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RISE

MP08-0234

Bush Fire Assessment Report

14 April 2009
Job No. 5100/38/1

Terranora Group Management

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Document Control

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1	8 June 2007	Karen Pither	KP	John Delaney	JD
2	29 June 2007	Karen Pither	KP	John Delaney	JD
3	27 September 2007	Karen Pither	KP	John Delaney	JD
4	24 March 2009	Karen Pither	KP	John Delaney	JD
5	14 April 2009	Robert Speirs		John Delaney	

RISE

BUSH FIRE ASSESSMENT REPORT

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1. INTRODUCTION

This Bush Fire Assessment Report has been prepared by Cardno (QLD) Pty Ltd on behalf of Terranora Group Management in respect of a proposal to establish a master planned community, known as the *RISE* development, at Bilambil Heights in the Tweed Shire. The locality for the *RISE* development encompasses and adjoins areas of land that are identified as bush fire prone areas in the Tweed Local Environmental Plan.

The RISE development will involve the creation of private residences, retirement and aged care facilities, education facilities, hotel apartments, health spa, commercial, retail, sports park, public and protected open spaces. The *RISE* development will proceed in two stages and this Bush Fire Assessment Report has been prepared in respect of Stage 1 of the *RISE* development, being the area nominated by the NSW Minister for Planning as the MP08-0234 area generally within the Far North Coast Regional Strategy Urban Expansion line.

The objectives of this report are to provide an assessment the bush fire hazard and the associated planning requirements for the proposed development. This Bush Fire Assessment Report has been prepared in accordance with the Submission Requirements for Development Applications on bush fire prone land as set out in Appendix 4 of the NSW Rural Fire Service's *Planning for Bush Fire Protection Guideline* 2006 (*PBP Guideline*).

This assessment report provides:

- in Section 2.0, relevant background information concerning the general characteristics of the proposed *RISE* development and the characteristics of the site locality; and
- in Section 3.0, details concerning the bush fire protection measures that are proposed as part of the *RISE* development.

2. BACKGROUND INFORMATION

2.1 Site Description

The *RISE* development site is located to the west of the Terranora Broadwater and encompasses a total area of approximately 184ha of which 110ha is the subject of the MP08-0234 application. An aerial photograph of the *RISE* development site is presented in Figure 1.

The *RISE* development site is comprised of four (4) lots described as:

- Lot 2 DP867486
- Lot 31 DP 850230
- Lot 32 DP 1085109
- Lot 33 DP 1085109

As shown in Figure 2, the *RISE* development site contains and adjoins land with the following designations pursuant to the Tweed Local Environmental Plan 2000 (LEP):

- 1(a) Rural;
- 1(c) Rural Living;
- 2(c) Residential – Urban Expansion;
- 6(b) Open Space - Recreation; and
- 7(d) Environmental Protection (Scenic/Escarpment).

The *RISE* development is located on land that forms part of the Bilambil Heights Release Area, which is approximately 880 hectares in extent. The proposed *RISE* development is consistent with the land use intents specified for the site in the Tweed Shire Council's strategic planning documents.

The project area is mapped by Tweed Shire Council as containing and adjoining Bush Fire Prone Land as depicted on Figure 3.

2.2 Development Description

The RISE development will proceed in two stages. The Stage 1 *RISE* development will involve the creation of approximately 1,800 new dwellings and facilities comprising of private residences, retirement and aged care facilities, education facilities, hotel apartments, health spa, commercial, retail, sport fields, public and protected open spaces. The general nature of the *RISE* development is illustrated in the Concept Precinct and Staging Plan prepared by ML Design and presented in Appendix A. It is noted that the spine road, civil and infrastructure works within the Stage 2 area, form part of the Stage 1 development works covered by the MP08-0234 application.

The majority of the *RISE* development consists of standard residential land uses, however several components of the proposed development constitute Special Fire Protection Purposes (SFPP) land uses. The nature of SFPPs means that occupants may be more vulnerable to bush fire attack for one or more of the following reasons:

- they may be less educated in relation to bush fire impacts;
- they may have reduced capacity to evaluate risk and to respond adequately to the bush fire threat;

- they may present organisational difficulties for evacuation and or management;
- they may be more vulnerable through stress and anxiety arising from bush fire threat and smoke;
- there may be significant communication barriers;
- supervision during a bush fire may be difficult; and
- logistical arrangements for the numbers of residents may be complicated in terms of alternate accommodation, transport, healthcare and food supplies.

SFPP land uses proposed as part of the *RISE* development include:

- a Private School, located in the south-east of the site;
- a nursing home located within the north-east of the site; and
- a hotel, located centrally within the east of the site.

It is noted that the Concept Precinct and Staging Plan includes residential precincts described as Retirement Living. These precincts will not be limited to persons over 55 years of age and will not be subject to assessment under the *State Environmental Planning Policy (Housing for Older People or People with a Disability)* 2004. In this regard, these precincts are considered to be multi unit developments and do not constitute a SFPP use.

In terms of bush fire protection measures, the *RISE* development proposes a combination of measures including: asset protection zones (APZs), perimeter access roads, reticulated water supplies and multiple roadway access via Cobaki Road and Marana Street. Additional detail concerning bush fire protection measures proposed are provided in Section 3.0.

2.3 Vegetation

The majority of the *RISE* development site and adjoining land has been previously cleared of native vegetation and modified for rural and agricultural purposes and an 18 hole golf course. Previous land uses include banana farming, other agricultural land uses and recreational uses. The *RISE* development site and adjoining land also encompasses some land that has been developed for residential purposes and an 18 hole golf course and major club house.

The site locality supports areas of forest and woodland communities as described by James Warren and Associates (2006). Six (6) vegetation communities were identified by JWA (2006) which generally correspond to the Tweed Vegetation Management Strategy 2004 ("TVMS"). Comparison between the JWA vegetation mapping (2006) and TVMS mapping confirms that the existing site vegetation communities generally conform to the TVMS mapping and are suitable for the assignment of structure classes as outlined in the PBP Guideline.

In accordance with the methodologies described in the PBP Guideline, the existing vegetation communities have been assigned a structure classification as outlined below in Table 1 and depicted on Figure 4. TVMS Code 998 – Not Assessed has been allocated the Forest structure classification to account for the worst case scenario. The vegetation assessment extends to 140 metres from the development footprint as outlined in Appendix 2 of the PBP Guideline.

Table 1 Vegetation Community Structure Classification

PBP Guideline Structure Classification	TVMS Vegetation Types	JWA (2006) Vegetation Types
Rainforest	Sub-tropical / Warm Temperate Rainforest on Bedrock Substrates (Code 102)	Tall closed forest (mixed species) Tall closed forest (*Lophostemen confertus*)
Rainforest	Camphor Laurel Dominant Closed to Open Forest (Code 1004)	Tall closed forest (*Cinnamomum camphora* +/- mixed species)
Forest	Not Assessed (Code 998)	Landscape plantings Disturbed land
Cleared Grassland	Cleared Grassland, Landscape Plantings and Golf Course	Grassland with scattered trees

The potentially hazardous vegetation that exists within and adjacent to the *RISE* development site is comprised of relatively small clumps of vegetation (i.e. < 50 ha in extent).

2.4 Topography (Slopes)

An assessment of the slopes over a distance of 100 metres from the existing property boundary towards the existing vegetation communities was conducted. The slopes were grouped based on the classes outlined in the PBP Guideline, relative to the location of the development on the slope in relation to the vegetation. The following classes were determined and are depicted on Figure 4.

- Natural Surface Sloping < 5º
- Natural Surface Sloping 5º-10º
- Natural Surface Sloping 10º-15º
- Natural Surface Sloping 15º-18º
- Natural Surface Sloping >18º

As depicted on Figure 4 parts of the site have been identified as having slopes greater than 18º. It is noted that a detailed slope assessment was undertaken around the Precinct J area to gain an accurate understanding of the nature of the slopes identified as greater than 18º. The downhill slopes adjacent to the Precinct J development area ranged between 16º and 22º, with an average of 20º.

2.5 Significant Environmental Features

The Ecological Constraints Assessment conducted and prepared by JWA (2006) included a desktop investigation and detailed site investigations. A number of significant environmental features were identified by JWA (2006), including threatened flora and fauna species and high quality habitat for a number of species as outlined below.

- Sixteen (16) flora species and one (1) threatened fauna species within the project area classified as threatened under the *Threatened Species Conservation Act (TSC Act 1995)* and the *Environmental Protection and Biodiversity Conservation Act (EPBC Act1999*).

- Seven (7) Rare or Threatened Australian Plant (ROTAP) species were identified by JWA (2006) as occurring within the project area.
- Six (6) vegetation communities were identified as occurring within the project area, one of which is classed as *endangered* under the Forest Ecosystem Classification (NPWS 1999).
- No Endangered Ecological Communities (EECs) were recorded on the site by JWA (2006) however, it is noted that Lowland Rainforest communities are listed as an EEC by the NSW Scientific Committee. Field investigations by JWA (2006) determined that the rainforest community occurring within the project area is significantly degraded by invasive species and does not adequately represent this EEC.
- Database searches (NPWS) recorded six (6) threatened fauna species that are likely to occur on the site and a further eleven (11) that are considered as possible occurrences due to suitable habitat being present within the project area.

JWA (2006) also provides an assessment of the impact of the proposed *RISE* development, including consideration of the requirements for establishment of Asset Protection Zones for bush fire hazard management purposes, on threatened species and ecological communities. The outcome of the JWA (2006) assessment is that the proposed *RISE* development would not have a significant or otherwise unacceptable impact on any threatened species or ecological communities and JWA are currently updating their Threatened Species Assessment as part of the MP08-0234 application and the outcome of the new JWA report is expected to be the same.

3. BUSH FIRE PROTECTION MEASURES

The "*Planning for Bush Fire Protection: A Guide for Councils, Planners, Fire Authorities and Developers 2006*" ("PBP Guideline") has been developed by the NSW Rural Fire Service and replaces the 2001 Guideline. The PBP Guideline and Australian Standard AS3959-1999 Construction in Bush Fire Prone Areas and the Building Code of Australia identify the performance criteria that are of relevance to development in bush fire prone areas.

The PBP Guideline 2006 provides for the necessary planning considerations where development sites are in close proximity to bush fire hazard areas. The PBP Guideline requires that mitigation measures are implemented on sites mapped as bush fire prone.

The PBP Guideline 2006 identifies key bush fire protection measures that are of particular relevance to the assessment of development applications, including:

1. the provision of clear separation of buildings and bush fire hazards, in the form of fuel- reduced Asset Protection Zones;
2. building construction standards and design;
3. appropriate access standards for residents, fire fighters, emergency service workers and those involved in evacuation;
4. adequate water supply and pressure;
5. emergency management arrangements for fire protection and/or evacuation; and
6. suitable landscaping, to limit fire spreading to a building.

3.1 Asset Protection Zones

The PBP Guideline's requirement for Asset Protection Zones (APZs) to be established as part of the *RISE* development is to provide *sufficient space and maintenance of fuel loads, so as to ensure radiant heat levels at buildings are below critical limits and to prevent direct flame contact with a building*.

An APZ ensures that buildings are separated from hazardous vegetation and minimises the presence of bush fire fuels, thereby reducing the potential for impacts from direct flame contact, radiant heat and ember attack. The PBP Guideline's APZ standards are designed to ensure that future buildings can conform to the deemed-to-satisfy arrangements under the BCA that being the provisions for Level 3 construction of AS 3959.

The establishment and maintenance of an effective APZ usually requires that existing vegetation is selectively cleared and maintained to reduce fuel levels and the ability for the vegetation convey fire. Landscaping and maintenance plans for APZs also need to be of an appropriate design to ensure the effectiveness of the APZ is not compromised.

3.1.1 APZ Width Requirements

The RFS has developed an on-line APZ Calculator that is designed to determining the width of Asset Protection Zone (APZ) required by a development for either Residential Subdivision Purposes or Special Fire Protection Purposes in bush fire prone areas. The required APZ is calculated for Level 3 construction (at the interface), thus minimising APZ, maximizing lot yield and minimising habitat destruction. The RFS's online Asset Protection Zone Calculator was used to determine the nature of APZs required in respect of the Residential and Special Fire Protection Purposes components of the *RISE* development. The results of these analyses are presented in Table 2.

Table 2 Recommended APZ Requirements for Specified Land Uses

Vegetation Structure / Effective Slope	Recommended Asset Protection Zone Width	
	Residential	SFPP
Rainforest Areas		
Up slope 15º	**3**	**14**
Level	7	27
Down slope 5º	9	34
Down slope 10º	12	**42**
Down slope 15º	**15**	**52**
Down slope 18º	18	58
Down slope 20º	**21**	**62**
Down slope > 20º	**Out of scope**	**Out of scope**
Forest Areas		
Up slope 15º	8	31
Level	17	54
Down slope 5º	22	64
Down slope 10º	**28**	76
Down slope 15º	**38**	**91**
Down slope 18º	46	100
Down slope 20º	53	100
Down slope > 20º	**Out of scope**	Out of scope
Urban Development Areas		
All slope	**APZ not required**	

Note: Shaded cells represent combinations of vegetation types on slopes that occur within and adjacent to the *RISE* development site.

The general locations of the required APZs, which have been calculated based on the assumption that cleared land external to the site may become reforested overtime, are illustrated in Figure 4.

As noted in Table 2 and illustrated in Figure 4, in some areas there are no recommended APZ specifications due to the presence of slopes in excess of 20º. The PBP Guideline 2006 does not provide recommended APZ widths for land with slopes in excess of 18º (it is noted that the Online APZ Calculator provides an APZ width for slopes up to 20º), primarily due to concerns regarding:

- the practicality, costs and environmental effects of establishing and maintaining APZs on steep land, particularly when the APZs are located on land transferred to public ownership as part of a development; and

- the canopy fuels in forests and woodlands are more readily available to a fire, significantly reducing the advantage of having an APZ particularly in situations where the assets are surrounded by hazardous vegetation.

In areas where APZs are required or proposed on slopes in excess of 18º, the PBP Guideline indicates that where it can be demonstrated that these issues can be effectively managed, APZs on steeper slopes will be considered as an exceptional circumstance. In this respect it is considered that relevant circumstances exist that may enable the establishment of APZs on slopes in excess of 18º, these being:

1. the *RISE* development is based on a "body corporate" model, and as such there will be no financial or resource burdens placed on Council to establish or maintain the APZs or any other bush fire protection measures;
2. the vegetation on steep slopes within and adjacent to the *RISE* development is comprised primarily of rainforest, which is one of the least hazardous vegetation types from a bush fire perspective; and
3. the individual patches of potentially hazardous vegetation that occur within and adjacent to the *RISE* development are relatively small (i.e. <50 ha), which substantially reduces the potential for severe fires and the crowning of fires.

Notwithstanding the above, detailed Bush Fire Management Plans should be prepared for areas where APZs are required on slopes in excess of 18º, demonstrating the constraints of locating APZs on steep slopes can be effectively managed for the life of the development.

An assessment of the degree of compliance that the *RISE* development achieves with the PBP Guideline APZ Performance Criteria for Residential, Rural Residential Subdivisions and Special Fire Protection Purposes is provided in Appendix B.

3.1.2 APZ Landscaping and Maintenance Requirements

The *RISE* development is proposed to be managed under a Body Corporate arrangement where the majority of the Asset Protection Zones will be within the Body Corporate Area. The design and maintenance of any landscaping within the APZ should include the following strategies:

- selective clearance of all understorey vegetation (shrubs and small trees);
- selective clearance of canopy trees to reduce canopy cover to less than 15% and to ensure vegetation does not provide a continuous path to assets;
- control noxious and environmental weeds within the APZ;
- provision of vegetation plantings in clumps rather than continuous rows;
- removal of lower tree branches up to a height of 2 metres;
- landscape planting to be setback from assets to exclude ignition via direct flame contact of radiant heat emission (i.e. > 10 m);
- maintenance of short green grass or flame proof pathways directly around assets;
- use of low flammability plants (e.g. rainforest species) and non flammable ground covers such as pebbles; and
- avoid flammable fencing, wooden sheds, organic mulches and edge treatments.

As a part of the Body Corporate Maintenance Schedule, an APZ Fuel Management and Monitoring Program should be prepared in accordance with the requirements of *Standards for Asset Protection Zones* prepared by NSW Rural Fire Service. An APZ maintenance

program that makes reference to the RFS's publication *Standards for Asset Protection Zones*, should also be prepared and implemented by the Body Corporate.

3.1.3 Establishment of Easements for External APZs

As illustrated in Figure 4a-c and Figure 5a-c, the standard APZ requirements cannot be completely met within the boundaries of the *RISE* development site for the following land use elements: the proposed Nursing Home, parts of the Residential and Hillside Residential precincts, and the Private School. Some of the APZs for the *RISE* Stage 1 development will also extend into the *RISE* Stage 2 development area.

The RFS will generally not approve the subdivision of land for a residential purpose when the building footprint is unable to meet the necessary APZ setbacks within the site boundaries unless relevant exceptional circumstances exist.

The RFS will also require that appropriate measures are proposed to ensure the maintenance of APZs over the life of the development, including provision for a levy on property owners to fund ongoing maintenance, body corporate or community title schemes and positive covenants (under s.88B of the *Conveyancing Act 1919*) at the development stage. The terms of the easements must be adequate to secure the required APZ, and meet the general terms of the RFS easement principles detailed in the RFS *Development Control Note 02 Establishment of Easements for the purposes of Asset Protection Zones (DCN 02)*.

The APZ principles identified in DCN 02 include:

- lots must first be assessed to determine the capability for providing the required APZ width within the boundaries;
- easements will only be considered where the most exceptional circumstances test has been proven;
- identification of a building line or building footprint as part of the information supplied; and
- easements on land awaiting further residential type development (e.g. staged development strategies) should contain no more than 50% of the required APZ for the land being developed.

The owner of the land that has benefited from the establishment of the easement is responsible for the maintenance of the APZ, to ensure compliance with the standards for APZs identified by the RFS. The easement must contain provisions that provide a legal responsibility for the costs associated with maintaining the APZ be borne by the benefitting party.

DCN 02 outlines the criteria for the exceptional circumstances test of easements for APZs on adjoining lands. Relevant exceptional circumstances that apply to the *RISE* Stage 1 development include the application for an easement on adjoining lands where a development would normally be declined due to inadequate APZs on the land to be developed and where it can be demonstrated that there is a strong likelihood of the adjoining land being developed for future residential or other compatible purposes, including staged development or Urban Development Program or Strategies with supporting development control plans.

As noted previously the standard APZs required for the proposed Nursing Home, parts of the Residential and Hillside Residential precincts and Private School cannot be wholly contained within the site boundaries. The locations and extents of areas where the APZs extend into adjoining land external to the RISE Stage 1 development site are illustrated in

Figure 5a-c. In respect of whether or not this fact prevents achievement of an appropriate level of bush fire protection, it is relevant to consider the following.

1. **Nursing Home**: it is considered that the partial inclusion of external land into the APZ for the proposed Nursing Home would not compromise bush fire hazard management due to the facts that:
    a. the closest area of hazardous vegetation to the proposed nursing home site is a patch of rainforest vegetation located approximately 50 metres from the proposed building envelope location;
    b. a number of existing dwellings, and associated APZs, are located on adjacent land situated between the potentially hazardous vegetation and the proposed nursing home site;
    c. a formed roadway (McAlisters Road) is located between the potentially hazardous vegetation and the proposed Nursing Home site;
    d. within the nursing home site, it would be possible to establish an internal APZ, approximately 25 m in width, between the site boundary and the proposed building envelope location; and
    e. the subject area of adjoining land is primarily cleared land, has a Residential (Urban Expansion) designation under the Tweed LEP, and as the adjoining land is developed for residential purposes the requirement for an APZ in the locality would become redundant.

2. **Private School**: it is considered that the partial inclusion of external land into the APZ for the proposed Private School would not compromise bush fire hazard management due to the facts that:
    a. the area immediately surrounding the Private School site is not mapped as Bush Fire Prone Land (refer Figure 3);
    b. the closest area of hazardous vegetation to the proposed private school is mapped as rainforest vegetation and is located approximately 130 metres from the southernmost building within the private school site;
    c. the existing vegetation within the proposed APZ area is a managed plantation area, which is considered to be a reduced vegetation area pursuant to the PBP Guideline 2006;
    d. the adjoining property has an Environmental (Scenic/Escarpment) designation pursuant to the Tweed Shire LEP and the existing land use is for agricultural purposes (i.e. crop growing);
    e. the adjoining property is in private ownership and is unlikely to be transferred to government ownership as a conservation reserve or public land and as such it is expected that the existing agricultural land use will continue and the managed vegetation type will dominate on this adjoining property;
    f. the building footprint depicted on the Concept Precinct and Staging Plan presented in Appendix A provides for a setback of approximately 60 metres from the site boundary;
    g. the majority of the APZ can be accommodated within the boundary of the Private School site; and
    h. the provision of the APZ on the adjoining property will not require the clearance of any native vegetation communities.

3. **Residential and Hillside Residential precincts**: it is considered that the partial inclusion of external land into the APZ for the proposed Residential and Hillside Residential precincts would not compromise bush fire hazard management due to the facts that:
    a. the APZ will be provided partially within the Stage 2 *RISE* development area, which part of the RISE site and is currently under the same ownership as the Stage 1 development area and the owner of the site has a high degree of control over that land proposed to contain the APZ;
    b. the APZ will be provided partially on the neighbouring property, which is in private ownership and is currently cleared, managed lands;
    c. the subject area of adjoining land has a Residential (Urban Expansion) designation under the Tweed LEP, and as the adjoining land is developed for residential purposes the requirement for an APZ in the locality would become redundant; and
    d. the provision of the APZ on the adjoining property will not require the clearance of any native vegetation communities.

The locations of the areas where APZs extend outside of the Stage 1 RISE development site and which will need to be secured by way of an Easement are depicted on Figure 5a-c.

Detailed Bush Fire Management Plans should be prepared for areas where APZs are proposed to be located on adjoining lands, demonstrating the APZs can be maintained effectively during the transition period between Stage 1 and Stage 2 and for the life of the *RISE* development.

If it is not possible to establish Easements over these external APZ areas or if investigations carried out in the preparation of the detailed Bush Fire Management Plans indicate that the external APZs can not be adequately maintained, then it would be necessary for the internal development layout and/or the nature of the proposed uses to be modified.

3.2 Building Construction Standards

Pursuant to the PBP Guideline, preliminary consideration of construction levels is necessary at DA stage to ensure that reasonable building requirements (and costs) are achievable following residential and rural/ residential subdivision.

The RFS has developed an on-line Bush fire Attack Assessor that is designed to determine the level of bush fire attack to which a development might be exposed and therefore the construction level required for the development to compensate this level of attack in bush fire prone areas. The RFS's Bush fire Attack Assessor was used to determine the building construction standards that would be required for the Residential and Special Fire Protection Purposes components of the *RISE* development in the presence of proposed APZs. The results of this analysis are presented in Table 3.

Table 3 Minimum APZ Width Requirements for Specified Construction Levels

Vegetation Structure / Slope	Specified Construction Level			
	Level 3	Level 2	Level 1	None
Rainforest Areas	**Minimum Asset Protection Zone Width (m)**			
Up slope 15º	5	7	10	> 50
Down slope 10º	12	20	30	> 50
Down slope 15º	20	25	35	> 50
Down slope 20º	25	30	45	> 50
Down slope > 20º	> 25	> 30	> 45	> 50
Forest Areas				
Down slope 10º	30	40	55	> 100
Down slope 15º	40	50	65	> 100
Down slope > 20º	> 55	> 65	> 80	> 100

The majority of buildings to be established in the *RISE* development do not need to be built to any specific construction level to achieve a satisfactory bush fire protection outcome. However buildings which are located adjacent to retained areas of vegetation will generally require a Level 3 building construction level. The precise building construction levels and design that are required for individual buildings will need to be reviewed at the time that detailed subdivision and building plans are being prepared and approvals sought.

3.3 Access

The PBP Guideline's requirement for Public Roads to be established as part of the *RISE* development is the provision of *safe operational access to structures and water supply for emergency services, whilst residents are seeking to evacuate from an area*. The proposed layout of the public road network for the *RISE* development makes provisions to:

- facilitate safe access to fire fighters;
- provide safe retreat routes; and
- provide clear control lines for hazard reduction and back burning purposes.

In most instances perimeter roads are located between the proposed residential areas and potentially hazardous vegetation located within or adjacent to the *RISE* development site. Multiple access to the *RISE* development is provided via Cobaki Road and Marana Street, with provision also made for future roadway access to external Urban Expansion areas to the central-north of the *RISE* development site. All proposed public roads will be constructed to a two-way, two-wheel drive, all weather standard. A number of cul-de-sac roads are proposed within the internal sectors of the *RISE* development, and the majority of the cul-de-sac roads are linked with laneways to provide an alternative ingress/egress if required.

The *RISE* development does not propose any extensive reliance on the establishment and maintenance of fire trails, due to the fact that the majority of the APZs can be directly accessed from public roadways. Where access to APZs can not be obtained from public roadways fire trials will be established in accordance with the PBP Guideline standards. The development's body corporate will be responsible for the maintenance of any fire trails that are established and where appropriate fire trails will also serve a dual function as pedestrian/cycle pathways. In most instances the need for fire trails will disappear once identified urban land to the central north of the site is developed.

Further details regarding the road layout and provision of access will be provided at the detailed design stage. The final road layout and design will need to make appropriate provisions to ensure that the requirements of the PBP Guideline have been achieved.

An assessment of the degree of compliance that the *RISE* development achieves with the PBP Guideline Access Performance Criteria for Residential, Rural Residential Subdivisions and Special Fire Protection Purposes is provided in Appendix B.

3.4 Services

The PBP Guideline's requirement for Services (water, electricity and gas) to be established as part of the *RISE* development is to provide *adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building*.

The *RISE* development will be serviced by a reticulated water supply and underground electricity and potentially reticulated gas services. The services to be established as part of the *RISE* development will be designed and will have the capacity to meet the requirements of the PBP Guidelines for residential and SFPP developments.

An assessment of the degree of compliance that the *RISE* development achieves with the PBP Guideline Services Performance Criteria for Residential, Rural Residential Subdivisions and Special Fire Protection Purposes is provided in Appendix B.

3.5 Emergency and Evacuation Planning

The PBP Guideline's requirements for Emergency and Evacuation Planning for SFPP developments is relevant to the *RISE* development and is intended to ensure that *suitable emergency and evacuation (and relocation) arrangements for occupants of special fire protection purpose developments* are provided. In this respect it is recognised that relevant Emergency and Evacuation Management Plans will need to be prepared, to the satisfaction of the relevant fire authority for the area, by future operators of the following SFPP developments that are catered for in the *RISE* development land use plan:

- a Private School, located in the south-east of the site;
- a nursing home, located in the north-east of the site; and
- a hotel, located centrally within the site.

3.6 Detailed Bush Fire Management Plans

Detailed Bush Fire Management Plans should be prepared at the Development Application stage for each relevant precinct for areas where APZs:

- are required on slopes in excess of 18º; or
- cannot be wholly contained within the site boundary and easements are to be established.

3.6.1 APZs on Steep Slopes

The Detailed Bush Fire Management Plans must demonstrate that the issues associated with locating APZs on steep slopes and on adjoining lands can be effectively managed for the life of the development. For example Precinct J, located in the southern sector of the site, occurs on and adjacent to slopes ranging from 16º - 22º and supporting rainforest

vegetation. Within Precinct J it is proposed to establish a number of two and three storey townhouses and the provision of APZs to protect these town houses will require the establishment and maintenance of APZs on slopes ranging from 16º - 22º. As noted in Section 3.1, the PBP Guideline does not support the locating of APZs on slope in excess of 18º other than for exceptional circumstances where it can be demonstrated that:

- suitable management practices can be implemented on site, demonstrating that slope constraints can be overcome;
- the environmental consequences of clearing on such slopes such as landslip, slump, erosion and landslide are suitably managed; and
- the availability of canopy fuels does not significantly reduce the advantage of having an APZ (i.e. the potential for crown fires is negated).

The Detailed Bush Fire Management Plans, for Precinct J and any other areas where APZs are required on slopes in excess of 18º, must demonstrate that the following issues can be satisfactorily addressed.

1. **Land Stability** - which will require:
   - a geotechnical slope assessment to determine the risk associated with the clearing of vegetation within the APZs;
   - engineering designs and details to demonstrate that any geotechnical issues associated with slippage, erosion, slumping and landslide will be manageable for the life of the development;
   - drainage design details to demonstrate that stormwater runoff to and across batters will be managed to prevent bank destabilisation; and
   - details of batter stabilisation techniques that are intended to ensure the hazard of landslide is mitigated.
2. **Ecological** - whilst the ecological implications of the establishment of APZs is not the subject of this assessment, it is noted that in some instances the provision of APZs on slopes in excess of 18º may involve the clearance of vegetation identified as being analogous to an Endangered Ecological Community (JWA, 2006 which is currently being updated, specifically for Precinct J). Where relevant the Detailed Bush Fire Management Plan will be required to include provisions addressing the management of species and ecosystems protected under the provisions of the *TSC Act 1999*.
3. **Access** - in respect of Precinct J, the *RISE* Precinct and Staging Plan makes provision for two formal access/egress roads linking the proposed town house sites to the main *RISE* road network. The design of both of these roads must be in accordance with AS2890.2-2002 and demonstrate compliance with the performance criteria and acceptable solutions outlined in Chapter 4 of the *PBP Guideline*.
4. **Building design and construction standards** - The construction level and building design elements intended in areas where the associated APZ is to be located on slopes in excess of 18º will be required. The minimum construction level standards are to be determined in accordance with the *PBP Guideline* methodology for determination of category of bush fire attack in relation to the construction levels required under AS3959-1999. A specific determination will be required at Development Application stage for the relevant precincts for each building as to its relevant category of bush fire attack, including consideration of whether the building will be located within the Flame Zone and therefore require a specific performance based assessment.
5. **Ongoing maintenance of APZs on steep slopes** - a maintenance strategy for the life of the development that demonstrates the APZs on slopes in excess of 18º can

be maintained for the life of the development in accordance with the standards outlined in the Rural Fire Service's *Standards for Asset Protection Zones*.

6. **Emergency and evacuation planning** - documentation of the emergency and evacuation (and relocation) arrangements for occupants of the buildings relying upon the APZs situated on excessive slopes or land outside of the development site must be provided.

3.6.2 APZs on External Land

The Detailed Bush Fire Management Plans, for any areas where APZs are to be located partially on adjoining lands, must demonstrate that the following issues can be satisfactorily addressed.

1. **APZ Standards** - The Detailed Bush Fire Management Plan must identify the required APZ standards, to ensure the APZ is provided in accordance with the standards outlined in the Rural Fire Service's *Standards for Asset Protection Zones.*
2. **Monitoring and maintenance** - Detailed Bush Fire Management Plans must provide a monitoring maintenance strategy for the life of the development that demonstrates the APZs can be maintained for the life of the development in accordance with the standards outlined in the Rural Fire Service's *Standards for Asset Protection Zones*.
3. **Access** - Provision must be made for access to the APZ area to allow for maintenance and monitoring.

If the Detailed Bush Fire Management Plan indicates that the establishment of an APZ easement over adjoining land is not feasible, then it may be necessary to adjust the location or design of buildings proposed within a precinct.

4. CONCLUSIONS

This Bush Fire Assessment Report has been prepared in accordance with the Submission Requirements for DAs on bush fire prone land as set out in Appendix 4 of the NSW Rural Fire Service's Planning for Bush Fire Protection Guideline 2006 (PBP Guideline).

In summary, the conclusions of this report are as follows.

1. The proposed *RISE* development site contains and adjoins bush fire prone land as identified by Tweed Shire Council Overlay Mapping, and hence requires referral to the Rural Fire Service as part of the development assessment process. The bush fire planning requirements have been recognised in the current master plan design and will be dealt with in detail in the future development applications for the specific precincts of the project.
2. The *RISE* development is located on land that forms part of the Bilambil Heights Release Area, which is approximately 880 hectares in extent. The proposed *RISE* development is consistent with the land use intents specified for the site in the Tweed Shire Council's strategic planning documents.
3. The majority of the *RISE* development consists of standard residential land uses, however several components of the proposed development constitute Special Fire Protection Purposes (SFPP) land uses. SFPP land uses proposed as part of the *RISE* development include:
    - a Private School, located in the south-east of the site;
    - a nursing home located within the north-east of the site; and
    - a hotel, forming part of the Village Centre, located centrally within the east of the site.
4. In compliance with the requirements of the PBP Guideline, the *RISE* development makes generally appropriate provisions for a combination of bush fire protection measures, including:
    - the provision of clear separation of buildings and bush fire hazards, in the form of fuel- reduced Asset Protection Zones;
    - appropriate building construction standards and design;
    - appropriate access standards for residents, fire fighters, emergency service workers and those involved in evacuation;
    - adequate water supply and pressure;
    - emergency management arrangements for fire protection or evacuation; and
    - suitable landscaping, to limit fire spreading to a building.
5. Additional consideration of bush fire protection measures will be required during the preparation of detailed development plans and development approval applications to ensure that relevant bush fire protection outcomes are achieved for the *RISE* development.
6. Easements will need to be secured to accommodate some APZs which are unable to be located wholly within the *RISE* development site. The easement arrangements must contain provisions for the ongoing maintenance of the APZs to ensure compliance with the accepted standards for APZs. If, at the time of the individual Development Applications for specific precincts in *RISE,* the creation of easements on adjoining property is not possible then the location of the proposed buildings may need to be re-evaluated.
7. Detailed Bush Fire Management Plans should be prepared at the time of Development Applications for specific precincts in *RISE* for areas where APZs are required on slopes in excess of 18º and where APZs cannot be wholly contained

within the site boundary and easements are to be established. The Detailed Bush Fire Management Plans must demonstrate that the issues associated with locating APZs on steep slopes and on adjoining lands can be effectively managed for the life of the development.

5. BIBLIOGRAPHY

Tweed Shire Council – Tweed Local Environment Plan.

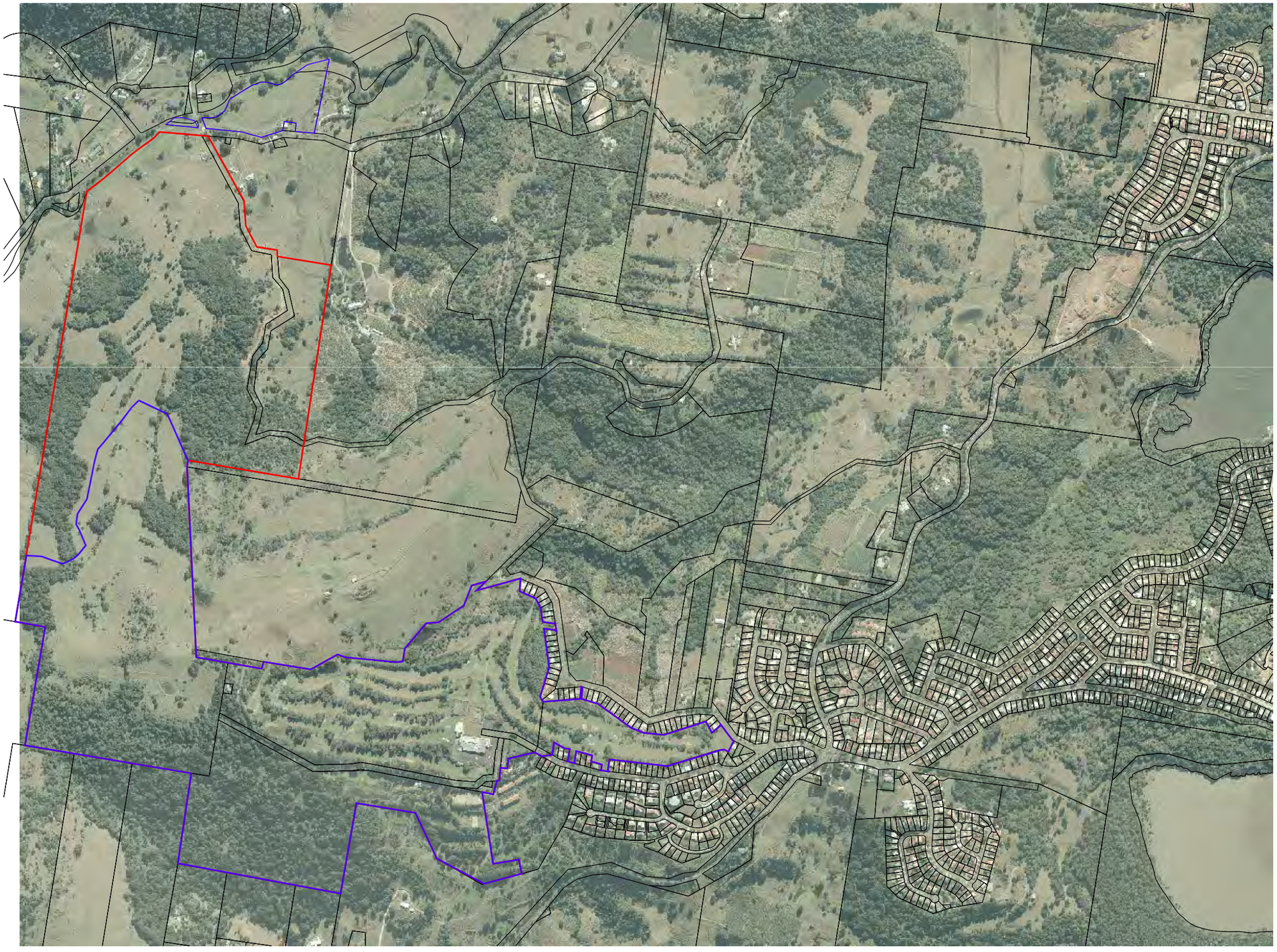
Tweed Shire Council – Tweed Vegetation Management Strategy.

James Warren & Associates (2006) – Ecological Constraints Assessment.

NSW Rural Fire Service (2006) - Planning for Bush Fire Protection: A Guide for Councils, Planners, Fire Authorities and Developers.

NSW Rural Fire Service (2004) – Development Control Note 02 Establishment of Easements for the Purposes of Asset Protection Zones.

FIGURES



N

LEGEND

- RISE Stage 1 Development Area
- Rise Stage 2 Development Area
- Cadastral Boundaries

125 0 125 250 375 500 625m
1:12,500

Rev: B. Date: 9 April 2009

Terranora Group Management

CAD FILE: I:\5100-38\ACAD\090319\510037 FIG1 -Aerial Photograph.dwg
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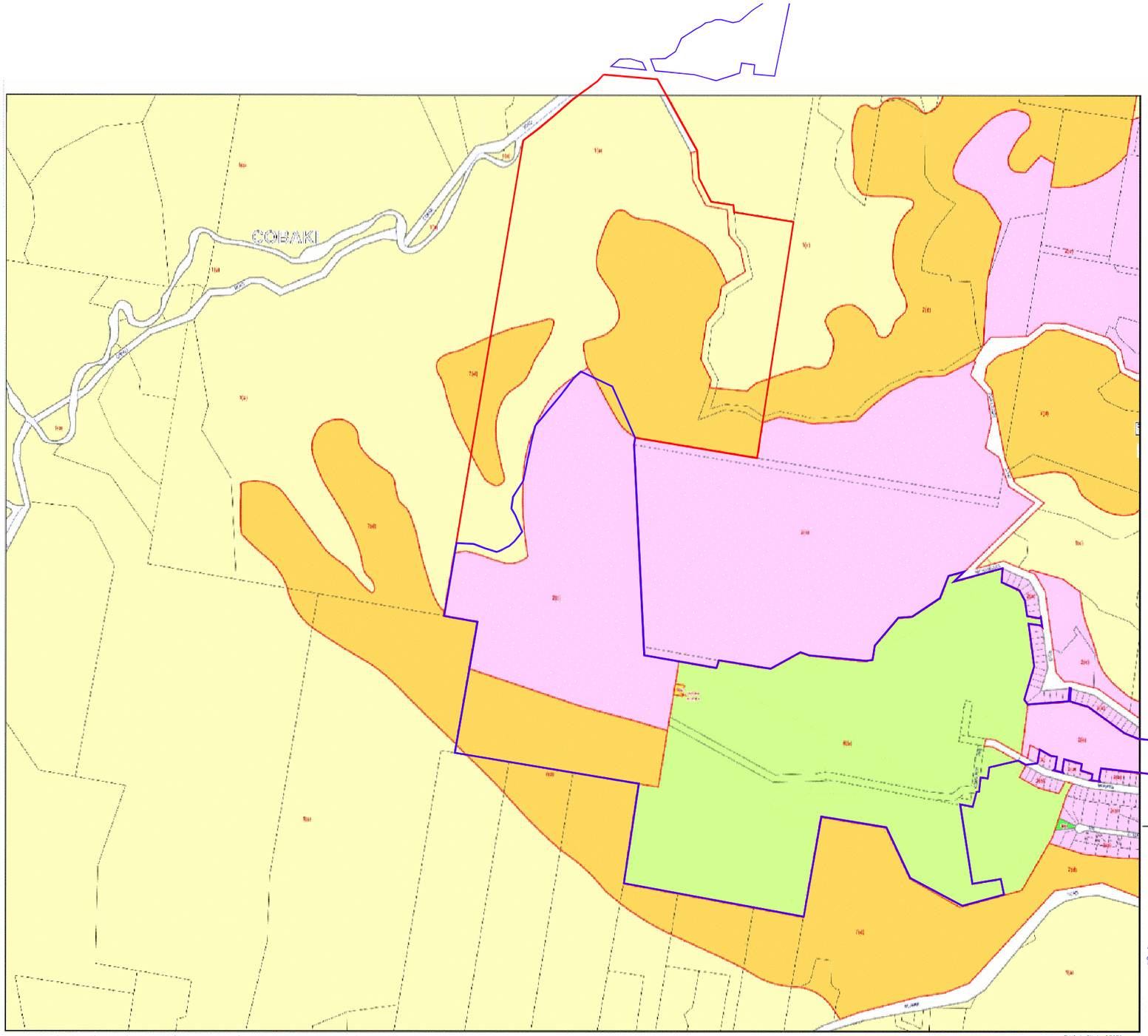
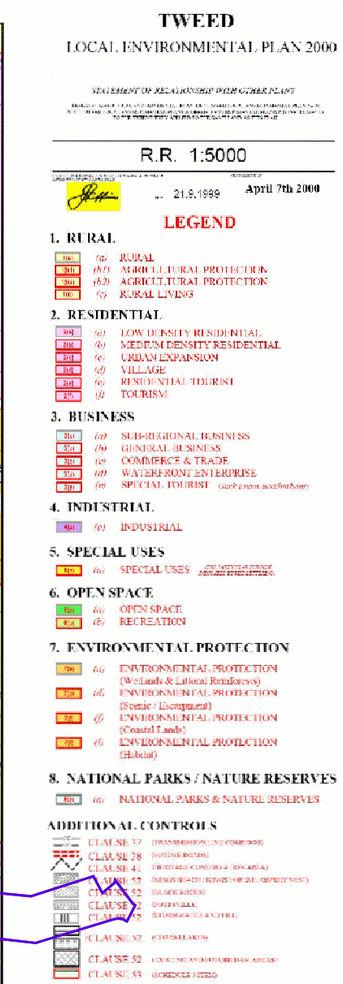
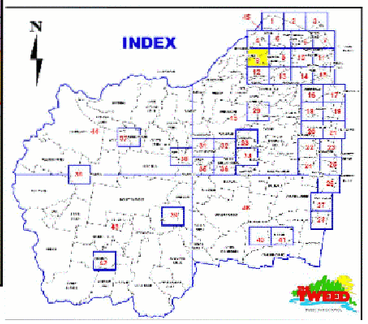
FIGURE 1 (Rev B)
AERIAL PHOTOGRAPH

Project No.: 510038

PRINT DATE: 09 April, 2009 - 2:30pm







N

LEGEND

RISE Stage 1 Development Area

RISE Stage 2 Development Area

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1:12,500

Scale 1:12,500 (A3)

FIGURE 2 (Rev B)
TWEED LOCAL ENVIRONMENTAL PLAN

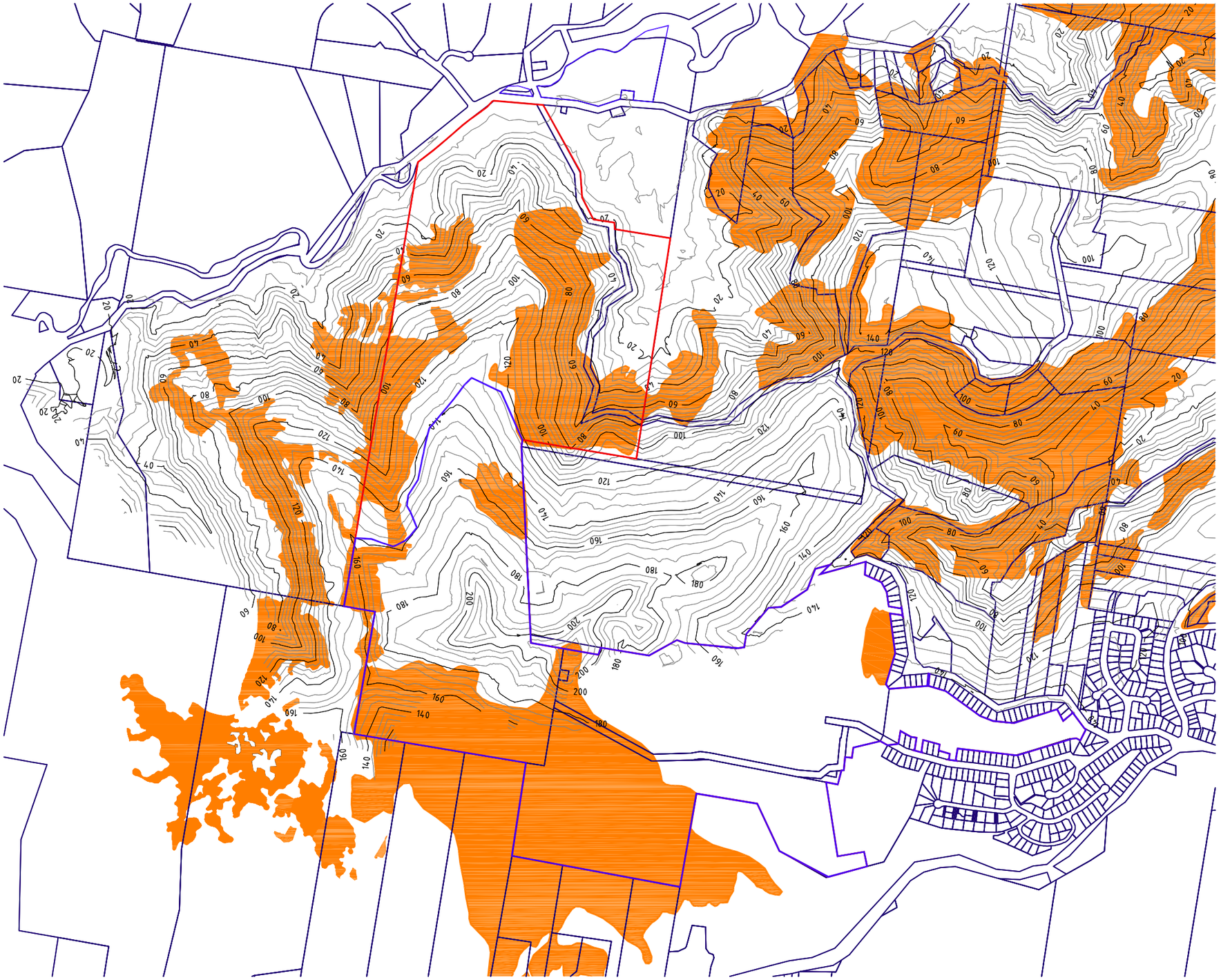
Rev: B. Date: 9 April 2009

Terranora Group Management

CAD FILE: I:\5100-38\ACAD\090319\510038 FIG2 - Tweed Local Environmental Plan.dwg
XREF's:

Project No.: 510038

PRINT DATE: 09 April, 2009 - 2:28pm



LEGEND

- RISE Stage 1 Development Area
- RISE Stage 2 Development Area
- Cadastral Boundaries
- Bushfire Prone Land

125 0 125 250 375 500 625m
1:12,500

Rev: A. Date: 9 April 2009

Terranora Group Management

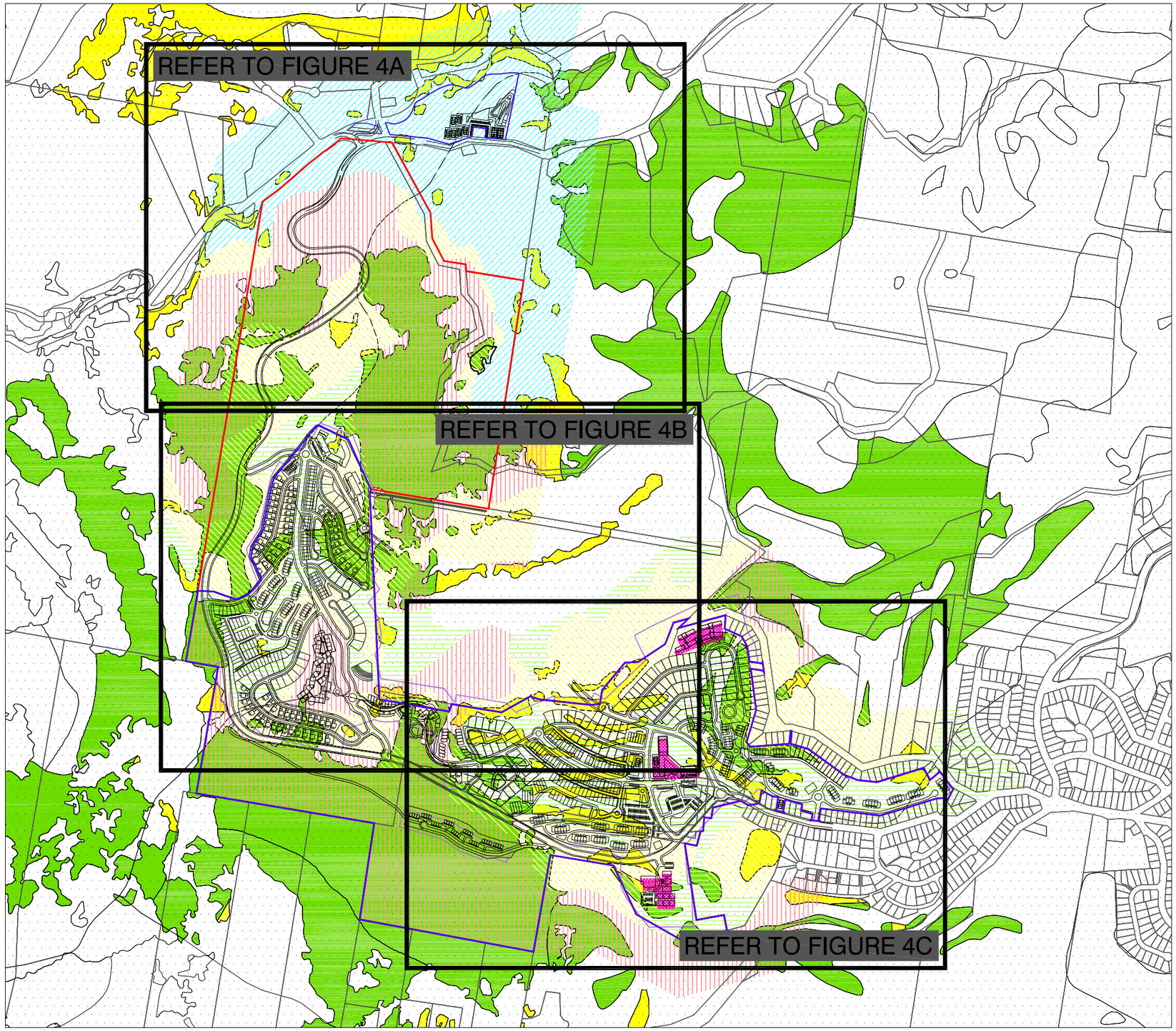
CAD FILE: I:\5100-38\ACAD\090319\510038 FIG3 - Bushfire Prone Land.dwg
XREF's: CADASTRAL; CONTOURS

Scale 1:12,500 (A3)

FIGURE 3 (Rev A)
BUSH FIRE PRONE LAND

Project No.: 510038

PRINT DATE: 09 April, 2009 - 2:24pm



LEGEND

VEGETATION TYPE

- Rainforest
  - Sub-tropical / Warm Temperate Rainforest on Bedrock Substrates (Code 102)
  - Camphor Laurel Dominant Closed to Open Forests (Code 1004)
- Forest
  - Not Assessed (Code 998)
- Cleared Grassland (Potential Revegetation Areas)

SLOPE

- Natural Surface Sloping <5 degrees
- Natural Surface Sloping 5-10 degrees
- Natural Surface Sloping 10 - 15 degrees
- Natural Surface Sloping 15 - 18 degrees
- Natural Surface Sloping >18 degrees

LAND USE

- Special Fire Protection Purposes
  - Private School
  - Hotel
  - Nursing Home
- Asset Protection Zone
- RISE Stage 1 Development Area
- RISE Stage 2 Development Area

Scale 1:12,500 (A3)

FIGURE 4 (Rev C)

BUSH FIRE ASSET PROTECTION ZONE PLAN

Rev: C. Date: 9 April 2009

Project No.: 510038

Terranora Group Management

CAD FILE: I:\S100-38\ACAD\090409\S10038 FIG4 - APZ Plan_v3.dwg

XREF's: TERR0001_A-MP-01-16(A) Master Plan; xr - Vegetation - forest and rainforest types_solid (2); TERR0001_A-MP-01-16(B) Master Plan; TERR0001_A-MP-01-16(B) Master Plan adapted to fit cadastral boundaries; CADASTRAL

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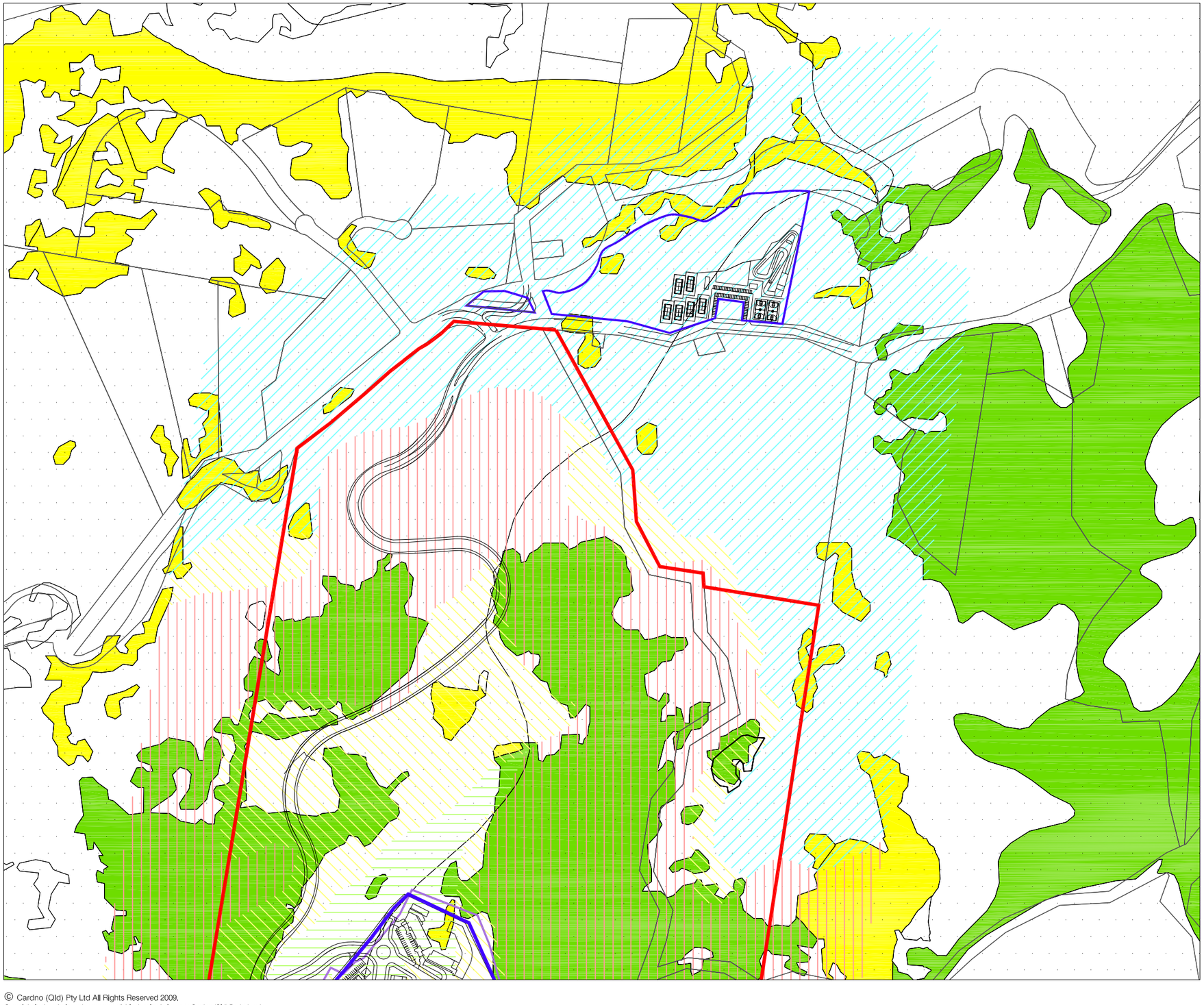

LEGEND

VEGETATION TYPE

- Rainforest
  - Sub-tropical / Warm Temperate Rainforest on Bedrock Substrates (Code 102)
  - Camphor Laurel Dominant Closed to Open Forests (Code 1004)
- Forest
  - Not Assessed (Code 998)
- Cleared Grassland (Potential Revegetation Areas)

SLOPE

- Natural Surface Sloping <5 degrees
- Natural Surface Sloping 5-10 degrees
- Natural Surface Sloping 10 - 15 degrees
- Natural Surface Sloping 15 - 18 degrees
- Natural Surface Sloping >18 degrees

LAND USE

- Special Fire Protection Purposes
  - Private School
  - Hotel
  - Nursing Home
- Asset Protection Zone
- RISE Stage 1 Development Area
- RISE Stage 2 Development Area

Scale 1:6000 (A3)

FIGURE 4A (Rev C)
BUSH FIRE ASSET PROTECTION ZONE PLAN

Rev: C. Date: 9 April 2009

Project No.: 510038

Terranora Group Management

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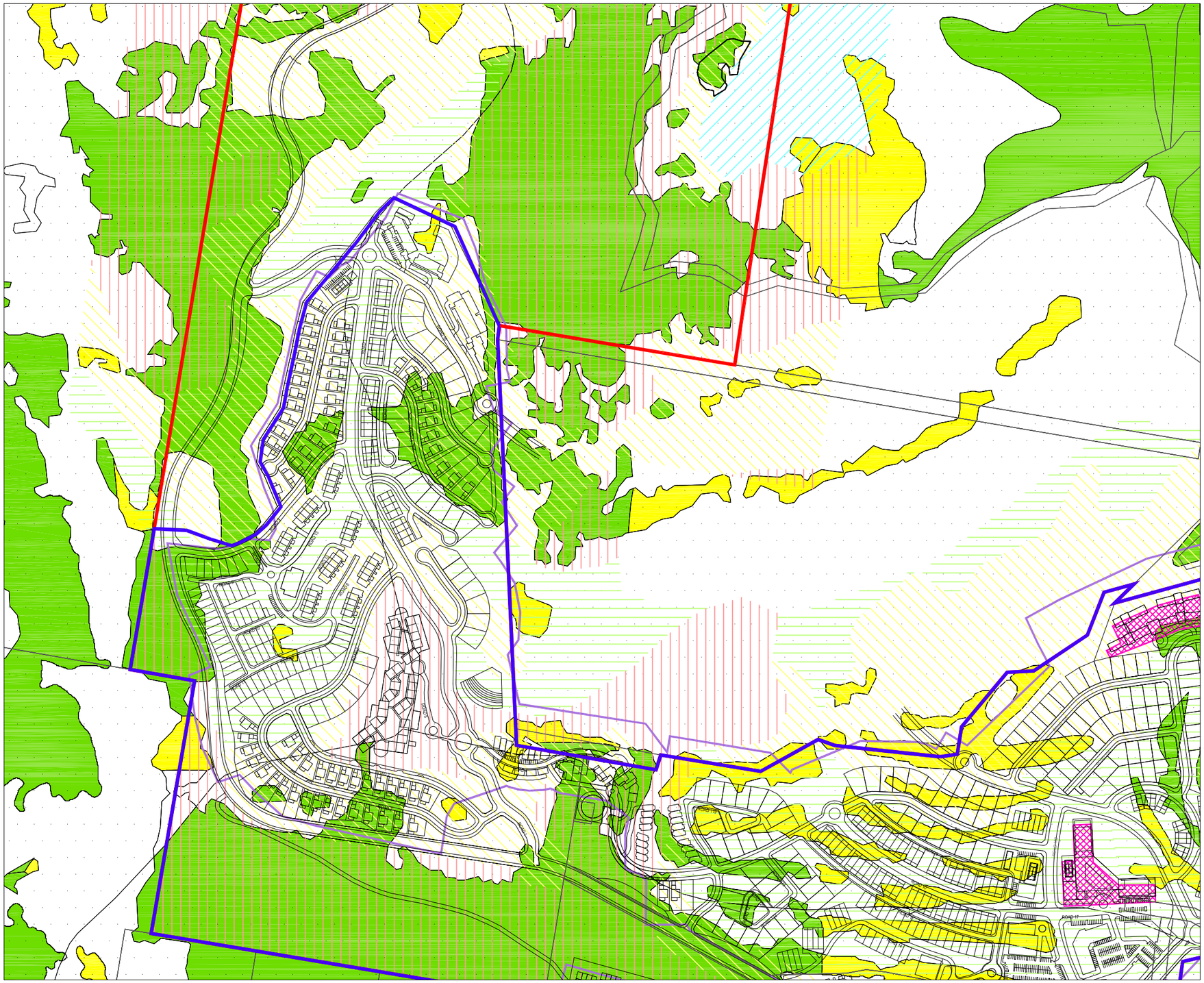

LEGEND

VEGETATION TYPE

- Rainforest
  - Sub-tropical / Warm Temperate Rainforest on Bedrock Substrates (Code 102)
  - Camphor Laurel Dominant Closed to Open Forests (Code 1004)
- Forest
  - Not Assessed (Code 998)
- Cleared Grassland (Potential Revegetation Areas)

SLOPE

- Natural Surface Sloping <5 degrees
- Natural Surface Sloping 5-10 degrees
- Natural Surface Sloping 10 - 15 degrees
- Natural Surface Sloping 15 - 18 degrees
- Natural Surface Sloping >18 degrees

LAND USE

- Special Fire Protection Purposes
  - Private School
  - Hotel
  - Nursing Home
- Asset Protection Zone
- RISE Stage 1 Development Area
- RISE Stage 2 Development Area

Scale 1:6000 (A3)

FIGURE 4B (Rev C)
BUSH FIRE ASSET PROTECTION ZONE PLAN

Rev: C. Date: 9 April 2009

Project No.: 510038

Terranora Group Management

CAD FILE: I:\5100-38\ACAD\090409\510038 FIG4 - APZ Plan_v3.dwg
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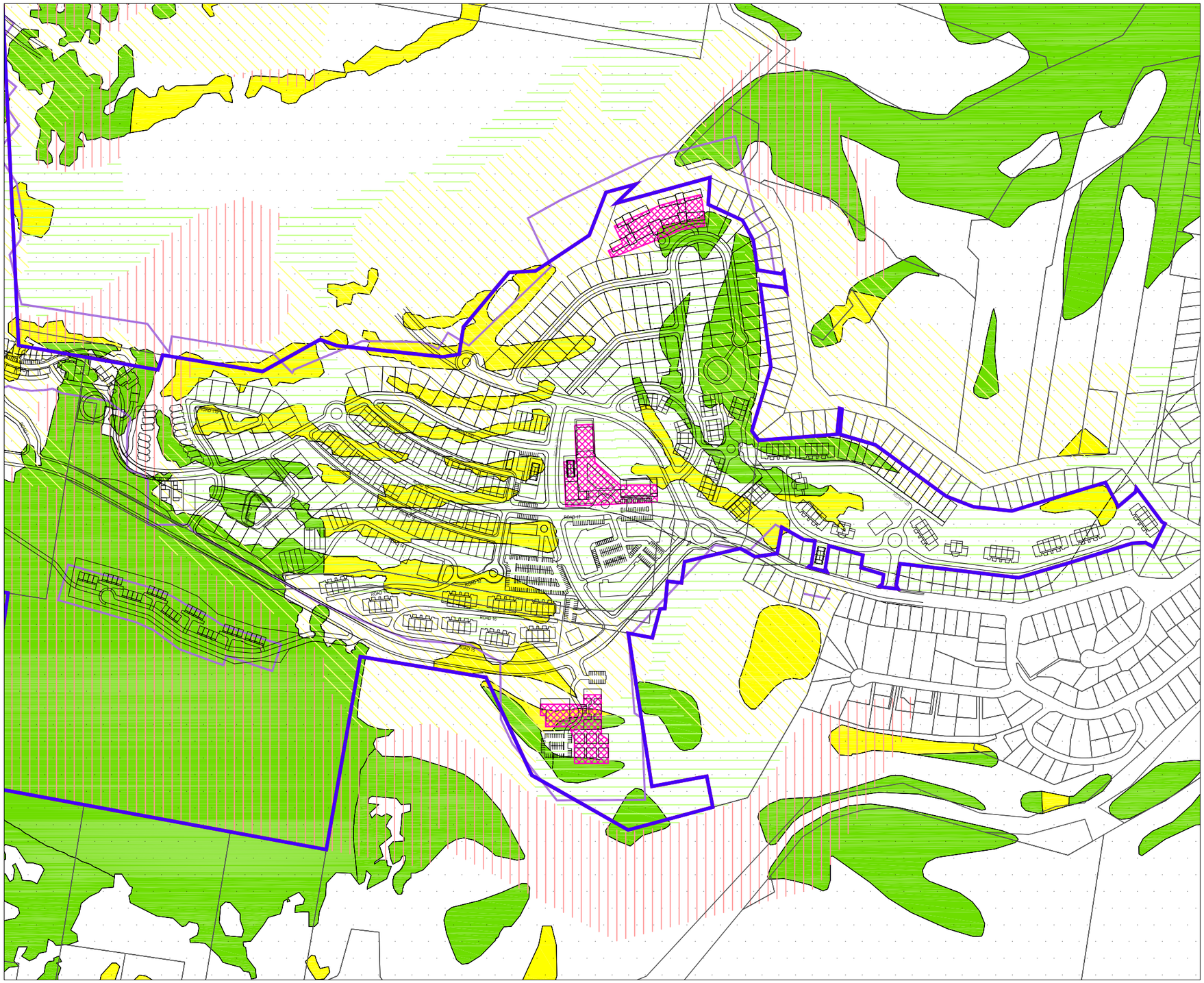

LEGEND

VEGETATION TYPE

- Rainforest
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  - Camphor Laurel Dominant Closed to Open Forests (Code 1004)
- Forest
  - Not Assessed (Code 998)
- Cleared Grassland (Potential Revegetation Areas)

SLOPE

- Natural Surface Sloping <5 degrees
- Natural Surface Sloping 5-10 degrees
- Natural Surface Sloping 10 - 15 degrees
- Natural Surface Sloping 15 - 18 degrees
- Natural Surface Sloping >18 degrees

LAND USE

- Special Fire Protection Purposes
  - Private School
  - Hotel
  - Nursing Home
- Asset Protection Zone
- RISE Stage 1 Development Area
- RISE Stage 2 Development Area

Scale 1:6000 (A3)

FIGURE 4C (Rev C)
BUSH FIRE ASSET PROTECTION ZONE PLAN

Rev: C. Date: 9 April 2009

Project No.: 510038

PRINT DATE: 09 April, 2009 - 2:22pm

Terranora Group Management

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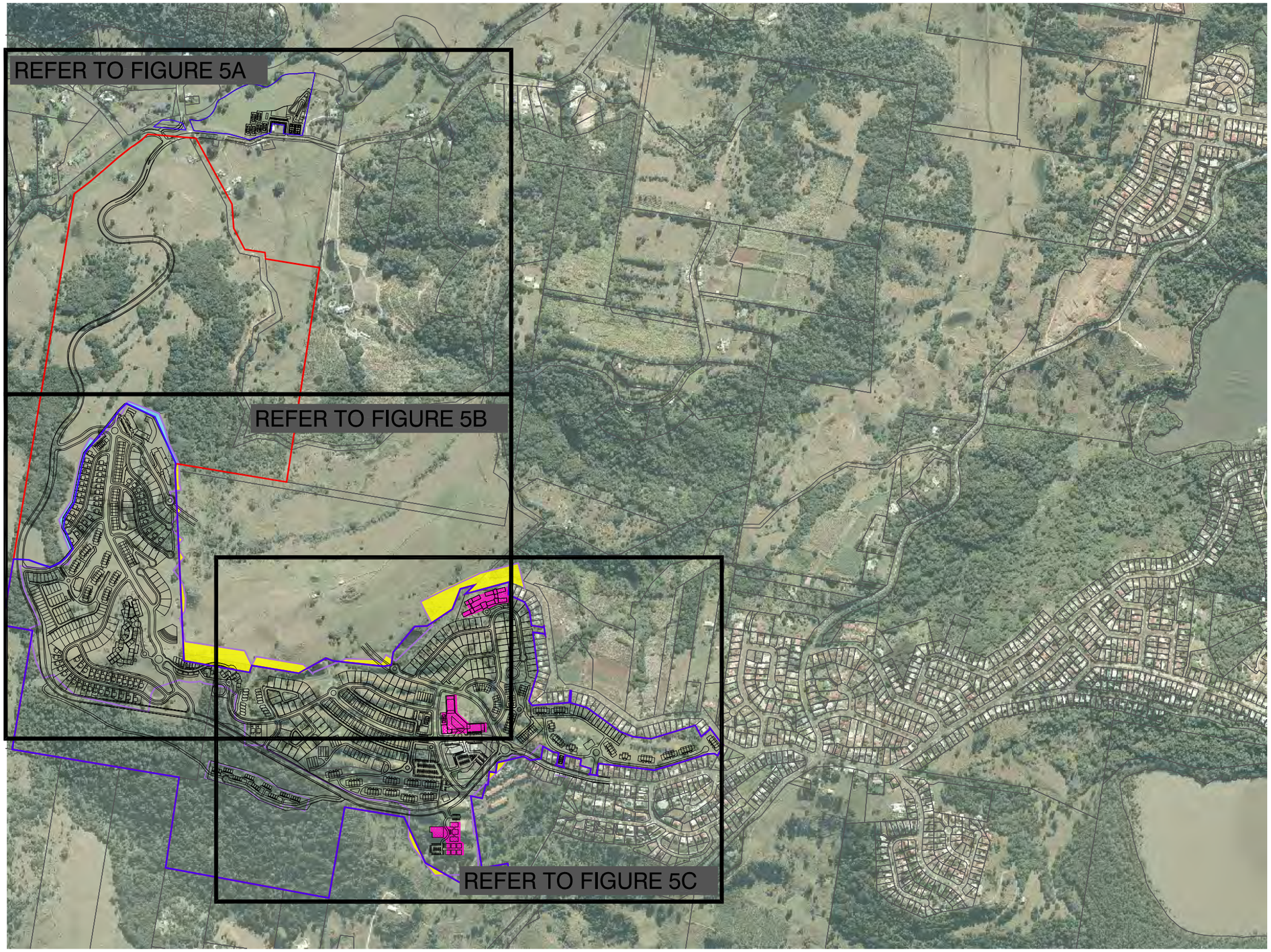

N

LEGEND

- RISE Stage 1 Development Boundary
- RISE Stage 2 Development Boundary
- External APZ Area

Areas where APZs are proposed on neighbouring lots.

- Stage 2 APZ Area

Areas where APZs are proposed on areas outside the Stage 1 boundary and within the Stage 2 area, proposed for future development

- Cadastral Boundaries
- Special Fire Protection Purposes (SFPP)
- General Residential APZ

125 0 125 250 375 500 625m
1:12,500

Scale 1:12,500 (A3)

FIGURE 5
ASSET PROTECTION ZONE LAYOUT PLAN

Rev: Date: 9 April 2009

Project No.: 510038

Terranora Group Management

CAD FILE: I:\5100-38\ACAD\090409\510038 FIG 5- APZ Layout Plan_v3.dwg
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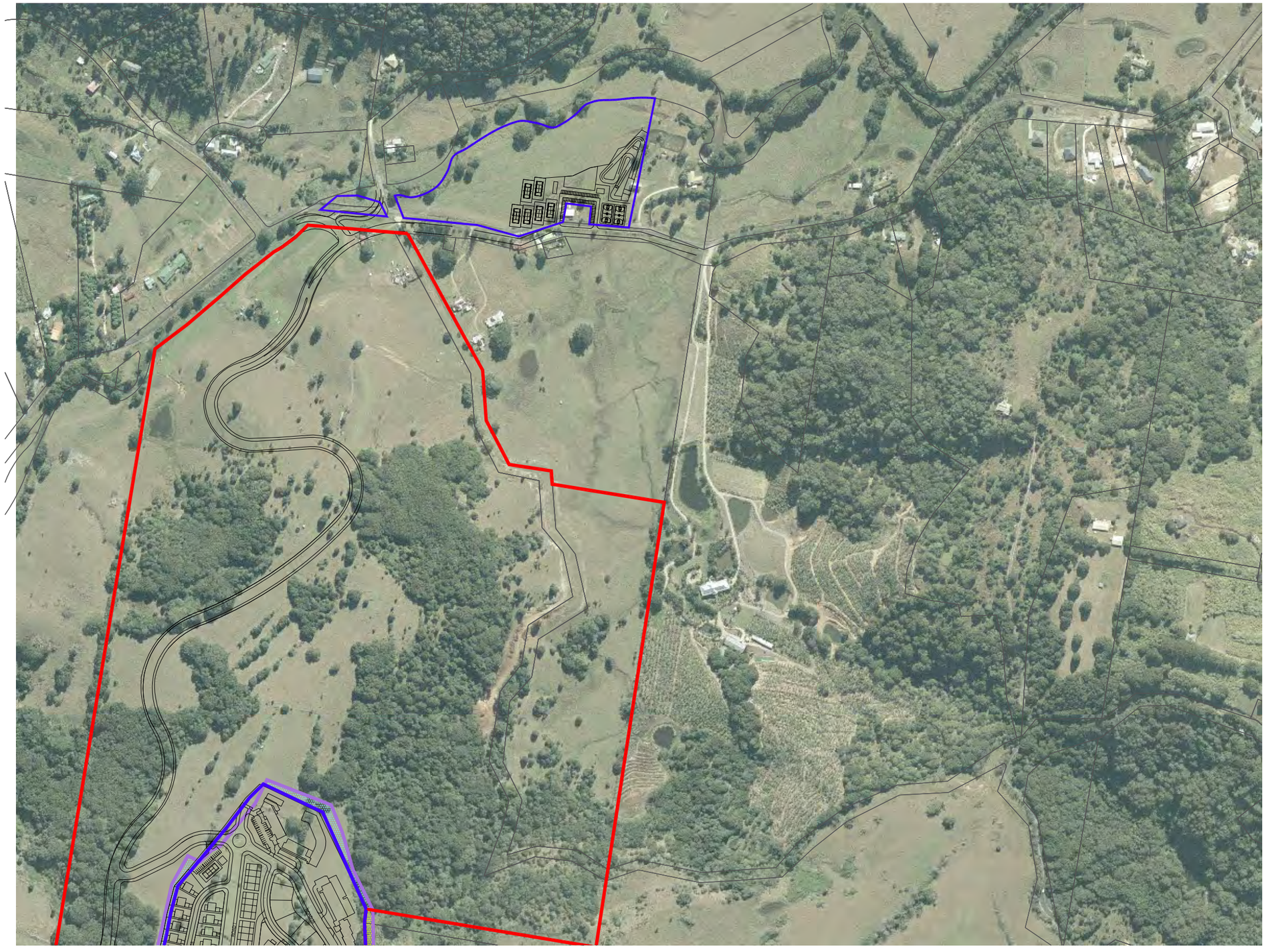

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LEGEND

- RISE Stage 1 Development Boundary
- RISE Stage 2 Development Boundary
- External APZ Area

Areas where APZs are proposed on neighbouring lots.

- Stage 2 APZ Area

Areas where APZs are proposed on areas outside the Stage 1 boundary and within the Stage 2 area, proposed for future development

- Cadastral Boundaries
- Special Fire Protection Purposes (SFPP)
- General Residential APZ

60 0 60 120 180 240 300m
1:6000

Scale 1:6000 (A3)

FIGURE 5A
ASSET PROTECTION ZONE LAYOUT PLAN

Rev: Date: 9 April 2009

Project No.: 510038

Terranora Group Management

CAD FILE: I:\S100-38\ACAD\090409\510038 FIG 5- APZ Layout Plan_v3.dwg
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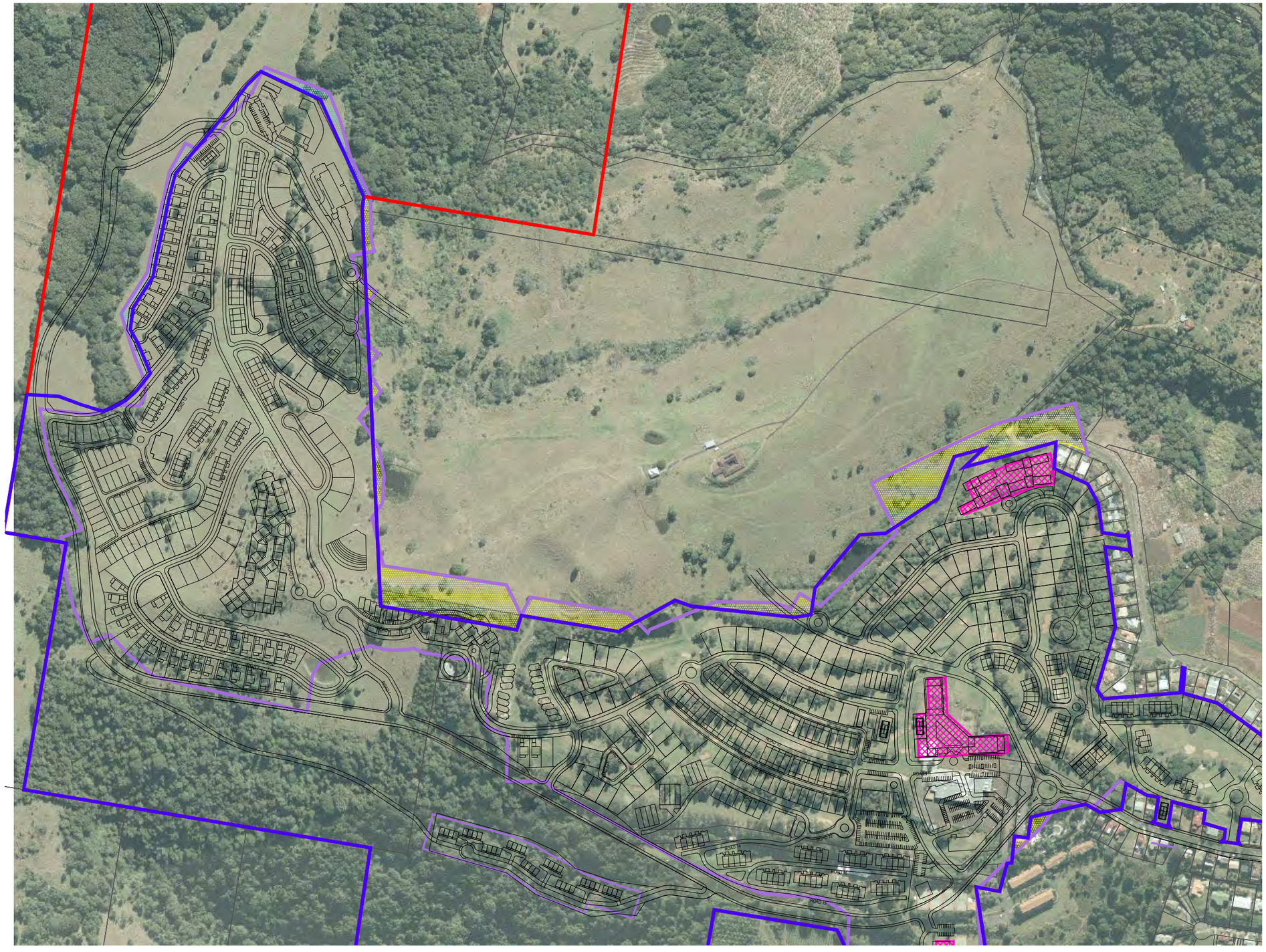

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LEGEND

- RISE Stage 1 Development Boundary
- RISE Stage 2 Development Boundary
- External APZ Area

Areas where APZs are proposed on neighbouring lots.

- Stage 2 APZ Area

Areas where APZs are proposed on areas outside the Stage 1 boundary and within the Stage 2 area, proposed for future development

- Cadastral Boundaries
- Special Fire Protection Purposes (SFPP)
- General Residential APZ

60 0 60 120 180 240 300m 1:6000

Scale 1:6000 (A3)

FIGURE 5B
ASSET PROTECTION ZONE LAYOUT PLAN

Rev: Date: 9 April 2009

Project No.: 510038

Terranora Group Management

CAD FILE: I:\5100-38\ACAD\090409\510038 FIG 5- APZ Layout Plan_v3.dwg
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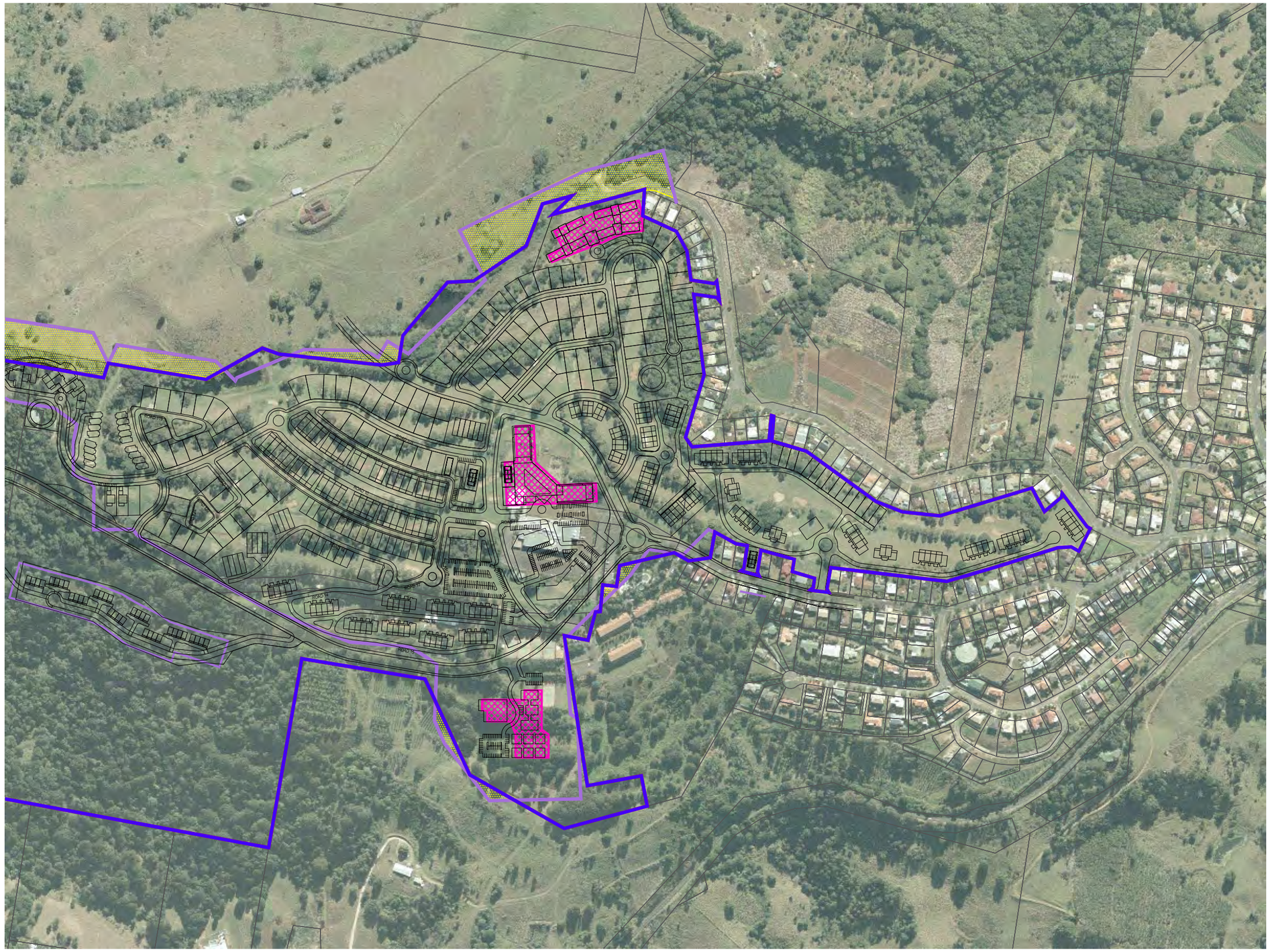

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LEGEND

- RISE Stage 1 Development Boundary
- RISE Stage 2 Development Boundary
- External APZ Area

Areas where APZs are proposed on neighbouring lots.

- Stage 2 APZ Area

Areas where APZs are proposed on areas outside the Stage 1 boundary and within the Stage 2 area, proposed for future development

- Cadastral Boundaries
- Special Fire Protection Purposes (SFPP)
- General Residential APZ

60 0 60 120 180 240 300m
1:6000

Rev: Date: 9 April 2009

Scale 1:6000 (A3)

FIGURE 5C
ASSET PROTECTION ZONE LAYOUT PLAN

Project No.: 510038

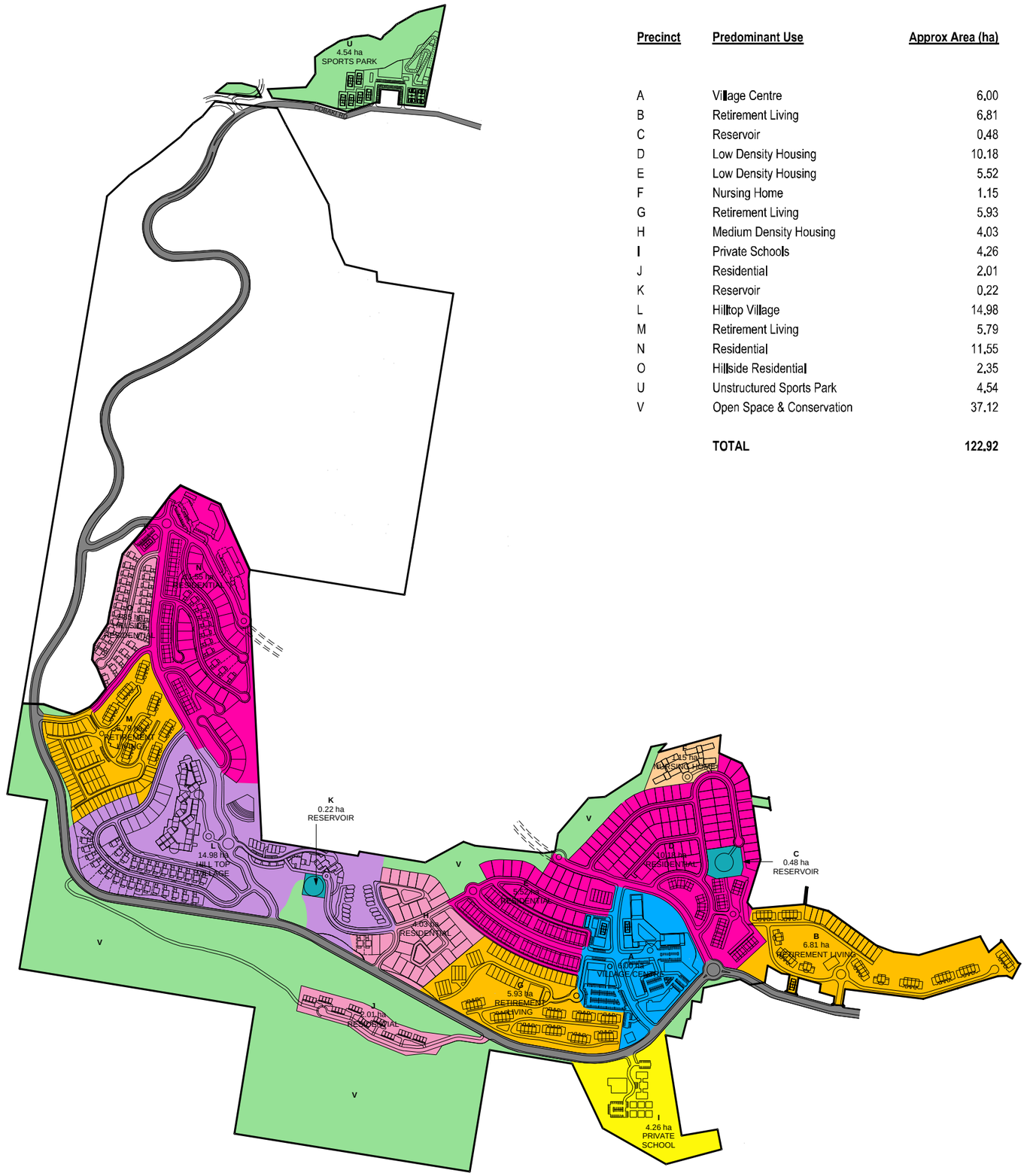
Terranora Group Management

CAD FILE: I:\S100-38\ACAD\090409\510038 FIG 5- APZ Layout Plan_v3.dwg
XREF's: B1005006-BDY 130307; TERR0001_A-MP-01-16[B] Master Plan adapted to fit cadastral boundaries; CADASTRAL

PRINT DATE: 09 April, 2009 - 2:53pm

APPENDIX A

RISE Concept Precinct and Staging Plan



Precinct	Predominant Use	Approx Area (ha)	Dwellings/ha	Potential Dwellings
A	Village Centre	6.00	43	257
B	Retirement Living	6.81	29	195
C	Reservoir	0.48	-	-
D	Low Density Housing	10.18	12	120
E	Low Density Housing	5.52	14	75
F	Nursing Home	1.15	174	200
G	Retirement Living	5.93	34	199
H	Medium Density Housing	4.03	9	36
I	Private Schools	4.26	-	-
J	Residential	2.01	18	36
K	Reservoir	0.22	-	-
L	Hilltop Village	14.98	20	299
M	Retirement Living	5.79	35	204
N	Residential	11.55	13	148
O	Hillside Residential	2.35	11	27
U	Unstructured Sports Park	4.54	-	-
V	Open Space & Conservation	37.12	-	-
	TOTAL	**122.92**		**2004**

0 50.0 100 200 300 400 500m

SITE PLANS - PRECINCT & STAGING PLAN

JOB NO : TERR0001 24/03/2009 SCALE: 1:5000 @ A1 A-MP-01-18B

APPROVED FOR ISSUE _ __

P:\TERR0001_RISE\B_Documentation\B1_Production\B1_Drawings\ArchiCAD\Master\TERR0001_SITE.pln

Terranora Group Management Pty Ltd

RISE® ABOVE IT ALL

ML Design architecture | master planning | urban design | interior design

APPENDIX B

PBP Guideline 2006 – Code Assessment

Residential Subdivisions

Asset Protection Zones

Performance Criteria	Acceptable solutions	Response
The intent may be achieved where:		
Radiant heat levels at any point on a proposed building will not exceed 29 kW/m2	An APZ is provided in accordance with the relevant tables/ figures in Appendix 2 of this document. The APZ is wholly within the boundaries of the development site. Exceptional circumstances may apply (see section 3.3)	The proposed APZ widths have been determined using the methods outlined in Appendix 2 of the PBP Guideline. Where APZs are partially located outside of the site boundaries, in the central east of the site, the adjacent lot is zoned as Residential – Urban Expansion under the Tweed LEP and as Residential development occurs on adjacent lots, the need for APZs will diminish. To ensure the ongoing management of APZ areas external to the site, easements may be established in accordance with Development Control Note 02 Establishment of Easements for the purposes of Asset Protection Zones. Any external APZ areas will be managed in accordance with a Detailed Bush Fire Management Plan and the associated terms of a formal Easement. This Bush Fire Management Plan will be prepared at Development Application stage for the relevant precincts.
APZs are managed and maintained to prevent the spread of a fire towards the building.	In accordance with the requirements of Standards for Asset Protection Zones (RFS, 2005) *Note: A Monitoring and Fuel Management Program should be required as a condition of development consent.*	The APZs and open spaces will be located within areas proposed for Body Corporate management and as such will be subject to ongoing management and maintenance as a part of the Site Management Plan. Any external APZ areas will be managed in accordance with a Detailed Bush Fire Management Plan and the associated terms of a formal Easement. This Bush Fire Management Plan will be prepared at Development Application stage for the relevant precincts.
APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated	The APZ is located on lands with a slope less than 18 degrees.	A Detailed Bush Fire Management Plan (prepared at Development Application stage for the relevant precincts) will be prepared for areas where APZs are proposed on slopes in excess of 18 degrees, demonstrating that the issues associated with locating APZs on steep slopes can be effectively managed for the life of the development. The Detailed Bushfire Management Plan will be required to demonstrated that: • suitable management practices can be implemented on site, demonstrating that slope constraints can be overcome; • the environmental consequences of clearing on such slopes such as

		landslip, slump, erosion and landslide are suitably managed; and • the availability of canopy fuels does not significantly reduce the advantage of having an APZ (i.e. the potential for crown fires is negated).

Access (1) Public Roads

Performance Criteria	Acceptable solutions	Response
The intent may be achieved where		
Firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources)	Public roads are two-wheel drive, all weather roads	The proposed roads will be two-wheel drive and all weather as the site is proposed to be an integrated development. Further details regarding the provision of roads will be provided at the detailed design stage.
Public road widths and design that allow safe access for firefighters while residents are evacuating an area	Urban perimeter roads are two-way, that is, at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions. Non perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle). The perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas. Traffic management devices are constructed to facilitate access by emergency services vehicles. Public roads have a cross fall not exceeding 3 degrees. All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end and direct traffic away from the hazard. Curves of roads (other than perimeter roads) are a minimum inner radius of six metres and minimal in number, to allow for rapid access and egress. The minimum distance between inner and outer curves is six metres.	As indicated on the Site Master Plan prepared by ML Designs and as demonstrated by the site layout, the entire eastern aspect of the development will be provided with a two way perimeter road. Internal two-way roads link to the perimeter road at regular intervals to provide alternative routes. Road design and layout will meet the minimum requirements of the code, further detail to be provided at the detailed design stage. A number of cul-de-sac roads are proposed to the western aspect of the development. The majority of the cul-de-sac roads are linked with laneways to provide an alternative ingress/egress if required. Road design and layout will meet the minimum requirements of the code. Further detail will be provided at the detailed design stage.

Performance Criteria	Acceptable solutions	Response
	Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient. There is a minimum vertical clearance to a height of four metres above the road at all times.	
The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles	The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicate load rating	Road design and layout will meet the minimum requirements of the code. Further detail will be provided at the detailed design stage.
Roads that are clearly sign- posted (with easily distinguishable names) and buildings/properties that are clearly numbered	Public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression. Public roads between 6.5 metres and 8 metres wide are No Parking on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression	Road design and layout will meet the minimum requirements of the code. Further detail will be provided at the detailed design stage.
There is clear access to reticulated water supply	Public roads up to 6.5 metres wide provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression. One way only public access roads are no less than 3.5 metres wide and provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression.	Road design and layout and the provision of fire hydrants will meet the minimum requirements of the code. Further detail will be provided at the detailed design stage.
Parking does not obstruct the minimum paved width	Parking bays are a minimum of 2.6 metres wide from kerb edge to road pavement. No services or hydrants are located within the parking bays. Public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side of the road.	Road design and layout will meet the minimum requirements of the code. Further detail will be provided at the detailed design stage.

Access (2) - Property Access

Performance Criteria	Acceptable solutions	Response
The intent may be achieved where		
Access to properties is provided in recognition of the risk to fire fighters and/ or evacuating occupants.	At least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200 metres from a public through road	The majority of cul-de-sac roads will be provided with laneways to ensure two ingress/egress points are provided.
Access to properties is provided in recognition of the risk to fire fighters and/ or evacuating occupants. All weather access is provided	Bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes Roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge).	No bridges are proposed. The site does not occur in a wetland area nor is the site flood affected.
Road widths and design enable safe access for vehicles =	A minimum carriageway width of four metres for rural-residential areas, rural landholdings or urban areas with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building (or footprint). *Note: No specific access requirements apply in a urban area where a 70 metres unobstructed path can be demonstrated between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles (i.e. a hydrant or water supply).* In forest, woodland and heath situations, rural property access roads have passing bays every 200 metres that are 20 metres long by two metres wide, making a minimum trafficable width of six metres at the passing bay.	Road design and layout will meet the minimum requirements of the code. Further detail will be provided at the detailed design stage.

Performance Criteria	Acceptable solutions	Response
	A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches. Internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum 12 metre outer radius. Curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress. The minimum distance between inner and outer curves is six metres. The crossfall is not more than 10 degrees. Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads. *Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.* Access to a development comprising more than three dwellings have formalised access by dedication of a road and not by right of way.	

Access (3) - Fire Trails

Performance Criteria	Acceptable solutions	Response
The intent may be achieved where		
The width and design of the fire trails enables safe and ready access for firefighting vehicles	A minimum carriageway width of four metres with an additional one metre wide strip on each side of the trail (clear of bushes and long grass) is provided. The trail is a maximum grade of 15 degrees if sealed and not more than 10 degrees if unsealed. A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches is provided. The crossfall of the trail is not more than 10 degrees. the trail has the capacity for passing by: - reversing bays using the access to properties to reverse fire tankers, which are six metres wide and eight metres deep to any gates, with an inner minimum turning radius of six metres and outer minimum radius of 12 metres; and/or - a passing bay every 200 metres, 20 metres long by three metres wide, making a minimum trafficable width of seven metres at the passing bay. *Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m) and extend for no more than 30m and where obstruction cannot be reasonably avoided or removed.*	Extensive use of fire trails is not proposed as a part of this development. All access for emergency vehicles will be via the public road system. Where fire trails are required they will serve a dual function as public access pathways and will be constructed in accordance with the standard requirements and will be maintained by the Body Corporate.
Fire trails are trafficable under all weather conditions. Where the fire trail joins a public road, access shall be controlled to prevent use by non authorised persons	The fire trail is accessible to firefighters and maintained in a serviceable condition by the owner of the land. Appropriate drainage and erosion controls are provided. The fire trail system is connected to the property access road and/or to the through road system at frequent intervals of 200 metres or less. Fire trails do not traverse a wetlands or other land potentially subject to periodic inundation (other than a flood or storm surge). Gates for fire trails are provided and locked with a key/lock system authorized by the local RFS.	Any fire trails established as part of the Pacific Highlands development will be constructed and maintained in accordance with requirements of the PBP Guideline.

Performance Criteria	Acceptable solutions	Response
Fire trails designed to prevent weed infestation, soil erosion and other land degradation.	Fire trail design does not adversely impact on natural hydrological flows. Fire trail design acts as an effective barrier to the spread of weeds and nutrients. Fire trail construction does not expose acid-sulphate soils.	Any fire trails established as part of the Pacific Highlands development will be constructed and maintained in accordance with requirements of the PBP Guideline.

Services

Performance Criteria	Acceptable Solution	Response
The intent may be achieved where:		
Reticulated water supplies Water supplies are easily accessible and located at regular intervals.	Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads Fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles. Hydrants are not located within any road carriageway. All above ground water and gas service pipes external to the building are metal, including and up to any taps. The provisions of parking on public roads are met.	Reticulated water supply is proposed to be provided in easily accessible locations and at the rate by the relevant standards, further detail is to be provided at the detailed design stage of the proposal. Fire hydrant provision and infrastructure is proposed to be provided in accordance with the requirements of the PBP Guideline and AS2419.1-2005. Further detail is to be provided at the detailed design stage.
Electricity Services Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings. Regular inspection of lines is undertaken to ensure they are not fouled by branches.	Where practicable, electrical transmission lines are underground. Where overhead electrical transmission lines are proposed: - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002).	All services will be provided in accordance with the required specifications. Further detail is to be provided at detailed design stage.

Gas services Location of gas services will not lead to ignition of surrounding bush land or the fabric of buildings.	Reticulated or bottled gas is installed and maintained in accordance with AS 1596 and the requirements of relevant authorities. Metal piping is to be used. All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation. If gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal. Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used.	Any gas services will be provided in accordance with the required specifications. Further detail is to be provided at detailed design stage.

Special Fire Protection Purpose Developments

Asset Protection Zones

Performance Criteria	Acceptable Solution	Response
The intent may be achieved where:		
Radiant heat levels of greater than 10kW/m2 will not be experienced by occupants or emergency services workers entering or exiting a building.	An APZ is provided in accordance with the relevant tables and figures in Appendix 2 of this document.	The Asset Protection Zone widths have been determined using the methodology outlined in the PBP Guideline and the Rural Fire Services APZ online calculator.
	Exits are located away from the hazard side of the building.	The primary exit/entry points to all of the proposed SFPP developments are located away from the hazard side of the building. The APZ for the Nursing Home in the north-east of the site extends onto adjacent land which has a Residential (Urban Expansion) designation pursuant to the Tweed LEP and other relevant circumstances exist that enable a satisfactory bush fire protection level to be achieved (refer Section 3.1.1 of primary report).
	The APZ is wholly within the boundaries of the development site. Exceptional circumstances may apply (see section 3.3).	The APZ for the Private School extends marginally onto adjacent lands which are currently being used for agricultural purposes. The provision of an APZ in this area may require an easement to be created to ensure the long term management of the APZ. The APZ for the northern residential and hillside precincts will extend onto parts of the Stage 2 development area. As the development of the Stage 2 area proceeds, the APZ in this area will become redundant. Any external APZ areas will be managed in accordance with a Detailed Bush Fire Management Plan and the associated terms of a formal Easement. This Bush Fire Management Plan will be prepared at Development Application stage for the relevant precincts.

Applicants demonstrate that issues relating to slope are addressed: maintenance is practical, soil stability is not compromised and the potential for crown fires is negated.	Mechanisms are in place to provide for the maintenance of the APZ over the life of the development. The APZ is not located on lands with a slope exceeding 18 degrees.	As the site is proposed to remain within a Body Corporate tenure arrangement, responsibility for the maintenance of the APZs will fall to the Body Corporate. As a part of the Body Corporate Maintenance Schedule, a Fuel Management and Monitoring Program will be required in accordance with the requirements of *Standards for Asset Protection Zones* prepared by NSW Rural Fire Service. Where APZs are located on slopes of 18 degrees or greater, additional stabilisation measures will be implemented to ensure soil is stabilised. APZs will be maintained in accordance with the provisions of Standards for Asset Protection Zones (RFS 2005) A Detailed Bush Fire Management Plan (prepared at Development Application stage for the relevant precincts) will be prepared for areas where APZs are proposed on slopes in excess of 18 degrees, demonstrating that the issues associated with locating APZs on steep slopes can be effectively managed for the life of the development.
APZs are managed and maintained to prevent the spread of a fire towards the building.	In accordance with the requirements of 'Standards for Asset Protection Zones (RFS 2005). *Note - a Monitoring and Fuel Management Program should be required as a condition of development consent*	The APZs and open spaces will be located within areas proposed for Body Corporate management and as such will be subject to ongoing management and maintenance as a part of the Site Management Plan. APZs will be maintained in accordance with the provisions of Standards for Asset Protection Zones (RFS 2005)
Vegetation is managed to prevent flame contact and reduce radiant heat to buildings, minimise the potential for wind driven embers to cause ignition and reduce the effect of smoke on residents and fire-fighters.	Compliance with Appendix 5.	Landscaping within the APZs will be in accordance with the requirements of Appendix 5 of the PBP Guideline.

Access internal roads

Performance Criteria	Acceptable Solution	Response
The intent may be achieved where:		
Internal road widths and design enable safe access for emergency services and allow crews to work with equipment about the vehicle.	Internal roads are two-wheel drive, sealed, all-weather roads; Internal perimeter roads are provided with at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb) and shoulders on each side, allowing traffic to pass in opposite directions; Roads are through roads. Dead end roads are not more than 100 metres in length from a through road, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end; Traffic management devices are constructed to facilitate access by emergency services vehicles. A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches, is provided. Curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress. The minimum distance between inner and outer curves is six metres. Maximum grades do not exceed 15 degrees and average grades are not more than 10 degrees. Crossfall of the pavement is not more than 10 degrees. Roads do not traverse through a wetland or other land potentially subject to periodic inundation (other than flood or storm surge). Roads are clearly sign-posted and bridges clearly indicate load ratings. The internal road surfaces and bridges have a capacity to carry fully-loaded firefighting vehicles (15 tonnes).	The proposed roads will be two-wheel drive and all weather as the site is proposed to be an integrated development. Further details regarding the provision of roads will be provided at detailed design stage. Road design and layout will meet the minimum requirements of the code. Further detail will be provided at the detailed design stage.

Services

Performance Criteria	Acceptable Solution	Response
The intent may be achieved where:		
Reticulated water supplies Water supplies are easily accessible and located at regular intervals.	Access points for reticulated water supply to SFPP developments incorporate a ring main system for all internal roads. Fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority, once development has been completed. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles. The provisions of public roads in section 4.1.3 in relation to parking are met.	Reticulated water supply is proposed to be provided in easily accessible locations and at the rate by the relevant standards, further detail is to be provided at the detailed design stage of the proposal. Fire hydrant provision and infrastructure is proposed to be provided in accordance with the requirements of the PBP Guideline and AS2419.1-2005. Further detail is to be provided at the detailed design stage.
Electricity Location of electricity services will not lead to ignition of surrounding bush land or the fabric of buildings or risk to life from damaged electrical infrastructure.	Electrical transmission lines are underground.	Electrical transmission lines will be underground.
Gas Location of gas services will not lead to ignition of surrounding bush land or the fabric of buildings.	Reticulated or bottled gas is installed and maintained in accordance with AS 1596 - 2002 and the requirements of relevant authorities. Metal piping is to be used. All fixed LPG tanks are kept clear of all flammable materials and located on the non hazard side of the development. If gas cylinders need to be kept close to the building, the release valves must be directed away from the building and away from any combustible material, so that they do not act as catalysts to combustion. Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used.	Any gas services will be provided in accordance with the required specifications. Further detail is to be provided at the detailed design stage.

Emergency and Evacuation Planning

Performance Criteria	Acceptable Solutions	Response
The intent may be achieved where:		
An Emergency and Evacuation Management Plan is approved by the relevant fire authority for the area.	An emergency/evacuation plan is prepared consistent with the RFS Guidelines for the *Preparation of Emergency/Evacuation Plan.* Compliance with AS 3745-2002 'Emergency control organisation and procedures for buildings, structures and workplaces' for residential accommodation'. Compliance with AS 4083-1997 'Planning for emergencies - for health care facilities'. *Note: The developer should provide a copy of the above document to the local Bush Fire Management Committee for their information prior to the occupation of any accommodation of a special fire protection purpose or community title subdivision.*	An Emergency and Evacuation Plan will be required as part of the Approval Process for any SFPP Facility and will include provisions specific to the type of facility that is proposed. This Emergency and Evacuation Plan will be prepared at the Development Application stage for the relevant precincts
Suitable management arrangements are established for consultation and implementation of the emergency and evacuation plan.	An Emergency Planning Committee is established to consult with residents (and their families in the case of aged care accommodation and schools) and staff in developing and implementing an Emergency Procedures Manual. Detailed plans of all Emergency Assembly Areas including "onsite" and "offsite" arrangements as stated in AS 3745- 2002 are clearly displayed, and an annual (as a minimum) trial emergency evacuation is conducted.	Noted.