ROCKHAMPTON REGIONAL COUNCIL

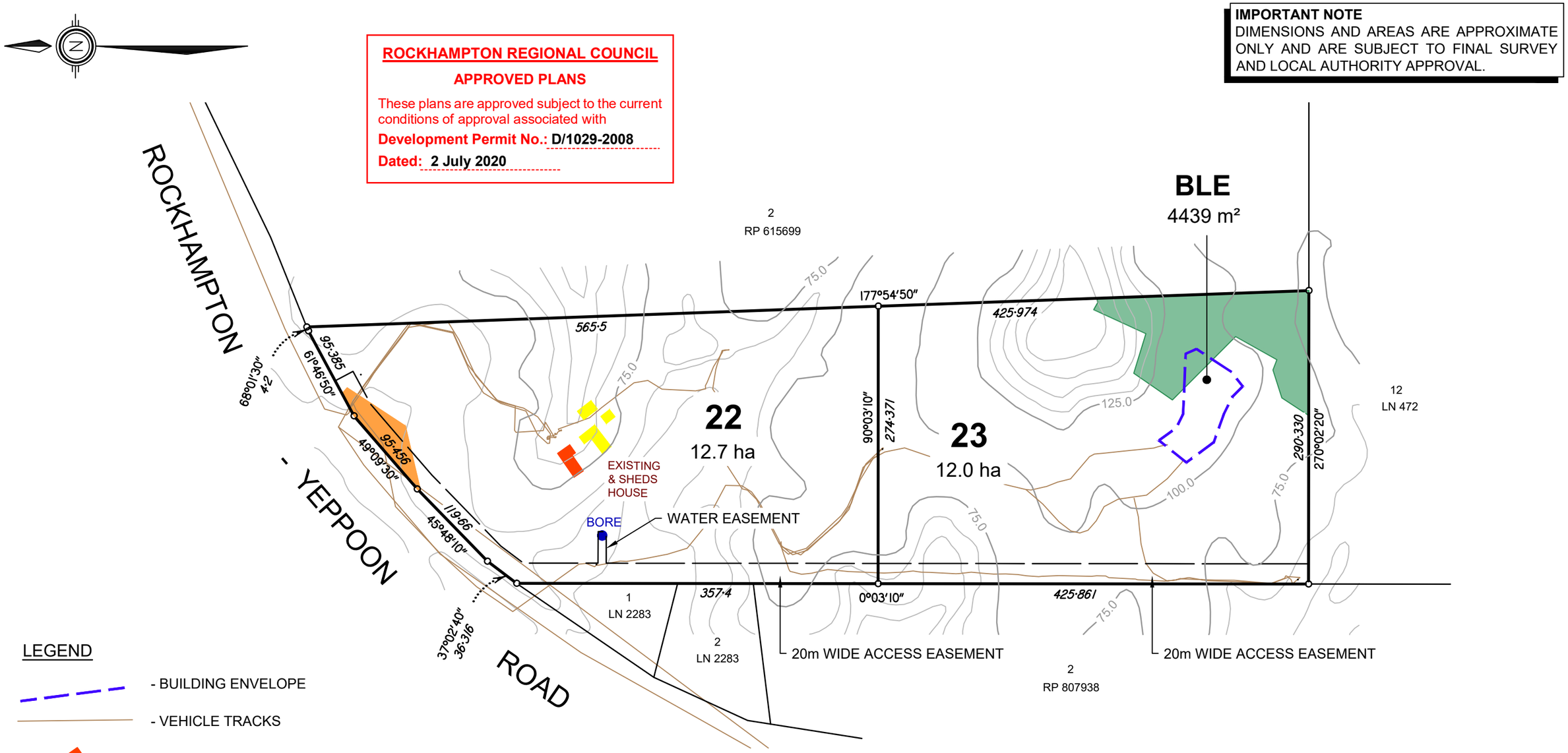
APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/1029-2008

Dated: 2 July 2020

IMPORTANT NOTE
DIMENSIONS AND AREAS ARE APPROXIMATE ONLY AND ARE SUBJECT TO FINAL SURVEY AND LOCAL AUTHORITY APPROVAL.



LEGEND

- BUILDING ENVELOPE
- VEHICLE TRACKS
- EXISTING HOUSE
- EXISTING SHED
- CATEGORY 'B' REGULATED VEGETATION (LEAST OF CONCERN)

Scale 1:4000 - Lengths are in Metres.

50 0 50 100 150 200 250 300 350 400

Rev	Description	Drawn	Checked	Date
A	Issue for approval	AD	BF	15/05/2020

This plan was prepared as a proposed subdivision and should not be used for any other purpose. The dimensions, areas and total number of lots shown hereon are subject to field survey and also to the requirements of Council and any other authority which may have requirements under any relevant legislation. In particular, no reliance should be placed on the information on this plan for any financial dealing involving the land. This note is an integral part of the plan.

PROPOSAL PLAN

PROJECT: ROL - PROPOSED SUBDIVISION

LOCATION: 496 YEPPOON ROAD, LIMESTONE CREEK
Real Property Description: LOT 1 ON RP615699

CLIENT: REEL PLANNING

Horiz. Datum:	VIDE RP615699	Scale:	1 : 4000 @ A3
Vert. Datum:	AHD	Drawn:	AD
Local Authority:	ROCKHAMPTON REGIONAL	Surveyor:	N/A
Drawing No:	20280-1-PP-01	Sheet:	1 OF 1
Revision:	A		

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ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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Development Permit No.: D/1029-2008

Dated: 2 July 2020

Bushfire Hazard Assessment & Management Plan

Reconfiguring a Lot (1 into 2 lots and building location envelope)

496 and 498 Yeppoon Road, Limestone Creek 4701

Publication Details

Title: Bushfire Hazard Assessment & Management Plan. Dwelling on Lot 23SP230293 496 Yeppoon Road, Limestone Creek 4701

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Acronyms and Abbreviations

AS 3959: Australian Standard 3959: 2018Building in Bushfire Prone Areas and amendments.

BAL: Bushfire Attack Level indicated in AS3959 for site specific factors.

BHA: Bushfire Hazard Assessment

BMP: Bushfire Management Plan

QFES: Queensland Fire and Emergency Services

QRFS: Queensland Rural Fire Service

RRC: Rockhampton Regional Council

SPP: *State Planning Policy*. July 2017

SPP Guideline: *Natural hazards, risk and resilience - Bushfire. State Planning Policy – state interest guidance material*. December 2019

NCA 1992: *Nature Conservation Act* 1992

VMA 1999: *Vegetation Management Act* 1999

Table of Contents

Bushfire Hazard Assessment 1

1 Introduction 1

1.1 Site Location 1

1.2 Dwelling Location 2

1.3 Surrounding Landscapes 2

1.4 Weather 2

2 Materials & Methods 3

3 Results 3

3.1 Site Selection 3

3.2 Hazard in Relation to Proposed Dwelling Site 3

3.2.1 Site Vegetation Patterns 4

3.2.2 Site Vegetation 5

3.3 Surface Fuel Hazard Rating 5

3.3.1 Canopy & Bark 6

3.3.2 Elevated Fuels 6

3.3.3 Near Surface Fuels 6

3.3.4 Surface Fuels 6

3.4 Total surface fuel loads 6

3.4.1 Surrounding Land Practices 7

3.5 Evidence of Fire 7

3.6 Environmental Considerations 7

3.7 Assessed Hazard 7

Bushfire Management Plan 8

4 Purpose 8

4.1 Bushfire Survival Plan 8

4.2 Ongoing Risk Management 8

4.3 Responsible Agencies 8

5 Site Description 8

6 Expected Fire Behavior 9

7 Construction Standards and Building Protection Zones 9

8 Driveways & Tracks 9

8.1 Alternative Access & Egress Routes 10

9 Water supply for firefighting purposes 10

10 Landscaping 11

11 Purchaser/Resident Education and Awareness Programs 12

12 References & Bibliography 14

13 Appendix 15

List of Figures

Figure 1. Location of Lot 23SP230293 at 496 Yeppoon Road, Limestone Creek 4701.....1
Figure 2. The proposed location of a dwelling on 23SP230293 with lot boundaries in yellow, adjacent boundaries in black and access easement in white. 2
Figure 3. One metre contours showing slope and aspect around the subject building. 4
Figure 4. Local vegetation is dominated by shrubby woodlands and grassy open woodlands 4
Figure 5. Shrubby ironbark woodland is located to the NE (left) and SW (right) of the building. The dominant canopy is ironbark with scattered bloodwood. 5
Figure 6. Left: Grassy open woodland in the distance with a cleared slope of dense lantana in the foreground. Right: Cleared are to the north of the building 5
Figure 7. A diagram of various layers of vegetation hazard used in the BAL calculation for surface fuels (taken from Hines et. al., 2010). 6
Figure 8. Example turnaround areas (Taken from Building Fire Safety Management Tool & Advisory Notes, State of Queensland (Queensland Fire and Emergency Services) 2015). 10

Property Information

Subject Lot	23SP230293
Owners	Joel & Teneille Ward
Street Address	496 Yeppoon Road, Limestone Creek 4701
Development plan	

Bushfire Hazard Assessment

1 Introduction

The purpose of the Bushfire Hazard Assessment is to determine the level of bushfire hazard with reference to:

a) The Rockhampton Regional Council 8.2.4 Bushfire hazard overlay code;
b) SPP Guideline: Natural hazards, risk and resilience - Bushfire. State Planning Policy – state interest guidance material. December 2019;
c) The Australian Standard AS3959: 2018 Construction of buildings in bushfire-prone areas (AS3959); and
d) Site specific factors that may influence standardised assessment methods.

The subject of this Bushfire Hazard Assessment and Management Plan is the existing building on 23SP230293 located at 496 Yeppoon Road, Limestone Creek 4701. This building is to be encompassed by a building location envelope, subsequent to the amended development approval for reconfiguring a lot (1 into 2 lots) that relates to Lot 23 and Lot 22 on SP230293.

A plan of the dwelling location and surrounding roads, trails and access is provided in the **Appendix**.

1.1 Site Location

Lot 23SP230293 is located at 496 Yeppoon Road, Limestone Creek 4701. See **Figure 1** for the site location.

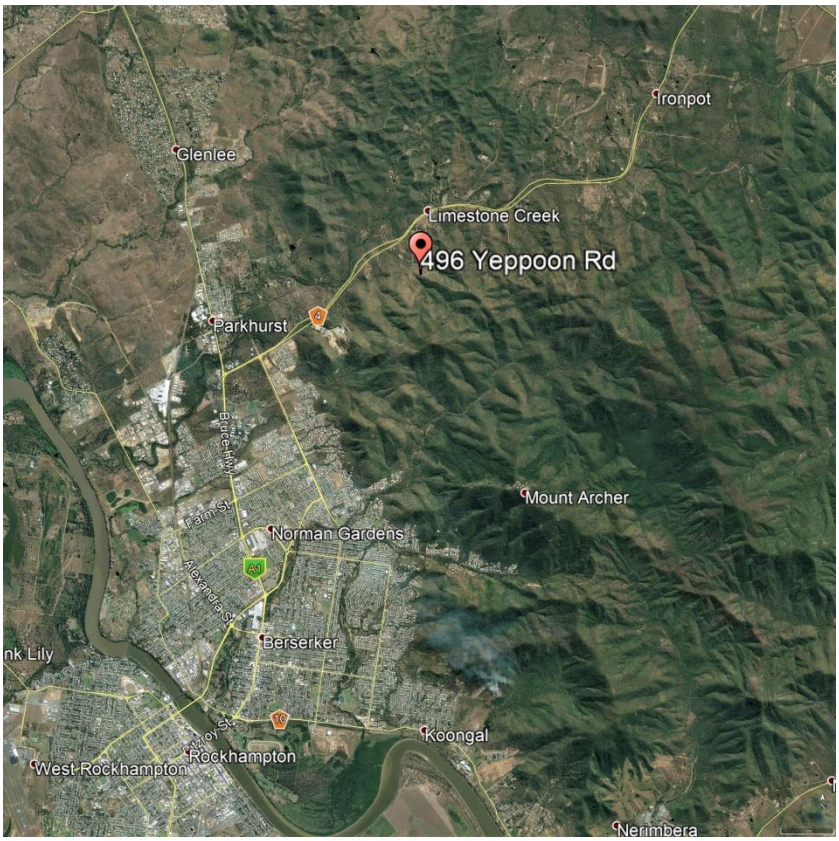

Figure 1. Location of Lot 23SP230293 at 496 Yeppoon Road, Limestone Creek 4701.

1.2 Dwelling Location

The location of the dwelling is shown in **Figure 2** along with surrounding lots and access

easement. The proposed dwelling is an existing shed that will be repurposed as a dwelling.

Figure 2. The proposed location of a dwelling on 23SP230293 with lot boundaries in yellow, adjacent boundaries in black and access easement in white.

1.3 Surrounding Landscapes

The subject lot is located within hilly terrain. The vegetation hazard largely consists of grassy open woodlands (possibly selectively cleared), patches of shrubby woodlands and isolated rainforest scrub in gullies. Yeppoon road, a four lane highway, is located approximately 300 metres to the north.

1.4 Weather

The following data was obtained from the Bureau of Meteorology (http://www.bom.gov.au/climate/averages/tables/cw_033294.shtml) for Yeppoon Weather Station.

Mean annual rainfall is 982.3 millimetres. Rainfall above 100mm occurs from December through to March.

Temperatures above 29 degrees Celsius are January and February with the hottest time of year around November to March.

Prevailing winds are south to east with warm northwest to northeast winds occurring largely in spring and summer.

The risk of fire in the area is related to regular seasonal conditions. Northwest winds are generally dry and warm in late spring through to early summer and coincide with higher

temperatures, low rainfall and low humidity in October and November. These weather conditions in late spring to early summer represent the highest risk of bushfire in the area.

2 Materials & Methods

Bushfire hazard and associated mitigation is assessed with reference to the The Rockhampton Regional Council 8.2.4 Bushfire hazard overlay code, State Planning Policy – state interest guidance material, the Australian Standard AS3959: 2018 *Construction of buildings in bushfire-prone* areas advice from local fire authorities and a site specific hazard assessment.

Construction requirements and minimum dwelling setback distances are given with reference to the AS3959 and in regard to local and site specific conditions and any other expert advice received.

Vegetation structural description is taken from the Australian Standard 3959. Vegetation density scales (very sparse, sparse, medium, dense etc.) are from Melzer (2011). Vegetation heights and degree of slope are calculated using a Suunto clinometer. A Suunto compass is used to determine aspect. Field data is recorded with Android software 'Open Data Kit' using an electronic version of the *fuel assessment field work form v3* (Hines *et. al.*, 2010).

3 Results

The following site specific hazard assessment includes vegetation, slope, aspect and any other natural or manmade features of relevance located within 100 metres of the dwelling site. Consideration is also given to surrounding landscapes and vegetation patterns in the local area. The site specific hazard assessment is considered with respect to vegetation density, species and extent and how natural or manmade features interact with the hazard to modify risk. This provides a measure on the level of risk presented to the dwelling from wildfires at a more detailed local scale.

3.1 Site Selection

This hazard assessment is with reference to an existing building that will be repurposed as a dwelling

3.2 Hazard in Relation to Proposed Dwelling Site

Clearing around the existing building consists of:

- 31m to the SE;
- 31m to the SW;
- 15 to the NE; and
- 60m to the NW.

The building is located on a large, levelled pad. Surrounding effective slopes (degrees) are:

- 21.3 to the SE;
- 23.7 to the SW;
- 23.7 to the NE (upslope); NS
- 15 to the NW

One metre (QLD Data) in relation to the building site are shown in **Figure 4.**

Figure 3. One metre contours showing slope and aspect around the subject building.

3.2.1 Site Vegetation Patterns

There are five distinct vegetation types evident in aerial photography of the local area. These are shrubby woodland, grassy woodland, grassy open woodland and grassy open woodland (possibly cleared in the past).

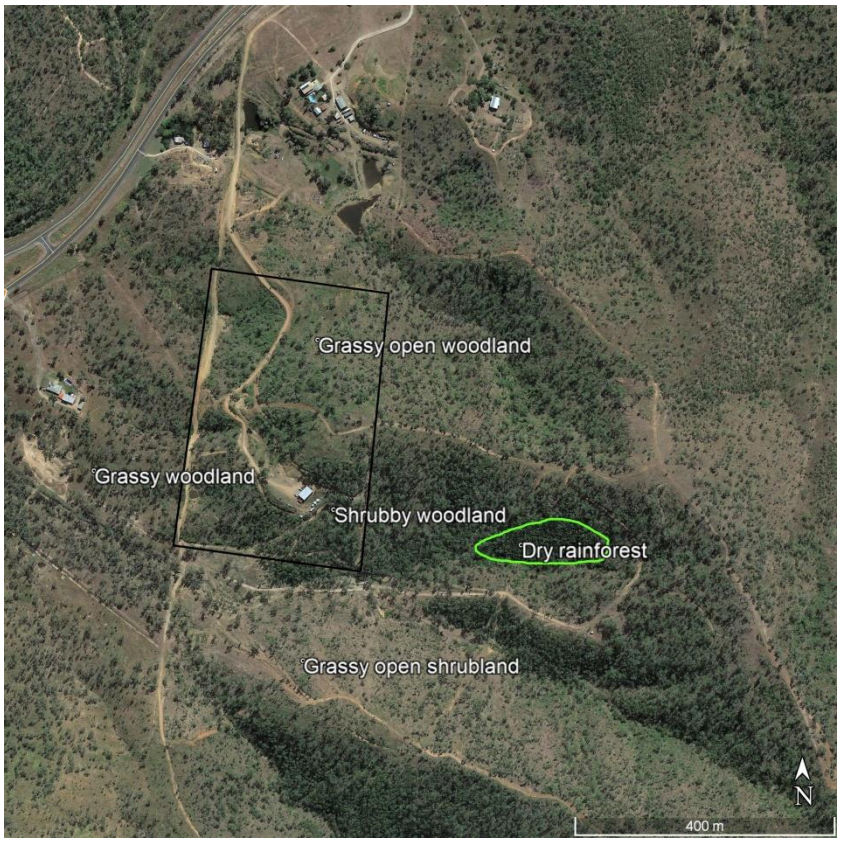

Figure 4. Local vegetation is dominated by shrubby woodlands and grassy open woodlands

3.2.2 *Site Vegetation*

Within in proximity to the building, shrubby ironbark woodland is located to the northeast, south and through to the west (**Figure 5**). Grassy ironbark woodland is located to the northeast and 60 metres beyond the cleared and leveled building pad (**Figure 6**).

Figure 5. Shrubby ironbark woodland is located to the NE (left) and SW (right) of the building. The dominant canopy is ironbark with scattered bloodwood.

Figure 6. Left: Grassy open woodland in the distance with a cleared slope of dense lantana in the foreground. Right: Cleared are to the north of the building

3.3 Surface Fuel Hazard Rating

Figure 7 provides a classification of vegetation layers as levels of potential fuel. Hazard ratings are given with respect to Hines *et. al.* (2010). Hines *et. al.* provides an assessment of fuel hazard on a 5 step scale from low, moderate, high, very high to extreme. These hazard ratings with respect to a vegetation layer provides an estimate of tons/ha of fuel load for that layer.

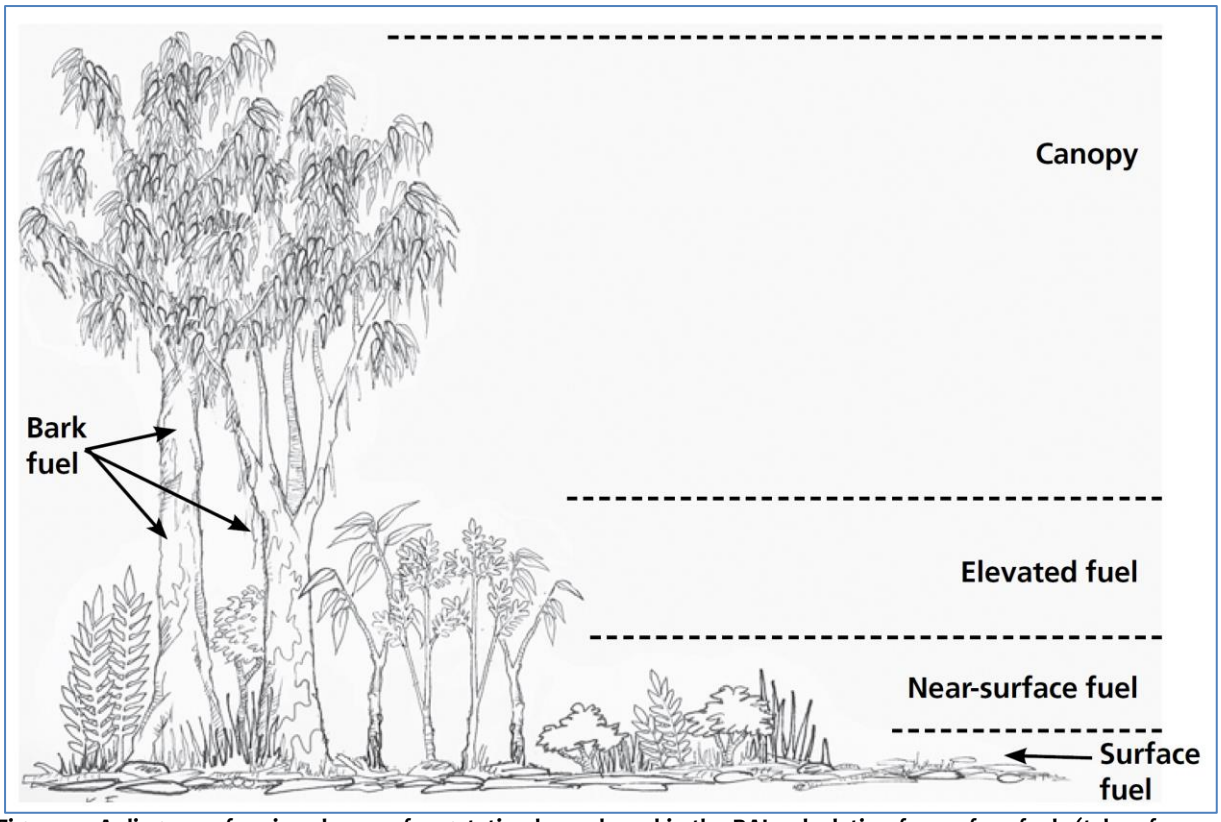

Figure 7. A diagram of various layers of vegetation hazard used in the BAL calculation for surface fuels (taken from Hines et. al., 2010).

3.3.1 Canopy & Bark

The predominant bark type was ironbark with some bloodwood.

3.3.2 Elevated Fuels

Elevated fuels were relatively low in height with a distinct discontinuity between the elevated fuel layer and tree canopy. Density was variable between high to very high. Some areas included less fire prone dry rainforest species while medium to dense patches of lantana were common in places, significantly elevating fuel potential in those areas.

3.3.3 Near Surface Fuels

Near surface fuels were moderate, consisting of low grasses with red natal dominant in bushland near the dwelling.

3.3.4 Surface Fuels

Ground fuels (leaf litter, bark, small branches etc) were low to moderate.

3.4 Total surface fuel loads

The median value of indicative fuel loads (t/ha) for each layer of elevated fuel (Hines et. al. 2010) is provided in **Table 1.**

Table 1. Results of estimated tons per hectare of the surface fuel loads at the site.

Surface layer	Hazard Rating	Tons/hectare
Bark	Moderate	1
Elevated	High	3-5
Near-surface	High	3-4
Surface	Low to moderate	5
Total (t/ha)		12-15

Queensland Rural Fire Service provides a protection zone calculator (QFRS, 2020) that indicates fuel loads in various types of Queensland vegetation communities. The Calculator indicates the following fuel loads for vegetation with a similar structure to vegetation adjacent to the building:

Moist to dry eucalypt woodlands on coastal lowlands and ranges; total surface fuel load of 14.9t/ha and total overall fuel load of 17.2t/ha

Moist to dry eucalypt open forests on coastal lowlands and ranges; total surface fuel load of 21t/ha and total overall fuel load of 24t/ha

Both the site assessment of fuel loads and the QFRS estimate of surface fuel loads are very similar. Therefore fuel load parameters used in AS3959 Method 2 are 15t/ha surface fuels and 20t/ha overall fuel load.

3.4.1 Surrounding Land Practices

Queensland National Park land is located to the south and east of the subject lot. Surrounding rural land use appears to be rural lifestyle and grazing.

3.5 Evidence of Fire

Evidence of recent fires (~5 years) was confined to charred bark on trees to 10 metres up the tree. There was no evidence of canopy fires

3.6 Environmental Considerations

The building and associated clearing already exists. It is unlikely any clearing will be required outside of existing essential management rights.

3.7 Assessed Hazard

The Bushfire Attack Level (BAL) was determined using AS3959 Method 2. Abbreviated results are provided in **Table 2** and full results are appended**.** The edge of the vegetation hazard is determined by the unmanaged understorey rather than either the canopy (drip line) or the trunk of any trees.

Table 2. Minimum distances in metres from the hazard to the nearest facing surface of the building with respective BAL construction standards.

	Minimum distance (m) from hazard			
Aspect	**NE**	**SE**	**SW**	**NW**
BAL-29	8.1	24.4	27.9	17.2
BAL-19	12.1	34.3	38.6	24.9
BAL-12.5	17.8	46.4	51.6	34.9

4 Purpose

The purpose of this Bushfire Management Plan is to reduce risks from bushfire hazard to a tolerable level of risk.

The aim of the Bushfire Management Plan is to provide appropriate construction standards, setbacks, hazard maintenance and recommendations based on the identified hazard components present at the time of survey. Conditions may change over time so that owners and occupiers should be prepared to increase risk reduction when required.

Owners and occupiers must bear in mind that implementation of the Bushfire Management Plan will assist in addressing and mitigating identified fire hazards on the subject site, however, the plan does not in itself prevent the loss of life or property. Owners should consider additional mitigation measures such as those provided as recommendations in this Plan or as advised by your local Rural Fire Service Warden.

4.1 Bushfire Survival Plan

To assist in mitigating risk, current and future occupants should develop a **Bushfire Survival Plan**. Leaving too late, when a fire is approaching is a common cause of fatalities during a bushfire event. The decision to stay when a fire is approaching involves activating the **Bushfire Survival Plan** and undertaking planned actions before, during, and after the fire. A Bushfire Survival Plan template and/or guidance material can be obtained from the Queensland Fire and Emergency Service.

4.2 Ongoing Risk Management

Occupiers should implement all practical measures to prevent the loss of life and property.

It is imperative that owners and occupiers maintain hazard reduction measures so that they are at hand and functional in a bushfire emergency.

At the start of the bushfire season, revisit your bushfire survival strategy and ensure all intended measures are in place and working. Fine fuels around the house and within the building protection zone are the greatest threat to a dwelling. Ensure these areas are fuel reduced. Check all hoses; water sources; pumps etc are adequate and functional. Ensure driveways and fire trails are adequate and suitable for firefighting vehicles.

In case of fire, immediate contact should be made with the relevant fire authority and all directions and advice should be followed.

4.3 Responsible Agencies

The responsible Fire Authority is the Queensland Fire and Emergency Services (QFES). The Rural Division of the QFES is responsible for bushfires. The Urban Division of the QFES is responsible for structural fires.

The Local Authority is Rockhampton Regional Council. It is the responsibility of the Council and the building certifier to ensure that the measures outlined in this Management Plan are in place prior to the occupation of any buildings that are subject to this plan.

5 Site Description

The subject of the Bushfire Management Plan is the proposed new dwelling on 23SP230293 located at 496 Yeppoon Road, Limestone Creek 4701.

6 Expected Fire Behavior

Critical slopes in relation to the building are to the south east and south west.

Warm, dry northeast winds are common in late spring to early summer in the local area. This period and wind direction represents the highest risk of bushfire in the area.

The likelihood of fire and fire intensity will depend on fuel accumulation. Fires are likely to be infrequent and usually burn only under severe conditions. Fires may be severe with flame lengths of 15 to 20 metres with little ember attack.

7 Construction Standards and Building Protection Zones

1. Building Protection Zones (fire breaks) will conform to the distances indicated in **Table 3** and in accordance with the AS3959 BAL Construction Standard.
2. The nearest surface of the dwelling must not be located closer to the hazard than the distance ranges indicated in for the BAL Construction Standard employed.
3. Non-livable structures (garages, sheds etc.) adjacent to the dwelling on the subject lot are to comply with Section 3.2.3 of the AS3959.
4. Tree canopy cover in the building protection zone will be less than 10%; and
5. The nearest canopy should be located greater than 2 metres from any part of the roofline of the dwelling.

The installation of a rooftop or perimeter sprinkler system is recommended. The associated pump should be able to be operated independently of the electricity grid. This may be petrol or diesel operated pump or an electric pump powered by a generator.

Table 3. Required construction Standards and associated minimum fire break distances (building protection zone) for a dwelling located on the subject lot. Minimum distance is derived from AS3959 Method 2.

	Minimum distance (m) from hazard			
Aspect	**NE**	**SE**	**SW**	**NW**
BAL-29	8.1	24.4	27.9	17.2
BAL-19	12.1	34.3	38.6	24.9
BAL-12.5	17.8	46.4	51.6	34.9

8 Driveways & Tracks

The access driveway to the house site will:

- Be constructed to a standard so that they are accessible by QFES & QRFS fire fighting vehicles in all weather conditions and capable of accommodating a vehicle of 8 tonnes;
- Have a minimum formed width of 4 metres,
- Have a minimum cleared height of 4.8 metres including any gates;
- Have a working area either side of the formed road that is 3 metres wide and cleared of all flammable vegetation greater than 10cm in height.
- Have adequate drainage to prevent soil erosion.
- Gradients greater than 12.5% should be treated (impermeable surface etc.) to ensure fire fighting vehicles can safely traverse these sections.
- Have passing bays for firefighting appliances every 200 metres along the access driveway; and

1.1. Passing bays are 20 metres long with a formed width of 6 metres.

- Have a turning circle with a minimum radius of 8m (including roll-over kerbs if they are provided) no further than 50m from the dwelling. Other solutions using T or Y heads of specified dimensions are also appropriate. See **Figure 8** for example turnaround areas;
- Fire trails are to be constructed to the satisfaction of QRFS.

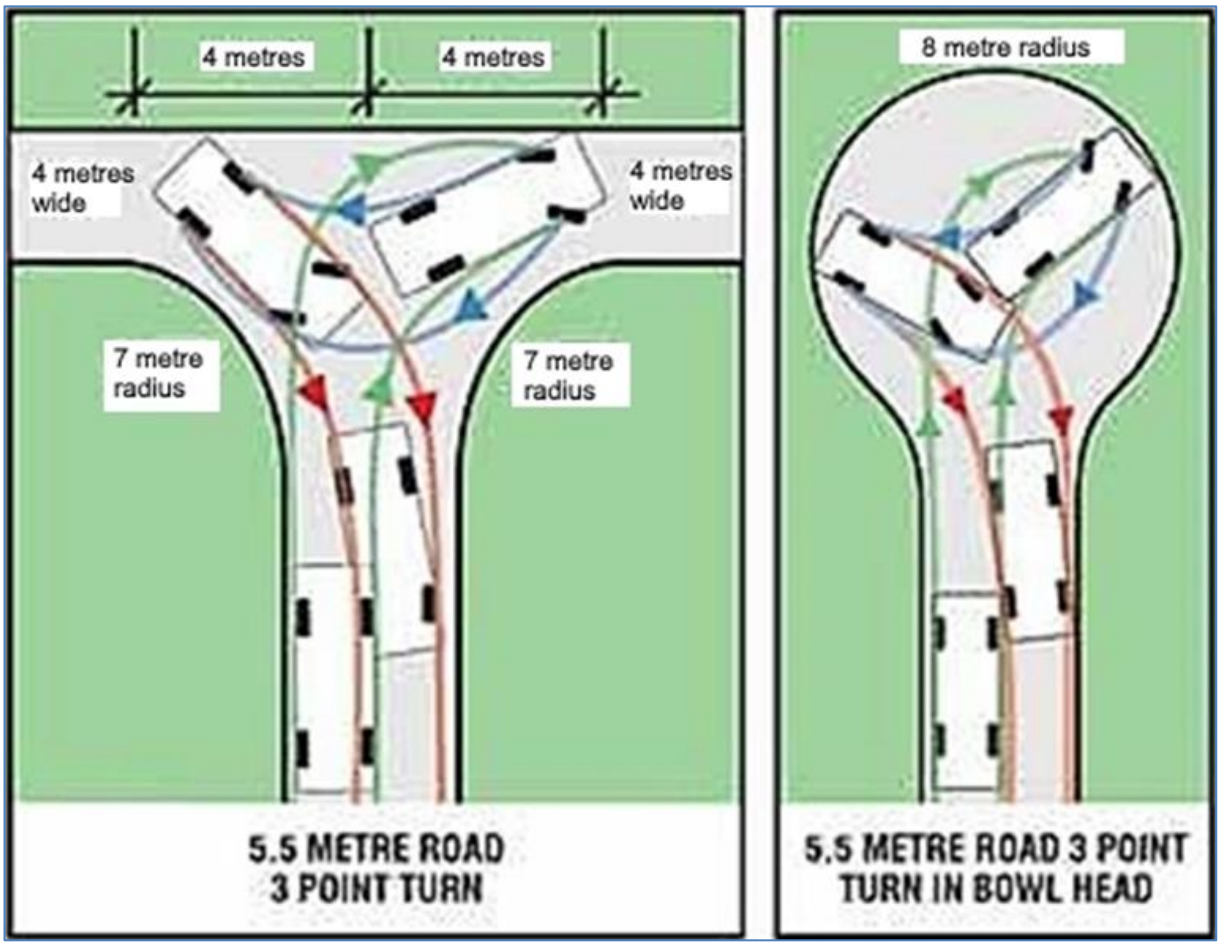

Figure 8. Example turnaround areas (Taken from Building Fire Safety Management Tool & Advisory Notes, State of Queensland (Queensland Fire and Emergency Services) 2015).

8.1 Alternative Access & Egress Routes

The subject lot has a well formed driveway to the building and an alternative driveway route halfway along the main driveway. There are also numerous trails over the subject lot (see the *Driveways & Trails Map* in the **Appendix).** The internal trails connect to a broader network of trails that are regularly used by Rural Fire and Queensland Parks & Wildlife to manage and control bushfires in the broader area (see the *Local Access & Trails Map* in the **Appendix).** The rural fire brigade can access the southern end of the subject lot along these local trails.

9 Water supply for firefighting purposes

The lot will have:

1. A dedicated on-site water storage for firefighting to be located within 10 metres of the dwelling that:
   1.1. Is constructed of non-combustible materials or is an underground tank;

1.2. has a take-off connection from the building to the tank which is at a level that provides on-site water storage of not less than 20,000 litres;

1.3. has a hardstand area allowing heavy rigid fire appliance access within six (6) metres of a tank; and

1.4. has fire brigade tank fittings consisting of:

1.4.1. a fifty (50) millimetre ball valve and male camlock coupling for above ground tanks; and

1.4.2. above ground water pipe fittings that are metal; or

1.4.3. for underground tanks, an access hole of 200 millimetre diameter (minimum) to allow access for suction lines.

1.5. Are accessible at all times to any appliance from the Queensland Fire and Emergency Services;

2. Other accessible water sources (e.g. accessible dam, bore or swimming pool) are to be provided with all-weather access.

10 Landscaping

1. The dwelling should be located so that it is:
   a) 10 meters from any retained vegetation strips or small areas of vegetation;
   b) Retained trees in the Building Protection Zone should provide a non-continuous canopy with a total canopy cover of less than 10%; and
   c) All dead and damaged timber is to be removed within the Setback Zone.
2. Lawns and Gardens within 10m width surrounding the dwelling are to be kept at no greater than 50mm in height;
3. Grassed areas and lawns for a further 10m are to be kept at no greater than 150mm;
4. The balance of the setback zone will be kept in a hazard reduced state: free of weeds (particularly lantana and guinea grass) and grasses at no greater than 200mm high: and
5. Landscaping trees within 10m of residences should be fire resistant species. No tree or shrub should be in contact with or overhang buildings.
6. All fencing and other garden structures within 10 metres of the dwelling will be constructed from non-combustible materials.

11 Purchaser/Resident Education and Awareness Programs

Each owner should be provided with a copy of this Fire Management Plan with an alert placed either on the title or Council rate searches that the Fire Management Plan is in existence and is to be made available to subsequent owners. The hazard ratings are to be placed on council plans and / or rate notices.

Owners should read and be familiar with the information contained in this report. Owners are responsible for maintenance of fire reduction measures on the site to reduce the risk of fire.

Owners should establish a Fire Safety Plan and Emergency Evacuation Plan for the event of fire including all suitable evacuation routes from their land and dwelling for fire from all potential directions. In the event of a fire, dialling 000 obtains emergency assistance.

Bushfire Safety Plans should include a series of time actions:

1. out of season observations for general fire safety around your house and property;
2. at the start of the fire season;
3. when very high to catastrophic conditions are announced for your area
4. when a fire is near your area;
5. when QRFS provide a watch and act or elevated warnings; and
6. when you are told to leave

Examples of Fire Safety Plans include the *Rural Property Fire Management Guide* and *'Plan Act Survive' - Bushfire Survival Plan*.

Residents should maintain regular contact with the Fire Brigade for local information updates and check the Queensland Rural Fire Service website for any updated fire safety guides and further information.

Additional recommendations to reduce fire risk around the dwelling are provided in **Table 4**

Table 4. Hazard Reduction Measures: The following recommendations provide additional measures to reduce hazards around the dwelling

Category	Issue	Action
Buildings	Maintenance: Buildings and Grounds	• Clear overhanging trees and shrubs from dwellings and associated structures; • Point LPG gas tank relief valves away from dwellings; • Store flammable items well away from dwellings (e.g. woodpiles, boxes, paper); • Secure roof and clean gutters of dry leaf debris to eliminate an ignition source for embers; • Clear fuels around the house for at least 20 metres; • Trim under fences and remove overgrown bushes and plants; • Ensure surrounding grassed areas are trimmed and well-watered; and • Install non-flammable gutter guards. • Ensure door mats and other flammable material is moved away from the building when a bushfire is imminent.
Water	Water Supply and firefighting equipment	• Water sources for firefighting may include an accessible dam or tank with fire brigade tank fittings, a swimming pool, bore water etc. These sources should be provided with all-weather access; • All structures should be provided with a garden hose with metal fittings attached to the water supply at all times. The hose should be of sufficient length to reach all sides of a building; and • Regularly check that firefighting equipment is operational. • Rooftop and perimeter sprinkler systems are considered to be very effective in reducing the risk of spot fires around a dwelling.
Hazard Reduction	Close proximity of buildings to hazardous vegetation Hazard reduction:	• Trees should be located at a sufficient distance away from dwellings so that when fully mature, branches do not overhang the eaves of the house. • Create a fuel reduction zone adjacent to a dwelling. Remove hazardous vegetation. Do not cause erosion when reducing potential fuel loads in these areas. • Within the hazard reduction zones, hazardous understory vegetation (dry sclerophyll species) should be removed within the setback zone of all structures. These can be replaced with fire resistant species.
Landscaping	Growth of grasses and other fire prone vegetation in disturbed and cleared areas	• Remove hazardous grasses and undesirable regrowth from buffer areas; and • Maintain all safety buffer areas free of weeds and tall grasses to maximum heights set out in this Bushfire Management Plan.
	Landscaping species	• Many species of locally occurring dry rainforest species are very effective at supressing the spread of fire. • Avoid using palm trees and ferny leaved trees near the dwelling. These species are susceptible to burning.

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13 Appendix

AS3959 Method 2 results

Driveway & Trails Map

Local Access & Trails Map

Calculated May 7, 2020, 2:39 pm (MDc v.4.8)

23SP230293NE

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	40	Rate of spread	0.71 km/h
Vegetation classification	Woodland	Flame length	7.07 m
Surface fuel load	15 t/ha	Flame angle	54 °, 64 °, 73 °, 78 °, 80 ° & 85 °
Overall fuel load	20 t/ha	Elevation of receiver	2.86 m, 3.18 m, 3.38 m, 3.46 m, 3.48 m & 3.52 m
Vegetation height	n/a	Fire intensity	7,439 kW/m
Effective slope	0 °	Transmissivity	0.887, 0.876, 0.859, 0.839, 0.827 & 0.754
Site slope	0 °	Viewfactor	0.5898, 0.4312, 0.2888, 0.1947, 0.1588 & 0.0435
Flame width	100 m	Minimum distance to < 40 kW/m²	5.9 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	8.1 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	12.1 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	17.8 m
		Minimum distance to < 10 kW/m²	21.7 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Calculated May 7, 2020, 2:44 pm (MDc v.4.8)

23SP230293NW

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	40	Rate of spread	2.02 km/h
Vegetation classification	Woodland	Flame length	15.57 m
Surface fuel load	15 t/ha	Flame angle	53 °, 63 °, 70 °, 75 °, 76 ° & 82 °
Overall fuel load	20 t/ha	Elevation of receiver	6.21 m, 6.93 m, 7.31 m, 7.52 m, 7.55 m & 7.71 m
Vegetation height	n/a	Fire intensity	20,944 kW/m
Effective slope	15 °	Transmissivity	0.87, 0.85, 0.824, 0.798, 0.785 & 0.725
Site slope	0 °	Viewfactor	0.6022, 0.446, 0.3027, 0.2052, 0.1673 & 0.0453
Flame width	100 m	Minimum distance to < 40 kW/m²	12.8 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	17.2 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	24.9 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	34.9 m
		Minimum distance to < 10 kW/m²	41.1 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Calculated May 7, 2020, 2:36 pm (MDc v.4.8)

23SP230293SE

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	40	Rate of spread	3.13 km/h
Vegetation classification	Woodland	Flame length	22.74 m
Surface fuel load	15 t/ha	Flame angle	51 °, 60 °, 67 °, 71 °, 73 ° & 80 °
Overall fuel load	20 t/ha	Elevation of receiver	8.83 m, 9.85 m, 10.46 m, 10.75 m, 10.87 m & 11.2 m
Vegetation height	n/a	Fire intensity	32,348 kW/m
Effective slope	21.3 °	Transmissivity	0.859, 0.834, 0.805, 0.779, 0.767 & 0.711
Site slope	0 °	Viewfactor	0.6111, 0.4559, 0.3093, 0.2104, 0.1712 & 0.0461
Flame width	100 m	Minimum distance to < 40 kW/m²	18.4 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	24.4 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	34.3 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	46.4 m
		Minimum distance to < 10 kW/m²	53.8 m

Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005

Calculated May 7, 2020, 2:42 pm (MDc v.4.8)

23SP230293SW

Minimum Distance Calculator - AS3959-2018 (Method 2)

Inputs		Outputs	
Fire Danger Index	40	Rate of spread	3.69 km/h
Vegetation classification	Woodland	Flame length	26.41 m
Surface fuel load	15 t/ha	Flame angle	51 °, 59 °, 66 °, 70 °, 72 ° & 79 °
Overall fuel load	20 t/ha	Elevation of receiver	10.26 m, 11.32 m, 12.06 m, 12.41 m, 12.56 m & 12.96 m
Vegetation height	n/a	Fire intensity	38,174 kW/m
Effective slope	23.7 °	Transmissivity	0.853, 0.827, 0.797, 0.772, 0.76 & 0.705
Site slope	0 °	Viewfactor	0.6146, 0.4589, 0.3127, 0.2124, 0.1726 & 0.0465
Flame width	100 m	Minimum distance to < 40 kW/m²	21.3 m
Windspeed	n/a	Minimum distance to < 29 kW/m²	27.9 m
Heat of combustion	18,600 kJ/kg	Minimum distance to < 19 kW/m²	38.6 m
Flame temperature	1,090 K	Minimum distance to < 12.5 kW/m²	51.6 m
		Minimum distance to < 10 kW/m²	59.5 m

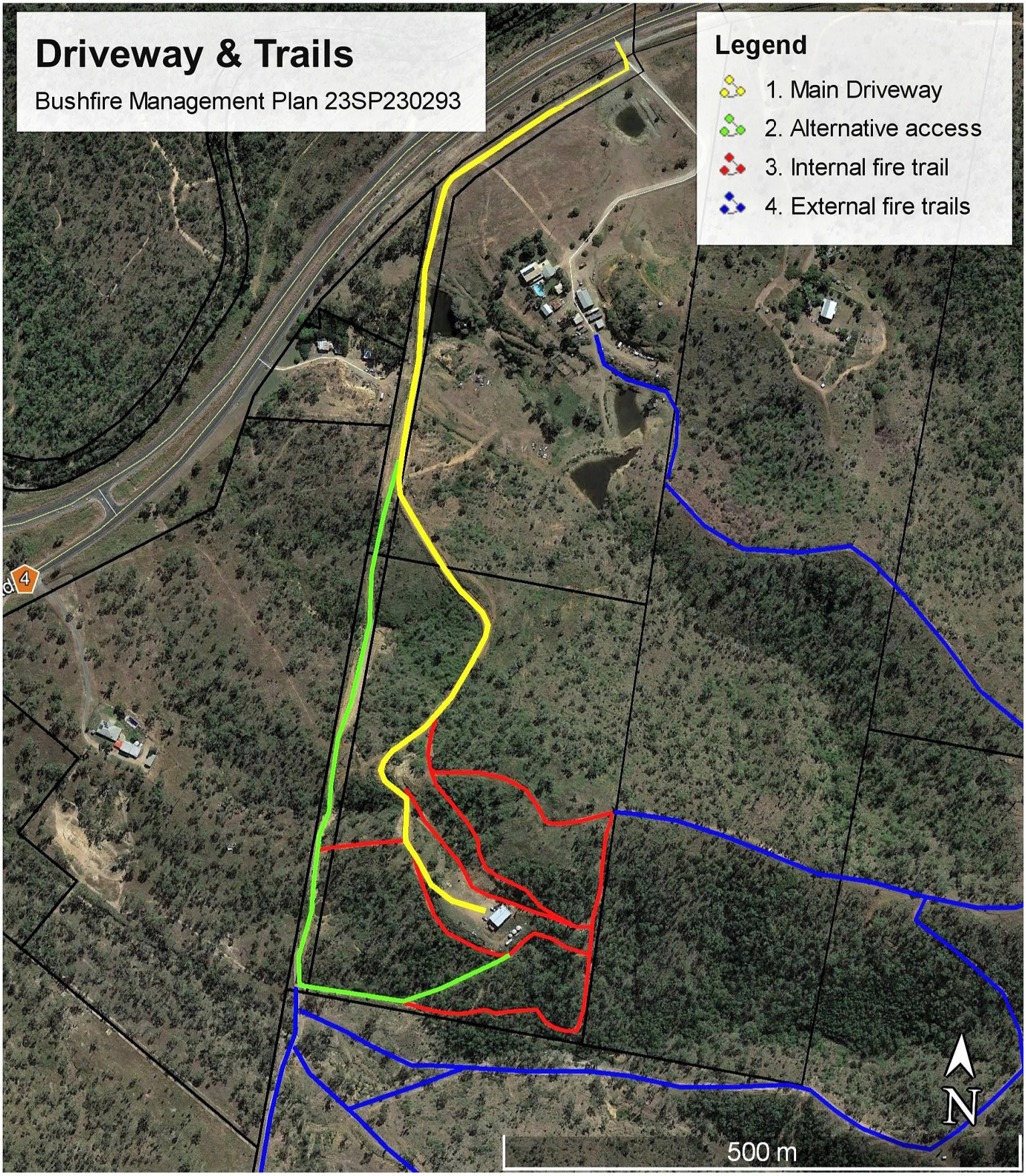
Rate of Spread - Mcarthur, 1973 & Noble et al., 1980

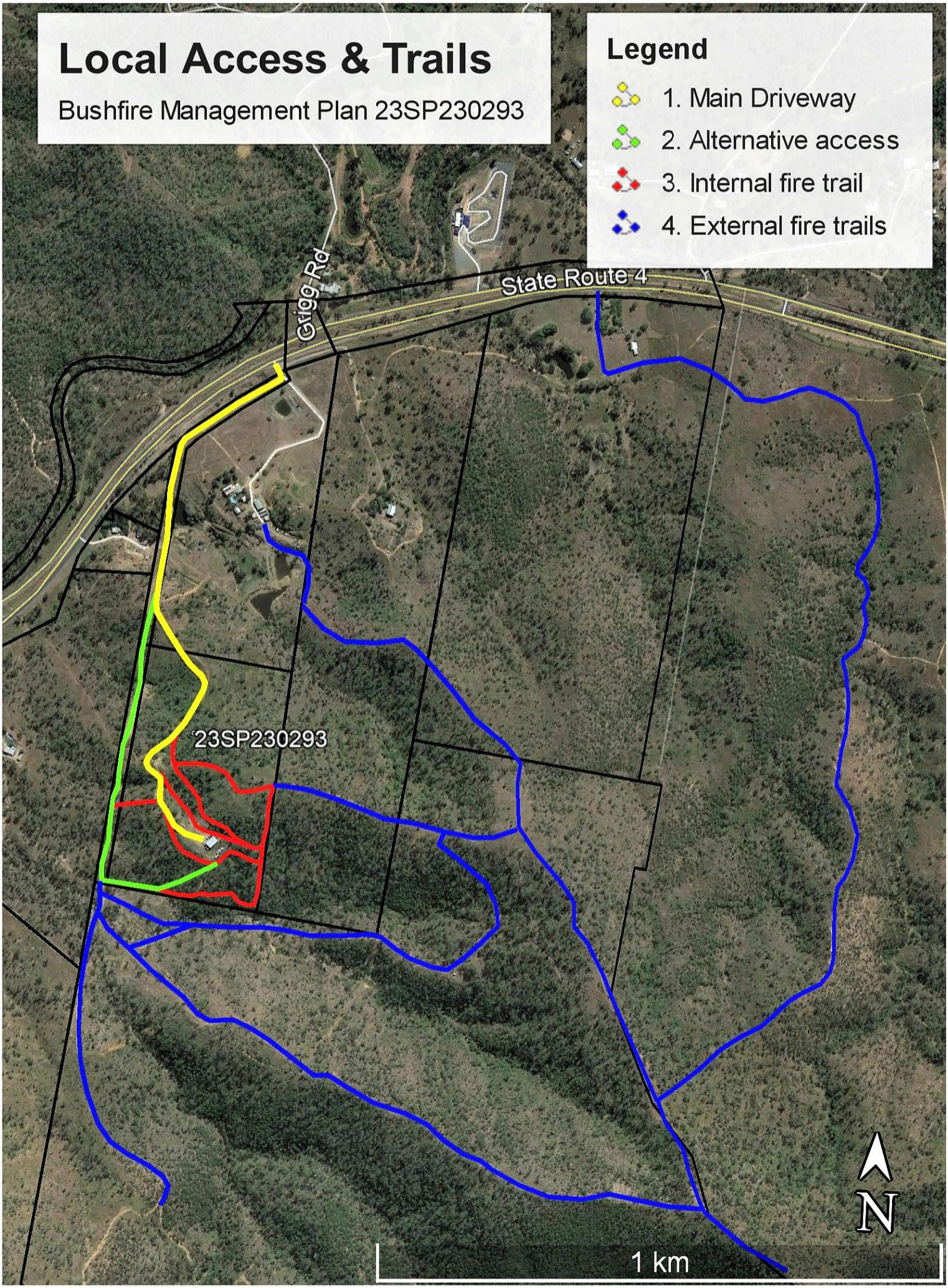
Flame length - NSW Rural Fire Service, 2001 & Noble et al., 1980

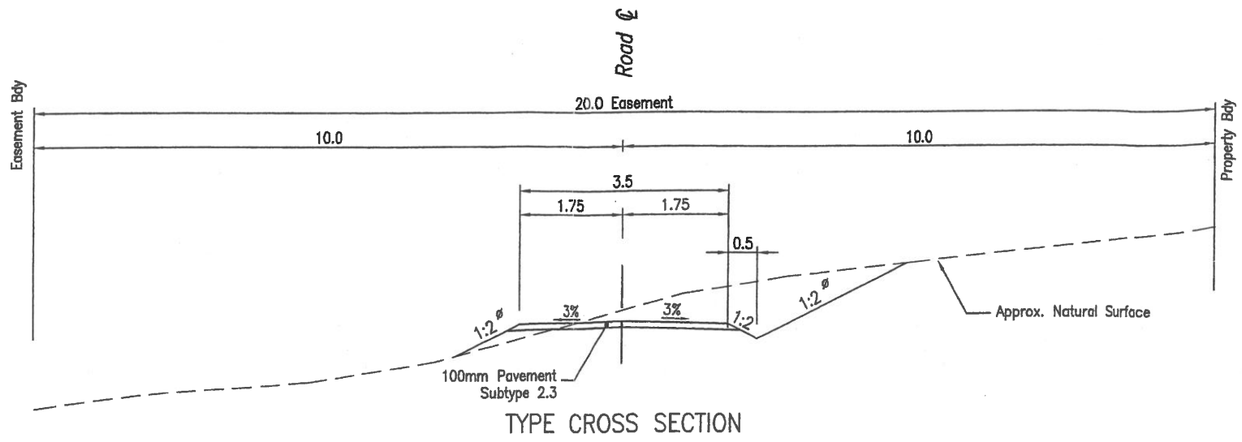
Elevation of receiver - Douglas & Tan, 2005

Flame angle - Douglas & Tan, 2005

Radiant heat flux - Drysdale, 1999, Sullivan et al., 2003, Douglas & Tan, 2005


Driveway & Trails
Bushfire Management Plan 23SP230293
Legend
1. Main Driveway
2. Alternative access
3. Internal fire trail
4. External fire trails
N
500 m


Local Access & Trails
Bushfire Management Plan 23SP230293
Legend
1. Main Driveway
2. Alternative access
3. Internal fire trail
4. External fire trails
Grigg Rd
State Route 4
23SP230293
N
1 km



TYPE CROSS SECTION

ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D1029/2008
Dated 26/11/09

ø Hydromulch to new batter slopes and all disturbed areas

GENERAL NOTES

1. All dimensions are in metres unless shown otherwise.
2. All works shall be carried out in accordance with the Council's requirements unless stated otherwise.
3. Although the present and/or proposed positions of public utilities, fittings, manholes, poles, etc may be indicated on the drawings, the Contractor shall verify the location of all existing services with the revelant Authorities before commencement of any work. Any cost associated with repairing damage to existing services shall be paid for by the Contractor.
4. Levels refer to lip of kerb and channel. Road dimensions and radii measured to setout line at the invert (275mm behind lip).
5. Notwithstanding the limits of cut and fill shown on the drawings, the actual limits shall be determined on site by the Superintendent.
6. All new work shall be joined neatly to existing and the levels for connection to existing works may be varied where necessary on site by the Superintendent to achieve a satisfactory smooth finish to the existing works. Joins to existing ac surfacing shall be saw cut to the satisfaction of the Superintendent.
7. The pavement thickness shown on the drawings may be varied by direction, in writing, of the Superintendent after the examination and/or testing of the road subgrade. The Contractor shall in all cases confirm the pavement thickness before proceeding with the final preparation of the road subgrade.
8. A Telstra representative must be present when excavating near Telstra cables.
9. Layout and levels plan must be read in conjunction with longitudinal sections, cross sections and details.
10. Road contours are at 0.1m intervals unless stated otherwise.
11. Clearing and grubbing shall be as defined in the specifications. All debris shall be removed from the site (which includes the road reserve and allotments). Burning of waste material and debris is prohibited, without approval from the fire warden and Gladstone Regional Council.
12. Stockpiling of reusable material shall be at a location approved by the Superintendent on site and shall be watered down to ensure that dust is kept to a minimum.
13. Topsoil is to be stripped to a depth of not less than 75mm and stockpiled for later respreading on footpaths and batters as directed by the Superintendent. Topsoil to be respread to minimum depth of 50mm or as directed by the Superintendent.
14. Turf is to be applied to all footpaths for a minimum of 800mm from rear of kerbs in accordance with the turfing detail.
15. All signage shall be installed in accordance with the Manual of Uniform Traffic Control Devices.
16. All signs to be min Class 1 retro-reflective material.

ROADWORKS & EARTHWORKS NOTES

1. Control testing of earthworks shall be undertaken in accordance with A.S.3798.
2. Fill shall be placed and compacted to the following standards:
   (a) Cohesive Materials: Allotment fill shall achieve a Minimum Dry Density Ratio (M.D.D.R) of 95% Standard.
3. Road embankments shall achieve the following minimum standards:
   (a) Greater than or equal to 0.3m below pavement subgrade: 95% M.D.D.R Standard.
   (b) Less than 0.3m below pavement subgrade: 97% M.D.D.R Standard.
   (c) Non Cohesive Material: Fill shall achieve a Minimum Density Index Ratio of 80%.
4. Field Density tests shall be undertaken at the following minimum frequencies:
   (a) Allotment Fill: 1 test/500cu.m or 1 test/allotment (whichever is greater)
   (b) Subgrade Fill and Road Pavement: 1 test/200cu.m or 1 test/200mm thickness/1000sq.m (whichever is greater)
5. Road pavements shall be placed and compacted to achieve a Minimum Dry Density Ratio (M.D.D.R) of 100% Standard.
6. Driveway access to have expansion joints at maximum 4m spacings.

Plot Date : 20/03/2009
Filename : S:\PROJECT RECORDS\056-08-09 498 Yeppoon Rd For Semple\Drawings\Planning\Final Drawings\LJJ 0580809-01P Types.dwg

NOT TO SCALE

All dimensions in metres unless stated otherwise.

Rev.	Description	Date	Designed	Checked
A	SUBMITTED FOR APPROVAL	12/03/09	LJJ	PYU
AMENDMENTS				

Surveyor:

Datum:-

Approved: / /

Certified: / /

RPEQ

McMurtrie consulting engineers
Address: 63 Charles Street, NORTH ROCKHAMPTON QLD 4701
Postal: PO BOX 2149, WANDAL QLD 4700
E-mail: mail@mcmengineers.com
Phone: (07) 4921 1780
Mobile: 0407 631 066
Fax: (07) 4921 1790

RECONFIGURATION OF LOT 498 YEPPOON RD, LIMESTONE CREEK

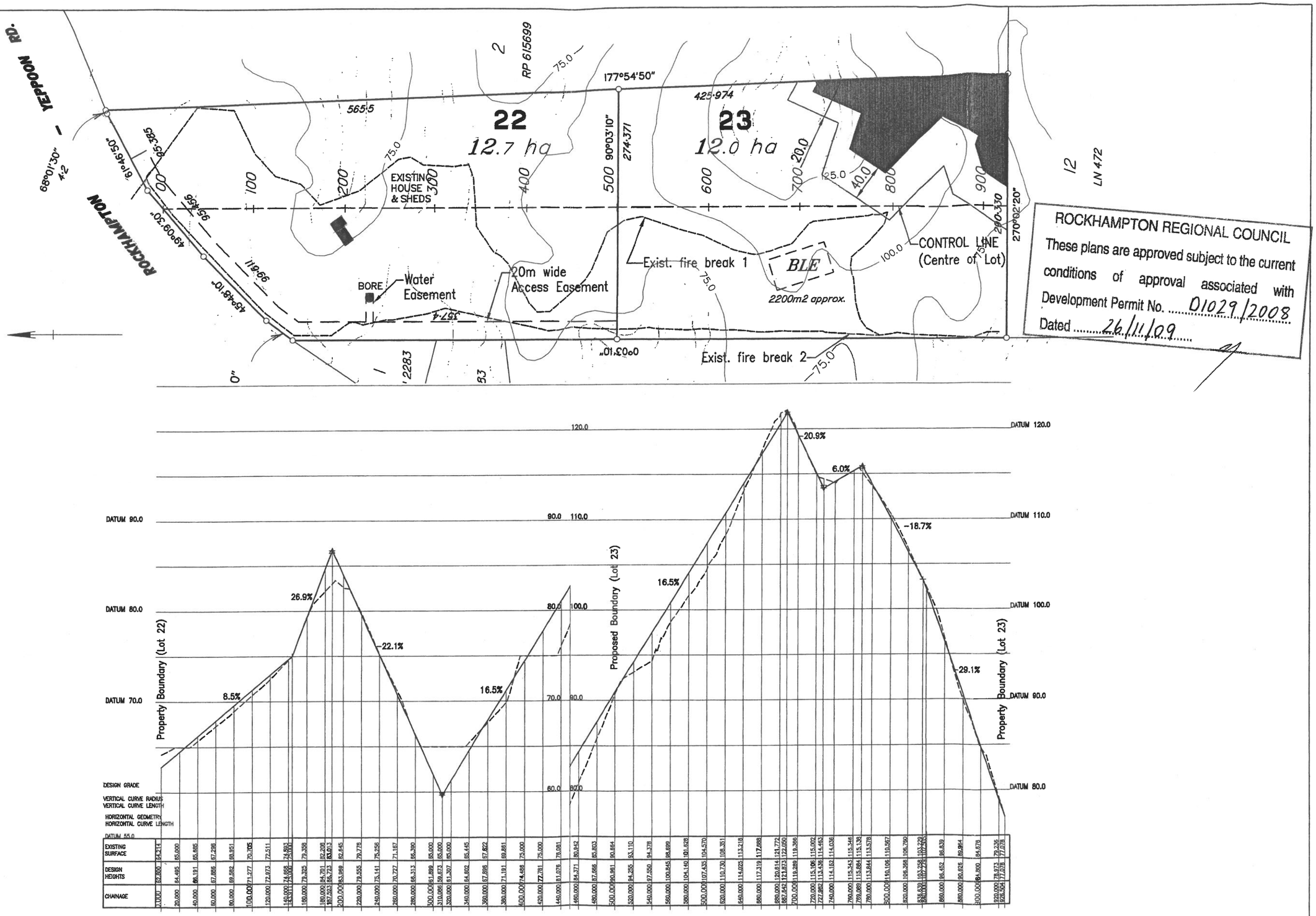
for K SEMPLE & T SEMPLE

TYPE CROSS SECTION AND DETAILS

Revision No: A

Drawing Number 0580809-01P

SHEET 1 OF 5 SHEETS



LONGITUDINAL SECTION ALONG CENTRE of ORIGINAL LOT

HORIZONTAL 0 20 40 60 80 100 — 1:2000 (A1), 1:4000 (A3)

VERTICAL 0 2 4 6 8 10 — 1:200 (A1), 1:400 (A3)

All dimensions in metres unless stated otherwise.

Rev.	Description	Date	Designed	Checked
A	SUBMITTED FOR APPROVAL	19/03/09	LJJ	PYU
	AMENDMENTS			

Surveyor: SCHLENCKER SURVEYING, EAST STREET, ROCKHAMPTON QLD
Datum:- C.A.M. AHD
Derived from Aerial Mapping

Approved: / /

Certified: / / RPEQ

McMurtrie consulting engineers
Address: 63 Charles Street, NORTH ROCKHAMPTON QLD 4701
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E-mail: mail@mcmengineers.com
Phone: (07) 4921 1780
Mobile: 0407 631 066
Fax: (07) 4921 1790

LONG SECTION THROUGH CENTRE OF LOT

498 YEPPOON ROAD, LIMESTONE CREEK
for K SEMPLE & T SEMPLE

Revision No: A

Drawing Number 0580809–02P

SHEET 2 OF 5 SHEETS

Plot Date : 20/03/2009
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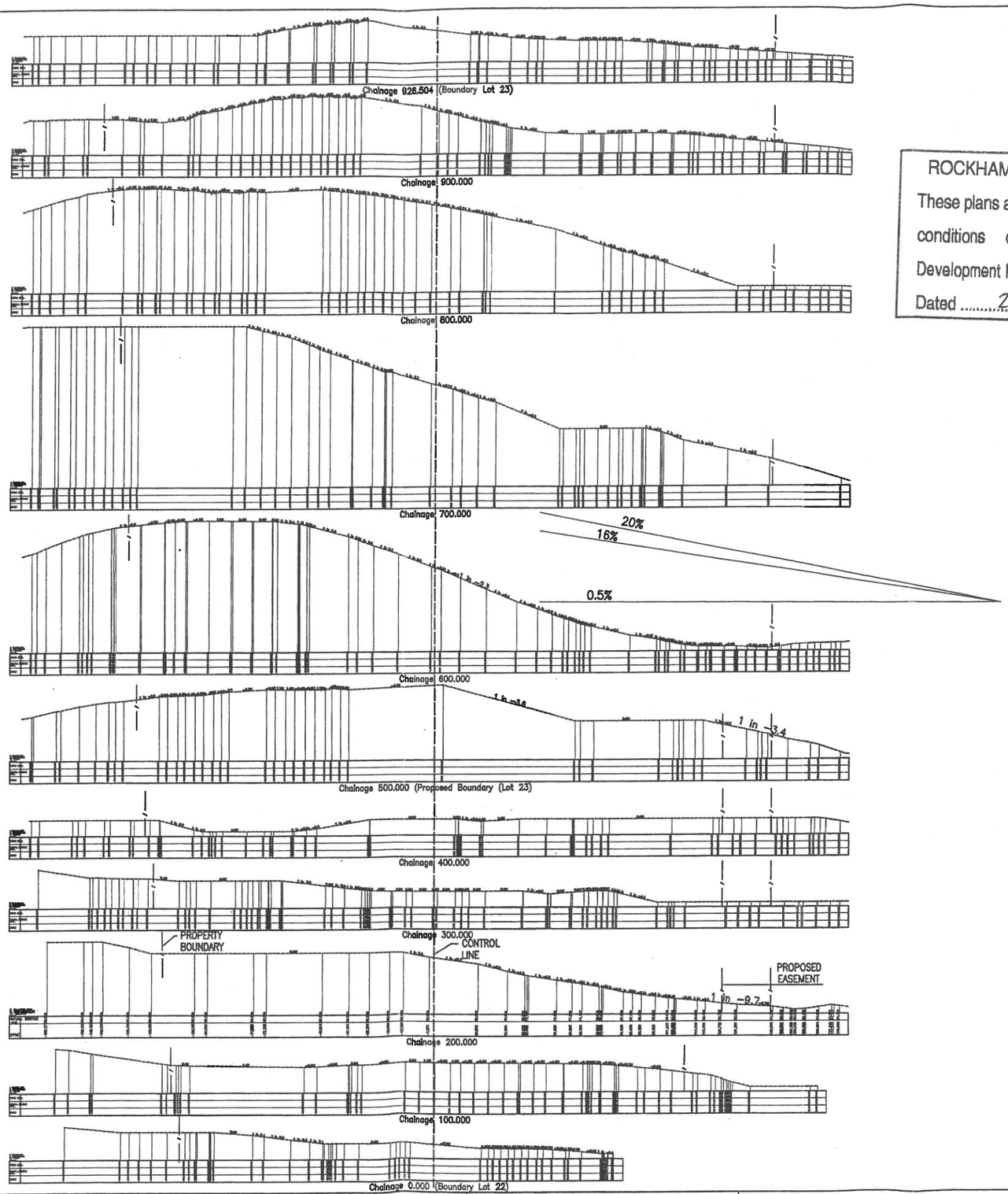

ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D1029/2008
Dated 26/11/09

Plot Date : 20/03/2009
Filename : S:\PROJECT RECORDS\058-08-09 498 Yeppoon Rd For Semple\Drawings\Planning\Final Drawings\0580809-02 - 05P LONG & X SECTS.dwg

0 10 20 30 40 50
1:1000 (A1), 1:2000 (A3)

All dimensions in metres unless stated otherwise.

Rev.	Description	Date	Designed	Checked
A	SUBMITTED FOR APPROVAL	19/03/09	LJJ	PYU
AMENDMENTS				

Surveyor: SCHLENCKER SURVEYING, EAST STREET, ROCKHAMPTON QLD
Datum:- C.A.M. AHD
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Approved:

Certified: RPEQ

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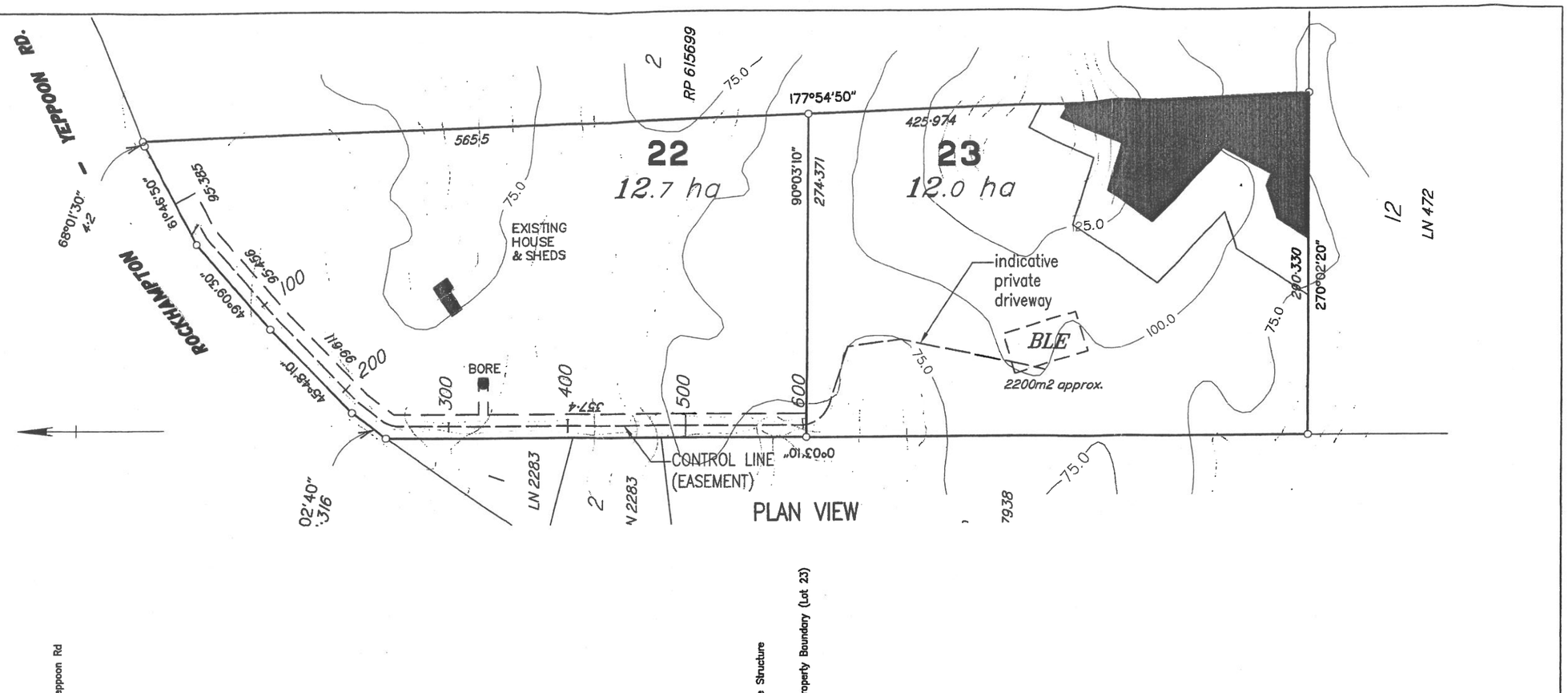
CROSS SECTIONS ALONG CENTRE OF ORIGINAL LOT

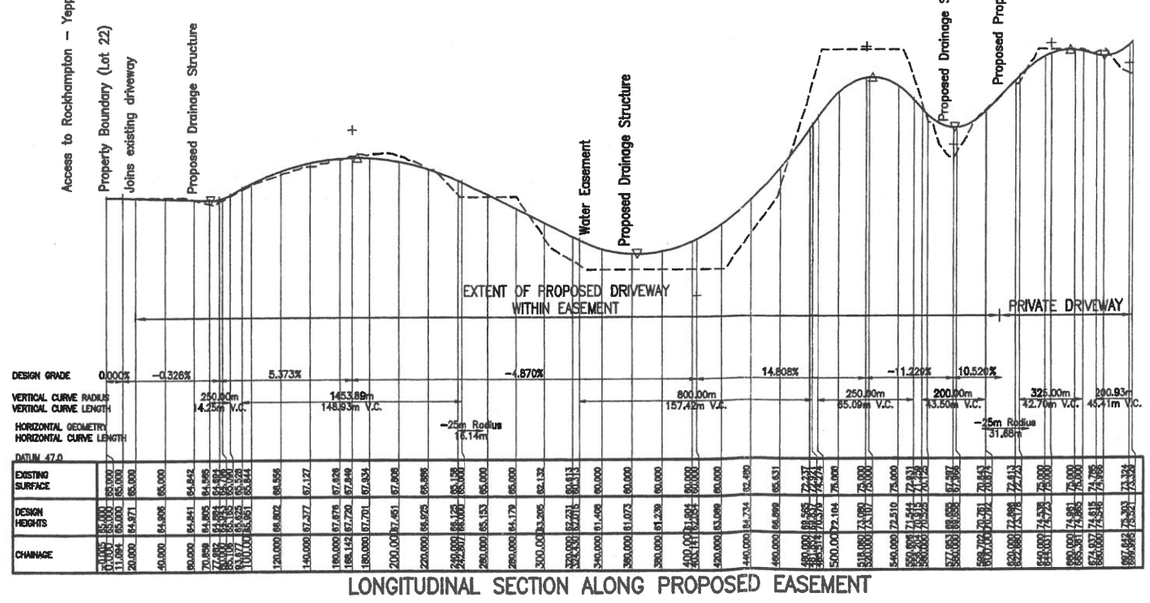
498 YEPPOON ROAD, LIMESTONE CREEK
for K SEMPLE & T SEMPLE

Revision No: A

Drawing Number 0580809-03P

SHEET 3 OF 5 SHEETS





LONGITUDINAL SECTION ALONG PROPOSED EASEMENT

ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. 01029/2008
Dated 26/11/09

Plot Date : 20/03/2009
Filename : S:\PROJECT RECORDS\058-08-09 498 Yeppoon Rd For Semple\Drawings\Planning\Final Drawings\0580809-02 - 05P LONG & X SECTS.dwg

HORIZONTAL 0 20 40 60 80 100 — 1:2000 (A1), 1:4000 (A3)
VERTICAL 0 2 4 6 8 10 — 1:200 (A1), 1:400 (A3)
All dimensions in metres unless stated otherwise.

Rev.	Description	Date	Designed	Checked
A	SUBMITTED FOR APPROVAL	19/03/09	LJJ	PYU
AMENDMENTS				

Surveyor: SCHLENCKER SURVEYING, EAST STREET, ROCKHAMPTON QLD
Datum:– C.A.M. AHD Derived from Aerial Mapping

Approved: / /
Certified: / /
RPEQ

McMurtrie consulting engineers
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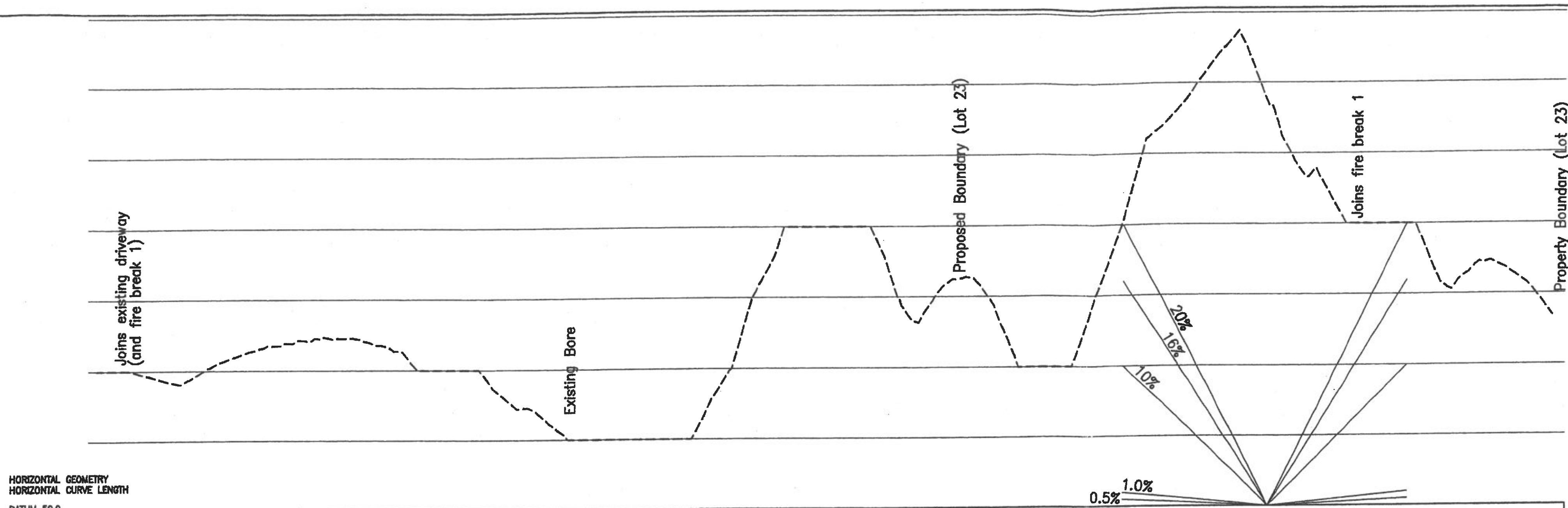
LONG SECTION ALONG PROPOSED EASEMENT
498 YEPPOON ROAD, LIMESTONE CREEK
for K SEMPLE & T SEMPLE

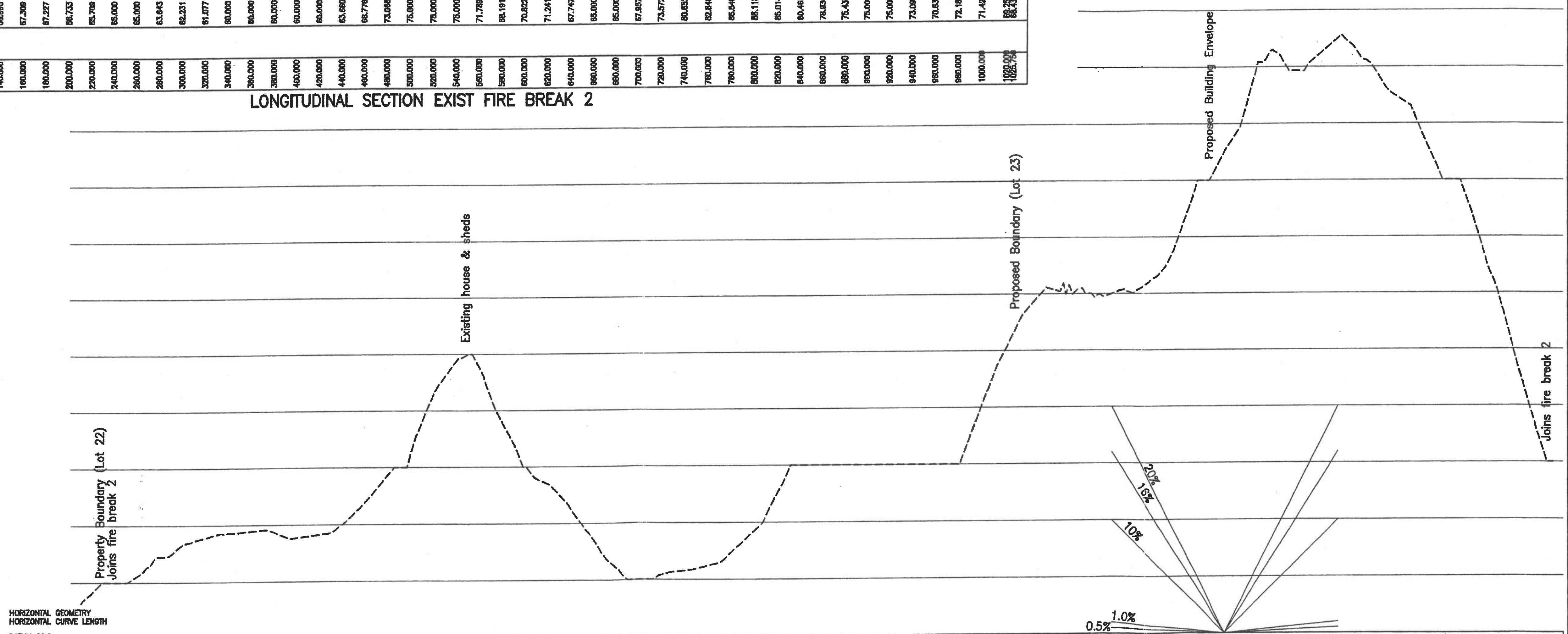
Revision No: A
Drawing Number 0580809–04P
SHEET 4 OF 5 SHEETS



HORIZONTAL GEOMETRY
HORIZONTAL CURVE LENGTH
DATUM 50.0

CHAINAGE	EXISTING SURFACE	DESIGN HEIGHTS
-0.177 / 0.000	65.000 / 65.000	
20.000	65.000	
40.000	64.516	
60.000	64.032	
80.000	65.178	
100.000	66.001	
120.000	66.671	
140.000	66.990	
160.000	67.309	
180.000	67.227	
200.000	66.733	
220.000	65.709	
240.000	65.000	
260.000	65.000	
280.000	63.643	
300.000	62.231	
320.000	61.077	
340.000	60.000	
360.000	60.000	
380.000	60.000	
400.000	60.000	
420.000	60.000	
440.000	63.660	
460.000	68.776	
480.000	73.098	
500.000	75.000	
520.000	75.000	
540.000	75.000	
560.000	71.789	
580.000	68.191	
600.000	70.822	
620.000	71.241	
640.000	67.747	
660.000	65.000	
680.000	65.000	
700.000	67.957	
720.000	73.572	
740.000	80.652	
760.000	82.840	
780.000	85.545	
800.000	88.118	
820.000	85.014	
840.000	80.465	
860.000	78.930	
880.000	75.439	
900.000	75.000	
920.000	75.000	
940.000	73.090	
960.000	70.639	
980.000	72.189	
1000.000	71.426	
1020.000 / 1025.756	69.257 / 68.437	

LONGITUDINAL SECTION EXIST FIRE BREAK 2



HORIZONTAL GEOMETRY
HORIZONTAL CURVE LENGTH
DATUM 60.0

CHAINAGE	EXISTING SURFACE	DESIGN HEIGHTS
-0.696 / 0.000	63.204 / 63.270	
20.000	65.000	
40.000	65.010	
60.000	66.407	
80.000	67.519	
100.000	68.647	
120.000	69.208	
140.000	69.376	
160.000	69.548	
180.000	68.921	
200.000	69.001	
220.000	69.334	
240.000	70.963	
260.000	73.098	
280.000	75.000	
300.000	79.050	
320.000	83.051	
340.000	84.979	
360.000	81.206	
380.000	77.123	
400.000	73.983	
420.000	72.476	
440.000	69.827	
460.000	67.053	
480.000	65.049	
500.000	65.000	
520.000	65.645	
540.000	65.922	
560.000	66.445	
580.000	68.317	
600.000	70.596	
620.000	74.556	
640.000	75.000	
660.000	75.000	
680.000	75.000	
700.000	75.000	
720.000	75.000	
740.000	75.000	
760.000	75.000	
780.000	77.368	
800.000	83.008	
820.000	87.360	
840.000	90.083	
860.000	90.904	
880.000	90.039	
900.000	89.894	
920.000	90.081	
940.000	91.314	
960.000	94.492	
980.000	100.000	
1000.000	101.942	
1020.000	105.791	
1040.000	110.724	
1060.000	109.673	
1080.000	110.564	
1100.000	112.298	
1120.000	111.226	
1140.000	108.810	
1160.000	106.959	
1180.000	103.242	
1200.000	100.000	
1220.000	97.087	
1240.000	91.053	
1260.000	84.208	
1280.000	77.222	
1293.479	75.000	

LONGITUDINAL SECTION EXIST. FIRE BREAK 1

ROCKHAMPTON REGIONAL COUNCIL

These plans are approved subject to the current conditions of approval associated with Development Permit No. D1029/2008

Dated 26/11/09

Plot Date : 20/03/2009
Filename : S:\PROJECT RECORDS\058-08-09 498 Yeppoon Rd For Semple\Drawings\Planning\Final Drawings\0580809-02 – 05P LONG & X SECTS.dwg

HORIZONTAL 0 20 40 60 80 100 — 1:2000 (A1), 1:4000 (A3)
VERTICAL 0 2 4 6 8 10 — 1:200 (A1), 1:400 (A3)
All dimensions in metres unless stated otherwise.

Rev.	Description	Date	Designed	Checked
A	SUBMITTED FOR APPROVAL	19/03/09	LJJ	PYU
	AMENDMENTS			

Surveyor: SCHLENCKER SURVEYING, EAST STREET, ROCKHAMPTON QLD
Datum:– C.A.M. AHD Derived from Aerial Mapping

Approved: / /
Certified:
RPEQ / /

McMurtrie consulting engineers
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E-mail: mail@mcmengineers.com

LONG SECTIONS ALONG EXISTING FIRE BREAKS
498 YEPPOON ROAD, LIMESTONE CREEK
for K SEMPLE & T SEMPLE

Revision No: A
Drawing Number 0580809–05P
SHEET 5 OF 5 SHEETS