

PLACE
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ENVIRONMENT

160-210 Daleys Rd,
Ripley

Bushfire Management
Plan

Prepared for
Backup Australia P/P and P&D
Holdings

PLANS AND DOCUMENTS
referred to in the ULDA
APPROVAL dated 20/11/2012

PLANNING **DESIGN** ENVIRONMENT

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Date:	15 June 2012		
Document Reference:	BUA01 Daleys Rd Deebling Heights BMP v1.0.docx		
Report:	Bushfire Management Plan for 160 – 210 Daleys Road, Ripley		

DOCUMENT HISTORY

Date	Change Description	Version No.
15/06/2012	Original	1.0

GLOSSARY, ACRONYMS & ABBREVIATIONS

Term	Definition
AS	Australian Standard
BLE	Building Location Envelope
BMP	Bushfire Management Plan
DERM	Department of Environment and Resource Management
NC Act	<i>Nature Conservation (Qld) Act 1992</i>
PDG	PLACE Design Group
QFRS	Queensland Fire and Rescue Service
RE	Regional Ecosystem
RVDS	Ripley Valley Development Scheme
SP Act	<i>Sustainable Planning (Qld) Act 2009</i>
SPP 1/03	State Planning Policy 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide
UDA	Urban Development Area
ULDA	Urban Land Development Authority

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1.0 INTRODUCTION

1.1 Overview

PLACE Design Group (PDG) has been commissioned by P & D Holding and Back Up Australia Pty Ltd (Client) to prepare a Bushfire Management Plan (BMP) for a proposed residential development at 160 – 210 Daleys Road, Ripley (the Site). The site is situated some 6 kilometres south of the Ipswich city centre and is adjacent to, and south of, the Cunningham Highway (**FIGURE 1**).

Although the Site lies within Ipswich City Council's (ICC) Local Government Area, it is part of a designated Ripley Valley Urban Development Area (UDA) which was declared by regulation, pursuant to Part 2 Division 1 Section 7 of the *Urban Land Development Authority Act 2007*. Declaration of a UDA overrides a local planning instrument, and land use planning is guided by the Urban Land Development Authority's (ULDA) Development Schemes and Guidelines.

The Site is comprised of three separate parcels totalling 34.2 hectare (**FIGURE 2**):

- Lot 3, RP180932, 2.014 ha;
- Lot 5, RP180932, 10.71 ha; and
- Lot 6, RP180932, 21.432 ha.

This BMP identifies the location and severity of potential bushfire hazard by means of site-based assessment and review of the *State Planning Policy 1/03 – Mitigating Adverse Impacts of Flood, Bushfire and Landslide* (SPP 1/03). The hazard assessment considers factors such as vegetation type, slope, aspect, and meteorological conditions. The assessment also addresses on-and-off site hazard implications arising on account of development, including those posed by nearby bushland.

This BMP assesses the proposal against the performance criteria contained in SPP 1/03 and considers the acceptable solutions contained within SPP 1/03. Furthermore it recommends:

- remedial measures such as specific features of the development design (eg: land use type, vehicular access, lot layout and building location);
- proposed fire-fighting infrastructure (eg: water supply and fire/maintenance trails);
- recommended standard of building construction; and
- clearing and landscaping measures.

1.2 Existing Environment

The Site is bound to the north by the Cunningham Highway; to the east by Daleys Road; to the west by Deebing Creek, and by undeveloped land to the south. Although historic landuse was most probably one of grazing on alluvial terraces and within unimproved native forest, as evidenced by clearing in surrounding areas and grazing type infrastructure, much of the Site retains remnant woody vegetation (**FIGURE 2**). Some minor areas around the site's perimeter have previously been cleared and are regrowing. The Site is experiencing adverse impacts from the unauthorised vehicle access which has created many unformed tracks traversing the Site and creating erosion issues.

Properties to the east, south and west remain relatively well vegetated and are well connected to large tracts of contiguous vegetation to the south of the Site (**FIGURE 1**).

In addition to Deebing Creek (a 4th order stream), two tributaries of Deebing Creek traverse the Site, one (a 2nd order stream) bisecting Lot 3, and the other (a 1st order stream) bisecting Lot 5.



DATE: 13/06/2012
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SCALE: 1:30,000 @ A3

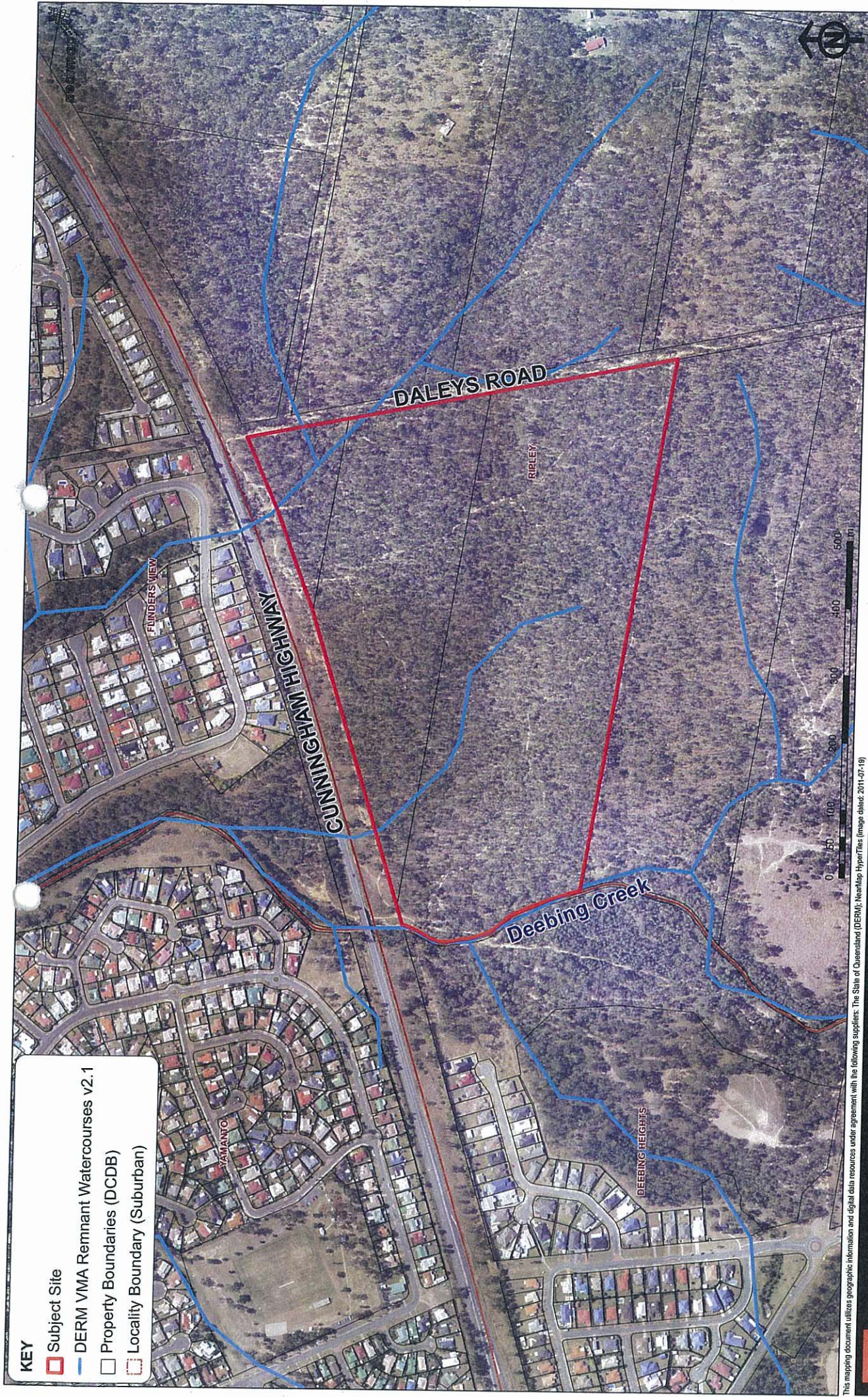
FIGURE 1: LOCALITY AND SUBJECT SITE
160 - 210 DALEYS ROAD, RIPLEY

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KEY

- Subject Site
- DERM VMA Remnant Watercourses v2.1
- Property Boundaries (DCDB)
- Locality Boundary (Suburban)

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FIGURE 2: SUBJECT SITE
 160 - 210 DALEYS ROAD, RIPLEY

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1.3 Planning Considerations

1.3.1 Ripley Valley UDA

The Ripley Valley UDA came into force on 8 October 2010. The Ripley Valley Development Scheme (RVDS) has been approved and is now in effect. The Development Scheme is the planning document that will assist the ULDA in planning, carrying out, promoting, coordinating and managing the development of land in the Ripley Valley UDA. All development applications within the UDA will now be assessed against the development scheme, replacing the Interim Land Use Plan.

Declaration of a UDA binds the administering authority, the ULDA, to generally have regard to other state legislation, regulation, codes and policies. UDA Development Schemes prevail over planning instruments or other plans, policies or codes made under the *Sustainable Planning Act 2009* (SP Act) or any other act. However, development in UDAs is subject to the *Environmental Protection Act 1994* and as such it should exercise a general environmental duty and avoid environmental harm as defined under that legislation. Provisions of the *Nature Conservation Act 1992* (NC Act) and the Commonwealth's *Environmental Protection and Biodiversity Conservation Act 1999* also apply to UDAs in relation to the management of threatened species and communities.

Whilst State Planning Policies under the SP Act *do not* bind development within a UDA, they do represent a reference point to guide planning and management of:

- Significant Wetlands;
- Koala Conservation;
- Natural hazards; and
- Acid sulfate soils.

ULDA Guideline No. 14: *Environment and Natural Resources Sustainability* outlines the ULDA's principles and requirements for natural resource sustainability in UDAs. A Development Scheme may specify a different requirement, in which case the Development Scheme would prevail. Additionally the guideline indicates that alternative, innovative solutions that satisfy UDA-wide criteria but may not meet the guideline are encouraged.

1.3.2 State Planning Policy 1/03 – Mitigating Adverse Impacts of Flood, Bushfire and Landslide- Assessment Code

The *State Planning Policy 1/03 – Mitigating Adverse Impacts of Flood, Bushfire and Landslide* (SPP 1/03) aims to ensure that natural hazards, such as bushfire, are adequately considered when making decisions about development. This code is also intended to ensure that development in Confirmed Bushfire Prone Areas is appropriately planned and designed to minimise the risk to life and property and cost to the community.

The specific outcomes sought by the SPP 1/03 are as follows:

1. *Development maintains the safety of people and property by:*
 - a. *Avoiding areas of High or Medium bushfire hazard; or*
 - b. *Mitigating the risk through:*
 - *Allotment design and the sitting of buildings;*
 - *Including firebreaks that provide adequate setbacks between buildings / structures and hazardous vegetation and access for fire fighting / emergency vehicles;*

- Providing adequate road access for fire-fighting / emergency vehicles and safe evacuation; and
- Providing an adequate / accessible water supply for fire-fighting.

2. Public safety and the environment are not adversely affected by the detrimental impacts of bushfire on hazardous materials manufactured or stored in bulk.

1.4 Bushfire Context

1.4.1 Regional Climate

The Ipswich area experiences hot wet summers (highest mean maximum temperature of 31.1°C in January; highest mean rainfall 123.6mm in December) and cool dry winters (lowest mean minimum temperature of 5.3°C in July; lowest mean rainfall 29.4mm in August). Wind direction of predominant winds during the period of highest bushfire danger is from the north-east and east (3pm conditions, November to February). Refer to **APPENDIX A** for details.

1.4.2 Regional Bushfire Context

The Site is bounded to the north by the Cunningham Highway. North of the highway is the dense residential development of Yamanto and Flinders View, suburbs of Ipswich City.

The Site is located at the northern end of a mountain range which extends south to Boonah and which supports the Flinders Goolman Conservation Estate and Flinders Peak Conservation Park. To the east, south and west of the Site are large tracts of woody vegetation which represent the greatest source of bushfire threat (**FIGURE 2**).

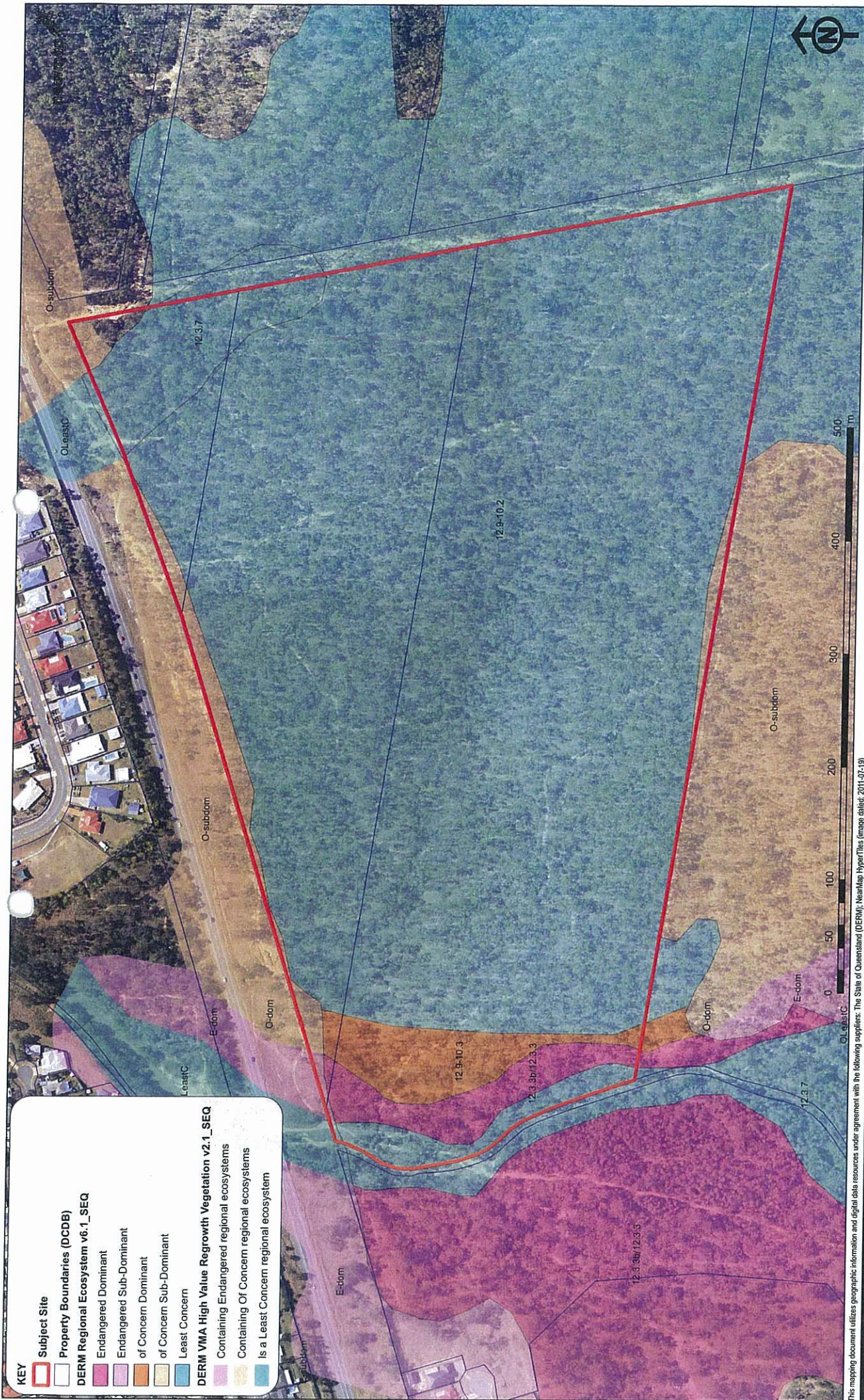
Map 3a of the RVDS presents the development constraints across the Ripley Valley UDA (**APPENDIX B**). It shows the majority of the Site as well as large areas to the south of the Site mapped as Transitional Bushfire Risk Areas with the Deebing Creek corridor mapped as Bushfire Risk Area. In Transitional Bushfire Risk Areas the risk for bushfire is likely to diminish as development occurs (RVDS section 3.3.9).

1.4.3 Site Bushfire Context

An Ecological Assessment Report prepared by PDG (Daleys Road Residential Development, Ecological Assessment Report, dated 13 October 2011) indicated that the vegetation communities present on site had been confirmed via field investigations to be as identified in DERM's Version 6.1 Regional Ecosystem Mapping and Version 2.1 Regrowth Mapping (**FIGURE 3**). These consist of the following Regional Ecosystems:

- RE12.3.7 - *Eucalyptus tereticornis* (Queensland blue gum), *Melaleuca viminalis* (river bottlebrush), *Casuarina cunninghamiana* (River oak) fringing forest which occurs along Deebing Creek. This RE has a vegetation management status of Least Concern.
- RE12.3.3 - *Eucalyptus tereticornis* (Queensland blue gum) woodland to open forest on alluvial plains which occurs as a narrow band to the east of RE12.3.7 and Deebing Creek. It is represented on site by major vegetation community 12.3.3a. This RE has a vegetation management status of Endangered.
- RE12.9-10.3 - *Eucalyptus moluccana* (Gum topped box) on sedimentary rocks and which occurs as a narrow fringe between RE12.3.3 to the west and RE12.9-10.2 to the east. RE12.9-10.3 has a vegetation management status of Of Concern.

- RE12.9-10.2 - *Corymbia citriodora* (Spotted Gum), *Eucalyptus crebra* (narrow-leaved ironbark) open forest on sedimentary rocks. This RE constitutes the majority of the remnant vegetation present on the site and is the largest vegetation type present. It has a vegetation management status of Least Concern.



KEY

Subject Site

Property Boundaries (DCDB)

DERM Regional Ecosystem v6.1_SEQ

Endangered Dominant

Endangered Sub-Dominant

of Concern Dominant

of Concern Sub-Dominant

Least Concern

DERM VMA High Value Regrowth Vegetation v2.1_SEQ

Containing Endangered regional ecosystems

Containing Of Concern regional ecosystems

Is a Least Concern regional ecosystem

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ISSUE: A

SCALE: 1:3,000 @ A3

FIGURE 3: REMNANT AND REGROWTH MAPPING

160 - 210 DALEYS ROAD, RIPLEY

2.0 HAZARD ASSESSMENT

2.1 Assessment Criteria

This BMP follows the methodology outlined in the SPP for assessing bushfire hazard. The methodology involves quantitative and qualitative assessments of vegetation (communities and height) and terrain (slope and aspect) features. A hazard score is assigned for each of these factors; the individual scores are then added up to produce a total bushfire hazard score which is then banded into low, medium and high ratings.

To aid in the interpretation of the hazard maps that have been produced for this assessment, a number of analysis points (**FIGURE 4** to **FIGURE 6**) have been placed across the Site and the hazard score calculated at that particular point. A precautionary approach has been utilised to determine the higher fire hazard scores within the Site, ensuring that the proposed development is adequately designed to mitigate fire hazard.

2.2 Vegetation Community Hazard

SPP 1/03 Guidelines paragraph A3.1 allows for the hazard scores to be reduced based on the extent of vegetation and/or its proximity to extensive vegetation (refer **TEXT BOX 1**). Given the extent and proximity of contiguous woody vegetation to the north, east, south and south-west, no reductions will be available on the vegetation hazard scores.

Text Box 1 – SPP 1/03 Guidelines A3.1 - Note 1

Note 1: Vegetation assessment should be based upon examination of the vegetation on the subject site and surrounding the subject site. Narrow strips of vegetation may be flammable; however, bushfires will not generally reach their full intensity where bushfire fronts are less than 100 metres wide. For this reason areas of vegetation with a narrow linear shape (e.g. roadside vegetation beside a cleared paddock) are considered to have the next lower hazard score (e.g. paperbark heath would have a score of 6 not 8, cypress pine forest 5 not 6)

- areas with a linear shape (e.g. roadside vegetation beside a cleared paddock); and
- units of vegetation less than 50 hectares in area and more than one kilometre from the nearest extensive vegetation.

With respect to SPP 1/03, there are two vegetation communities present on Site. Whilst both include a canopy of eucalypt trees, the variation is in the shrub layer. Due to past land uses of the Site, areas at the higher elevations have only a grass understorey with no shrub layer whilst waterway corridors have a shrub layer. Therefore the vegetation community of the upper elevations correlates with the description in the SPP Guidelines (refer Table A3.1) of "Grassy eucalypt and acacia forest [...]" and the vegetation community of the lower elevations correlates with "[...] eucalypt forest with dry-shrub ladder fuels".

The description and hazard score in accordance with the SPP 1/03 Guidelines table A3.1 for each of the Vegetation Communities identified in **FIGURE 3**. **FIGURE 4** shows the vegetation community hazard score map for the Site. **TABLE 1** summarises the hazard scores associated with the defined analysis points.

TABLE 1: VEGETATION COMMUNITY HAZARD SCORE

Analysis Point ID	Hazard Score	Rationale
1, 3, 4, 5, 8, 9, 10, 13, 14, 15, 20, 21	6	Grassy eucalypt and acacia forest [...]
2, 6, 7, 11, 12, 16, 17, 18, 19, 22, 23	8	[...] eucalypt forest with dry-shrub ladder fuels



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FIGURE 4: BUSHFIRE HAZARD MAP - VEGETATION
 160 - 210 DALEYS ROAD, RIPLEY

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 PROJECT NO: BUAD01
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2.3 Slope Hazard

The Site is gently undulating rising from Deebing Creek at approximately 30m AHD to a highest elevation of approximately 70m in the south-eastern corner of the Site with waterways creating small gullies in between.

The SPP 1/03 Guidelines state that *"if the site is downhill from the [bushfire] hazard, the slope effect may be taken as two or less as the fire intensity will be less"*. The Site is situated downhill from its major bushfire threat being the large extent of remnant vegetation to the south (**FIGURE 1**). However remnant vegetation is present throughout the Site. It is also noted that fire may proceed slowly down hill and contribute falling debris and embers which could lead to ember attack potentially causing ignition of flammable items downslope of a fire front.

TABLE 2 provides the scores for the mapping analysis points shown and **FIGURE 5** shows the contour elevations which have been surveyed and interpolated to determine slope values at each analysis point.

TABLE 2: SLOPE HAZARD SCORE

Analysis Point ID	Hazard Score	Rationale
1	1	Plain (0% to 5%)
2	2	Undulating (>5% to 10%)
3	3	Rolling hills (>10% to 20%)
4, 5, 6, 7, 8, 9	2	Undulating (>5% to 10%)
10, 11	3	Rolling hills (>10% to 20%)
12	1	Plain (0% to 5%)
13, 14, 15, 16, 17, 18, 19, 20, 21	2	Undulating (>5% to 10%)
22	3	Rolling hills (>10% to 20%)
23	2	Undulating (>5% to 10%)

2.4 Aspect Hazard

Aspect affects bushfire hazard due to the effects that exposure to direct sunlight has on different vegetation communities, including the drying rates of fuels. Aspect also correlates closely with exposure to low humidity winds that increase bushfire intensity. In extremely broken country where there are a variety of aspects, the predominant aspect should be used.

As aspect has only a minor influence on flatter land, aspect is not considered to be significant contributing factor to overall risk on land with a slope less than 5% (SPP 1/03 Guidelines). Therefore analysis points located on the valley floor of the Site (with a slope hazard score of 1) will be assigned an aspect hazard score of 0. **TABLE 3** provides the raw and adjusted scores for each of the analysis points shown in **FIGURE 6**.

TABLE 3: ASPECT HAZARD SCORE

Analysis Point ID	Hazard Score		Rationale
	Initial	Final	
1	3.5	0	North to North-west; land under 5% slope
2	3	3	North-west to West

Analysis Point ID	Hazard Score		Rationale
	Initial	Final	
3	3	3	North-west to West
4	3.5	3.5	North to North-west
5	3.5	3.5	North to North-west
6	2	2	West to South
7	3	3	North-west to West
8	1	1	North to East
9	3.5	3.5	North to North-west
10	3.5	3.5	North to North-west
11	2	2	West to South
12	3	0	North to East; land under 5% slope
13	1	1	North to East
14	3.5	3.5	North to North-west
15	1	1	North to East
16	2	2	West to South
17	2	2	West to South
18	2	2	West to South
19	3	3	North-west to West
20	1	1	North to East
21	1	1	North to East
22	3	3	North-west to West
23	2	2	West to South

2.5 Total Bushfire Hazard

The scores for the individual factors determined for vegetation communities, slope and aspect are added together to give a total for each sub-unit as follows:

Total hazard score = vegetation community hazard score +
slope hazard score +
aspect hazard score

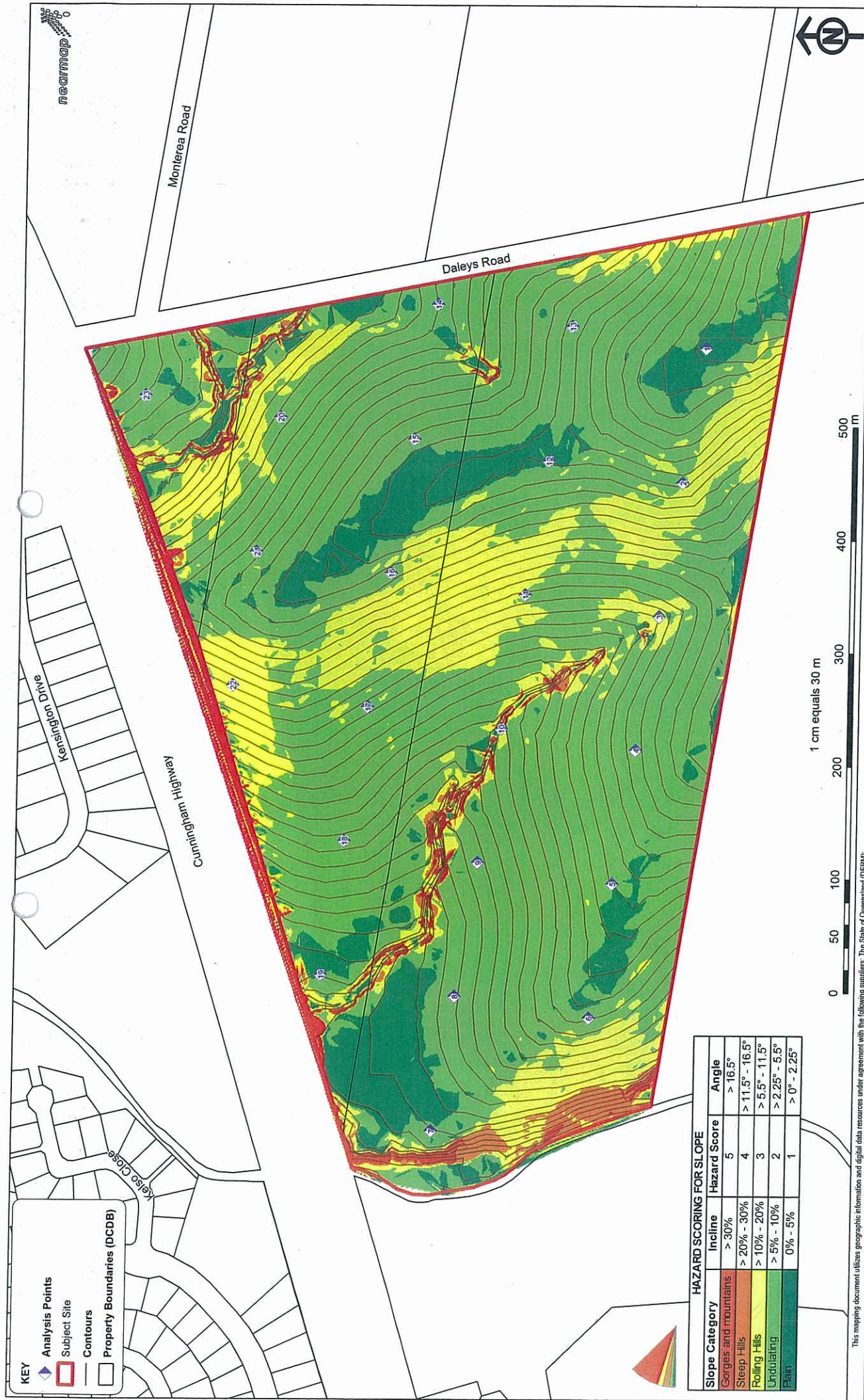
'Table A3.4: Hazard score ranges to identify the severity of bushfire hazard' of the SPP 1/03 Guidelines demonstrates that three levels of bushfire ratings are applicable (refer **TEXT BOX 2**).

Text Box 2 – Table A3.4: Hazard Score ranges to identify the severity of bushfire hazard	
13 or greater	High
6 – 12.5	Medium
1 to 5.5	Low

TABLE 4 provides the individual scores for the analysis points across the Site. Note that final hazard scores have been derived from the above analysis and utilise the final adjusted scores applicable to each analysis point. The Total Hazard Score represents the addition of the individual attribute hazard scores (i.e. Vegetation Community, Slope and Aspect).

TABLE 4: FINAL BUSHFIRE HAZARD SCORE

Analysis Point ID	Hazard Score				Hazard Rating
	Vegetation	Slope	Aspect	Total	
1	6	1	0	7	Medium
2	8	2	3	13	High
3	6	3	3	12	Medium
4	6	2	3.5	11.5	Medium
5	6	2	3.5	11.5	Medium
6	8	2	2	12	Medium
7	8	2	3	13	High
8	6	2	1	9	Medium
9	6	2	3.5	11.5	Medium
10	6	3	3.5	12.5	Medium
11	8	3	2	13	High
12	8	1	0	9	Medium
13	6	2	1	9	Medium
14	6	2	3.5	11.5	Medium
15	6	2	1	9	Medium
16	8	2	2	12	Medium
17	8	2	2	12	Medium
18	8	2	2	12	Medium
19	8	2	3	13	High
20	6	2	1	9	Medium
21	6	2	1	9	Medium
22	8	3	3	14	High
23	8	2	2	12	Medium



- KEY**
- Analysis Points
 - Subject Site
 - Contours
 - Property Boundaries (DCDB)

HAZARD SCORING FOR SLOPE			
Slope Category	Incline	Hazard Score	Angle
Gorges and mountains	> 30%	5	> 16.5°
Steep Hills	> 20% - 30%	4	> 11.5° - 16.5°
Rolling Hills	> 10% - 20%	3	> 5.5° - 11.5°
Undulating	> 5% - 10%	2	> 2.25° - 5.5°
Plan	0% - 5%	1	> 0° - 2.25°

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FIGURE 5: BUSHFIRE HAZARD MAP - SLOPE
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FIGURE 6: BUSHFIRE HAZARD MAP - ASPECT
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DATE: 14/06/2012
PROJECT NO: BUA01
ISSUE: A
SCALE: 1:3000 @ A3

3.0 MITIGATING BUSHFIRE RISK

3.1 Requirement for a BMP

There is a requirement for the preparation of a BMP for development that materially increases the number of people living or working (except for single dwellings on existing lots) in a high severity bushfire hazard area. This hazard should be assessed on a landscape and Site specific basis with the overall hazard at a landscape level detailing the level of mitigation implemented.

In accordance with the SPP, this BMP recommends specific mitigation actions for the proposed development including:

- Road and lot layout and land use allocations;
- Firebreaks and buffers;
- Building locations or building envelopes;
- Landscaping treatments;
- Warning and evacuation procedures and routes;
- Fire fighting requirements including infrastructure;
- Any other specific measures such as external sprinkler systems and alarms;
- Purchaser/resident education and awareness programs; and
- Ongoing maintenance and response awareness programs.

The above points have been addressed in **SECTIONS 3.3** to **SECTION 3.9**.

3.2 Proposed Development

The proposed development layout includes a 14 stage, 426 lot development comprising a variety of lot sizes (**FIGURE 7**). The layout recognises and affords the retention of vegetated buffers to the riparian zone of Deebing Creek. This buffer ranges from 70 m in the south to 210 m in the north. The majority of the area will be retained with remnant vegetation cover, although a constructed wetland is proposed for the area adjoining the Cunningham Highway in the north-east corner of the Site. The Context Plan for the UDA Neighbourhood Planning Unit (refer **APPENDIX C**) expands on future developments and the creation of open spaces, parks, residential areas and urban centre facilities. **FIGURE 7** shows the proposed development layout and indicative areas of vegetation clearing that will be effected.

3.3 Road and Lot Layout

The development will initially be accessed from the south east by Binnies Road into Daleys Road. A main avenue (24m wide) will run through the subdivision with a number of minor roads (15m wide) providing access to the lots. The main access road will afford access for larger fire fighting vehicles. The road network does not include any cul-de-sacs.

Esplanade roads have been designed to provide effective fire breaks between all dwellings and the surrounding bushland, with the exception of six allotments backing onto the stormwater management area in the north-eastern corner of the Site.



FIGURE 7: PROPOSED LAYOUT & INDICATIVE EXTENT OF CLEARING
160 - 210 DALEYS ROAD, RIPLEY

DATE: 14/08/2012
PROJECT NO: BU001
ISSUE: A
SCALE: 1:3000 @ A3

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It is assumed that the construction of the various stages will be phased. Therefore any road which is temporarily terminated as a cul-de-sac until the follow-on stages are constructed, should be designed to ensure that emergency vehicles have a sufficient turn-around space.

The Site is located approximately 10 kms from a full time Queensland Fire and Rescue Service (QFRS) station (Ipswich Fire Station, Cnr Limestone & Waghorn Sts, Ipswich). The existing road network will ensure adequate and fast access to the Site by emergency vehicles.

3.4 Firebreaks and Buffers

In addition to the esplanade roads, a 20m buffer will be created between remnant vegetation and the western edge of the proposed development (refer Daleys Road Context Plan, BR005365-001.008, version C, dated 01/06/2012, in **APPENDIX C**). This buffer will run from the Cunningham Highway at the northern boundary to Binnies Road at the southern boundary.

Depending on the progress of other developments around the Site, a 20m wide firebreak will need to be constructed and maintained along the southern boundary of the proposed development until such time as further construction takes place. It should also be noted that Daleys Road will not be constructed for vehicular access between the collector road (road No 1) and minor road No. 11. This section of road will need to be maintained clear of vegetation in order to provide a firebreak from the bushland to the east until such time as future works take place. Daleys Road will allow traffic flow between minor road No. 11 and road No. 12 (refer **FIGURE 7**).

The density of the residential development does not require the provision of individual buffers or firebreaks for the allotments.

3.5 Building Locations and Building Envelopes

The Assessment Code in SPP 1/03 has several requirements relating to the location of buildings in relation to bushfire hazard areas. The Assessment Code requires that:

- Buildings and structures are located within lowest hazard areas within each lot;
- Setbacks are 1.5 times the predominant mature canopy height or 10 m (whichever is greater); and
- Building envelopes should be set back 10 m from any small areas of retained vegetation.

The SPP 1/03 Guidelines also recognises that it is not possible to provide a setback of ideal proportions in all situations. On lots less than 2,500 m² (such as proposed for the development), the SPP 1/03 states that setbacks to hazardous vegetation must be maximised. It allows for alternative solutions provided that they comply with Outcomes 1 & 2 of the policy. The SPP 1/03 requires that development is compatible with the natural hazard (Outcome 1) or that it minimises as far as practicable the adverse impacts from natural hazard and does not result in unacceptable risk to people or property (Outcome 2).

The proposed 20 metre bushfire buffer zone which separates the proposed development from the remnant vegetation associated with Deebling Creek, provides sufficient bushfire mitigation and will act as the development's Asset Protection Zone.

Owing to these fire mitigation measures, the proposed development will not be subject to any construction restrictions under Australian Standard (AS) 3959/1999 (*Construction of Buildings in Bushfire Prone Areas*) or the most recent version (AS3959-2009). It is however recommended that fences within lots adjoining hazardous vegetation (in particular the six allotments in the north-eastern corner adjoining the stormwater

condos?

management area) utilise fire retardant materials (i.e. colour-bond, wire strand or chain-wire fencing).

3.6 Landscaping Treatments

It is recommended that landscaping treatments comply with performance requirements stated below; landscaping within areas such as any rehabilitation in Open Space areas of the development must ensure:

- There is minimal fine fuel at ground level which could be set alight by a bushfire; and
- Any vegetation within the proposed allotments does not provide a path for the transfer of fire to the development – that is, the fuels are discontinuous. Vegetation included within these areas should be noted fire retardant plants. Such plants include fleshy broad leaved evergreen species such as rainforest and common landscape species with large leaves).

It is recommended that shrubs / trees within allotments:

- Do not touch or overhang the building;
- Are well spread out and do not form a continuous canopy;
- Are not species that retain dead material or deposit excessive quantities of ground fuel in a short period or in a danger period; and
- Are located far enough away from the house so that they will not ignite the house by direct flame contact or radiant heat emission.

These landscaping requirements should be incorporated into the landscape design of the esplanade roads and detention basins. This will reduce potential fuel loads and subsequently lower the bushfire hazard for the adjacent lots.

3.7 Fire Fighting Requirements

According to the SPP 1/03 the site must have access to a "reliable reticulated water supply that has sufficient flow and pressure characteristics for fire-fighting purposes at all times (minimum pressure and flow is 10 litres a second at 200 kPa)".

The Site will be connected to town water and therefore will be able to comply with this requirement and no additional water storage for fire-fighting purposes will be necessary. Fire hydrants will be installed throughout the subdivision in accordance with regulations for an urban development.

3.8 Fire Maintenance Trail

The proposed development will incorporate esplanade roads allowing fire fighting access to the bushfire buffer zones. Access to the proposed development is considered sufficient for fire fighting purposes. No fire maintenance trail is being proposed for the vegetated corridor along Deebing Creek.

3.9 Ongoing Maintenance

Until future developments take place south of the Site, there will be a requirement to maintain the bushfire buffer along the Site's boundary. Vegetation along the short stretch of Daleys Road which will not be constructed for vehicular access will also need to be maintained.

3.10 Residual Bushfire Hazard Post-construction

To assess the proposed development's bushfire hazard there is a need to understand what the inherent post construction bushfire risk will be. This is desirable due to the

likelihood that the alteration to the pre-development vegetation structure will in turn alter the bushfire hazard.

The layout is based on the incorporation of the mitigation measures described in the sections above. **TABLE 5** summarises the bushfire threat rating associated with each proposed development stage, by identifying the source of the highest threat for each stage (using analysis points as references). The assessment is based on a phased construction of the subdivision, sequenced in accordance with the stage numbers. It has been assumed that vegetation will only be cleared for the Stage under construction, including an appropriate bushfire buffer from surrounding remnant vegetation. It has also been assumed that any developments which could occur to the east and south of the Site will not be underway when this subject proposed development is being constructed. Therefore two hazard ratings have been provided: the transitional hazard rating is based on the fire threat existing during the initial construction of the stage; the final hazard rating provides an indication of the residual fire threat post construction of the entire development.

TABLE 5: BUSHFIRE THREAT BY STAGES

Stage No.	Source of Fire Threat	Relevant Analysis Point	Transitional Hazard Rating	Final Hazard Rating
1A	During initial construction this stage will be exposed to the highest fire threat as it will be surrounded by remnant vegetation on all sides with only Daleys Road providing a buffer to the east. Analysis point 1 indicates a rating of Medium but analysis point 2 is rated High. A bushfire buffer will be essential to provide sufficient protection for the proposed allotments. Final configuration of the development will see this stage surrounded by built forms to the north and west. A bushfire buffer to the south will still be required. The final hazard rating is assessed as Low based on predominant easterly winds during the bushfire season.	1, 2, 13	Medium	Low
1	With Stage 1A to the south and Daleys Road to the east, the source of highest fire threat will be from the remnant vegetation to the north and west. On the basis that an appropriate buffer will be constructed, analysis points 1, 12, 13, and 14 all indicate a Medium hazard rating. Final configuration of the development will see this stage surrounded by built forms to the south, north and west, and Daleys Road to the east. The final hazard rating is assessed as Low.	2, 12, 14	Medium	Low
2	This stage will face similar fire threat sources as stage 1. Analysis points within and surrounding stage 2 are all Medium. Final configuration will see the hazard reduced to Low. It should be noted that Daleys Road will not be constructed for vehicular access (only pedestrian) between the main collector road (road No. 1) and minor road No. 11 which will provide access to the allotments within stage 2. Emergency vehicles will have to travel from Daleys Road and along the collector road (road No. 1) to access stage 2.	12, 15	Medium	Low
3	This stage will face similar fire threat sources as stages 1 and 2. Analysis points within and surrounding stage 3 are all Medium. Final configuration will see the hazard reduced to Low.	11, 16, 20	Medium	Low
4	This stage will incorporate the construction of a stormwater detention basin in a dedicated area at the corner of Daleys Road and Cunningham Highway. Earthworks for the detention basin are likely to result in the removal of most of the vegetation in this area. Therefore the source of fire threat for the allotments in this stage will be from the remnant vegetation to the west. As per the previous stages, the transitional hazard rating is assessed as Medium with a Low rating post construction of the entire development.	16, 21	Medium	Low

Stage No.	Source of Fire Threat	Relevant Analysis Point	Transitional Hazard Rating	Final Hazard Rating
5A	Analysis point 2 located within the boundaries of stage 5A is rated as High. However all the vegetation representing the fire threat will be cleared. Previous stages to the east will provide additional buffering from vegetation to the east of the Site. Surrounding vegetation to the north and west which will be present in the early phases is rated as Medium. Final configuration will see the rating reduced to Low on the basis of predominant easterly winds during the bushfire season.	3, 11, 12	Medium	Low
5	The highest fire threat for this stage will come from the vegetation to the north, as indicated by analysis point 11 rated as high. A bushfire buffer will be essential in order to provide the appropriate mitigation measures for the allotments within this stage. Transitional rating will Medium and final rating will be Low.	3, 11	Medium	Low
6	Construction of stage 6 will result in the clearing of the vegetation representing on of the highest sources of fire threat (refer analysis point 11). As per previous stages, fire threat during construction will come from remnant vegetation to the north and west. Final configuration will see the hazard reduced to Low.	4, 10, 16	Medium	Low
7	As per previous stages, the transitional rating for this stage will be Medium, reducing to Low following completion of the entire development.	10, 17	Medium	Low
8	The highest fire threat for this stage will come from the vegetation to the north, as indicated by analysis point 22 rated as high. A bushfire buffer will be essential in order to provide the appropriate mitigation measures for the allotments within this stage. Transitional rating will Medium and final rating will be Low.	10, 18, 21, 22	Medium	Low
9	Stage 9 will be surrounded by remnant vegetation to the north and west with some of the highest scoring analysis points located in these areas (ID 1, 19 and 22). Bushfire buffers will be essential to provide effective protection for the proposed allotments.	4, 9, 18	Medium	Low
10	Sources of bushfire threat are located on the western and southern boundaries of this stage. Construction phase rating will be Medium, and final phase will be Low on the basis of predominant easterly winds during the bushfire season.	5, 9	Medium	Low
11	With all previous stages constructed to the east and south, this stage will only have a narrow interface to the remnant vegetation on the western boundary. Transitional rating is assessed as Medium and final rating as Low.	18, 22	Medium	Low
12	Stage 12 will be adjacent to remnant vegetation on its western boundary. This vegetation is rated as a High hazard (analysis point ID 7, 19). The proposed allotments will be located uphill from the hazardous vegetation however will be effectively buffered by the esplanade road and the planned stormwater management area. Therefore the hazard rating is assessed as Medium for the transitional phase and Low for the final configuration.	9, 19	Medium	Low
13	Similarly to those stages along the southern boundary of the Site (i.e. 1A, 5A and 10), this stage will face its highest threat from the remnant vegetation to the north, west and south. Bushfire buffers will be essential during and post construction of the whole development. However predominant wind direction during the bushfire season is from the east therefore the final hazard is assessed as Low.	6, 9	Medium	Low
14	This final stage will be adjacent to and uphill from High hazard-rated vegetation along its northern and western boundaries (analysis point ID 7, 19). The esplanade road will be an effective bushfire buffer with the addition of the 20m setback from the remnant vegetation along the proposed linear park (refer Context Plan in APPENDIX C). Predominant wind direction during the bushfire season is from the east therefore the final hazard is assessed as Low.	7, 8	Medium	Low

4.0 CONCLUSIONS

The proposed development has been assessed to have a Medium transitional bushfire hazard rating during the sequential construction of the development's stages with a Low bushfire hazard rating on completion of the whole subdivision. This assessment is based on:

- source of highest bushfire threat being the large tract of remnant vegetation to the south of the Site;
- road layout incorporates esplanade roads around the allotments;
- bushfire buffers to remnant vegetation to be constructed along the Deebing Creek corridor and the southern boundary of the Site;
- subdivision will be appropriately serviced by water infrastructure and fire hydrants will be installed in strategic locations.

The proposed development is for a subdivision of an urban density (not rural residential) therefore individual allotments will not be required to implement asset protection zones via bushfire setbacks and building location envelopes (BLE).

It is the responsibility of the developer to:

- Construct road networks to Council standards (**SECTION 3.3**);
- Provide (**SECTION 3.4**) and maintain the bushfire buffers (**SECTION 3.9**);
- Design and implement landscaping treatments in accordance with **SECTION 3.6**; and
- Provide reticulated water for fire fighting access (viz hydrant locations recommended within **SECTION 3.7**).

Appendix A

Meteorological Statistics