

**Stage 2
Lot 9001 Waterloo
Road
Roelands, WA 6226**

Bushfire Management Plan



3/4/2018

Kathryn Kinnear

Bio Diverse Solutions

DOCUMENT CONTROL

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Reviewer (s): Bianca Theyer, Andrew McRobert

Job No.: MPM002-003

Client: Roelands Development Pty Ltd as Trustees for the Roelands Development Trust.

REVISION RECORD

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1. Executive Summary

Roelands Development Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to prepare a Bushfire Management Plan to guide all future bushfire management for the proposed development of Stage 2 Lot 9001 Waterloo Road, Roelands WA.

The proposed subdivision for the Subject Site consists of 29 lifestyle size residential lots ranging in size from 3,009m² to 11,932m² with one lot 14.2052ha. The subdivision plan for the Subject Site also includes a 20m wide road for access to the lots.

The Subject Site was assessed as having internal areas of Grassland Type G consistent with rural farmland and a small area of Woodland Type B and Scrub Type D. External to the site is predominantly Woodland Type B and Grassland Type G, with low fuel areas to the west in the previous Stage 1 of Heritage Hills. The vegetation classifications and Bushfire Attack Level (BAL) has been calculated using the Method 1 procedure as outlined in AS3959-2009. The assessed BAL ratings for the development are depicted as BAL contours, BAL ratings for the Subject Site are presented in Table 3 with BAL Contours for the Subject Site shown on Figure 6. Internal areas of Grassland Type G (Plot 5) **have not been mapped on the BAL Contour Plan** with BAL-FZ applicable to the whole of site. A 20m APZ area will apply to ensure that all proposed buildings will be in Building Envelopes and will be subject to a BAL rating of BAL-12.5. The 20m APZ has been specified for each lot and shall be designated over the lots through this approved BMP and the design guidelines for the subdivision. It is recommended that the Shire of Harvey refer to the approved BMP for the estate as part of their firebreak order.

It is noted only lots 3, 4, 9 and 19-26 are legally required to build to BAL and AS3959-2009 as these lots are located in the WA bushfire prone area mapping. All other lots are not legally required to build to BAL/AS3959. Individual BAL assessments may be considered on the lots by the new owners when dwelling design/placement is known and can be undertaken at building approval stages with the engagement of an Accredited Level 1 BAL Assessor.

Access is available to two separate destinations through the public road network and provisions of EAW's. A Fire Service Access Way is provided to assist with firefighting operations to the east in proposed lot 9. Water supply will be through the extension of reticulated water from Stage 1 of Heritage Hills Estate.

A summary of the assessment to the Acceptable Solutions is provided in Table 1.

Table 1: Bushfire protection criteria applicable to the site

Element	Acceptable Solution	Applicable or not Yes/No	Meets Acceptable Solution
Element 1 – Location	A1.1 Development Location	Yes	Compliant BAL 29 or less applied to lots
Element 2 – Siting and Design	A2.1 Asset Protection Zone	Yes	Compliant, APZ in BAL 12.5 in 20m APZ area to be specified through approval of BMP and reference in Shire fire break order for Heritage Hills.
Element 3 – Vehicular Access	A3.1 Two Access Routes	Yes	Compliant two access to 2 destinations
	A3.2 Public Road	Yes	Compliant – Meets minimum standards see Section 6.3
	A3.3 Cul-de-sacs	Yes	Compliant to minimum standards
	A3.4 Battle axes	Yes	Compliant to minimum standards
	A3.5 Private driveways	Yes	Compliant to minimum standards
	A3.6 Emergency Access Ways	Yes	Compliant to minimum standards
	A3.7 Fire Service Access Ways	Yes	Compliant to minimum standards
	A3.8 Firebreaks	Yes	Compliant to Shire of Harvey current fire break notice

Table 1 cont.

Element	Acceptable Solution	Applicable or not Yes/No	Meets Acceptable Solution
Element 4 – Water	A4.1 Reticulated areas	Yes	Compliant reticulated water supplied
	A4.2 Non-reticulated areas	N/A	NA
	A4.3 Individual lots in non- reticulated areas	N/A	N/A

This BMP report provides details of the fire management strategies proposed to be implemented across the site as it is developed to ensure adequate protection of life, property and biodiversity assets. To ensure the bushfire mitigation measures are implemented, responsibilities are outlined in Section 8 for the future lot owners, the developer and the Shire of Harvey.

2. Introduction

Roelands Development Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to prepare a Bushfire Management Plan (BMP) to guide all future bushfire management for the proposed subdivision of Lot 9001 Waterloo Road, Roelands WA.

The Department of Mines imposed a 1km buffer to a basalt quarry situated to the east of the subject land. That buffer intrudes upon the land and has resulted in the previous structure plan prepared for the land having to be re-drafted. The imposition of this buffer, together with the existing development to the west, has limited significantly the alternative design outcomes for Lot 9001.

This BMP has been prepared to assess the subject site to the current and endorsed Guidelines for Planning in Bushfire Prone Areas Vers 1.2 (WAPC, 2017) and State Planning Policy 3.7 (WAPC, 2015).

Such planning takes into consideration standards and requirements specified in various documents such as Australian Standard (AS) 3959-2009, Western Australian Planning Commission (WAPC) Guidelines for Planning in Bushfire Prone Areas Vers 1.1 (WAPC, 2017) and State Planning Policy 3.7 (WAPC, 2015). These policies, plans and guidelines have been developed by WAPC to ensure uniformity to planning in designated “Bushfire Prone Areas” and consideration of the relevant bushfire hazards when identifying or investigating land for future development.

2.1. Location

Lot 9001 Waterloo Road, Roelands WA, (herein referred to as the Subject Site) is 32 ha and located to the east of South Western Highway. The Subject Site is bound by residential development to the west, and rural land to the north, east and south. The location of the Subject Site is shown on Figure 1.



Figure 1: Location Plan Heritage Hills Stage 2

2.2. Development Proposal

The Department of Mines imposed a 1km buffer to a basalt quarry situated to the east of the subject land. That buffer intrudes upon the land and has resulted in the previous structure plan prepared for the land having to be re-drafted. The imposition of this buffer, together with the existing development to the west, has limited significantly the alternative design outcomes for Lot 9001.

The proposed subdivision for the Subject Site consists of 29 lifestyle size residential lots ranging in size from 3,009m² to 11,932m² with one lot 14.2052ha in size. The subdivision plan for the Subject Site also includes a 20m wide road for access to the lots. The proposed Subdivision Plan (McRobert Planning, 2017) for the Subject Site is shown in Figure 2.

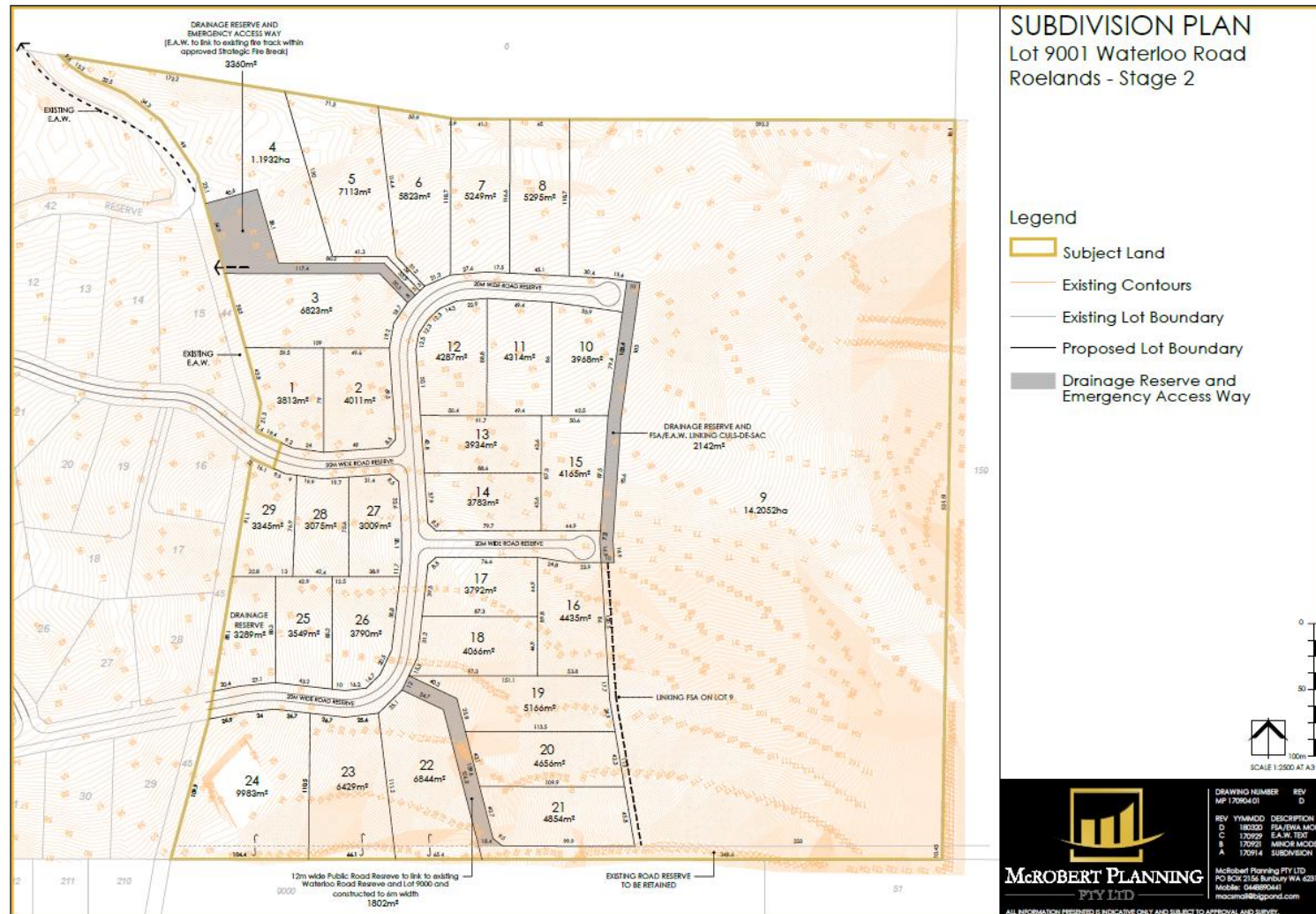


Figure 2: Plan of Subdivision Stage 2 Heritage Hills

2.3. Statutory Framework

This document and the recommendations contained within are aligned to the following policy and guidelines:

- *Planning and Development Act 2005;*
- *Planning and Development Regulations 2009;*
- *Planning and Development (Local Planning Scheme) Regulations 2015;*
- State Planning Policy 3.7 Planning in Bushfire Prone Areas;
- Guidelines for Planning in Bushfire Prone Areas;
- *Building Act 2011;*
- *Building Regulations 2012;*
- Building code of Australia (National Construction Code);
- *Fire and Emergency Services Act 1998.*
- AS 3959-2009 “Construction of Buildings in Bushfire Prone Areas” current and endorsed standards;
- *Bushfires Act 1954;* and
- Shire of Harvey Fire Break Order 2016/2017.

The publicly released Bushfire Prone Area Mapping (DFES, 2017) shows that the whole of the Subject Site is partially located within a Bushfire Prone Area (situated within 100m of >1 ha of bushfire prone vegetation). Bushfire Prone Area Mapping is shown on Figure 3 below.



Figure 3: Bushfire Prone Area Mapping

2.4. Suitably Qualified Bushfire Consultant

This BMP has been prepared by Kathryn Kinnear (nee White), who has 10 years operational fire experience with the (formerly) DEC (1995-2005) and has the following accreditation in bushfire management:

- Incident Control Systems;
- Operations Officer;
- Prescribed Burning Operations;
- Fire and Incident Operations;
- Wildfire Suppression 1, 2 & 3;
- Structural Modules – Hydrants and hoses, Introduction to Structural Fires, and Fire extinguishers; and
- Ground Controller.

Kathryn Kinnear currently has the following tertiary Qualifications:

- BAS Technology Studies & Environmental Management;
- Diploma Business Studies; and
- Graduate Diploma in Environmental Management.

Kathryn Kinnear is an accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD30794). Bio Diverse Solutions are Silver Corporate Members of the Fire Protection Australia Association. Kathryn is a committee member of the WA Bushfire Working Group (FPAA) and Kathryn is a suitably qualified Bushfire Practitioner to prepare this Bushfire Management Plan.

3. Objectives

The objectives of this BMP are to assess the bushfire risks associated with the existing site and the proposed subdivision to reduce the occurrence of, and minimise the impact of bushfires, thereby reducing the threat to life, property and the environment. It also aims to guide the subdivision design by assessing the proposed subdivision according to the Bushfire Protection Criteria Acceptable Solutions as outlined in the Guidelines for Planning in Bushfire Prone Areas Vers 1.2 (WAPC, 2017).

The BMP aims to:

- Achieve consistency with objectives and policy measures of SPP 3.7 (WAPC, 2015);
- Assess any building requirements to AS3959-2009 (current and endorsed standards) and BAL Construction;
- Assess the subdivision proposal against the Bushfire Protection Criteria Acceptable Solutions as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017);
- Understand and document the extent of the bushfire risk to the Subject Site;
- Prepare bushfire risk management measures for bushfire management of all land within the Subject Site with due regard to people, property, infrastructure and the environment;
- Nominate individuals and organisations responsible for fire management and associated works within the Subject Site; and
- Ensure alignment to the recommended assessment procedure which evaluates the effectiveness and impact of proposed, as well as existing, bushfire risk management measures and strategies.

4. Spatial consideration of bushfire threat

A site inspection was conducted on the 16th September 2016 and November 2017 by Kathryn Kinnear to assess the current land use, topography/slope, vegetation and conditions of the site and its surroundings. Photographs of the Subject Site and surrounding areas were taken and have been presented in this report.

4.1. Land use

The Subject Site consists predominately of cleared rural land, with no existing dwellings on the site. There are areas of remnant vegetation to east of the Subject Site, which consists predominantly of Jarrah, Marri and Casuarina trees. The subject site has been grazed as pasture land and is currently vacant.

4.2. Surrounding land uses

The Subject Site is located to the east of Stage 1 of the Heritage Hills development. The Heritage Hills development is comprised of lifestyle size residential lots. There is existing rural farmland to the north, south and east of the development.

4.3. Topography

The Subject Site generally slopes from the south east to the north west towards South Western Highway, from a high point of 130m AHD at the south-eastern boundary of the site to a low point of 45m AHD along the northern western boundary. Topographic contours (5 metre contours) are shown on Figure 2.

The effective slopes (measured as per AS3959-2009) for the Subject Site are high to low across the site ranging from 12.1 to 0.6 degrees. Topography is significantly steeper to the south east and east of the Subject Site however most slopes are calculated as upslope from the development.

4.4. Bushfire fuels – Vegetation

The subject site lies within the Swan Coastal Plain 2 (SWA02) IBRA bioregion. Mitchell et al (2002) describes this bioregion as “...a low lying coastal plain, mainly covered with woodlands. It is dominated by *Banksia* or *Tuart* on sandy soils, *Casuarina obesa* on outwash plains, and *paperbark* in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland. The climate is Warm Mediterranean. Three phases of marine sand dune development provide relief. The outwash plains, once dominated by *C. obesa-marri* woodlands and *Melaleuca* shrublands, are extensive only in the south.”



The vegetation has been mapped on a broad scale by J.S. Beard (Shepherd et al 2002) in the 1970's, where a system was devised for state-wide mapping and vegetation classification based on geographic, geological, soil, climate structure, life form and vegetation characteristics (Sandiford and Barrett 2010). A GIS search of J.S. Beards (DEC, 2005) vegetation classification places the Subject Site within two Vegetation Associations (Source DEC Pre-European Vegetation GIS dataset, 2005):



- **System Association Name:** Pinjarra.
- **Vegetation Association Number:** 968.
- **Vegetation Description:** Medium woodland; jarrah, marri & wandoo.



- **System Association Name:** West Darling.
- **Vegetation Association Number:** 4.
- **Vegetation Description:** Medium woodland; marri & wandoo


The vegetation across the Subject Site and surrounding areas is consistent with rural farmland, with the majority of the site and surrounds comprising of grazed pasture dominated by pasture grass species. There are areas of remnant vegetation to the south, south east, east and north west of the Subject Site comprising of open Eucalypt trees with no midstorey or understorey (Woodland Type B). To the north west there is remnant vegetation consisting of low Paperbarks (Scrub Type D).

All vegetation within 150m of the site / proposed development was classified in accordance with Clause 2.3 and Exclusions as per Clause 2.2.3.2 of AS 3959-2009. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified over the page. Each plot is representative of the Vegetation Classification to AS3959-2009 Table 2.3 and exclusion clauses 2.2.3.2 and shown on the Vegetation Classification Mapping (Figure 4).

Plot	1	Classification or Exclusion Clause	Scrub Type D
			<p>Location: Located outside the subject site boundary to the north-west.</p> <p>Separation distance: 20m to lot boundary.</p> <p>Dominant species & description: Paperbarks and revegetated areas with a grassy understorey. Predominantly revegetation as per landscaping plan.</p> <p>Average vegetation height: Potential to future 4m, occasional paperbark to 5m.</p> <p>Vegetation coverage: >30% foliage cover.</p> <p>Surface fuel loading: 25t/ha available fuels.</p> <p>Effective slope: >0 to 5 degrees downslope.</p>
Photo Id 1: View of paperbark scrub to the north west of the Subject Site.			
Plot	2	Classification or Exclusion Clause	Woodland Type B
			<p>Location: Adjacent to Plot 1 and extending to the north west of the subject site.</p> <p>Separation distance: Located 31m from lot boundary.</p> <p>Dominant species & description: Marri, Jarrah and Flooded gum with grassy understorey. Grassy understorey (unmanaged).</p> <p>Average vegetation height: Overstorey 6-8m unmanaged grasses to 300-400mm.</p> <p>Vegetation coverage: 10-30% vegetative cover.</p> <p>Surface fuel loading: 15-25t/ha.</p> <p>Effective slope: >0 to 5 degrees downslope.</p>
Photo Id 2: View of Marri tree along the northern boundary			

Plot	3	Classification or Exclusion Clause	Woodland Type B
			<p>Location: Located internally and externally to the east, south east and north east of the Subject Site.</p> <p>Separation distance: Nil to lot boundary.</p> <p>Dominant species & description: Jarrah/Marri/Casuarina Woodland.</p> <p>Average vegetation height: Eucalypt Trees 10-15m, scrubs <1m.</p> <p>Vegetation coverage: <30% vegetative structure/cover.</p> <p>Surface fuel loading: Surface fuels 15-25t/ha.</p> <p>Effective slope: Upslope.</p>
Photo 3: View to the east along the eastern boundary.			
Plot	4	Classification or Exclusion Clause	Woodland Type B
			<p>Location: Located internally and externally along the southern boundary of the Subject Site.</p> <p>Separation distance: Nil to lot boundary.</p> <p>Dominant species & description: Jarrah/Marri/Casuarina Woodland with a grazed grassy understorey.</p> <p>Average vegetation height: Eucalypt Trees 10-15m.</p> <p>Vegetation coverage: <30% vegetative structure/cover.</p> <p>Surface fuel loading: Surface fuels 15-25t/ha.</p> <p>Effective slope: Upslope.</p>
Photo 4: View of Woodland Type B looking west along the boundary of Subject Site.			

Plot	5	Classification or Exclusion Clause	Grassland Type G
			<p>Location: Located internally, and to the north, east and south of the Subject Site.</p> <p>Separation distance: Nil.</p> <p>Dominant species & description: Unmanaged Paddock grasses of Kikuyu, clovers, cape weed.</p> <p>Average vegetation height: 100-250mm high.</p> <p>Vegetation coverage: < 10% trees.</p> <p>Surface fuel loading: Fuel loading 2-4t/ha.</p> <p>Effective slope: Upslope.</p>
Photo 5: View of Grassland Type G to the south of the Subject Site (note Woodland Type B in background).			
Plot	6	Classification or Exclusion Clause	Low fuel of non-vegetated exclusion 2.2.3.2 (e)
			<p>Location: Roads and buildings located to the west of the Subject Site in established subdivision.</p> <p>Description: Waterloo and Nunnagine Road, driveways and residential dwellings.</p> <p>As per the Exclusion Clause 2.2.3.2 (e) of AS3959-2009.</p>
Photo 6: View of roads and residential dwellings looking west along Nunnagine Road.			

Plot	7	Classification or Exclusion Clause	Low fuel of non-vegetated exclusion 2.2.3.2 (f)
			<p>Location: Located to the west of the Subject Site.</p> <p>Description: Low fuel areas associated with Asset Protection Zones in adjacent Lots. As per exclusion clause 2.2.3.2 (f) of AS3959.</p> <p>Surface fuel loading: <2t/ha</p>
<p><i>Photo 7: View of maintained road verges, lawns and APZ area looking west along Waterloo Road.</i></p>			

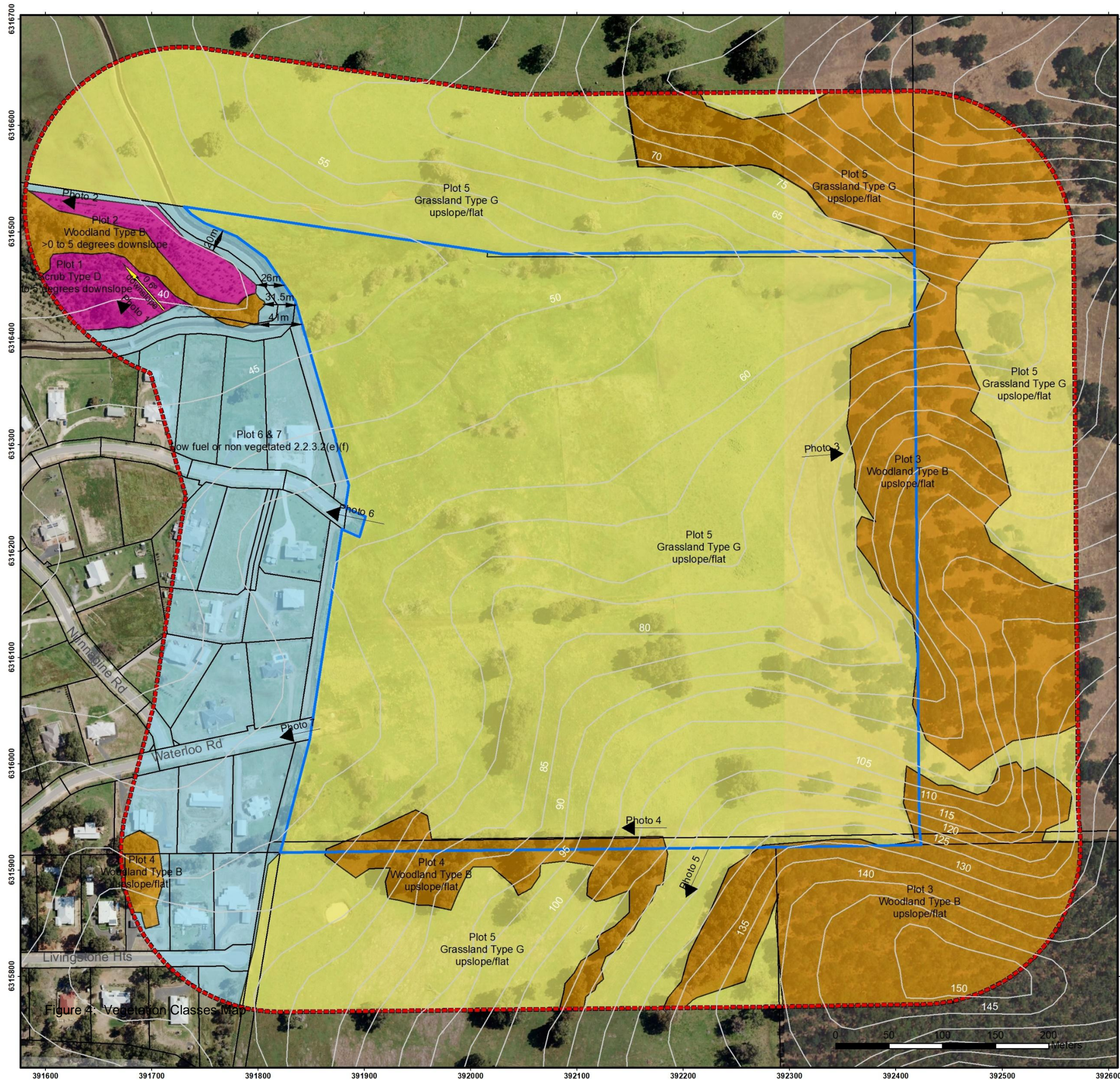


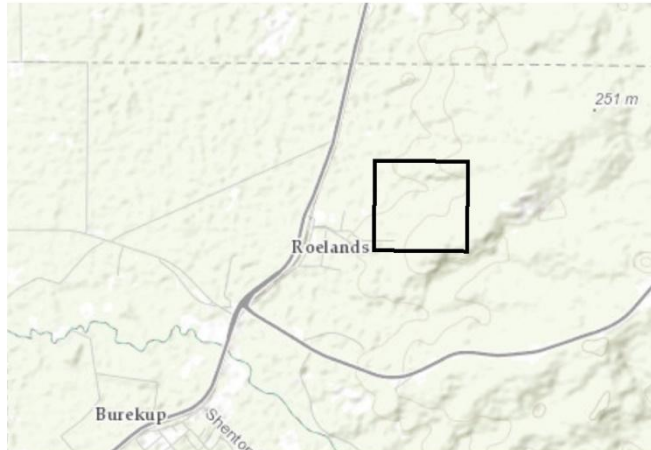


Figure 4: Vegetation Classes Map

This BAL Plan was prepared by:
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Jurisdiction: Level 2 - WA



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Overview Map Scale 1:100,000

Legend

- Subject Site
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Separation Distance
- Slope Degrees
- Photo ID

Vegetation

- Woodland Type B
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2


Scale
1:3,500 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2017
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT

Heritage Hills Stage 2
Lot 9001 Waterloo Road
Roelands, WA 6226

Vegetation Classes

BAL Assessor KK	QA Check KK	Drawn by BT
STATUS FINAL	FILE MPM002-003	DATE 03/11/2017

5. Inputs to allocation of Bushfire Attack Levels (BAL)

Bushfire Attack Level (BAL) is the process in AS3959-2009 for measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. The threat or risk of bushfire attack is assessed by an accredited BAL Assessor. BAL rating determinations are of 6 levels BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40, BAL-FZ. Building is generally not recommended in BAL-40 or BAL-FZ areas. The BAL rating is determined by the distance of the building to vegetation, slope and vegetation type adjacent to the dwelling. Refer to Figure 5.

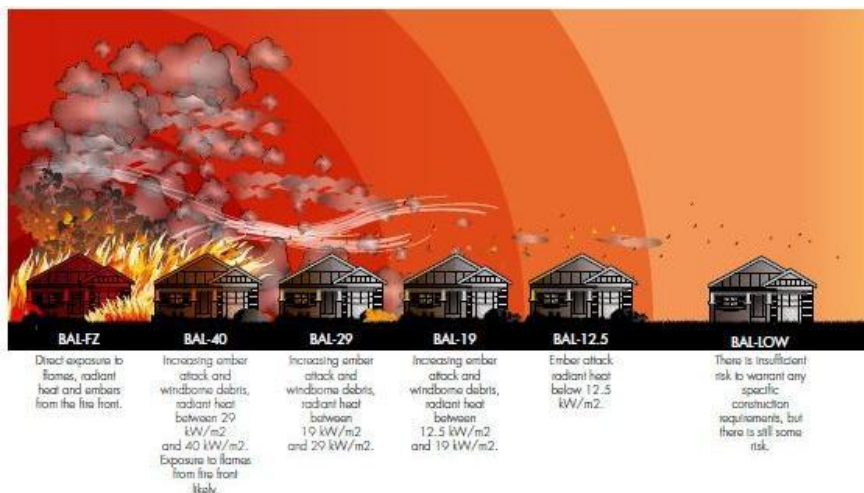


Figure 5: Building to BAL

Bushfire Attack Level (BAL) has been calculated using the Method 1 procedure as outlined in AS3959-2009. This incorporates the following factors:

- WA adopted Fire Danger Index (FDI);
- Vegetation Classes;
- Slope under classified vegetation; and
- Distance between proposed development site and classified vegetation.

The outcomes of the above inputs then allocate a specified BAL construction/setback for proposed buildings.

5.1. Fire Danger Index

The Western Australian adopted FDI is 80 as outlined in AS3959-2009 and endorsed by Australasian Fire and emergency Services Authorities Council. The FDI input for this project is also therefore 80.

5.2. Vegetation Classes

All vegetation within 150m of the Subject Site was classified. The vegetation classes (as described in Section 4.4) inputs to the BAL allocation (contours) are shown on Figure 4 and listed below.

- Woodland Type B;
- Scrubland Type D; and
- Grassland Type G (external to subject site only). See Section 5.4 and Section 6.0.

5.3. Slope Under Classified Vegetation

Slope under classifiable vegetation (Effective Slope) was assessed in accordance with Section 2.2.5 of AS3959-2009. Table 2 below summarises the slopes assigned (input) to each plot of classifiable vegetation for the BAL calculation.

Table 2: Effective slope allocation to classified vegetation

Plot Number	Vegetation Classification	Effective Slope
1	Scrub Type D	Downslope >0 to 5 degrees
2	Woodland Type B	Downslope >0 to 5 degrees
3	Woodland Type B	Upslope/flat
4	Woodland Type B	Upslope/flat
5	Grassland Type G	Upslope/flat
6	Low fuel or non-vegetated Exclusion 2.2.3.2 (e)	N/A
7	Low fuel or non-vegetated Exclusion 2.2.3.2 (f)	N/A

5.4. Method 1 BAL Calculation

A Method 1 BAL calculation (in the form of BAL contours) has been completed for the proposed development in accordance with AS 3959-2009 methodology. The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed buildings and subsequently informs the standard of building construction required to increase building tolerance to potentially withstand such impacts in line with the assessed BAL.

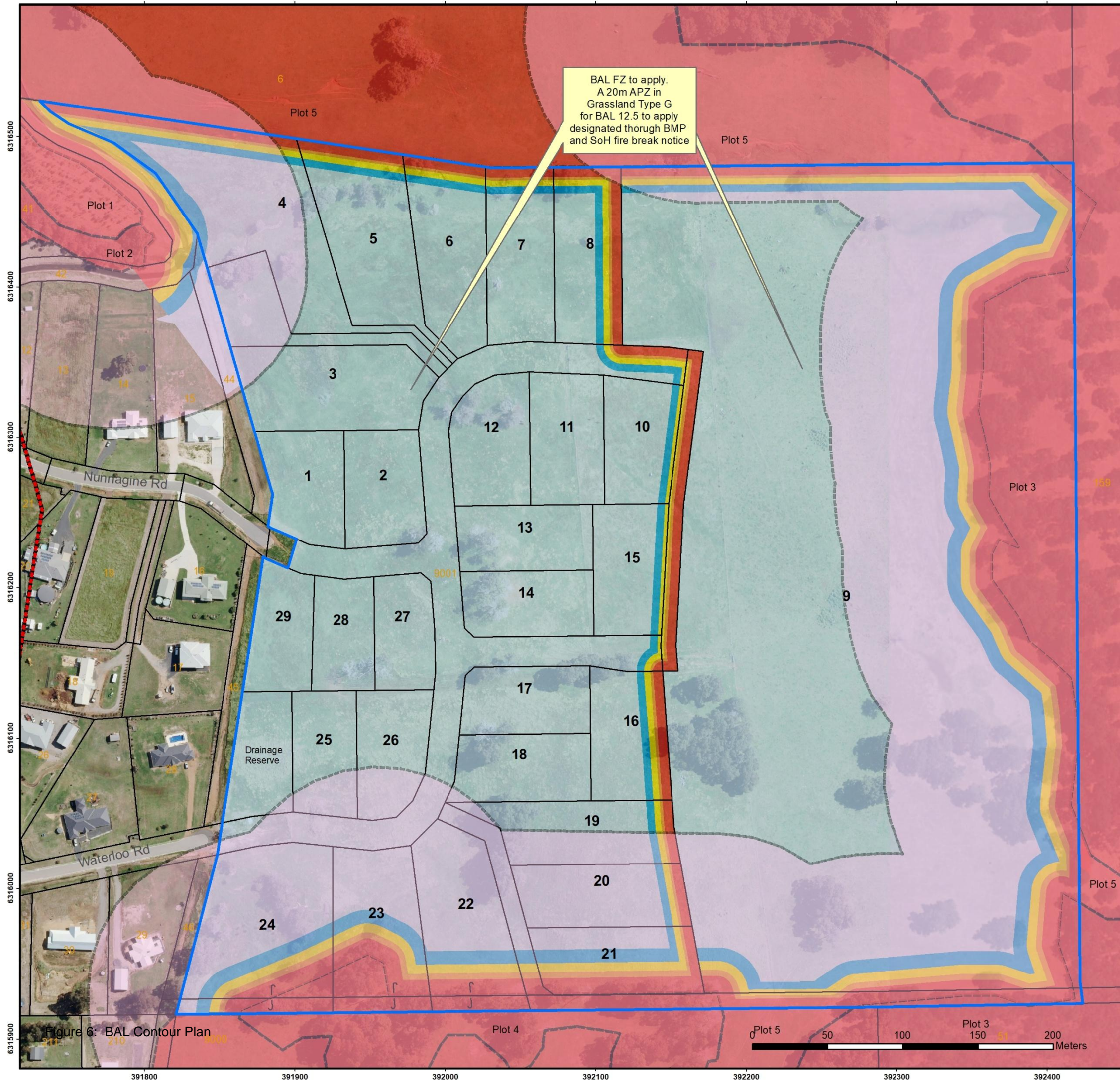
Bushfire Attack Level (BAL) has been calculated using the Method 1 procedure as outlined in AS3959-2009. The assessed BAL ratings for the development are depicted as BAL contours. BAL ratings for the Subject Site are presented in Table 3 with BAL Contours for the Subject Site (post development) shown on Figure 6. Internal areas of Grassland Type G (Plot 5) **have not been mapped on the BAL Contour Plan** with BAL-FZ applicable to the whole of site. A 20m APZ area will apply to ensure that all proposed buildings will be in Building Envelopes and will be subject to a BAL rating of BAL-12.5. Refer to Section 6 for more detail.

Table 3: BAL Allocation to Lots

Lot number	Vegetation Type (Table 2.3)	Slope (Table 2.4.3)	Separation distance to vegetation (m)	Highest BAL Contour	Modified BAL Contour
1,2, 3, 11-14, 17, 18,25-29	Grassland Type G (Plot 5)	Upslope/flat land	0m	BAL FZ	BAL 12.5 through application of 20m APZ area.
4	Scrub Type D (Plot 1)	Downslope >0 to 5 degrees.	20m	BAL 29, BAL 19 & BAL 12.5 can apply.	BAL 12.5 through application of 20m APZ area.
	Woodland Type B (Plot 2)	Downslope >0 to 5 degrees.	31m	BAL 19 & BAL 12.5 can apply.	
	Grassland Type G (Plot 5)	Upslope	0m	BAL FZ	
5-8, 10, 15, 16, 19 & 20	Grassland Type G (Plot 5)	Upslope	0m	BAL FZ	BAL 12.5 through application of 20m APZ area.
9	Grassland Type G (Plot 5)	Upslope	0m	BAL FZ	BAL 12.5 through application of 20m APZ area.
	Woodland Type B (Plot 3)	Upslope	0m	BAL FZ	
21-24	Woodland Type B (Plot 4)	Upslope	0m	BAL FZ	BAL 29, BAL 19 and BAL 12.5 through application of 20m APZ area.
	Grassland Type G (Plot 5)	Upslope	0m	BAL FZ	BAL 12.5 through application of 20m APZ area.

Assumptions made in BAL Contour Mapping:

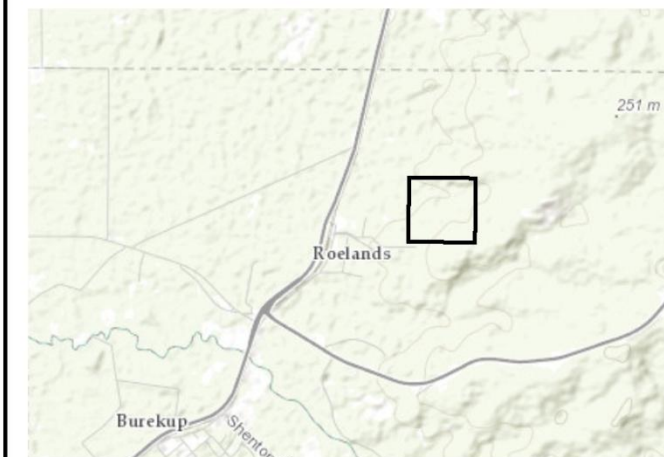
- The Subject Site will be developed according to the Subdivision layout shown in Appendix A.
- Low fuel areas associated with Asset Protection Zones (APZ) are recommended as a minimum of 20m in grassland areas to maintain BAL 12.5. See Section 6.2 for more detail.
- The owner of the Subject Site will maintain grasslands internal to the site (balance of land/titles) at all times in a low fuel state (i.e. slashed to <100mm) for a minimum distance of 100m from any dwellings or construction areas.



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Overview Map Scale 1:100,000

Legend

- Subject Site
- Cadastre
- Proposed Lots
- BushFireProneAreas2017OBRM_008

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW



Scale
1:2,500 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2017
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Heritage Hills Stage 2
Lot 9001 Waterloo Road
Roelands, WA 6226

BAL Contour Plan (Post development)

BAL Assessor KK	QA Check KK	Drawn by BT
STATUS FINAL	FILE MPM002-003	DATE 6/11/2017

6. Assessment to the bushfire protection criteria

The Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017) outlines bushfire protection criteria which subdivision and development proposals are assessed for compliance. The bushfire protection criteria (Appendix 4, WAPC, 2017) are a performance based criteria utilised to assess bushfire risk management measures and they outline four elements, being:

- Element 1: Location
- Element 2: Siting and Design of Development;
- Element 3: Vehicle Access; and
- Element 4: Water.

(WAPC, 2017)

The Plan of subdivision(s) is required to meet the “Acceptable Solutions” of each Element of the bushfire mitigation measures (WAPC, 2017). The proposal will be assessed against the bushfire protection criteria Acceptable Solutions for Elements A1, A2, A3 and A4. A summary of the assessment is provided below in Table 4. The following sections of this report outlines how the proposal complies with the bushfire protection criteria Acceptable Solutions as per the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2017).

The Subject Site was assessed against the bushfire protection criteria Acceptable Solutions for Elements A1, A2, A3 and A4. Please refer to the summary table below and the detailed assessment in Sections 6.1-6.4.

Table 4: Bushfire protection criteria applicable to the site

Element	Acceptable Solution	Applicable or not Yes/No	Meets Acceptable Solution
Element 1 – Location	A1.1 Development Location	Yes	Compliant BAL 29 or less applied to lots
Element 2 – Siting and Design	A2.1 Asset Protection Zone	Yes	Compliant, APZ in BAL 12.5 in 20m APZ area to be specified through approval of BMP and reference in Shire fire break order for Heritage Hills.
Element 3 – Vehicular Access	A3.1 Two Access Routes	Yes	Compliant two access to 2 destinations
	A3.2 Public Road	Yes	Compliant – Meets minimum standards see Section 6.3
	A3.3 Cul-de-sacs	Yes	Compliant to minimum standards
	A3.4 Battle axes	Yes	Compliant to minimum standards
	A3.5 Private driveways	Yes	Compliant to minimum standards
	A3.6 Emergency Access Ways	Yes	Compliant to minimum standards
	A3.7 Fire Service Access Ways	Yes	Compliant to minimum standards
Element 4 – Water	A3.8 Firebreaks	Yes	Compliant to Shire of Harvey current fire break notice
	A4.1 Reticulated areas	Yes	Compliant reticulated water supplied
	A4.2 Non-reticulated areas	N/A	NA
	A4.3 Individual lots in non-reticulated areas	N/A	N/A

6.1. Element 1: Location

Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.

Acceptable Solutions

A1.1 Development Location: *The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low Bushfire hazard level or BAL-29 or below (WAPC, 2017).*

Assessment to Acceptable Solutions

A1.1 Development Location: The publicly released Bushfire Prone Mapping (DFES, 2017) indicates this area as bushfire prone. The BAL Contour Plan (Figure 6) prepared demonstrates the BAL Contours for classifiable external vegetation of Woodland Type B, Scrub Type D and Grassland Type G and the effect on internal lots upon completed construction of the subdivision. This demonstrates dwellings and their associated APZ areas could be subject to BAL 29 to BAL 12.5. Internal grassland areas would make the whole of the lots in the subject site BAL FZ completely. To overcome this, a minimum of 20m APZ has been specified for each lot and shall be designated over the lots through this BMP and the design guidelines for the subdivision. It is recommended that the Shire of Harvey refer to the applicable BMP for the estate as part of their firebreak order.

BAL 12.5 can be achieved on any internal grassland areas through a minimum of a 20m APZ area around individual dwellings. Refer to Figure 6.

It is noted only lots 3, 4, 9 and 19-26 are legally required to build to BAL and AS3959-2009 as these lots are located in the WA bushfire prone area mapping. All other lots are not legally required to build to BAL/AS3959. Individual BAL assessments may be considered on the lots by the new owners when dwelling design/placement is known and can be undertaken at building approval stages with the engagement of an Accredited Level 1 BAL Assessor.

Plan of subdivision compliant to Acceptable Solution A1.1.

Recommendations

The recommendations arising from the assessment of the subdivision to Element 1: Location:

- The developer will be responsible for the implementation of a notification on title pursuant to Section 70A of the Transfer of Land Act 1893 for all lots affected by an increase in construction standards consistent with a BAL rating/AS3959-2009 allocation to the lot, and alerting the prospective owner(s) of the lots and successors in title of the Bushfire Management Plan.
- The Shire of Harvey refers to the approved BMP for Stage 2 Heritage Hills Estate to ensure a 20m Asset Protection Zone (and subsequently BAL 12.5 in grassland areas) prevails over the lots at all times.
- Individual BAL assessments may be considered on the lots by the new owners when dwelling design/placement is known and can be undertaken at building approval stages with the engagement of an Accredited Level 1 BAL Assessor.

6.2. Element 2: Siting and Design

Intent: To ensure that the siting and design of development minimises the level of bushfire impact.

Acceptable Solutions

A2.1 Asset Protection Zone (APZ): Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:

- **Width:** Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m² (BAL-29) in all circumstances.
- **Location:** The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes).
- **Management:** The APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones'.

(WAPC, 2017)

An Asset Protection Zone (APZ) is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (WAPC, 2017). This is also defined as a "defendable zone". Any buildings will have an APZ utilising Low threat or non-vegetated areas as classified by AS3959-2009 Section 2.2.3.2. Any replanting, revegetation and landscaping across the lots is to be to an APZ standard as per WAPC Guidelines V 1.1 (WAPC, 2017) as outlined below.

WAPC Guidelines for an APZ (WAPC, 2017)

Fences: Within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

Objects: Within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.

Fine Fuel load: Combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.

Trees (> 5 metres in height): Trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. See Figure 7 (WAPC Figure 16, Appendix 4) below.

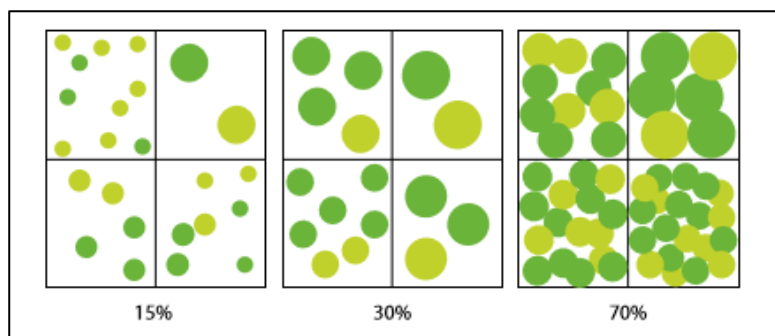


Figure 7: Tree Canopy Coverage – ranging from 15 to 70% at maturity (WAPC, 2017).

Shrubs (0.5 metres to 5 metres in height): Should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m² in area, clumps of shrubs should be separated

from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): Can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: Should be managed to maintain a height of 100 millimetres or less.

(WAPC, 2017).

Assessment to Acceptable Solutions

A2.1 Asset Protection Zone (APZ): All future buildings can achieve an APZ area associated with a BAL allocation of 12.5 through the application of a 20m APZ area. This will ensure setbacks to Grassland Type G are maintained to BAL 12.5. The designation of the 20m APZ area shall be through the approved BMP report, a 70A notification on title and through the designation in the SoH Fire Break notice. Refer to "Implementation" Section 8.3.

The developer will be responsible for maintenance of the site to APZ standards at all times until ownership is relinquished to new lot owners.

Any future plantings as shown in revegetation and landscaping areas are to be to an APZ standard as outlined in this report. New lot owners are to conform to any planting on their lot for revegetation, screening or windbreaks to APZ standards.

The subdivision is deemed to be compliant with A2.1.

Recommendations

The recommendations arising from assessment of the Subdivision Guide Plan to Element 2: Siting and design:

- A 20m APZ to apply to the lots in Heritage Hills Stage 2;
- The developer will be responsible for maintenance of the site to APZ standards at all times until ownership is relinquished to new lot owners;
- Designation of the 20m APZ area is to be through the approved BMP, a Section 70A notification on title of the BMP report and through the SoH fire break notice; and
- Any future landscaping, revegetation or replanting is to conform to APZ standards as outlined in this document.

6.3. Element 3: Vehicle Access

Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.

Acceptable Solutions

A3.1 Two access routes: Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.

A3.2 Public road: A public road is to meet the requirements in Table 5, Column 1.

A3.3 Cul-de-sac (including a dead-end road): A cul-de-sac and/or a dead-end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent), the following requirements are to be achieved: Requirements in Table 5, Column 2; Maximum length: 200 metres; and Turn-around area requirements, including a minimum 17.5 metre diameter head.

A3.4 Battle-axe: Battle-axe access leg should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) all of the following requirements are to be achieved: Requirements in Table 5, Column 3; Maximum length: 600 metres; and Minimum width: 6 metres.

A3.5 Private driveway: Longer than 50 metres A private driveway is to meet all of the following requirements: Requirements in Table 5, Column 3; Required where a house site is more than 50 metres from a public road; Passing bays: every 200 metres with a minimum length of 20 metres and a minimum width of two metres (i.e. the combined width of the passing bay and constructed private driveway to be a minimum six metres); Turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres) and within 50 metres of a house; and any bridges or culverts are able to support a minimum weight capacity of 15 tonnes. All-weather surface (i.e. compacted gravel, limestone or sealed).

A3.6 Emergency access way: An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet all of the following requirements: – Requirements in Table 4, Column 4; – No further than 600 metres from a public road; – Provided as right of way or public access easement in gross to ensure accessibility to the public and fire services during an emergency; and – Must be signposted.

A3.7 Fire service access routes (perimeter roads): Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire fighters and link between public road networks for firefighting purposes. Fire service access routes are to meet the following requirements: Requirements Table 5, Column 5; Provided as right of ways or public access easements in gross to ensure accessibility to the public and fire services during an emergency; Surface: all-weather (i.e. compacted gravel, limestone or sealed) Dead end roads are not permitted; Turn-around areas designed to accommodate type 3.4 appliances and to enable them to turn around safely every 500 metres (i.e. kerb to kerb 17.5 metres); No further than 600 metres from a public road; Allow for two-way traffic and Must be signposted.

A3.8 Firebreak width: Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level as prescribed in the local firebreak notice issued by the local government.

Table 5: Vehicular Access Technical Requirements (WAPC, 2017)

Technical requirements	Public Road	Cul-de-sacs	Private Driveways & Battle Axes	Emergency Access Ways (EAW)	Fire Service Access Ways
Minimum trafficable surface (m)	*6	6	4	6	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	4.5	4.5	4.5	4.5
Maximum grades	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5
Maximum Length	N/A	200m	50m	600m	N/A

*Denotes the width can include a 4m wide paving with one metre wide constructed road shoulders

Assessment to Acceptable Solutions

A3.1 Two access routes: The Department of Mines imposed a 1km buffer to a basalt quarry situated to the east of the subject land. That buffer intrudes upon the land and has resulted in the previous structure plan prepared for the land having to be re-drafted. The imposition of this buffer, together with the existing development to the west, has limited significantly the alternative design outcomes for Lot 9001.

Public access and egress to the subdivision will be along the public roads of Nunnagine and Waterloo roads to the west as well as three Emergency Access Ways (EAW). Nunnagine Road merges with Waterloo connecting to Government Road where vehicles can travel south or connect to South Western Highway. Refer to Figure 8. Vehicles can travel north and south along South Western Highway. A public road will be provided in the adjoining subdivision to the south (See appendix A and Figure 8). This will provide two destination points to the two subdivisions. There is also an existing road reserve along the southern boundary of the subject site which will remain in place and be utilised for Fire Service Access to the east. The access plan for the Subject Site is shown on Figure 8.

Subject site deemed compliant with A3.1.

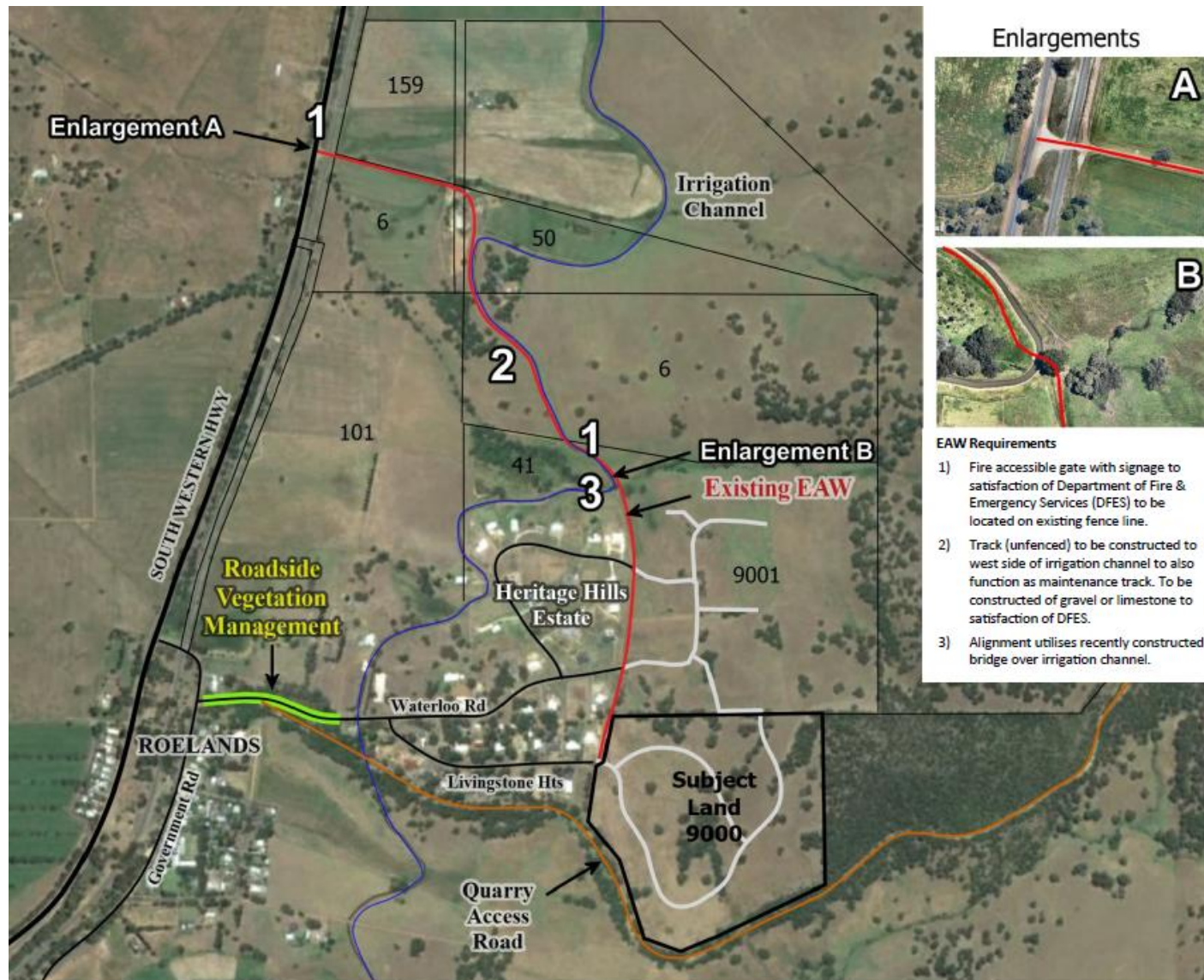


Figure 8: Access Plan

A3.2 Public roads: Public roads proposed for this development are 20m and meet the minimum technical requirements of Table 5, column 1 and to be approved by the SoH prior to construction. Subdivision plan deemed compliant to A3.2.

A3.3 Cul-de-sacs: Cul-de-sacs where possible should be avoided in bushfire prone areas. The Department of Mines imposed a 1km buffer to a basalt quarry situated to the east of the subject land. That buffer intrudes upon the land and has resulted in the previous structure plan prepared for the land having to be re-drafted. The imposition of this buffer, together with the existing development to the west, has limited significantly the alternative design outcomes for Lot 9001. As a result of the above, the construction of a road along the southern boundary has become unnecessary and would be expensive. The alternative access arrangements still provide for effective emergency escape options to the north, west and south similar to the original road. See Figure 8.

Two cul-de-sacs are proposed within the site, however each will connect to an EAW to assist with access. Refer to EAW Section 3.6 below. This will ensure the cul-de-sacs proposed are compliant to the guidelines. Subdivision plan with the inclusion of an EAW is deemed compliant to A3.3.

A3.4 Battle-axe: Five Battle Axe lots (Lots 4 and 5) are proposed for this subdivision and are shown on the Subdivision Plan. The Battle axe's are an extension from the public road network and do not exceed 600m and are connected to the EAW to the east to the public road. Battle axe lots are unavoidable as a result of limiting issues with the subdivision design and are a legacy to the previous approvals over the site. The alternative access arrangements still provide for effective emergency escape options to the north, west and south similar to the original road. See Figure 8.

Subdivision plan deemed to meet Acceptable Solution A3.4.

A3.5 Private driveways: Private driveways will conform to the minimum technical standards as outlined in Table 5 – Column 3. Where driveways exceed 50m a turnaround area will be required at the house to accommodate heavy duty vehicles. The driveways do not exceed 200m, therefore passing bays will not be required. The subdivision plan is deemed compliant to Acceptable Solution A3.5.

A3.6 Emergency access ways: Three Emergency Access Ways (EAW) is shown on the plan of subdivision, Figure 1. The EAW to the east (internal on lot 9) will link the cul-de-sacs providing two-way access. The EAW to the north-west (installed from previous stages construction, see attached deed of agreement Appendix B) links the internal road network to existing road reserves. See Figure 8. The public road to the south links the adjoining subdivision to the south and provide a secondary destination point (see adjacent plan of subdivision Appendix A). The EAWs will need to meet the technical requirements of Table 5, column 4 and be approved by the SoH prior to construction. EAW's signage is also to be approved by the SoH. EAW's can be gated but not locked. Gates are to be a minimum 3.6m to accommodate heavy vehicles. An easement in favour or easement in gross is to be provided for unimpeded access in an emergency bushfire event.

The EAWs are deemed compliant to this Acceptable Solution A3.6.

A3.7 Fire Service Access Routes: Fire Service Access (FSA) Routes will apply at this development in Lot 9 (see Figure 1). A FSA is proposed to link around the boundary of Lot 9 to enable fire appliances access to the east in a bushfire emergency. The FSA is to be constructed by the developer and maintained by Lot 9 owner. The FSA is to meet Table 5, column 5 minimum technical requirements.

The FSA provides linking access to the east for bushfire appliances and is deemed compliant to Acceptable Solution A3.7.

A3.8 Firebreaks: Firebreaks are in existence on the Subject Site and maintained regularly by the current owners. These will be maintained as per the SoH Fire Management Notice (updated annually) until developed. Individual future lot owners will be required to maintain internal 3m perimeter firebreaks as per the *current* SoH Fire Break Notice. This notice is updated annually and should be consulted by the lot owner. Copies are available from the Shire office or downloaded from:

www.harvey.wa.gov.au.

The subdivision plan is deemed compliant to Acceptable Solution A3.8.

Recommendations

The recommendations from assessment of the plan of subdivision to Element 3: Vehicular Access:

- Is deemed compliant with Element 3 as it meets the Acceptable Solutions as outlined A3.1 to A3.8;
- The developer implements the vehicular construction standards as outlined in Table 5 and prior to clearance of titles;
- Engineering construction details on the public road network particularly to meet minimum technical standards (Table 5) is provided to the SoH prior to construction of each development stages; and
- Perimeter 3m fire breaks as per the requirements in the SoH maintained by the developer until lots are relinquished to new owners.

6.4. Element 4: Water

Intent: To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.

Acceptable Solutions

A4.1 Reticulated areas: The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.

A4.2 Non-reticulated areas: Water tanks for firefighting purposes with a hydrant or standpipe are provided and meet the following requirements: Volume: minimum 50,000 litres per tank; Ratio of tanks to lots: minimum one tank per 25 lots (or part thereof); Tank location: no more than two kilometres to the further most house site within the residential development to allow a 2.4 fire appliance to achieve a 20 minute turnaround time at legal road speeds; Hardstand and turn-around areas suitable for a type 3.4 fire appliance (i.e. kerb to kerb 17.5 metres) are provided within three metres of each water tank; and Water tanks and associated facilities are vested in the relevant local government.

A4.3 Individual lots within non-reticulated areas (Only for use if creating 1 additional lot and cannot be applied cumulatively): Single lots above 500 square metres need a dedicated static water supply on the lot that has the effective capacity of 10,000 litres.

Assessment to Acceptable Solutions

A4.1 Reticulated areas: Scheme water will be provided to the subdivision and has been installed in Stage 1. Fire Hydrants will be installed by the developer every 400m in the road reserve, these are/and will be constructed to the following standards:

- Australian Standards approved underground fire hydrants are required; and
- Fire hydrants outlets must be installed to Water Corporation standards.

Fire Hydrants will be extended into Stage 2 of the development, and are to be constructed to the above standards. Stage 2 dwellings will be connected to mains scheme reticulated water.

Plan of subdivision meets Acceptable Solution A4.1.

A4.2 Non-reticulated areas: Assessment of subdivision plan to A4.2 not required.

A4.3 Individual lots within non-reticulated areas: Assessment of subdivision plan to A4.3 not required.

Recommendations

The recommendations from assessment to Element 4: Water:

- Is deemed compliant with Element 4 through the provision of reticulated water to the subdivision. Design of reticulated water to be approved by the Shire of Harvey to WCWA standards.

7. Other Fire Mitigation Measures

7.1. Evaporative air conditioners

Evaporative air conditioning units can catch fire as a result of embers from bushfires entering the unit. These embers can then spread quickly through the home causing rapid destruction. It can be difficult for fire-fighters to put out a fire in the roof spaces of homes.

It is also recommended that the developer:

- Ensure that suitable external ember screens are placed on roof top mounted evaporative air conditioners compliant with AS3959-2009 (current and endorsed standards) and that the screens are checked annually; and
- Maintain evaporative air conditioners regularly as per DFES recommendations, refer to the DFES website for further details:
<http://www.dfes.wa.gov.au>

7.2. Barrier Fencing

In November 2010 the Australian Bushfire CRC issued a "Fire Note" (Bushfire CRC, 2010) which outlined the potential for residential fencing systems to act as a barrier against radiant heat, burning debris and flame impingement during bushfire. The research aimed to observe, record, measure and compare the performance of commercial fencing of Colourbond steel and timber (treated softwood and hardwood).

The findings of the research found that:

".. Colourbond steel fencing panels do not ignite and contribute significant heat release during cone calorimeter exposure" (exposure to heat)

.."Colourbond steel (fencing) had the best performance as a non-combustible material. It maintained structural integrity as a heat barrier under all experimental exposure conditions, and it did not spread flame laterally and contribute to fire intensity during exposure"

It is also noted that non-combustible fences are recommended by WAPC (APZ standards: Fences and sheds within the APZ are constructed using non-combustible materials e.g. colourbond iron, brick, limestone, metal post and wire).

8. Implementation

Roelands Development Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to prepare a Bushfire Management Plan to guide all future bushfire management for the proposed development of Lot 9001 Waterloo Road, Roelands WA.

This BMP report provides details of the fire management strategies proposed to be implemented across the site as it is developed to ensure adequate protection of life, property and biodiversity assets. To ensure the mitigation measures are implemented responsibilities are outlined in the following sections for the future lot owners and the developer.

8.1. Future Lot owner's Responsibility

It is recommended the future property owners shall be responsible for the following:

Lot owner– Ongoing management			
No	Implementation Action	Annual	All times
1	Individual BAL assessments may be considered on the lots by the new owners when dwelling design/placement is known and can be undertaken at building approval stages with the engagement of an Accredited Level 1 BAL Assessor	<input type="checkbox"/>	<input type="checkbox"/>
2	Maintain 20m APZ around dwellings areas at all times	<input type="checkbox"/>	<input checked="" type="checkbox"/>

8.2. Developer's responsibility

Prior to development being given final approval by the Shire of Harvey, the developer shall be required to carry out works that include the following but in respect to individual stages of development. Subsequent to the issue of final approval, the Developer shall have no further responsibilities to the provision of firefighting facilities and fire management on individual lots that pass from their ownership.

It is recommended the developer be responsible for the following:

Developer – Prior to issue of titles		
No	Implementation Action	Subdivision Clearance
1	Notification on title 70A of the Transfer of Land Act 1893 to alert prospective owners that the lots are located in a bushfire prone area and may be subject to increased construction standards to AS3959.	<input checked="" type="checkbox"/>
2	Maintain balance of land in ownership in a low fuel state (APZ standards) at all times.	<input checked="" type="checkbox"/>
3	Ensure Vehicle Access constructed to Table 5 standards.	<input checked="" type="checkbox"/>
4	Signage to be approved by the SoH prior to installation at the EAW's.	<input checked="" type="checkbox"/>
	Perimeter 3m fire breaks as per the requirements in the SoH maintained by the developer until lots are relinquished to new owners.	<input checked="" type="checkbox"/>
	Reticulated water and hydrant design to approval from WCWA and the SoH at subdivision clearance stages.	<input checked="" type="checkbox"/>
	Ensure Vehicle Access constructed to Table 5 standards.	<input checked="" type="checkbox"/>

8.3. Shire of Harvey Responsibility

LGA– Clearance of conditions		
No	Implementation Action	Subdivision Clearance
1	Designation of the approved BMP through their annual fire break order to ensure provisions as outlined in this BMP report prevail over the lots in Heritage Hills Estate.	<input type="checkbox"/>
2	Ensure Vehicle Access constructed to Table 5 standards.	<input type="checkbox"/>
4	Signage to be approved by the SoH prior to installation by the developer at the EAW's.	<input type="checkbox"/>
5	Reticulated water and hydrant design to approval from WCWA and the SoH at subdivision clearance stages.	<input type="checkbox"/>

9. References

AS 3959-2009 Australian Standard, *Construction of buildings in bushfire-prone areas*, Building Code of Australia, Primary Referenced Standard, Australian Building Codes Board and Standards Australia.

Bushfire CRC (2010) *Managing Forest in South West Western Australia*, Research project undertaken by Dr Lachlan McCaw and Dr Roy Wittkuhn, retrieved from: <http://www.bushfirecrc.com/projects/b11/managing-forest-fires-south-western-australia>

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Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2002) *Native Vegetation in Western Australia, extent Type and Status, Technical Report 249*, Department of Agriculture WA.

Western Australian Planning Commission (WAPC) (2017) *Guidelines for Planning in Bushfire Prone Areas Version 1.2*. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC, 2015) *State Planning Policy 3.2 Planning in Bushfire Prone Areas*. Department of Planning WA and Western Australian Planning Commission.

State Land Information Portal (SLIP) (2015 & 2016) *Map of Bushfire Prone Areas*. Office of Bushfire Risk Management (OBRM) data retrieved from: <https://maps.slip.wa.gov.au/landgate/bushfireprone/>

Appendices

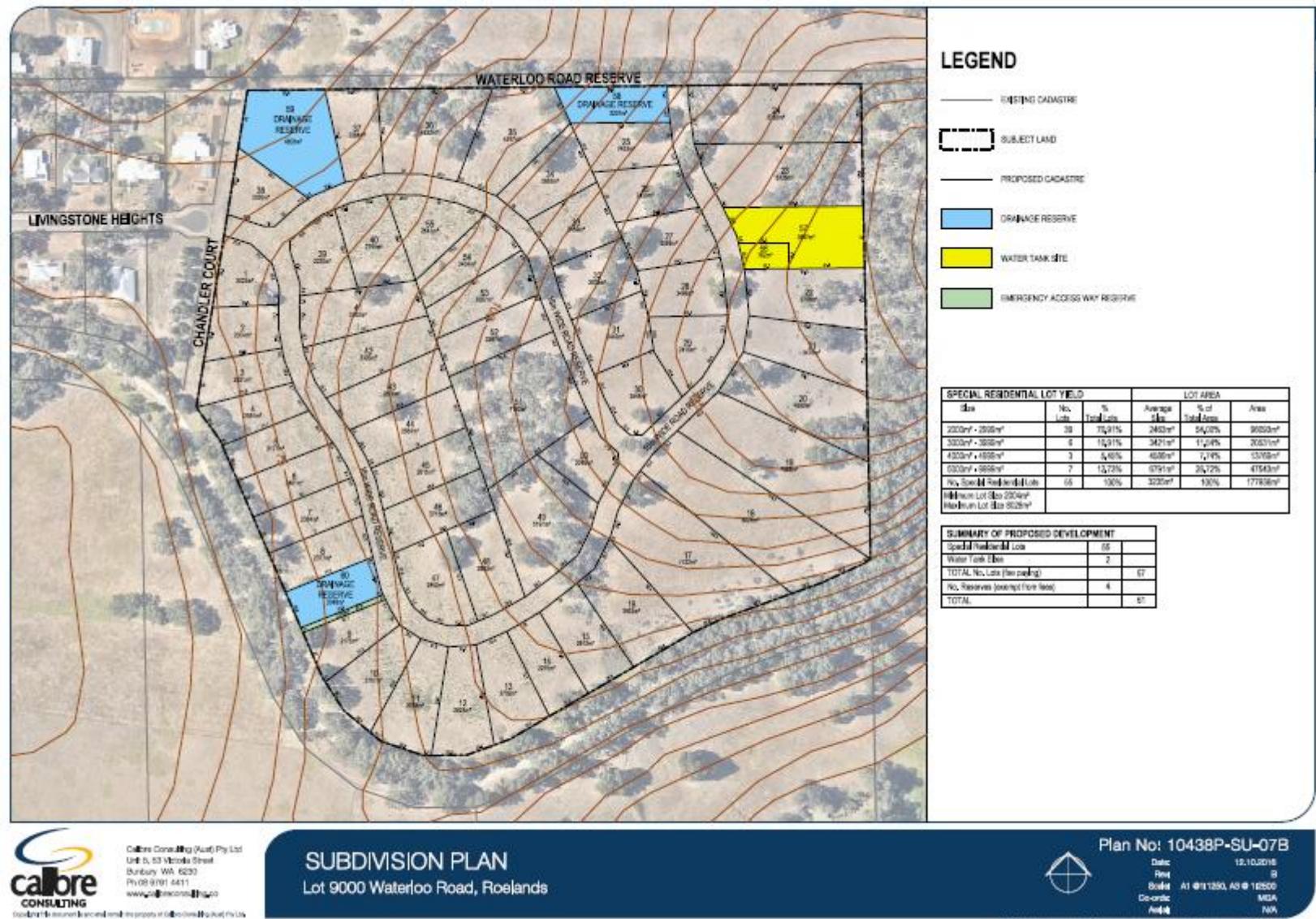
Appendix A – Plan of Subdivision

(Adjacent subdivision south)

Appendix B Deed of agreement with adjacent owner (north)

Appendix A

Plan of Subdivision (adjacent subdivision south)



Appendix B

Deed of agreement with adjacent owner (north)

The Chief Executive Officer
Shire of Harvey
PO Box 500
HARVEY WA 6220

Registration Number:	12/20661
SHIRE OF HARVEY	
31 JUL 2012	
Retention/Disposal:
Dept/Officer:	KIRK
File Number:	5135345(6)

24th July 2012

Attention: Mr Simon Hall & Mr Shane Kirk

Dear Sirs

RE: Alternative Emergency Fire Access through Lots 6 & 50, Roelands

We write to advise that we have recently been contacted by the owner/developer of proposed Stage 2 of the Heritage Hills Estate at Roelands which adjoins to the south of the above properties owned by us.

At a meeting between our son Mark, the owner (Mr George Chaffey) and his town planning consultant (Mr Andrew McRobert) on the 23rd of July, 2012, it was explained that the proposed Heritage Hills Stage 2 and proposed subdivision of Lot 9000 (situated to the south of the Heritage Hills development) are required to be serviced by an alternative emergency fire access route.

We advise Council that we agree to the proposed emergency fire access route and acknowledge that this will necessitate the construction of a limestone or gravel track adjoining the western side of the existing irrigation channel through our land. We also acknowledge that the proposed route will connect with the existing road reserve on the western boundaries of the above lots and that it will necessarily rely on use of our existing driveway as an escape to South Western Highway.

We acknowledge that the developers will, at their own cost, be required to:

1. construct the track to a standard trafficable by 2 wheel drive vehicles (ie either limestone or gravel standard);
2. provide suitable signage to ensure that residents (or users) are made aware that the track is only available for emergency fire access and irrigation channel maintenance;
3. install a gate (suitable for the purposes of emergency fire access) in approximately the location shown on the attached plan; and,
4. at a later date, prepare a formal agreement (to which we will be required to become a party) consistent with achieving the required alternative emergency fire access.

Yours faithfully,


.....
Mr Frederick Mark Talbot

Date 26th July 2012


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Mrs Judith Helen Talbot

Date 26th July 2012