)

#### 6.3.1. Two Access Ways (A.3.1)

The SP design allows for two access points onto Tea Tree Road and an Emergency Access Way and Fire Service Access onto Brennan Road in the west and to southern firebreaks (in adjacent properties) to the south and meet the Acceptable Solution. Please refer to Bushfire Management Plan Appendix G.

#### 6.3.2. Public roads (A.3.2)

All internal public roads shall be constructed to acceptable standards (Refer to Table 4 – Vehicle Access Standards) and shall be detailed in Civil Engineering Designs. The Subdivision design allows for two way traffic and safe egress from the subdivision via a road network with 30m internal road reserves and meets the Acceptable Solution. Please refer to Bushfire Management Plan Appendix G.

**6.3.3. Cul de Sacs (A3.3)**

Cul-de-sacs will not exceed 200m in length and meet the Acceptable Solution.

**6.3.4. Battle Axes (A3.4)**

Battle Axes shall not exceed 600m, standards for road/street construction are as per Table 4 – Vehicle Access Standards. All Battle Axes proposed meet this requirement and meet the Acceptable Solution.

**6.3.5. Private Driveways (A3.5)**

Constructed driveways are to meet the requirements of Table 4. All driveways will be <50m from road to dwelling and will not require turnaround areas or passing pays, therefore meeting the Acceptable Solution.

**6.3.6. Emergency Access Ways (A3.6)**

Emergency Access Ways (“Fire Access”) will be from the northern side of the subdivision to Tea Tree Road, from Brennan Road to the west and to southern firebreaks (in adjacent properties) to the south. If the subdivision is staged, the Emergency Access Ways will be required to link through to Brennan Road and to Tea Tree Road, this will need to be via a hardened surface as per Table 4 - Vehicular Access Standards. The linking Emergency Access Way to Brennan Road will provide a trafficable surface for emergency access linking Brennan Road and the subdivision internal roads, and meet the Acceptable Solution. Please refer to the Please refer to Bushfire Management Plan Appendix G.

**6.3.7. Fire Service Access (A3.7)**

Fire Service Access (FSA) is proposed from the northern side of the subdivision to Tea Tree Road, from Brennan Road to the west and to southern firebreaks (in adjacent properties) to the south. These FSA’s to enable fire appliance ease of access through the subdivision for fire fighting operations, please refer to the Bushfire Management Plan- Appendix G. The road reserve through the subdivision enables light unit fire appliance and heavy unit (truck appliances) access in an emergency.

The linking Fire Service Access to Brennan Road will provide a trafficable surface for fire appliance access through the POS corridor (Shire land) linking Brennan Road and the subdivision internal roads. Please refer to the Please refer to Bushfire Management Plan Appendix G.

The minimum running surface and standards of construction roads is as per Planning for Bushfire Protection Edition 2 (2010), please refer to Table 4. Fire Service Access routes for this subdivision will:

- Link the road network;
- Be adequately signposted (see following section);
- Allow for two-way traffic (as per Table 4);
- Have a hardened surface (as per Table 4 standards); and
- Have erosion control measures in place such as culverts, stormwater contours/diversions, and native vegetation remediation/stabilisation at gully crossings.

If the subdivision is staged, the Fire Service Access Ways will be required to link through to Brennan Road, this must be via a hardened surface as per Table 4 - Vehicular Access Standards.

**6.3.8. Signage**

“Fire Service Access Ways” are to be sign posted where they adjoin public roads. DFES recommend the following wording for signage as appropriate:

- “Fire Service Access – No Public Access”; and
- “Emergency Access Only”.

An example of clear street signage is shown over the page in Photo13.





Photo 13 – Example of street/road signage clearly indicating emergency access/egress within the subdivision.

### 6.3.9. Gates

The use of gates to restrict public traffic on “Emergency Access Ways” is acceptable provided it is wide enough to accommodate 3.4 Heavy Duty Fire Appliances. Gate standards are to be as follows:

- Minimum width 3.6 metres;
- Approved by the Shire of Chittering;
- Emergency Access must not be locked; and
- Bollards should be installed to restrict vehicle movement around the gates where appropriate.

### 6.3.10. Individual Fire breaks (A3.8)

Internal fire breaks are required by the Shire of Chittering, refer to the current Fire Break Order (annually updated) from the Shire website:

<http://www.chittering.wa.gov.au/chittering-fire-services/fire-breaks-and-important-dates-to-remember.aspx>

As at 2014/15, the Shire of Chittering Firebreak Order states the following firebreaks would apply to this subdivision:

- ***All properties, including Rural Residential with land greater than equal or greater than 2 ha:*** Must clear a fire break of all flammable materials three metres (3) metres wide, with a four (4) metre vertical clearance along the inside of the boundary to the property.
- ***Land Greater than 120 ha:*** Must have a firebreak in such a position which divides the land into areas not exceeding 120 ha. An indication of how this can be achieved on the Rural Lot is shown in the BMP Appendix G.

Individual fire breaks will apply to lots 1-47 (Rural small holdings 5.01 to 5.44ha), with firebreaks for the larger Rural Lot (proposed lot 48) along existing fire breaks as shown in the BMP Appendix G.

The fire breaks are to be maintained to the standard of the Shire of Chittering's Town Planning Scheme No 6, Local Planning Policy No 21. This policy requires all firebreaks to be as stated above (3m wide with a 4m vertical clearance) for 4 wheel drive access. Where a Fire Access (Emergency Access Way) or road adjoins a property, an individual fire break is not required

Internal lot firebreaks should be designed to minimise soil erosion. For instance, firebreaks will generally avoid areas undergoing environmental remediation (Remnant Vegetation areas or Vegetative Corridors) and be installed around these areas. In areas of steep terrain, firebreaks can be created by spraying with chemicals, the path of a firebreak can be meandered to follow contours to reduce the risk of soil erosion from storm water.

#### 6.4. Element 4 Water

Intent: To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.

##### *Acceptable Solution applied*

Scheme water will not be provided to the subdivision. The Guidelines for Planning in Bushfire Prone Areas recommends rural small holdings to have the provision of a 50,000L water tank (to a standard approved by the Shire of Chittering) every 25 residences and a hydrant installed. It is therefore required that a 100,000 L capacity should be applied at this subdivision (48 lots) at a central location. These structures will be located on public land and vested with the Shire of Chittering as subdivision clearance occurs.

The hydrant/water tank construction must meet the following standard specifications and have:

- Hardstand and turnaround area suitable for 3.4 Heavy Duty fire appliance;
- Fire water tanks to have level indicators installed;
- Valves and manifolds must be locked by the developer with a Shire Standard lock;
- AS approved fire hydrants;
- Must be capable of delivering 600 litres per minute via Engineers certification;
- Procedures to be put in place by the developer to ensure the tank is maintained at full capacity at all times;
- Be easily accessible with standard fire services hydrant and key; and
- Be identified by standard road and pole markings.

A recommended location for the tank and hardstand area is shown in the Bushfire Management Plan Appendix G. After the developer has completed all maintenance periods, it shall be the responsibility of the Shire of Chittering to maintain this facility.

As scheme water is not to be provided to individual houses, all buildings intended for residential use must include provision for the storage of water in tanks not less than 120,000 litres capacity, of which 10,000L is to be held in reserve for fire fighting purposes. All water tanks intended to reserve 10,000L for fire fighting purposes are required to install a 50mm male camlock fitting to the floor of the tank and the draw point for the residential purposes is to be 10,000L above the floor of the tank.

#### 6.5. Other Bushfire Mitigation Procedures

##### 6.5.1. Landscaping/Streetscaping Areas

Landscaping and Streetscaping areas subject to similar standards that apply to the APZ and the following minimum standards shall apply:

- Trees (crowns) a minimum of 10m apart (no continuous crowns);
- Trees should have no dead material within the plant's crown or on the bole;
- Fuel reduced to <2t/ha; and
- Shrubs should be no higher than 0.5 m.

##### 6.5.2. Staged Development

If the development is staged it should incorporate the following:

- Reduction of bushfire fuels in HSZ and APZ for each stage of construction of the subdivision and during maintenance periods;
- Maintenance of 100m HSZ to APZ standards – note grasses to be slashed and maintained to <100mm at all times.
- Construction of 2-way Emergency Access Way from Tea Tree Road to Brennan Road;
- Installation of Water Tank on public land (minimum of 50,000L/25 residences); and

- Maintenance of fire protection measures in public areas (gates, access, landscaped areas etc) until the developer has relinquished construction/maintenance responsibility of public use areas to the Shire of Chittering.

#### **6.5.3. Evaporative Air Conditioners**

Evaporative air conditioning units can catch fire as a result of embers from bushfire getting into the unit. These embers can then spread quickly through the home causing destruction. It can be difficult for fire-fighters to put out a fire in the roof spaces of homes. Information on Evaporative air conditioners is supplied in Appendix F of this document.

It is also recommended that home owners:

- Ensure that suitable external ember screens are placed on roof top mounted evaporative air conditioners compliant with AS3959-2009 (current and endorsed standards) and that the screens are checked annually.

## 7. Shire of Chittering Fire Protection Plan

The Shire of Chittering has the assistance of the Chittering Fire Services which is made up of six Volunteer Bush Fire Brigades. It has a Chief Bush Fire Control Officer and two Deputies. Five Brigades are fire fighting units and one is an incident support Brigade. Each fire fighting unit has three appliances suited to its area. The Incident Support Brigade supports the Incident Management Team at all fires when required.

Training and induction courses are held regularly and land owners are encouraged to attend these. For more information refer to their website:

<http://www.chitteringfireservices.org.au/>

Local Bush Fire Control Officers are allocated throughout the Shire depending on region, the latest Fire Break Order should be consulted from the Shire's website for contact details:

[www.chittering.wa.gov.au](http://www.chittering.wa.gov.au)

### 7.1. Fire Fighting Facilities

The subject area is in the Upper Chittering Bushfire Brigade District. Response times can vary depending on commitments of volunteers, fire events current at time and priority of the fire services in the south west of Western Australia during summer periods. DFES recommend that homeowners take care to prepare their individual dwellings for fire season and take precautions against fire as per the **"Bushfire Preparedness – Prepare. Act. Survive."**

It is generally acknowledged that during large wildfire events, local resources may not be able to respond to every dwelling due to strategic deployments of services, priorities within the area or state and/or present commitments of volunteers and resources.

The Chittering Fire Services has 3.4 and 2.4 heavy duty tankers (3000L and 2000L) and light tankers (fast attack 400L capacity). These are typical of Brigade units for fire fighting services within Western Australia.

The Chittering Fire Services' six bush fire brigades provide local fire services and have:

- 4 fire stations;
- Volunteer members;
- A communications and call out system;
- Protective clothing issue to volunteers; and
- DFES approved fire appliances.

### 7.2. Homeowner Protection

It is the responsibility of homeowners to protect their property from fire. DFES have readily available information online which can assist homeowners in their preparedness during fire season (October to May). The DFES website **"Bushfire Preparedness – Prepare. Act. Survive."** should be accessed by all owners in bushfire prone areas. A hard copy of the A4 book "Prepare. Act. Survive" can be found at local Shire of Chittering Offices or DFES offices, or downloaded off the above web address:

<http://www.dfes.wa.gov.au>

### 7.3. Bushfire Plan

Residents should prepare their own individual fire plans, as they need to make a commitment to develop a bushfire survival plan detailing preparations and actions to take if a bushfire threatens. When developing a bushfire survival plan, the following should be considered:



- If you plan to leave for a safer place - where will you go and how will you get there? Your safer place could be with friends and family, and may not be far away. Know where you will go and never 'wait and see'. Relocating at the last minute can be deadly
- Does your household include elderly relatives, young children, people with disabilities or illness? When, where and how will they be relocated? Who will care for them?
- What will you do with your pets and livestock?
- Can your home be defended? Is it in a location that makes it difficult or dangerous to actively defend? (refer to DFES's Homeowners Bushfire Survival Manual - PDF)
- Will your home provide shelter if you have to or decide to stay?
- Are you capable of defending your home without the support of fire fighters?
- Do you have the skills, knowledge and capacity to check for and put out spot fires for up to ten hours after the fire front has passed?
- Do you have the right equipment and resources to actively defend? (e.g. sufficient independent water supply of at least 20,000 litres and a petrol, diesel or generator powered pump capable of pumping 400 litres per minute)
- Will you cope with the noise and stress of a bushfire if you decide to actively defend? Being in a bushfire may be the most traumatic experience of your life.

(from DFES website, 2013)

By compiling information as outlined above, the individual lot owner can be prepared for their response in a bushfire emergency. Home owners should not rely on emergency personnel to attend their home and thus it is stressed to **prepare an individual bushfire emergency plan** regarding their intentions and property. This Bushfire Management Plan is **not** an individual bushfire emergency plan.

As noted in Section 6.0, building to AS3959-2009 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.

***AS3959-2009 disclaimer:*** *It should be borne in mind that the measures contained within this Standard (AS3959-2009) cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather condition.*

(AS3959, 2009)

Information is also available on the ABC Radio website to guide homeowners in the event of a fire emergency, such information includes:

Planning for an Emergency Bushfire:

- Survival Kit
- Fire Emergency Services
- Before a Bushfire
- During a Bushfire
- After a Bushfire

Refer to the following links for more information on how to prepare a bushfire plan:

<http://www.abc.net.au/news/emergency/?ref=front-page-slider-v2--emergencies>

It is also recommended that homeowners in bushfire prone areas understand the DFES Bushfire Warning System. A brief outline is shown over the page, however further detail should be sought from DFES website ([www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)) in a bushfire emergency.

### **Bushfire Warning System**

During a bushfire, emergency services will provide as much information as possible through a variety of channels.

### **Community Alerts**

DFES issues Community Alerts for bushfires that threaten lives and property.

The alert level changes to reflect the increasing risk to your life and the decreasing amount of time you have until the fire arrives. DFES issues the following bushfires warnings:

- **Advice**  
A fire has started but there is no immediate danger, this is general information to keep you informed and up to date with developments.
- **Watch and Act**  
A fire is approaching and conditions are changing, you need to leave or prepare to actively defend to protect you and your family.
- **Emergency Warning**  
You are in danger and you need to take immediate action to survive as you will be impacted by fire. An emergency warning may be supported with a siren sound called the Standard Emergency Warning Signal (SEWS).
- **All Clear**  
The danger has passed and the fire is under control, but you need to remain vigilant in case the situation changes. It may still not be safe to return home.

([www.dfes.wa.gov.au](http://www.dfes.wa.gov.au))



## 8. Summary

### 8.1. Overall Fire Threat

Marou Property Development Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a fire hazard assessment and prepare a Bushfire Management Plan to guide all future fire management for the proposed subdivision development of Lots 1 and 2 Tea Tree Road, Bindoon. The subdivision proposal is for approximately 47 lots to be created as Rural small holdings zoning (5.01ha to 5.44ha) and large 1 Rural Lot.

The subject site is predominantly cleared paddock areas in the east with some internal remnant vegetation patches with Forest/Woodland vegetation. The majority of the site has have been disturbed from previous land activities (clearing, grazing, agricultural pursuits). In 2016 site reassessment (since 2012) assessed the western paddock areas to be not grazed for some time and regenerating Woodland Type B. Adjacent to the subject site to the south, north and west is Forest Type A, Woodland Type B and Scrub type D in private property areas (as classified by AS3959-2009)

The subdivision has been rated as having an **Extreme - Moderate** Bushfire Hazard Level as defined by WAPC Guidelines, Table 3. The subdivision was assessed against the bushfire protection criteria Acceptable Solutions for Element A1, A2, A3 and A4 found that upon construction, the subdivision will comply with the bushfire protection criteria Acceptable Solutions as per the newly released Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015),

A summary includes:

- Subdivision is deemed to be compliant with “Acceptable Solutions” for Element A1, see Section 6.1;
- Subdivision is deemed compliant with “Acceptable Solutions” for Element A2, see Section 6.2;
- Subdivision is deemed compliant with “Acceptable Solutions” for Vehicles (Element), see Section 6.3; and
- Whole of subdivision compliant with “Acceptable Solutions” for Water (Element), see Section 6.4.

This BMP report provides details of the fire management strategies proposed to be implemented across the site as it is subdivided and developed to ensure adequate protection of life, property and biodiversity assets. To ensure the mitigation measures are implemented responsibilities are outlined in the following sections for the Future Lot Owner, Developer and SoC.

### 8.2. Future Lot Owners Responsibility

***It is recommended the Future Property Owners shall be responsible for the following:***

- To take measures to protect their own assets on their property, home owners should not rely on emergency personnel to attend their home and thus it is stressed to **prepare an individual bushfire emergency plan** regarding their intentions and property. This Bushfire Management Plan is **not** an individual bushfire emergency plan;
- Implement this document, Bushfire Management Plan of 1 and 2 Tea Tree Road Bindoon as it applies to their individual property;
- Ensure that APZ's are maintained to a minimum of 20 metres around all buildings (see Appendix F);
- Ensure that 100m setbacks (HSZ's) are maintained from the Woodland (internal) vegetation (bushfire) risks (see Appendix F);
- Ensure that their property is built to BAL/AS3959-2009 Building Standards if 100m setback cannot be achieved within their property from Woodland Type B;
- Provision for the storage of water in tanks not less than 120,000 litres capacity, of which 10,000L is to be held in reserve for fire fighting purposes;

- Ensuring that suitable external ember screens are placed on roof top mounted evaporative air conditioners compliant with AS3959-2009 (current and endorsed standards) and that the screens are checked annually; and
- Each property owner is to be made aware of:
  - Fire Management Plan,
  - A hard copy of the A4 book “Prepare. Act. Survive”,
  - Fire Control Information supplied by the Shire of Chittering; and
- It is the responsibility of the individual property owner to maintain in good order and condition APZ, HSZ and driveway standards. Future modifications other than requirements as set out in this Bushfire Management Plan can only be done with written agreement from the Shire of Chittering.

### 8.3. Developers Responsibility

Prior to development being given final approval by the Shire of Chittering, the Developer shall be required to carry out works that include the following but in respect to individual stages of development. Subsequent to the issue of final approval, the Developer shall have no further responsibilities to the provision of fire fighting facilities and bushfire management on individual lots that pass from their ownership.

***It is recommended that the Property Developer shall be responsible for the following:***

- Implement this document, Bushfire Management Plan of Lots 1 and 2 Tea Tree Road Bindoon as it applies to their development;
- Comply with standards as outlined by the Shire of Chittering and WAPC conditions of subdivision;
- Ensure that potential property owners are aware of this Bushfire Management Plan;
- Comply with minimum subdivision construction standards as outlined by this Bushfire Management Plan;
- Maintain fire protection measures in public areas (gates, access, landscaped areas etc) until the Developer has relinquished construction/maintenance responsibility of public use areas to the Shire of Chittering;
- Install a 100,000 L capacity water tank for fire fighting purposes located at a central location of the subdivision;
- Construct Access to the following standards as outlined in Table (4).

**Table 4 – Vehicular Access Standards**

Standard	Public Roads	Fire Service Access Ways	Emergency Access Ways
Minimum trafficable	6 metres	4 metres	6 metres
Horizontal clearance	6 metres	6 metres	6 metres
Vertical clearance	4 metres	4 metres	4 metres
Maximum grades	1 in 10	1 in 10	1 in 10
Minimum weight capacity	15 tonnes	15 tonnes	15 tonnes
Maximum crossfall	1 in 33	1 in 33	1 in 33
Curves minimum inner	8.5 metres	8.5 metres	8.5 metres
Cul de sacs	N/A	N/A	N/A
Battle Axes	Not more than 600m	N/A	N/A
Private Driveways	Standard as roads if house >50m from road, passing bays every 200m for 20m.	N/A	N/A
Signage	Not required	Required	Must be signposted
Gates	Not required	Min width 3.6	Min width 3.6
Design and construction	Approved by relevant local government	Approved by relevant local government	Approved by relevant local government



Turn around areas	Every 500 metres, within 50 metres of the house and at water tanks	Every 500 metres, within 50 metres of the house.	Not required
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(WAPC, 2015a)

- Install Signage and Gates of Fire Service Access (if required);
- Install signage for Emergency Access Ways (if required);
- Implement a notification on title under Section 70A of the *Transfer of Land Act 1983* notifying future lot owners about the BMP;
- Provide each prospective owner with:
  - Fire Management Plan,
  - A hard copy of the A4 book “*Prepare. Act. Survive*”; and
  - Fire Control Information supplied by the Shire of Chittering (Yearly advice Brochure updated annually).

#### 8.4. Shire of Chittering Responsibility

At approval and endorsement of this Bushfire Management Plan, the Shire of Chittering has statutory control and responsibility to ensure that aspects of the Plan and community fire safety are maintained.

***It is recommended the Shire of Chittering be responsible for the following:***

- Provide advice on standards and methods to achieve community fire protection to owners/occupiers of land.
- Ensure individual Property Owners maintain in good order and condition Emergency Access/Fire Access Ways building protection zones, hazard reduction zone and driveway standards.
- Maintain district Fire Fighting Facilities.
- Undertake Prescribed Burning (if required) and fuel reduction strategies to ensure a maximum of 8T/ha ground fuels on any internal public remnant vegetation (i.e. Vegetative corridor areas) in accordance with the *Bushfire Act 1954*.
- Ongoing management of any public areas will be the responsibility of the Shire of Chittering after the Developer has relinquished construction/maintenance responsibility.
- Maintain condition and working order of district water supplies and equipment for fire fighting purposes.

## 9. Checklist for compliance to and Guidelines for Planning in bushfire Prone Areas and State Planning Policy 3.7

### 9.1. Checklist to Compliance to Guidelines for Planning in Bushfire Prone Areas

The following checklist has been developed by Bio Diverse Solutions in response to the bushfire protection criteria as outlined in the recently released Guidelines for Planning in Bushfire prone Areas.

Checklist for proposal compliance and justification to Guidelines for Planning in Bushfire Prone Areas (2015) )			
<b>BDS Project Name</b>	BMP Lot 1 and 2 Tea Tree Road Chittering		
<b>BDS Job Number</b>	WHEL014		
<b>Date</b>	13/6/2016	<b>WAPC#</b>	n/a
<b>Client name</b>	Marou Property Development Pty Ltd	<b>Condition #</b>	n/a
<b>Bushfire Prone Area</b>	Yes	<b>Mapping</b>	Yes See App A
<b>Planning proposal</b>	Rural Subdivision	<b>Lots created</b>	48
1. Bushfire Protection Criteria Acceptable Solutions as defined by Guidelines for Planning for Bushfire Prone Areas (WAPC 2015).			
Element	Compliant to Acceptable Solution– Yes/No	Justification	
<b>Element 1 – Location</b>	Yes	Site will be classified as Extreme and Moderate bushfire hazard upon completion. Buildings built to BAL-Low and AS3959-2009, no higher building than BAL 12.5 required on (large sized lots) rural small holding lots. <b>Subdivision deemed to meet Acceptable Solution.</b>	
<b>Element 2 - Siting and design of development</b>	Yes Stages Stag	A2.1: APZ can be achieved within the lot boundaries due to large lots created <b>Subdivision deemed to meet Acceptable Solution</b> A2.2 Setbacks can be achieved and building no higher than BAL 12.5. Setbacks to BAL located within the lot boundary. Building to BAL –Low can occur on all lots. <b>Subdivision deemed to meet Acceptable Solution</b>	
<b>Element 3 - Vehicular access</b>	Yes	A3.1: Two access routes south to north and to west to Brennan Road A3.2 Public roads to meet minimum grades A3.3 Cul-de-sacs meet minimum grades A3.4 Battle axes meet minimum grades A3.5 Private Driveways meet minimum grades A3.6 EAW proposed and can meet minimum requirements. A3.7 FSA along public road network and EAW's. A3.8 Firebreaks/low fuel areas compliant to SoC requirements <b>Meets Acceptable Solution.</b>	
<b>Element 4 – Water</b>	Yes	Reticulated scheme water proposed. <b>Meets Acceptable Solution.</b>	
<b>Bushfire Hazard Assessment required</b>	Yes	See Section 5 and Appendix D of BMP.	
<b>BAL Contour required</b>	Yes	See Section 6 and Appendix E of BMP.	
<b>BMP required</b>	Yes	This BMP document assessed the proposal in detail to the bushfire protection criteria.	

## 9.2. Checklist to Compliance to SPP3.7 Policy Measures

The following checklist has been developed by Bio Diverse Solutions in response to the Policy measures as outlined in the recently released State Planning Policy 3.7

2. Policy measures SPP3.7		
Policy Measure	Applicable – Yes/No	Justification
6.1 - Higher order strategic planning documents in bushfire prone areas	No	Not applicable – not a high order planning document
6.2 – Strategic planning proposals, subdivision and development applications:	Yes	a) Subdivision proposal within a designated bushfire prone area, BAL and AS3959-2009 to apply where <100m of bushfire prone vegetation. BHL Extreme and Moderate adjacent to site, internal Moderate and Low BHL at completion of construction. No higher BAL construction than BAL Low or BAL 12.5 required. Large lots proposed.
6.3 - Information to accompany strategic planning proposals:	Yes	a) Results of BHL documented in BMP and prepared by an accredited Level 1 BAL Assessor and Experienced Level 2/3 Bushfire Planning Practitioner. b) BAL Contour Map documented in BMP and prepared by an accredited Level 1 BAL Assessor and Experienced Level 2/3 Bushfire Planning Practitioner. c) Assessment to guidelines indicated can meet all Elements assessed against Acceptable Solutions updated BMP would be required to document any changes for future planning stages.
6.4 - Information to accompany subdivision application	Yes	a) BAL Contour map provided and prepared by an Accredited Level 1 BAL Assessor and Experienced Level 2/3 Bushfire Planning Practitioner b) Bushfire hazard issues identified arising from BAL Contour Map buildings. Subdivision can be built to no higher allocation than BAL 12.5. c) Assessment to guidelines indicated can meet all Elements assessed against Acceptable Solutions. Update of BMP required to document any changes for future stages
6.5 Information to accompany Development applications	No	Not applicable – not a Development Application
6.6 Vulnerable or high-risk land uses	No	Not applicable – not a Vulnerable or high-risk land use.
6.7 Strategic Planning proposals, subdivision or development applications in areas where an extreme BHL and/or BAL-40 or BAL –FZ applies	No	No.
6.8 Advice of State/relevant authorities for emergency services sought	No	
6.9 Advice of State/relevant agencies/authorities	No	Flora and Fauna survey completed in 2012, vegetation cleared and degraded condition.

for environmental protection to be sought		
6.10 Bushfire conditions may be imposed	Yes	Building to BAL if dwelling situated within 100m of Bushfire Prone Vegetation.
6.11 Precautionary principle	No	Not applied

### 9.3. Recommendations/conclusions based on above checklists

A summary of the recommendations within this report is supplied below. This also forms the “upfront” and “ongoing” tasks which need to be completed for this project.

- Implementation of responsibilities of the developer (Section 8.3) will be undertaken by the developer/client via formal endorsement/release of this BMP plan. Agreeance to the responsibilities as outlined in Section 8.3 of this BMP is accepted by the developer/client by the provision of this document to approving agencies.
- Implementation of the responsibilities of the developer (Section 8.3) will not occur by the developer until a formal written approval/endorsement is given from the approving agency regarding the BMP.
- In the event the property passes ownership to a subsequent developer/owner the implementation of the endorsed/approved BMP (Section 8.3) should be conditioned by WAPC as a matter of the WAPC subdivision conditional process.
- The developer will be responsible for the implementation of a notification on title pursuant to Section 70A of the Transfer of Land Act 1893 for all lots affected by an increase in construction standards consistent with a BAL rating/AS3959-2009 allocation to the lot, and alerting owner (s) of the lots and successors in title of the Bushfire Management Plan.
- The BAL Contour Plan (Appendix E) is prepared at a point in time and it is recognised by Bio Diverse Solutions that the landscape may change post subdivision construction and over time. It is therefore recommended that a review of the BAL Contour Plan is undertaken post construction stages and prior to subdivision clearance stages; and/or the map is over 3 years from date of production and, if required, an updated BAL Contour Plan is provided to the CoA prior to conditional clearance of the bushfire management issues.
- Individual BAL assessments may be required on the lots by the new owners and can be considered at building approval stages with the engagement of an Accredited Level 1 BAL assessor.

Based on the above recommendations, Bio Diverse Solutions recommend the proposed subdivision can occur as documented in this BMP Plan. The BMP plan does not give recommendations in regards to detailed environmental (flora, fauna, soil etc) plans, town planning, engineering – civil, structural or building and feature survey requirements, these considerations would need to be addressed through other suitably qualified practitioners.



## 10. References

AS 3959-2009 Australian Standard, *Construction of buildings in bushfire-prone areas*, Building Code of Australia, Primary Referenced Standard, Australian Building Codes Board and Standards Australia.

Bureau of Meteorology Climate Data Gingin accessed June 2010 and April 2015:

<http://www.bom.gov.au/climate/data/index.shtml>

Keighrey, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA.

Bushfire Management Plan(2012) unpublished report prepared for Lot 1 and 2 Tea Tree Road, Bindoon. Bio Diverse Solutions, Albany WA.

Department of Fire and Emergency Services Authority WA (DFES) (2004) *The Homeowners Bush Fire Survival Manual*, Fourth Edition, Community Safety Division, Perth WA

Department of Fire and Emergency Services Website accessed April 2015:

<http://www.dfes.wa.gov.au>

Department of Planning Western Australia *Planning and Development (Bushfire Risk Management) Regulations 2014 and Development (Bushfire Risk Management) Regulations 2014* accessed from website February 2015 from:

[http://www.planning.wa.gov.au/dop\\_pub\\_pdf/bushfire\\_risk\\_mgt.pdf](http://www.planning.wa.gov.au/dop_pub_pdf/bushfire_risk_mgt.pdf)

Environmental Weeds Strategy for Western Australia (1999) Department of Environment and Conservation, Western Australia.

Hearn, H., Williams, K., Comer, S. and Beecham, B. (2002) SWAN 1 (SWA1 – Swan 1 subregion). Department Conservation and Land Management. Government of Western Australia.

Keighrey, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA.

Western Australian Planning Commission (WAPC) (2010) *Planning for Bushfire Protection Edition 2* Fire and Emergency Services Authority of Western Australia and Department for Planning and Infrastructure Western Australia.

Western Australian Planning Commission (WAPC) *Planning Bulletin 111/2013 Planning for Bushfire*.

Western Australian Planning Commission (WAPC) (2014) *Draft Planning for Bushfire Risk Management Guidelines*. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) (2015a) *Guidelines for Planning in Bushfire Prone Areas*. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) *State Planning Policy 3.2 Planning in Bushfire Prone Areas*. Department of Planning WA and Western Australian Planning Commission.

State Land Information Portal (SLIP) (2015) *Map of Bushfire Prone Areas*. Office of Bushfire Risk management (OBRM) data retrieved from:

<https://maps.slip.wa.gov.au/landgate/bushfireprone/>

**Appendices**

**Appendix A – Location**

**Appendix B – Structure Plan**

**Appendix C - Vegetation Classes Map**

**Appendix D –Bushfire Hazard Level Mapping**

**Appendix E – BAL Contour Plan**

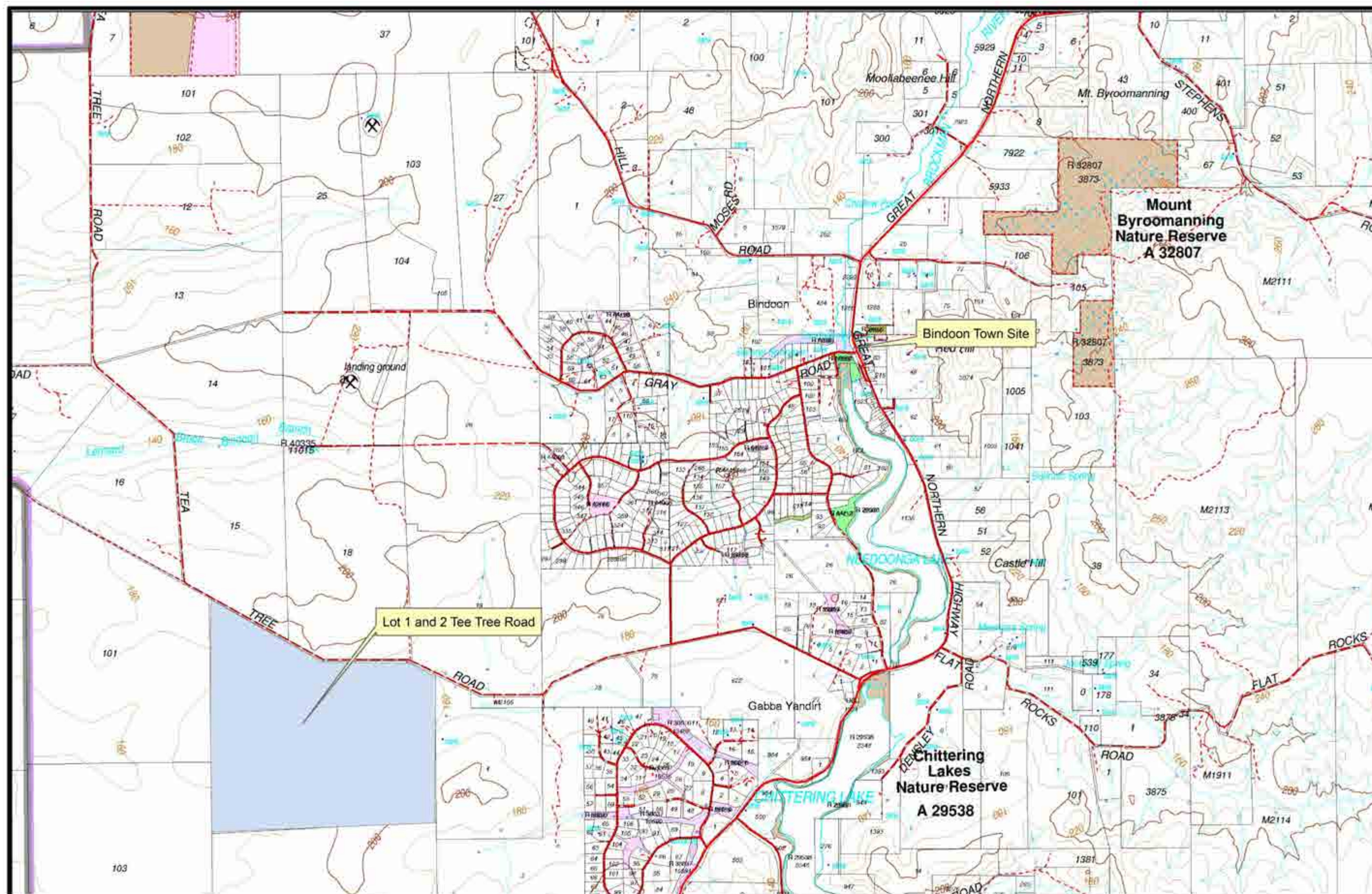
**Appendix F – DFES Information for the homeowner**

**Appendix G – Bushfire Management Plan**


Appendix A

Location Mapping





## Legend

 Subject area

Scale  
1:40000 @ A3



0 390 780 1,560 2,340 3,120 Meters



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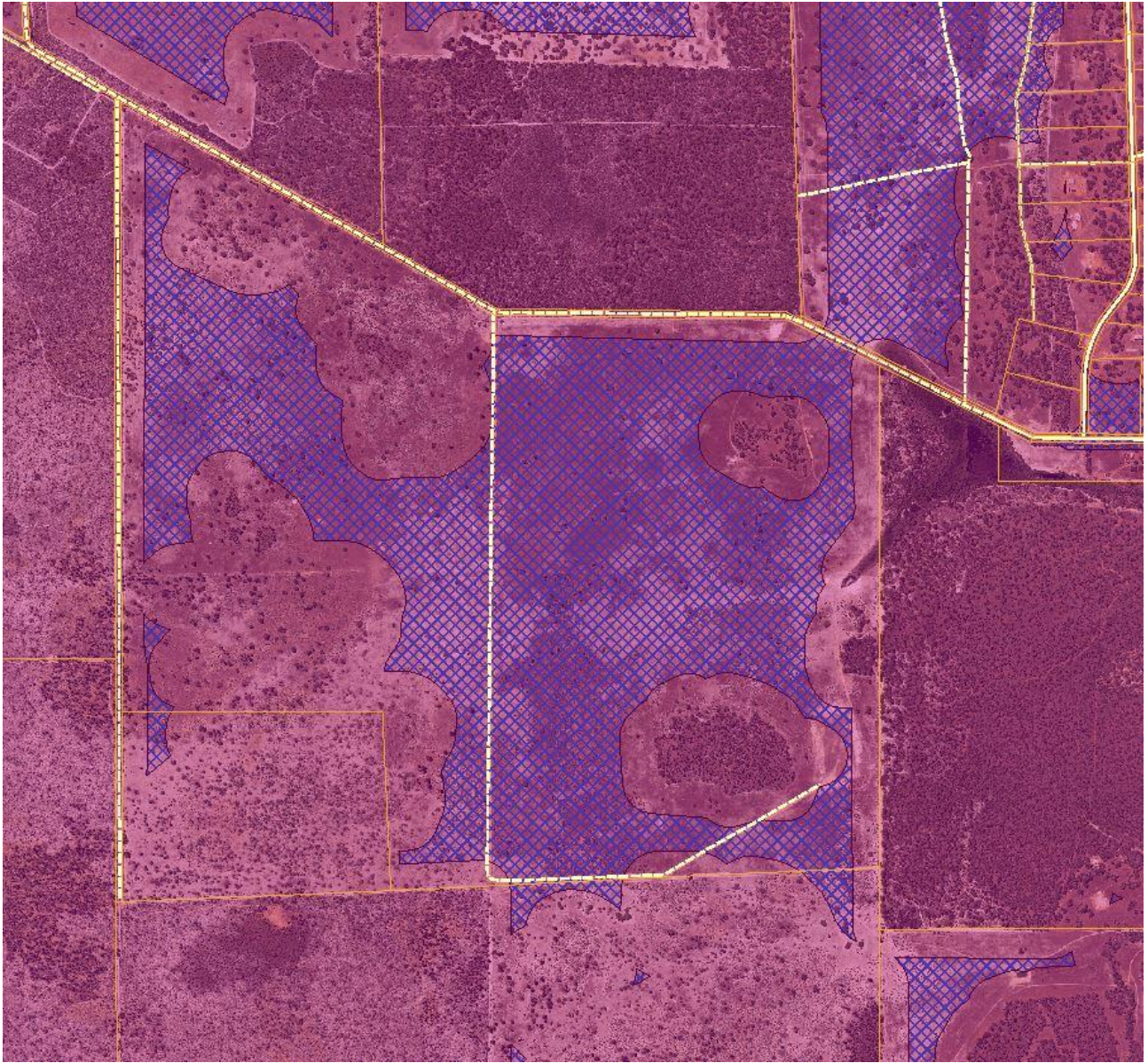
CLIENT Lot 1 and 2 Tee Tree Road  
Bindoon WA

## Location Mapping

STATUS	FILE	DATE
FINAL	WHEL014	13/06/2016



**OBRM BUSHFIRE PRONE MAPPING 7/12/15 & 20/5/2016**



<https://maps.slip.wa.gov.au/landgate/bushfireprone/>

(SLIP 2016)

Appendix B

Structure Plan

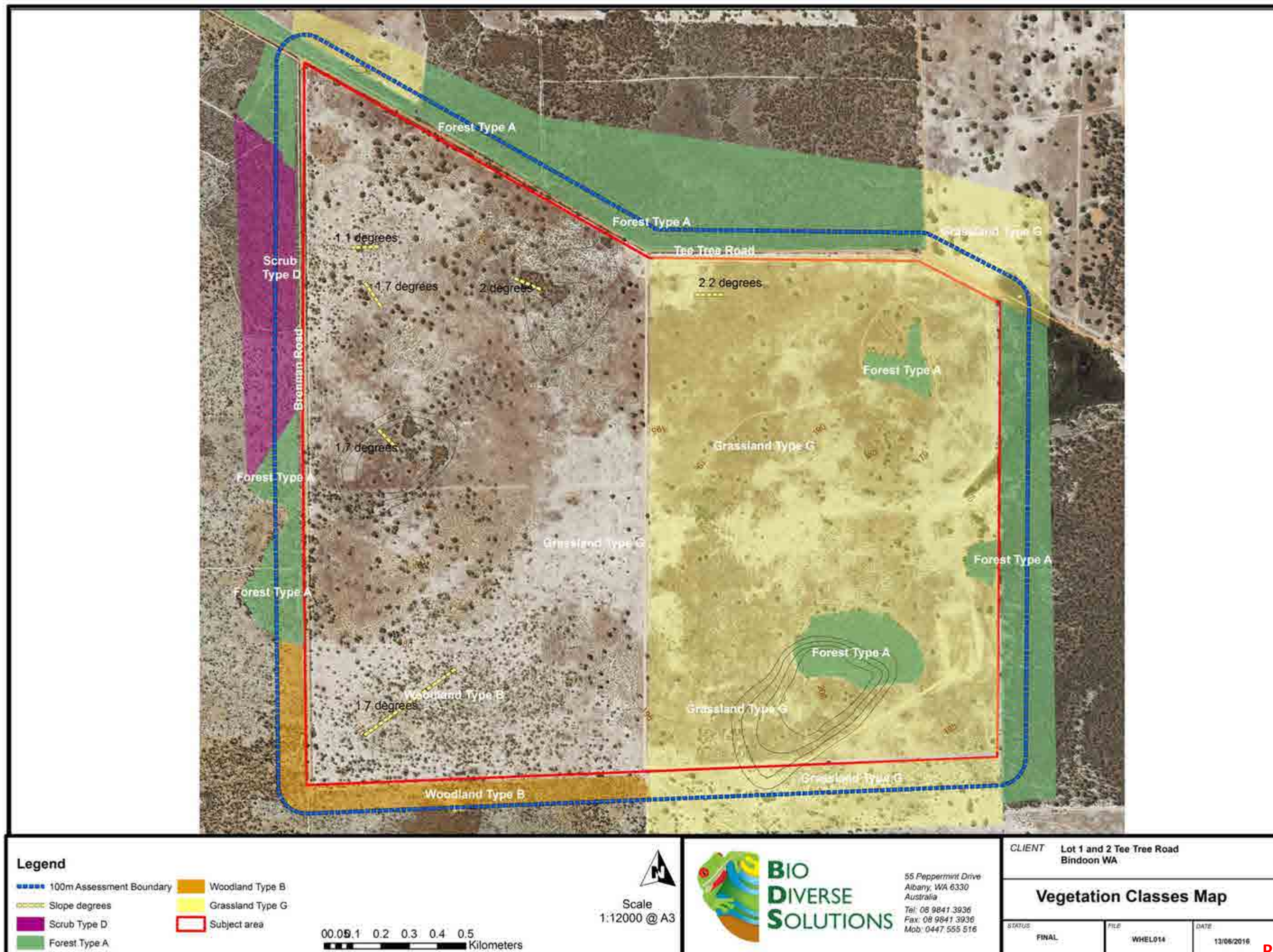




Appendix C

Vegetation Classes Map

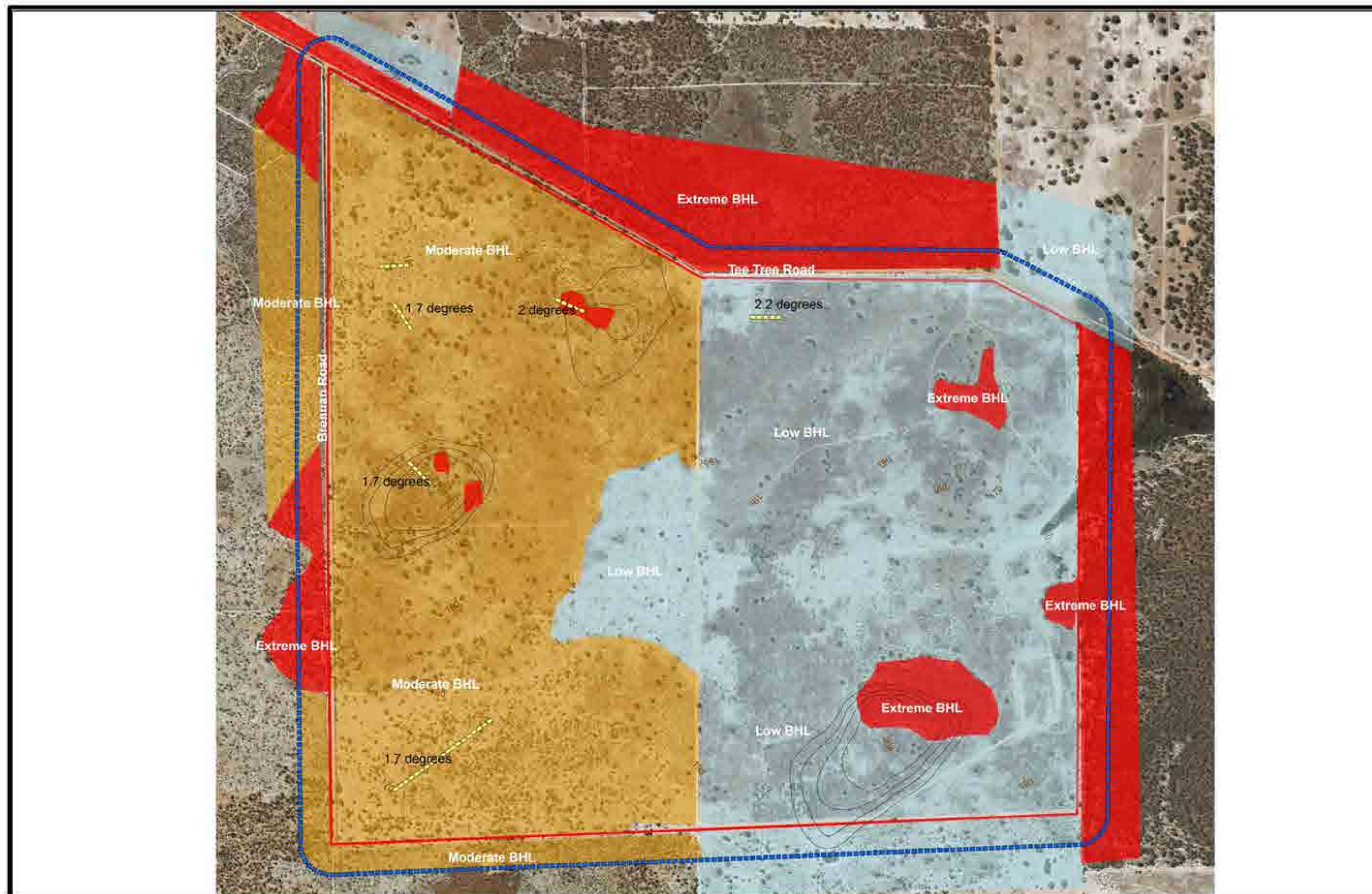






**Appendix D**

Bushfire Hazard Level (BHL) Mapping



### Legend

- 100m Assessment Boundary
- Slope degrees
- Extreme BHL
- Moderate BHL
- Low BHL
- Subject area

Scale  
1:12000 @ A3

0 0.1 0.2 0.4 0.6 0.8 1  
Kilometers



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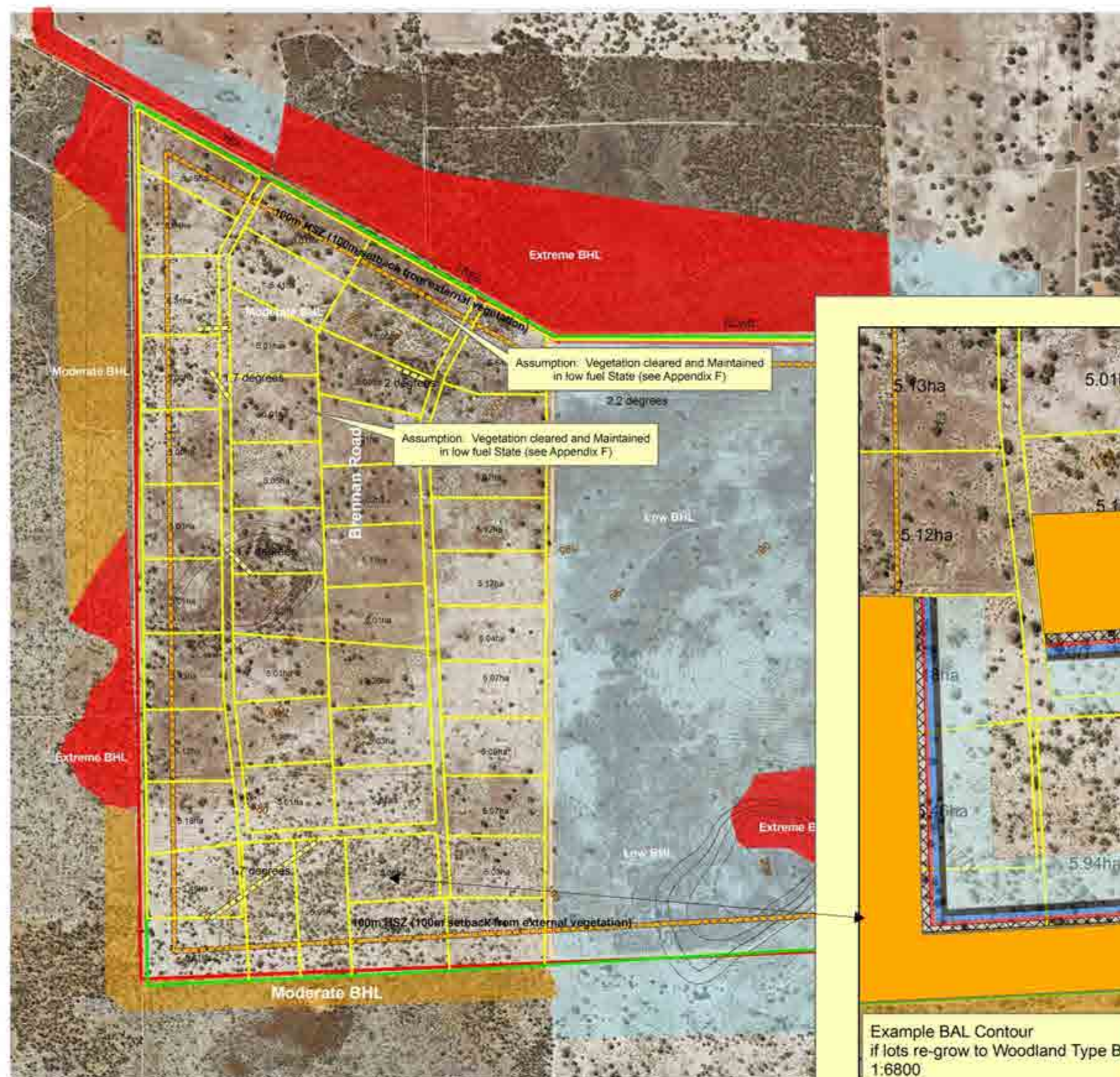
### Bushfire Hazard Level

STATUS	FILE	DATE
FINAL	WHEL014	13/04/2015

Appendix E

BAL Contour Plan





## Legend

- 100 HSZ
- Slope degrees
- Extreme BHL
- Moderate BHL
- Low BHL
- Subject area

0 0.1 0.2 0.4 0.6 0.8 1 Kilometers

Scale  
1:12000 @ A3



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Bindoon WA

## BAL Contour Plan

STATUS	FILE	DATE
FINAL	WHEL014	13/04/2015



**Appendix F**

DFES information for the homeowner

## BUSHFIRE

## Building Protection Zones

FACTSHEET

02

ARE YOU  
BUSHFIRE  
READY?

areyouready.wa.gov.au

PREPARING YOUR HOME AND  
PROPERTY FOR A BUSHFIRE

You should prepare your home to survive the passage of a bushfire, even if your plan is to leave. A well prepared and constructed house is more likely to survive a bushfire than an unprepared one. Firefighters cannot defend every property and are unlikely to defend a poorly prepared property; remember their lives are at risk too.



## DID YOU KNOW?

**Firebreaks have a number of purposes.**

They are used to stop the spread of a bushfire and are also used by firefighters to gain access around all areas of your property and as a place from which to fight a fire.

Remember that firebreaks must be wide enough and have enough vertical clearance to let a firefighting truck pass.

Maintain your firebreaks to ensure your property can be defended during a fire.

- ☐ **Create a minimum 20 metre building protection zone** around your home and other buildings. This area needs to be cleared of all rubbish, long dry grass, bark and material that may catch fire.
- ☐ **Prune lower branches** (up to two metres off the ground) to stop a ground fire spreading into the canopy of the trees.
- ☐ **Clear vegetation** around your property to create a fire break, particularly the overhanging branches. Make sure you meet your local government's firebreak requirements.
- ☐ **Cut grass** to less than 10 centimetres high and prune shrubs to remove dead material.

For more information visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au) or contact **DFES Community Engagement** 9395 9816



Government of Western Australia  
Department of Fire & Emergency Services



**PREPARE ACT SURVIVE**



## Information Note

September 2014

# What is a Building Protection Zone?

### Key Points

- Fuel loads influence bushfire intensity.
- The lower the fire's intensity the less impact on the building.
- Creating a minimum 20 metre reduced fuel load area (building protection zone) will increase the protection of the building.
- Ember protection is important to protect the building.
- Constructing or retrofitting your home to meet the Australian Standard 3959 — *Construction of buildings in bushfire-prone areas*; and addressing bushfire risks in accordance with the *Planning for Bushfire Risk Management Guidelines* will ensure your house has the best bushfire protection.

### Definitions

- **Scrub crown** is the green, leaf material on the scrub plants.
- **Surface fire** is the fire burning the leaves and scrub on the top of the ground.
- **Mineral earth firebreak** is a firebreak without vegetation.
- **Ember attack** is where the bark and fine vegetation material is set alight, becomes airborne and is carried forward of the fire.

### Managing and reducing fuel loads

**Managing and reducing fuel loads for a minimum of 20 metres around a building will increase its likely survival from a bushfire.**

Known as the Building Protection Zone (BPZ), the aim of this area is to ensure that there will be no direct flame contact on the building from a bushfire. By utilising fuel management options it will also be possible to reduce the potential radiant heat impact on the building.



Above: Well prepared Building Protection Zone with reduced fuel.

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

- Maintaining a minimum 2 metre gap between trees and the building. Make sure that no trees overhang the house.
- Ensuring tree crowns are a minimum of 10 metres apart.
- Ensuring there is a gap between shrubs and buildings of three times their mature height.
- Ensuring shrubs aren't planted in clumps.
- Keeping the grass short and prune the scrub so that it is not dense, nor does it have fine, dead aerated material in the crown of the scrub.
- Raking up leaf litter and twigs under trees and remove trailing bark.
- Pruning lower branches (up to 2 metres off the ground) to stop a surface fire spreading to the canopy of the trees.
- Creating a mineral earth firebreak.
- Having your paths adjacent to the building and have your driveway placed so that it maximises the protection to the house.

Version 5, September 2014

For more information contact the Environmental Protection Branch on 93 95 9300 • email: [environment@dfes.wa.gov.au](mailto:environment@dfes.wa.gov.au) or visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)





- Storing firewood away from the building.
- Ensuring fences and sheds are constructed using non-combustible materials, but preferably not located in the BPZ.
- Keeping your gutters free of leaves and other combustible material.
- Ensuring gas bottles are secured and positioned so that they will vent away from the building, if subject to flame contact or radiant heat.

## Ember attack

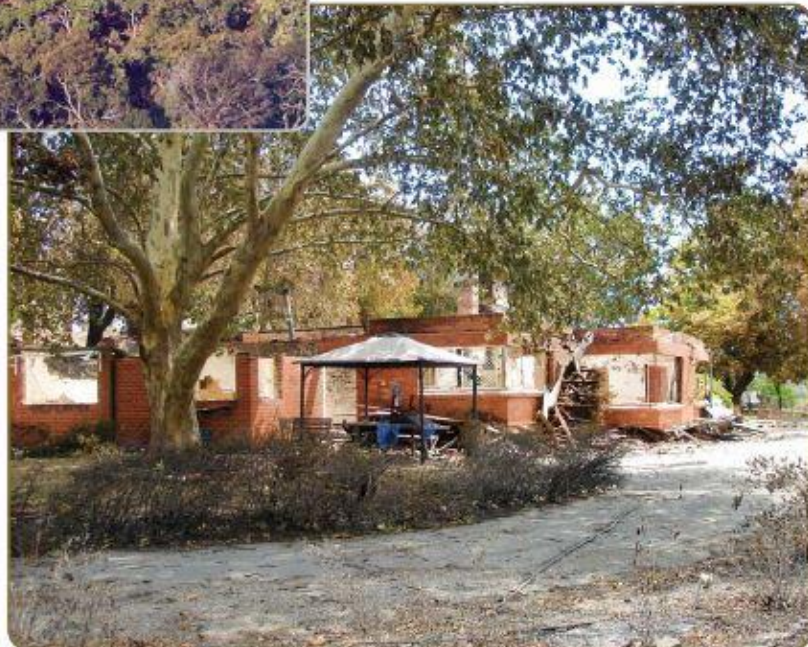
In a bushfire, most homes that are damaged or destroyed are from ember attack. These burning embers get into gaps within the building, such as into the roof cavity, and ignite the material within the cavity. It can take a number of hours before the burning becomes apparent and by that time the building may not be able to be saved.



**Above:** Reduced fuel in the Building Protection Zone contributed to the survival of this home in a bushfire.

**Right:** Home destroyed by bushfire, note the tree branches overhanging the house.

It is recommended that all homes that may be affected by embers be made ember proof. If a bushfire occurs in the general area, then the roof cavity and other crevices should be inspected to ensure that no embers have caused a fire. Be aware that there are electricity cables in the roof area and the introduction of water will be a safety issue.



For more information contact the Environmental Protection Branch on 9395 9300, email: [environment@dfes.wa.gov.au](mailto:environment@dfes.wa.gov.au) or visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)



**BUSHFIRE****Evaporative Air Conditioners**

FACTSHEET

**08****ARE YOU  
BUSHFIRE  
READY?**

areyouready.wa.gov.au

**DID YOU KNOW?**

Your evaporative air conditioning unit can catch fire as a result of embers from bushfires, or even small back yard fires, getting into your unit. If a fire starts in your air conditioner, it can spread quickly throughout your home.

**If there is smoke nearby  
you should:**

- ☐ Run the air conditioner to wet the filter pads
- ☐ When smoke is over your home or ash starts to drop around your house, switch the air conditioner off
- ☐ If possible, continue to run water over the filter with the fan turned off
- ☐ If the water can't be run on its own, or if there is a power failure at the time, wet the air conditioner filter pads using a garden hose
- ☐ Keep checking your air conditioner and the area around your home for spot fires from embers until the danger has passed

It can be difficult for firefighters to put out a fire caused by embers getting into the roof space of your home. Knowing what to do to keep your evaporative air conditioner safe from fire can help save your property.

For more information on evaporative air conditioners see DFES Information Note on Ember Protection Screens.

**DID YOU KNOW?**

If you live within 500 metres of bushland and have a roof mounted evaporative air conditioning unit, your home may be at increased risk of ember attack.



**If your home does  
catch fire, leave your  
home and call 000  
immediately**

**WHAT IS EMBER ATTACK?**

Embers are pieces of burning bark, leaves or twigs that are carried by the wind around the main fire creating spot fires.

For more information visit [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au) or contact DFES Community Engagement 9395 9816



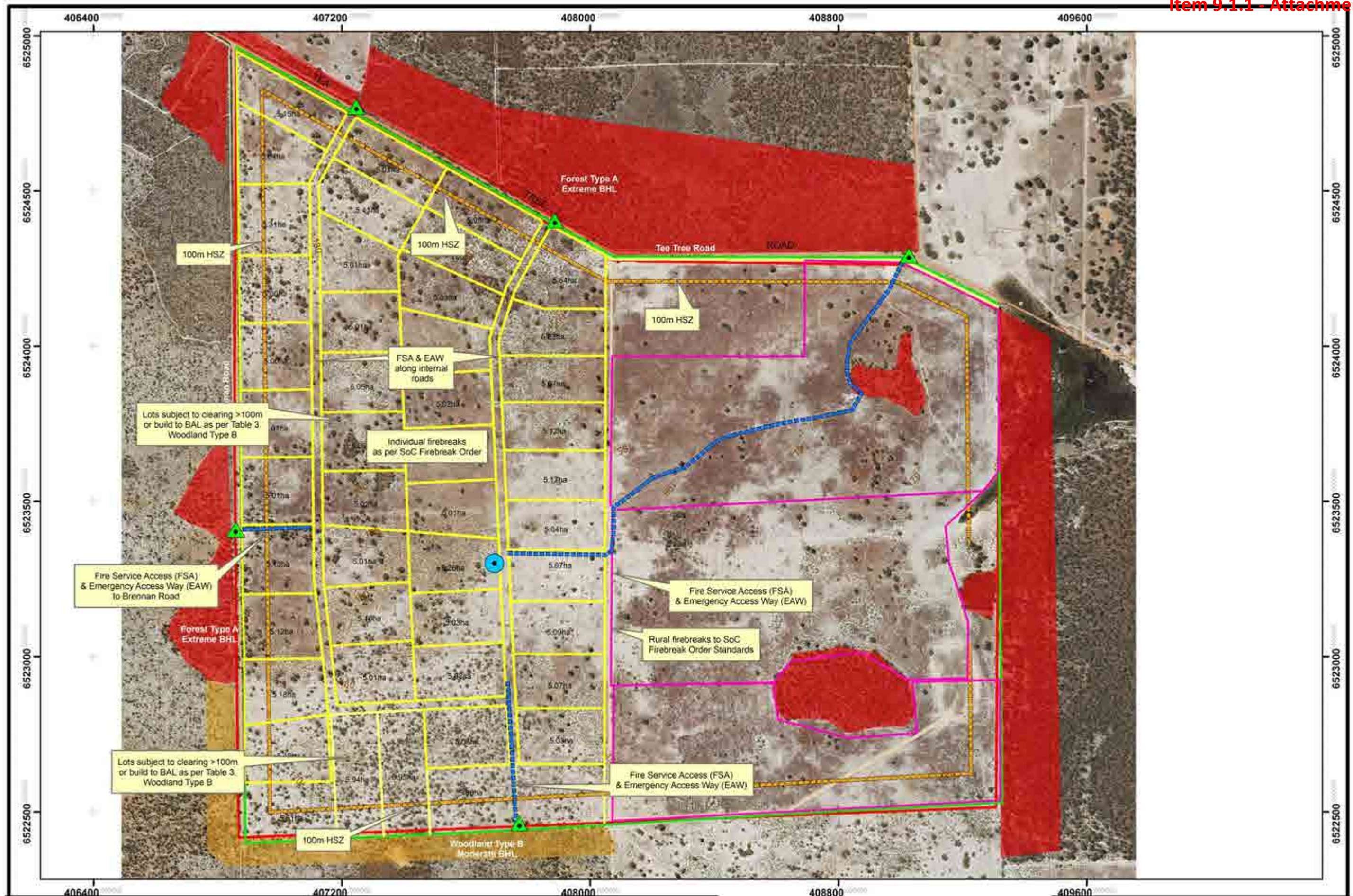
Government of Western Australia  
Department of Fire & Emergency Services

**PREPARE ACT SURVIVE**

**Appendix G**

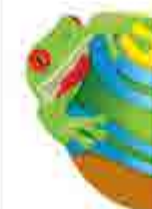
Bushfire Management Plan





### Legend

- Access points
  - Water tank
  - Emergency & Fire Service Access
  - Outline Development Plan
  - Rural Firebreaks
  - 100 HSZ
  - Woodland Type B - Moderate Risks
  - Subject area
- Scale 1:11500 @ A3
- 0 100 200 400 600 800 1,000 Meters



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CLIENT Marou Property Group Pty Ltd  
Lot 1 and 2 Tee Tree Road  
Bindoon WA

### Bushfire Management Plan

STATUS	FILE	DATE
FINAL	WHEL014	13/6/2016



Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



## APPENDIX 5 – LAND CAPABILITY FOR ON-SITE EFFLUENT DISPOSAL

**LOTS 1 AND 2 TEA TREE ROAD, BINDOON**

**LAND CAPABILITY FOR  
ON-SITE EFFLUENT DISPOSAL**

**Prepared for**

**Marou Property Developments Pty Ltd**

c/- Whelans

PO Box 99

MT HAWTHORN WA 6915

Draft Report No. J15017

14 October 2015

**BAYLEY ENVIRONMENTAL SERVICES**

30 Thomas Street

**SOUTH FREMANTLE WA 6162**

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B	Water Analysis Results

## 1.0 INTRODUCTION

Marou Property Developments Pty Ltd plans to subdivide Lots 1 and 2 Tea Tree Rd, Bindoon (the subject land) into 47 five hectare rural smallholding lots and one balance lot of about 186ha. All lots will employ on-site effluent disposal.

Bayley Environmental Services was commissioned in August 2015 to investigate and report on the capability of the subject land to accommodate on-site effluent disposal. The investigations took place in September-October 2015 and included:

- drilling of nine boreholes across the site, focussing on areas of likely groundwater accumulation and/or drainage;
- installation of bores in three boreholes where groundwater was encountered;
- collection of soil samples from the boreholes and analysis for phosphorus retention index (PRI);
- measurement of depth to groundwater in the bores;
- collection and analysis of water samples from the bores;
- review of environmental information including aerial photography, topography, geology, soils, groundwater and previous reporting on the site by Landform Research (2000).

The conclusion from these investigations is that the subject land has a very high capability for on-site effluent disposal by conventional or alternative systems. Specifically:

- The site has low slopes (less than 10%; mostly less than 5%).
- The soils are deep, sandy and permeable with no confining layers such as clay or rock in the shallow profile.
- The water table is more than 6m deep over all but the eastern extremity of the site.
- All proposed lots have a large separation (>500m) to surface water bodies.

Details of the investigations and findings are presented below.



## 2.0 ENVIRONMENTAL CHARACTERISTICS

### 2.1 Topography and Landforms

The subject land is located on an elevated, undulating plateau at elevations for 160m AHD to 208m AHD. From high ground in the centre, west and south-east, the land falls away in broad valleys to the north-west, south-west, north-east and east. Figure 1 shows topographic contours of the site. Figure 2 shows an oblique aerial view.

The slope varies from about 10% in the steepest eastern valley to less than 1% in the centre of the site, with the slope averaging about 4% over the site.

### 2.2 Geology and Soils

#### 2.2.1 Overview

The subject land is located on the Dandaragan Plateau just west of the Darling Fault. The soils are predominantly sandy, with deep yellow and yellow-brown sands, earthy sands and gravelly sands on the slopes and leached grey sands in the valleys. Ferricrete cemented sandstone rock occurs on a few ridge tops.

Landform Research Pty Ltd (2000) described and mapped the soils in detail based on 47 shallow test pits across the subject site. Figure 1 shows the Landform Research soil mapping.

Drilling of nine boreholes across the site by Bayley Environmental Services in 2015 (Figure 1) found generally sandy soils with grey and grey-brown sands to about 1m over yellow and yellow-brown sands and earthy and clayey sands. Appendix A presents the soil logs from the drilling.

#### 2.2.2 Soil Permeability

The sandy soils have a high permeability, with no evidence of clay being found in the boreholes at less than 3m deep.

Landorm Research (2000) mapped ferricrete on some ridge tops and beneath the sandy soils of the valley slopes, but drilling in these areas in 2015 found no evidence of this beyond minor gravel to at least 6m depth.

#### 2.2.3 Phosphorus Retention Index

Soil samples from 1m depth in the boreholes were analysed for phosphorus retention index (PRI). This depth was generally at about the interface between the grey and grey-

brown surface soils and the yellow earthy subsoils, so the results would underestimate the PRI of the subsoils.

The analysis found low PRI across the site. Table 2.1 summarises the PRI results.

**Table 2.1 Phosphorus Retention Index**

Site Figure 1)	BB1	BB2	BB3	BB4	BB5	BB6	BB7	BB8	BB9
PRI @ 1m	0.5	0.6	0.9	0.3	0.3	0.4	0.5	1.4	0.9

## 2.3 Hydrology

### 2.3.1 Surface Drainage

The subject land lies across a drainage divide between Chandala Brook to the west and the Brockman River to the east, both tributaries of the Swan-Avon system.

Given the deep sandy soils and low slopes of the subject land, there is no defined surface drainage. Surface runoff would be limited to short-lived overland flow during and immediately after extreme rainfall.

Surface flow begins at the eastern boundary of the site, where a small drainage line rises and flows into the Brockman River via Lake Chittering. A soak dam has been constructed just inside the eastern boundary at the beginning of this drainage line.

### 2.3.2 Groundwater

Groundwater is present beneath the site and is expected to flow east and west from the central high ground in line with the prevailing topography. The groundwater intersects the ground surface in the soak at the eastern boundary and in another soak just outside the boundary at the north-east corner.

Over most of the site, the groundwater is at least 6m below the surface. The depth to groundwater is likely to exceed 30m in the higher parts of the site. Table 2.2 shows the depths to groundwater found by drilling and bore measurements in September 2015.

**Table 2.2 Depth to Groundwater**

Site Figure 1)	BB1	BB2	BB3	BB4	BB5	BB6	BB7	BB8	BB9
Depth to Water (mbgl)	>9	>6	>9	>6	1.16	4.10	>6	>6	1.09

### 2.3.3 Water Quality

Analysis of samples collected from the bores and the soak dam in September 2015 shows that the groundwater quality is high, with low salinity, near-neutral pH and low nutrient levels. Appendix B presents the full results of the water analysis.

## 3.0 LAND CAPABILITY ASSESSMENT

Land capability for on-site effluent disposal depends on a number of factors, some of which are mandated by the Health Department's *Country Sewerage Policy* (2002):

- slope (maximum 20%);
- depth to groundwater (minimum 0.5m);
- soil profile (minimum 1.2m of free-draining soil free of rocks, clay and other confining layers);
- soil permeability (sufficient to permit infiltration but not so great as to permit unrestricted flow);
- soil purification ability (able to effectively remove bacteria, nutrients etc. from effluent by soil filtration);
- separation from surface water bodies (30-100m, depending on soil and system type);
- flooding risk (not susceptible to inundation more than once every ten years); and
- development density (maximum 10 lots equivalent per hectare in unsewered towns).

The subject land meets all of these criteria, as detailed below.

#### *Slope*

The slope of the subject land is all less than 10% and mostly less than 5%.

#### *Groundwater Depth*

The shallowest groundwater was measured at 1.09m near the eastern boundary. Over most of the site the depth to groundwater is greater than 6m.

#### *Soil Profile*

The site has deep sandy soils with no significant confining layers. Although Landform Research (2000) found ferricrete gravel and rock on ridge tops, there are no building envelopes proposed in these areas and in any case the ferricrete (cemented sandstone) would likely be permeable and/or readily excavated.

#### *Soil Permeability*

The sandy soils would be readily permeable but not excessively so.

*Soil Purification Ability*

The deep earthy sand subsoils would ensure very effective removal of contaminants before the effluent reaches the water table. Although the PRI at 1m depth is low, the change in soil colour at most sites below this depth indicates that the subsoil PRI would be higher. Added to this, the large depth to groundwater will ensure effective uptake of phosphorus from effluent.

The exception to this is the eastern side of the subject land, where leached white sands and shallower groundwater (less than 2m) would require alternative treatment systems. However, the development plan shows no building envelopes within this zone.

*Separation from Water Bodies*

The nearest surface water bodies are the soak dam near the eastern boundary and the wetland just outside the north-eastern corner of the site. The nearest building envelopes are more than 500m from these water bodies.

*Flooding/Inundation Risk*

There is no risk of inundation anywhere on the subject land.

*Development Density*

The Country Sewerage Policy limits unsewered development in Bindoon to ten residences (or equivalent) per hectare. The total of 48 lots proposed on the subject land is equivalent to less than one residence per hectare.

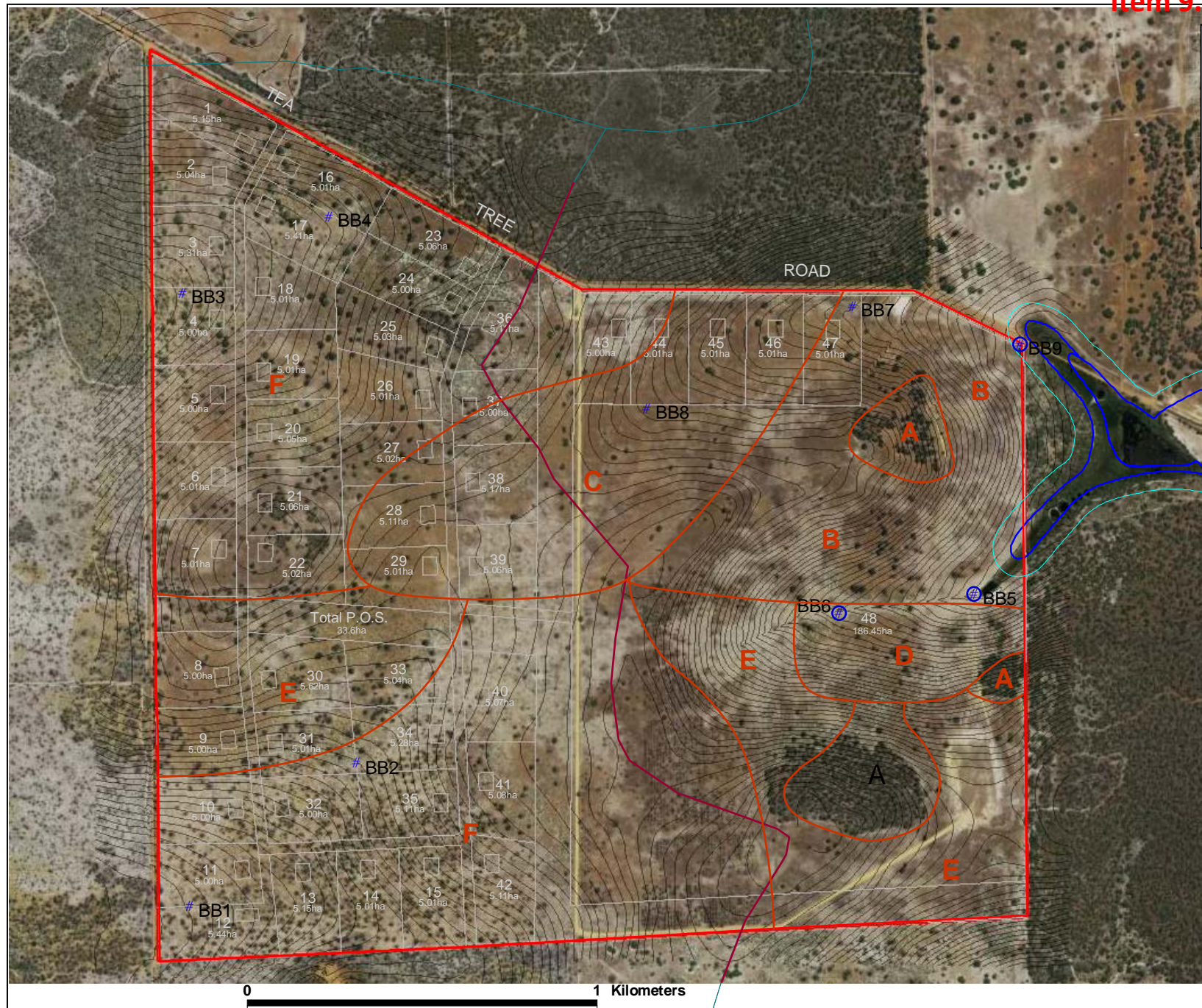
**4.0 CONCLUSION**

This investigation has concluded that the subject land has very high capability to support on-site effluent disposal using conventional or alternative treatment systems for the development as proposed.

-



## Figures



- Property boundary
- Subdivision boundary
- Topo contour (1m AHD)
- Soil boundary  
(Landform Research, 2000)
- Drainage divide
- Conservation Category
- Wetland (DPAW)
- 50m wetland buffer
- Borehole – dry
- Monitoring bore

Figure 1  
ENVIRONMENTAL  
FEATURES





0 200 metres  
Vertical exaggeration: 3x

Figure 2

OBLIQUE AERIAL VIEW

# **Appendix A**

## **Soil Logs**



# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB1
EASTING:	406974
NORTHING:	6522556
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	9m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>9m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Dark grey sand		
1 - 3.5	Pale brown-grey sand, paler and finer with depth		
4 - 4.5	Grey-brown sand with occasional gravel to 10mm		
5	Yellow-brown sand with occasional gravel to 10mm		
5.5	Brown-yellow sand with occasional gravel to 10mm		
6 - 7	Brown-yellow earthy sand with occasional gravel to 15mm		
7.5 - 9	Brown-yellow coarse sandy clay with occasional white clay lumps		



# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB2
EASTING:	407441
NORTHING:	6522958
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	6m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>6m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Grey sand		
1	Pale grey sand		
1.5	Very pale grey sand		
2 - 2.5	Cream sand		
3 - 3.5	Pale yellow-brown sand with occasional gravel to 15mm		
4	Yellow-brown sand with occasional gravel to 15mm		
4.5	Coarse yellow earthy sand with common gravel to 15mm		
5 - 6	Orange coarse clayey gritty sand		



# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB3
EASTING:	406954
NORTHING:	6524278
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	9m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>9m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Brown-grey sand		
1	Yellow-brown sand		
1.5 - 2	Yellow sand		
2.5 - 3	Yellow sand with occasional gravel to 10mm		
3.5	Yellow sand with occasional gravel to 20mm		
4	Brown-yellow coarse sand with gravel to 25mm		
4.5 - 6	Orange-brown-yellow earthy sand with gravel to 25mm		
6.5 - 7	Red gritty clayey sand		
7.5 - 9	Red gritty clayey sand, more clay		





# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB4
EASTING:	407365
NORTHING:	6524494
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	6m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>6m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Grey sand		
1	Very pale brown-grey sand, coarse		
1.5 - 2	Very pale grey sand, finer		
2.5 - 3	Pale yellow-brown sand with occasional gravel to 15mm		
3.5 - 5.5	Yellow-brown gravelly sand wo 20mm		
6	Red-brown earthy sand with gravel to 20mm		





# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB5
EASTING:	409178
NORTHING:	6523433
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	4.5m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	~1.25m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 2	Brown-grey sand, medium coarse, wet from ~1.25m		
2.5 - 3	Grey-brown sand, medium coarse		
3.5 - 4.5	Pale grey sand, medium coarse	Cased to 4.5m	



# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB6
EASTING:	408798
NORTHING:	6523380
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	6m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	4.5m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Grey sand		
1 - 1.5	Pale brown-grey sand		
2	Yellow sand with occasional gravel to 10mm		
2.5	Brown sand with gravel to 10mm		
3 - 5	Yellow earthy sand, wet from ~4.5m		
5.5	Pale yellow earthy sand		
6	Grey sandy clay	Cased to 6m	



SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB7
EASTING:	408836
NORTHING:	6524241
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	6m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>6m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Grey sand		
1 - 1.5	Yellow-brown sand		
2 - 6	Orange earthy sand, moist		



# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB8
EASTING:	408258
NORTHING:	6523954
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	6m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	>6m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Yellow-brown sand		
1 - 1.5	Yellow sand		
2 - 6	Orange earthy sand, moist		





# SOIL PROFILE LOG

PROJECT NUMBER:	J15017
SITE ID:	BB9
EASTING:	409306
NORTHING:	6524134
METHOD:	Auger rig
TOTAL DEPTH (mbgl):	4.5m
REFUSAL (Y/N):	N
DATE:	7/09/2015
DEPTH TO WATER (mbgl)	~1.5m

SOIL PROFILE		SAMPLE DATA	
DEPTH (m)	SOIL DESCRIPTION	SAMPLE ID	INTERVAL (m)
0 - 0.5	Grey sand		
1 - 2	Pale grey sand, medium coarse, wet from ~1.5m		
2.5	Brown sand		
3 - 4	Grey-brown sand		
4.5	Dark brown earthy sand	Cased to 4.5m	



# **Appendix B**

## **Water Analysis Results**

**LABORATORY REPORT**

Bayley Environmental Services

ARL Job No: 15-7050

Revision: 00

Date: 9 October 2015

Metals in Water Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Aluminium - Dissolved	0.1	mg/L	<0.1	<0.1	<0.1	<0.1
Arsenic III	0.001	mg/L	<0.001	<0.001	<0.001	<0.001
Arsenic V	0.001	mg/L	<0.001	<0.001	<0.001	<0.001
Calcium - Dissolved	0.1	mg/L	1.3	1.1	1.7	1.4
Cadmium - Dissolved	0.002	mg/L	<0.002	<0.002	<0.002	<0.002
Chromium III	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Copper - Dissolved	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Iron - Dissolved	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Mercury - Dissolved	0.0002	mg/L	<0.0002	<0.0002	<0.0002	<0.0002
Potassium - Dissolved	0.1	mg/L	1.2	0.8	1.2	2.6
Magnesium - Dissolved	0.1	mg/L	2.6	3.1	6.5	8.4
Sodium - Dissolved	0.1	mg/L	35	31	89	78
Nickel - Dissolved	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Lead - Dissolved	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Zinc - Dissolved	0.01	mg/L	<0.01	<0.01	<0.01	<0.01
Total Nitrogen in Water Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Total Nitrogen	0.2	mg/L	5.9	3.8	4.1	4.2
TKN	0.2	mg/L	<0.2	<0.2	<0.2	<0.2
Total Phosphorus in Water Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Total Phosphorus	0.01	mg/L	0.05	0.02	0.09	0.03
Ions by Discrete Analyser Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Chloride	5	mg/L	55	21	120	100
Sulphate	1	mg/L	11	8	4	15
Filterable Reactive Phosphorus	0.01	mg/L	0.01	<0.01	0.01	<0.01
NO <sub>x</sub> -N	0.01	mg/L	5.9	3.8	4.1	4.2
Physical Parameters Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Acidity	5	mgCaCO <sub>3</sub> /L	32	88	32	20
Alkalinity	5	mgCaCO <sub>3</sub> /L	<5	<5	<5	8
Chromium (VI)	0.002	mg/L	<0.002	<0.002	<0.002	<0.002
Conductivity	0.01	mS/cm	0.15	0.12	0.43	0.37
Total Suspended Solids	5	mg/L	51	8	250	<5
pH	0.1	pH units	6.4	6.2	5.2	5.6
Misc. Inorganics in Water Sample No: Sample Description:	LOR	UNITS	15-7050-1 BB5	15-7050-2 BB6	15-7050-3 BB9	15-7050-4 Dam
Hardness	5	mgCaCO <sub>3</sub> /L	14	18	31	30

Analytical Reference Laboratory (WA) Pty. Ltd.

40-48 Banksia Road, Welshpool, Western Australia 6100. Telephone: 08 6253 4444. Facsimile: 08 6253 4440.  
www.arlwa.com.au ABN 91 050 159 898

Shire of Chittering  
Lots 1 & 2 Tea Tree road, Bindoon



## APPENDIX 6 – PRE-LODGEMENT CONSULTATION



**Shire of Chittering**  
 Lots 1 & 2 Tea Tree road, Bindoon



## PRE-LODGEMENT CONSULTATION

AGENCY	DATE OF CONSULTATION	METHOD OF CONSULTATION	SUMMARY OF OUTCOME
Shire of Chittering	2012 - 2014	Meetings/Telephone/Emails	Consideration by Shire of Rural Retreat ODP and scheme amendment proposing a variation to lot size to allow for 'cluster type' subdivision of minimum lot size 4ha with average lot size of 10ha to ensure lot density does not exceed Rural Retreat maximum lot yield.  Initial ODP lodged as per above and deferred by Shire.
	26 February 2015	Meeting Manager Planning	Proponent should consider a 'Rural Small Holdings' zone and ODP.
	May 2016	Meeting Manager Planning	Discussions to refine both SA No. 56 and LSP document in light of the Perth-Darwin Alignment
Department of Planning	June – October 2015	Shire consultation with DoP officers on 'Rural Small Holdings' zone	DoP officers support in-principle 'Rural Small Holdings' zone scheme amendment which would be included in Local Planning Strategy review.
Western Power	During 2009	Email/telephone discussion	LSP development area can be connected to reticulated power supply.
Main Roads Department	February 2016	Email/Telephone discussion With Network Manager	Advice and mapping showing indicative location of the Perth-Darwin Highway

## Attachment 1

The Western Australian Planning Commission provides the following advice:

1. The resolution made by Council to prepare the amendment (Resolution 071115) and the adoption/approval page are not in a form approved by the Commission (*Regulation 35(1)*). With the introduction of the Regulations a resolution of a local government to prepare or adopt an amendment to a local planning scheme must -
  - (a) specify whether, in the opinion of the local government, the amendment is a complex amendment, a standard amendment or a basic amendment; and
  - (b) include an explanation of the reason for the local government forming that opinion (*Regulation 35(2)*).

In consideration of a complex amendment to a local planning scheme the local government must also resolve -

- (a) to proceed to advertise the amendment to the local planning scheme without modification; or
- (b) to proceed to advertise the amendment to the local planning scheme with modifications; or
- (c) not to proceed to advertise the amendment to the local planning scheme (*Regulation 37(1)*).

Form 2A and an approval page template are provided in **Attachment 2**.

2. The amendment proposes a modification of the Scheme Map. Scheme amendment maps depicting both the existing and proposed zoning of the amendment area are required (*Regulation 8(1)(a)*).
3. Replace references to 'Development Plan' and 'Outline Development Plan' with 'Structure Plan' throughout the amendment documentation (*to ensure terminology is consistent with the Regulations*).
4. The amendment proposes to rezone agricultural land. Information as to how the proposal complies with the objectives and policy measures of *State Planning Policy 2.5 Land Use Planning in Rural Areas* (SPP 2.5) is required to support the proposal (*section 77(1)(a) of the Planning and Development Act 2005*).
5. General information relating to land supply (existing land supply and take-up and population projections) is required to support the statements in Section 4.2 of the amendment report (*clause 5.6(b)(iv) of SPP 2.5*).
6. In the absence of a reticulated water supply, the availability of a sustainable water supply is required to be demonstrated (*clause 5.6(b)(vii) of SPP 2.5*).
7. The amendment area contains extractable sand resources. Clarification on whether the resources are regionally significant basic raw materials is required in Section 4.4 of the amendment report (*draft State Planning Policy 2.5 Rural Planning Policy*).
8. Portions of the amendment area have been designated as bushfire prone areas by the Fire and Emergency Services Commissioner. A Bushfire Management

**Attachment 1**

Plan (BMP) has been prepared to support the proposal. It is noted that this was produced prior to the release of the Commission's *State Planning Policy 3.7 Planning in Bushfire Prone Areas* and the accompanying *Guidelines for Planning in Bushfire Prone Areas*. The BMP may need to be reviewed in light of the Commission's updated policy position (*section 77(1)(a) of the Planning and Development Act 2005*).

# Local Planning Policy No 7

## OUTBUILDINGS





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## STATUTORY CONTEXT

The Shire of Chittering, as enabled under Part 2 of *Town Planning Scheme (TPS) No 6*, hereby makes this Local Planning Policy (LPP) regarding Outbuildings.

Any Local Planning Policy prepared under this part shall be consistent with the Scheme and if any inconsistency arises the Scheme shall prevail.

A LPP is not part of the Scheme and shall not bind the Local Government in any respect of any application for Planning Approval, but the Local Government shall have due regard to the provisions of any Policy, and the objectives which the Policy is designed to achieve before making its decision.

This policy applies to all land zoned within the Shire of Chittering and supersedes Local Planning Policy No.7 (adopted 16 July 2008).

## 1.0 DEFINITIONS

The following are definitions that relate directly to the application of this policy:

**“Attached”** means that a structure is structurally joined or joined at the roof to another roof.

**“Building Envelope”** means the area of land within a lot marked on a plan approved by the responsible authority within which all buildings and effluent disposal facilities on the lot must be contained within a defined building envelope that may be cleared for the purposes of erecting a dwelling, outbuildings and management of vegetation for gardens, car parking, driveways and fire hazard reduction (TPS No. 6).

**“Building Setback Area”** means the area of any lot between the property boundary and the building setback line, measured at right angles (90 degrees) to the boundary (Residential Design Codes).

**“Carport”** means a roofed structure designed to accommodate one or more motor vehicles unenclosed except to the extent that it abuts a dwelling or a property boundary on one side, and being without a door unless that door is visually permeable.

**“Combined Floor Area of Outbuildings”** for the purpose of this policy is the total floor area of all the outbuildings located on the subject land.

**“Combined Roof Area of Outbuildings”** for the purpose of this policy is the total roof area of all outbuildings located on the subject land.

**“Council”** mean the elected members of the Shire.

**“Detached”** means that no part of a structure is joined to any part of another structure.

**“Earthworks”** means the movement of earth on land which is carried out in conjunction with the construction of a structure or independently and exceeds 0.5m in height at any given point.

**“Enclosed”** means an area bound on three or more sides by a permanent wall and covered in a water impermeable material.

**“Garage”** Any enclosed roofed structure, other than a carport, designed to accommodate one or more motor vehicles provided for the sole use of the dwelling and designed to be integrated with the dwelling. Garages that are included under the main roof of the residence are not subject to this policy.

**“Garden Shed”** means a prefabricated steel structure with a maximum floor area of 10m<sup>2</sup>, and a maximum wall height of 1.7m and a maximum ridge height of 2.1m.

**“habitable building”** Habitable Outbuildings are defined in the Building Codes of Australia as a class 1a. Outbuildings that are defined class as 10a buildings are not for habitation.

**“Integrated”** means that a garage or outbuilding is constructed of a similar roof pitch, colours, materials and design in reference to the existing dwelling’s roof pitch, colours, materials and design.

**“Lean To”** means a structure with a single sloping roof that is structurally attached to an existing building, lean-to’s that are attached to an outbuilding are subject to this policy.

**“Lot”** has the same meaning as in the *Town Planning and Development Act 2005*, but does not include a strata or survey strata lot (TPS No. 6).

**“Outbuilding/Shed”** has the same meaning given to it in the Residential Design Codes and is also a structure used for the housing/storage of machinery or household items, which may be provided with power and incorporates such structures as sheds and barns and includes detached garages, carports and outbuildings. An outbuilding also means a Class 10A building as defined by the Building Code of Australia, which Class 10 refers to a “non-habitable” building. The outbuilding does not include a water tank or animal feed bin.

**“Residential Design Codes”** is in reference to *State Planning Policy 3.1 Residential Design Codes*.

**“Ridge Height”** means the maximum vertical distance between the finished floor level and the finished roof height directly above.

**“Scheme”** means *Town Planning Scheme No. 6* as amended.

**“Shire”** means Shire of Chittering.

**“Strata Lot”** and **“survey strata lot”** has the same meaning as in the *Town Planning and Development Act 2005*.

**“Wall Height”** means the maximum vertical distance between the finished floor level and the finished wall height directly above.



## 2.0 OBJECTIVES

The objectives of this policy are:

- ♦ To allow for appropriate outbuildings that do not have adverse impacts on the streetscape, character, amenity or environmental attributes of the surrounding area;
- ♦ Council may grant permission to live on site, in a caravan which may be stored in an outbuilding for a period not exceeding twelve (12) months if a building for a dwelling is under construction;
- ♦ To provide flexibility in the acceptable design and siting of outbuilding that do not impact adjoining properties in varying the Residential Design Codes; and
- ♦ To protect the natural vegetation, water quality and landscape amenity of the Shire.

### 3.0 POLICY STATEMENT

This policy applies to all outbuildings, detached patios, carports and garages on private property located within the Shire of Chittering,

Vegetation clearing for outbuilding shall not be permitted if cleared areas are available.

#### 3.1 Exemptions from Planning Consent Requirements

- 3.1.1 Planning Approval is not required for an outbuilding with an area of 10m<sup>2</sup> or less. This would include garden sheds aviaries and other minor structures, as defined in the BCA.
- 3.1.2 Planning approval is not required for an outbuilding with an area of greater than 10m<sup>2</sup>, provided that it:
- a) Complies with the development specifications within this policy; 3.2 and 3.3
  - b) In rural residential and townsites zones outbuildings are to be integrated to a primary dwelling. For example, patios are classified as 10a but appropriately attached to a dwelling and located at the rear of the dwelling do not require Planning Approval.
  - c) is constructed of non-reflective material, such as 'Colorbond' as per LPP No 19
  - d) Is not located within
    - i. Special Control Areas;
    - ii. Bushfire Prone Areas as identified by Department of Fire and Emergency Services; and
    - iii. Heritage Areas

### 3.2 Design Requirements for Outbuildings

- 3.2.1 Dongas for storage purposes will not be permitted within the Shire of Chittering.
- 3.2.2 Second-hand materials may only be used where the materials are in good condition and are sufficient to provide a consistent appearance to the building. Council's Building Surveyor may request a report from a structural engineer for use of second-hand materials.
- 3.2.3 Outbuildings are not placed on strategic fire breaks.
- 3.2.4 The construction of an outbuilding on a vacant property within the Townsite or Rural Residential, Rural Conservation, Rural Smallholding and Rural Retreat zone is not permitted unless a Building Permit Application for a dwelling has been approved by the Local Government.
- 3.2.5 The siting of any outbuilding shall be in accordance with the following:
- a) Contained within any defined building envelope;
  - b) Or in accordance with the setbacks prescribed by the Residential Design Codes or *Town Planning Scheme No. 6* where they apply;
  - c) The variation of a secondary street setback will not be approved except under exceptional circumstances;
  - d) Behind the main residential building line in accordance with Schedule 1.
  - e) Not located in building setback or exclusion areas, as specified in *LPP No 18 Setbacks*:
    - i. As per *Town Planning Scheme No 6*;
    - ii. Not to be located in firebreaks;
    - iii. Must be located a minimum 1.8 metres from septic tanks, leach drains and utilities; and
    - iv. With a minimum setback of 30m from an existing water body or highest known flood level or drainage easement.
- 3.2.6 Outbuildings within Bushfire Prone Areas, not set back 6m or more shall comply with *Australian Standard 3959 Construction of buildings in bushfire-prone areas*.
- 3.2.7 The Local Government may exercise its discretion to vary the deemed-to-comply standards of the Residential Design Codes by approving outbuildings in accordance with the maximum design standards referred to in **Table 1**.

### 3.3 Cladding materials

- 3.3.1 Within the Agricultural Resource zone , non-painted steel wall cladding will only be supported for use on outbuildings where the Shire's officers are satisfied that the reflection will not cause undue impact to neighbouring properties or passing road traffic.
- 3.3.2 The Shire will support the use of factory applied painted steel wall and roof cladding in a colour that is sympathetic to the surroundings and colour scheme of the dwelling.
- 3.3.3 Second-hand materials may only be used where the materials are in good condition and are sufficient to provide a consistent appearance to the building. The Shire's Building Surveyor may request a report from a structural engineer for use of second-hand materials.
- 3.3.4 Dongas and transportable structures for storage purposes are prohibited.
- 3.3.5 Where masonry construction is to be employed, the wall and roof colour and appearance of any outbuilding should be complementary to the design and construction of the dwelling



### 3.4 Maximum Floor Areas, Wall Height and Ridge Height

Table 1. Maximum Combined Floor Areas, Wall Height and Ridge Height

Zoning of Property	Maximum Acceptable Design Standards		
	Area	Wall Height	Ridge Height
R10/30 Townsite	70m <sup>2</sup>	3.0	4.5
R2 Residential	120m <sup>2</sup>	3.5	4.5
Townsite R2.5	120m <sup>2</sup>	3.5	4.5
Rural Residential	200m <sup>2</sup>	4m	5.0m
Rural Smallholding	300m <sup>2</sup>	4.5m	5.5
Rural Retreat	300m <sup>2</sup>	5.0	5.5
Agricultural Resource Up to 5 hectare	300m <sup>2</sup>	4.5	5.5
Up to 10 hectare	300	5.0	5.5
10 hectare and above	To be assessed on individual basis	To be assessed on individual basis	To be assessed on individual basis

- 3.4.1 Outbuildings that do not comply with the maximum acceptable design standards, as per **Table 1** are unlikely to be considered unless detailed justification can be provided for proposed variation in relation to lot configuration, topography or use.
- 3.4.2 Variations that are considered under exceptional circumstances will be referred to affected surrounding landowners for comment. The procedure for referring an application for planning approval is outlined by *Town Planning Scheme No. 6* and the Residential Design Codes respectively. Where a submission is received objecting to a proposal for an oversized shed the application may be referred to Council for consideration.
- 3.4.3 Outbuildings that exceed the maximum acceptable standards will generally not be supported unless the Shire exercises discretion and approves the application, having regard to the size, appearance and location of the outbuilding insofar as it will not have a significantly detrimental impact on the landscape, affected surrounding landowners and amenity of the area.
- 3.4.4 Unless specified in this Policy, outbuildings shall otherwise comply with the Residential Design Codes (as amended) on land where they apply.
- 3.4.5 The conversion of an outbuilding (class 10) to a dwelling (class 1a) is not supported.

### **3.5 Living in Outbuildings**

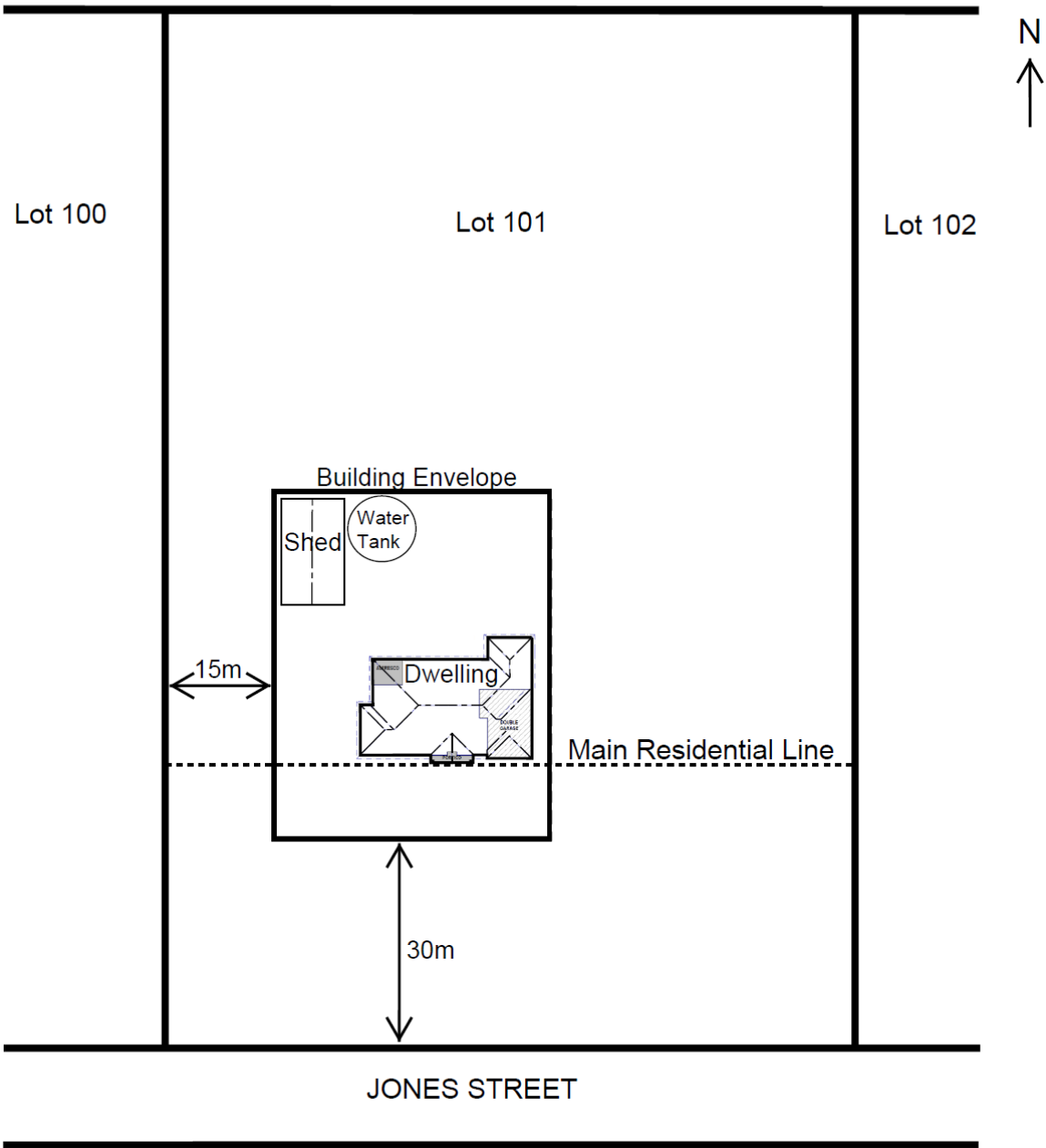
- 3.5.1 Residential use will not be permitted in a building other than one approved by the Council for that purpose, except that Council may grant a permit to live on site, in a caravan, which may be stored in an outbuilding for a period not exceeding twelve (12) months if a building for a dwelling is under construction.

### **3.6 Planning Consent Requirements**

- 3.6.1 The development will be located in a heritage area designated under the Scheme.
- 3.6.2 The proposal is located within a Special Control Area.
- 3.6.3 The proposal requires access from an un-constructed road.
- 3.6.4 The development utilises transported and transportable buildings.
- 3.6.5 Outbuildings appurtenant to a dwelling will not be approved on vacant Townsite or Rural Residential properties unless a simultaneous Building Licence Application for a dwelling has been lodged with the Local Government

# 4.0 Schedule 1: Examples of Main Residential Line

----- Main Residential Line



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Office hours: Monday to Friday  
8.30am - 4.30pm

**SHIRE OF CHITTERING**

**TOWN PLANNING SCHEME NO. 6**

**Local Planning Policy  
No. 7**

**OUTBUILDINGS AND SWIMMING POOLS**

12 AUG 2008

*Planning*  
*18/06/0007.*

*E081441.*

**SHIRE OF CHITTERING  
LOCAL PLANNING POLICY No. 7  
OUTBUILDINGS AND SWIMMING POOLS**

**1. STATUTORY CONTEXT**

The Shire of Chittering, as enabled under Part 2 of Town Planning Scheme (TPS) No. 6, hereby makes this Local Planning Policy (LPP) regarding Outbuildings and Swimming Pools throughout the Shire of Chittering.

Any LPP prepared under this part shall be consistent with the Scheme and if any inconsistency arises the Scheme shall prevail.

An LPP is not part of the Scheme and shall not bind the Local Government in any respect of any application for Planning Approval but the Local Government shall have due regard to the provisions of any Policy and the objectives which the Policy is designed to achieve before making its decision.

This policy applies to all land zoned within the Shire of Chittering and supersedes Local Planning Policy No. 7, Outbuildings, adopted 18/07/2002. It does not apply to Tunnel Houses, which are the subject of LPP No. 9, nor to Sea Containers, which are the subject of LPP No. 29.

**2. DEFINITIONS**

The following are definitions that relate directly to the application of this policy:

*"Building Clearing Area"* means the area within a defined building envelope that may be cleared for the purposes of erecting a dwelling, outbuildings and management of vegetation for gardens, car parking, driveways and fire hazard reduction (TPS No.6).

*"Building Setback Area"* means the area of any lot between the property boundary and the building setback line, measured at right angles (90 degrees) to the boundary (Residential Design Codes).

*"Council"* means the Council of the Shire of Chittering (Local Government Act 1995).

*"Lot"* has the same meaning as in the Planning and Development Act 2005, but does not include a strata or survey strata lot (TPS No. 6).

*"Outbuilding"* means an enclosed non-habitable structure that is required to meet the standards of the Building Code of Australia and is detached from any dwelling or other building, but does not include a water tank or animal feed bin.

**3. BACKGROUND**

The reasons why landowners need outbuildings are many and varied. They are part of the rural scene and reflect the uses to which landowners use and enjoy their land. In the Agricultural Resource Zones the storage of machinery, produce, fertilizers and on-site workshops are commonplace and are an acceptable part of the rural lifestyle. Outbuildings in the broader rural areas also include poultry farms and rural industries permitted under the Scheme.

In Rural Residential Zones, some landholders use sheds or covered areas for rural pursuits, such as stabling for horses and growing or storing produce, accommodating uses that cannot be normally enjoyed in urban areas due to the limitations on lot size.

Larger outbuildings may also provide an opportunity for additional rainwater capture in locations where there is no scheme water provision.

In urban areas, outbuildings can be used for storage of various kinds, including vehicles and boats and as hobby workshops. Here there is the potential loss of amenity in the smaller lot subdivisions. In both rural and urban areas, there may be the impact of building mass on the landscape. In this regard the objectives of each zone or landform, the use of the land and the living environment are important considerations when dealing with applications.

In the Residential Design Codes, which apply within the Muchea, Bindoon and Wannamal Townsites, outbuildings are controlled so they do not detract from the streetscape or the visual amenity of residents or neighbouring properties. In this case, they are not to exceed 60m<sup>2</sup> in area or 10 per cent of the site area, whichever is the lesser and there are also maximum wall and ridge heights specified.

TPS No. 6 makes the following references to outbuildings:

**5.8 Development Provisions – Rural Residential Zone, Rural Retreat Zone and Small Rural Holding Zone**

*The following general clauses will apply to the development and use of land in these rural zones.*

**5.8.8 Protection of Vegetation and Tree Cover**

*Areas of Vegetation Protection identified on the adopted Development Plan using Clause 5.8.1 of the Scheme shall not be cleared, felled or removed except where necessary in the following situations:*

- (c) the clearing is for the purpose of access to an approved dwelling or outbuildings;*
- (e) the clearing is necessary for the construction of a dwelling, outbuildings and an area of 20m width surrounding the dwelling for the purpose of bush fire protection.*

**6.2 Landscape Protection Areas**

**6.2.4 Planning Requirements**

*In dealing with an application for Planning Approval, the Local Government will not support:*

- (a) a dwelling or outbuilding on any ridgeline as may be prominently visible from any public road or which may adversely affect the aspects of neighbouring dwellings;*

**6.3 Water Prone Area – Ellen Brook Palusplain**

**6.3.3 Planning Requirements**

*The Local Government will impose conditions on any Planning Approval relating to-*

- (a) the construction and occupation of any dwelling or outbuilding;*

**8.2 Exempted Development**

*Except as otherwise provided in the Scheme, for the purposes of the Scheme the following development does not require the Planning Approval of Local Government-*



- (b) *the erection on a lot of a single house including any extension, ancillary outbuildings and swimming pools, except where -*
  - (i) *the proposal requires the exercise of a discretion by the Local Government under the Scheme to vary the provisions of the Residential Planning Codes; or*
  - (ii) *the development will be located in a heritage area designated under the Scheme;*
  - (iii) *the proposal is located within a Rural Residential zone;*
  - (iv) *the proposal is located within Special Control Area;*
  - (v) *the proposal requires access from a un-constructed road;*
  - (vi) *the development utilises transported and transportable buildings.*

This policy has been created to provide guidance for Council, land owners and developers in satisfying the outbuilding requirements of TPS No. 6.

#### 4. OBJECTIVES

The objectives of this policy are:

*To allow appropriate outbuildings with the minimum of administrative requirements;*

*To protect the natural vegetation, water quality and landscape amenity of the Shire;*

*To maintain the rural character of the Shire.*

#### 5. POLICY STATEMENT

##### 5.1 Exemptions from Planning Consent Requirements

Planning consent is not required for:

- a) above-ground swimming pools, provided they are located:
  - i) within any building clearing area specified for the lot; and
  - ii) outside strategic fire breaks (see also Local Planning Policy No. 21);
- b) below-ground swimming pools and outbuildings constructed of Colorbond or other non-reflective materials, with an area of 10m<sup>2</sup> or less, provided they are located:
  - i) within any building clearing area specified for the lot;
  - ii) outside setback areas (see also Local Planning Policy No. 18);
  - iii) outside strategic fire breaks (see also Local Planning Policy No. 21); and
  - iv) with a minimum setback of 30m from an existing water body or highest known flood level or drainage easement;
  - v) with a minimum setback of 10m from a drainage easement;
  - vi) behind any dwelling ie. not between a dwelling and the road frontage.

##### 5.2 Planning Consent Requirements for Outbuildings and In-ground Swimming Pools

- a) Subject to Clause 5.3 below, planning consent is not required for outbuildings or in-ground swimming pools with an area greater than 10m<sup>2</sup> located in accordance with 5.1 b) i) to vi) unless:
  - (i) the proposal requires the exercise of a discretion by the Local Government under the Scheme to vary the provisions of the Residential Planning Codes;
  - (ii) the development will be located in a heritage area designated under the Scheme;

- (iii) the proposal is located within a Rural Residential zone;
  - (iv) the proposal is located within a Special Control Area;
  - (v) the proposal requires access from a un-constructed road; or
  - (vi) the development utilises transported and transportable buildings, in which case the application may be dealt with by the Chief Executive Officer under delegation issued by Council in accordance with Section 5.42 of the Local Government Act;
- b) Outbuildings appurtenant to a dwelling will not be approved on vacant Townsite or Rural Residential properties unless a simultaneous Building Licence Application for a dwelling has been lodged with the Local Government.
  - c) The Local Government may exercise its discretion to vary the Residential Design Codes by approving outbuildings up to the maximum size of 150m<sup>2</sup>, irrespective of the Residential Design Codes density restrictions.
  - d) All outbuildings are to be placed behind the main residential building line.
  - e) Planning consent is not required for outbuildings not specified in part a) of this clause and otherwise in accordance with the Scheme and all Local Planning Policies.

*Note: If uncertain as to whether a planning consent is required, please contact the Shire's Planning Department.*

### **5.3 Building Licence Requirements for Outbuildings and Swimming Pools**

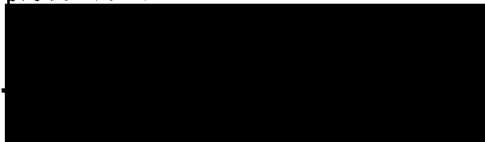
- a) All outbuildings and swimming pools, both above and in-ground, including those exempted from planning requirements, require a building licence;
- b) Sheds with a floor area greater than 100m<sup>2</sup> require an engineer's certificate to accompany the building licence application.

**ADOPTED FOR PRELIMINARY APPROVAL** by resolution of the **Shire of Chittering** at the Ordinary Meeting of the Council held on the 21<sup>st</sup> day of May 2008.

**ADOPTED FOR FINAL APPROVAL** by resolution of the **Shire of Chittering** at the Ordinary Meeting of the Council held on the 16<sup>th</sup> day of July 2008.

and the seal of the Municipality was pursuant to that resolution hereunto affixed in the presence of:

**PRESIDENT.**



**CHIEF EXECUTIVE OFFICER.**



**Date:**

11/8/2008

# Local Planning Policy No 29

## Sea Containers



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## STATUTORY CONTEXT

The Shire of Chittering, as enabled under Part 2 of *Town Planning Scheme (TPS) No 6*, hereby makes this Local Planning Policy (LPP) regarding Sea Containers.

Any LPP prepared under this part shall be consistent with the Scheme and if any inconsistency arises the Scheme shall prevail.

An LPP is not part of the Scheme and shall not bind the Local Government in any respect of any application for Planning Approval, but the Local Government shall have due regard to the provisions of any Policy, and the objectives which the Policy is designed to achieve before making its decision.

This policy applies to all land zoned within the Shire of Chittering and supersedes Local Planning Policy No 29 - Sea Containers (adopted 28 September 2005).

## 1.0 DEFINITIONS

The following are definitions that relate directly to the application of this policy:

**“Building Envelope”** means an area of land within a lot marked on a plan approved by the responsible authority within which all buildings and effluent disposal facilities on the lot must be contained. (Town Planning Scheme No. 6)

**“Building Setback Area”** means the area of any lot between the property boundary and the building setback line, measured at right angles (90 degrees) to the boundary (Residential Design Codes)

**“Council”** mean the elected members of the Shire.

**“Lot”** has the same meaning as in the Town Planning and Development Act 1928, but does not include a strata or survey strata lot (TPS No. 6)

**“Other Similar Structures”** is a prefabricated structure with a flat roof and rectangular in shape and is capable of being transported (includes a donga or a railway carriage).

**“Sea Container”** means large metal container originally manufactured to carry goods in a sea vessel.

**“Shire”** means Shire of Chittering.

**“TPS No. 6”** means Town Planning Scheme No. 6.

## 2.0 OBJECTIVES

The objectives of this policy are:

*To provide guidelines for placement, use, size and construction of sea containers and other similar storage structures.*

*To maintain the rural character and landscape amenity of the Shire.*

*To allow for the temporary controlled use of sea containers during building construction.*

## 3.0 POLICY STATEMENT

### 3.1 Exemptions from Planning Consent Requirements

Planning consent is not required for:

- a) use of containers fully enclosed within a building; or
- b) loading or unloading of containers for shipping, provided that the container does not remain on the one lot for longer than thirty (30) days.

### 3.2 General Requirements for Sea Containers

Unless exempt from planning consent requirements:

- a) approval is required for use of all containers and applications are to be submitted to the Shire for determination;
- b) containers are not to be located in:
  - 1) building setback or exclusion areas, as specified in LPP No. 18 Setbacks;
  - 2) are not to be located in firebreaks
- c) containers must be located a minimum 1.8 metres from septic tanks, leach drains and utilities.
- d) sea containers are not permitted in Townsite zones, unless associated with a business .
- e) The sea container shall be located at the rear of the buildings and shall not be prominently visible from the street.
- f) if sea container falls into disrepair or becomes unsightly, the Shire of Chittering will require its removal.
- g) Sea containers or similar structures are for storage purposes only
- h) Sea containers will not be permitted for habitable use or conversion for habitable use unless it can be demonstrated that the proposal meets the provisions of the Building Code of Australia and will not detrimentally impact the amenity of the locality where the development is to be situated.

### 3.3 Temporary Use of Sea Containers

Council may grant approval for temporary use of a maximum of one (1) sea container or similar structure of 6m or less for storage purposes only, in Rural Residential, Rural smallholdings, Rural Retreat zonings for up to 6 months, in the following circumstances:

- a) with active building permit for a dwelling and house slab or footings constructed;
- b) the requirements of 3.2 above are satisfied and the container is sited, where practicable at the rear of the property, behind the dwelling under construction, or next to/or to the rear of a shed, where the dwelling is already constructed.; if unable to site as required then it will be subject to officer discretion and site inspection.
- c) Prior the expiry of the approved period the container is to be removed from the lot;
- d) Upon application to the Shire an extension may be granted for a period not exceeding 12 months.
- e) If sea container is on site for 12 months or more it is considered permanent and will be assessed accordingly

**3.4 Permanent Use of Sea Containers**

- a) Permanent use of containers is permitted within the Agricultural Resource Zone, in accordance with 3.2 above; no planning approval is required in the Agricultural Resource zone.
- b) Permanent use of one 6 metre may be permitted in rural residential, rural small holding and rural retreat zones in accordance with 3.2 above;
- c) Permanent use of containers is not permitted within Townsite zones, unless on 2ha lots or greater;
- d) Containers are to be screened from view from public spaces and neighbouring properties by:
  - a. landscaping and the use of natural vegetation;
  - b. fencing that is sited next to /or rear of an outbuilding; and/or
  - c. with the requirements of 3.2 above, the container is sited next to/or behind the rear of an outbuilding structure; and
- e) Containers must be painted to match either dwelling or shed.

**ADOPTED FOR PRELIMINARY APPROVAL** by resolution of the **Shire of Chittering** at the Ordinary Meeting of the Council held on the 15<sup>th</sup> day of September 2015.

**ADOPTED FOR FINAL APPROVAL** by resolution of the **Shire of Chittering** at the Ordinary Meeting of the Council held on the \_\_\_\_\_ and the seal of the Municipality was pursuant to that resolution hereunto affixed in the presence of \_\_\_\_\_



**SHIRE OF CHITTERING**

**TOWN PLANNING SCHEME NO. 6**

**Local Planning Policy  
No. 29**

**SEA CONTAINERS**

**SHIRE OF CHITTERING  
LOCAL PLANNING POLICY No. 29  
SEA CONTAINERS**

**1. STATUTORY CONTEXT**

The Shire of Chittering, as enabled under Part 2 of Town Planning Scheme (TPS) No. 6, hereby makes this Local Planning Policy (LPP) regarding Sea Containers throughout the Shire of Chittering.

Any LPP prepared under this part shall be consistent with the Scheme and if any inconsistency arises the Scheme shall prevail.

A LPP is not part of the Scheme and shall not bind the Local Government in any respect of any application for Planning Approval but the Local Government shall have due regard to the provisions of any Policy and the objectives which the Policy is designed to achieve before making its decision.

This policy applies to all land zoned within the Shire of Chittering and supersedes that part of Local Planning Policy No. 7 Outbuildings, dealing with sea containers, given preliminary approval 28/09/2005.

**2. DEFINITIONS**

The following are definitions that relate directly to the application of this policy:

*“Building Setback Area”* means the area of any lot between the property boundary and the building setback line, measured at right angles (90 degrees) to the boundary (Residential Design Codes).

*“Council”* means the Council of the Shire of Chittering (Local Government Act 1995).

*“Lot”* has the same meaning as in the Town Planning and Development Act 1928, but does not include a strata or survey strata lot (TPS No. 6).

**3. BACKGROUND**

In recent years there has been increased use of sea containers within the Shire for storage. While these can serve a useful role in rural areas there have been concerns about aesthetics, particularly in more settled areas.

TPS No. 6 makes no direct reference to sea containers and Council regulates them under general development control powers covering amenity and protection of the natural environment.

This policy has been created to provide guidance for Council and land owners in the use and siting of sea containers.

#### 4. OBJECTIVES

The objectives of this policy are:

*To allow use of sea containers for shipping;*

*To discourage alternative use of containers, particularly where they might become permanent fixtures in the landscape ;*

*To maintain the rural character and landscape amenity of the Shire.*

#### 5. POLICY STATEMENT

##### 5.1 Exemptions from Planning Consent Requirements

Planning consent is not required for:

- a) use of containers fully enclosed within a building; or
- b) loading or unloading of containers for shipping, provided that the container does not remain on the one lot for longer than seven days.

##### 5.2 General Requirements for Sea Containers

Unless exempt from planning consent requirements as specified in 5.1 above:

- a) approval is required for use of all containers and applications are to be submitted to Council for determination;
- b) containers are not to be located in:
  - (i) building setback or exclusion areas, as specified in LPP No. 18 Setbacks;
  - (ii) firebreaks, as specified in LPP No. 21 Fire Management Plans; and
- c) containers are to be screened from view from public spaces and neighbouring properties;

##### 5.3 Temporary Use of Sea Containers

Council may grant approval for temporary use of a container, up to 12 months, in the following circumstances:

- a) people are residing on the lot, with approved building plans, house slab constructed and approved sewage system connected;
- b) the requirements of 5.2 above are satisfied and the container is sited at the rear of the property, behind the dwelling under construction;
- c) at the end of the approved period the container is to be removed from the lot, unless granted an extension of time by the Council;
- d) sea containers are not permitted in Townsite zones.

##### 5.4 Permanent Use of Sea Containers

- a) Permanent use of containers is permitted within the Agricultural Resource Zone, in accordance with 5.2 above;
- b) Permanent use of containers is not permitted within Townsite and Rural Residential Zones
- c) A sea container may require a building licence depending on modifications and how it is used.

**ADOPTED FOR PRELIMINARY APPROVAL** by resolution of the **Shire of Chittering** at the Ordinary Meeting of the Council held on the 15th day of March 2006.

**ADOPTED FOR FINAL APPROVAL** by resolution of the **Shire of Chittering** at the Ordinary Meeting of the Council held on the 15<sup>th</sup> day of November 2006.

and the seal of the Municipality was pursuant to that resolution hereunto affixed in the presence of:

**PRESIDENT**.....

**CHIEF EXECUTIVE OFFICER**.....

**Date:**.....



Agency Submissions		
Submitter	Comment	Shire Officer Response
	<i>No agency submissions received.</i>	
Public Submissions		
PUBLIC A	1. Does Council intend to charge a fee for submission of approval? If so, how much and what is the expected approval time?	All planning applications are subject to a few as per the Shire’s Schedule of Fees and Charges which are consistent with the Planning and Development Regulations. TPS 6 sets out statutory timeframes in which applications must be dealt with. Sea Containers would be 60 days.
	2. How does Council intend to police container usage?	Control of development is enforced through TPS No.6 under the Planning and Development Act 2005. Any unauthorised containers brought to the Shire’s attention will be required to obtain approval or alternatively remove. Failure to do this may result in legal action being taken.
	3. How does Council intend to enforce this policy?	As per above.
	4. Is this policy retrospective?	The review of LPP 29 is not introducing any changes that would result in retrospective issues. If containers are found not to have required approval then the landowner will be required to obtain approval as per above.
	5. If not retrospective, does Council propose an amnesty for those residents with existing sea containers used for storage?	As mentioned above the review doesn’t introduce changes in approvals required.
	6. This policy fails to deal with the use of sea containers converted to cost effective dwellings that comply with building regulations etc. a. This policy must address all the potential uses other than storage.	Comment noted. This policy applies to non-habitable structures only. Should an application be received for a dwelling/house (Class 1a) it would be treated as construction material and assessed in accordance with Town Planning Scheme No. 6 and relevant planning policies.
	7. The potential impact of this policy on the community could be significant and warrants more open engagement with the community.	The policy was advertised for a period of 21 days in accordance with Section 2.4.1 of Town Planning Scheme No. 6.
PUBLIC B	Submission on proposed Local Planning Policy 29-Sea Containers	The use of screening is to help maintain the rural character and landscape amenity of the Shire. Efforts to screen would not ensure that the sea container did not impact on neighbouring properties. Screening could be of trellis, plants or other suitable materials.
	Comment on the proposed policy....	Containers can be made to open from the inside by use of a simple hole allowing access to opening mechanisms. Safety requirements are stated in the policy of other Shires.
	3.2 General Requirements for Sea Containers  c) containers are to be screened from view from public spaces and neighbouring properties  This should perhaps read ' efforts should be made such that containers are screened from view from public spaces and neighbouring properties ' since it is quite likely that the 'are to be' is not practical.  If the Shire is assessing the application then the 'effort to screen' can be considered to see if appropriate.  _____	
	d) containers must open from the inside for safety  This sounds good from a safety point of view and is easy to say, but in practice, just how do you propose to make a container open able from the inside? Perhaps fit a PA door? This probably defeats the security though.	

	<p>One of the main purposes of using a container for storage is the security. This usually involves a padlock on the handle of the opening side door, as a minimum. Thus the container would not be open able from the inside even if there was a method of operating the existing levers from the inside.</p> <p>Container doors are designed not to latch or lock if pushed closed or blown closed. The handles must be lifted and operated intentionally.</p> <p>What evidence is there of people being locked inside containers without the deliberate action of someone outside ?</p> <p>I do think that this 'safety' requirement is quite unrealistic.</p>	
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\*Note: Comments are as per original submission received by the Shire. Submission comments have not been edited unless for the purposes of confidentiality where necessary.