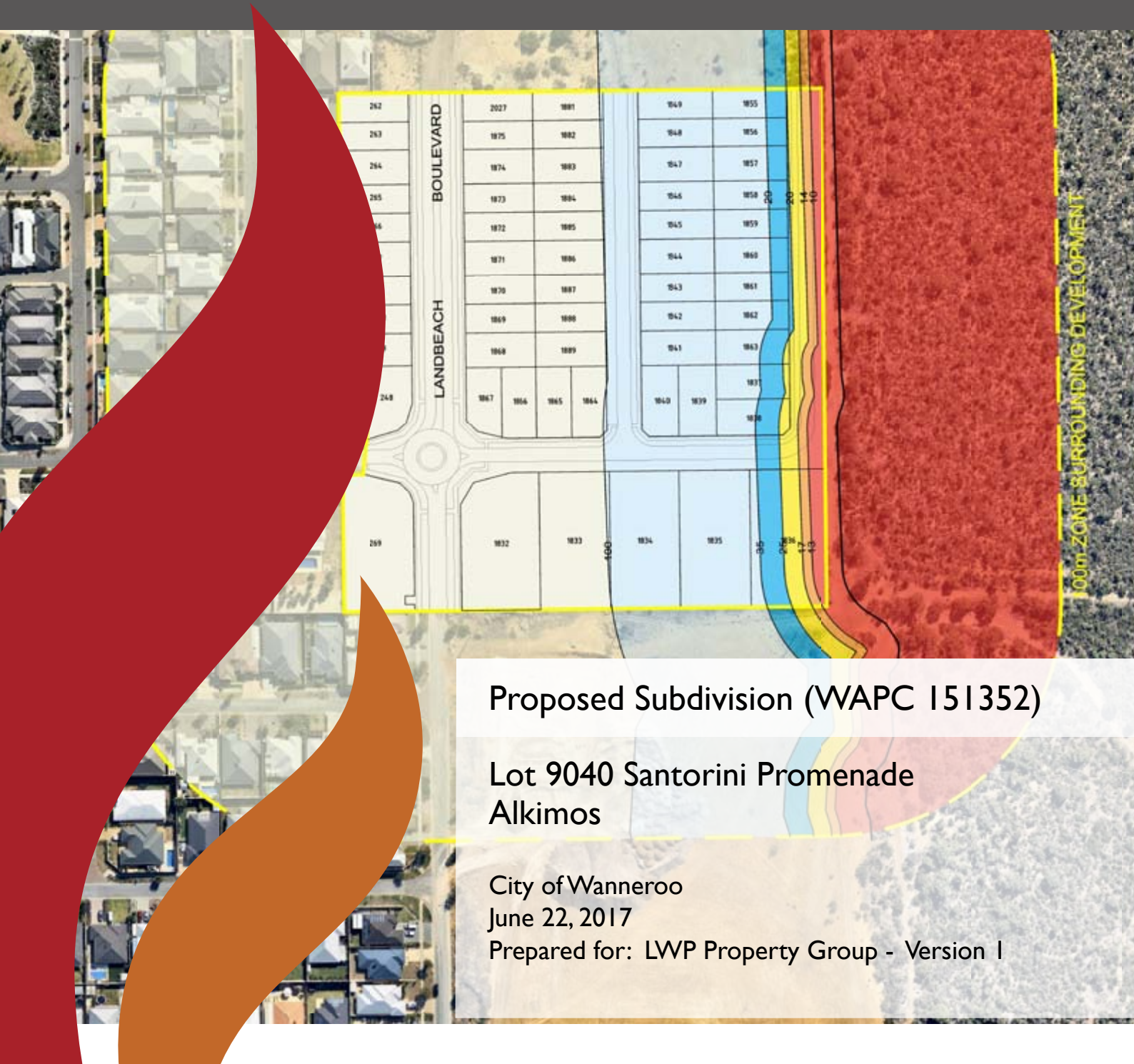


Bushfire Management Plan



Proposed Subdivision (WAPC 151352)

Lot 9040 Santorini Promenade
Alkimos

City of Wanneroo
June 22, 2017

Prepared for: LWP Property Group - Version 1

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Address : Lots 9040 Santorini Promenade, Alkimos
Site Owner: Northern Corridor Developments Ltd

Document Control

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V1	23/06/2017	Client Review	K Strahan	R Carboon	Electronic

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EXECUTIVE SUMMARY

This Bushfire Management Plan (BMP) has been prepared to support a subdivision application (WAPC 151352) that will create 60 residential lots.

The study area is a portion of the parent Lot 9040 Santorini Promenade, Alkimos, it is Stage 26 of the broader development area and is herein referred to as “the site”. The site has been completely cleared and contains mineral earth with some revegetation of grassland with scattered scrub. Residential development occurs to the immediate west, north-west and south west. Cleared undeveloped areas are to the immediate north and south of the site. Woodland vegetation lies to the east of the site.

The study area location is shown in **Appendix A**. The site is located in Alkimos in the City of Wanneroo 44 km to the north of the Perth CBD

The subdivision proposal (**Appendix B**) illustrates the proposed subdivision of the site, including the creation of 60 lots.

All areas on the site and within 100 metres (m) of the site boundary have been assessed for vegetation classification (**Appendix C**) and bushfire hazard rating levels (**Appendix E**).

As part of design a perimeter Asset Protection Zone (APZ) will be established. The APZ requirements have also been assessed and are shown in **Appendix F**.

Construction within 100 m of identified classified vegetation will be meet the requirements of *AS3959 Construction of Buildings in Bushfire Prone Areas* standards. The areas impacted are outlined in the BAL contour plans (**Appendix G**)

It is expected that the implementation of this BMP will reduce the threat to residents, guests and fire fighters in the area addressed by this BMP. The proposal complies with the *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas (SPP 3.7)* and the *Guidelines for Planning in Bushfire Prone Areas* (WAPC 2017 V1.1).

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1 INTRODUCTION

This Bushfire Management Plan (BMP) has been prepared to support the subdivision application for Lot 9040 Santorini Promenade, Alkimos in the City of Wanneroo, has an area of 10.5401 hectares and is located approximately 44 km north of Perth Central Business District (CBD).

(Appendix A). The site is currently undeveloped and contains mineral earth and grassland. Residential development is to the west, north-west and south west. Cleared undeveloped areas are to the immediate north and south of the site. Woodland vegetation lies to the east of the site. The Subdivision Proposal is shown in **Appendix B**.

The site has been previously cleared of all vegetation and some revegetation of grassy weeds and shrubs has occurred. The site is bounded by residential areas to the west, future development areas to the north and south and a temporary reserve to the east managed by the Planning Commission for a future freeway extension.

The bushfire hazard surrounding the site is defined by a banksia woodland in the reserve east of the site. This is the only area that will pose a bushfire hazard for residential development within the site.

1.1.1 The Subdivision Proposal

The proposed subdivision provides for the development of 60 residential lots within the site (Appendix B). The proposal is consistent with the broader planning context. The site, is serviced by scheme water and has good public road access.

The area to the north of the proposed subdivision is under LWP management, (future Release Stage 27) and the development land to the south is managed by Satterley developers.



Figure 1: Broader subdivision plan showing Stage 26

1.2 Purpose of Bushfire Management Plan

The purpose of this Bushfire Management Plan (BMP) is to support a subdivision proposal for the site by providing guidance as to how potential bushfire threat at the site can be mitigated to acceptable levels using land use planning and building controls. The objective of this BMP is to address bushfire management issues within the proposed development and address the following conditions.

As part of the subdivision approval (WAPC 151352), condition 7 states:

A fire management plan being prepared, approved and relevant provisions implemented during subdivisional works, in accordance with the WAPC's Guideline Planning for Bushfire Protection Edition 2, May 2010 (in particular, Appendix 3) to the specifications of the local government and/or Department of Fire and Emergency Services (Local Government).

As part of the subdivision approval (WAPC 151352), condition 8 states:

"A notification, pursuant to Section 70A of the Transfer of Land Act 1893 is to be placed on the certificate(s) of title of the proposed lot(s). Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows:

"The lot(s) is/are subject to a fire management plan." (Local Government)"

This BMP addresses these two conditions by providing responses to the performance criteria in the *Guidelines for Planning in Bushfire Prone Areas V1.1* (WAPC et.al. 2017).

If there is a bushfire within or near the site, implementing this BMP will reduce the threat to residents, property and emergency response personnel.

Achievable and measurable goals of this plan include ensuring:

- Development is located in an area where the bushfire hazard does not present an unreasonable level of risk to life and property.
- Vehicular access to the development is safe if a bushfire occurs.
- Water is available to the development, so that life and property can be protected from bushfire.
- The development is sited to minimise the effects of a bushfire.
- The development design will minimise the effects of a bushfire.

This document sets out the roles and responsibilities of the developer, future residents, the City of Wanneroo and the Water Corporation of WA. It is important that the measures and procedures outlined in this BMP are adopted across the various stages of the land use planning and dwelling construction approvals processes.

This BMP includes:

- A description of the site, the surrounding area, fire climate and bushfire history.
- A bushfire hazard assessment.
- Means of addressing vehicular access.
- Siting of buildings to include building protection and hazard separation zones.
- Water supply.
- Maps and plans of fire reduction measures.

1.3 Accreditation

This BMP has been prepared by Bushfire Safety Consulting. Bushfire Safety Consulting is owned and operated by Rohan Carboon and Ken Strahan. Rohan and Ken have provided all technical input and review for this bushfire assessment.

Rohan has undergraduate degrees in Environmental Management and postgraduate qualifications in Bushfire Protection and has been providing bushfire risk and hazard assessment and mitigation advice to the urban planning and development industry for more than 7 years. He first worked professionally in community bushfire safety education in 1999 and has been involved in land management including bushfire suppression since 1993.

Ken Strahan has twenty years' experience in emergency management research for a number of major emergency management organisations including the Victorian Country Fire Authority, the Office of the Emergency Services Commissioner (Victoria), Country Fire Service (SA) Office of Premier and Cabinet (NSW) and a large number of local councils. His work was cited extensively by the Black Saturday Bushfire Royal Commission. He recently completed a PHD thesis researching community responses during bushfire events including the Perth Hills bushfire in 2014.

Bushfire Safety Consulting is a Corporate Bronze Member of the Fire Protection Association of Australia. Ken is in the process of obtaining BPAD Level 2 accreditation under the Fire Protection Association of Australia's new accreditation scheme. Rohan is currently applying for Level 3 accreditation.

2 Policy, Guidelines and Australian Standards

2.1 Application of SPP 3.7

The *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas (SPP 3.7)* provides the foundation for land use planning to address bushfire risk management in Western Australia. It is used to inform and guide decision makers, referral agencies and land owners/proponents to help achieve acceptable bushfire protection outcomes.

The policy contains objectives and policy measures as well as reference to the bushfire protection criteria as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 V1.1; the Guidelines).

The policy applies to this subdivision proposal because the subdivision application is located in a designated bushfire prone area on the WA map of Bushfire Prone Areas (Figure 2).



Figure 2: The eastern portion of the site is designated bushfire prone on the WA map of Bushfire Prone Areas

The following policy measures will need to be comply with SPP 3.7:

Policy Measure 6.2	The subdivision application is located within a designated bushfire prone area and will have a Bushfire Hazard Level above low and a Bushfire Attack Level rating above BAL-LOW.
Policy Measure 6.4	Policy 6.2 applies meaning the subdivision proposal will be accompanied by: <ul style="list-style-type: none">- BHL Assessment- BAL Contour Plan- Lot specific BAL ratings- Identification of relevant issues; and- Demonstration of compliance with the guidelines

The subdivision proposal does not propose vulnerable or high risk land use and is not considered as minor or unavoidable development under *SPP 3.7*.

2.2 Guidelines for Planning in Bushfire Prone Areas V1.1 (2017)

The Department of Planning have recently released the *Guidelines for Planning in Bushfire Prone Areas V1.1 (2017)*. The requirements of this document are accommodated within this BMP.

The *Guidelines for Planning in Bushfire Prone Areas V 1.1(2017)* is intended to inform and guide decision makers, referral authorities and proponents to achieve acceptable bushfire protection outcomes, including expectations at the different stages of planning.

2.3 AS3959-2009: Construction of buildings in bushfire-prone areas (Standards Australia 2009, as amended) and the Building Code of Australia (BCA)

These documents set out the construction requirements for buildings in bushfire-prone areas. AS 3959-2009 has six categories of Bushfire Attack Level, namely BAL-LOW, BAL-12.5,

BAL19, BAL-29, BAL-40 and BAL-FZ. These categories are based on heat flux exposure thresholds. The method for determining the BAL involves a site assessment of vegetation, setback distances and local topography. The assumed Fire Danger Index (FDI) for Western Australia is 80. The BAL identifies the appropriate construction standard that applies as a minimum standard in AS 3959-2009.

3 DESCRIPTION OF SUBJECT AREA

3.1 General

The site is largely cleared and covered with mineral earth and grassland with scattered remnant scrub. The site was completely cleared in 2011 and all vegetation on-site has regenerated since this time. Residential development occurs to the west, north-west and south west. Cleared undeveloped areas are to the immediate north and south of the site. Woodland (Class B) vegetation lies to the east of the site comprising mainly banksia and shrubland. **(Appendix C).**

The effective slope (that is the slope that will affect the behaviour of an approaching bushfire) is flat or slightly downslope. The effective downslope under the woodland south-east of the site will increase fire behaviour **(Appendix D).**

The post development long-term hazard is concentrated east of the site and this will impact for 100 metres into the development. This area includes the current and post development bushfire prone area.

The site is accessed via Landbeach Boulevard to the west. The Subdivision Proposal provides vehicular access and future users will have two immediate access ways. The subdivision is to be serviced by mains water.

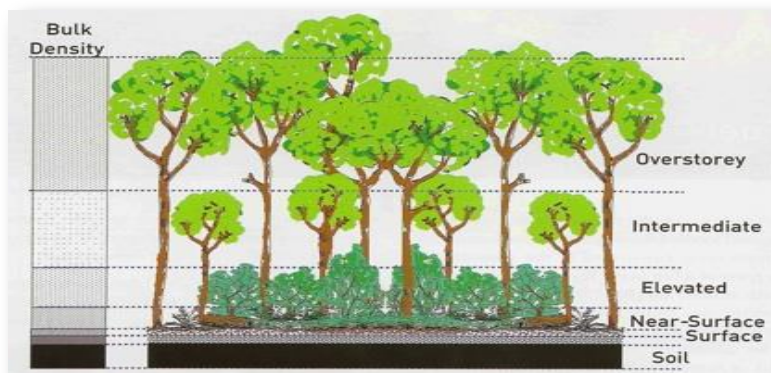
Community bushfire safety is a shared responsibility between state and local governments, fire agencies, communities and individuals. The planning and building controls outlined in this BMP, when implemented, will reduce the risk to people and property within the site. How future managers of the site interpret the risk, prepare and maintain the property and buildings and what decisions and actions they take (i.e. evacuate early or relocate to a safer place) will greatly influence the consequences of any bushfire.

4 BUSHFIRE ASSESSMENT

Bushfires are common in the City of Wanneroo and local brigades respond to numerous bushfires in the district annually. Given the bushfire threat in the area this BMP plays a critical role in ensuring that the development of the land appropriately mitigates the risk from bushfire.

4.1 Bushfire Hazard Level Assessment

The methodology used to assess bushfire hazard is outlined in the *Guidelines for Planning in Bushfire Prone Areas V1.1 (2017)*. Assessing bushfire hazards at the site-specific level accounts for the predominant class of vegetation on the site and surrounding area for a minimum of 100 m, as shown in **Appendix C**. Fuel layers in a typical forest environment can be broken-down into five segments as illustrated in **Figure 3** below. These defined fuel layers are used in the following descriptions regarding vegetation types, fuel structure and bushfire hazard levels.



Source: Gould et al. (2007)

Figure 3: The five fuel layers in a forest environment that could be associated with fire behaviour

4.1.1 Vegetation Type and Structure

The site is undeveloped, it has been previously completely cleared and is predominantly covered with mineral earth (**Figure 4**). Some grassland (Class G) vegetation (**Figure 5**) with scattered scrub and shrubs has regenerated (**Figure 6**).

The areas to the south of the site is mainly cleared mineral earth (**Figure 7**). North of the site it is similarly cleared with some regrowth grassland and scattered shrubs (**Figure 8**).

Vegetation to the east of the site is intact and comprises low banksia woodland (Class B) that has an elevated fuel layer of low shrubs (**Figure 9**). Residential development is to the west.



Figure 4: Mineral earth on the site



Figure 5: Grassland on the site



Figure 6: Scattered shrubs in grassland on the site.



Figure 7: Area of mineral earth to the south of the site



Figure 8: Area north of the site with scattered shrubs



Figure 9: Low banksia woodland east of the site.

4.1.2 Effective Slope

The site slopes downward to the north. The effective slope to the east of the site (that is the slope that will affect the behaviour of an approaching bushfire) is predominantly flat or downslope to the south-east (**Appendix D**).

4.1.3 Bushfire Hazard Level Assessment – Existing Site Conditions

The vegetation class map for the site (**Appendix C**) outlines the existing vegetation classifications on the site and in the surrounding 100 m assessment area as identified in AS 3959:2009. Descriptions of the vegetation types, structure and fuel layers are outlined in Section 4.1.

The bushfire hazard assessment levels were determined using Appendix 2 of the *Guidelines for Planning in Bushfire Prone Areas V1.1 (2017)*.

An extreme hazard exists in the woodland vegetation to the east of the site. The remainder of the site and areas within 100 metres is a moderate bushfire risk (**Appendix E**).

4.2 BAL Contour Map – Post Development Conditions

A post development BAL contour plan has been prepared for the site (**Appendix G**) which shows the predicted impacts of radiant heat levels on the development area.

Eight interface lots are exposed to a maximum of BAL-19, three are exposed to BAL-29 and the large homestead lot 1836 is exposed to higher radiant heat flux level however it can accommodate an 11 metre internal Asset Protection Zone to ensure buildings are exposed to BAL-29 or lower.

Existing residential areas to the west of the site and future development areas north and south of the site provide a suitable low threat (excluded vegetation) zone to ensure it is limited to exposure of BAL-29 or less.

An Asset Protection Zone (APZ) is incorporated into the design (see Acceptable Solution A2.1 and **Appendix F**) to ensure the development is sited within acceptable exposure limits (i.e. BAL-12.5, BAL-19 and BAL-29) or less.

4.3 FIRE MITIGATION STRATEGIES

This report adopts an acceptable solution and performance-based system of control for each bushfire protection criteria. This approach is consistent with Appendix 4 of the *Guidelines for Planning in Bushfire Prone Areas, Version 1.1 (2017)*. The management issues are:

- Location of the development
- Siting and Design of Development
- Vehicular access.
- Water

Acceptable solutions are proposed for all of the bushfire protection criteria and each illustrates a means of satisfactorily meeting the corresponding performance criteria.

Land use planning bushfire risk mitigation strategies are comprehensively detailed in the following sections by providing responses to the performance criteria that fulfil the intent of the bushfire hazard management issues outlined in the *Guidelines for Planning in Bushfire Prone Areas (2015)*. The compliance checklist is attached as **Appendix I**.

4.3.1 Element 1: Location of the Development

4.3.1.1 Intent

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

4.3.1.2 Acceptable Solution A1.1 –Development Application

The proposed subdivision is located in an area that will, on completion, accommodate dwellings subject to BAL ratings of BAL-29 or lower.

4.3.2 Element 2: Siting of the Development

Intent

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

Background

Post-development classified vegetation and hazard is to the east of the site.

4.3.2.1 Acceptable Solution A2.1: Asset Separation Zone

One of the most important bushfire protection measures influencing the safety of people and property is to create an Asset Protection Zone (APZ) around buildings. The APZ is a low fuel area immediately surrounding a building. Non-flammable features such as irrigated landscapes, gardens, driveways and roads can form parts of an APZ.

Recent research into land management and house losses during the ‘Black Saturday’ Victorian bushfires concluded that the action of private landholders who managed fuel loads close to their houses was the single most important factor in determining house survival when compared with other land management practices, such as broad scale fuel reduction burning remote from residential areas (Gibbons et al., 2012).

The internal APZ on the eastern perimeter of the site includes the entire 15 metre road reserve and a 10 metre internal setback within the homestead lot number 1836 (**Appendix F**). This will ensure that bushfire fuels and classified vegetation are never close to buildings on the eastern interface of the site. The predicted maximum radiant heat flux exposure level for the east interface is BAL-29.

Managing vegetation in the APZ has two main purposes:

- To reduce direct flame contact and radiant heat from igniting the building during the passage of a fire front.

- To reduce ember attack and provide a safer space for people to defend (if required) before, during and after a fire front passes.

Any revegetation in the road reserve and Lot 1836 will be established in accordance with the APZ standards to ensure that Performance Principle P2 under the *Guidelines for Planning in Bushfire Prone Areas* (WAPC et al. 2017) is met (Table 1).

Table 1: Asset Protection Zone requirements

Width:	15 metre road reserve and the BAL-40 and BAL-FZ zones within Lot 1836.
Location:	Road, road reserve and lot setback.
Fine Fuel load:	Combustible dead vegetation matter less than 6 mm in thickness and reduced to and maintained at two tonnes per hectare.
Trees and Shrubs (> 5m in height):	Trunks at maturity a minimum 6 metres from all elevations of the building. Branches at maturity not touch or overhang the building. Lower branches removed to 2 m above ground or surface vegetation. Canopy cover < 15%. Tree canopies at maturity at least 5 m apart so as not to form a continuous canopy.
Shrubs and ground cover (0.5 to 5 m):	Not located under trees or within 3 m of buildings. Not planted in clumps >5m ² . Clumps separated from each other and exposed window or door by at least 10 m.
Ground cover (< 0.5 m in height)	If > 100mm in height, maintained to remove dead plant material if within 2m of a structure or 3m from windows or doors
Grass:	Managed to maintain a height of 10mm or less.
Fences:	Fences within the APZ are constructed using non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended solid or slatted non-combustible perimeter fences are used.
Objects:	Within 10 m of a building must not be located close to vulnerable parts of the building (i.e. windows and doors)

It is the responsibility of the developer to ensure that any hazard separation requirements are established through appropriate design.

The setback distances outlined in Table 2 below are based on the minimum setbacks required to achieve an acceptable level of radiant heat flux posed by the adjacent classified vegetation and the effective slope beneath these areas of vegetation.

4.3.2.2 Building Siting and Predicted Bushfire Attack Levels

AS 3959:2009 *Construction of buildings in bushfire prone areas* has six categories of Bushfire Attack Level, namely BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ. These categories are based on heat flux exposure thresholds.

4.3.2.3 Methodology and Assumptions

The following indicative BAL assessment has been undertaken to demonstrate that the proposed construction on the site will fall within acceptable levels of risk.

This indicative BAL assessment was undertaken by assessing the permanent classified vegetation and effective slope. The criteria to determine the BAL is outlined as follows:

Designated FDI:	80
Flame Temperature:	1090
Slope:	Flat and downslope 0-5 degrees
Vegetation Class:	Woodland
Setback distances:	Shown in Table 2 below

4.3.2.4 BAL Outcome

The following BAL assessment outlines the minimum setback distances from vegetation with different effective slopes to achieve BAL-29 or less. These minimum setback distances are achievable for the proposed development. The BAL contour plans (**Appendix G**) summarises the outcome.

The BAL contour assessment was undertaken on the post development site conditions reflecting the exposure of buildings once the site is fully developed and the Asset Protection Zone and roads are established and maintained in perpetuity.

Table 2 shows the BAL assessment outcomes for the site.

Table 2: Maximum Bushfire Attack Level ratings for future dwellings

Lot Number	Vegetation Class	Setback Distance	Internal LOT APZ requirement	Effective Slope (°)	Maximum BAL Rating
248	Exclusion. 2.2.3.2(e)	>100	0	N/A	BAL-LOW
262-269	Exclusion. 2.2.3.2(e)	>100	0	N/A	BAL-LOW
1832	Exclusion. 2.2.3.2(e)	>100	0	N/A	BAL-LOW
1833	Exclusion. 2.2.3.2(e)	>100	East side 1.9m	N/A	BAL-LOW
1834	Class B Woodland	69m	0	Downslope 4	BAL-12.5
1835	Class B Woodland	38.5m	0	Downslope 4	BAL-12.5
1836	Class B Woodland	17	East side 11m	Downslope 4	BAL-29
1837	Class B Woodland	22	0	Downslope 2	BAL-29
1838	Class B Woodland	20	0	Downslope 2	BAL-29
1839	Class B Woodland	51	0	Downslope 2	BAL-12.5
1840	Class B Woodland	67	0	Downslope 2	BAL-12.5
1841-1849	Class B Woodland	53	0	Downslope 2	BAL-12.5
1855-1862	Class B Woodland	20	0	Flat/upslope	BAL-19
1863	Class B Woodland	20	0	Downslope 2	BAL-29
1864	Exclusion. 2.2.3.2(e)	>100	East side 1.9m	N/A	BAL-LOW
1865-1875	Exclusion. 2.2.3.2(e)	>100	0	N/A	BAL-LOW

Lot Number	Vegetation Class	Setback Distance	Internal LOT APZ requirement	Effective Slope (°)	Maximum BAL Rating
1866	Exclusion. 2.2.3.2(e)	>100	0	N/A	BAL-LOW
1867	Exclusion. 2.2.3.2(e)	>100	0	N/A	BAL-LOW
1881	Exclusion. 2.2.3.2(e)	>100	East side 1.7m	N/A	BAL-LOW
1882	Exclusion. 2.2.3.2(e)	>100	East side 1.5m	N/A	BAL-LOW
1883	Exclusion. 2.2.3.2(e)	>100	East side 1.1m	N/A	BAL-LOW
1884	Exclusion. 2.2.3.2(e)	>100	East side 0.7m	N/A	BAL-LOW
1885	Exclusion. 2.2.3.2(e)	>100	East side 0.5m	N/A	BAL-LOW
1886-1889	Exclusion. 2.2.3.2(e)	>100	0	N/A	BAL-LOW
2027-2029	Exclusion. 2.2.3.2(e)	>100	0	N/A	BAL-LOW

Note: See Appendix G for the BAL Contour Plan.

Of the 60 proposed residential lots, 4 are partly exposed to BAL-29, 8 lots are exposed to BAL-19. 13 lots are exposed to BAL-12.5 and the remaining 35 lots can accommodate dwellings exposed to BAL-LOW.

All exposed dwellings located in the bushfire prone area, will have the threat mitigated by ensuring those dwellings are compliant with AS 3959:2009 construction standards.

An assessment of BAL-29 means there is an increased risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to an increased level of radiant heat (AS 3959). The risk is considered to be high. It is expected that the construction elements will be exposed to a heat flux not greater than 29 kW/m². In this case, the recommended construction sections in AS 3959 are 3 and 7.

An assessment of BAL-19 means the risk is considered to be moderate. It is expected that the construction elements will be exposed to a radiant heat flux not greater than 19 kW/m². There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat (AS 3959). The recommended construction sections in AS 3959 are 3 and 6.

An assessment of BAL-12.5 means the risk is considered to be low. It is expected that the construction elements will be exposed to a radiant heat flux not greater than 12.5 kW/m². There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat (AS 3959). The recommended construction sections in AS 3959 are 3 and 5.

Any new construction within 100 m of classified vegetation in the declared bushfire prone area will require consideration of the need for increased construction requirements to address AS3959 'Construction of Buildings in Bushfire Prone Areas'.

4.3.2.5 Environmental Considerations

The site has been previously cleared of all vegetation and the existing revegetation on the site is dominated by grassy weeds and isolated native shrubs. There are no environmental values that limit the full development of the site into the proposed residential subdivision

4.3.3 Element 3: Vehicular Access

Intent

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

Background

The road network for the Subdivision Proposal is outlined in **Appendix H**. Landbeach Boulevard runs along the western perimeter of the site and connects with three existing public roads. Proposed roads will be constructed on the eastern perimeter.

4.3.3.1 Acceptable Solution A3.1: Two Access Routes

The Subdivision Proposal ensures all potential lots have two access options for two separate destinations on the existing public road network and a proposed temporary emergency Access Way. Two access routes are provided at all times.

4.3.3.2 Acceptable Solution A3.2: Public Road

Proposed and existing public roads achieve the following standards.

Minimum trafficable surface (m)	6
Horizontal clearance (m)	6
Vertical clearance (m)	4.5
Maximum grade < 50 metres	1 in 10
Minimum weight capacity (t)	15
Maximum crossfall	1 in 33
Curves minimum inner radius (m)	8.5

4.3.3.3 Acceptable Solution A3.3: Cul-de-sac / Dead End Road

No Cul-de-sac or dead end roads are proposed in this development. The three roads that terminate at the northern boundary will each link to Pravia Way through an Emergency Access Way.

4.3.3.4 Acceptable Solution A3.4: Battle Axe

No battle axe is proposed for this development.

4.3.3.5 Acceptable Solution A3.5: Private Driveway longer than 50 metres

No private driveway longer than 50 metres is proposed for this development.

4.3.3.6 Acceptable Solution A3.6: Emergency Access Way

The proposed temporary Emergency Access Way will be signposted and will achieve the following standards.

Minimum trafficable surface (m)	6
Horizontal clearance (m)	6
Vertical clearance (m)	4.5
Maximum grade < 50 metres	1 in 10
Minimum weight capacity (t)	15
Maximum crossfall	1 in 33
Curves minimum inner radius (m)	8.5

4.3.3.7 Acceptable Solution A3.7: Fire Service Access Route

No fire service access route is proposed in this development

4.3.3.8 Acceptable Solution A3.8: Firebreak width

Compliance with the City of Wanneroo Fire Control Notice is required at all times.

4.3.4 Element 4: Water

4.3.4.1 Intent

To ensure that water is available to the development to enable people, property and infrastructure to be defended from bushfire.

4.3.4.2 Acceptable Solution A4.1: Reticulated Water

Fire services require ready access to an adequate water supply during fire emergencies.

The area is provided with a reticulated water supply. The provision of scheme water together with fire hydrants will meet the specifications of Water Corporation Design Standard DS 63 and DFES.

The Water Corporation is responsible for all hydrant maintenance and repairs.

5 BUSHFIRE RISK MANAGEMENT MEASURES

5.1 Public Education and Community Awareness

Community bushfire safety is a shared responsibility between individuals, the community, government and fire agencies. DFES has an extensive Community Bushfire Education Program including a range of publications, a website and Bushfire Ready Groups. *Prepare. Act. Survive.* (DFES, 2016) provides excellent advice on preparing for and surviving the bushfire season. Other downloadable brochures are available from <http://www.dfes.wa.gov.au/safetyinformation/fire/bushfire/pages/publications.aspx>.

The City of Wanneroo provides bushfire safety advice to residents available from their website www.wanneroo.wa.gov.au. Professional, qualified consultants also offer bushfire safety advice and relevant services to residents and businesses in bushfire prone areas.

5.2 Fire Safer Areas

There are no designated Community Fire Refuges in the City of Wanneroo, however, at the time of an emergency, the relevant authorities can select an evacuation centre and DFES, the Council and Police will provide this information to site managers and people accommodated on the site.

A predetermined centre cannot be nominated, because there are no purpose-built structures (such as bunkers) designed to withstand the impacts of a bushfire.

This means that the location of an evacuation centre is not determined until the position of the fire and the characteristics of a specific event are considered by authorities. There would be nothing more dangerous than sending residents to a centre which is in the direct path of a fire.

The safest place to be during a bushfire is away from it. Where to go is an important element when people are relocating during a time of emergency (NSW Rural Fire Service, 2004). The preferred option for residents is to designate a destination that is not in a bushfire-prone area and will be safe to travel to before a bushfire attack.

5.3 Assessment of Fire Management Strategies

Extreme bushfire hazard that could threaten the development is concentrated to the east of the site. All dwellings constructed in the subdivision will be exposed to predicted radiant heat flux levels below 29 kW/m² and this threat will be mitigated by application of the Australian Standard AS3959-2009 Construction of buildings in bushfire prone areas.

The development accommodates a suitable perimeter APZ to ensure BAL-29 is not exceeded and fire hydrants are provided to urban standards.

All residents have two access ways and would need to evacuate to the west into the existing developed areas to reduce their threat from a fire in the woodland east of the site.

Fire response operations will utilise the reticulated water supply and public road access to defend property and life.

5.4 Implementing the Bushfire Management Plan

5.4.1 Developer's Responsibilities

To maintain a reduced level of risk from bushfire, the developer's responsibilities are to:

- Comply with the City of Wanneroo Firebreak Notice as published.
- Establish and maintain the perimeter APZ within the site to standards as specified in this document.
- Establish access and water supply to standards as specified in this document.
- A notification, pursuant to Section 70A of the Transfer of Land Act 1893 is to be placed on the certificate(s) of title of the proposed lot(s). Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows:
"The lot(s) is/are subject to a fire management plan.' (Local Government)".
- As part of the subdivision approval or Detailed Area Plan preparation process have the proposed lots re-assessed for BAL by a qualified consultant with assessment recommendations to be submitted to the City of Wanneroo and accommodated in the lot clearances and/or Detailed Area Plan outcomes.
- Make a copy of this BMP available to each lot owner subject to AS 3959:2009 construction standards, along with the *Homeowners Bush Fire Survival Manual, Prepare, Act, Survive* (or similar suitable documentation) and the City of Wanneroo's Firebreak Notice.

5.4.2 Property Owner Responsibilities

The owners of assets on the site, as created by the development approval process, are to maintain a reduced level of risk from bushfire, and will be responsible for undertaking, complying and implementing measures to protect their own assets (and people working at there) from the threat and risk of bushfire. Site owners will be responsible for:

- Ensuring the site complies with the City of Wanneroo's Fire Control Notice as published.
- Maintaining the APZ in good order to minimise the exposure of buildings and people to bushfire attack.
- Ensuring construction of buildings complies with AS 3959:2009.
- If buildings are subject to additional construction in the future, AS 3959:2009 compliance is required.

5.4.3 City of Wanneroo's Responsibilities

The responsibility for compliance with the law rests with the individual property owner and occupiers, and the following conditions are not intended to unnecessarily transfer some of the responsibilities to the City.

The City will be responsible for:

- Providing fire prevention and preparedness advice to landowners upon request, including the *Homeowners Bush Fire Survival Manual, Prepare, Act, Survive* (or similar suitable documentation) and the City of Wanneroo Fire Control Notice.
- Monitoring bush fuel loads in road reserve sites and liaising with relevant stakeholders to maintain fuel loads at safe levels.
- Maintaining public roads to appropriate standards and ensuring compliance with the City of Wanneroo's Fire Control Notice.
- Reviewing this BMP every 5 years.

5.4.4 Water Corporation's Responsibilities

The Water Corporation is responsible for the repair of water hydrants, as needed.

6 CONCLUSIONS

This Plan provides acceptable solutions and responses to the bushfire protection criteria that fulfil the intent of the bushfire hazard management issues outlined in the *Guidelines for Planning in Bushfire Prone Areas V1.1 (2017)*. However, community bushfire safety is a shared responsibility between governments, fire agencies, communities and individuals.

Buildings located in the bushfire prone area (i.e. within 100 m of classified vegetation) will have the risk mitigated via compliance with AS 3959:2009 standards. BAL-29 is not exceeded and a perimeter APZ is incorporated between the future assets (ie dwellings) and the bushfire hazard east of the site.

Reticulated water supply is provided. There is two access routes available to residents and emergency services at all times. The proposed development achieves compliance with the acceptable solutions and will fall within the acceptable level of risk.

7 REFERENCES

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8 GLOSSARY

AS	Australian Standard
APZ	Asset Protection Zone
BAL	Bushfire Attack Level
BMP	Bushfire Management Plan
BCA	Building Code of Australia
BOM	Bureau of Meteorology
DFES	Department of Fire and Emergency Services (was FESA)
FESA	Fire and Emergency Services (now DFES)
HSZ	Hazard Separation Zone
TPS	Town Planning Scheme
VBRC	Victorian Bushfires Royal Commission
WAPC	Western Australian Planning Commission



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APPENDICES

Appendix A: Site Location
Appendix B: Subdivision Proposal
Appendix C: AS3959 Vegetation Classification
Appendix D: Topography and Effective Slope
Appendix E: Bushfire Hazard Level Rating
Appendix F: Asset Protection Zone Plan
Appendix G: BAL Contour Plan
Appendix H: Vehicular Access Requirements
Appendix I: Bushfire Management Plan Checklist



APPENDIX A: SITE LOCATION PLAN

LEGEND:

SUBJECT LAND.....



PT LOT 9040 SANTORINI PROMENADE /
ROMEO ROAD, ALKIMOS
City of Wanneroo



NORTH

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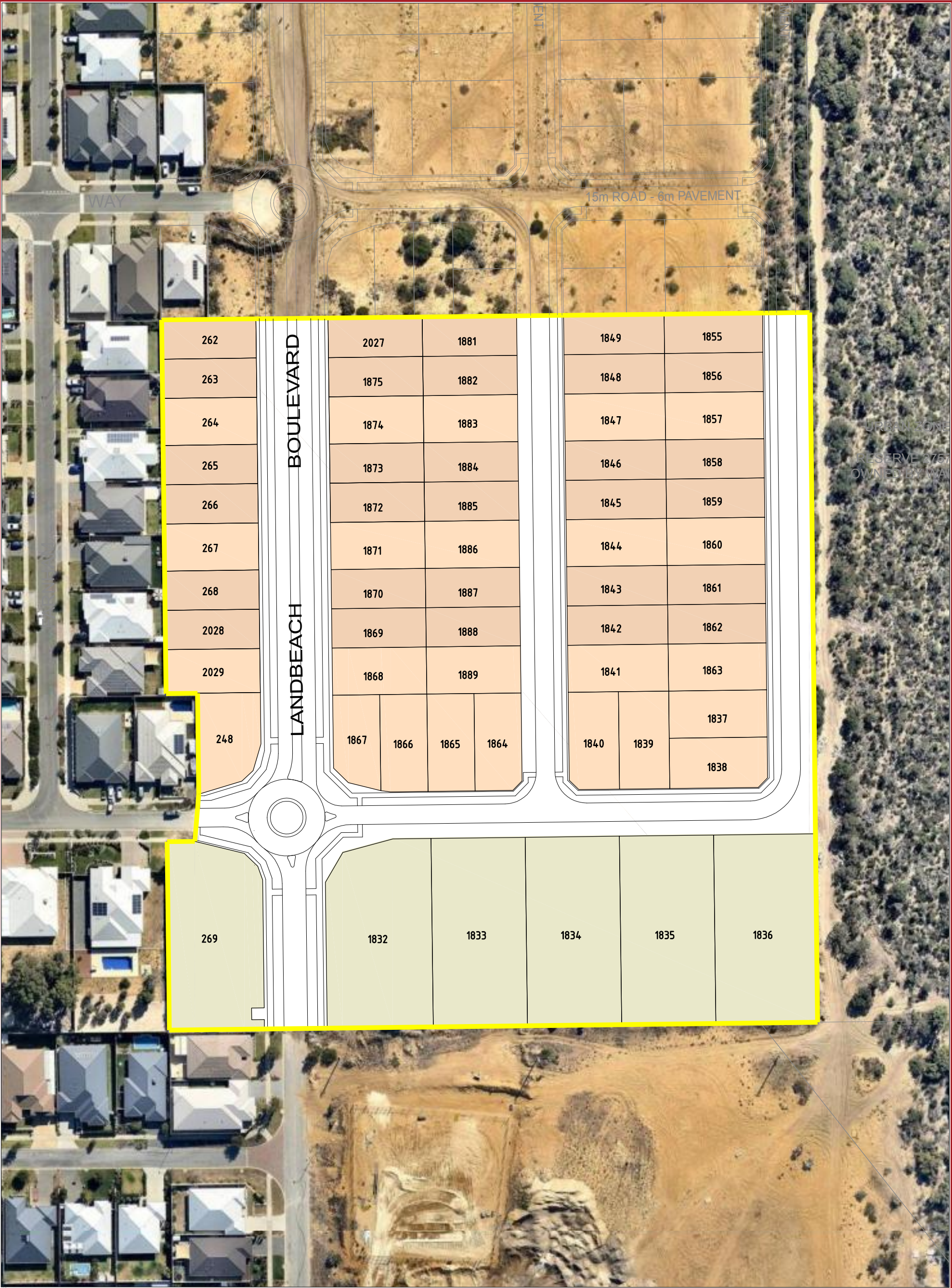
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DATE: JUNE 2017

Base mapping supplied by Nearmap & Google Maps

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CONSULTING

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Mbl: 0429 949 262
www.bushfiresafety.net




APPENDIX B
SUBDIVISION PROPOSAL

PT LOT 9040 SANTORINI PROMENADE /
ROMEO ROAD, ALKIMOS
City of Wanneroo

LEGEND

 SUBJECT LAND

SOURCE: PHOTOGRAPHY FROM NEARMAP


NORTH

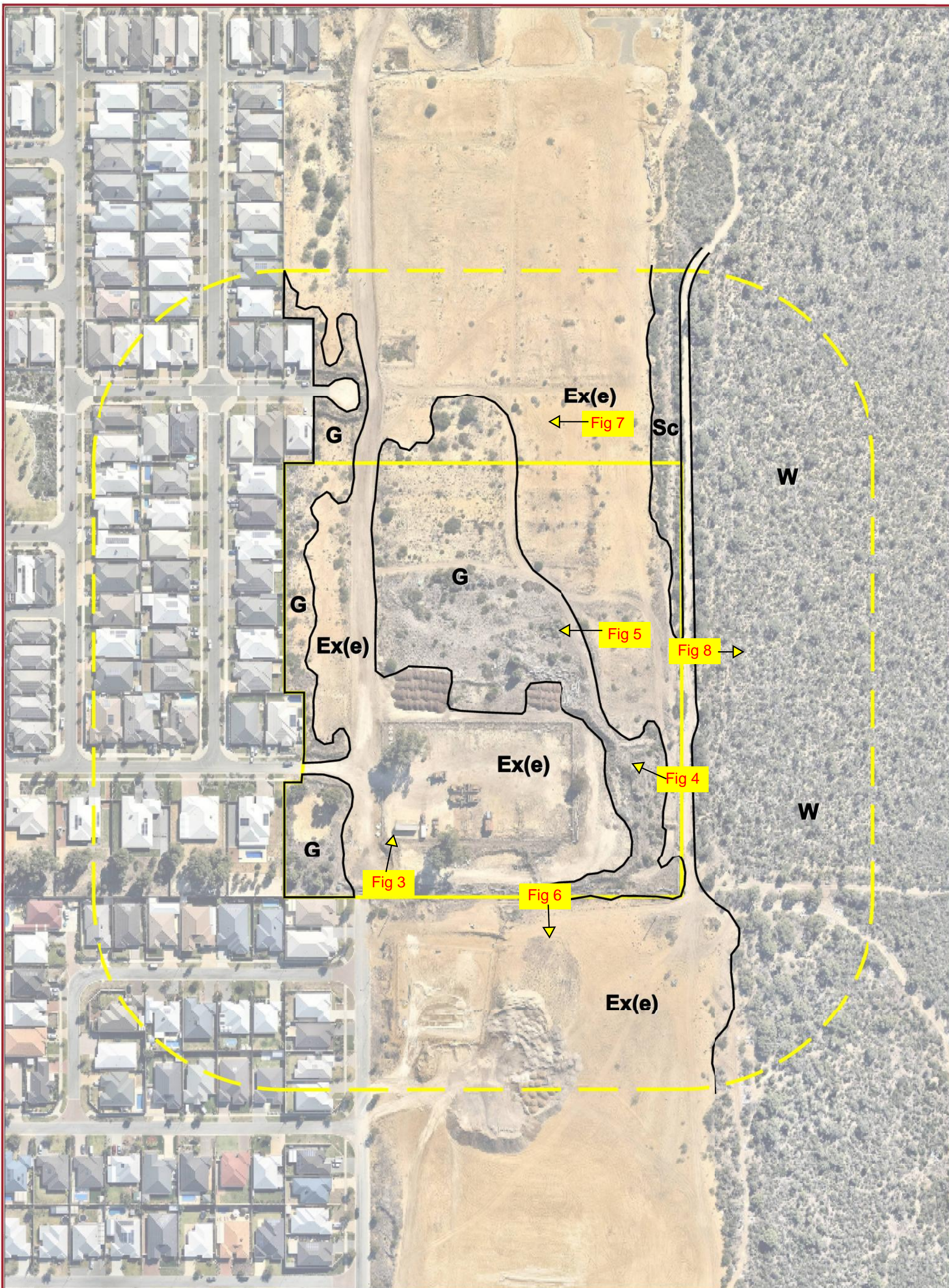
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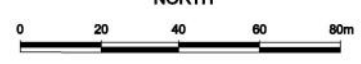
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Base mapping supplied by Gray & Lewis

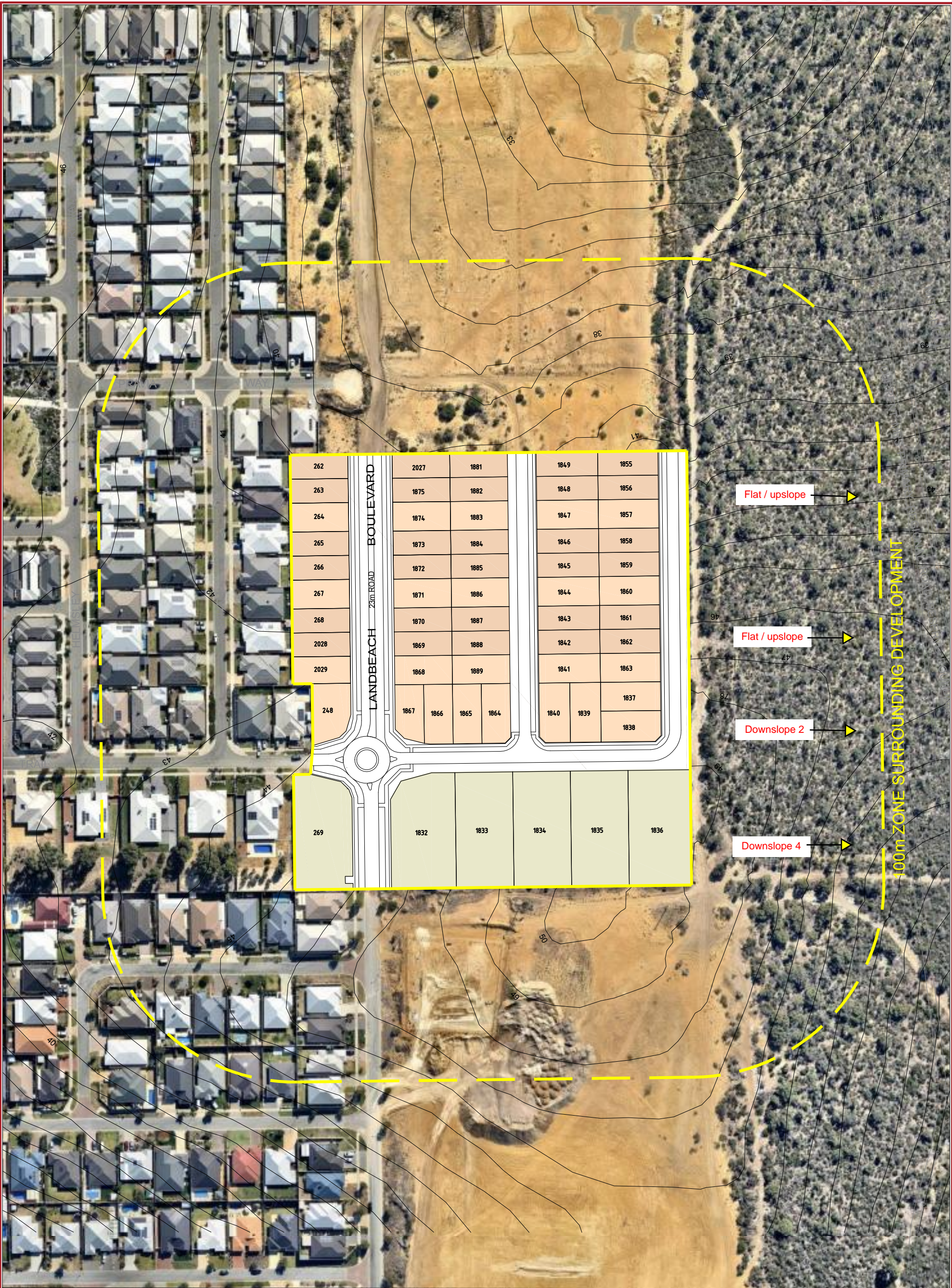
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<h2>APPENDIX C</h2> <p>AS 3959 VEGETATION CLASSIFICATION</p> <p>PT LOT 9040 SANTORINI PROMENADE / ROMEO ROAD, ALKIMOS City of Wanneroo</p>	<p>LEGEND</p> <p> SUBJECT LAND</p> <p>W - CLASS B WOODLAND</p> <p>Sc - CLASS D SCRUB</p> <p>G - CLASS G GRASSLAND</p> <p>Ex 2.2.3.2(e) - EXCLUSION CLAUSE 2.2.3.2(e)</p> <p>SOURCE OF PHOTOGRAPHY: NEARMAP</p>	<p style="text-align: center;">  NORTH </p> <p style="text-align: center;">  0 20 40 60 80m </p> <p style="text-align: center;"> NOT TO SCALE @ A3 DATE: MAY 2017 Base mapping supplied by Gray & Lewis </p>	<p style="text-align: center;"> Bushfire Safety CONSULTING </p> <p style="text-align: center;"> BUSHFIRE SAFETY CONSULTING </p> <p style="font-size: small;"> PC BOX 84 STONEVILLE WA 6081 M: 0429 949 262 www.bushfiresafety.net </p>
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Flat / upslope

Flat / upslope

Downslope 2

Downslope 4


100m ZONE SURROUNDING DEVELOPMENT

APPENDIX D

TOPOGRAPHY & EFFECTIVE SLOPE

PT LOT 9040 SANTORINI PROMENADE /
ROMEO ROAD, ALKIMOS
City of Wanneroo

LEGEND

 SUBJECT LAND

SOURCE: PHOTOGRAPHY FROM NEARMAP



NORTH

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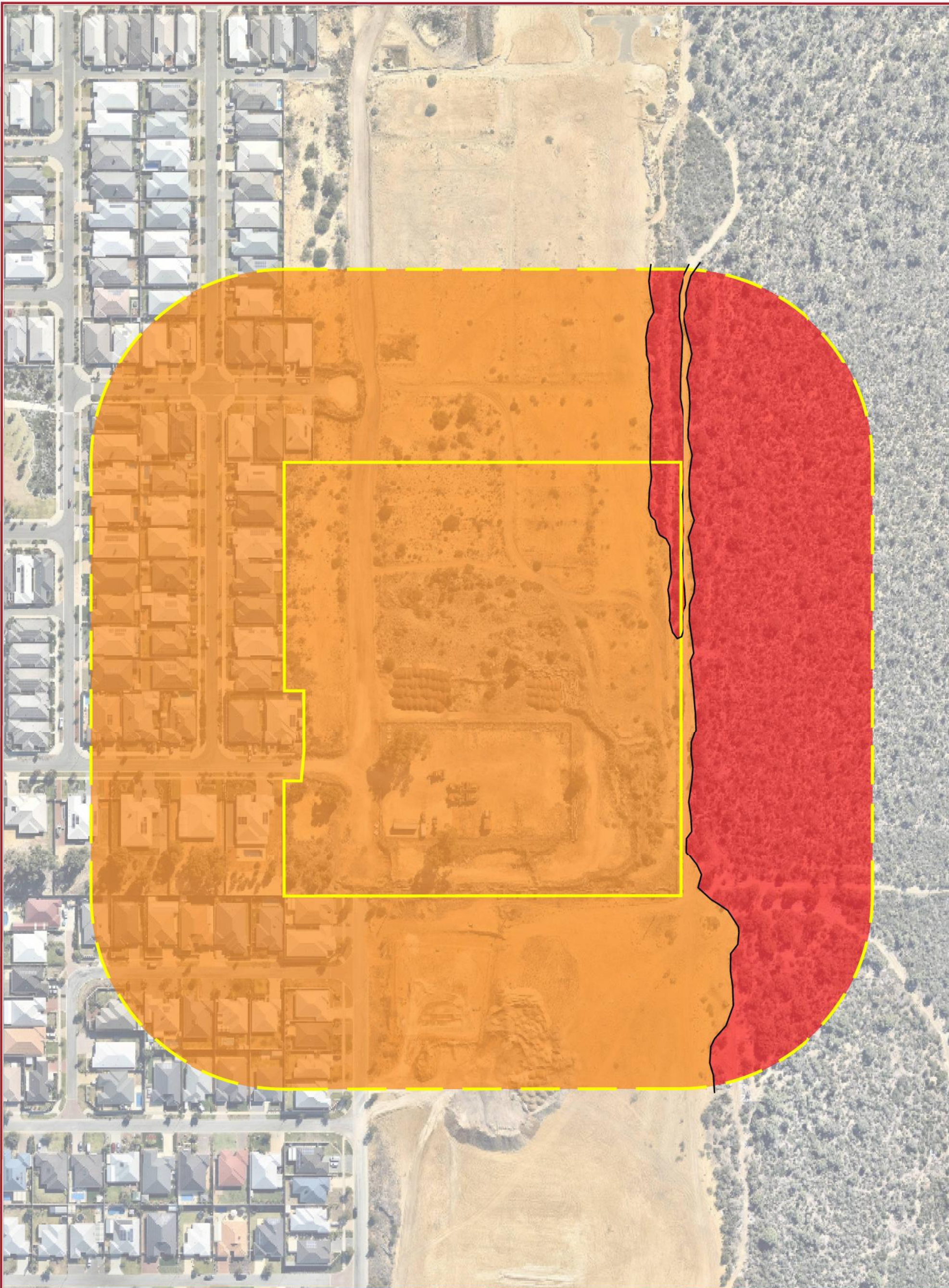
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Base mapping supplied by Gray & Lewis

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APPENDIX E

BUSHFIRE HAZARD LEVEL RATING

PT LOT 9040 SANTORINI PROMENADE /
ROMEO ROAD, ALKIMOS
City of Wanneroo

LEGEND

SUBJECT LAND.....
EXTREME
MODERATE
LOW
SOURCE OF PHOTOGRAPHY: NEARMAP



0 20 40 60 80m

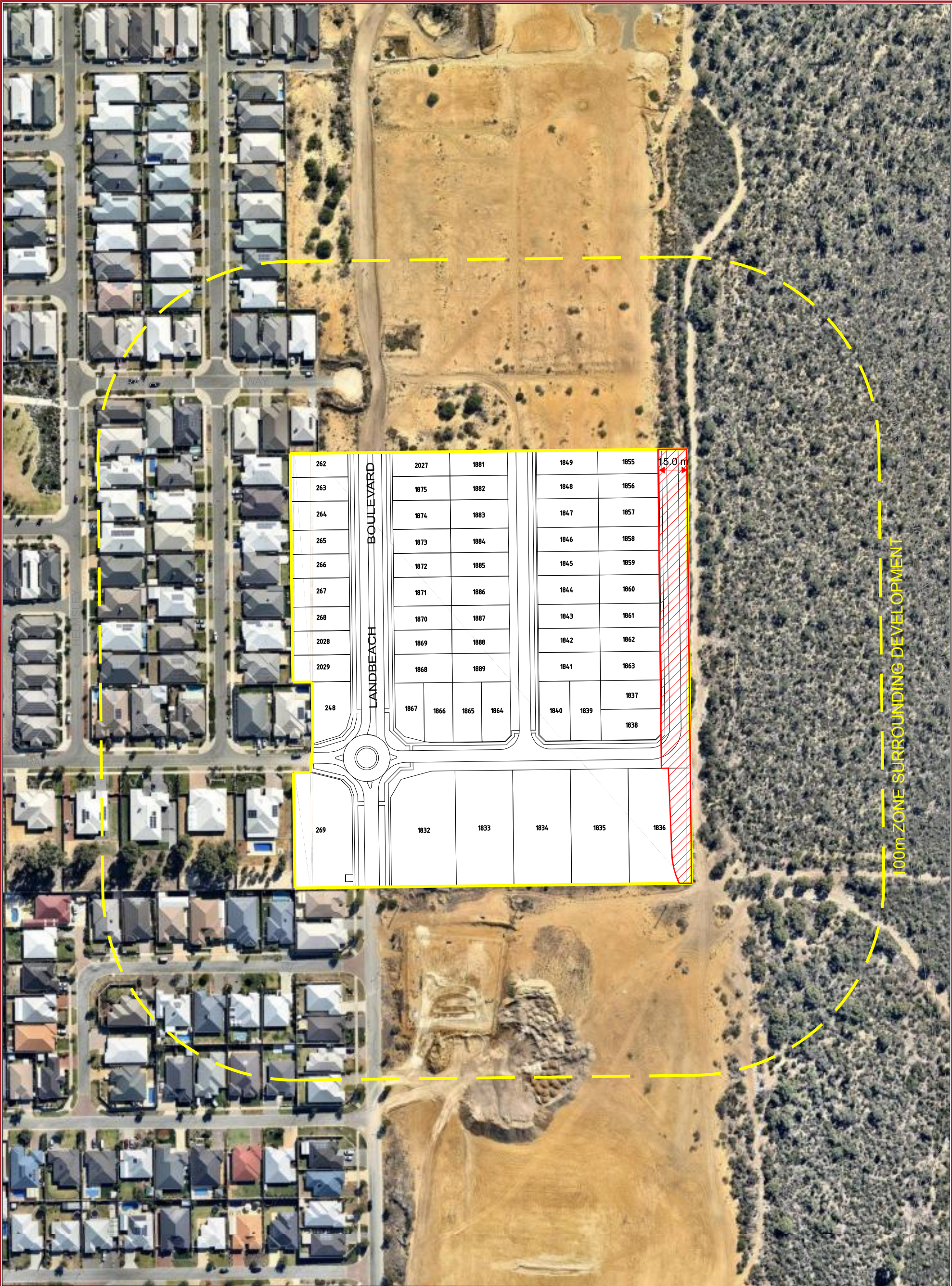
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DATE: MAY 2017

Base mapping supplied by Gray & Lewis

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APPENDIX F

ASSET PROTECTION ZONE

PT LOT 9040 SANTORINI PROMENADE /
ROMEO ROAD, ALKIMOS
City of Wanneroo

LEGEND

SUBJECT LAND.....

ASSET PROTECTION ZONE..

SOURCE OF PHOTOGRAPHY: NEARMAP

NORTH

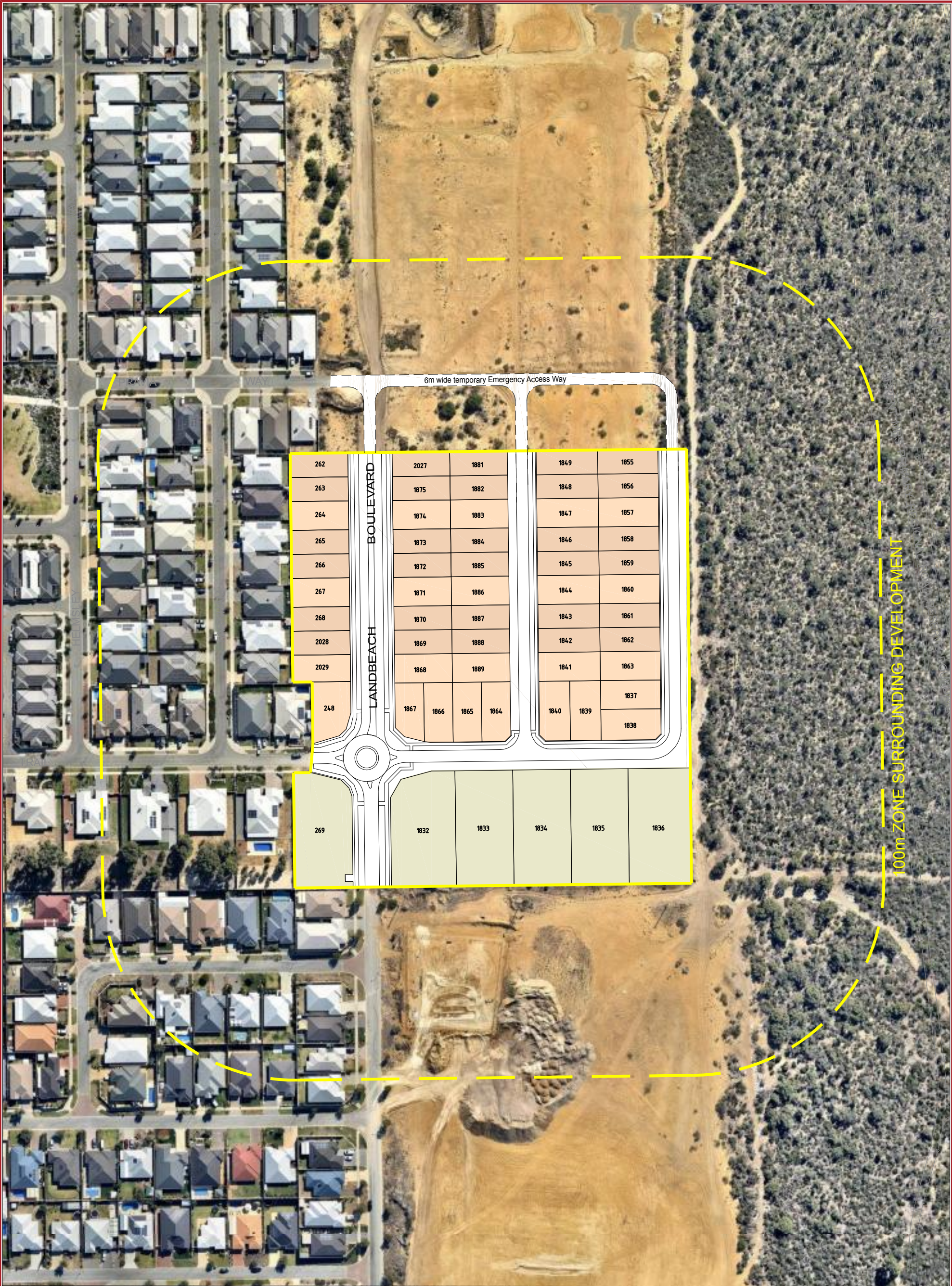
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DATE: MAY 2017
Base mapping supplied by Gray & Lewis

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APPENDIX H


VEHICULAR ACCESS

PT LOT 9040 SANTORINI PROMENADE /
ROMEO ROAD, ALKIMOS
City of Wanneroo

LEGEND

 SUBJECT LAND

SOURCE: PHOTOGRAPHY FROM NEARMAP


NORTH

0 20 40 60 80m

NOT TO SCALE @ A3
DATE: JUNE 2017
Base mapping supplied by Gray & Lewis

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8.1.1.1 Appendix I: Bushfire Management Plan Checklist

Criteria	Response
1 Background Information	Details on skills, expertise, qualifications and accreditation provided.
2. Spatial Consideration of Bushfire Threat	Aerial photography and maps are provided outlining spatial distribution of vegetation and bushfire hazard on the site and within 100 metres of the site boundary
3. Proposal Compliance	The Subdivision Proposal incorporates residential dwellings that meet the objectives of SPP 3.7
3.1 Location of Development	
Does the proposal comply with the performance criteria by applying acceptable solution A1.1?	Yes. The Subdivision Proposal area is located in an area that will on completion be subject to a BAL rating of BAL-29 or lower for all future dwellings
3.2: Siting of Development	
Does the proposal comply with the performance criteria by applying acceptable solution A2.1?	Yes. An APZ is established along the eastern boundary of the site that provides sufficient setback from bushfire fuels to ensure it is subject to a BAL rating of BAL-29 or lower
3.3: Vehicular Access	
Does the proposal comply with the performance criteria by applying acceptable solution A3.1?	Yes, Two access ways are provided on public roads and a temporary emergency access way.
Does the proposal comply with the performance criteria by applying acceptable solution A3.2?	Yes
Does the proposal comply with the performance criteria by applying acceptable solution A3.3?	Not applicable
Does the proposal comply with the performance criteria by applying acceptable solution A3.4?	Not applicable
Does the proposal comply with the performance criteria by applying acceptable solution A3.5?	Not applicable.
Does the proposal comply with the performance criteria by applying acceptable solution A3.6?	Not applicable.
Does the proposal comply with the performance criteria by applying acceptable solution A3.7?	Not applicable.
Does the proposal comply with the performance criteria by applying acceptable solution A3.8?	Yes, compliance with fire control notice can be achieved
Does the proposal comply with the performance criteria by applying acceptable solution A3.9?	Not applicable.
4: Water	
Does the proposal comply with the performance criteria by applying acceptable solution A4.1?	Yes

Criteria	Response
Does the proposal comply with the performance criteria by applying acceptable solution A4.2?	Not applicable
Does the proposal comply with the performance criteria by applying acceptable solution A4.3?	Not applicable

Applicant Declaration

I declare that the information provided is true and correct to the best of my knowledge.

Signature:

Applicant Declaration

We declare that the information provided is true and correct to the best of our knowledge.

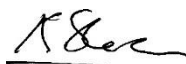
Signature:



Name: Rohan Carboon

Date: 22/06/2017

Signature:



Name: Ken Strahan

Date: 22/06/2017
