

APPENDIX 4 BUSHFIRE MANAGEMENT PLAN

Lot 5, 6, 7 and 8 Kerosene Lane Baldivis

Bushfire Management Plan





2/9/2016 Kathryn Kinnear Bio Diverse Solutions

DOCUMENT CONTROL

TITLE

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The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959 – Building in Bushfire prone Areas, WAPC SPP3.7, Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) 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.





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1. Executive Summary

Terranovis Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a bushfire hazard assessment and prepare a Bushfire Management Plan to guide all future bushfire management for the proposed development of Lots 5, 6, 7 and 8 Kerosene Lane Baldivis Structure Plan and associated Subdivision Guide Plan. The proposed structure plan contemplates the creation of future lots in the density range of R30 and a public open space area. The publicly released Bushfire Prone Mapping (SLIP 2015 & 2016) indicates this area as bushfire prone.

To the west, south and east there is proposed urban development which will reduce the bushfire hazards to this development. The development to the east proposes to construct a road reserve to give access to the east, which assists the subject site achieving two opposing access/egress points. Legal agreements are presently being formed with adjacent neighbours to ensure there is access, sewer and maintenance of any bushfire hazards upon their land. Copies shall be forward to the CoR upon completion.

The subject site is has internal areas of Forest Type A and Scrub Type D which is proposed to be cleared for the subdivision. The adjacent land within 100m of the site is Forest Type A, Woodland (Type B), Scrub type D and cleared paddock areas (Type G). Bushfire Prone Vegetation within 100m of the site is located within Reserve 22429 and private property north/north east of Kerosene Lane. Urban growth the west, south and east are classified as future "*Low Threat Vegetation and Non Vegetated Areas*" (AS3959-2009). The majority of the site will be cleared for the subdivision with internal POS areas proposed to be landscaped public reserves (classified as low fuel areas).

The structure plan area has been rated as having an **Extreme-Moderate** bushfire hazard level as defined by Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) and State Planning Policy 3.7 (WAPC, 2015b) due to adjacent Woodland, Forest and Scrub bushfire hazards. There are low effective slopes across the site and the majority of the long term bushfire risk (Woodland Type B vegetation (extreme)) is located upslope of the proposed dwellings. The external Scrub Type D vegetation (Moderate) is located downslope of the proposed subdivision.

The project is planned to be constructed and timed with the adjacent developers to the south and the east. Legal agreements are currently being drawn up to address access and low fuel areas (among other construction issues). If in the event that the adjacent developers do not construct at the time of this proposal then the BAL Contour Plan (Appendix E) had identified any areas of concern for BAL allocation. The developer has indicated some lots may be land banked until such time as the adjacent developer constructs (mainly affects south west and south east corner of the structure plan). The plan of subdivision, upon completed construction, will meet all the requirements of the Acceptable Solutions as outlined by WAPC Guidelines for Planning in Bushfire Prone areas.

This BMP report provides details of the fire management strategies proposed to be implemented across the site as it is subdivided and developed to ensure adequate protection of life, property and biodiversity assets. To ensure the mitigation measures are implemented responsibilities are outlined for the Future Lot Owner, Developer and CoR.



2. Introduction

Terranovis Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a fire hazard assessment and prepare a Bushfire Management Plan to guide all future fire management as part OF the planning process for a proposed development (Structure Plan) and subsequent subdivision of Lots 5, 6, 7 and 8 Kerosene Lane, Baldivis.

The basic requirements of any Bushfire Management Plan (BMP) is to identify potential issues or problems relating to environmental fire threats and recommend specific actions by certain persons, agencies, authorities and developers to ensure, as much as practical, that the lives and assets of the location are not put at undue threat from any unplanned fire event. A BMP takes into account various physical attributes of the land, including topographical and vegetation properties, local climatic impacts, biodiversity, past and current land use, past fire history and management practices, local authority fire management obligations, road access, water supplies, adjacent property and tenure, and future obligations by various parties should the subdivision application be successful.

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 (WAPC, 2015a) and State Planning Policy 3.7 (WAPC, 2015b). These policies, plans and guidelines have 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.

The subject area is described as Lots 5, 6, 7 and 8 Kerosene Lane, Baldivis and is shown in Appendix A and the Structure Plan (SP) at Appendix B.

2.1. Statutory Conditions

On the 7th December 2015 the Fire and Emergency Services (Bush Fire Pone Areas) Order 2015; Planning and Development (Local Planning Scheme) Amendment Regulations 2015; Planning and Development Act 2005 State Planning Policy 3.7 - Planning in Bushfire Prone Areas and the Building Amendment Regulations (No.3) were published in the WA Government Gazette. The Western Australian State Bushfire Prone Mapping was also publicly released.

These reforms introduce new requirements for people intending to develop and/or build in bushfire prone areas, including the need to assess a property's bushfire risk and take additional construction measures to limit the impact of bushfires.

The reforms introduced in 2015 included:

- Emergency Services (Bush Fire Prone Areas) Order 2015: 4 (1) The areas of the state described in the Bushfire Prone Areas dataset are designated as bush fire prone areas.
- Planning and Development (Local Planning scheme) Amendment Regulations 2015:
- States that a property is within a 'bush fire prone area' if designated as such by the Fire and Emergency Services Commissioner for the purposes of land-use planning requirements;
- Clarify where exemptions to the requirements set out in the LPS Amendment Regulations 2015 apply;
- Ensure that a Bushfire Attack Level (BAL) assessment is undertaken for new habitable buildings in a bush fire prone area (unless exemptions apply);
- Require development approval for habitable buildings and land uses on sites that receive a BAL of BAL-40 or BAL-Flame Zone (FZ);
- Include a four-month transitional period from the date a site is designated as being bushfire prone to ensure landowners and the development industry have time to adequately prepare; and
- Ensure Special Control Areas continue to have effect in local government areas. (DoP, 2016)



- Planning and Development Act 2005 State Planning Policy 3.7 (SPP 3.7)- Planning in Bushfire Prone Areas: The intent of this policy is to implement effective, risk based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure. The application of SPP 3.7 applies to all higher order strategic planning documents, strategic planning proposals, subdivision and development applications located in designated bushfire prone areas.
- **Building Amendment Regulations (No.3):** Outlines the definition of the bushfire prone area as designated under the *Fire and Emergency Services Act 1998* Regulation 31BA applicable building standards for buildings and incidental structures in bushfire prone areas. (WA Australian Government Gazette, 2015)

The publicly released bushfire prone mapping (Bushfire Prone Area Mapping, SLIP 8/12/15 & 21/5/2016) outlines the site to be Bushfire Prone as per the above regulations, as it is situated within 100m of >1 ha of bushfire prone vegetation. Refer to extract from the Office of Bushfire Risk Management (SLIP) as released in December 2015 (updated 20/5/2016) Appendix A.

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

- AS 3959-2009 "Construction of Buildings in Bushfire Prone Areas" current and endorsed standards;
- State Planning Policy 3.7 (SPP 3.7) Planning in Bushfire-Prone Areas (WAPC, 2015b);
- Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a);
- Fire and Emergency Services (Bush Fire Prone Areas) Order 2015;
- Planning and Development (Local Planning Scheme) Amendment Regulations 2015;
- Bushfires Act 1954; and
- City of Rockingham annual Fire Control Notice.

2.2. 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 of Environmental Management.

Kathryn Kinnear is an accredited Level 1 BAL Assessor (Accreditation No: BPAD30794) and is classified as an Experienced Level 2/3 Practitioner pending accreditation. Kathryn Kinnear is presently a member of Fire Protection Australia Association and a committee member of the Bushfire Subcommittee Western Australia. Kathryn is a suitably qualified Bushfire Practitioner to prepare this Bushfire Management Plan.



3. Aims of this Plan

The aim of this BMP is to assess the bushfire risks associated with the existing subdivision and future subdivisions and 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 future development of the subject site by assessing the development to the Bushfire Protection Criteria Acceptable Solutions as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a).

3.1. Planning Context

The BMP has been prepared to support a Structure Plan (SP) proposal on Lots 5, 6, 7 and 8 Kerosene Lane Baldivis (Appendix B). The BMP has been prepared as part of the planning process to prescribe bushfire management measures for the proposed development as per the State Planning Policy 3.7 Planning in Bushfire-Prone Areas (WAPC, 2015b), and the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) (Appendices, 2, 3 and 4). The BMP will guide the development design to implement bushfire protection and risk mitigation measures for the preservation of life, property and infrastructure.

3.2. Site inspection

To ensure that every aspect of the proposed subdivision meets the planning requirements as set out in Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) (Appendices, 2, 3 and 4) a site inspection was undertaken on the 19th June 2015 by Kathryn Kinnear (Bushfire Consultant, Bio Diverse Solutions) to assess the vegetation and the site conditions.

The site was assessed as having an **Extreme - Moderate** Bushfire Hazard Level (BHL) due to the site being adjacent to internal and external patches of remnant native vegetation areas (bushfire prone vegetation). Where a subdivision is located within an extreme or moderate BHL, the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) requires assessment to the bushfire protection criteria – a process where subdivisions are assessed for compliance to the criteria. The bushfire protection criteria (Appendix 4, WAPC, 2015a) are a performance based criteria in assessing bushfire risk management measures and they outline four "Elements". The "Elements" which are to be met either through the objectives of the "Performance Principle" or "Acceptable Solutions" (WAPC, 2015a) for the subject site include:

- Element 1 Location;
- Element 2 Siting and design of development;
- Element 3 Vehicular access; and
- Element 4 Water.

(WAPC, 2015a)

This BMP has been prepared to assess the site suitability against the "Acceptable Solutions" of the bushfire protection criteria (WAPC, 2015a).

3.3. Objectives

The objectives of this BMP are:

- Achieve consistency with objectives and policy measures of SPP 3.7 (WAPC, 2015b);
- 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, 2015a);
- 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 area with due regard to people, property, infrastructure and the environment;
- Nominate individuals and organisations responsible for fire management and associated works within the subject area; and
- Aligned to the recommended assessment procedure which evaluates the effectiveness and impact of proposed, as well as existing, bushfire risk management measures and strategies.



4. Description of the area

4.1. Location

The subject site is 10 km east of Rockingham CBD, within the municipality of the City of Rockingham. The subject site is 8.1ha made up of 4 existing lots which have 2 existing dwellings on site (lot 5 and lot 7). Please refer to Figure 1 below - Locality Map, and Site Location Mapping Appendix A.



Figure 1 – Subject site locality

4.2. Development proposal

The SP at Lots 5, 6, 7 and 8 Kerosene Lane Baldivis contemplates residential development in the density range R30 and Public Open Space areas (POS). Please refer to the proposed SP in Appendix B. Adjacent properties to the east and south are proposed urban areas, refer to Appendix B for plans associated with these.



5. Desktop Assessment – Regional Setting

5.1. Current site land use

The site is currently 2 rural lots with remnant vegetation, two habitable dwellings (lot 5 and Lot 7) and one disused outbuilding (lot 6). Please refer to Photographs 1 to 4 below.



Photograph 1 – View of existing dwelling on Lot 5 Kerosene Lane.



Photograph 2 – View of disused outbuilding on Lot 6 Kerosene Lane



Photograph 3 – View of existing dwelling and outbuildings on Lot 7 Kerosene Lane.



Photograph 4 – View of Lot 8 from north west (off Kerosene Lane), predominantly vegetated with no existing dwelling on site.

5.2. Surrounding land uses

Adjacent to the subject site to the north is remnant vegetation contained in Reserve 22429 (north of lots 8, 7 and 6) and Lot 287 Kerosene lane (Lot 6 and 5). The remnant vegetation has recently sustained a bushfire (summer 2015) and is regenerating post fire. Refer to Photographs 5 and 6.





Photograph 5 – View of Reserve 22429 north of Kerosene Lane, recently burnt.



Photograph 6 – View of remnant vegetation to the north of Kerosene Lane on private property.

To the east of lot 5 there is market gardens which are not currently tended (Photograph 7) and to the west (adjacent to lot 8) is cleared paddock areas with some isolated trees, refer to Photographs 7 and 8.



Photograph 7 – View of market gardens to the east of the subject site (adjacent to Lot 5).



Photograph 8 – View of cleared paddock areas to the west of the subject site (adjacent to lot 8).

To the south is private property with some remnant vegetation (eastern extents) and cleared paddock areas with remnant trees (western extents), refer to Photographs 9 and 10.



Photograph 9 – View of cleared paddocks south of lot 7 and 8 Kerosene Lane.



Photograph 10 – View of remnant vegetation south of Lot 5 and 6 Kerosene Lane.



The lots adjacent to the subject site to the east, south and west are proposed to be developed into residential areas (refer to Section 5 for more detail).

5.3. Climate

Perth experiences a Mediterranean climate, characterised by hot, dry summers and mild, wet winters. These seasons extend into the autumn and spring months, which are transitional periods between the main seasons (BoM, 2014).

The climate of the region is strongly influenced by the position of the axis of the band of high pressure known as the sub-tropical ridge, and in the warmer months by the development in the easterlies to the north of the ridge of a trough of low pressure near the West Coast. For much of the year the ridge is located to the south allowing the east or southeasterly winds to prevail. During the cooler months the ridge periodically moves to the north allowing cold fronts to pass over the west coast and deliver much of the annual rainfall. Sometimes these fronts interact with tropical cloud bands from the northwest and this can enhance the amount of rainfall produced.

5.3.1. Rainfall

Long term climate statistics from Medina Research Centre Bureau of Meteorology (BOM) station 9194 (13km north of subject site) indicates an annual mean rainfall of 752.7 mm (BOM, 2015), which occurs on 89 rain days, approximately 80% usually falls between May and September. Rain occurs on four days out of every seven on average during winter. Flooding is rare to the region, however heavy rain may be produced by strong winter cold fronts or, less frequently, by summer storms or, more rarely, by decaying tropical cyclones. The highest mean monthly rainfall is 147.2mm recorded in July, with the driest month being January with 2.2mm mean rainfall. It is not unusual for there to be extended dry periods during the warmer months. Please refer to Medina Research Centre (13km north of subject site) Annual Rainfall Graph (Figure 2).





(BoM, 2015)

5.3.2. Temperature

Mean monthly air temperatures range from 31.5°C in February to 18.3°C in July (BoM, 2015). Summer maximum temperatures are strongly dependent upon the arrival time of the reliable sea breezes. On some days the difference between the maximum temperatures on the coast and the eastern suburbs may exceed 10°C. Heatwaves are associated with strong easterly winds and the late arrival or absence of the sea breeze. The highest temperature ever recorded is 46.2°C, however, the temperature exceeds 40°C on only three days per year on average. The average minimum temperature ranges from just 8.2°C in July and August to 17.6°C in February. Please refer to average temperatures over the page for Medina Research Centre (13km away), Figure 3 and Figure 4.



Figure 4 – Mean Min Temperatures



(BoM, 2015)

5.3.3. Wind

Winds are mainly easterly and south easterly but varied in the warmer months by reliable afternoon sea breezes from the south west and west. Summer morning (9am) winds are characterised by strong easterly and south easterly winds to 20-30k/hr occurring 20% of the time with lighter north east 10-20km/hr occurring 10% of the time. Afternoon (3pm) summer winds are characterised by strong south westerlies (prevailing afternoon sea breeze) up to 30-40km/hr occur close to 50% of the time. Westerly winds occur 10% of the time. In the cooler months winds are predominantly from the north in the morning and then westerlies in the afternoon that are associated with the bulk of the annual rainfall. Despite the occurrence of strong winds or gales, average wind speeds in winter are considerably lighter than in summer (BoM, 2015). Please refer to Figure 5 and 6 below.

Figure 5 – Summer (January 9am & 3pm) wind rose BoM







Figure 6 – Winter (July 9am & 3pm) wind rose BoM

5.3.4. Prevalent Fire Weather

Weather significantly affects the behaviour of bushfires and time of low humidity and strong winds will lead to more aggressive bushfires and extreme bushfire events. Seasonal factors affect fuel moistures and fuel availability, and affect the intensity of fires. The south west of WA is one of the most bushfire prone regions in the world due to the combination of a Mediterranean-type climate with hot dry summers and the presence of large areas of flammable native vegetation (Bushfire CRC, 2015).

Fire weather is characterised by mid-level disturbances across the south west of Western Australia, bringing unstable atmospheric conditions (thunder and lightning) from the north or north-west wind directions. Very dangerous fire weather conditions often follow a sequence of hot days and easterly winds when the trough deepens near the coast and moves inland. Winds can change from easterly to northerly, then westerly very quickly during these climatic events. This is characteristic of "Extreme" Fire Weather conditions to the area with hot, dry conditions prior to storm events. Risk of lightning strikes, spark ignition, arson and other causes of fire give rise to uncontrolled bushfires under these conditions.

Prevalent winds which most bushfire events are associated with in the region during summer (bushfire season) are from the east (dry land based winds), south and south-west direction (afternoon sea breezes). Conditions tend to be dry through the day with low relative humidity. High winds and excess fuels can lead to hazardous conditions for residents. Strong south westerly winds exist at the subject site during dry (afternoon) summer periods (Figure 5). These circumstances place residential housing under the most risk from wildfire events.

5.3.5. Climate Change

Climate change is expected to impact on the future rainfall pattern of the area. It is recognised that the average rainfall has already declined by 20%-30% over the past few decades and that the long term impact of climate change may lead to a shift in rainfall, as well as dryer climatic conditions for the region. The long term changes are predicted to impact on the flora, fauna and water availability for the region. (Climate Commission 2010)



The Climate Commission (Climate Commission 2010) estimates that

"...Rainfall patterns in Western Australia have changed over the last 40 years. There is significant evidence that climate change has contributed to the marked drying trend in the southwest of the state."

The construction of the proposed development is not predicted to be affected by sea-level rise, however could be affected from increased intensity rainfall events or extended drying periods. Increased extreme weather from climate change could affect fire frequency and behaviour in Western Australia (DEC, 2012), this Bushfire Management Plan has been prepared to reduce the risk of fire on the proposed residential dwellings in the newly created subdivision.

5.4. Topography

The subject site is located in an undulating landscape on the Swan Coastal Plain with the "Effective Slopes" (as per AS3959-2009) measured between 8-10° (degrees) (north of the site), 3.2°-4° (north east), and flat land (west, south and east). Please refer to the slope analysis on the Vegetation Mapping Appendix C.

Generally slopes surrounding the site are low not exceeding 5° (degrees). The effective slopes under classifiable vegetation to AS3959-2009 (Table 2.4.3) that to apply to this development include:

- Upslope and Flat Land; and
- Downslope >0 to 5 degrees.

5.5. Bushfire fuels – Vegetation

The subject site lies within the Swan IBRA bioregion. This bioregion is comprised of "*low lying* coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils." The area is located within the SWA1- Dandaragan Plateau. The plateau is bordered by Derby and Dandaragan Faults. Cretaceous marine sediments are mantled by sands and laterites. Characterised by Banksia low woodland, Jarrah - Marri woodland, Marri woodland, and by scrubheaths on laterite pavement and on gravelly sandplains. (Hearn et al., 2002).

The vegetation has been mapped on a broad scale by JS 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 search of JS Beard's vegetation classification database for the general area places the site within 1 broad Vegetation Association for the site:

1. System Association: Spearwood

Vegetation Association number: 998

Vegetation Description: Medium woodland; tuart (e4Mi)

The vegetation on site to the east forms an Open forest of mature *Eucalyptus gomphocephala* with an understorey dominated by weedy species and *Acacia Rostellifera, Acacia pulchella (var. goadbyi)* and *Olearia axillaris* (Lots 5 and 6) in good to degraded condition. To the west a low open forest of *Eucalyptus gomphocephala* with a variety of understories including a weedy understorey dominated by **Pelargonium capitatum* and *Pennisetum *clandestinum*, as well as *Acacia sp. rostellifera, Acacia pulchella (var. goadbyi)* and *Olearia axillaris* (lots 7 and 8) in good to degraded condition. In the east of lot 8 a small patch of *Acacia rostellifera* occurs in a dense thicket/scrub to 2-3m.

To the north of the site in Reserve 22429 is Low Open Forest of mature *Eucalyptus gomphocephala* and *E.marginata* over *Acacia sp. rostellifera, Acacia pulchella (var. goadbyi)* and *Olearia axillaris.* To the north and north east of lot 5, thickets (scrub) of *Acacia pulchella and A.rostellifera* occur.



To the south of Lot 5 and 6 there is Open forest of mature *Eucalyptus gomphocephala* with an understorey dominated by weedy species and *Acacia rostellifera*, considered degraded. To the south and south east of Lots 7 and 8 there is cleared paddock areas with isolated *Eucalyptus gomphocephala* and *E.marginata*. These areas had a completely weedy understorey and were considered completely degraded.

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. Each plot is representative of the Vegetation Classification to AS3959-2009 Table 2.3 and shown on the Vegetation Classification Mapping Appendix C. Note the following vegetation plots differ to the original assessment undertaken by Bio Diverse Solutions and have been adapted to comply with CoR requests (COR assessment document dated 2/2/2016 E. Dawson). These are not necessarily agreed to or supported by Bio Diverse Solutions.

Plot	1	Classification or Exc Clause	lusion	Woodland Type B
				North of the subject site in CoR Reserve. View of Reserve 22429 north of Kerosene Lane, recently burnt. Woodland Type B. Fuel loading 15T-25T/ha. Jarrah, Casuarina Low open Woodland. Grassy understorey. Effective slope – upslope. Located 20m from the lot boundary.

Photo ID: Photo 1 View of Reserve 22429 north of Kerosene Lane, recently burnt (at time of assessment) view from south to north.

Plot	2	Classification or Clause	Exclusion	Scrub Type D
				To the north of Kerosene Lane, north of the subject site. Acacia dominant, interspersed with grassy understorey. Average vegetation height 3-4m. Effective slope – upslope. Surface fuel loading 25 t/ha. Located 20m from the lot boundary.

Photo ID: Photo 2 View of Acacia Scrub Vegetation Type D, north and north east of Lot 5 and 6. View from south to north

Plot	3	Classification Clause	or	Exclusion	Forest Type A
Photo ID: Photo 3 view of Forest Type A to the north east east.			North east of the subject site along Kerosene Lane. <i>Eucalyptus marginata</i> 6-8m. Multi layered. Total available fuels 25-35T/ha. Canopy cover >70%. Average height of trees 8-10m. Effective slopes 4 degrees downslope. Located 56m from the proposed lots in the subject site. t of the subject site. View from the southwest to the north		
Photo ID: Photo 3 view of Forest Type A to the north east east.					t of the subject site. View from the southwest to the north
Plot	4	Classification Clause	or	Exclusion	Grassland Type G
			_		Paddock grasses, old horticultural lot disused. Unmanaged grasses 100-400mm. Kikuyu, clover, fleabane, lupins, cape weed,



Photo ID: Photo 4 View of grassland Type G in horticultural lot to the east of lot 5, view from north to south.

Plot	5	Classification c	or Exclusion	Forest Type A
				Forest Type A. Tuarts 10-15m in height. Located within the subject site in lot 5 and 4m to the south of the subject site in adjacent private property. Multi layered. 25/35T/ha. Grassey understorey in some places. >30% vegetative cover. Effective Slope Flat land.

Photo ID: Photo 5 View of Tuart Forest, Vegetation Type A, view to the south of lot 5 and 6



Plot	6	Classification or Clause	Exclusion	Scrub Type D		
				Located in Lot 8 (north west), northern edge of Lot 6 and to the south of the subject site in the south east. Surface fuel loading 25T/ha. 30% vegetative cover. Scrubs 3-4m high. <i>Acacia</i> dominant with grassy understorey. Effective Slopes 5.7 degrees downslope (lot 8), Upslope (Lot 6) and flat land (south of subject site).		
Pno	to ID: Photo 6	Classification or		subject site in Lot 8. View from north west to south east.		
Plot	7	Clause	Exclusion	Woodland Type B		
				Tuart dominant with understorey of paddock grasses and Acacia. 10-30% vegetative cover. 30% canopy cover. 15-25T/ha available fuel. Located within the subject site in Lot 7 and Lot 8. Located adjacent to the subject site to the south (0- 10m). Effective slopes in the subject site 3.4 degrees and to the south of the subject site flat land (0 degrees).		
Photo	DID: Photo 7 V	/iew of Woodland Type	B in Lot 7, viev	v from west to east.		
Plot	8	Classification or Clause	Exclusion	Grassland Type G		
	Provide the set of the subject site. View from north east to southProvide the south and to the south and west in adjacent lots.Highly disturbed area, grasses and occasional Tuart trees.Fuel loading possibly reach 4.5 T/ha if left unmanaged.Effective slope 0 degrees in the south and to the west of the site >0-5 degrees downslope.<10% trees.					
Ph	Photo ID: Photo 8 view of Grassland Type G in the north west of the subject site. View from north east to south west.					



Plot	9	Classification Clause	or	Exclusion	Forest Type A	
Clause					Located in Lot 8 of the subject site. Previously disturbed in state of regrowth. Multilayered structure. Trees 6-12m. Occasionally a Woodland Type B structure but if left to regenerate will become a Forest Type A fuel loading. Surface fuel loads 25-35T/ha. Effective slopes 3.2 degrees downslope Located within the site 0m.	
Phot	o ID: Photo 9	view of Forest Type	A in I	north west con south	ner of subject site in Lot 8. Photo view from north west to	
Plot	10	Classification	or	Exclusion	Woodland Type B	
Phot	Photo ID: Photo 10 View of Open Weedland Turo B to th			d Type B to the	Isolated Tuart trees forming connected canopy over grasslands. Located in the south west corner of the subject site and adjacent to the west and south. Available fuels could reach 15T/ha if left unmanaged. 10-30% vegetative structure. Trees 10-15m high. Located 0m (within the site) and 0m to the west and south (along the boundary). Effective Slopes flat land.	
Plot	11	Classification	or	Exclusion	Low Fuel or non-vegetated areas Exc 2.2.3.2 (e)	
Photo ID: Photo 11 View of existing dwelling in L of 5. View					Buildings in the existing lots.	
Photo	Photo ID: Photo 11 View of existing dwelling in Lot 5. View from north east to south west.					

Plot	12	Classification o Clause	r Exclusion	Low Fuel or non-vegetated areas Exc 2.2.3.2 (e)
	t			Roads, driveways, bare areas and accessible firebreaks Located to the north in Kerosene Lane and within the lots.
Photo road	DID: Photo 12 reserve.	View of Low Threat	and non-vegetate	ed areas (AS3959-2009 Exc 2.2.3.2 (e)) – Kerosene Lane
Plot	13	Classification o Clause	r Exclusion	Low Fuel or non-vegetated areas Exc 2.2.3.2 (f)
				Low fuel areas associated with dwellings. Exclusion 2.2.3.2 (f). Located in lots 5 and 7.

5.6. Assets

The subject site has some areas of remnant vegetation, the site is valued for its proximity to the expanding residential areas of Rockingham, Leda and Wellard. Once developed, the values which will be potentially affected by fire include:

- *Human lives:* It is likely that more than 320 people could be resident at the newly created subdivision;
- Assets: The development will contain dwellings and valuable infrastructure; and
- **Environmental Conservation Values**: once developed there will be no conservation values for the site.

5.7. Access

Vehicle access to the subject site is from presently from Kerosene Lane into private driveways for lot 5 and 7 (limited formal access into Lots 6 and 8).

5.8. Water Supply

Water supply is presently from scheme mains resources.

5.9. Fire Breaks

There are existing firebreaks around the property, refer to Photograph 11. The adjacent properties to the east, west and south has 4m mineral earth firebreaks, refer to Photograph 12.



Photograph 11 – View of firebreak along the eastern boundary of lot 5 of the subject site.

Photograph 12– View of firebreak along the southern boundary of lot 5 of the subject site, and firebreak adjacent lot to the south (LHS).



6. Potential Bushfire Issues and Bushfire Hazards

The Bushfire Hazard Level (BHL) provides a "broad-brush" means of determining the potential intensity of a bushfire for a particular area (WAPC, 2015a). The BHL assessment process assists in informing the suitability of land contained within the strategic planning proposals for future subdivision and development (WAPC, 2015a). The BHL assessment process assigns land within a designated bushfire prone area as Low, Moderate or Extreme. Refer to the BHL categories Table 1 below.

The Vegetation type for the subject site (within 100m) has been classified as per AS3959-2009 as Forest Type A, Woodland Type B, Scrub Type D, Shrubland Type C, Grassland Type G and Low threat Vegetation (as per vegetation classifications outlined in AS3959-2009, Table 2.3). The bushfire hazard Level (BHL) ratings have been assessed as per the methodology as outlined in the Guidelines for Planning in Bushfire Prone Areas (2015) (Appendix 2). Please refer to Table 1 below.

<u> Table 1 – Bushfire Hazard Level (BHL) Categories</u>
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HAZARD LEVEL	CHARACTERISTICS
	 devoid of standing vegetation (less than 0.25ha cumulative area); areas which, due to climatic conditions or vegetation (e.g. rainforest), do not experience bushfires;
	Inner urban or suburban areas with maintained gardens and very limited standing vegetation (less than 0.25ha cumulative area);
Low	 low threat vegetation, including grassland managed in a minimal fuel condition (i.e. to a nominal height of 100mm), maintained lawns, vineyard and orchards; and
	 pasture or cropping areas with very limited standing vegetation that is shrubland, woodland or fores with an effective up slope*, on flat land or an effective down slope* of less than 10 degrees, for a distance greater than 100 metres.
	 areas containing pasture or cropping with an effective down slope* in excess of 10 degrees for a distance greater than 100 metres;
	 unmanaged grasslands;
	open woodlands;
	 open shrublands;
Moderate	 low shrubs on areas with an effective up slope*, on flat land or an effective down slope* of less than 10 degrees, for a distance greater than 100 metres or flat land;
	 suburban areas with some tree cover; and
	 forest and woodlands with a permanent grass understorey or at most, a scrub understory structure consisting of multiple areas of <0.25ha and not within 20 metres of each other or single areas of <1ha and not within 100 metres of other scrub areas.
r .	 forests with a scrub understorey which is multi-liered;
	 woodlands with a scrub understorey which is multi-tiered;
Extreme	 tall shrubs; and
	 any area of vegetation not otherwise categorised as low or moderate.

Table 3: Hazard levels and characteristics

(WAPC, 2015a)

Internal Bushfire Hazard Level

The subject site has sustained some vegetation clearing on Lot 5, 7 and partially on lot 8 associated with dwellings, infrastructure and firebreaks. The remnant vegetation on the lots is predominantly Forest Type A, which is classified as an <u>"Extreme"</u> bushfire hazard (as per WAPC Guidelines, Table 1). There are some areas in Lot 8 and 6 which have Acacia scrub Vegetation Type D which is classified as a "<u>Moderate – Extreme"</u> bushfire hazard (as per WAPC Guidelines, Table 1). Grasslands adjacent to moderate or extreme classifiable vegetation is classified as "Low threat vegetation and Non Vegetated areas" (AS3959-2009), with the internal built landscape posing a <u>"Low"</u> threat of bushfire (as per WAPC Guidelines, Table 1).

Refer to Bushfire Hazard Mapping Appendix D.



External Bushfire Risks

To the east there is a disused horticultural lot with future planned urban areas (See Appendix B) these areas pose a <u>"Moderate"</u> threat of fire (as per WAPC Guidelines, Table 1). To the south, south west and west there is Grassland (Type G) with future planned urban areas (See Appendix B) which present a <u>"Moderate"</u> bushfire hazard (as per WAPC Guidelines, Table 1). These areas also have small patches of Woodland Type B which present a <u>"Moderate"</u> bushfire hazard (as per WAPC Guidelines, Table 1) and Forest Type A which present an <u>"Extreme"</u> bushfire hazard (as per WAPC Guidelines, Table 1) and Forest Type A which present an <u>"Extreme"</u> bushfire hazard (as per WAPC Guidelines, Table 1). These areas to the south, west, south east and east are also planned future urban (see Appendix B).

The Bushfire Hazard associated with the site is the Woodland Type B to the north in Reserve 22429 and Tall Scrub Type D in private property which are classified as an <u>"Extreme"</u> bushfire hazards (as per WAPC Guidelines, Table 1). This bushfire prone vegetation will remain in perpetuity. The majority of this area to the north of the proposed subdivision is located upslope, excepting in the north east where the vegetation is located downslope (effective slopes $3.4^{\circ} - 4^{\circ}$). Kerosene Lane intercepts this bushfire hazard, and the risk of bushfire and ember attack from upslope is reduced to the buildings located downslope. The north east corner (existing lot 5) of the subdivision poses the highest risk of bushfire from downslope ember attack and radiant heat.

There are proposed subdivision development(s) to the south (Lot 815 Mandurah Road), west (Lot 26 Kerosene Lane) and east (Lot 299 Kerosene Lane), these areas, once developed will be Low threat of fire (as per WAPC Guidelines, Table 1).

Refer to Bushfire Hazard Mapping Appendix D.

Proposed Subdivision Fire Risk Rating

The Bushfire Hazard within the proposed Structure Plan has proposed urban and landscaped areas containing low threat vegetation or non-vegetated areas with slopes <5°, or suburban areas with some native tree cover. This gives the newly built areas of the subdivision a **Low risk**.

The fire risk for this subdivision has been rated at an **Extreme - Moderate risk** due to the site being adjacent to external patches of forest remnant native vegetation areas to the north and scrub to the north east. The overall slopes for the scrub (Type D) vegetated areas are low (>5 degrees), however setback distances of over 100m from native vegetation cannot be achieved from the northern boundary. The Woodland Type D bushfire hazard to the north in Reserve 22429 has high effective slopes (8-10°) however is located upslope of the proposed dwellings and therefore has a reduced radiant heat and ember attack on the residences. Upon Completion of the subdivision Low BHL apply to the northern areas and when the adjacent subdivisions are completed to the east and the south.

Setback distances of over 100m from native vegetation (Bushfire Prone Vegetation) cannot be achieved for the development. Where 100m cannot be achieved to dwellings from Bushfire Prone Vegetation, the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) states that Building to Bushfire Attack Levels (BAL) and AS3959-2009 can apply to dwellings to assist in achieving "Acceptable Solutions" to the subdivision. Where a building is located within the State Gazetted Bushfire Prone Area Mapping (OBRM, 2015), the *Planning and Development (Local Planning Schemes) Amendment Regulations 2015* states that building to Bushfire Attack Levels (BAL) and AS3959-2009 is to apply to new dwellings.

The subdivision (and proposed dwellings) will be located within 100m of Bushfire Prone vegetation and is located within the WA State Bushfire Prone Area (SLIP, 2015 & 2016) mapping. The proposal will require assessment to the bushfire protection criteria as per the newly released "Guidelines for Planning in Bushfire Prone Areas" (WAPC, 2015a). These are outlined in **Section 6 Assessment to Bushfire Protection Criteria**.

7. Assessment to the Bushfire Protection Criteria

The Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) outlines bushfire protection criteria which subdivisions and development proposals are assessed for compliance. The bushfire protection criteria (Appendix 4, WAPC, 2015a) 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, 2015a)

The Structure Plan is required to meet the "Performance Principles" and/or "Acceptable Solutions" of each Element of the bushfire mitigation measures (WAPC, 2015a). The site has been classified as a having a "Low" future internal bushfire hazard in the development/building areas, with adjacent "**Extreme**" and "**Moderate**" bushfire hazards (as per WAPC Guidelines, Table 1) due to the presence of Forest Type A, Woodland Type B and Scrub Type D. Effective Slopes under vegetation are variable across the site but generally are upslope and flat land or Downslope >0 to 5 degrees.

The proposal will be assessed against the bushfire protection criteria Acceptable Solutions for Elements A1, A2, A3 and A4. 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, 2015a).



7.1. 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.

Assessment to the Acceptable Solutions.

Acceptable Solution applied A1.1: 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.

The publicly released Bushfire Prone Mapping (SLIP 2015 & 2016) indicates this area as bushfire prone. After completion of the subdivision, not all of the proposed lots and future dwellings are able to be located >100m from Bushfire Prone Vegetation (classified to AS3959). Proposed dwellings which cannot meet >100m HSZ from AS3959-2009 classifiable vegetation require a Bushfire Attack Level (BAL) and building to AS3959-2009 to apply to the lot (dwelling).

The AS3959-2009 construction standard that can apply to the dwellings in the subject site is shown in Table 3 – Minimum Setback Distances and Construction Standards. This is based on the BAL Contour with the legal agreements in place with adjacent developers and low fuel areas maintained as per AS3959-2009 Clauses 2.2.3.2.

Lot Affected	Vegetation Type	Distance to Vegetation and Effective Slope	BAL Rating	Construction
Lots 124-133, 104-107 114- 117, 93-96, 78- 82, 67-72, 57- 61	Woodland Type B	29-<100m All upslopes and flat land	BAL 12.5	AS3959-2009 to apply
52-49, 34-37, 25-30, 3-7	Scrub Type D	27m-<100m All upslopes and flat land	BAL 12.5	AS3959-2009 to apply
54-55, 66, 76, 77, 91, 92	Woodland Type B	20-<29m All upslopes and flat land	BAL 19	AS3959-2009 to apply
1, 2, 31-33, 53	Scrub Type D	19m-<27m All upslopes and flat land	BAL 19	AS3959-2009 to apply
1- 6	Forest Type A	50-<100m Downslope >0-5 Degrees	BAL 12.5	AS3959-2009 to apply
100-103, 120- 123	Woodland Type B	14-<20m All upslopes and flat land	BAL 19	AS3959-2009 to apply

Table 3 – Guide for minimum setback distances and construction standards

(AS3959-2009, Table 2.4.3 FDI 80)

Notes on BAL Contour Assessment:

- Some allocated BAL's are from CoR site assessment and not reflected from the • authors original assessment of the site.
- Sites will be subject to detailed feature survey and the mapping depicted in the BAL • Contour Mapping Appendix E is a guide, with accuracy to within 5m.
- Detailed BAL Assessment (Method 1 AS3959-2009) is determined from the existing • vegetation at time of feature survey and building construction/approval stages.
- Detailed assessment and re-assessment for BAL Construction as described in this document can be undertaken at construction stage/building approval stages by an accredited Level 1 BAL Assessor with approval from the City of Rockingham.

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• The BAL Contour Plan should be reviewed/updated at any staged construction, changes to the SP and/or at completion of the development construction.

The development upon completion will have areas of internal **Low** bushfire hazard Levels and BAL – Low applied in developed areas of the subject site. The internal designated POS areas are proposed to be low fuel and landscaped areas, which is a Low BHL.

External to the site to the south there will remain an **Extreme and Moderate BHL's** if the adjacent property does not develop prior to the release of lots. Legal agreements are being generated to ensure that the developer clears and maintains to 100m from the adjacent road reserves developed by the client. The BAL Contour Plan generated in Appendix E is a "worst case scenario" whereby if all other lots are not developed adjacent to the subject site. The adjacent development to the south is dependent on the subject site being developed for infrastructure and therefore is anticipated to be built within 12 months of the subject site approvals.

To meet the Acceptable Solution the developer is proposing to clear and develop all external roads to ensure there is a separation for adjacent dwellings. Refer to Section 7.5.5 for further detail on staging. The client informed Bio Diverse Solutions that *"The clearing and earthworks will be completed in the first stage for the full development (stage 1 & 2) due to cut and fill requirements."* (Pers comms L. Spencer, 2016)

Upon completion an updated BAL contour would be produced which (as noted in appendix E) will have BAL's associated only with the bushfire fuels from the CoR Reserve to the north of Kerosene Lane. A BAL Contour Plan has been prepared Appendix E which demonstrates the BAL Contours upon completed construction of the subdivision. This clearly demonstrates the dwellings will be subject to BAL 29-12.5 and no higher allocation of these BAL's will apply to completed subdivision.

Information for the lot owner on building to BAL is provided in Section 6.5.6 of this report.

The SP (and completed subdivision) is deemed to meet A1.1.

7.1.1. Recommendations arising from assessment to this element

The recommendations from assessment of the SP to Element 1: Location:

- SP development is deemed compliant to A1.1 due to :
 - No of the higher BAL allocation than BAL 29 will apply to buildings upon completion of construction development; and
 - Legal agreements are made to ensure the adjacent developers clear and maintain low fuel areas at all times 100m from the subject site boundary.



7.2. Element 2: Siting and design of development

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

Assessment to the Acceptable Solutions – To achieve compliance with this Element using an Acceptable Solution, either or both acceptable solutions (A2.1 and A2.2) must be met that it satisfies Element 2.

The Acceptable Solutions which will be applied to this subdivision include:

- A2.1: Asset Protection Zone (APZ): Every building is surrounded by a 20m APZ (see Section 5.2.2).
- A2.2 Hazard Separation: not applied to this development.

The subdivision will be assessed to the Acceptable Solutions for Element 2 as demonstrated in the following sections.

7.2.1. Asset Protection Zone (Acceptable Solution A2.1)

Acceptable Solutions applied

The aim of the Asset Protection Zone (APZ) is a low fuel area immediately surrounding a habitable building, and is designed to minimise the likelihood of flame contact with buildings WAPC, 2015a). APZ will minimise the risk of the building igniting, (thus protecting the occupants), and with the reduced fuel quantities, allow safer and more effective conditions for fire-fighters to contain wildfires. Roads, pathways, lawns, and other low hazard items should be placed within this zone to improve the effectiveness of the zone. The APZ are required in addition to Hazard Separation (see Section 5.2.2).

Every building must be surrounded by a 20 metre wide APZ, this is deemed by WAPC (2015) as the minimum width to be constructed around all buildings as a "defendable zone". Activity within the APZ (as per WAPC, 2015) for each individual dwelling must meet the following requirements:

- a) Width: 20 metres measured from any external wall of the building or building envelope;
- b) Location: within the boundaries of the lot on which the building is situated;
- c) Fine fuel load: reduced to and maintained at 2 tonnes per hectare;
- d) Trees (crowns) are a minimum of 10 metres apart;
- e) Trees are low pruned at least to a height of 2 metres;
- f) No tall shrub or tree is located within 2 metres of a building;
- g) No tree crowns overhang the building;
- h) Fences and sheds within the APZ are constructed using non-combustible materials (e.g. colour bond iron, brick, limestone, metal post and wire); and
- i) Sheds within the APZ should not contain flammable materials.

An example of APZ from the "Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) is shown in Figure 8.

Figure 8 – Asset Protection Zone and Hazard Separation Zone WAPC, 2015a)



Most of the buildings utilise the Low threat and non-vegetated areas (as classified by AS3959-2009) for a 20m APZ (i.e. external roads, maintained POS or adjacent low fuel buildings) and this



can be contained within the parent lot. Lots adjacent to external Moderate BHLs in the south, west and east of the subject site require a will have a 100m low fuel area to be implemented by the adjacent developers and maintained at all times. As the subdivision is staged, the developer (and all title owners) are to maintain a minimum 20m APZ around any staged development. Refer to Section 6.5.6 for further detail on staging.

A 20m APZ is shown on the Bushfire Management Plan Mapping Appendix F.

The subdivision layout is deemed to be compliant with A2.1 with the adjacent Lots developed at the same time and with a low fuel area implemented to 100m as per the legal agreements.

Assumptions made in BAL Contour Mapping:

- The subject site will be cleared in entirety as shown on the SP.
- Low fuel areas of POS will be maintained as per AS3959-2009 clauses 2.2.3.2 (f) and has been applied to internal POS areas (See Section 6.5.2. for landscaping requirements).
- Reserve 22429 to the north will remain in current vegetative status.
- Adjacent developments will be maintained in a low fuel state as per AS3959-2009 Clauses 2.2.3.2 (f) at all times to 100m.

The subdivision will comply to Acceptable Solution A2.2 by applying either a 100m Hazard Separation Zone at the interface of the building and the bushfire hazard or a setback associated with BAL construction and AS3959-2009 as outlined in the BAL Contour Map(s) in Appendix E. No higher BAL allocation than BAL 29 is applied to the proposed buildings. In the south east and south west corners (if adjacent developer does not construct) a BAL 40 does overlay lots. If this occurs then these lots will not be able to be released and land banked by the current owner until a setback associated with BAL 29 can be achieved. As mentioned previously, it is understood that the adjacent developer to the south is dependent on construction of this project and development is anticipated within the timeframes of this proposal. Refer to the legal agreements prepared by Terranovis.

Staged construction is to be applied the developer will be responsible during staged construction to maintain 100m setback (internal) from any bushfire hazards to dwellings at all times or building to BAL/AS3959-2009 will apply to the buildings. Refer to Section 7.5.5 for more detail on Staging.

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

7.2.2. Recommendations arising from assessment to A2

The recommendations from assessment of the SP to Element 2: Siting and design:

- The SP is deemed to be compliant with Element 2 by:
 - The application of a 20m APZ located within the parent lot; and
 - APZ setbacks associated with building to BAL/AS3959-2009 as it applies to the lots;
- 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.
- It is recommended that the developer clear all the area within the SP during development and prior to sale to ensure the APZ and setbacks are demonstrated to the purchaser at time of sale. The APZ areas are to be as per the standards in Section 6.2.1 and these areas are regularly maintained by the developer until all land is relinquished to the new lot owner(s).
- Maintain setbacks from dwellings and bushfire hazards at all times if the construction is staged construction and grasses maintained to <50mm at all times;
- The vegetation clearing required for POS area, street verges, APZ and HSZ areas does allow for the retention of significant trees, these should be clearly marked for the developer



prior to clearing operations on the site and shall be as per the standards of the APZ Section 6.2.1; and

• 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.

7.3. Element 3: Vehicle Access - Performance Criteria

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

Acceptable Solutions applied

The internal layout of the Subdivision's public roads and private access allows vehicles and other emergency vehicles to move through the subdivision at all times, meeting the Acceptable Solutions. Vehicle access technical standards as outlined in Table 4 are the minimum requirements from Guidelines for Planning in Bushfire Prone Areas WAPC, 2015a). Refer to Table 4 and Bushfire Management Plan Appendix F.

Technical requirements	Public Road	Cul-de- sacs	Battle Axes & Private Driveways	Emergency Access Ways (EAW)
Minimum trafficable surface (m)	6	6	4	6
Horizontal clearance (m)	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5
Maximum grades	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity(t)	15	15	15	15
Maximum crossfall	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

Table 4 – Vehicular Access Technical Standards

(WAPC, 2015a)

Assessment of the subdivision to the Acceptable Solutions is outlined in the following sections.

7.3.1. Two access routes (A3.1)

The subdivision meets the Acceptable Solution, with the design allowing for two way traffic and safe egress from the subdivision via newly established road networks linking from the north to the east. Access to and from the subdivision (entry/exit points) will be from Kerosene Lane (north) via two entry points, and a future eastern access, which is proposed to be developed prior to the construction of this subdivision (*pers comms* L. Spencer Terranovis 2015). Please refer to the current SGP Appendix B and Bushfire Management Plan Appendix G. The adjacent proposed SGP's are shown in Appendix B which indicates the future access. Emergency access egress will be via the adjacent developer to the east and possibly future emergency access if required to the south west (this is yet to be confirmed by the adjacent developer).

Stage 1 construction (refer to Staging Plan Appendix B and overlaid on BAL Contour Appendix E and BMP report Appendix F) will allow for access to the north and the east to two different destinations. Legal agreements have been drawn up with the adjacent develop to the east to ensure the secondary access to the east is access is implemented.

The SP is deemed to meet the Acceptable Solution A3.1.

7.3.2. Public roads (A3.2)

All internal public roads shall be constructed with a minimum of 16-20m road reserves meeting the minimum construction requirements. The Vehicular Access Standards (Refer to Table 4 – Column 1) and relevant technical information shall be detailed in Civil Engineering Designs at subdivision stage. The SP is deemed compliant to Acceptable Solution A3.2.

7.3.3. Cul de Sacs (A3.3)

No cul-de-sacs are not proposed for this development, temporary cul-de-sacs may exist during staged development however is not anticipated to remain in perpetuity. The SP is deemed to comply to Acceptable Solution A3.3. T

7.3.4. Battle Axes (A3.4)

Battle Axes are not proposed for this development and therefore not assessed to Acceptable Solution A3.4.

7.3.5. Private Driveways (A3.5)

Private driveways will conform to the minimum technical standards as outlined in Table 4 – Column 4. The SP is deemed compliant to Acceptable Solution A3.5.

7.3.6. Emergency Access Ways (A3.6)

Temporary Emergency Access Ways (EAW) will apply to this development and are shown in the Bushfire Management Plan Appendix F. Once the adjacent developments are completed any emergency access will be along the established internal roads, with a separate dedicated Emergency Access Way not required. The SP is deemed compliant to this Acceptable Solution A3.6.

7.3.7. Fire Service Access Routes (A3.7)

Fire Service Access (FSA) Routes will be not be applied at this development. Any emergency access will be along the established internal roads, with a separate dedicated FSA not required. Subdivision upon construction is deemed compliant to this Acceptable Solution A3.7.

7.3.8. Firebreaks (A3.8)

Firebreaks are in existence on the subject site and maintained regularly by the current owners. These will be maintained as per the CoR Fire break notice (updated annually) until developed. The urban environment proposed will not require firebreaks in the future as per the current notice. The SP is deemed compliant to this Acceptable Solution 3.8.

Please refer to the CoR "Annual Fire Control Notice", this is updated annually and the current versions should be obtained from the City of Rockingham website:

http://www.rockingham.wa.gov.au

7.3.9. Recommendations arising from assessment to this element

The recommendations from assessment of the SP 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 4;
- Engineering construction details on the road network particularly to meet maximum allowable grades is provided to the CoR prior to construction of each development stages.
- Fire breaks as per the requirements in the CoR Firebreak Notice maintained by the owner until the land is developed into urban land (annually updated).



7.4. Element 4 Water – Performance Criteria

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 Applied

7.4.1. Reticulated areas (A4.1)

The development will be provided with reticulated scheme water in accordance with the specifications of the relevant water supply authority (Water Corporation WA (WCWA)) and DFES requirements. This will be detailed in the detailed engineering drawings and be subject to approval from WCWA and DFES at subdivision condition stages, meeting the Acceptable Solution. Fire hydrant (street) outlets are required, these must be installed to WCWA standards installed in accordance with the *Water Corporation's No 63 Water Reticulation Standard* and are to be identified by standard pole and/or road markings and installed by the Developer.

Subdivision upon construction is deemed compliant to this Acceptable Solution.

7.4.2. Non-reticulated areas (A4.2)

The subdivision will be connected to reticulated water, therefore water tanks will not be required, assessment to A4.2 not required.

7.4.3. Individual lots within non-reticulated areas

The subdivision will be connected to reticulated water, therefore water tanks will not be required and assessment to A4.3 not required.

7.4.4. Recommendations arising from assessment to this element

The recommendations from assessment of the SP to Element 4: Water:

- Is deemed compliant with Element 4 through the provision of reticulated water to the development which will be detailed in the engineering drawings at development stages; and
- Fire hydrant (street) outlets are required, these must be installed to WCWA standards installed in accordance with the *Water Corporation's No 63 Water Reticulation Standard* and are to be identified by standard pole and/or road markings and installed by the Developer.



7.5. Other Fire Mitigation measures

7.5.1. Reduction in Construction through Shielding

"Shielding" as defined by AS3959-2009 is the reduction in construction requirements (for an individual building) for the next lower BAL than determined for the site (individual dwelling) and may be applied to an elevation of a building where the elevation is not exposed to the source of the bushfire attack (AS3959-2009). Shielding applies where the an elevation of a building is not deemed to be exposed to the source of the bushfire attack due to other parts of the individual building obstructing the source of the bushfire attack.

Give the bushfire source is from the east, west and south, buildings in the northern area of the SP could possibly apply shielding whereby a lower BAL is applied to the northern elevations of a building. This would need to be assessed at building approval stages and be undertaken by an Accredited Level 1 BAL Assessor.

7.5.2. Landscaping/Streetscaping Areas

Landscaping and Streetscaping areas subject to similar standards that apply to the APZ and the following minimum standards shall apply:

- Trees (crowns) a minimum of 10m apart (no continuous crowns);
- Trees should have no dead material within the plant's crown or on the bole;
- Fuel reduced to <2t/ha; and
- Shrubs should be no higher than 0.5 m.

A concept POS landscaping plan is presently being developed to retain significant trees (>500mm diameter) and example of the POS landscaping is shown below in Photograph 22 and meets the above requirements and thus does not increase the internal bushfire hazard.



Photograph 22: View of POS area in Baldivis with significant trees retained. This concept will be applied in the SGP at the subject site.

7.5.3. Evaporative air conditioners

Evaporative air conditioning units can catch fire as a result of embers from bushfire getting into the unit. These embers can then spread quickly through the home causing destruction. It can be difficult for fire-fighters to put out a fire in the roof spaces of homes. Information on Evaporative air conditioners is supplied in Appendix G of this document.

It is also recommended that home owners:

- 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 as per DFES guidance note provided Appendix G.

7.5.4. 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"

Residents will be encouraged to build Colourbond or non-combustible fences in bushfire prone areas through dissemination of the CRC information "Fire Note" (Issue 70, Bushfire CRC, 2010) by the developer. It is also noted that non-combustible fences are recommended by WAPC refer to Section 6.2.1 of this document (APZ standards: Fences and sheds within the APZ are constructed using non-combustible materials (e.g. colour bond iron, brick, limestone, metal post and wire).

7.5.5. Staging

The subdivision is proposed to be staged (as shown on the BAL Contour Plan and the BMP Plan, Appendix E and F respectively), staged development will incorporate the following:

- Incorporation of "Low fuel zone" minimum of a 100m adjacent to any lots/proposed dwellings maintained as per AS3959-2009 Clause 2.2.3.2 (f). To be implemented by the developer and maintained at all times adjacent to the staged construction;
- Implementation of 100m "Low fuel zone" in adjacent subdivisions to be cleared and maintained but the adjacent developer as per the legal agreements and as per the standards in AS3959-2009 Clause 2.2.3.2 (f);
- Maintenance of fire protection measures in public areas (gates, access, landscaped areas etc.) until the developer has relinquished construction/maintenance responsibility of public use areas to the CoR;
- Provide the CoR prior to each subdivision stage and/or release of lots with a detailed plan showing the BAL Contour Plan for lots requiring increased construction standard for dwellings in accordance with AS3959-2009 Construction of Buildings in Bushfire Prone Areas (current and endorsed standards);
- Implementation of temporary EAW's to the east and (possibly) the south by adjacent developers giving linking emergency access in alternative directions at all times;
- Maintenance of fire breaks as required by the CoR until the lots are relinquished to new lot owners;
- Depending on the timing of the future stages, a review of the endorsed Bushfire Management Plan is recommended every 3-5 years and will be the responsibility of the developer until the issue of final approval/clearances from CoR/WAPC; and
- Slashing of grasslands should occur to maintain low fuel areas (i.e. APZ) around housing and dwellings until the land is relinquished to new owners and/or CoR.

7.5.6. Information on Building to BAL/AS3959-2009

Bushfire Attack Level (BAL) is the process in AS39598-2009 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 9 over the page.



Figure 9 - - BAL Construction levels in context

(WAPC, 2015a)

Building design and construction to AS39590-2009 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. The construction standards outlined in AS 3959-2009 provide reference to specific items of building and it is recommended that the future lot owner discuss these in detail with their builder or architect. Table 2 outlines some of the construction standards are to be approved by the CoR prior to construction. Building to AS3959-2009 applies to buildings as defined in the Building Code of Australia (BCS).

Tabl	e z – A33959-2009 Constitut	Juon Requirement (cxample)
		A COOFO 0000	

AS2050 2000 Construction Dequirement (Example)

Construction requirement AS3959-2009			
Flooring systems			
Supporting posts, columns, stumps, piers and poles			
External Walls			
Windows			
External Doors			
Vents and weep holes			
Roof			
Eaves			
Fascia's			
Gutters and downpipes			
Veranda and decks			
Service Pipes (water and gas)			

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)

8. City of Rockingham Bushfire Protection Plan

The City of Rockingham has the assistance of the Baldivis Volunteer Fire Brigade which is made up of emergency trained personnel and volunteers. The CoR has volunteer bush fire fighting units and incident support teams within the brigade system. Training and induction courses are held regularly and land owners are encouraged to attend these. For more information refer to the City of Rockingham and DFES website:

http://www.dfes.wa.gov.au

http://www.rockingham.wa.gov.au/

8.1. Fire Fighting Facilities

The subject area is in the City of Rockingham in the locality of Baldivis. The Baldivis Volunteer Fire Brigade attends bushfire emergencies within the region. The Volunteer BFB's services maintain 3.4 fire appliance vehicles/trucks and fast attack units, this is also backed up with a modern communication system for call outs as well as communication on the fire ground. These are typical of bush fire brigades for fire fighting services within Western Australia.

The Career Fire & Rescue Service have the following:

- Fully equipped fire station;
- Volunteer trained members;
- A communications and call out system;
- Protective clothing issue to volunteers; and
- DFES approved fire appliances.

Response times can vary depending on commitments of fire and rescue services, volunteers, fire events current at time and priority of the fire services in the south west of Western Australia during summer periods. DFES recommends that homeowners take care to prepare their individual dwellings for fire season and take precautions against fire as per the <u>'Bushfire Preparedness –</u> <u>Prepare. Act. Survive.'</u>

It is generally acknowledged that during large wildfire events, local resources may not be able to respond to every lot due to strategic deployments of services, priorities within the area or state and/or present commitments of volunteers and resources. It is therefore recommended that land owners implement strategies as recommended by DFES to protect life and property during the fire season.

8.2. Fire Suppression Actions CoR

The following protocols/actions for the subject site are recommended:

- Local Government (City of Rockingham) through their Bush Fire Brigade Organisation is the Controlling Authority for fire suppression operations on the area.
- Bushfire in or threatening the area will be contained to the smallest possible area, either by direct attack or by back burning from established buffers or fire lines taking into consideration the likely threats to life and property as well as the impact of suppression activity on the water quality and conservation objectives of the reserve.
- Irrespective of fire weather forecasts, whenever reserve vegetation will burn and whenever burns on adjoining lands are imminent, a high level of vigilance and preparedness will be maintained.

8.3. Homeowner Protection

It is the responsibility of homeowners to protect their property from fire. DFES have readily available information online which can assist homeowners in their preparedness during fire season (October to May). The DFES website "**Bushfire Preparedness – Prepare. Act. Survive.**" should be accessed by all owners in bushfire prone areas. A hard copy of the A4 book "Prepare. Act.

Survive" can be found at local City of Rockingham Offices or DFES offices, or downloaded off the above web address:

http://www.dfes.wa.gov.au

8.4. Bushfire Plan

Residents should prepare their own individual fire plans, as they need to make a commitment to develop a bushfire survival plan detailing preparations and actions to take if a bushfire threatens.

"Before summer starts you need to decide what you will do if a bushfire threatens. If you live or work in a bushland area you need to **prepare** your home, family or business and have a plan so you can **act** to make sure you **survive**." (DFES 2010)

When developing a bushfire survival plan, the following should be considered:

- If you plan to leave for a safer place where will you go and how will you get there? Your safer place could be with friends and family, and may not be far away. Know where you will go and never 'wait and see'. Relocating at the last minute can be deadly
- Does your household include elderly relatives, young children, and people with disabilities or illness? When, where and how will they be relocated? Who will care for them?
- What will you do with your pets and livestock?
- Can your home be defended? Is it in a location that makes it difficult or dangerous to actively defend? (refer to DFES's Homeowners Bushfire Survival Manual PDF)
- Will your home provide shelter if you have to or decide to stay?
- Are you capable of defending your home without the support of fire fighters?
- Do you have the skills, knowledge and capacity to check for and put out spot fires for up to ten hours after the fire front has passed?
- Do you have the right equipment and resources to actively defend? (e.g. sufficient independent water supply of at least 20,000 litres and a petrol, diesel or generator powered pump capable of pumping 400 litres per minute)
- Will you cope with the noise and stress of a bushfire if you decide to actively defend? Being in a bushfire may be the most traumatic experience of your life.

(from DFES website, 2013)

By compiling information as outlined above, the individual lot owner can be prepared for their response in a bushfire emergency. Home owners should not rely on emergency personnel to attend their home and thus it is stressed to **prepare an individual bushfire emergency plan** regarding their intentions and property. This Bushfire Management Plan is **not** an individual bushfire emergency plan.

Information is also available on the City of Rockingham's website and the ABC Radio website to guide homeowners in the event of a fire emergency, such information includes:

Planning for an Emergency Bushfire:

- Survival Kit
- Fire Emergency Services
- Before a Bushfire
- During a Bushfire
- After a Bushfire

Refer to the following links for more information on how to prepare a bushfire plan:

http://www.rockingham.wa.gov.au/Services/Emergency-Services/Fire-Control#A and http://www.abc.net.au/news/emergency/?ref=front-page-slider-v2--emergencies

9. Summary

9.1. Overall Fire Threat

Terranovis Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a bushfire hazard assessment and prepare a Bushfire Management Plan to guide all future bushfire management for the proposed development of Lots 5, 6, 7 and 8 Kerosene Lane Baldivis Structure Plan and associated Subdivision Guide Plan. The proposed structure plan contemplates the creation of future lots in the density range of R30 and a public open space area.

To the west, south and east there is proposed urban development which will reduce the bushfire hazards to this development. The development to the east proposes to construct a road reserve to give access to the east, which assists the subject site achieving two opposing access/egress points. Legal agreements are presently being formed with adjacent neighbours to ensure there is access, sewer and maintenance of any bushfire hazards upon their land. Copies shall be forward to the CoR upon completion.

The subject site is has internal areas of Forest Type A and Scrub Type D which is proposed to be cleared for the subdivision. The adjacent land within 100m of the site is Forest Type A, Woodland (Type B), Scrub type D and cleared paddock areas (Type G). Bushfire Prone Vegetation within 100m of the site is located within Reserve 22429 and private property north/north east of Kerosene Lane. Urban growth the west, south and east are classified as future "*Low Threat Vegetation and Non Vegetated Areas*" (AS3959-2009). The majority of the site will be cleared for the subdivision with internal POS areas proposed to be landscaped public reserves (classified as low fuel areas).

The structure plan area has been rated as having an **Extreme-Moderate** bushfire hazard as defined by Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) and State Planning Policy 3.7 (WAPC, 2015b) due to adjacent Woodland, Forest and Scrub bushfire hazards. There are low effective slopes across the site and the majority of the long term bushfire risk (Woodland Type B vegetation (extreme)) is located upslope of the proposed dwellings. The external Scrub Type D vegetation (Moderate) is located downslope of the proposed subdivision.

This BMP report provides details of the fire management strategies proposed to be implemented across the site as it is subdivided and 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 Owner, Developer and CoR.

9.2. Future Lot Owners Responsibility

It is recommended the Future Property Owners shall be responsible for the following:

- To take measures to protect their own assets on their property;
- Implement this document, Bushfire Management Plan of Lots 5, 6, 7 and 8 Kerosene Lane Baldivis as it applies to their individual property;
- Ensure that APZ's are maintained to a minimum of 20 metres around all buildings as per DFES and Planning for Bushfire Protection Guidelines;
- Where a lot has been identified as requiring an increased construction standard (i.e. BAL/AS3959-2009) ensure that the design and construction of any building is compliant with the requirements of AS3959-2009 (current and endorsed standards);
- Detailed BAL may be required by the individual lot owner with the BAL ratings supplied in this report as a guide to meet Acceptable Solutions. Detailed BAL should be undertaken by an accredited Level 1 BAL Assessor;
- Maintaining the property to minimise bushfire fuels and mitigate the risk of fire in accordance with CoR annual Fire Control Order;
- Ensuring 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;
- Each lot owner is aware of:
 - o The endorsed and approved Bushfire Management Plan,



- o A hard copy of the A4 book "Prepare. Act. Survive",
- Fire Control Information supplied by the City of Rockingham (annual updated advice brochure); and
- It is the responsibility of the individual property owner to maintain in good order and condition APZ and driveway standards. Future modifications other than requirements as set out in this Bushfire Management Plan can only be done with written agreement from the CoR.

9.3. Developers Responsibility

Prior to development being given final approval by the City of Rockingham, 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 fire fighting facilities and fire management on individual lots that pass from their ownership.

It is recommended that the Property Developer shall be responsible for the following:

- Implement this document, Bushfire Management Plan of Lots 5, 6, 7 and 8 Kerosene Lane Baldivis as it applies to their development;
- Comply with standards as outlined by the CoR and WAPC conditions of subdivision;
- Ensure that property owners are aware of the endorsed and approved Bushfire Management Plan;
- Comply with minimum subdivision construction standards as outlined by this Bushfire Management Plan;
- Maintain any APZ and/or HS as Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a) (as outlined in this plan) until the land is relinquished to new lot owners;
- Maintain fire protection measures in public areas (access, landscaped areas etc.) until the Developer has relinquished construction/maintenance responsibility of public use areas to the City of Rockingham;
- Implementing fire protection measures during staged development as per Section 7.5.5 of this Bushfire Management Plan;
- Maintaining the subject site to minimise bushfire fuels and mitigate the risk of bushfire in accordance with the CoR Fire Control Notice (yearly advice brochure updated annually);
- Implement a notification on title pursuant to section 70A of Land Act 1893 of lots affected by an increase in construction standards consistent with BAL rating/AS3959-2009 alerting owners of the lot and successors in title of the Bushfire Management Plan;
- In the event that the adjacent subdivisions to the east, west and south are not cleared or not constructed at the time of the release of any of the lots, a building setback will be required from all grassland, woodland and forest vegetation to assist in achieving a 20m APZ and BAL/AS3959-2009 may apply;
- Modify this Bushfire Management Plan to accord with any changes to the applicable structure plan(s);
- Construct access to meet Performance Criteria, with minimum standards outlined in Table 4;
- Provide reticulated to the subdivision water as per WCWA standards;
- Provide the City of Rockingham prior to each subdivision stage an updated BAL Contour Plan outlining lots requiring increased construction standard for dwellings in accordance with AS3959-2009 Construction of Buildings in Bushfire Prone Areas (current and endorsed standards);
- Provide each prospective owner with:
 - o The endorsed and approved Bushfire Management Plan,
 - A BAL Contour Plan outlining BAL/AS3959-2009 applicable to individual lots.
 - o A hard copy of the A4 book "Prepare. Act. Survive"; and



• Fire Control Information supplied by the City of Rockingham (yearly advice brochure updated annually).

9.4. City of Rockingham Responsibility

At approval and endorsement of this Fire Management Plan, the City of Rockingham has statutory control and responsibility to ensure that aspects of the Plan and community fire safety are maintained.

It is recommended the City of Rockingham be responsible for the following:

- Provide advice on standards and methods to achieve community fire protection to owners/occupiers of land through issue and enforcement of the current CoR Fire Control Notice (yearly advice brochure updated annually);
- Ensuring compliance with this Bushfire Management Plan with regard to any related conditions of subdivision approval;
- Developing and maintaining District Fire Fighting Facilities and related infrastructure;
- Maintaining roads consistent with the standards this Bushfire Management Plan an in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015a); and
- Maintaining the public open space (after the handover from the developer) in a manner that will minimise bushfire fuels and mitigate the risk of fire.



10. Conclusions

Terranovis Pty Ltd commissioned Bio Diverse Solutions (Bushfire Consultants) to undertake a fire hazard assessment and prepare a Bushfire Management Plan to guide all future fire management as part the planning process for a proposed development (Structure Plan) and subsequent subdivision of Lots 5, 6, 7 and 8 Kerosene Lane, Baldivis.

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 (WAPC, 2015a) and State Planning Policy 3.7 (WAPC, 2015b). These policies, plans and guidelines have 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.

The Structure Plan is required to meet the "Performance Principles" and/or "Acceptable Solutions" of each Element of the bushfire mitigation measures (WAPC, 2015a). The site has been classified as a having a "Low" future internal bushfire hazard in the development/building areas, with adjacent "**Extreme**" and "**Moderate**" bushfire hazards (as per WAPC Guidelines, Table 1) due to the presence of Forest Type A, Woodland Type B and Scrub Type D. Effective Slopes under vegetation are variable across the site but generally are upslope and flat land or Downslope >0 to 5 degrees.

The bushfire protection criteria (Appendix 4, WAPC, 2015a) 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.

The proposal was assessed against the bushfire protection criteria Acceptable Solutions for Elements A1, A2, A3 and A4. 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, 2015a).

There are specific key solutions to meet the above through:

- The layout of the subdivision and the facilities proposed have been designed to reduce the fire threat to persons and property within the development (i.e. Internal road design, access in alternative directions);
- Accessible "Fire Service Access" and "Emergency Access Ways" along established road reserves in opposing directions through the subdivision for access and egress in fire events;
- 20m APZ can be achieved through the increased construction of Kerosene Lane, POS areas and internal roads.
- Development is proposed to the west, east and south of the subject site reducing the bushfire hazards in the future and legal agreements are established to address any temporary bushfire protection issues.
- Legal agreements are presently being formed with adjacent neighbours to ensure there is access and maintenance of any bushfire hazards upon their land. Copies shall be forward to the CoR upon completion.
- Building to BAL/AS3959-2009 where 100m HS cannot be achieved to Bushfire Prone Vegetation to the north/north east in the SGP; and
- Reticulated scheme water to Water Corporation WA standards.

In summary it is recommended to the Developers that in building the proposed subdivision at Lots 5, 6, 7 and 8 Kerosene Lane Baldivis the Developer:

- Implements the fire protection standards as outlined in this document and by Planning for Bushfire Protection Edition 2 (WAPC 2010);
- Adheres to WAPC and CoR subdivision conditions;
- If any changes to structure plan designs occur, that this Bushfire Management Plan is updated to reflect these changes, with approval from the CoR and DFES; and
- Implement this document, Bushfire Management Plan Lots 5, 6, 7 and 8 Kerosene Lane Baldivis standards of construction and recommendations.

11. References

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Appendices

Appendix A – Location Mapping Appendix B –Structure Plan(s) Appendix C - Vegetation Mapping

Appendix D – Bushfire Hazard Mapping

Appendix E- BAL Rating Plan

Appendix F – Bushfire Management Plan



Appendix A

Location Mapping

& OBRM Bushfire Prone Area Mapping







OBRM BUSHFIRE PRONE MAPPING 7/12/15 & 21/5/2016



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



Appendix B

Subject Site Structure Plan

Adjacent properties structure plans











Appendix C

Vegetation Mapping





Appendix D

Bushfire Hazard Mapping





Appendix E

BAL Rating Plan(s)







Appendix F

Bushfire Management Plan



