



THE CONSULTANCY BUREAU

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DEVELOPMENT APPROVAL



Approval no: DEV2017/844

Date: 25 October 2017

BUSHFIRE MANAGEMENT STRATEGIES

ON

PRECINCT 1 - FLINDERS

FOR

PACIFIC INTERNATIONAL DEVELOPMENT
CORPORATION PTY LTD – ATF THE PIDC
TRUST

by

L.S. Hawkes, B.Sc.(For)
The Consultancy Bureau Pty Ltd
February 2012

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Summary

A property (Flinders) of about 3,919 Ha's situated north west of Beaudesert and west of Jimboomba is being managed for a rural grazing business. (see Flinders Land Ownership Plan)

The site is flagged for development and Precinct 1 is to be submitted to the Urban Land Development Authority (ULDA) for approval. (see Precinct 1 Reference Plan)

Onsite investigations in August 2011 confirmed the bushfire risk under the rural management is low but the potential bushfire hazard ranges from low to high. (see Overall Bushfire Hazard Map)

This range of hazards is present on Precinct 1 and generally an increasing hazard from south to north, grassland to forest and low elevation to higher steeper elevations.

This strategy recognises these hazards along with risk areas along with broad design parameters to detail those mitigating actions that will satisfy State Planning Policy 01/03 and local Codes.

A detailed Bushfire Management Plan has been developed for Sector 1 (NH1S) and further detailed plans will be in place by the end of February 2012 for the following areas:-

- NH1N – NH3
- NH2 - H2 – H1

This report draws on these detailed plans and covers the entire Precinct 1.



1. Introduction

Precinct 1 is entirely within Logan City Council with possible future development lands to the east and south and long term development areas to the west.

There are large tracts of vegetation in the region and these occur on non-developable lands and will post a bushfire threat into the long term. As such it is important at the planning stage to put in place suitable mitigating actions to ensure those exposed areas are appropriately protected. These actions must be compatible with ecological, engineering and other site specific imperatives.



2. Description of the Site

2.1 Tenure and Area

Precinct 1 is freehold land in three portions including the current Farm Managers residence:-

(Unit T)	-	Lot 3 SP311896	–	674.1 Ha's
(Unit O)	-	Lot 200 SP133189	–	322.688 Ha's
(Unit P)	-	Lot 1 RP97710	–	<u>0.3975 Ha's</u>
TOTAL				<u>997.1855 Ha's</u>

The Aerial Photographs show the land rising from Woolaman Creek to a high point on the northern boundary of RL 300m.

The lowest point in the south east corner is about RL 40m.

The steepest lands are the heavily vegetated northern 30% of the area. (see Site Analysis Map)

The amount of vegetation on the property has increased appreciably in recent times. The bulk of this increase has been regrowth of wattle (*Acacia* spp) with various *Eucalyptus* spp and *Corymbia* spp that has invaded grassland areas. An increase in property management will assist in the reduction of the regrowth risk.

The vegetation on the property can be broken into three types for the purpose of assessing the potential bushfire hazard. These types with a brief description are as follows:-

(i) Grassy eucalypt forest

This type covers a number of Regional Ecosystems (RE) described under the Vegetation Management Act 1999; the major RE are



12.9-10.2 spotted gum (*C. citriodora* subsp. *variegata*), narrow-leaved ironbark (*E. crebra*) open forest on sedimentary rocks

and

12.9-10.17 open forest complex often with white mahogany (*E. acmenioides*), grey gum (*E. major*), grey ironbark (*E. siderophloia*) +/- spotted gum on sedimentary rocks.

Along some of the creeks and gullies, there is a fringing vegetation (RE 12.3.3) dominated by forest red gum (*E. tereticornis*) but this is narrow and of no practical difference from the above in assessing the potential bushfire hazard.

The predominant ground cover in all the grassy forest RE is kangaroo grass (*Themeda triandra*) with understorey species such as wattle, oaks (*Allocasuarina torulosa* and *A. littoralis*) and dogwood (*Jacksonia scoparia*) being common. The difference between the various REs within the grassy forest type is of no practical significance in deriving a potential bushfire hazard.

The areas of grassy eucalypt forest are mapped mainly as RE or regrowth by the Department of Environment and Resource Management (DERM) under the *Vegetation Management Act 1999*.

(ii) Regrowth

This type is quite extensive and contains wattle, oak, eucalypts and *Corymbia* spp. The wattle has obviously grown from seed (probably after a fire) with the eucalypts and *Corymbia* spp developing from lignotubers and coppice. Generally this regrowth has a grassy understorey. In the past 10 years or so, this regrowth has invaded areas previously cleared for grass production.

The bulk of this regrowth has been classified by DERM as Category X on PMAVs under the *Vegetation Management Act 1999*.



(iii) Grazed grassland

These areas are heavily grazed grassland with isolated trees or small clumps of *Eucalyptus*, *Corymbia* and *Acacia* that reflect the long term use as a grazing property. These areas carry very light ground fuel.

These grazed grassland areas have been classified by DERM as Category X on PMAVs under the *Vegetation Management Act 1999*.



3. Potential Bushfire Hazard Assessment

The entire property known as “Flinders” was assessed in 2011 using the standard methodology specified in State Planning Policy 1/03. (see Appendix 1)

The areas in Precinct 1 assessed low – medium – or high hazard largely based on the presence of vegetation on steep lands giving the highest results.

This is summarised in Table 1.

Unit	Characteristic	Description/Score	Potential Bushfire Hazard
O1	Vegetation	Grazed grassland	2
	Total		2 LOW
O2	Vegetation	Regrowth	5
	Slope	10-20	3
	Aspect	S-SW	2
	Total		10 MEDIUM
O3	Vegetation	Regrowth	5
	Slope	20-30	4
	Aspect	W-SW	2
	Total		11 MEDIUM
O4	Vegetation	Regrowth	5
	Slope	10-20	3
	Aspect	E-S	0
	Total		8 MEDIUM
O5	Vegetation	Regrowth	5
	Slope	10-20	3
	Aspect	E-S	0
	Total		8 MEDIUM
O6	Vegetation	Grassy forest	6



	Slope	10-20	3
	Aspect	S, E & W	2.5
	Total		11.5 MEDIUM
O7	Vegetation	Regrowth	5
	Slope	10-20	3
	Aspect	S & E	2
	Total		10 MEDIUM
O8	Vegetation	Grassy forest	6
	Slope	5-10	2
	Aspect	SW	2
	Total		10 MEDIUM
O9	Vegetation	Grassy forest	6
	Slope	10-20	3
	Aspect	SE	0
	Total		8 MEDIUM
O10	Vegetation	Grassy forest	6
	Slope	10-20	3
	Aspect	SW	2
	Total		11 MEDIUM
O11	Vegetation	Grazed grassland	2
	Total		2 LOW
P	Vegetation	Manicured house block	2
	Total		2 LOW
T1	Vegetation	Grazed grassland	2
	Total		2 LOW
T2	Vegetation	Grassy forest	6
	Slope	0-5	1
	Aspect	<5% slope	0
	Total		7 MEDIUM
T3	Vegetation	Grassy forest	6



	Slope	5-10	2
	Aspect	all	2.5
	Total		10.5 MEDIUM
T4	Vegetation	Grassy forest	6
	Slope	0-5	1
	Aspect	<5% slope	0
	Total		7 MEDIUM
T5	Vegetation	Regrowth	5
	Slope	10-20	3
	Aspect	E-S	0
	Total		8 MEDIUM
T6	Vegetation	Grassy forest	6
	Slope	30+	5
	Aspect	E-SW	2
	Total		13 HIGH

The potential bushfire hazard is about $\frac{1}{3}$ of each class. Steepness and aspects with a strong west component increases the potential bushfire hazard to high. The grazed grassland areas on generally rolling topography have a low potential bushfire hazard. The Bushfire Hazard Map shows a ground truthed potential bushfire hazard status on the property and Precinct 1. This shows a generally higher hazard than Council's Bushfire Overlay (OV 3.1D – refer attached) and this reflects the extent of regrowth on the area.



4. Risk Analysis

The Potential Bushfire Hazard is a measure of the physical attributes of any site. The risk of these features supporting a damaging unplanned bushfire is the chance or opportunity of a fire starting and developing.

These risks are generally considered in two ways:-

- Internal
- External

4.1 Internal

Precinct 1 Reference Development Plan shows the development nodes and the extensive retained natural areas and corridors of vegetation.

The large retained area in the north shows evidence of past fires and there are further areas of vegetation to the north. These areas will burn from time to time so the interface with any development is a moderate risk. This risk is lowered by the fact that the proposed development is on the lower slopes and any fire must burn downhill to it or uphill away from the development.

The narrow retained creek corridors are to be revegetated to their original ecosystems and as such these may carry a low intensity in dry times. These fires will be of nuisance value but residents in the development node will need protection and access to deal with these events when they occur.

Overall the risk from vegetation internal to Precinct 1 is low to moderate.



4.2 External

The Aerial Photograph confirms the largely undeveloped nature of the lands surrounding Precinct 1.

The lands to the east are heavily vegetated but some areas are located within the ULDA and planned for future development. There is a moderate risk of fire developing in this area and threatening development units NH3 and H2 (see Reference Plan). These external easterly areas are also a source of fire for the large retained vegetation in the northern section of Precinct 1. (NH1)

The lands to the south are mostly open grazing lands with low fuel loads and a high chance of future development. There is a risk of a grass fire in dry times but this risk is low.

The lands to south west with Woolaman and Undullah Creeks as the boundary will have a significant internal corridor but any fire approaching from outside has to cross the significant fire proof strip of the creeks. The risk from this direction is very low.

The lands along the north west boundary are vegetated and steep uphill to ridge line western boundary of Precinct 1. These lands are owned by the developer and ongoing management (cattle grazing and burning will be a major risk reduction in this area.

This area is a moderate to high risk of delivering a fire to development nodes NH8, NH7 and NH10. The lands along the northern boundary are extensive areas of undeveloped and unmanaged vegetation. These areas will burn from time to time and fires will move onto the Natural Retained Area in Precinct 1. (NH1) The risk from this direction is the same as the internal risk from this area i.e. moderate but lowered by the downhill nature of any fires approaching development.

Overall there is currently a moderate risk for some external areas to carry fires onto or threaten proposed development. This risk is highest in the north west and some small sections to the east.



5. Mitigating Actions

For development to proceed in an assessed Bushfire Hazardous area it is necessary to detail actions to achieve the following outcomes:-

- Provide a safe efficient access network.
- Protect and enhance nature conservation values.

These actions fall into six categories:-

1. Access:- Roads, Fire Trails etc.
2. Separation from Hazards.
3. Vegetation Management
4. Provision of accessible water.

These four are to be dealt with at the planning stage.

5. House construction and design.
6. Public Awareness

These are dealt with during the residential construction stage.

Stage NH1 South is in a low hazard and risk area and a detailed B.M.P. has been prepared for this area. As other nodes are designed, detailed plans will be developing using the following principles and details:-

1. Access

Where possible provide a boundary access between development and adjoining hazard.

Where the external road system is not possible a minimum of a 6 metre wide fire trail with access to a road network at each end (road grades normally a maximum of 16% with short sections of 25% are allowed) will be in place.

The access is particularly important where an adjoining hazard and risk is high because of uphill topography or high fuel loads.

Precinct 1 development for nodes NH7, NH8 and parts of NH10 will require particular attention to high quality access and suitable overall separation from the hazard of the adjoining vegetation to the west and north.

Similar detail will be required for the less hazardous interface for NH3 and H2 nodes.



2. Separation

Where a high hazard adjoins a development node the total separation distance (including access) will normally be – 1.5 times the predominant canopy tree height or 20 metres whichever is the greater.

For medium hazard situations the minimum may reduce to 10 metres if low risk strategies are in place. E.g. retained strips and small areas of vegetation.

If this separation zone includes a boundary fence then the construction of the fence should not involve timber or other combustible material in the high hazard areas.

3. Vegetation Management

Where the separation zone includes areas of retained vegetation the following prescription will apply.

- Well-spaced mature trees can be retained but must not include fibrous barked fire dangerous species.
- Understorey will be maintained in a manicured condition by mowing, slashing or burning. This management will be most important in areas of dense low regrowth of wattle etc.
- The use of ground cover plantings of fire safe species as landscaping etc. is also permissible.

A minimum of 5 metres around all residences as “on foot” access should be maintained for emergency service personnel.

4. Water

The entire development will be supplied with Council managed reticulated water systems. As such the strategic location of fire hydrants will provide adequate access for fire fighting appliances in the development. Special attention can be given to this where adjoining retained vegetation is assessed as a moderate or high risk at individual neighbourhood design stage.



6. Conclusion

As each node of development receives detailed assessment and design the requirements of section 5 will be included to satisfy SPP 1/03 and local Constraints Codes.

Onsite hazard evaluation suggests the challenges for design to meet Bushfire Risk will be in the boundary interfaces of nodes:-

- NH10B Northern Boundary
- NH10A Northern Boundary
- NH7 Western Edge
- NH8 Western Boundary
- H1 Northern Boundary
- H2 Northern and Eastern Edges
- NH3 Eastern Edge at Boundary

All of these challenges can be met with appropriate design and bushfire will not be a limiting factor in the development of Precinct 1 of the Flinders Project.

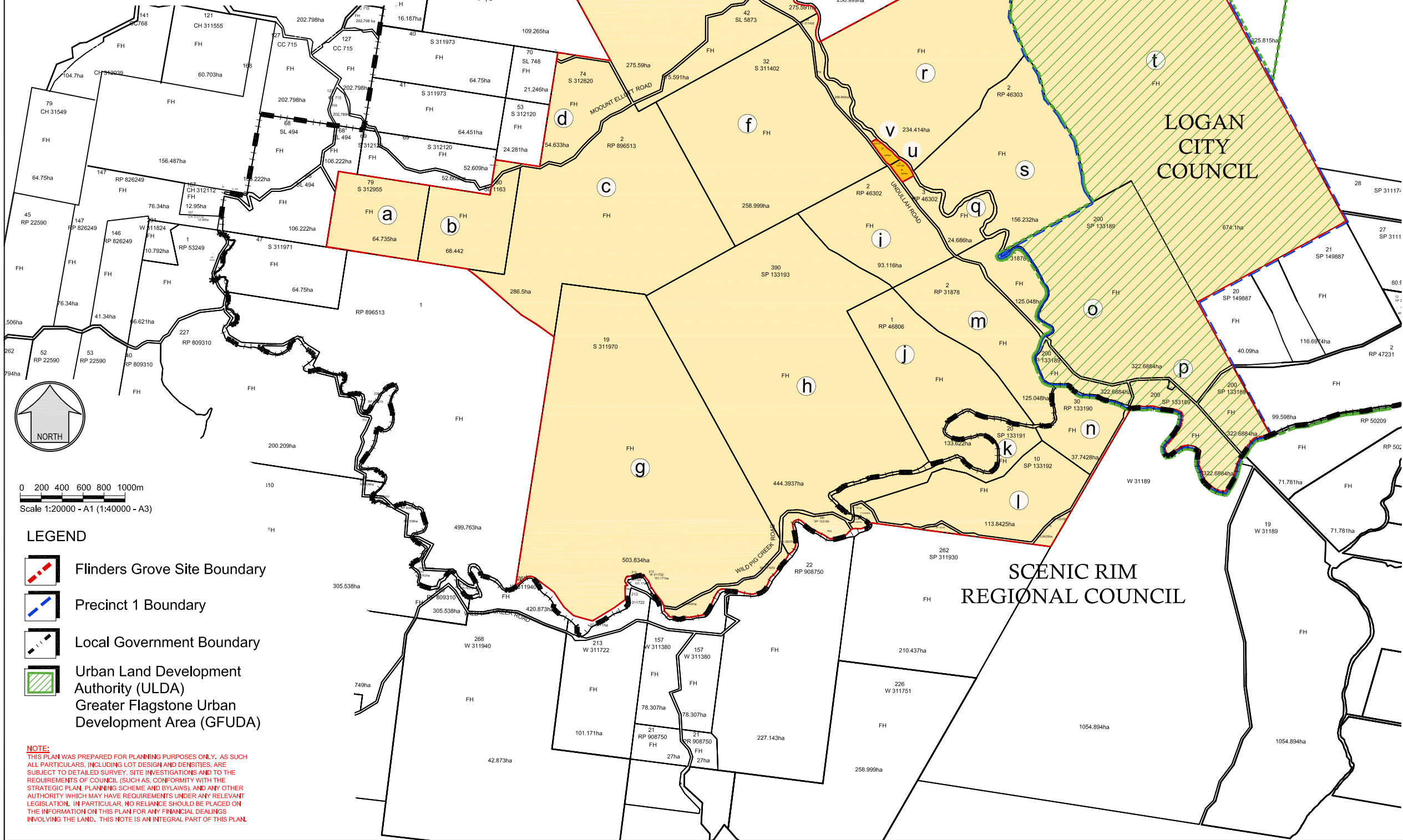


L.S. Hawkes, B.Sc.(For)

Senior Associate



Map Ref.	Real Property Description	Registered Owner	Area (Ha)
a	Lot 79 on S312955	Pacific Exchange Holdings Pty Ltd (Trustee)	64.735
b	Lot 80 on SL 1163	Pacific Exchange Holdings Pty Ltd (Trustee)	68.442
c	Lot 2 on RP 896513	Pacific Exchange Holdings Pty Ltd (Trustee)	286.5
d	Lot 74 on S312820	Pacific Exchange Holdings Pty Ltd (Trustee)	54.633
e	Lot 42 on SL 5873	Pacific Exchange Holdings Pty Ltd (Trustee)	275.591
f	Lot 32 on S311402	Pacific Exchange Holdings Pty Ltd (Trustee)	258.999
g	Lot 19 on S311970	Pacific Exchange Holdings Pty Ltd (Trustee)	503.834
h	Lot 390 on SP133193	Pacific Exchange Holdings Pty Ltd (Trustee)	444.3937
i	Lot 2 on RP 46302	Pacific Exchange Holdings Pty Ltd (Trustee)	93.116
j	Lot 1 on RP 46806	Pacific Exchange Holdings Pty Ltd (Trustee)	133.662
k	Lot 20 on SP133191	Pacific Exchange Holdings Pty Ltd (Trustee)	41.1387
l	Lot 10 on SP133192	Pacific Exchange Holdings Pty Ltd (Trustee)	113.843
m	Lot 2 on SP 31878	Pacific Exchange Holdings Pty Ltd (Trustee)	125.048
n	Lot 30 on SP133190	Pacific Exchange Holdings Pty Ltd (Trustee)	37.7428
o	Lot 200 on SP 133189	Pacific Exchange Holdings Pty Ltd (Trustee)	322.688
p	Lot 1 on RP 97710	Michelle and Darw in King	0.3974
q	Lot 3 on RP 46302	Pacific Exchange Holdings Pty Ltd (Trustee)	24.686
r	Lot 1 on RP35158	Pacific Exchange Holdings Pty Ltd (Trustee)	234.414
s	Lot 2 on RP 46303	Pacific Exchange Holdings Pty Ltd (Trustee)	156.232
t	Lot 3 on S 311896	Pacific Exchange Holdings Pty Ltd (Trustee)	674.1
u	Lot 81 on S311859	Logan City Council	2.428
v	Lot 78 on M33772	Logan City Council	2.428
TOTAL AREA =			3,919.05



PROJECT NAME

RP DESCRIPTION

Lot 79 on S312955, Lot 80 on SL 1163
Lot 2 on RP 896513, Lot 74 on S312820
Lot 42 on SL 5873, Lot 32 on S311402
Lot 19 on S311970, Lot 390 on SP 133193
Lot 2 on RP 46302, Lot 1 on RP 46806
Lot 20 on SP133191, Lot 10 on SP 133192
Lot 2 on SP 31878, Lot 30 on SP 133190
Lot 200 on SP 133189, Lot 3 on RP 46302,
Lot 1 on RP35158, Lot 2 on RP 46303
Lot 3 on S 311896
PARISH OF UNDULLAH
COUNTY OF STANLEY

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OWNERSHIP

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Project Coordination

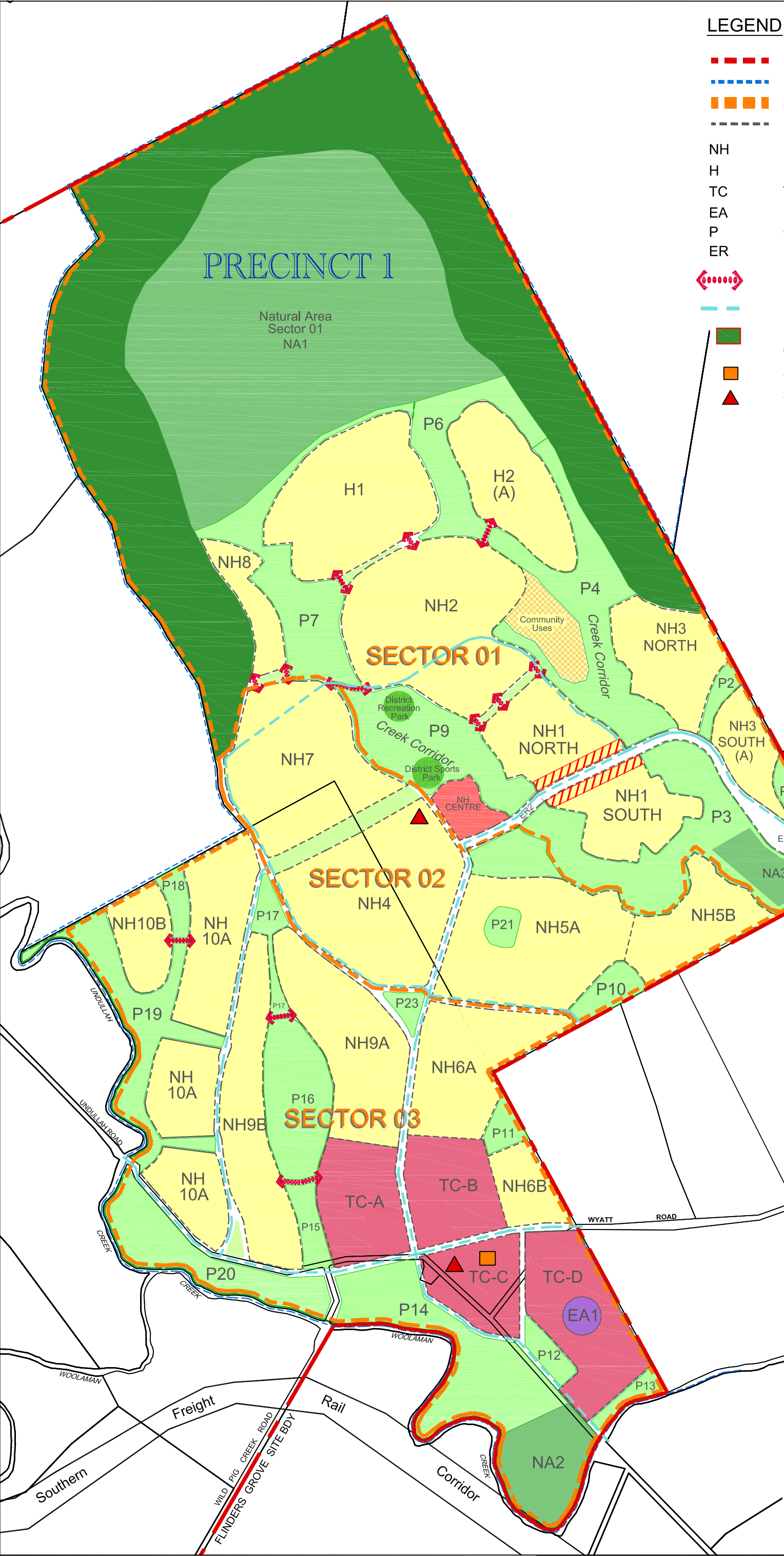
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DRAWN GG DATE 1/6/11 AMEND GG DATE 12/10/11

DRAWING NUMBER
23300_ALL_P05

AMEND
D



LEGEND

- FLINDERS GROVE BDY
- PRECINCT BDY
- SECTOR BDY
- NEIGHBOURHOOD / HAMLET BDY
- NH Neighbourhood
- H Hamlet
- TC Town Centre
- EA Enterprise Area
- P Open Space / Parkland (Multi-Use)
- ER Entry Road
- Potential Links
- Public Transport
- Environmental Protection Zone (balance areas in Precinct 1 are within urban living zone)
- State High School
- State Primary School



0 75 150 225 300 375m
Scale 1:7500 - A1 (1:15000 - A3)



Flinders
Logan City Council

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PRECINCT 1
Reference Plan

Lot 200 on SP 133189, Lot 1 on RP97710, Lot 3 on S 311896

Version 4.0
Dated 9th December 2011
Contact: Mortons Urban Solutions. Ph. (07) 55 711 099
DWG No. 23301-ALL-P121



Stephen Hosking Surveys Pty Ltd

Lot 79 on SP132955, Lot 80 on SL 1163
 Lot 2 on RP 896513, Lot 74 on SP12820
 Lot 42 on SL 5873, Lot 32 on SP131402
 Lot 19 on SP131970, Lot 390 on SP 133193
 Lot 2 on RP 46302, Lot 1 on RP 46806
 Lot 20 on SP133191, Lot 10 on SP 133192
 Lot 2 on SP 31878, Lot 30 on SP 133190
 Lot 200 on SP 133189, Lot 3 on RP 46302,
 Lot 1 on RP35158, Lot 2 on RP 46303
 Lot 3 on S 311896
 PARISH OF UNDULLAH
 COUNTY OF STANLEY

PACIFIC INTERNATIONAL
DEVELOPMENT
CORPORATION PTY LTD

PACIFIC EXCHANGE HOLDINGS P/L




James Warren & Associates

McCormick Rankin Cagney

= PLACE
PLANNING DESIGN ENVIRONMENT

FLINDERS
OVERALL
BUSH FIRE HAZARD MAP

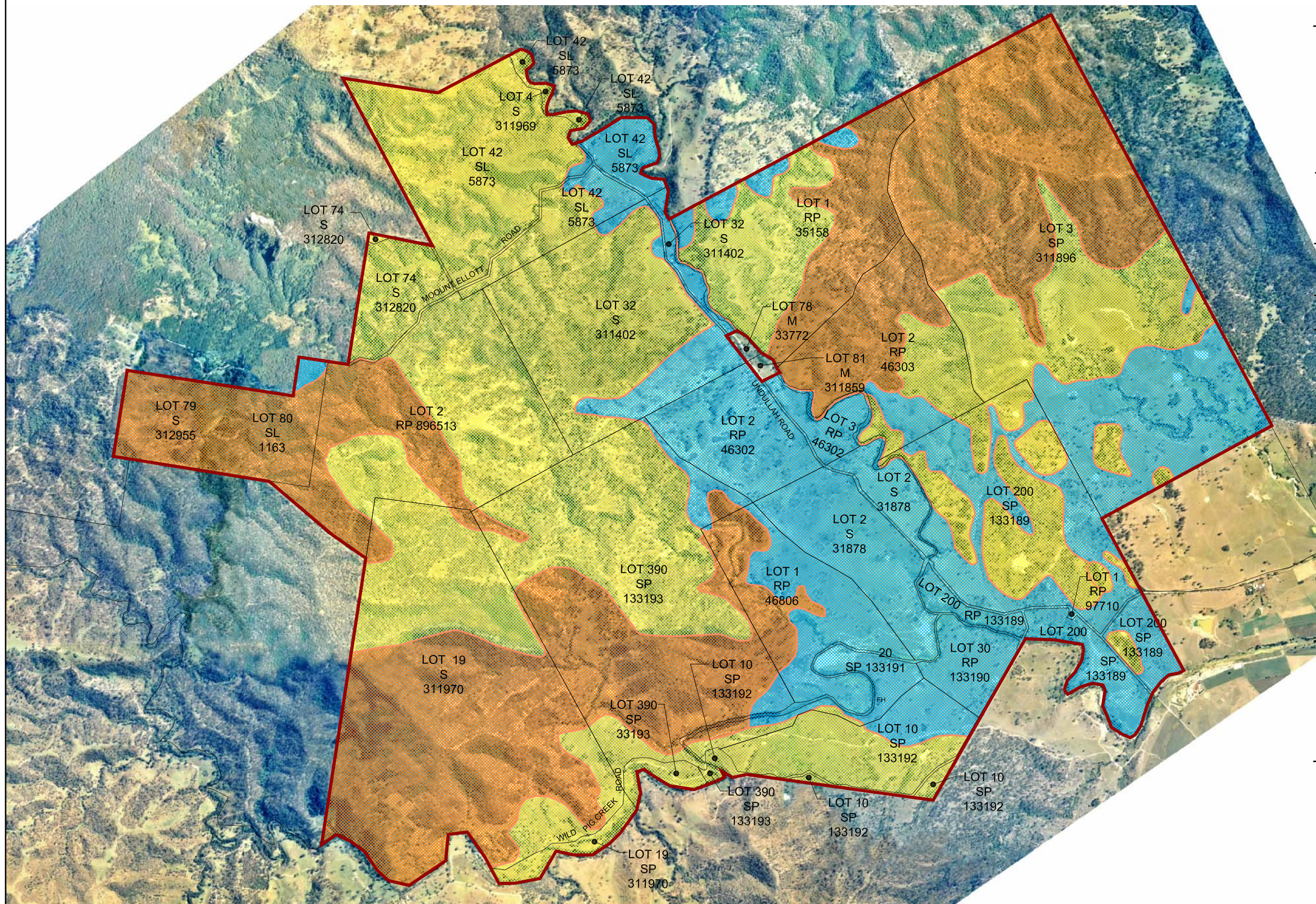


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 Low Hazard (Score 1-5.5)
 Medium Hazard (Score 6-12.5)
 High Hazard (Score 13+)



0 150 300 450 600 750m
Scale 1:15000 - A1 (1:30000 - A3)

FLINDERS

RP DESCRIPTION

Lot 79 on S312955, Lot 80 on SL 1163
 Lot 2 on RP 896513, Lot 74 on S312820
 Lot 42 on SL 5873, Lot 32 on S311402
 Lot 19 on S311970, Lot 390 on SP 133193
 Lot 2 on RP 46302, Lot 1 on RP 46806
 Lot 20 on SP133191, Lot 10 on SP 133192
 Lot 2 on SP 31878, Lot 30 on SP 133190
 Lot 200 on SP 133189, Lot 3 on RP 46302,
 Lot 1 on RP35158, Lot 2 on RP 46303
 Lot 3 on S 311896
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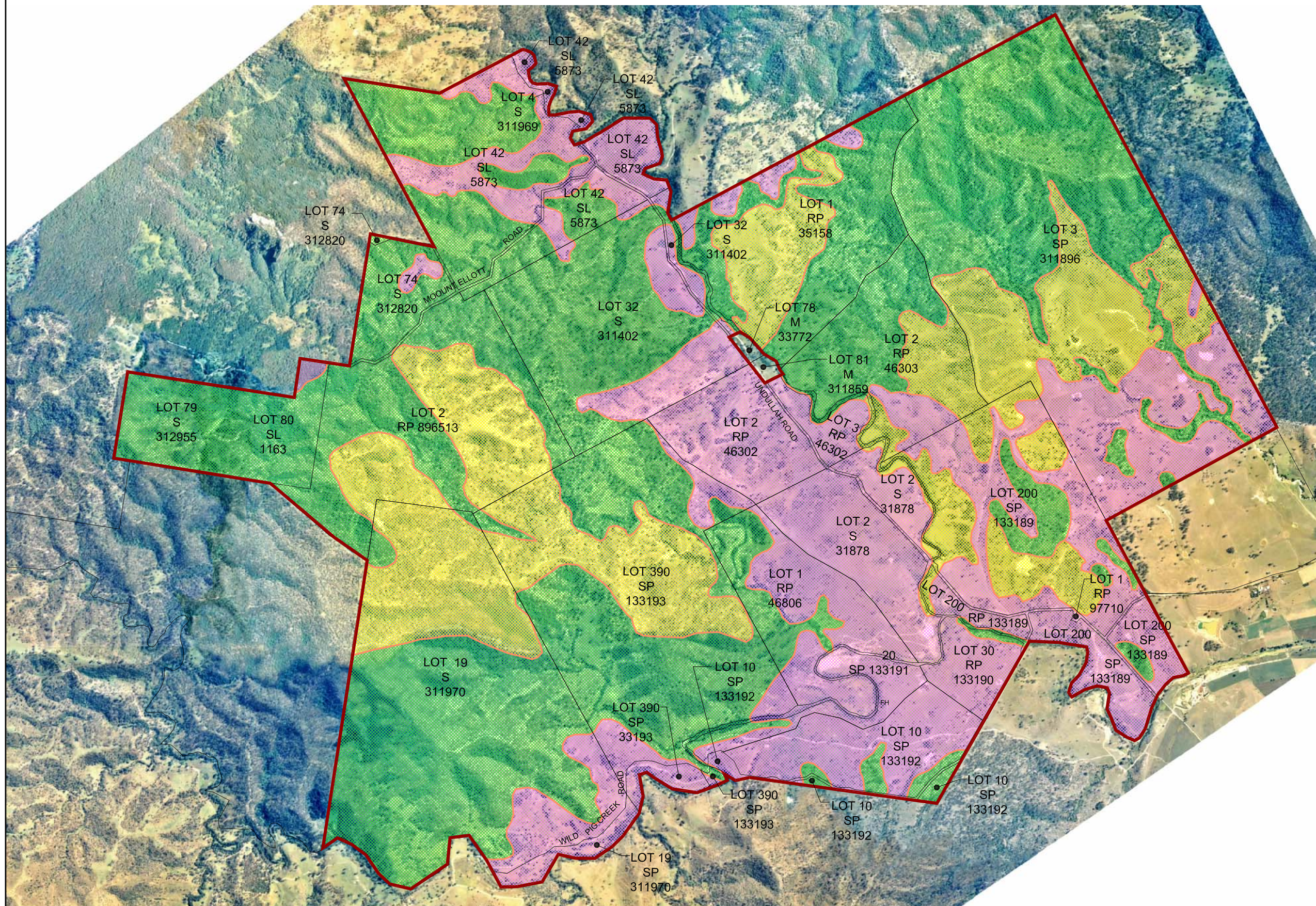
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DRAWING NUMBER AMEND

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Note:
 Information prepared by The Consultancy Bureau.



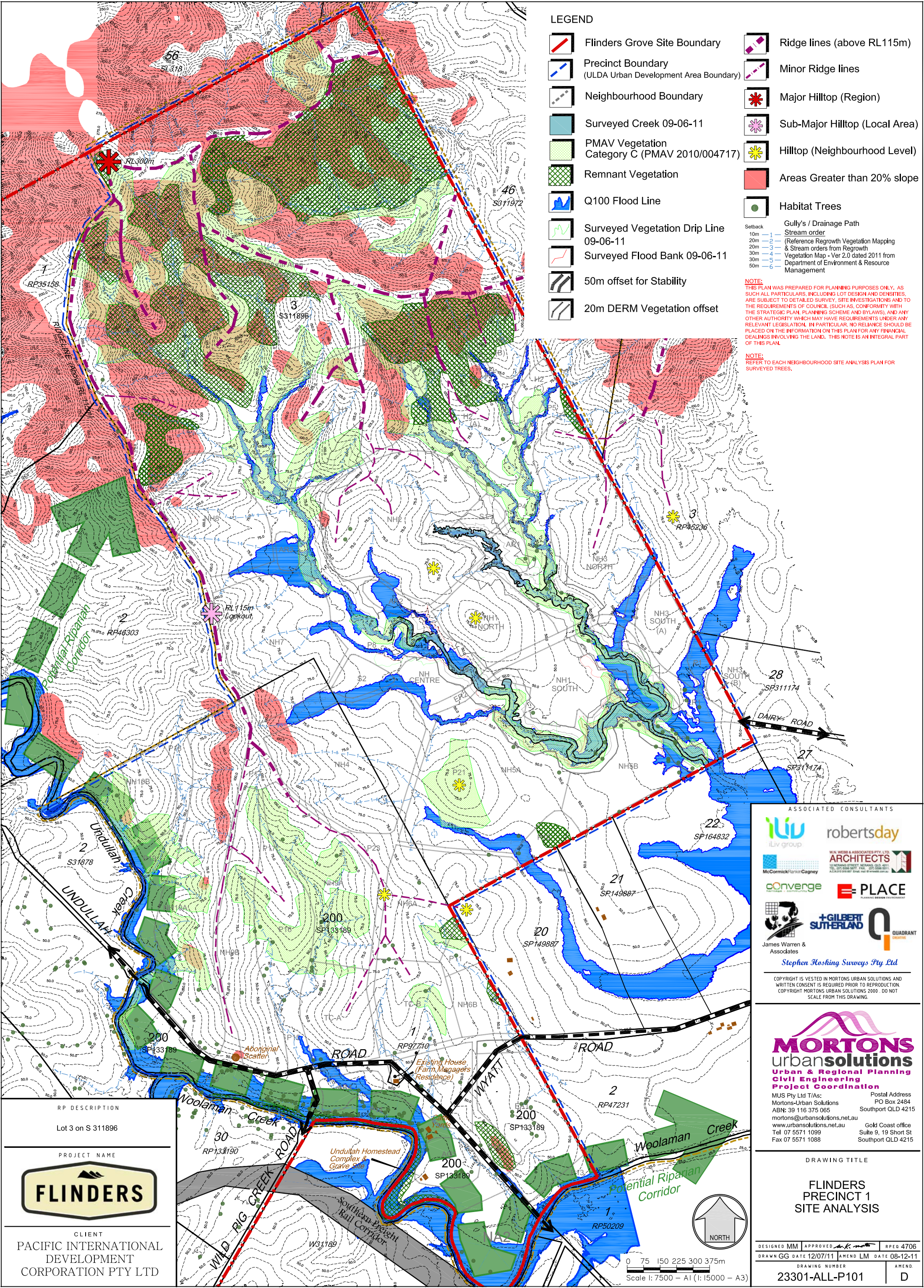
THE CONSULTANCY BUREAU

LEGEND

- Grassland (Grazed & Ungrazed)
- Regrowth
- Grassy Forest
- Vine Forest (Rainforest)



0 150 300 450 600 750m
 Scale 1:15000 - A1 (1:30000 - A3)



APPENDIX 3: UNDERTAKING NATURAL HAZARD ASSESSMENT – BUSHFIRE

What is a bushfire?

- A3.1** A bushfire is an uncontrolled fire burning in forest, scrub or grassland vegetation, also referred to as a wildfire.
- A3.2** Bushfire may occur on most vegetation and topography types in Queensland where there is a fuel path of sufficient dryness to be flammable.

Natural hazard management area (bushfire)

- A3.3** A natural hazard management area (bushfire) is described in Annex 3 of the SPP as follows:
- a) ‘an area identified by a local government in its planning scheme consistent with the conclusions of a bushfire hazard assessment prepared in accordance with Appendix 3 of the SPP Guideline or other methodology approved by the Queensland Fire and Rescue Service (QFRS); or
 - b) where such a study has not been undertaken, an area identified by a local government in its planning scheme, reflecting the Medium and High hazard area of the Bushfire Risk Analysis maps produced by QFRS, suitably modified following a visual assessment of the accuracy of the maps; or
 - c) where an area has not been identified by a local government, the Medium and High hazard areas on the Bushfire Risk Analysis maps produced by QFRS.’
- A3.4** Outcome 4 of the SPP requires natural hazard management areas (bushfire) to be identified in planning schemes (except for those local government areas to which the SPP does not apply in relation to bushfires – refer to Annex 2 of the SPP). Natural hazard management areas (bushfire) trigger the development outcomes and development assessment requirements specified in Outcome 1 of the SPP, and are also required to enable the development of the planning strategies and detailed measures required by Outcomes 5 and 6 of the SPP.
- A3.5** The following methodology has been developed to assist local governments and developers to identify natural hazard management areas (bushfire). It is an appropriate method for land use planning purposes and is suitable for use by local governments when identifying natural hazard management areas (bushfire) as part of the plan making or amending process and also for site-specific bushfire hazard assessments.
- A3.6** However, other methodologies may also be appropriate. Local governments or their consultants should contact the QFRS to discuss alternative methodologies and ensure that they are acceptable.

Climate change impacts

- A3.7** Climate change is expected to cause a gradual change in vegetation health and vigour, and some species and vegetation communities will be advantaged over others. Climate change impacts will be reflected over time through changes to vegetation communities and fuel characteristics. These changes are difficult to predict and are likely to occur very gradually over a long timeframe. The changes to bushfire hazard associated with climate change impacts will generally be outweighed by changes caused by human activity in the short term. For these reasons it is not practicable to consider the impacts of climate change in bushfire hazard assessment studies at present.

Methodology for assessing bushfire hazard⁴³

- A3.8** The methodology involves quantitative and qualitative assessments. The quantitative element requires an assessment of three key characteristics of land that have been found to be the main determinants of the severity of bushfire hazard. These factors are vegetation communities, slope and aspect.
- A3.9** The area to be assessed should be disaggregated into sub-units according to vegetation communities, slope and aspect characteristics. Tables A3.1 to A3.3 provide the ranges that should be applied for the analysis of each of the three factors. These ranges will also help to determine the sub-units that should be used to conduct the assessment. The size of the sub-units, and level of accuracy of the resultant bushfire hazard map, may vary with the extent of the area being assessed, the characteristics of the land and vegetation communities, and the accuracy of the base information being used.
- A3.10** Each sub-unit is allocated a score for each of the three factors. The total score for each sub-unit determines the severity of bushfire hazard for that sub-unit. A qualitative review of these findings should then be undertaken to verify the results of the quantitative assessment.
- A3.11** The qualitative review should consider the known bushfire behaviour.
- A3.12** Finally, a safety buffer of land in close proximity to identified bushfire hazard areas needs to be included within the natural hazard management area (bushfire). The safety buffer is required because bushfires can affect unvegetated land in close proximity, particularly due to winds fanning flames, smoke, embers and radiant heat.

Step 1: Assessment of vegetation communities

- A3.13** The different types of vegetation communities determine the rate at which dry fuel accumulates. Some vegetation communities protect fuel from drying out in all but extreme bushfire seasons and can then be susceptible to very destructive bushfires. Alternatively, vegetation communities may expose fuels to drying and therefore be frequently available for burning. Frequent bushfires can result in the development of bushfire-tolerant grassy woodlands or grasslands and less destructive bushfire behaviour. The characteristics of different vegetation communities are reflected in Table A3.1. This

⁴³ Alternative methodologies may also be acceptable but should be referred to the QFRS for assessment and approval prior to implementation.

table also presents the hazard scores for a range of vegetation communities. Vegetation community data is available in digital map form from the Queensland Herbarium, Environmental Protection Agency, at a scale of 1:100,000.

Table A3.1: Hazard scores and associated fire behaviours for various vegetation communities

Vegetation communities ¹	Fire behaviour	Hazard score
Wet sclerophyll forest, tall eucalypts (>30 m), with grass and mixed shrub understorey.	Infrequent fires under severe conditions, flame lengths may exceed 40 m, floating embers attack structures for 1 hour, radiant heat and direct flame are destructive for 30 minutes.	10
Paperbark heath and swamps, eucalypt forest with dry-shrub ladder fuels.	Fire intensity depends on fuel accumulation, but can be severe, with flame lengths to 20 m, spot fires frequent across firebreaks, radiant heat and direct flame for 15 minutes.	8
Grassy eucalypt and acacia forest, exotic pine plantations, cypress pine forests, wallum heath.	Fire intensity may be severe with flame lengths to 20 m, but less attack from embers.	6
Native grasslands (ungrazed), open woodlands, canefields.	Fast moving fires, available to fire annually to 4 years. Usually no ember attack, radiant heat for >10 m, duration <2 minutes.	5
Intact acacia forests, with light grass to leaf litter, disturbed rainforest.	Fires infrequent, usually burn only under severe conditions, relatively slow fires, usually little ember attack.	4
Orchards, farmlands, kikuyu pastures.	Fires very infrequent, slow moving, may be difficult to extinguish, frequent fire breaks.	2
Grazed grasslands, slashed grass.	Grazing reduces intensity and rate of spread of fire, duration <2 minutes.	2
Desert lands (sparse fuels), mowed grass.	Gaps in fuel, usually slow fire spread.	1
Intact rainforest, mangrove forest, intact riverine rainforest.	Virtually fireproof.	0

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 the following examples may be viewed as having the next lower hazard score (i.e. 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.

A3.14 Where the vegetation community is assessed as having a vegetation community hazard score of zero, no other factors need to be taken into account and the relevant sub-units should be given a Low severity of overall bushfire hazard. No further action is required.

Step 2: Assessment of slope⁴⁴

- A3.15** Studies have shown that fires burn more quickly and with greater intensity up slopes, generally doubling every 10 degrees of slope. Also, the steeper the slope the more difficult it is to construct ring roads, firebreaks and provide access for emergency crews. Trees situated downhill from structures will have their crowns close to the structures. This presents bushfire hazards particularly for exposed structures such as timber decks. Table A3.2 presents the hazard scores for different categories of slope.

Table A3.2: Hazard scores for slope

Slope	Hazard score
Gorges and mountains (>30%)	5
Steep Hills (>20% to 30%)	4
Rolling Hills (>10% to 20%)	3
Undulating (>5% to 10%)	2
Plain (0% to 5%)	1

[Note: For site-specific assessment of bushfire hazard, if the site is downhill from the hazard, the slope effect may be taken as zero as the fire intensity will be less. However, burning heavy fuels may roll downhill and trees may fall down, so recommended setbacks from the hazard still need to be observed.]

Step 3: Assessment of aspect

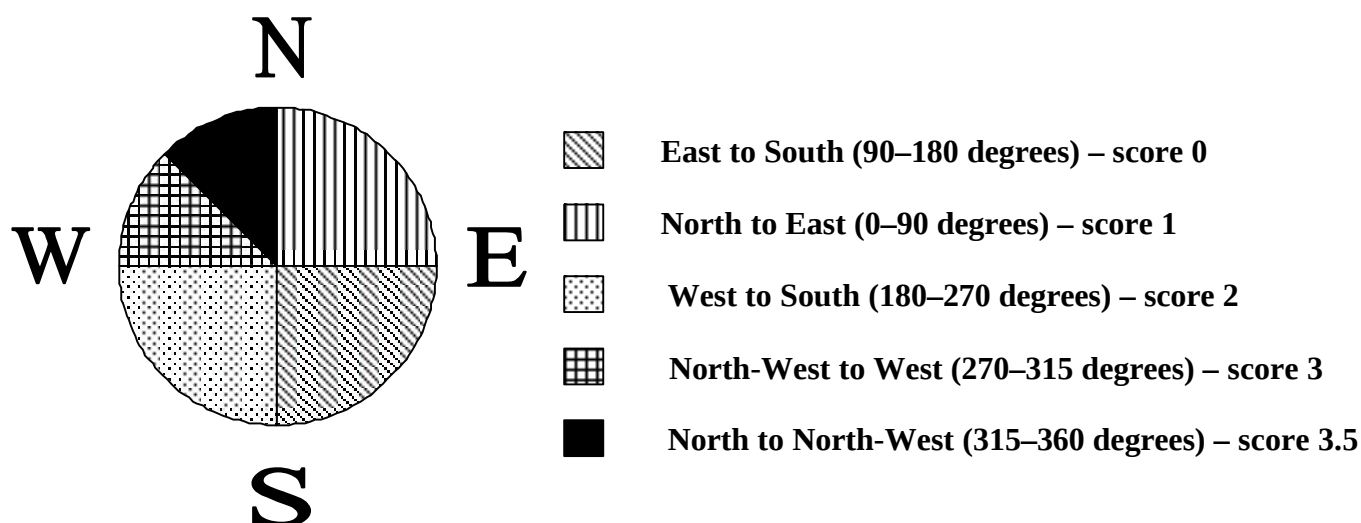
- A3.16** Aspect affects bushfire hazard due to the effects that exposure to direct sunlight has on different vegetation communities, including the drying rates of fuels. Aspect also correlates closely with exposure to low humidity winds that increase bushfire intensity. In extremely broken country where there is a variety of aspects, the predominant aspect should be used.
- A3.17** As aspect has only a minor influence on flatter land, aspect is not considered to be significant on land with a slope less than 5%. Table A3.2 lists the hazard score for different aspects and Figure A3.1 illustrates the compass degree ranges for each aspect category.

Table A3.2: Hazard score for aspect

Aspect	Hazard score
North to North-West	3.5
North-West to West	3
West to South	2
North to East	1
East to South and all land under 5% slope	0

⁴⁴ See Appendix 10 for the methodology for calculating slope.

Figure A3.1: Compass degree ranges for each aspect category



Step 4: Combining scores to identify the severity of bushfire hazard

A3.18 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:

$$\text{Total hazard score} = \text{vegetation community hazard score} + \text{slope hazard score} + \text{aspect hazard score}.$$

A3.19 The total hazard score determines the severity of bushfire hazard for each sub-unit as set out in Table A3.4.

Table A3.4: Hazard score ranges to identify the severity of bushfire hazard

Total hazard score	Severity of bushfire hazard
13 or greater	High ⁴⁵
6 to 12.5	Medium
1 to 5.5	Low

⁴⁵ Buildings in High severity bushfire hazard areas should be constructed in accordance with the Level 1 requirements of AS 3959:1999 'Construction of Buildings in Bushfire-Prone Areas'.

Step 5: Field verification

- A3.20** Preliminary bushfire hazard maps should be prepared based on the results of Step 4 above by aggregating all sub-units with similar levels of bushfire hazard severity into High and Medium severity classifications.⁴⁶ Field verification or ‘ground truthing’ of these preliminary results should then be undertaken. A number of sample areas should be evaluated to test the accuracy of the preliminary bushfire hazard findings.

Step 6: Qualitative assessment

- A3.21** Known bushfire behaviour complements the quantitative assessment and should be considered as part of the qualitative review.
- A3.22** Known bushfire behaviour is extremely difficult to use as a quantitative planning tool. This is because the absence of bushfire, even for an extended period of time, does not mean that an area will not burn and may lead to massive fuel accumulation with dangerous bushfire behaviour if it does ignite. Known bushfire behaviour may identify sites where combinations of slope and wind have led to severe bushfire behaviour in the past, and where extra precautions to protect assets might be required. The reliability of known bushfire behaviour may be difficult to assess and QFRS should be consulted if problems are indicated.

Step 7: Safety buffers

- A3.23** The final step in identifying bushfire hazard areas is to add a safety buffer, as land adjacent to bushfire hazard areas is vulnerable to bushfire attack from these areas.
- A3.24** Any land within 100 metres of an area identified as having a High bushfire severity classification should be included in the High bushfire hazard area and any land within 50 metres of an area identified as having a Medium bushfire severity classification should be included in the Medium bushfire hazard area.⁴⁷ The safety buffers should be integrated into the preparation of maps identifying bushfire hazard areas. Table A3.5 shows the width of the safety buffers that apply to the various bushfire hazard severity classifications.

Table A3.5: Total hazard score and severity of bushfire hazard with safety buffers

Total hazard score	Severity of bushfire hazard	Width of safety buffer
13 or greater	High	100 metres
6 to 12.5	Medium	50 metres
1 to 5.5	Low	Not applicable

⁴⁶ Areas of Low bushfire hazard severity may also be mapped, but the natural hazard management area (bushfire) for the purposes of the SPP comprises only areas identified as being of High or Medium severity.

⁴⁷ Safety buffer areas on the boundary between High and Medium bushfire severity areas should be included in the High bushfire severity area.



IPSWICH
CITY

BOONAH
SHIRE

LOCATION

OV 3.1D

Federal Government, Department of the Environment and Heritage.
Federal Government, Australian Heritage Commission.

Slope Stability and its Constraints on Closer Settlement on Tamborine Mountain, Southeast Queensland by W.F. Wilmoth, Geological Survey of Queensland Record 1981/14, Department of Mines, May 1981.

Slope Stability and its Constraints on Closer Settlement in the Canungra-Beechmont-Numinbah Area, Southeast Queensland by W.F. Wilmoth, Geological Survey of Queensland Record 1983/64, Department of Mines, November 1983.

SCALE 1:60000

Horizontal Datum: Geocentric Datum of Australia 1994, Zone 58
Vertical Datum: Australian Height Datum

Geographical
Information
System