HDB
TownPlanning&Design

BUSHFIRE THREAT ASSESSMENT

North Cooranbong Concept Plan

Former Cooranbong Aerodrome, Cooranbong

For

JPG Pty Ltd

hdb

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Bushfire Threat Assessment

For:

North Cooranbong Concept Plan

Client:

JPG Pty Ltd

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Prepared By:

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1.0 INTRODUCTION

HDB Town Planning and Design has been commissioned to undertake a site specific bushfire assessment of the concept North Cooranbong development located adjacent to the existing urban area Cooranbong in the Lower Hunter Valley area of NSW. The subject area is located in the Lake Macquarie Local Government Area (LGA). The future development of North Cooranbong will incorporate primarily residential land with a small section of commercial / retail space located centrally within the concept suburb area.

This Bushfire Report provides a site wide bushfire assessment of the North Cooranbong site to demonstrate the sites ability to accommodate bushfire protection measures and therefore facilitate future residential development throughout the site.

The subject site is within a bushfire prone area as indicated by Lake Macquarie Council's Bushfire Prone Land Map and as such requires adequate consideration of the bushfire threat. This report seeks to demonstrate that the site can meet the general provisions of *Planning for Bushfire Protection 2006,* and therefore that it is capable of safely accommodating future residential development.

2.0 BACKGROUND

In late 2006 the Lower Hunter Regional Strategy was released. In relation to the subject site, it was identified as being a key site in accepting population growth in the Hunter. Additionally the increasing population growth experienced in the Greater Sydney Metropolitan area has seen the Hunter earmarked as a receiving catchment for this population growth. With ample room for residential development, and capable of being fully serviced, the Cooranbong site was identified for future urban development.

A subsequent rezoning was undertaken for the site which included the preparation of a Local Environmental Study (LES), which demonstrated the sites capacity to accept future residential development. As part of this study an assessment of the bushfire threat was made (Holmes Fire and Safety 2005). The report concluded that the site can generally accommodate bushfire mitigation techniques. Since the publication of that report the NSW Rural Fire Service (RFS released *Planning for Bushfire Protection 2006* (PBP2006) which revised the method which bushfire setbacks are measured. Furthermore the original concept layout of the subject site has since been amended. For these reasons the following report has been prepared to demonstrate the concept plans compliance with the requirements of the RFS.

For a full appreciation of the site and the concept plan to which this report relates, this document should be read in conjunction with the *North Cooranbong Part 3A Preliminary Concept Plan Application* (HDB 2007).

3.0 SITE DETAILS

3.1 General Site Description

The subject site is identified as:

Name	North Cooranbong
Local Government Area	Lake Macquarie City Council
Lot & DP's	(see main Concept Plan document for property listing and ownership plan)
Address	Avondale Road, North Cooranbong
Size	3km² approx

All accesses to the study area generally link to Avondale Road which adjoins the southeastern boundary of the site. North Cooranbong is located north of the existing urban area of Cooranbong, approximately 16km north of Lake Macquarie and is located within the Lake Macquarie Council area. Refer Figure 4.

The site supports gently undulating terrain ranging in altitude from 50 to 90 metres AHD. Several unnamed natural watercourses traverse the site. These generally run in a east-west fashion.

3.2 Adjoining Land

North Cooranbong is bounded by three distinct landuses. These are:

- General agricultural farmland, with heavy disturbance and clearing.
- Less disturbed agricultural land which is generally more heavily vegetated than general farmland. Generally found along the western boundary to the site, and
- Residential/urban land primarily associated with the existing village of Cooranbong. This developed area sits along the southern boundary of the site.

3.3 The North Cooranbong Area

As previously stated the purpose of this report is to accompany a project application for North Cooranbong and demonstrate the ability of the site to accommodate the bushfire constraints and required mitigating features within the subject area.

North Cooranbong will be used primarily for residential purposes. A small neighborhood centre is located centrally within the site. Residential lot sizes are to average between 400m² - 800m².

The subject site is centered on the old Cooranbong Aerodrome. Refer to **Figure 1** for site location**.**

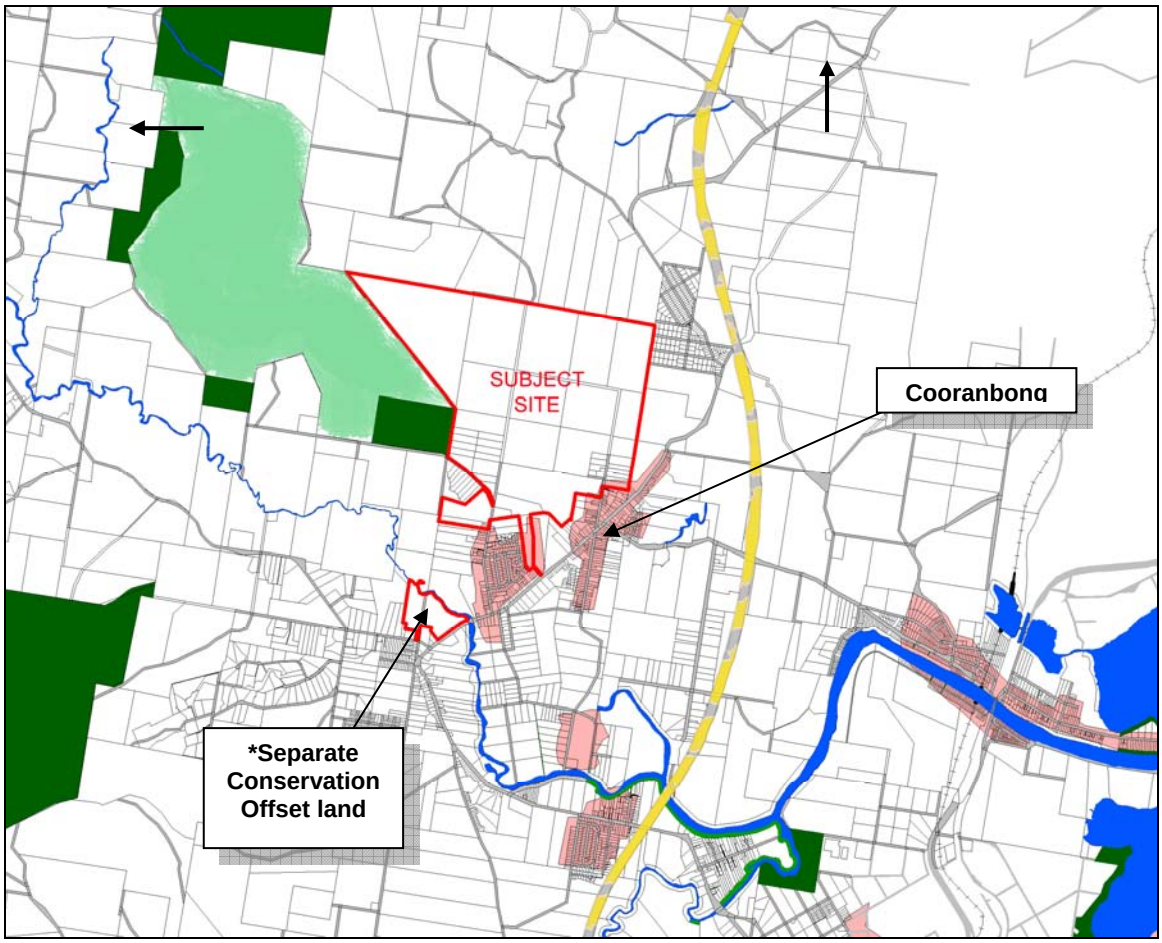


Figure 1 – Location Plan. Sources: whereis.com

*Note: A separate holding forms the entire North Cooranbong concept site however this area is to be used for conservation offset purposes. As no residential (or any development for that matter) is to occur in this area it has not been considered as part of this Bushfire Threat assessment.

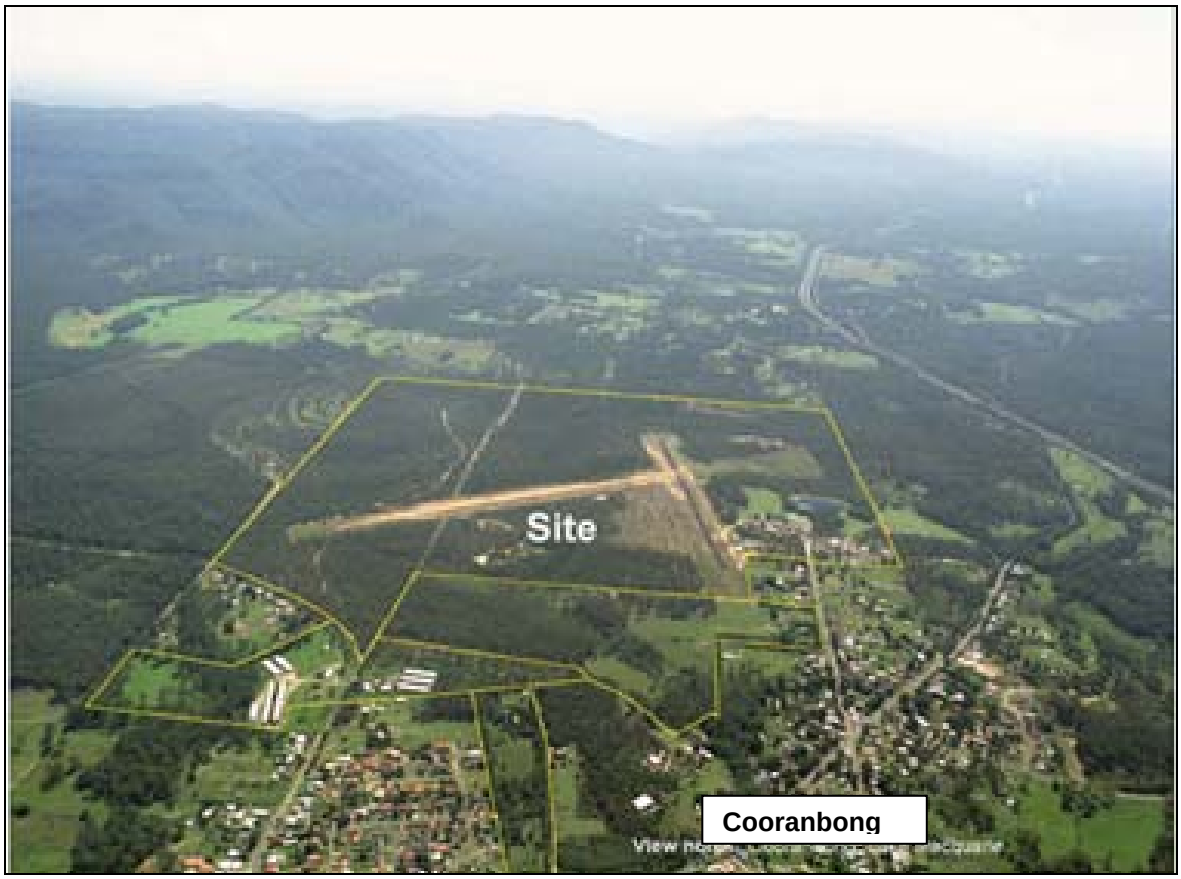


Figure 2 –North Cooranbong Site, Aerial Photo.

4.0 LEGISLATIVE REQUIREMENTS

This report addresses North Cooranbong in terms of protection from the threat of bushfire under the Environmental Planning and Assessment Act, 1979, the Rural Fires Act, 1997 and the Rural Fires Regulations 2002. Under this legislation land identified as Bushfire Prone requires appropriate assessment for certain types of development, in this case residential development. The subject site has been identified as bushfire prone by Lake Macquarie Councils Bushfire Prone Land Map. Refer **Figure 6**.

As such the proposed development has been assessed with regard to the following legislation:

Environmental Planning and Assessment At 1979
North Cooranbong falls under Part 3A Major Projects, of the EPA Act 1979. Under Part 3A. As North Cooranbong is a Major project Section 75U of the Act applies. Section 75U lists approvals and legislation that does not apply to major projects. This section includes:

(g) a bush fire safety authority under section 100B of the *Rural Fires Act 1997*,

Thus preventing the concept development being considered integrated and requiring a Bushfire Safety Authority. Despite this, given the bushfire prone nature of the site, the Director General, in his requirements, indicated that the Department of Planning needs to be satisfied that adequate consideration of the bushfire threat is undertaken under Part 3A of the Act. As such this report is intended to demonstrate the concept plans ability to generally meet the requirements of *Planning for Bushfire Protection 2006*.

It should be noted however, that further bushfire assessment, in line with Planning for Bushfire Protection 2006, and the Requirements of the Rural Fire Services will be undertaken as part of future development applications within the site (for residential and special fire protection purposes).

This report therefore quantifies the fire threat to the subject site in line with Planning for Bushfire Protection 2006, for the purposes of the Major Project Assessment under Part 3A of the Environmental Planning and Assessment Act 1979.

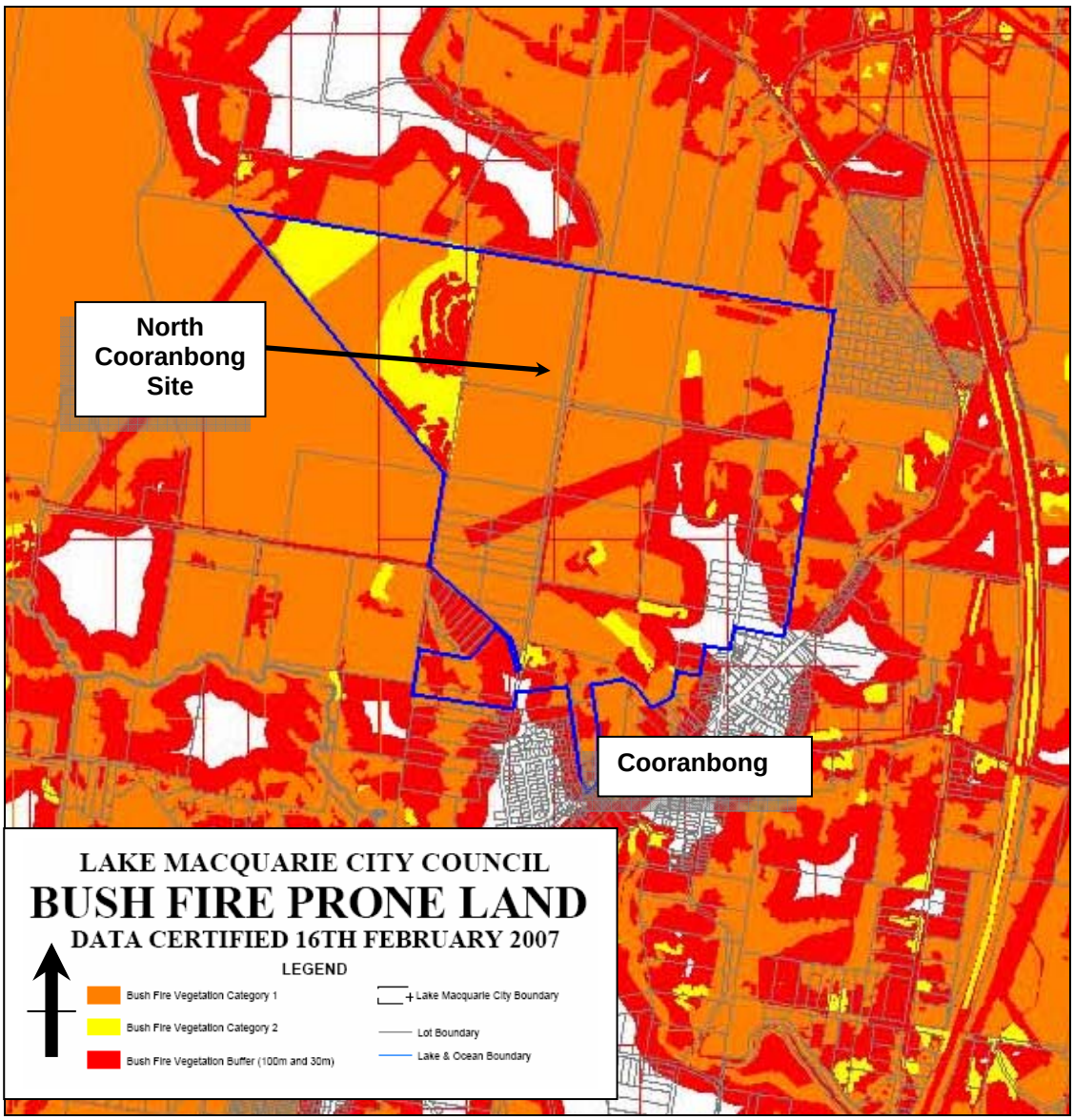


Figure 3 – Bushfire Prone Land Map showing North Cooranbong.
Source: Lake Macquarie City Council

5.0 METHODOLOGY

The following information will be assessed as part of this Bushfire Threat Assessment.

5.1 Vegetation Assemblages

Outlining the dominant vegetative features of the site provides the basis for an evaluation of the occurrence of combustible and hazardous flora species on and around site. *Planning for Bushfire Protection 2006* requires an assessment of all fire dominant vegetation types over a distance of at least 140m from the proposed building line on the development site to the bushfire prone land.

Planning for Bushfire Protection 2006 classifies vegetation into distinct groups based on the amount of fuel which can be found in each vegetation type. This measures fuel in tones/ hectare (t/ha). *Table A2.1 Classification of Vegetation Formations* from Planning for Bushfire Protection 2006 illustrates the different classifications which apply to vegetation. This table will be used to assess vegetation across the subject site.

5.2 Topography

Planning for Bushfire Protection 2006 requires an assessment of the slope of the site, over a distance of at least 100m from the boundary towards the various vegetation communities which are bushfire prone. Where there is more than one slope, the gradient, which has the most influence on fire behaviour, shall be adopted (usually the steepest slope). Downslope refers to the vegetation, or direction of bushfire attach, being downslope from a potential building site or subdivision boundary.

The dominant gradient should be determined in terms of the following classes:

i. All upslope vegetation considered 0º;
ii. >0 º to 5º downslope;
iii. >5º to 10 º downslope;
iv. >10º to 15 º downslope;
v. >15 to 18º downslope;

5.3 Bushfire Protection Assessment

This assessment involves combining the dominant vegetation assemblage with the topography (slope) of the site to determine the appropriate Asset Protection Zone's required. The slope and vegetation information is used along with Table A2.4 of *Planning for Bushfire Protection 2006* to arrive at a suitable setback distance to provide a buffer between a potential bushfire and any dwelling/asset.

Asset Protection Zones

Planning for Bushfire Protection 2006 states that *"where a bushfire hazard exists on or adjacent to the development site, an Asset Protection Zone is to be established on the hazard side of the development"*. Thus, this necessitates appropriately sized firebreaks for any proposed residential development. These fire breaks are known as Asset Protection Zones, (APZ's) and have been determined according to the method set out by the NSW Rural Fire Service as discussed above.

The primary purpose of an APZ is to ensure that a progressive reduction of bushfire fuel occurs between the bushfire hazard and any habitable dwelling. It incorporates two recognised zones, these being the Outer Protection Area (OPA) and Inner Protection Area (IPA). The APZ, requires the regular maintenance and ongoing management of "fire fuels". In almost all landscapes, mowing or slashing can control fuel to manageable levels.

The Inner Protection Area is an area directly surrounding a building in which there is minimum fine fuel at ground level. Scattered trees can remain within the IPA, provided none of the trees have canopies that touch or that are immediately adjacent. Trees are not to overhang dwelling structures. The IPA can include lawns, gardens, swimming pools and driveways, as well as access roads such as Perimeter Fire Trails.

The Outer Protection Area is an area outside the IPA where the fine fuels (understorey material) have been reduced such that the IPA is effectively isolated from the majority of the flames and heat and protected from airborne sparks, ash and incendiaries. These areas can be cleared by mechanical means or by controlled slow burning. OPZ's are usually associated with forest vegetation assemblages where larger buffers are required.

5.4 Roads & Access

An assessment of the road and access provisions to the site is required. This assessment is to be made in line with the requirements of the RFS as described in Planning for Bushfire Protection 2006.

5.5 Water Supply

Water supply for firefighting purposes must be evaluated. The supply of water for fire fighting to the standard required by the RFS will be assessed for the subject site. Furthermore it must be shown that these requirements can be met as described in Planning for Bushfire Protection 2006.

5.6 Level of Construction

Based on the calculated fire behaviour, it is important to safe guard habitual dwellings with the appropriate level of construction standards. Habitual structures are to be constructed in accordance with Section 3 of AS3959 – 1999.*Planning for Bushfire Protection 2006* describes appropriate levels of construction which should be taken into consideration when building in bushfire prone areas. As this report does not seek to address specific dwelling requirements levels of construction will not be specifically addressed, although recommendations can be made for level of construction given the recommended APZ's.

5.7 Special Considerations

Any additional information relating to the site which may or may-not effect the capacity of the RFS to assess the bushfire safety authority must be disclosed. In relation to the subject site to following areas will require additional considerations:

- Ecological issues. Flora and Fauna,
- Heritage,
- Site water courses,
- Servicing.

6.0 RESULTS

6.1 Vegetation Assemblages

An analysis the vegetation that influences bushfire behavior was undertaken. This assessment of vegetation beyond the site to a distance of 140m to the fire threat has found three distinct vegetation classifications as listed below:

Grasslands: The dominant vegetation assemblage across the site. As can be seen on the aerial photo, grasslands occur extensively across the entire Stage 1 Area and breaks up the larger areas of Vegetation.

Grassy Woodlands (Woodlands) *O*ccurs throughout the site, and provides some linkages between areas of greater vegetation. Scattered pockets also exist in isolation throughout the pastured areas.

Dry Sclerophyll Forest (Open Forest): Areas of forest are primarily found along the north, east and southeast boundaries to the Stage 1 area.

Refer to ***Appendix C*** for Site vegetation Analysis.

6.2 Topography

The large size of Stage 1 supports gently undulating terrain with a height range of 50 meters in the north east to 15 metres AHD in the south. Slope ranges from zero/flat for land adjoining the airstrip, to 10º- 12º for the steeper sections of the site. Mid-slopes are typically in the range of 5º -8º. Ridge top slope gradients of as little as 2º occur in isolated locations. A slope analysis was performed to identify the variety of slopes found on the site. Generally speaking, four effective slope classes have been found on the site. These are:

All upslope vegetation considered 0º

Where vegetation (the fire threat) which is either upslope of a potential dwelling site or on the same level (flat). For ease of dwelling construction future further development would maximise the use of flat sites.

>0 º to 5º downslope

The majority of this site can be described as 0º to 5º degrees upslope and can be described as occurring through out the site.

>5º to 10 º downslope

This slope can be found in the centre, and running through the southeasterly portion of the site. This degree of slope can also be seen in the north and northwesterly portions of the site within and beyond the boundary of the site.

>10º to 15 º downslope

There are three areas within the constraints of this site that have a slope of between 10º - 15º degrees. They occur in the northwesterly portion of the site in and beyond the boundaries of the site and in the southeasterly portion of the site.

Refer to ***Appendix B*** for site slope analysis.

6.3 Bushfire Protection Assessment

Due to the large size of the residential area, assessment of required APZ's need to be viewed at an appropriate level. Rather than attempting to identify required APZ's for each individual allotment, general subdivision boundary APZ's have been calculated. APZ for all combinations of vegetation and slope found on the site are listed in Table 1 below. Additionally required setbacks are shown on ***Appendix A.***

Table 1 – APZ's for North Cooranbong.

Where the vegetation is:	The Slope from the fire threat is:	Required setback therefore is:	OPZ
Grasslands	All upslope vegetation considered 0º (flat)	10 maintained as IPA	NA
Grasslands	>0 º to 5º downslope	10 maintained as IPA	NA
Grasslands	>5º to 10 º downslope	10 maintained as IPA	NA
Grasslands	>10º to 15 º downslope	10 maintained as IPA	NA
Grassy Woodlands (Woodlands)	All upslope vegetation considered 0º (flat)	10 maintained as IPA	NA
Grassy Woodlands (Woodlands)	>0 º to 5º downslope	15 maintained as IPA	NA
Grassy Woodlands (Woodlands)	>5º to 10 º downslope	20 maintained as IPA	NA
Dry Sclerophyll Forest (open forest)	All upslope vegetation considered 0º (flat)	20 APZ Including	10m

- Fire Danger index (FDI)= 100 for Lake Macquarie Local Government Area, therefore APZ's taken from Table *A2.4 Minimum Specifications for Asset Protection Zones (m) for Residential and Rural Residential Subdivision Purposes.*
- OPZ information for forest vegetation taken from Table *A2.7 Determining Allowable Outer Protection Areas (m) for forest vegetation within an APZ*.

6.4 Roads & Access

The future development of North Cooranbong will generate additional traffic. The upgrade of some local roads may be required depending on the outcomes of Traffic Studies undertaken as part of the masterplanning process for the area. (GHD, 2005)

The road network as shown on the subdivision concept plan includes a large number of internal and boundary roads. The subdivision plan includes perimeter roads between all areas allocated for residential development and bushfire prone vegetation.

A specific are of note is the residential land on the northern boundary of the subject site. Given the location of a 'green corridor' to the south of this area access appears somewhat limited.

Vegetation in this green corridor is to be limited to woodland type development with limited ground cover. As there is a single access to this area particular attention needs to be given to ensuring this access can be safety used during a fire event to reduce the likelihood of residential becoming isolated during a bushfire. Opportunity exists to evacuate this area along the unnamed gravel road (shown on the 1:25000 topographic map) which connect to Mount Nellinda Rd to the north.

While the specific design of the roads is not yet available the following requirements for access for the RFS in terms of turning radius and road width will be used in the road design. Refer **Figure 7** and **Table 4** below.

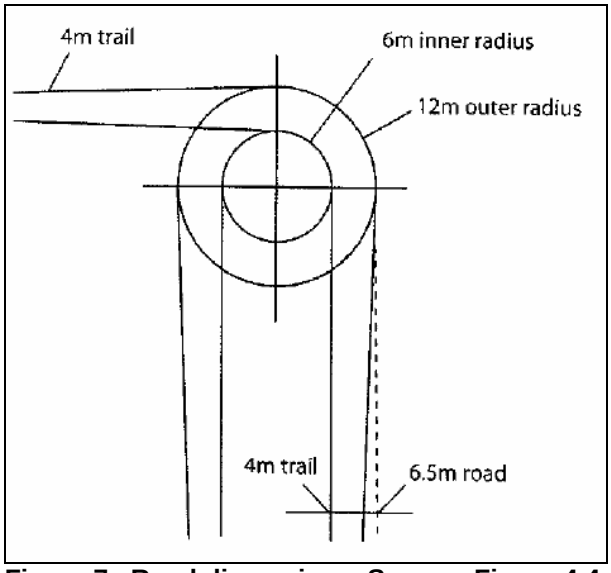


Figure 7 –Road dimensions. Source: Figure 4.4, Planning for Bushfire Protection 2006.

Table 2 – Minimum widths for public roads that are not perimeter roads. Source: Table 4.1 Planning for Bushfire Protection 2006.

Curved radius (inside edge metres)	Swept Path (metres wide)	Single Lane (metres width)	Two way (metres width)
<40	3.5	4.5	8.0
40-69	3.0	3.9	7.5
70-100	2.7	3.6	6.9
>100	2.5	3.5	6.5

6.5 Water Supply

The subdivision of North Cooranbong will be primarily for residential allotments with a small area of employment lands / urban centre. For the entire area there should be appropriate provision is water through a subdivision wide hydrant system built to the Australian Standard 2419.1 - 2005. Reticulated water will be available to all lots. Where water cannot be provided to a particular lot in line with the Australian Standard, designated fire fighting tanks are to be located in close proximity to each residence. The following should be provided:

- Minimum water supply 10,000 litres per dwelling will provide sufficient water to protect a house using a hose.
- A suitable connection for RFS purposes must be available. In general 65mm Stortz outlet with a gate or ball valve should be provided.
- Underground tanks with an access hole of 200mm will allow tankers to refill direct from the tank.
- Raised tanks should have their stands protected.
- Water should be gravity fed by a diesel or petrol powered pumps that are not dependant on the main electrical supply. It is generally considered that 3kW pumps are adequate for the protection of a single dwelling using one or two hose lines.

6.6 Level of Construction

As previously discussed this report does not seek to identify specific construction levels required in the Stage 1 area. This will vary across the site depending on the fire threat and the individual designs for each dwelling. Table 3 below illustrates the construction levels which will apply to dwelling in Stage 1.

Generally speaking, where the minimum APZ's as shown in this report are used, a Level 3 of construction should be applied. Where the APZ's exceed those expressed in this report for the corresponding slope and vegetation, Level 2 or 1 may be satisfactory.

For areas adjoining grasslands Level of Construction of 1 is required, two options exist when a 10mAPZ has been provided:

1. 10m APZ + screening of sub floor + screening of windows (basic ember protection)
2. 10m APZ + radiant heat fence + screening of windows.

Table 3 – Construction Levels,
Taken from Planning for Bushfire Protection 2006, Table A3.2.

PBP Category	Description	AS3959 – 1999 Construction Level
Low	Minimal attack from radiant heat and flame due to the distance of the site from the vegetation, although some attack by burning debris is possible. There is insufficient threat to warrant specific construction requirements	Low – on construction requirements
Medium	Attack by burning debris is significant with radiant heat (not greater than 12.5 kW/m²). Radiant heat is unlikely to threaten building elements (e.g. unscreened glass) Specific construction requirements for ember protection and accumulation of debris are warranted.	Medium – Level 1
High	Attack by burning debris is significant with radiant heat levels (not greater than 19kW/m²) threatening some building elements (screened glass). Specific construction requirements for embers and radiant heat are warranted.	High – Level 2
Extreme	Attack by burning debris is significant and radiant heat levels (not greater than 29kW/m²) threaten building integrity. Specific construction requirements for ember and higher radiant heat are warranted. Some flame contact is possible.	Extreme – Level 3
Flame Zone	Radiant heat levels and flame contact likely to significantly threaten building integrity and result in significant risk to residents who are unlikely to be adequately protected.	Outside Scope

All residential development will be required to have Construction Levels evaluated at the Development Application Stage.

6.7 Special considerations

Ecological constraints: Flora and Fauna

As part of the master planning which has been undertaken over the preceding year, an extensive ecological assessment was undertaken for the subject area. While this report is required to focus on the bushfire implications on the site in relation to future development it is recognised that the maintenance of APZ's sometimes clashes with the preservation of vegetation and habitat for local flora and fauna.

All APZ's will occur within the boundaries of the North Cooranbong site. The concept layout for North Cooranbong includes boundaries road which surround the outer lots. As these can be

incorporated into APZ's this will ensure APZ's will not encroach on neighboring conservation areas.

Aboriginal Heritage

As part of the initial site studies undertaken for the master planning of the site, an Aboriginal Archaeological study was undertaken. (Myall Coast Archaeological, 2003).

The report found that despite a number of relics being located these had been accommodated by planning and urban design and therefore no further consideration of these constraints are required in terms of bushfire.

Watercourses

A number of watercourses traverse the site as is evident by the green corridors which follow these watercourses through the site. Land zoning and urban design have created riparian areas along theses watercourses. Additional setbacks are achieved from these vegetated areas through the use of perimeter roads.

Urban Expansion

Although the majority of the Stage 1 area is currently zoned for agricultural purposes, the proposed urban areas will see the site become zoned of urban purposes, primarily residential with smaller areas for business and employment zones. Given the urban expansion it is envisaged that the responsibility for Fire Fighting within Stage 1 will move from the RFS to the NSW Fire Brigade.

As the transition of the zonings occurs the RFS will continue to provide Fire Fighting support and resources to the Stage 1 Area. A NSW Fire Brigade is anticipated to be built and run within the new township. At a time when this station is fully functional shall the NSW Fire Brigade assume responsibility for monitoring the fire situation within the Stage. RFS resource will however continue to be used in support of fire events encroaching on the area from adjoining agricultural and forested lands.

It is considered however that both organisations will work together as required by the circumstances of a fire event affecting the study area.

Services

It is the intention that the future North Cooranbong suburb will be fully serviced by electricity, telecommunications, and town water and sewer.

Where possible it is recommended that electricity and telecommunications are located underground to prevent damage during a fire event and to reduce possible service loss as a result of fire.

7.0 RECOMMENDATIONS

The following recommendations are made based on the results of this report. These recommendations would be required for future residential development. In respect to the following areas a number of recommendations have been made:

Asset Protection Zones

- The APZ's shown in Table 1 are be implemented for proposed subdivision boundaries and future dwelling houses for the corresponding slope and vegetation.
- All created lots who share boundaries with vegetation will require the corresponding APZ on any boundary which is exposed to a possible fire threat.
- Where required building line setback should be used to ensure APZ compliance.

Road and Access

- North Cooranbong is to take advantage of the existing road network to provide access to all areas which may be developed, including when fully operational.
- The development of the site will also integrate with the existing roads of Cooranbong to the south.
- Access is provided to the requirements of the RFS as outlined in this report, and Planning for Bushfire Protection 2006.
- The most important feature of the road network is the existence of perimeter roads which will provide a buffer between all residential allotments and vegetation, in and around the site. The road network has also been created to prevent the occurrence of dead-end streets which can cause evacuation problems in a fire event and be hard to negotiate for RFS vehicles.
- The road widths and turning radii conform to the requirements of the RFS as shown in Table 2 and Figure 7 in section 6.4 of this report.
- Further investigations are required to assess the ability to evacuate/access the north of the site through the unnamed gravel road which connects to Mount Nellinda Rd and then Freemans Drive. The ability of this road to accept RFS vehicles also need to be confirmed.

Fire Fighting Capacity and Bushfire Evacuation

Local branches of the NSW Rural Fire Service would be the first to attend any fire. Approximate response times from the local RFS station are shown in the following Table 4.

This indicates that within 30 minutes of notifying the fire authorities of a fire event up to 3 Stations could respond to the area. Given the size the site it is important that multiple stations can respond in the event of fire. If multiple fire fronts were to occur it is considered that there is an appropriate fire response time with access available from number of directions enabling RFS personnel to respond accordingly.

Table 4 – Local Fire Stations. Source NSW Fire Brigade/RFS.

Station Location	Distance (km)	Travel Time (min)	Direction of travel (to site)
Morrisset	5	10	Southeast
Toronto	10	15	Northeast
Wangi Wangi	10	15	East

In order to provide water for fire fighting purposes residential allotments will be serviced by hydrant system built to Australian Standard 2419.1 - 2005 which will be built into the subdivision at the construction stage.

Bushfire evacuation will take place through the internal road network away from fire affected areas. Minimum road widths should comply with Table 4. Evacuation will primarily be to Cooranbong via any of the connecting roads from North Cooranbong. Given the lack of vegetation along the connecting roads they are considered generally safe during a fire event.

Vegetation Maintenance

Maintenance of the property with particular attention to the APZ's is required. Management of existing vegetation involves selective fuel reduction. Measures that could be taken include (where applicable):

- Removal of ground litter and undergrowth.
- Thinning of trees to break any continuous canopy.
- Removal or pruning of trees and brush adjacent to building sites.
- Removal of trees overhanging any buildings.
- Pruning of lower limbs of trees to increase the distance between the canopy and the ground fuel.

Where asset protection zones are incorporated, in general they are to be maintained by the owner of the land. It is intended that APZ are to be maintained as such:

- Low cut lawn area.
- Area around fences, fence posts, gates and trees are to be kept clear of fuel.
- No foliage within 3m of dwellings.
- Gutter and roof gully clearance.
- Maintenance and location of woodpiles.
- Appropriate types of plants to be stocked (contact local nursery).
- Type of fencing (preferable non flammable).

Level of Construction

The appropriate level of construction is required for dwellings which will be built within the site. Given the APZ's that are recommended in this report are implemented, it is considered that most dwellings will be at a distance from the fire threat requiring only a medium level of construction. The final level of construction will be advised by Council as part of the conditions of development for individual dwelling development applications.

Dwelling affected by grassland vegetation can afford a Level 1 of construction given the presence of either a 10m APZ + screening of sub floor + screening of windows (basic ember protection) or10m APZ + radiant heat fence + screening of windows. As previously stated all other allotments to have required Level of Construction reviewed at Development Application stage.

8.0 CONCLUSION

As outlined above, the site is identified as being subjected to potential bushfire attack. The vegetation and the slope within this site vary considerably. Asset Protection Zones will be necessary around residential development and should be dictated by site specific conditions, and required APZ methodology, as outlined in this report.

It is expected that with the appropriate setbacks (Asset Protections Zones) met, the provision of adequate water supplies for fire fighting purposes, it is considered that the potential of bush fire threat to North Cooranbong would be negligible and the site can safety accommodate future residential development.

It is suggested that the recommendations as listed in the previous section of this report be implemented into the development of the site.

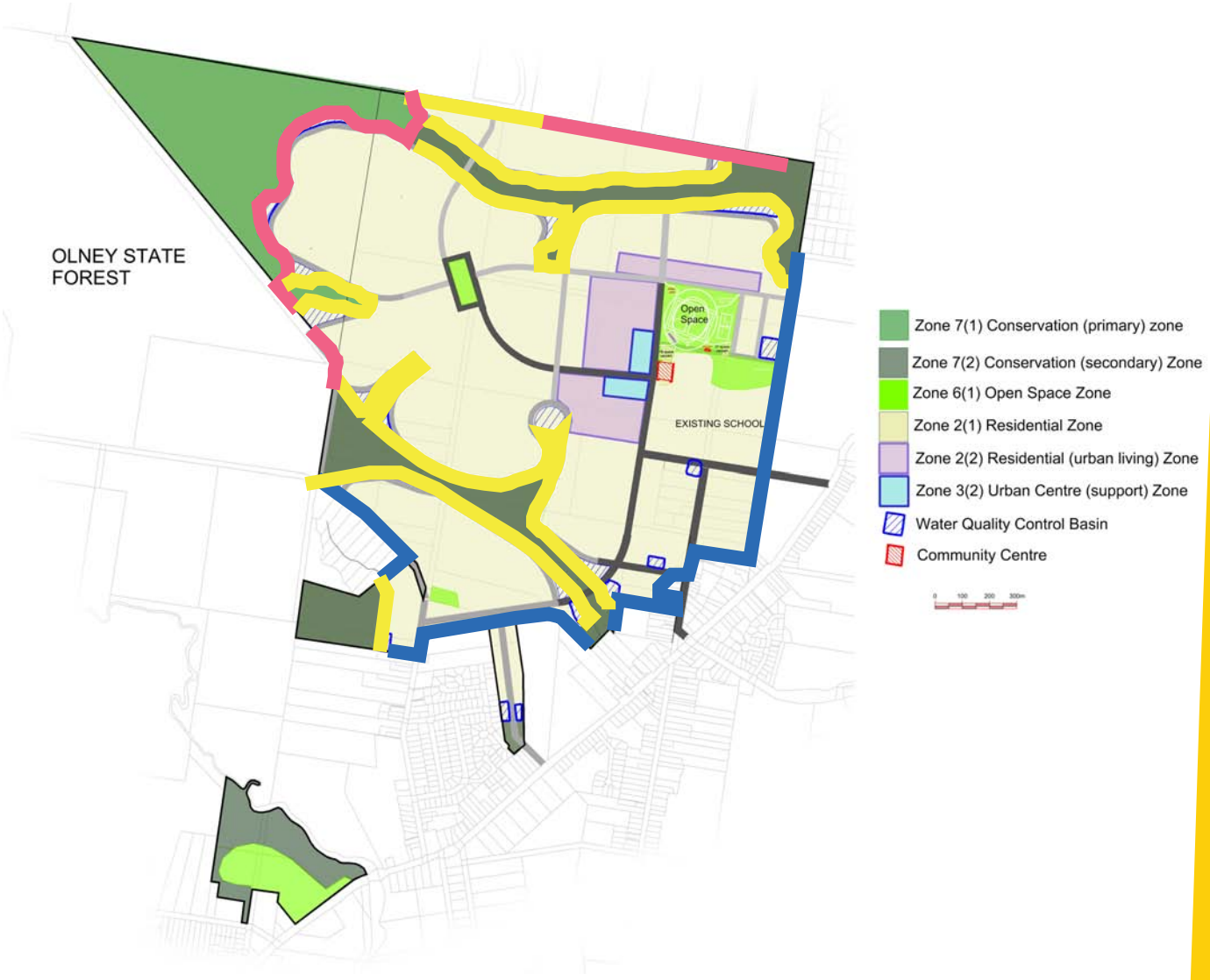
In summary, the proposed area can generally comply with bushfire requirements imposed by the *Planning for Bushfire Protection 2006* document.

Appendix A

Concept Structure Plan & APZ's

JOHNSON PROPERTY GROUP
Creating living communities

NORTH COORANBONG
RESIDENTIAL ESTATE



Not to Scale

ASSET PROTECTION ZONES

APZ Calculation

APZ's calculated on specific combination and slope effecting each subdivision boundary where residential land adjoins vegetation.

20 m APZ
15 m APZ
10 m APZ

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Appendix B

Site Slope Analysis

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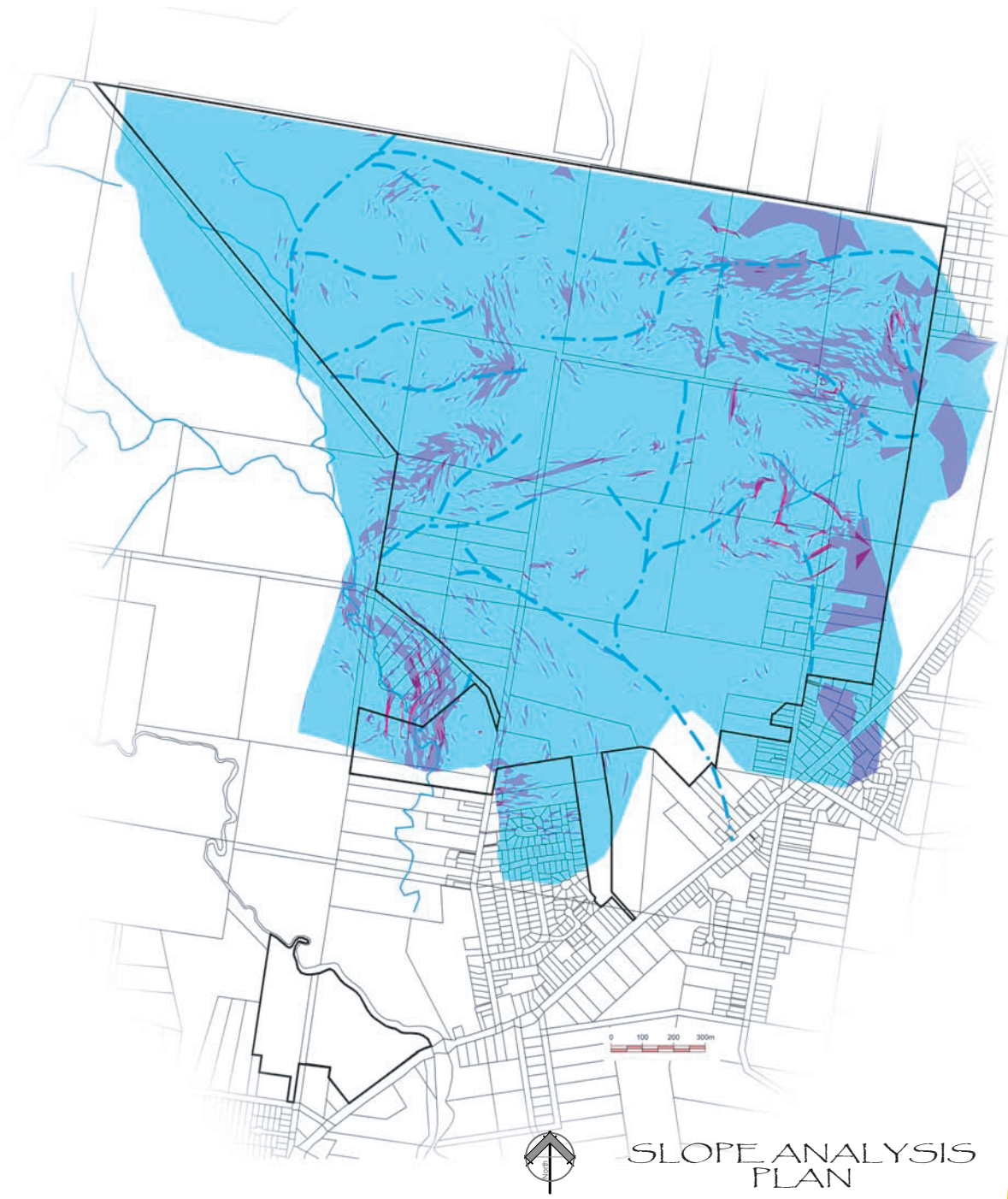
NORTH COORANBONG

RESIDENTIAL ESTATE



SLOPE ANALYSIS PLAN

- 0 - 5 Degrees Slope
- 5 - 10 Degrees Slope
- 10 - 15 Degrees Slope
- 15 - 20 Degrees Slope
- 20 < Degrees Slope

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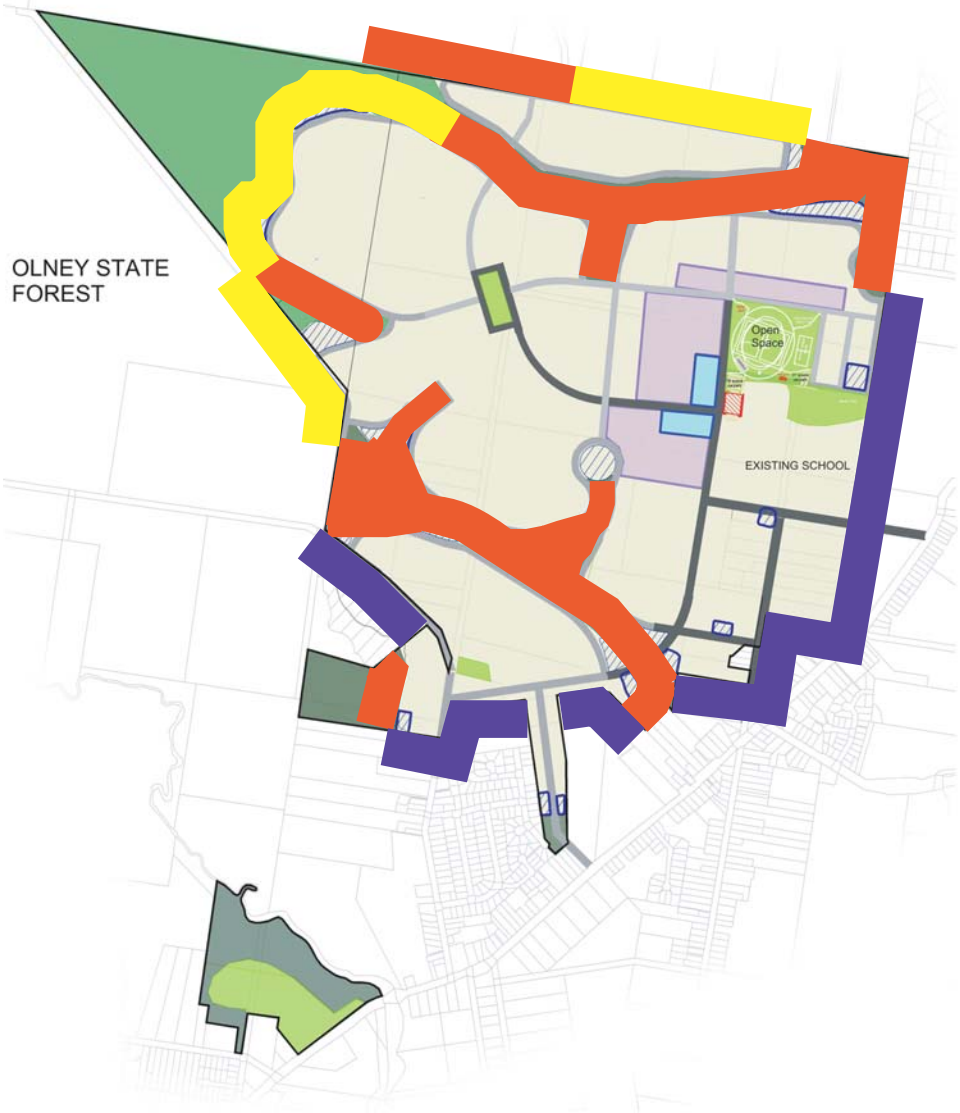
Appendix C

Site Vegetation Classification

JOHNSON PROPERTY GROUP
Creating living communities

NORTH COORANBONG
CONCEPT PLAN 2007

CONCEPT PLAN - VEGETATION TYPES



VEGETATION TYPES

Vegetation types are based on Table A2.1 in Planning for Bushfire Protection 2006

- Woodland
- Forest
- Grassland

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Appendix D

Site Photographs

Plate 1 – View along unsealded airstrip with internal site vegetation in background.

Plate 2- View along sealed airstrip.

Plate 3 – Grassland ajjoining forest vegetation at the end of the unsealed airstrip.

Plate 4 - Road entrance to site.