

# AS 3959 Bushfire Attack Level (BAL)

## Contour Plan Report




Site Details			
Address:	Stages 1-8 Riverbank Development		
Suburb:	Southern River	State:	WA
Local Government Area:	City of Gosnells		
Description of Building Works:	Subdivision Development		
Stage of WAPC Planning	WAPC subdivision application (s)		



Report Details			
Report / Job Number:	TER010	Report Version:	FINAL
Assessment Date:	8/4/16	Report Date:	1/11/2016






## SECTION 1 - Vegetation Classification




All vegetation within 100m of the site / proposed development was classified in accordance with Clause 2.2.3 of AS 3959-2009. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified below.

Plot	1	Classification or Exclusion Clause	Low fuel or non-vegetated area Clause 2.2.3.2 (f)
			<p>Exclusion clause 2.2.3.2 (f).</p> <p>Low threat vegetation, managed in minimum fuel condition associated with the sports ground.</p> <p>Located north of the subject site.</p>
<i>Photo ID: Photo 1 view of Sports oval to the north of the subject site. View from north to south along Holmes Street.</i>			
Plot	1 cont	Classification or Exclusion Clause	Low fuel or non-vegetated area Clause 2.2.3.2 (f)
			<p>Exclusion clause 2.2.3.2 (e) &amp; (f).</p> <p>Low threat vegetation, managed in minimum fuel condition associated with dwellings, footpaths, APZ areas and Roads.</p>
<i>Photo ID: Photo 2 view along Southern River Road from the west to east.</i>			
Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated area Clause 2.2.3.2 (c)
			<p>Exclusion clause 2.2.3.2 (c).</p> <p>Small plot of Woodland Type B in private property located 26m north east from subject site along Southern River Road and &lt;0.25ha in size.</p>
<i>Photo ID: Photo 3 View of small plot of Woodland Type B in front area of private property along Southern River Road. &lt;0.25ha in size – associated with a minor creek/drain.</i>			




<b>Plot</b>	<b>3</b>	<b>Classification or Exclusion Clause</b>	<b>Grassland Type G</b>
			<p>Paddock grasses 200-300mm in height.</p> <p>Grazed by horses.</p> <p>Fuel loading 2 t/ha.</p> <p>Located upslope of subject site.</p> <p>Effective Slope 2 ° (degrees).</p> <p>Located north of Southern River Road 30m from subject site.</p>
<p><i>Photo ID: Photo 4 view of Grassland Type G to the north of the subject site. View from Southern River Road from the south to north.</i></p>			
<b>Plot</b>	<b>4</b>	<b>Classification or Exclusion Clause</b>	<b>Grassland Type G</b>
			<p>Paddock grasses 300-400mm in height.</p> <p>Not grazed or managed.</p> <p>Fuel loading 2 t/ha.</p> <p>Located adjacent to subject site.</p> <p>Effective Slope 0.6° (degrees).</p> <p>Located east of Bradley Street 20m from subject site.</p>
<p><i>Photo ID: Photo 5 view of Grassland Type G located to the east of Bradley Street, view from west to east.</i></p>			
<b>Plot</b>	<b>5</b>	<b>Classification or Exclusion Clause</b>	<b>Low threat vegetation and non-vegetated areas</b>
			<p>Exclusion clause 2.2.3.2 (f).</p> <p>Low threat vegetation, managed in minimum fuel condition associated with APZ areas around buildings.</p> <p>Grasses maintained &lt;100m.</p> <p>Trees 10m apart.</p>
<p><i>Photo ID: Photo 6 view of managed grasses and gardens associated with buildings along Bradley Street. View from the north to south along Bradley Street.</i></p>			




<b>Plot</b>	<b>6</b>	<b>Classification or Exclusion Clause</b>	<b>Scrub Type D</b>
			<p>Paperbark, Spearwood and Acacia Scrub.</p> <p>3.2 – 4.0m in height.</p> <p>Occasional Eucalypt to 5m.</p> <p>Grassy understorey.</p> <p>15-25t/ha.</p> <p>Located downslope of subject site 20m.</p> <p>Effective slopes from 0.8° to 2.0° (degrees).</p>
<i>Photo ID: Photo 7 view of Scrub Type D east of Bradley Road in private property. View from west to east.</i>			
<b>Plot</b>	<b>7</b>	<b>Classification or Exclusion Clause</b>	<b>Grassland Type G</b>
			<p>Paddock grasses 50-200mm in height.</p> <p>Grazed.</p> <p>Fuel loading 2 t/ha.</p> <p>Located adjacent to subject site to the south east</p> <p>Effective Slope 0.8 ° (degrees).</p> <p>Located east of Bradley Street 20m from subject site.</p> <p>&lt;10% trees.</p>
<i>Photo ID: Photo 8 view of Grassland Type G to the south east of the subject site. View from Bradley Road to the east.</i>			
<b>Plot</b>	<b>8</b>	<b>Classification or Exclusion Clause</b>	<b>Grassland Type G</b>
			<p>Paddock grasses 300-400mm in height.</p> <p>Not grazed or managed.</p> <p>Fuel loading 2 t/ha.</p> <p>Located adjacent to subject site to the south east.</p> <p>Effective Slope 1.6 ° to 2.0° (degrees) downslope.</p> <p>Located east of Bradley Street 0m from subject site.</p> <p>&lt;10% trees.</p>
<i>Photo ID: Photo 9 view of Grassland Type G to the south east of the subject site. View from Bradley Street from the east to west.</i>			


Plot	9	Classification or Exclusion Clause	Forest Type A
			<p>Eucalypt Forest.</p> <p>Not multi-layered.</p> <p>Dense canopy &gt;90% coverage.</p> <p>Fuel loading 25t/35t ha.</p> <p>0.26ha in size.</p> <p>Located 87m from subject site to south east.</p> <p>Effective Slope 0.6 ° (degrees).</p>
<i>Photo ID: Photo 10 view of small isolated patch of Forest Type A located south east of the subject site</i>			
Plot	10	Classification or Exclusion Clause	Low fuel or non vegetated areas Clause 2.2.3.2 (e)
			<p>Bare areas.</p> <p>Cleared land with bare ground.</p> <p>Located 0m south of the subject site.</p>
<i>Photo ID: Photo 11 view of Bare area to the south of the subject site. View from the north west to south east.</i>			
Plot	11	Classification or Exclusion Clause	Low fuel or non vegetated areas Clause 2.2.3.2 (f)
			<p>Managed landscaped POS area central to the subject site.</p>
<i>Photo ID: Photo 12 view of POS area in the south (central) of the subject site. View from the south to the north.</i>			




<b>Plot</b>	<b>12</b>	<b>Classification or Exclusion Clause</b>	<b>Forest Type A</b>
			<p>Melaleuca paperbarks, Spearwood, Sydney Golden Wattle, weeds.</p> <p>Multi layered 3-5m in height occasional tree at 7-8m.</p> <p>Along creek line.</p> <p>Located 40m from Stage 4B to the south east.</p> <p>Effective slopes 1.2° (degrees) downslope.</p> <p>Area near the POS is fuel reduced, however not confirmed to be managed, has extensive canopy and connected to creek vegetation south.</p>
<i>Photo ID: Photo 13 view of creek area to the south of Stage 4B. View from the north west to south east of the creekline.</i>			
<b>Plot</b>	<b>13</b>	<b>Classification or Exclusion Clause</b>	<b>Forest Type A</b>
			<p>Casuarina, Jarrah/Marri Forest Type A.</p> <p>Multi layered 510mm in height occasional tree at 12-15m.</p> <p>Dead vegetation and elevated fuels.</p> <p>25-35 t/ha available fuels.</p> <p>Located 12m from proposed School site to the south east.</p> <p>Effective slope 1.2° (degrees) downslope.</p>
<i>Photo ID: Photo 14 view of Forest Type A to the south/south east of the school, site. View from the north to south off Matison Street.</i>			
<b>Plot</b>	<b>14</b>	<b>Classification or Exclusion Clause</b>	<b>Scrub Type D</b>
			<p>Spearwood, Woolly bush and Acacia Scrub.</p> <p>2.0 – 3.0m in height.</p> <p>Grassy understorey and interspersed with bare areas 15-25t/ha.</p> <p>Located downslope of school site 12m.</p> <p>Effective slope 1.6° (degrees) downslope.</p>
<i>Photo ID: Photo 15 view of Scrub Type D to the south of the Primary School site. View from Matison Street Road reserve to the south.</i>			

Plot	15	Classification or Exclusion Clause	Grassland Type G
			<p>Paddock grasses 300-400mm in height.</p> <p>Not grazed or managed.</p> <p>Fuel loading 2 t/ha.</p> <p>Located adjacent to subject site to the south of the Primary School site and Stage 9.</p> <p>Effective Slope 1.6 ° (degrees) downslope.</p> <p>Rubbish dumping, vacant land.</p> <p>&lt;10% trees.</p>

*Photo ID: Photo 16 view of Grassland Type G to the south of the Primary School site and Stage 9. View from the north east to the south west.*



Plot	16	Classification or Exclusion Clause	Exclusion 2.2.3.2 (e) bare areas
			<p>Previously Grassland Type G, removed for subdivision construction to the north west of the subject site.</p>

*Photo ID: Photo 17 view of Woodland Type B to the west of the site along Holmes Road. View from east to west.*

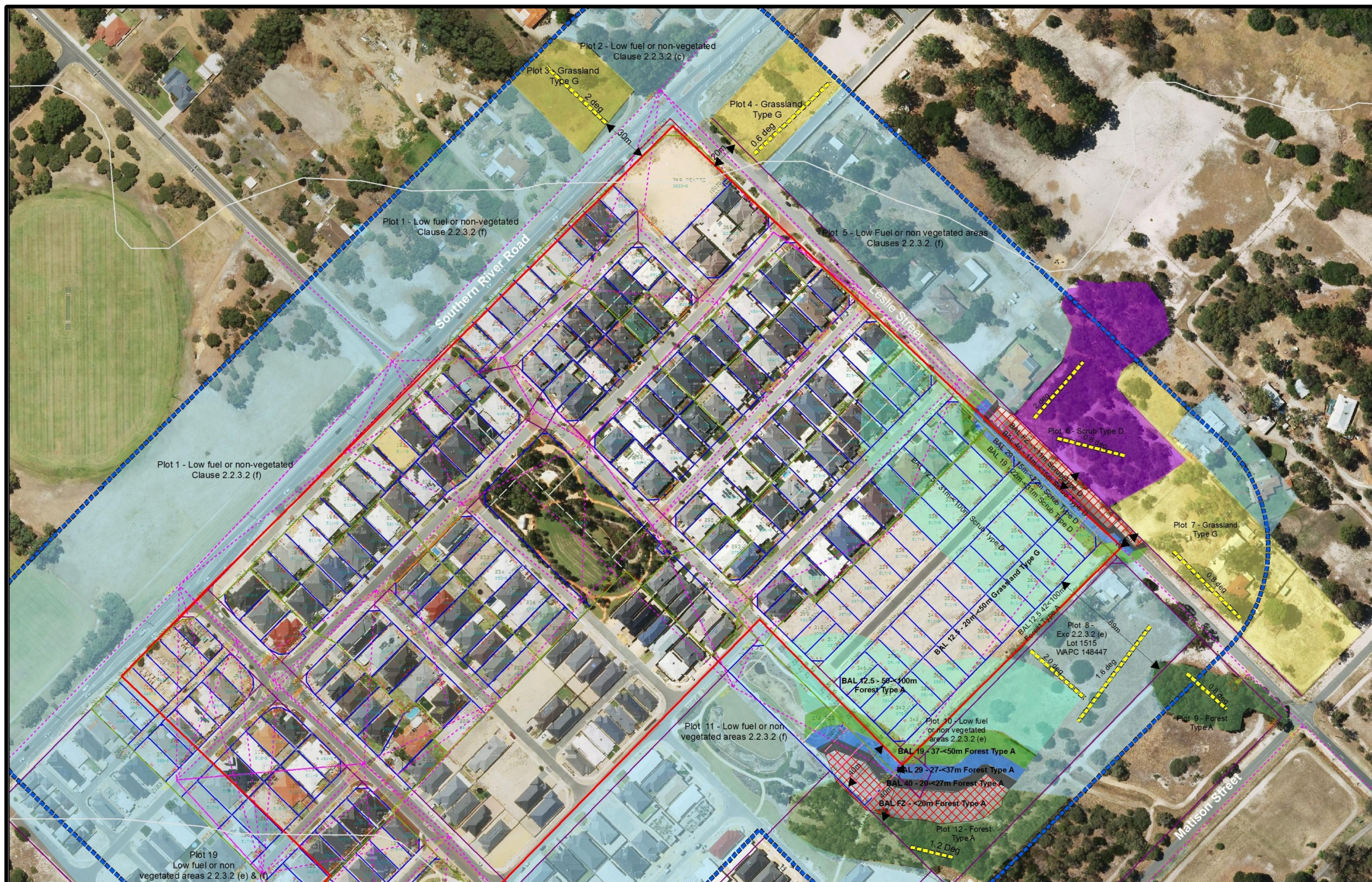
Plot	17	Classification or Exclusion Clause	Exclusion 2.2.3.2 (e) bare areas
			<p>Previously Woodland Type B, removed for subdivision construction to the west of the subject site.</p>

*Photo ID: Photo 18 view of Woodland Type B to the west of the site along Holmes Road. View from east to west.*

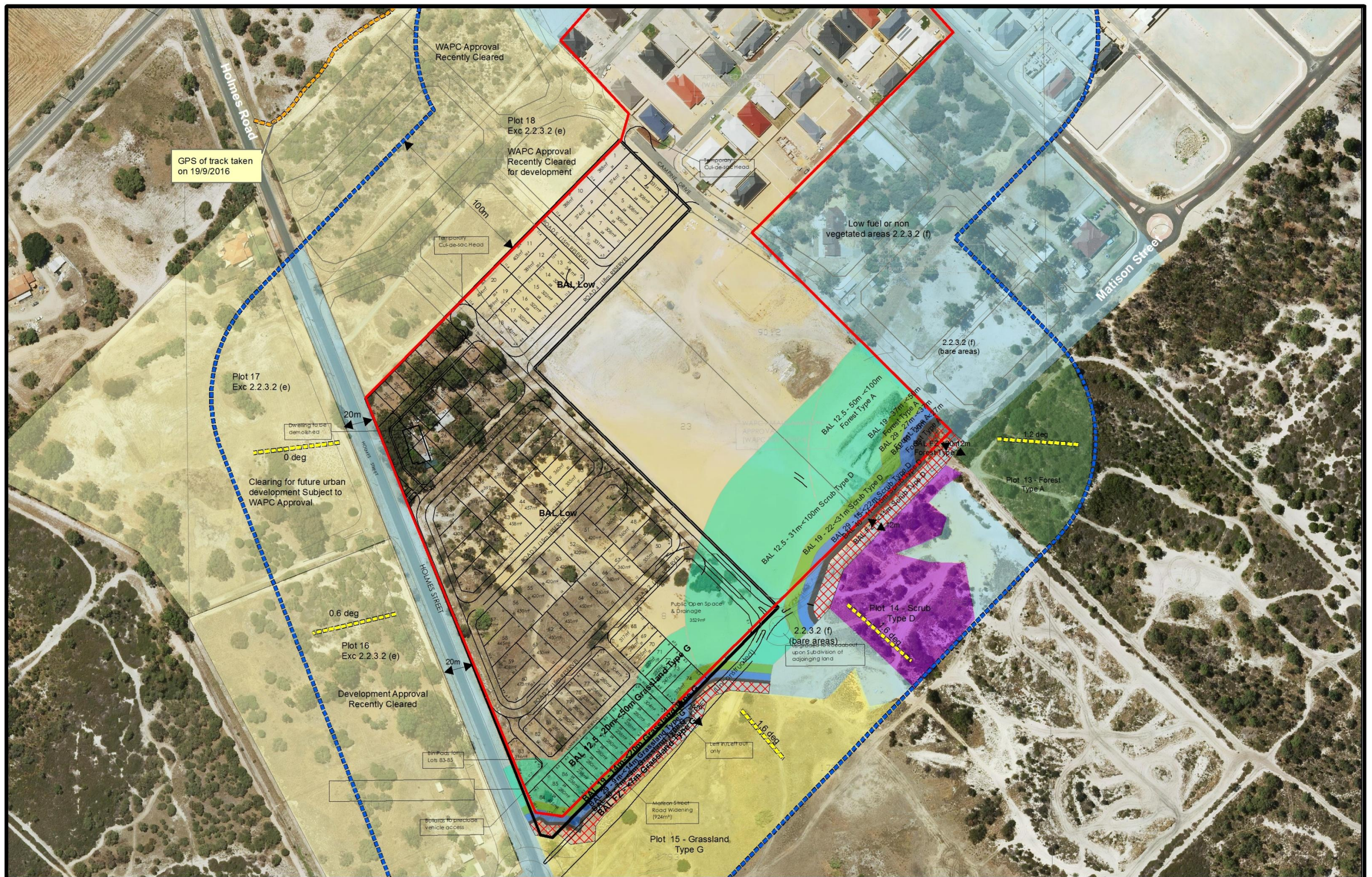


<b>Plot</b>	<b>18</b>	<b>Classification or Exclusion Clause</b>	<b>Exclusion 2.2.3.2 (e) bare areas</b>
			<p>Previously Scrub Type D, removed for subdivision construction to the north of the subject site.</p> <p>Sparse weeds on sand and bare areas.</p>
<i>Photo ID: Photo 19 view of Woodland Type B to the west of the site along Holmes Road. View from east to west.</i>			
<b>Plot</b>	<b>19</b>	<b>Classification or Exclusion Clause</b>	<b>Low fuel or non vegetated areas Clause 2.2.3.2 (e) &amp; (f)</b>
			<p>Exclusion clause 2.2.3.2 (f).</p> <p>Low threat vegetation, managed in minimum fuel condition associated with APZ areas around buildings.</p> <p>Grasses maintained &lt;100m.</p> <p>Trees 10m apart.</p> <p>Exclusion Clause (e) – Buildings.</p>
<i>Photo ID: Photo 20 view along Brahma Street from the west to east.</i>			









Legend		
Subject site	BAL 19	Woodland Type B
100m assessment boundary	BAL 29	Scrub Type D
5m Contours	BAL 40	Grassland Type G
Slope Degrees	BAL FZ	Low Fuel or non vegetated
Track 66	Forest Type A	Subdivision Plan
BAL 12.5		

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

0 12.5 25 50 75 100 Meters

This BAL Contour Plan was prepared by:  
Kathryn Kinnear, Bio Diverse Solutions  
Accreditation No: BPAD30794  
Valid to: Feb 2017  
Jurisdiction: Level 1 - WA

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CLIENT Riverbank Estate Teranovis Pty Ltd Applecross		
BAL Contour Plan South		
STATUS FINAL	FILE TER010	DATE 20/10/2016



### SECTION 3: Potential Bushfire Impacts

The potential bushfire impact to the site / proposed development from each of the identified vegetation plots are identified below. Refer to BAL Contour Plan Page 9 and 10.

Plot	Vegetation Classification	Effective Slope	Separation (m)	BAL
1	Low Fuel or non vegetated area 2.2.3.2 (f)	N/A	N/A	Low
2	Low Fuel or non vegetated area 2.2.3.2 (f)	N/A	N/A	Low
2	Low Fuel or non vegetated area 2.2.3.2 (c)	N/A	N/A	Low
3	Grassland Type G (outside Bushfire Prone Area Mapping)	>0 to 5 Degrees	N/A	Low
4	Low Fuel or non vegetated area 2.2.3.2 (f)	N/A	N/A	Low
5	Low Fuel or non vegetated area 2.2.3.2 (f)	N/A	N/A	Low
6	Scrub Type D	>0 to 5 Degrees	20m	BAL 29-12.5 can apply
7	Grassland Type G	>0 to 5 Degrees	20m	BAL 19-12.5 can apply
8	Low Fuel or non-vegetated area 2.2.3.2 (e) (WAPC 149447)	N/A	N/A	Low
9	Forest Type A	Flat Land	87m	BAL 12.5 can apply
10	Low Fuel or non vegetated area 2.2.3.2 (e)	N/A	N/A	Low
11	Low Fuel or non vegetated area 2.2.3.2 (f)	N/A	N/A	Low
12	Forest Type A	>0 to 5 Degrees	40m	BAL 19-12.5 can apply
13	Forest Type A -sports ground	>0 to 5 Degrees	12m	BAL FZ -12.5 can apply
14	Scrub Type D	>0 to 5 Degrees	12m	BAL 29-12.5 can apply
15	Grassland Type G	>0 to 5 Degrees	24m	BAL 12.5 can apply
16	Low Fuel or non vegetated area 2.2.3.2 (e)	N/A	N/A	Low
17	Low Fuel or non vegetated area 2.2.3.2 (e)	N/A	N/A	Low
18	Low Fuel or non vegetated area 2.2.3.2 (e)	N/A	N/A	Low
19	Low Fuel or non vegetated area 2.2.3.2 (e) & (f)	N/A	N/A	Low

#### COMMENTS ON BAL CALCULATIONS:

- Distances from vegetation were made based on surface fuels to ledge of lot boundary;
- Effective slopes were measured in the field using a Nikon Forestry Pro and represented on the respective plots;
- Method 1 (AS3959-2009) Simplified procedure was used for vegetation classification and BAL Assessment process;
- Vegetation was classified within 100m of the lot boundaries;
- The perimeter of the vegetation was measured using field GPS and notations on field GIS maps; and
- The BAL Contour Map has been prepared in accordance with Department of Planning (WAPC) Fact Sheet – BAL Contour Maps (Version 2, January 2016).

## ASSUMPTIONS

- Adjacent WAPC approvals have been sighted and confirmed by the author to be in effect and reducing areas adjacent to the proposal to low fuel areas as per AS3959-2009 Section 2.2.3.2.
- Photos have been supplied as documentary evidence of the vegetation removed (see Plot 16, 17 and 18 in BAL report).
- Internal areas of the subdivision will be maintained in a low fuel state (as per APZ standards and AS3959-02009 Clause 2.2.3.2 (f)) by the developer until construction occurs.
- Internal POS areas and the school oval will be maintained in a low fuel state consistent with AS3959-2009 Clause 2.2.3.2 (f).

## SECTION 4: DISCLAIMER


*The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959-2009 – Building in Bushfire prone Areas, WAPC State Planning Policy 3.7 (WAPC, 2015), WAPC Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015), and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.*

**AS3959-2009 disclaimer:** It should be borne in mind that the measures contained within this Standard (AS3959-2009) cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather condition.  
(AS3959, 2009)

Building to AS3959-2009 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.

## SECTION 7: Certification

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level stated above in accordance with the requirements of AS 3959-2009 (Incorporating Amendment Nos 1, 2 and 3).

SIGNED, ASSESSOR: .....  ..... DATE: 1/11/2016  
Kathryn Kinnear, Bio Dive  
Accredited Level 1 BAL Assessor (Accreditation No: BPAD30794)  
"Experienced" Level 2 Bushfire Practitioner pending accreditation.





## Appendix 2: – Additional Information / Advisory Notes / Justifications Related to Assessment

Vegetation types analysed to AS3959-2009 with the following justifications:

### Forest Type A

#### Vegetation Forest Type A

- Multi-layered and elevated fuels;
- Fuel loading 25T-35t/ha;
- Thick understorey and deep surface fuels noted in uncleared forests;
- 30-70% canopy cover;
- Eucalypt trees 8-15m.

### Vegetation Woodland Type B

- Not multi-layered vegetation structure;
- Surface fuels and could reach 15-25t/ha surface fuels;
- <30% vegetative structure/cover; and
- Eucalypt Trees 8-15m

### Scrub Type D:

- Acacia, Spearwood, melaleuca scrubs 2-3m;
- Dense single layer of fuels;
- No to few trees >4m; and
- Some understorey grasses, mainly midstorey and scrub species to 2.5-3m.

### Grassland Type G

- Unmanaged grasslands – not regularly slashed or grazed;
- Average heights of grasses 50-250mm;
- Dominated by grass species; and
- <10% tree/scrub species present.

### Low Fuel and non-vegetated areas (AS3959-2009 2.2.3.2):

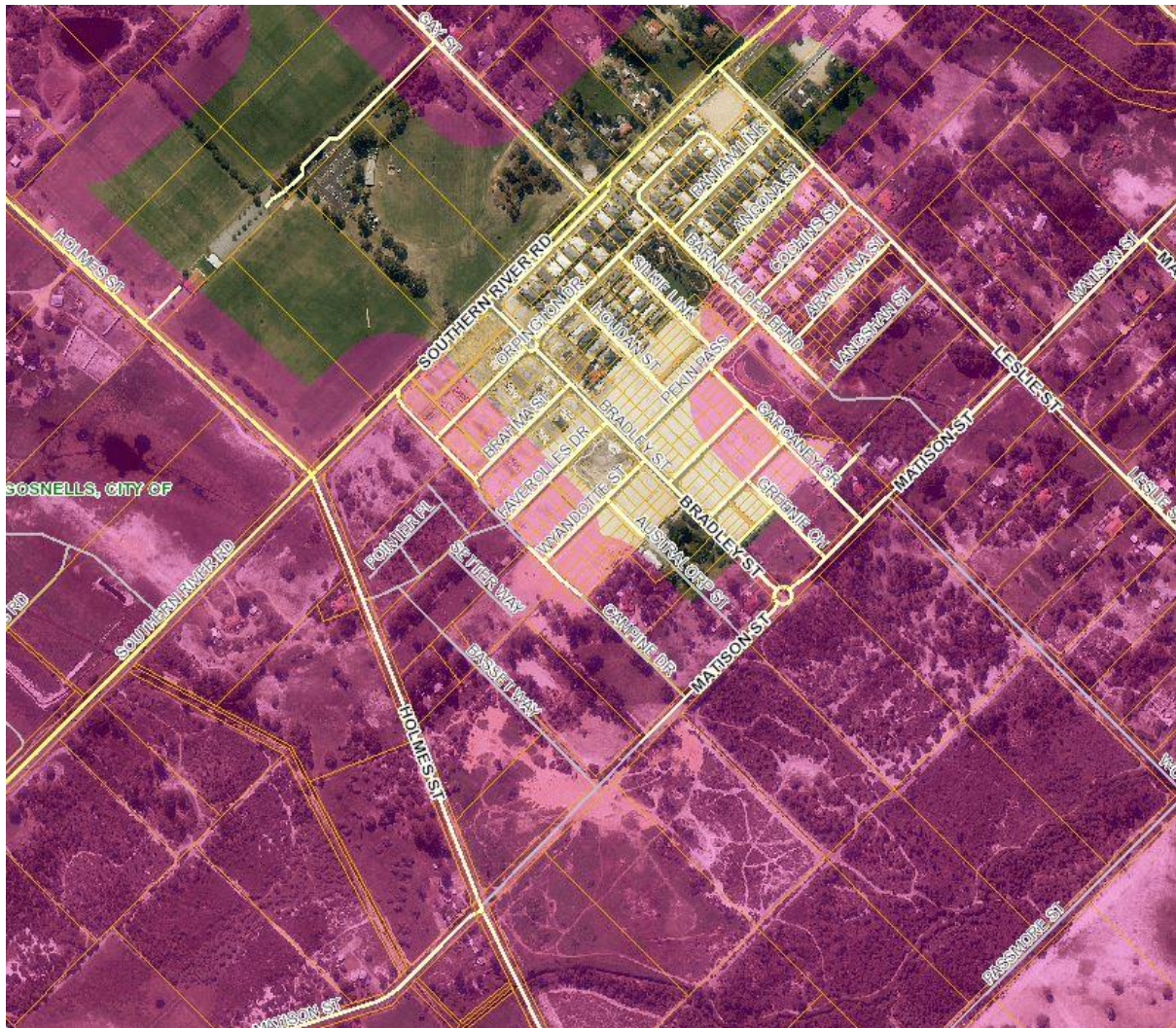
*Clause (e) – Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.*

- Footpaths;
- Buildings;
- Bare ground;
- Carparks; and
- Roads.

*Clause (f) – Low threat vegetation including managed grassland in minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated ornamental gardens, commercial nurseries, nature strips and wind breaks.*

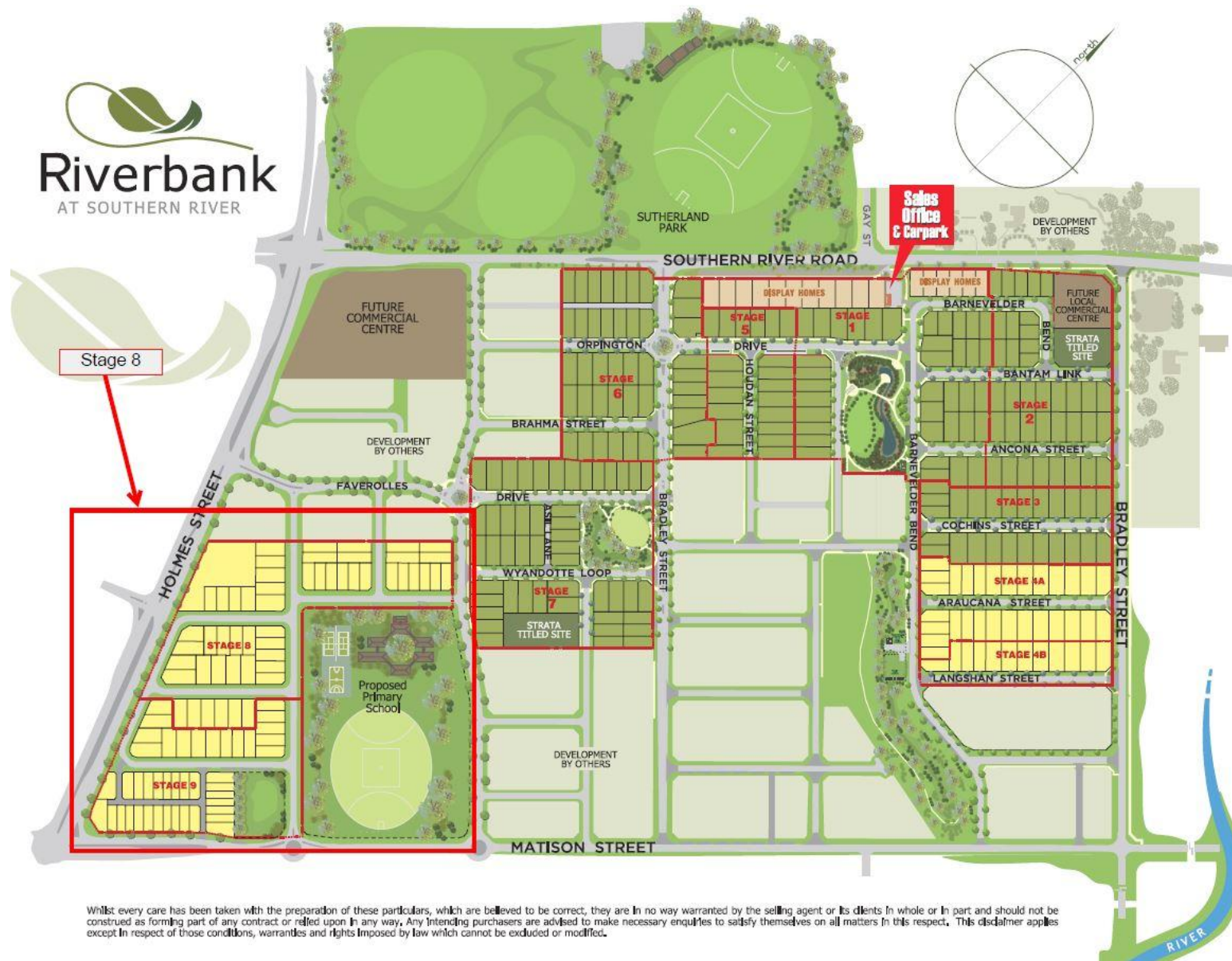
- Low fuel areas associated with managed grasslands, ornamental gardens in APZ areas of established buildings/dwellings.

BAL Assessment undertaken by a Level 2/.3 Bushfire Practitioner. Method 1 AS3959-2009 applied for BAL Assessment.

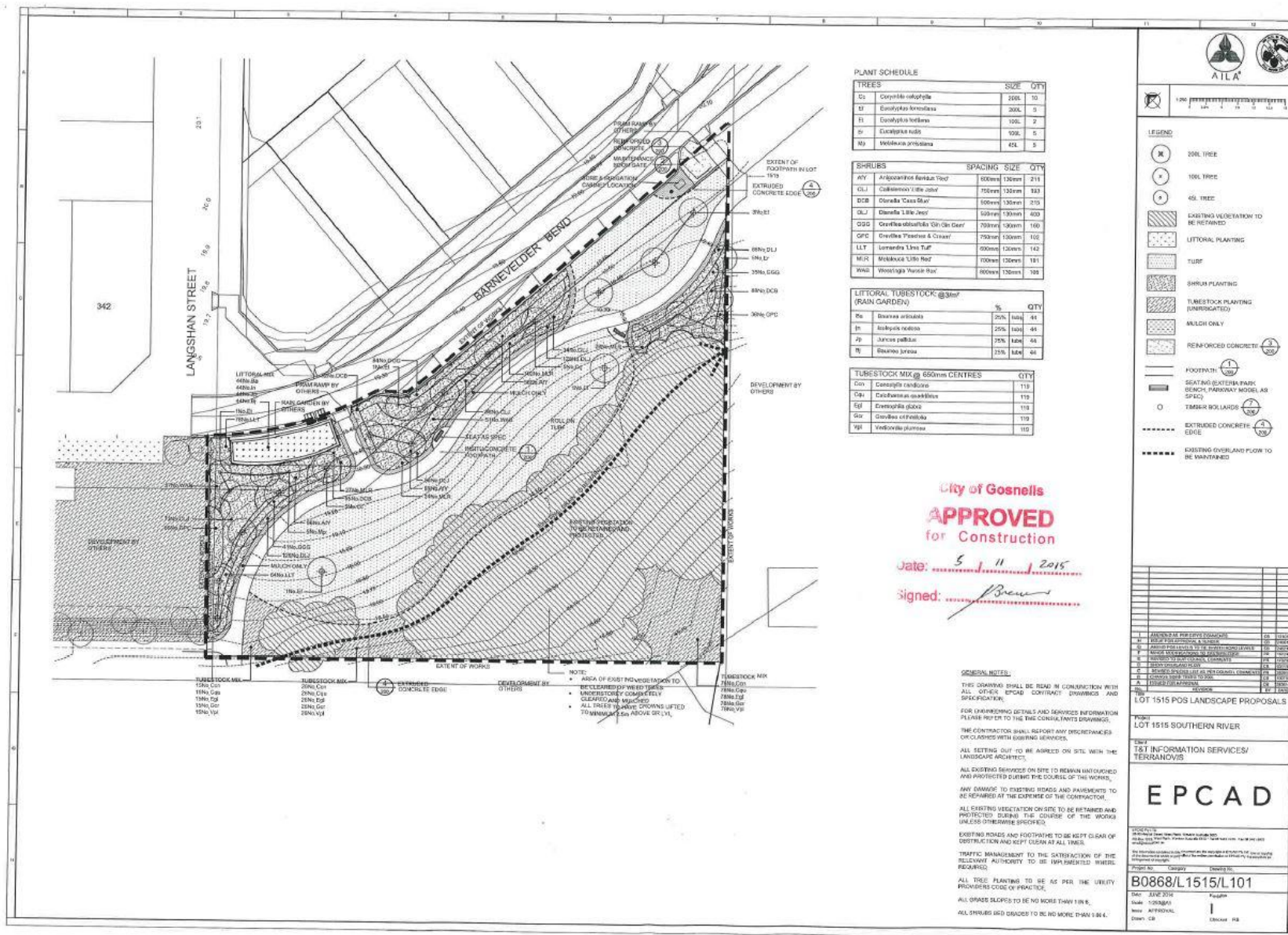


<https://maps.slip.wa.gov.au/landgate/bushfireprone/>





Whilst every care has been taken with the preparation of these particulars, which are believed to be correct, they are in no way warranted by the selling agent or its clients in whole or in part and should not be construed as forming part of any contract or relied upon in any way. Any intending purchasers are advised to make necessary enquiries to satisfy themselves on all matters in this respect. This disclaimer applies except in respect of those conditions, warranties and rights imposed by law which cannot be excluded or modified.







Checklist for proposal compliance and justification to SPP3.7 (2015) & Guidelines for Planning in Bushfire Prone Areas (2015) )			
<b>BDS Project Name</b>	BAL Contour Plan Lot Riverbank Estate		
<b>BDS Job Number</b>	TER010		
<b>Date</b>	1/11/2016	<b>WAPC#</b>	N/A
<b>Client name</b>	Terranovis	<b>Condition #</b>	N/A
<b>Bushfire Prone Area</b>	Yes (see attached)	<b>Mapping</b>	Yes see attached
<b>Planning proposal</b>	Subdivision application	<b>Lots created</b>	
<b>1. Bushfire Protection Criteria Acceptable Solutions as defined by Guidelines for Planning for Bushfire Prone Areas (WAPC 2015).</b>			
<b>Element</b>	<b>Compliant to Acceptable Solution– Yes/No</b>	<b>Justification</b>	
<b>Element 1 – Location</b>	Yes	Forest Type A, Woodland Type B, Scrub Type D and Grassland Type G assessed adjacent t to the subject site Proposed buildings can be in BAL 19 to BAL 12.5 zones.  Plan of subdivision is deemed to meet Acceptable Solutions for Element 1.	
<b>Element 2 - Siting and design of development</b>	Yes	A2.1: 20m APZ can be achieved within the proposed lots and within the parent lot or by use of low fuel areas such as roads.  A2.2 not used  Plan of subdivision is deemed to meet Acceptable Solutions for Element 2.	
<b>Element 3 - Vehicular access</b>	Yes	A3.1: Two access routes to the north and south (Holmes Road, Matison Road and Bradley Street). A3.2 Public roads to meet minimum grades. A3.3 No cul-de-sacs proposed. A3.4 Battle axes not proposed. A3.5 Private Driveways will meet minimum requirements. A3.6 No EAW proposed, use the internal road network. A3.7 No FSA proposed, use the internal road network. A3.8 Firebreaks compliant by current owner. Deemed to meet Acceptable Solutions for Element 3.	
<b>Element 4 – Water</b>	Yes	Connected to reticulated water, hydrants to WCWA standards. Deemed to meet Acceptable Solutions for Element 4.	
<b>Bushfire Hazard Assessment required</b>	No	Not required at subdivision stages	
<b>BAL Contour required</b>	Yes	See attached BAL Contour Map.	
<b>BMP required</b>	No	Not deemed required over residential areas, future school site will require a BMP report.	

## 2. Recommendations based on above checklist

1. BAL 12.5 –BAL 29 can be achieved in the proposed lots.
2. Brief assessment to Guidelines indicated can meet the Elements by applying Acceptable Solutions can be achieved in the subsequent stages.
3. Detailed BMP not deemed to be required over residential areas. Any vulnerable landuses (i.e. school site will require a BMP report prepared by a Level 3 Bushfire Practitioner. to fully assess against the bushfire protection criteria, applied at subdivision condition stages.
4. BAL Contour Plan based on assumptions that the classifiable vegetation to the east and south will remain and internal POS areas will be low fuel and landscaped areas).
5. Notification on title for newly created lot as condition of subdivision, building to AS3959-2009 to apply to any new dwellings.
6. Bushfire prone area mapping is correct as per the Map of Bush Fire Prone Areas identifying land falling within, or partially within, a bush fire prone area of Western Australia as designated by the Fire and Emergency Services (FES) Commissioner dated 8/12/2015 and 21/5/2016. Updates of this mapping will occur at the discretion of the FES Commissioner and the BAL Contour Mapping is considered valid for a period of 12 months from the date of production.

### Prepared by:

Kathryn Kinnear, Bio Diverse Solutions

Accredited Level 1 BAL Assessor (Accreditation No: BPAD30794)

Experienced Level 2 BAL Assessor (Pending Accreditation)



### Disclaimer

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### References

Western Australian Planning Commission (WAPC) (2015) Guidelines for Planning in Bushfire Prone Areas. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) 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/bushfireprone2016/>