Banksia Grove Development Nominees

Fire Management Plan
Lot 9140 Flynn Drive, Banksia Grove

Version 2 – 08 April 2015

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Executive Summary

Natural Area Consulting (NAC), a division of Natural Area Holdings Pty Ltd, was commissioned by Banksia Grove Development Nominees to prepare a Fire Management Plan (FMP) for the planned subdivision of the balance of Lot 9140 Flynn Drive, Banksia Grove. When preparing the plan, NAC has given consideration to the requirements outlined in:

- *Planning for Bushfire Protection Guidelines 2nd Edition*
- *AS 3959 –2009Construction of Buildings in Bushfire Prone Areas.*

The amount and type of vegetation and flora present on site directly contributes to the risks associated with fire and its impacts on property, the environment and people. Vegetation at the site was classified according to the descriptions provided in AS 3959 – 2009; the assessment identified the following vegetation types:

- Type A Forest – Pine Plantation
- Type B Woodland – Low Woodland (B07)
- Type D Scrub – Open Scrub (14).

The steepness of a landscape influences the combustion rate of vegetation, with fire typically accelerating uphill and decelerating when travelling downhill. Classified vegetation is considered to be upslope from the site or on flat land; as such, slope would have a minimal influence on bushfire behaviour around the development. Bushfire hazard assessments provide an indication of the likely threat to the site and surrounding areas. The bushfire hazard prior to development is considered to be:

- extreme for Low Woodland (B07) located within the subdivision boundary, Bush Forever Site 295 and Lot 902
- extreme for Pine Forest (A) to the north-east of the site
- moderate in Open Scrub (D14) to the east of the site
- low in vegetation associated in the Wanneroo Golf Course
- low in areas that have been cleared for development.

The Bushfire Attack Level (BAL) is an assessment of risk to buildings from embers, radiant heat (heat flux), larger debris and flames. The assigning of a BAL is an acceptable management strategy providing an increased level of protection to houses within 100 m of classified vegetation. Increased protection comes from improved construction standards and the setting of minimum distance requirements between buildings and vegetation.

The Low Woodland (B07) will be cleared within the subdivision boundary and as such, was not considered in the BAL assessment. A public open space (POS) located on the western boundary of the site will be retained as bushland, and which will mean:

- 205 lots will be rated BAL–12.5
- 8 lots will be rated BAL–19
- 7 lots will be rated BAL–29
- 20 additional lots will be rated as BAL–19 provided that there is a 3 m minimum property setback
- all other Lots are BAL-low.

The following performance criteria for the proposed development were assessed to ensure compliance with provisions within *Planning for Bushfire Protection Guidelines 2nd Edition*:

- location
- access
- water
- siting of the development
- design of the development.

The threat of bushfire from offsite vegetation can be reduced by implementing this FMP, along with appropriate planning and outlining the roles and responsibilities of the City of Wanneroo, the developer, DFES, and building owners.

Contents

1.0 Introduction

Natural Area Consulting (NAC), a division of Natural Area Holdings Pty Ltd, was commissioned by Banksia Grove Development Nominees to prepare a Fire Management Plan (FMP) for the planned subdivision of the balance of Lot 9140 Flynn Drive, Banksia Grove. The site is located approximately 30 km north of the Perth Central Business District and covers approximately 60 ha (Figure 1). The area under consideration is bound by Flynn Drive to the north, Old Yanchep Road to the east, Joondalup Drive to the south and Bush Forever Site 295 to the west. The assessment covers approximately 97 ha and includes the proposed development as well as vegetation within 100 m of projected housing locations. The development will provide residential lots and six public open space (POS) areas; a local centre is located to the south of the Western POS this lot may become a shopping centre, community centre or other public building (Figure 4).

Bushfires are a natural and necessary occurrence within Australian ecosystems with much of the vegetation having developed characteristics which promote the spread of fire, such as flammable bark, dry coarse leaf litter and leaves which contain flammable oils (CSIRO, 2013). Accordingly, residential areas in proximity to remnant native vegetation are at risk from bushfire impacts such as smoke, ember attack and radiant heat. In knowing the risks, it is possible to implement mitigation strategies that allow urban development to occur in proximity to remnant bushland areas.

This Fire Management Plan has been prepared to support the City of Wanneroo and Western Australian Planning Commission (WAPC) subdivision approvals process. It provides fire risk mitigation options that will be applied to the subdivision. When preparing the Fire Management Plan, Natural Area Consulting has given consideration to the requirements outlined in:

- *Planning for Bushfire Protection Guidelines 2nd Edition* (Western Australian Planning Commission, Department of Planning and Fire and Emergency Services Authority, 2010)
- *AS 3959 –2009Construction of Buildings in Bushfire Prone Areas*.

Activities involved with the plan preparation process included:

- assessing the vegetation types present within and adjacent to the proposed development site using *Planning for Bushfire Protection Guidelines 2nd Edition* (Western Australian Planning Commission *et al.*, 2010)
- assigning hazard ratings based on the vegetation types present
- determining the projected Bushfire Attack Level (BAL) and suggesting likely management strategies based on current and projected site considerations
- preparation of the Fire Management Plan.

The outcomes of the assessment process are documented in this plan, with key sections including:

- the aim and objectives of the Fire Management Plan
- location, zoning and current site characteristics
- fire problem
- Fire Management Plan
- roles and responsibilities of the developer, landowners and the City of Wanneroo.

Figure 1: Site location, Lot 9140 Flynn Drive, Banksia Grove

2.0 Fire Management Plan Aim

The aim of the Fire Management Plan (FMP) is to outline the fire management methods and requirements that will be implemented within the proposed subdivision. Accordingly, broad aims include:

- reducing the threat of fire to the life and property of future residents and the environment
- allowing access to fire-fighters if a fire does occur
- protecting the landscape within the subdivision area as far as is possible.

2.1 Management Plan Objectives

The objectives of this Fire Management Plan are to:

- classify the bushfire hazard by assessing the vegetation (Figure 2)
- propose bush fire prevention measures for the interface between the bushland areas surrounding the development
- define the building construction standards where vegetated areas interface with the urban development
- identify access for fire-fighting operations around the vegetated areas
- propose bush fire prevention measures around the urban development
- identify current and future landowner, developer and City of Wanneroo responsibilities for various components of this Fire Management Plan
- document the acceptable solutions adopted for the nominated areas of the subdivision for the balance of Lot 9140, Banksia Grove.

Figure 2: Vegetation with an extreme hazard rating

3.0 Description of the Area

3.1 Location and Zoning

The subject land is located within the City of Wanneroo and is zoned Residential R30 - R60 in Structure Plan 21a (City of Wanneroo, 2014). The subdivision is the responsibility of the Banksia Grove Development Nominees; the majority of lots will range from 400 - 600 m^2, with the occasional larger lot (Figure 4). In time, these individual lots will be sold at an appropriate phase of the development process

Bush Forever Site 295 is zoned as parks and recreation by the City of Wanneroo (2014). The land north of the site includes private land (Wanneroo Golf and Course industrial development) as well as bushland under negotiation as a potential Bush Forever Site (Lot 902) (City of Wanneroo, 2014). State Forest managed by the Department of Parks and Wildlife (DPAW) is located to the east of the site across Old Yanchep Road. Land to the south and east of the proposed development is under private ownership and being developed for residential housing. The northern portion of Lot 9140 will eventually be used to widen Flynn Drive.

3.2 Regional Context

According to Interim Biogeographical Regionalisation of Australia (IBRA) descriptions, Perth is located within the Swan Coastal Plain region. The Swan Coastal Plain comprises two major divisions, namely Swan Coastal Plain 1 –Dandaragan Plateau and Swan Coastal Plain 2 – Perth Coastal Plain. The site is located within the Perth subregion, which is broadly characterised as including areas of Jarrah and Banksia woodlands on sandy soils in a series of sand dunes, along with wetland areas, often within the interdunal swales (Mitchell, Williams and Desmond, 2002).

3.3 Climate

The climate experienced in the area is Mediterranean, with dry, hot summers and cool, wet winters; statistics taken from Perth Airport (Station ID 009021) indicate (Bureau of Meteorology, 2014):

- average rainfall is 728 mm pa, with the majority falling between May and August
- average maximum temperature ranges from 17.7 °C in winter to 33.4 °C in summer, with the highest recorded maximum being 46.7 °C
- average minimum temperatures range from 8.2 °C in winter to 17.6 °C in summer, with the lowest recorded minimum being -1.3 °C
- the predominant wind directions include morning easterlies and westerly sea breezes during summer months when the risk of fire is greatest, with an average wind speed of 23.8 km/h and gusts of more than 100 km/h, particularly during storm events.

3.4 Topography and Soils

Lot 9140 is situated on the interface between the Spearwood and the older Bassendean Dune Systems. The Spearwood Dunes are comprised of red/brown, yellow and pale yellow/grey sands with a high iron and aluminium oxide content. The Bassendean Dunes are the oldest system on the Swan Coastal Plain and are characterised by grey leached, infertile and acidic sands (Figure 3). No wetlands or drainage lines occur within the site boundary. The Shared Land Information Portal Natural Resource Management (SLIP NRM Portal) (Department of Agriculture and Food, 2014) indicated that two soil subsystems occur within the site boundary (Figure 5 and Table 1). The development area has a moderately undulating topography with

elevations ranging from 78 m AHD on the western boundary to 46 m AHD on the south-eastern boundary of the site (Figure 6).

Figure 3: The Spearwood dunes at Banksia Grove are characterised by yellow/grey sands

Table 1: Soil subsystems

Map Unit	Subsystem	Description
211Sp_Ky	Karrakatta Sand Yellow Phase	Undulating dunes on aeolian sand over limestone in the Swan Coastal Plain between Wanneroo and Lancelin. Deep yellow sands with Jarrah, Marri Tuart and Banksia woodland with dense shrubs.
212Bs_Ja	Bassendean, Jandakot Phase	Jandakot low dunes, slopes <10% and generally more than 5m relief. Grey sand over pale yellow sands generally underlain by humic and iron podsols. Vegetation dominated by Banksia Low Open Woodland with a dense shrub layer.

(Source: SLIP NRM Portal, 2014)

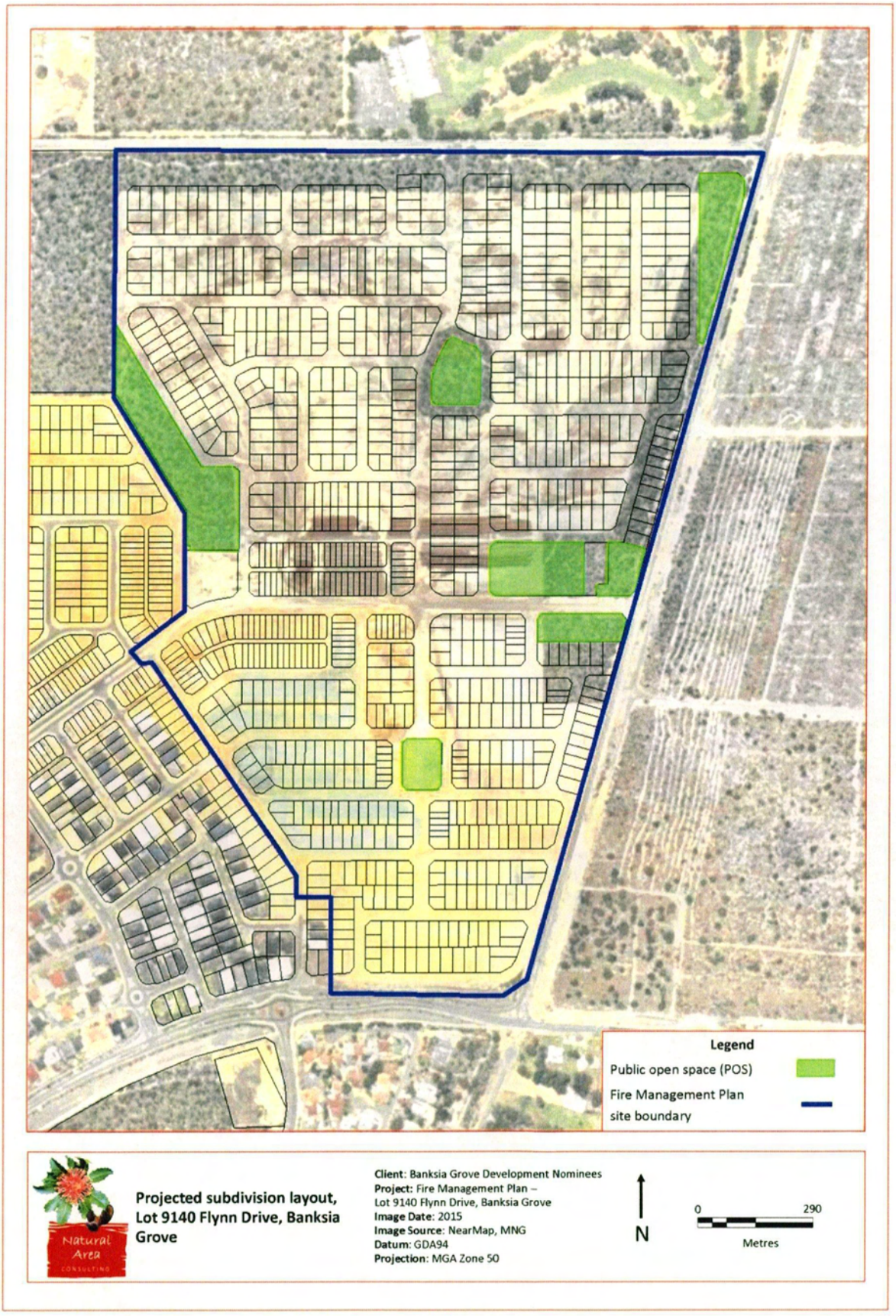


Figure 4: Projected subdivision layout, Lot 9140 Flynn Drive, Banksia Grove

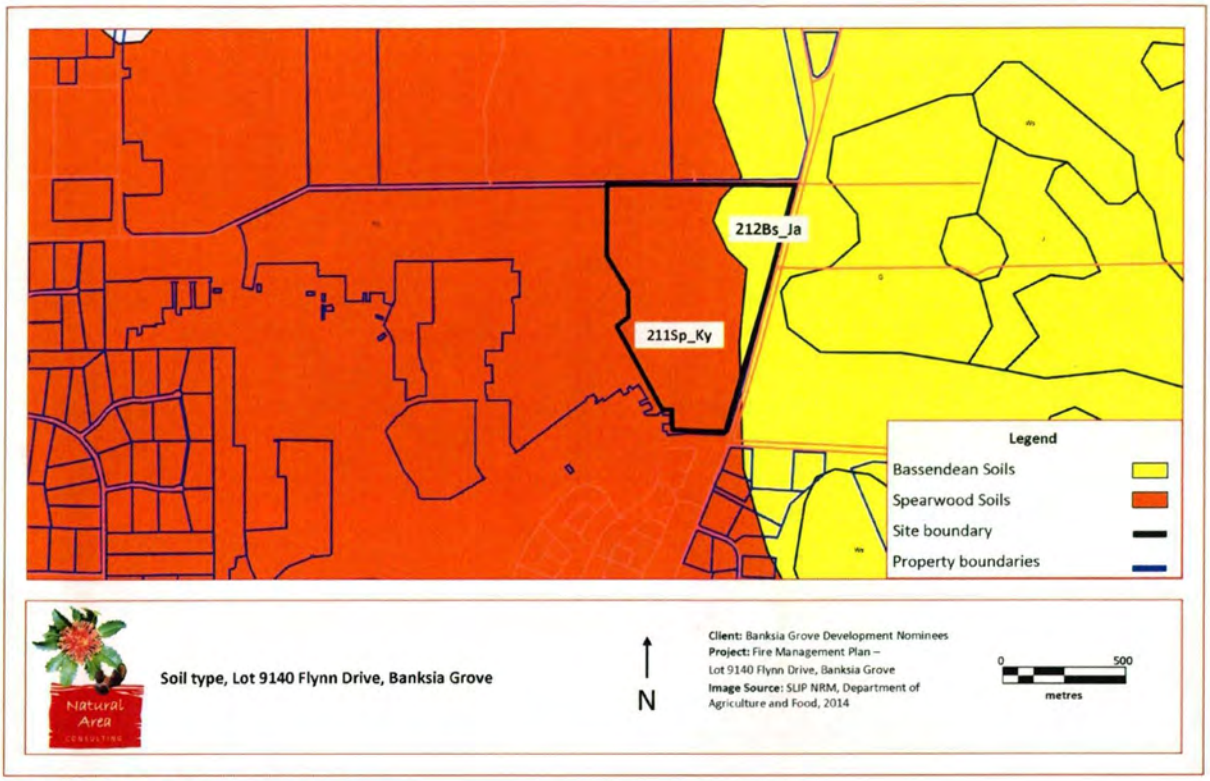


Figure 5: Soil type, Lot 9140 Flynn Drive, Banksia Grove

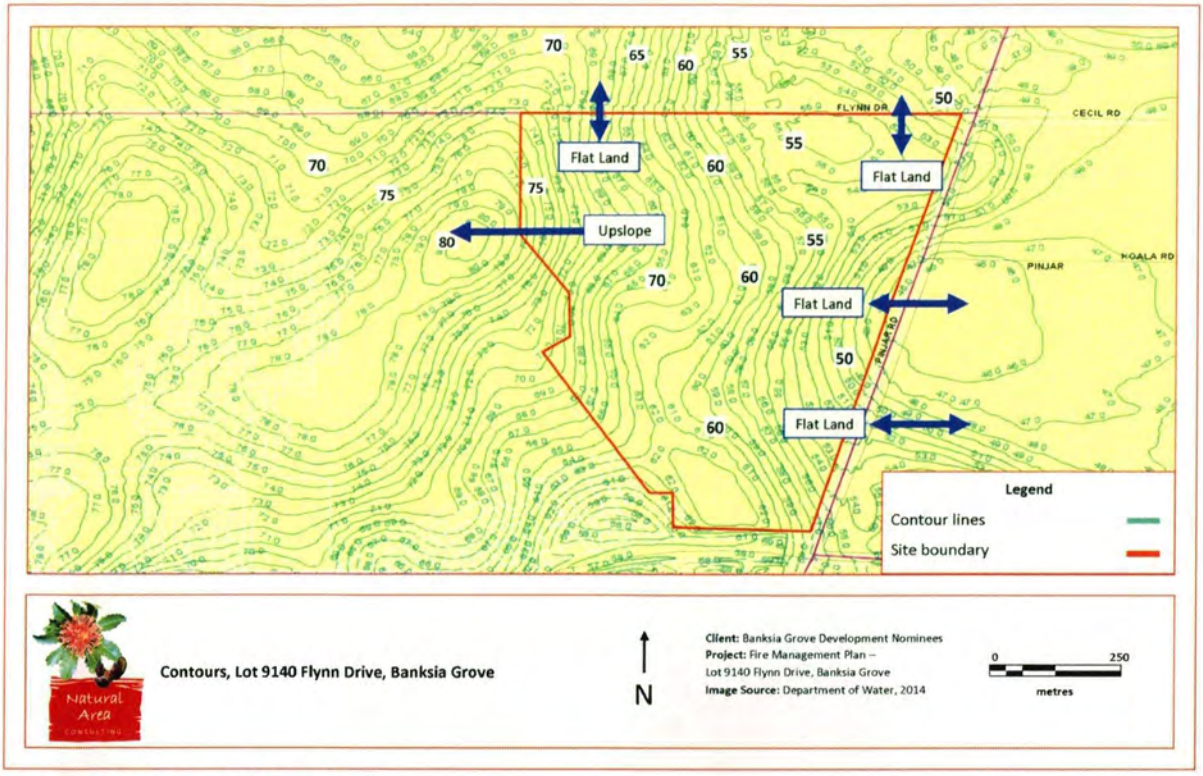


Figure 6: Contours, Lot 9140 Flynn Drive, Banksia Grove

3.5 Onsite Vegetation

The amount and type of vegetation and flora present on site directly contributes to the risks associated with fire and its impacts on property, the environment and people. The subdivision area is dominated by *Banksia Eucalyptus* Woodland; however, this vegetation will be removed during the development process (Figure 7).

Figure 7: *Banksia Eucalyptus* Woodland will be cleared within the development area

3.6 Offsite Vegetation

Offsite vegetation also needs to be considered due to the risks associated with smoke, ember attack and radiant heat. Vegetation located around the development area was identified as:

- *Adenanthos cygnorum* Shrubland
- *Banksia* and *Eucalyptus* Woodland
- parkland cleared vegetation
- *Pinus Pinaster* Open Forest.

3.6.1 *Adenanthos cygnorum* Shrubland

The *Adenanthos cygnorum* Shrubland is located to the east of the proposed development within State Forest land managed by the Department of Parks and Wildlife (DPaW). This vegetation type occurs in areas where pine plantations have been removed; it is dominated by early succession species such as *Adenanthos cygnorum, Jacksonia furcellata, Acacia pulchella* and *Acacia saligna* (Figure 8). This area has high densities of introduced grasses such as Wild Oats (*Avena barbata*), Perennial Veldt Grass (*Ehrharta calycina*) and African Love Grass (*Eragrostis curvula*); there are also small pines which have sprouted following the removal of the mature trees. As the vegetation matures it will become dominated by longer lived species such as banksias and eucalypts, this will have fire hazard implications for houses within the vicinity of the bushland in the longer term.

Figure 8: *Adenanthos cygnorum* Shrubland occurs in disturbed areas to the east of the proposed subdivision where mature pine trees have been removed

3.6.2 *Banksia* and *Eucalyptus* Woodland

The *Banksia* and *Eucalyptus* Woodland is located to the north and west of the proposed development within Bush Forever Site 295 and Lot 902; the majority of the bushland is in Excellent condition (Government of Western Australia, 2000) with low densities of weeds. This vegetation type is characterised by an overstorey of *Banksia attenuata*, *B. menziesii*, *Eucalyptus marginata* and *Allocasuarina fraseriana*. The understorey is dominated by *Xanthorrhoea preissii, Stirlingia latifolia, Mesomelaena pseudostygia, Hibbertia hypericoides* and *Macrozamia riedlei* (Figure 9).

Figure 9: *Banksia* and *Eucalyptus* Woodland within Bush Forever Site 295

3.6.3 Parkland Cleared Vegetation

The parkland cleared vegetation is located to the north of the site within the grounds of Wanneroo Golf Club. It is characterised by widely spaced introduced and native *Eucalyptus* trees with a turf understorey; areas in-between the fairways have an understorey with some shrubs and dry tussock grasses. A car park and club house is located in the south-west of the site and is fringed by introduced *Eucalyptus* and *Callistemon* trees (Figure 10).

Figure 10: Car park and clubhouse surrounded by introduced *Eucalyptus* and *Callistemon* trees

3.6.4 *Pinus pinaster* Open Forest

The *Pinus pinaster* Open Forest is located to the east and north-east of the proposed development (Figure 11). This vegetation type is a monoculture characterised by an overstorey of tall introduced pines with a sparse understorey. Some native species are found amongst the pines; however, these are suppressed by competition for light and the thick layer of pine needles.

Figure 11: The *Pinus pinaster* Open Forest is essentially a monoculture

3.7 Existing Land Use and Assets

Development is occurring in Lot 9140; assets within the subdivision include construction sites and machinery. The suburb of Banksia Grove is located to the south-west of the proposed subdivision and is characterised by completed residential housing as well as construction sites.

3.8 Water Supply

As the subdivision proceeds, the site will be connected to scheme water with fire hydrants required approximately every 200 m within the built up area. Clearance on the placement of hydrants will be required from the Department of Fire and Emergency Services (DFES) and the Water Corporation. Hydrants will need to be clearly identifiable, with markings installed by the developer prior to sign off. Hydrants will be marked with the following:

- a blue 'cats eye' reflective indicator to the left of the centre line of the road
- a small blue 'H' painted on the curbing
- a white and red stripe around the power pole nearest the hydrant.

3.9 Access

A limestone road bisects the site and provides access to the proposed subdivision (Figure 12); roads are currently being installed to the west of the site in accordance with the subdivision plan (Figure 4). The Bushland around the site can be accessed from Flynn Drive, Old Yanchep Road and Joondalup Drive. There is no formal access to Bush Forever Site 295 from the proposed subdivision.

Figure 12: Limestone road providing access to the proposed subdivision

4.0 Fire Problem

In order to identify the potential fire risks and mitigation strategies, it is necessary to describe the fire problem associated with the site. The assessment takes into consideration the:

- type and classification of vegetation
- distance between the vegetation and the walls of proposed buildings
- topography and slope of the land between proposed buildings and the classified vegetation
- land use.

Vegetation at the site was classified according to the descriptions provided in AS 3959 –2009. The assessment identified the following vegetation types (Table 2 and Figure 13):

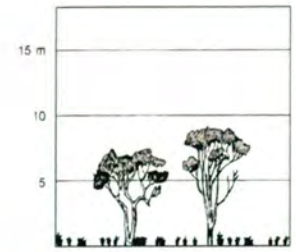
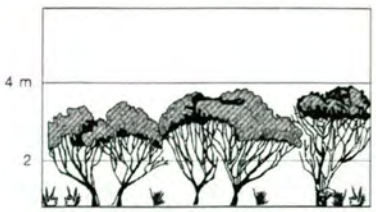
- Type A Forest – Pine plantation, trees 10 - 30 m in height at maturity, generally comprising *Pinus* species
- Type B Woodland – Low Woodland (B07), low trees and shrubs 2 - 10 m high, < 10% foliage cover, with a grassy understorey or low shrubs
- Type D Scrub – Open Scrub (D14), low trees and shrubs 2 - 10 m high, < 10% foliage cover, with a grassy understorey or low shrubs.

The greatest fire threat to the Banksia Grove subdivision is from the:

- vegetated areas to the west (Bush Forever Site 295)
- the bushland to the north (proposed Bush Forever site)
- pine plantation and scrubland to the east and north-east.

A fire in these areas has the potential to produce smoke and embers that could damage nearby property. It should be noted that summer weather conditions also contribute to the fire threat through mid-level disturbances bringing unstable atmospheric conditions with the potential for lightning strike. Heat wave conditions characterised by easterly winds from the arid interior dries leaf litter and grasses and thus increase their susceptibility to ignition and spread to surrounding areas.

Table 2: Vegetation types as per AS 3959 –2009

Pine plantation (A)	Low Woodland (B07)	Open Scrub (D14)
No image provided in AS 3959 –2009		
		

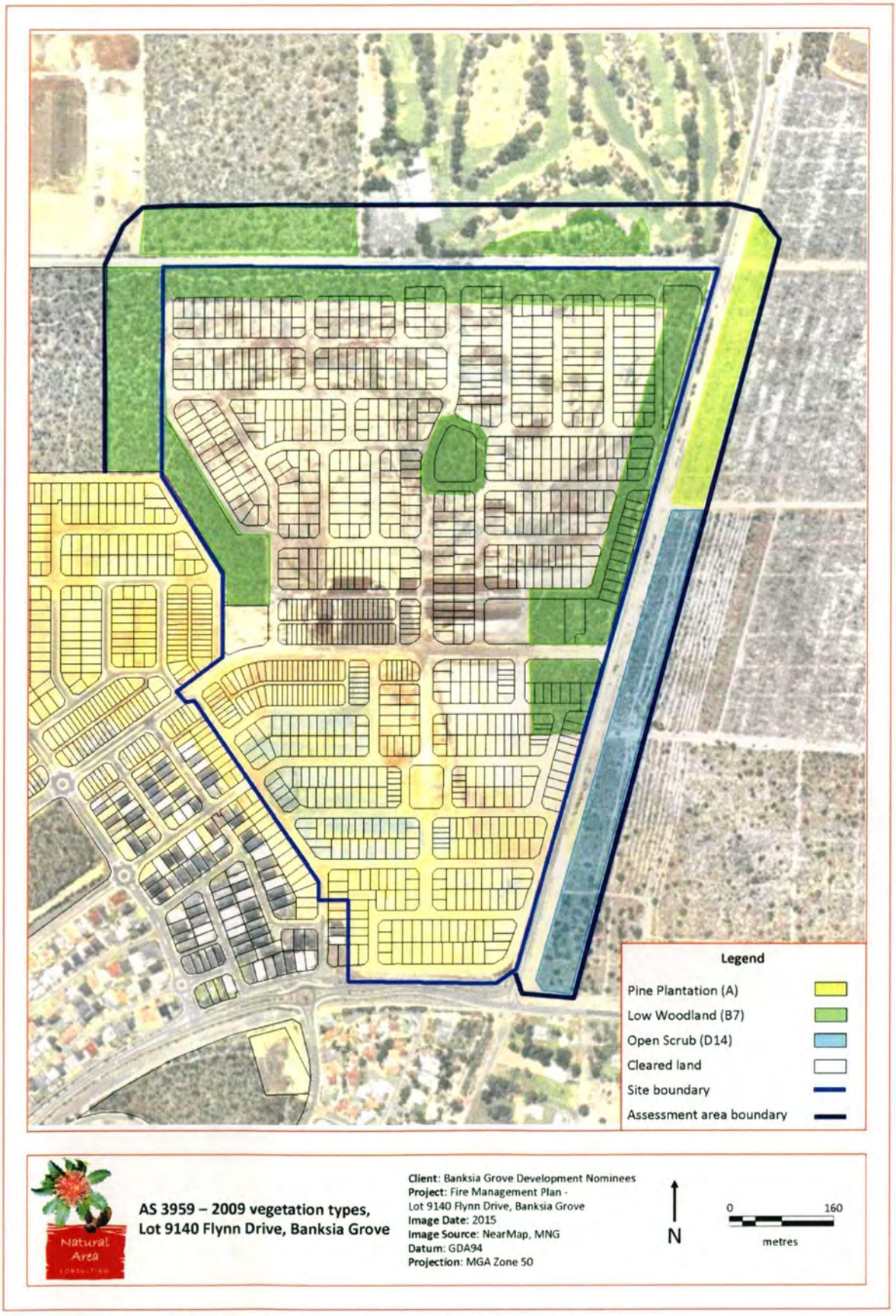


Figure 13: AS 3959 –2009 vegetation types, Lot 9140, Flynn Drive Banksia Grove

4.1 Fire History

A review of historical aerial imagery held by Landgate (2014) suggests there have been no fires within the development boundary for the past 40 years; however, there are often a number of years between early imagery dates so this cannot be confirmed with certainty. The scrubland to the east of the proposed development was previously a pine plantation; the pines were harvested with the remaining green waste burnt by the Department of Parks and Wildlife. Evidence of a recent fire was observed in the existing pine plantation approximately 400 m east of the site (Figure 14); however, the burn area was small (< 500 m^2).

Figure 14: Evidence of a small fire within the pine plantation east of the proposed development

4.2 Bushfire Risk

Risk relates to the likelihood of a negative or detrimental consequence arising out the interaction between hazards, community and the environment. The *Planning for Bush Fire Protection Guidelines* (Western Australian Planning Commission *et al.,* 2010), describes three hazard levels relating to bush fire risks. These are:

- **Low** – primarily areas of no standing native vegetation, pasture or cropping areas with limited vegetation or suburban areas with maintained gardens and < 0.25 ha of standing vegetation
- **Moderate** – open woodlands and shrublands, low shrubs with slopes < 10° or flat land, suburban areas with some native tree cover, pasture or cropped areas with slopes > 10°
- **Extreme** – forests, woodlands or tall shrubs.

The majority of vegetation within the grounds of the Wanneroo Golf Course is classified as low risk, while scrubland to the east of the subdivision is moderate. The following areas have been identified as having an extreme rating:

- all vegetation within the boundaries of the proposed development
- Bush Forever Site 295
- Lot 902 to the north of the site
- pine plantations.

As the development progresses the extreme vegetation within the subdivision boundary will be removed and the primary fire risk will come from offsite vegetation. Five of the six public open space (POS) areas

within the subdivision will be landscaped and maintained at a level that will have a low fire risk. The POS on the western boundary of the development may be retained as remnant vegetation; this will have bushfire risk implications for properties adjacent to the vegetation.

4.3 Bushfire Hazard Assessment

The bushfire hazard assessments provide a measure of fire intensity and the likely threat to the site and surrounding areas. The assessment of bushfire hazard takes into account existing site conditions including:

- topography, in particular, the slope or gradient of the land
- vegetation cover and associated fuel loads
- relationship to surrounding development.

4.3.1 Slope

The steepness of a landscape influences the combustion rate of vegetation, with fire typically accelerating uphill and decelerating when travelling downhill. The speed of a fire front doubles with every 10° increase in slope; thus, a fire on a 20° slope would be expected to advance four times faster than on flat ground (Geoscience Australia, 2013). Classified vegetation is considered to be upslope from the site or on flat land (Figure 6); as such, slope would have a minimal influence on bushfire behaviour around the development.

4.3.2 Bushfire Hazard Level Pre-development

Using assessment criteria (Western Australian Planning Commission *et al.,* 2010) the pre-development hazard is considered to be (Figure 15):

- extreme for Low Woodland (B07) located within the subdivision boundary, Bush Forever Site 295 and Lot 902
- extreme for the pine plantation (A) to the north-east of the site
- moderate in Open Scrub (D14) to the east of the site
- low in vegetation associated in the Wanneroo Golf Course
- low in areas that have been cleared for development.

4.3.3 Bushfire Hazard Level Post-development

As the development progresses the extreme vegetation within the subdivision boundary will be removed and the primary bushfire hazard will come from offsite vegetation. The post-development hazard is considered to be (Figure 16):

- low for all cleared land located within the subdivision boundary
- extreme for low woodland (B07) located within Bush Forever Site 295 and Lot 902
- extreme in western POS area as bushland is to be retained
- extreme for pine plantation (A) to the north-west of the site
- moderate in open scrub (D14) to the east of the site
- low in vegetation associated in the Wanneroo Golf Course
- low in areas that have been cleared for development.

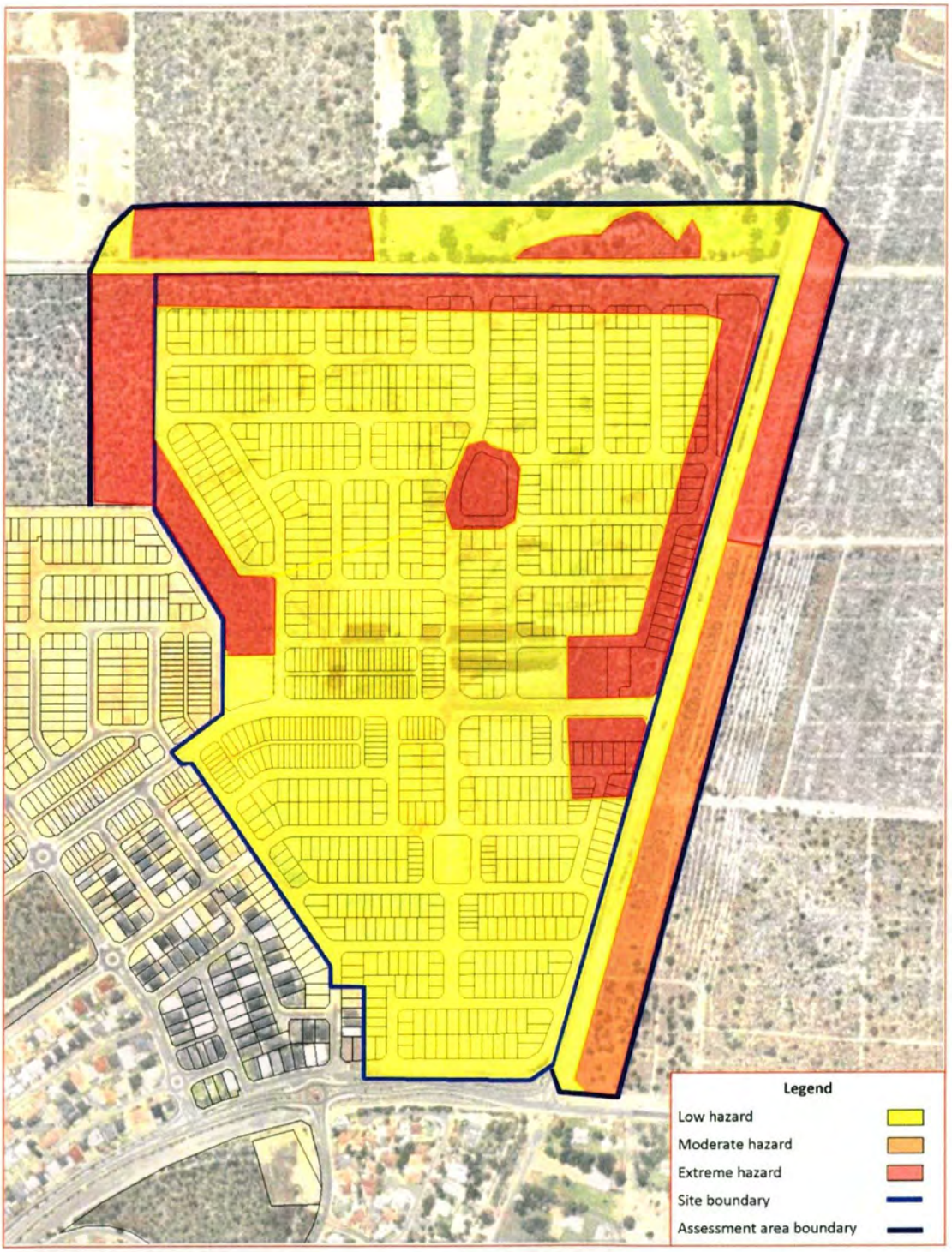


Figure 15: Pre-development bushfire hazard, Lot 9140, Flynn Drive Banksia Grove

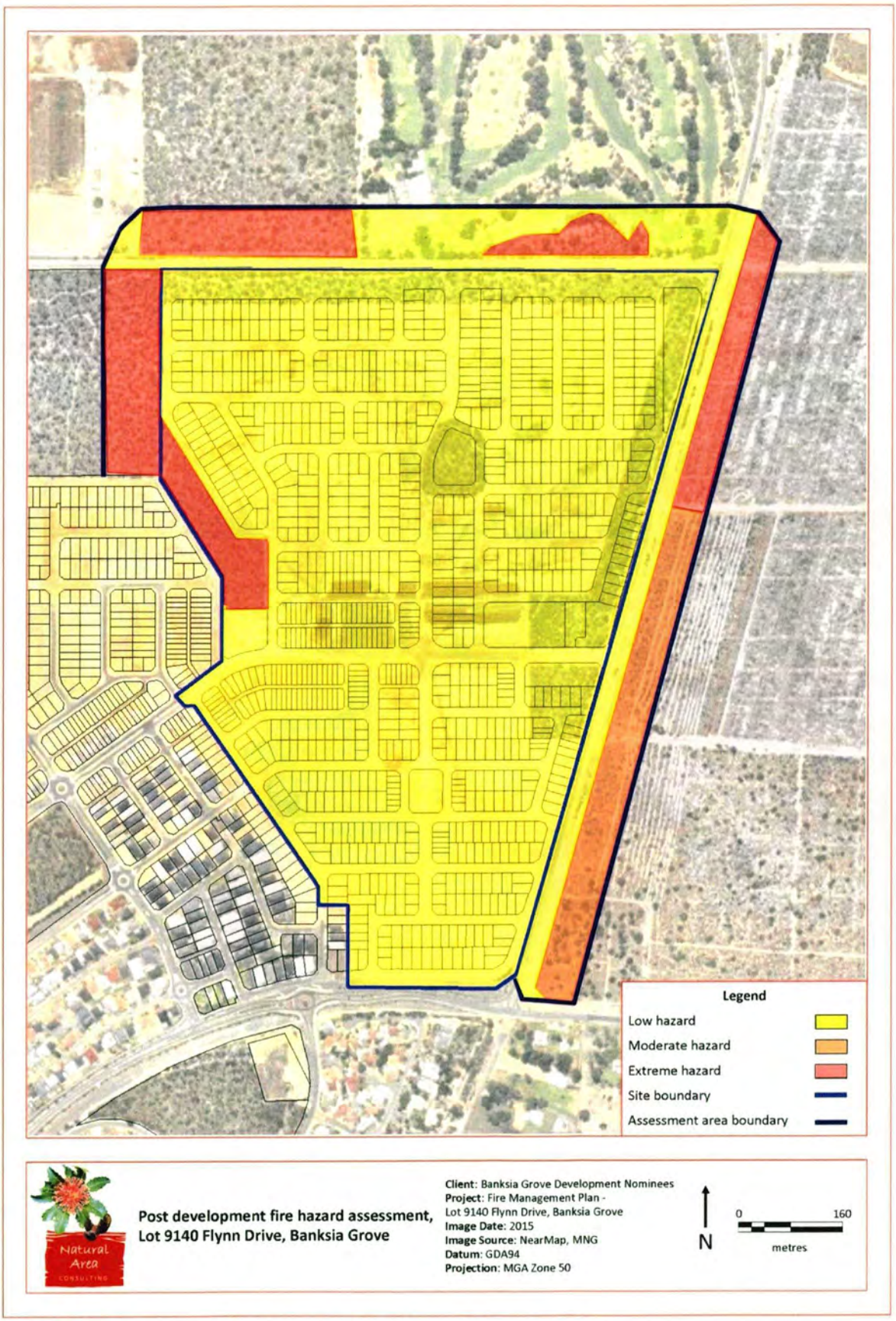


Figure 16: Post-development fire hazard, Lot 9140 Flynn Drive Banksia Grove

4.4 Bushfire Attack Level (BAL)

The Bushfire Attack Level (BAL) is an assessment of risk of damage to buildings from embers, radiant heat (heat flux), larger debris and flames. Six risk levels are used and are described in Table 3. The assigning of a BAL is an acceptable management strategy providing an increased level of protection in the event of a bushfire. Increased protection comes through increased construction standards and the setting of minimum distance requirements between building walls and vegetation.

Table 3: BAL description AS 3959 –2009

BAL rating	Risk Level	Description	Applicable AS 3959 – 2009 Sections
Low	Very low	▪ insufficient risk to warrant any specific construction requirements but there is still some risk	4
12.5	Low	▪ risk of ember attack ▪ exposure to radiant heat	3 and 5
19	Moderate	▪ risk of ember attack ▪ burning debris ignited by wind embers ▪ likelihood of exposure to radiant heat	3 and 6
29	High	▪ increased risk of ember attack ▪ increased risk of burning debris ignited by windborne embers ▪ likelihood of exposure to a high level of radiant heat	3 and 7
40	Very high	▪ increased risk of ember attack ▪ increased risk of burning debris ignited by windborne embers ▪ likelihood of exposure to a high level of radiant heat ▪ some likelihood of direct exposure to flames	3 and 8
FZ	Extreme	▪ extremely high risk of ember attack ▪ extremely high risk of burning debris ignited by windborne embers ▪ likelihood of exposure to an extreme level of radiant heat ▪ likelihood of exposure to flames from the fire front	3 and 9

A BAL–low is the preferred rating, requiring no additional building construction requirements; it applies to building lots 100 m or more from classified vegetation. For those properties within 100 m of the classified vegetation, a BAL rating of 12.5 or higher will apply according to the vegetation type, slope and distance.

Minimum distances between building walls and vegetation for each BAL rating and slope class are calculated from the edge of the classified vegetation to building walls, which acts as a building separation zone with a low fire fuel load.

Strategies that assist with implementing a suitable building separation zone can include the following:

- strategic firebreaks
- road reserves
- clearing and landscaping
- minimum set back distances from property boundaries to building walls.

The above have been considered when determining BAL ratings for the proposed subdivision, noting that ratings apply to an entire lot, not a part thereof. Minimum distances for each BAL rating for the vegetation types identified during site assessments is provided in Table 4 (0° slope).

Table 4: Minimum distance (metres) to vegetation for BAL ratings (upslope or flat land)

BAL Rating	Pine Plantation (A)	Low Woodland (B07)	Open Scrub (D14)
BAL–12.5	42 - <100	29 - <100	27 - <100
BAL–19	31 - <42	20 - <29	19 - <27
BAL–29	21 - <31	14 - <20	19 - <13

4.5 BAL Assessment

The BAL assessment was undertaken for all lots within 100 m of classified vegetation at Lot 9140. The evaluation takes into consideration the following:

- slope
- current lot layout for the subdivision site
- projected fill requirements in order to provide an even surface to build on
- recommended clearing and landscaping designed with fire mitigation strategies in mind
- location of offsite vegetation.

4.5.1 BAL Assessment in Vicinity of POS to be Maintained as Bushland

Bushland will be retained within the public open space (POS) located on the Western Boundary of the site. This area is characterised by Low Woodland (B07) which has an extreme fire hazard rating. Figure 20 provides BAL ratings for blocks adjacent to the POS and which incorporates a 4 m buffer around the reserve along with a 20 m buffer adjacent to the local centre. Note that the local centre to the south of the western POS is considered to be in the BAL–29 zone if it was designated for housing. However, assessment of this portion of the site will come through adherence to the Building Code of Australia and consideration of the centre layout at a later planning stage. The following BAL ratings will apply to those Lots in the vicinity of the western POS and associated buffer areas:

- 205 lots will be rated BAL–12.5
- 8 lots will be rated BAL–19
- 7 lots will be rated BAL–29
- 20 additional lots will be rated as BAL–19 provided that there is a 3 m minimum property setback
- all other Lots are BAL-low.

4.5.2 Northern Lots Adjacent to Lot 902 and Wanneroo Golf Course

Low Woodland (B07) is located to the north of the proposed subdivision within Lot 902 and the grounds of Wanneroo Golf Club. Flynn Drive and a road reserve within the subdivision will act as a low fuel zone between houses and the vegetation. The distance from the first row of houses to the woodland is between 55 and 68 m, meaning a BAL–12.5 will be applied for any properties within 100 m of the vegetation. This measurement is based on the assumption that the vegetation within the road reserve along Flynn Drive (Figure 17) is to be cleared as per the Metropolitan Region Scheme; if this vegetation is retained during property development a reassessment of the BAL will be required.

Figure 17: Vegetation along Flynn Drive that is to be cleared as per the Metropolitan Region Scheme

4.5.3 Lots Adjacent to Pine Forest

Properties within 42 m of pine plantations (Figure 18) are allocated a BAL–19 rating; five blocks within the proposed development are located between 45 m and 47 m of the Pine Forest east of the development. These lots have been highlighted in Figure 20 and have tentatively been assigned a BAL–19 rating; this may be reduced to BAL–12.5 after considering minimum property setbacks in consultation with the City of Wanneroo and/or DFES. All other blocks within 100 m of the pine plantation have been allocated a BAL–12.5 rating to mitigate the risks associated with smoke and ember attack. Old Yanchep Road runs along the subdivision boundary and will act as a low fuel zone between houses and the classified vegetation.

Figure 18: Pine plantation located to the north-east of Lot 9140 Flynn Drive, Banksia Grove

4.5.4 Lots Adjacent to Open Scrub

Compared to woodlands and forests the Open Scrub (D14) vegetation type has lower BAL setback requirements. A total of 46 blocks occur within 100 m of the vegetation and as a result would normally receive a BAL–12.5 rating. However, this vegetation type is currently dominated by coloniser species and occurs where pine trees have been removed; as the vegetation becomes established it will become more like an Open Woodland (B07) resulting in blocks adjacent to the bushland that would receive a BAL–19 rating. Accordingly, consideration of future growth will need to be given to the BAL rating in this situation. It may be necessary to manage fuel loads adjacent to properties as the vegetation matures.

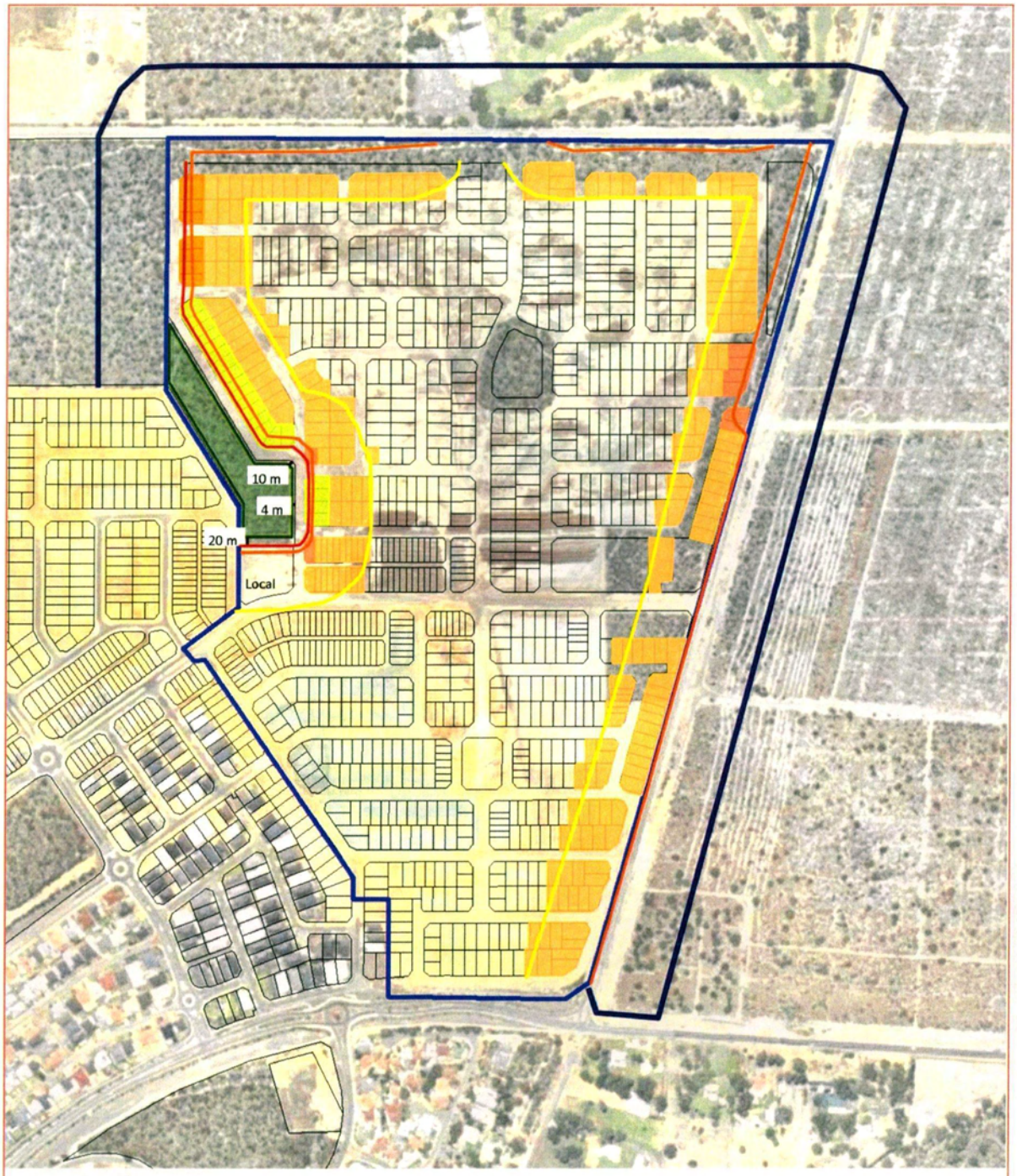
4.5.5 Properties Adjacent to Bush Forever Site 295

Bush Forever Site 295 is located to the west of the proposed development (Figure 19) and contains the Low Woodland (B07) vegetation type. A road will be constructed along the site boundary immediately adjacent to the vegetation and will act as a low fuel zone between houses when they are constructed (Figure 4). The first row of houses is within 15 - 18 m of the vegetation, thus a BAL–29 rating will apply to these lots. One property will have a BAL–19 rating as it is within 20 m of the reserve, all other lots within 100 m will have a BAL–12.5 rating.

Figure 19: Properties within 20 m of Bush Forever Site 295 will receive a BAL–29 rating

4.6 Other Fire Management Measures

All other POS areas within the subdivision will be landscaped, with the vegetation maintained to keep the bushfire risk low. It is recommended two vehicle access gates are installed along the boundary of the Bush Forever site to allow access for fire responders. Access to vegetation will also be provided by Flynn Drive, Old Yanchep Road and Joondalup Drive.



Legend

BAL-12.5 rated Lots	BAL-29 setback line	Lots that will receive BAL-19	Site boundary		
BAL-19 rated Lots	BAL-19 setback line	Rating based on 3 m property setback	Assessment area boundary		
BAL-29 rated Lots	BAL-12.5 setback line	Western POS area			

BAL-ratings
Lot 9140 Flynn Drive Banksia Grove

Client: Banksia Grove Development Nominees
Project: Fire Management Plan - Lot 9140 Flynn Drive, Banksia Grove
Image Date: 2015
Image Source: NearMap, MNG
Datum: GDA94

N

0 290
metres

Figure 20: BAL ratings, Lot 9140 Flynn Drive, Banksia Grove

5.0 Fire Protection Elements and Performance Criteria

The *Planning for Bushfire Protection Guidelines 2nd Edition* (Western Australian Planning Commission *et al.*, 2010) describes the objectives and underpinning principles for bushfire protection in subdivisions. The objectives of the guidelines are to:

- identify areas where fire presents a risk to people and property and determine the hazard level applying to those areas
- avoid increased risk to people and property through the appropriate consideration of the fire risk during the subdivision design process
- ensure the subdivision considers the appropriate fire protection requirements and includes the fire protection measures specified in risk areas.

The principles underpinning the guidelines are:

- bushfire hazards must be considered throughout the planning process to ensure the risk to people and property is reduced
- local government authorities need to broadly identify bushfire hazard levels within their local planning strategies and schemes
- development within locations with an extreme bushfire hazard or attack level between BAL–40 and BAL–FZ should be avoided unless appropriate fire protection strategies can be implemented to the satisfaction of the WAPC, DFES and/or the local government authority
- areas with an extreme bushfire hazard where more intensive development is planned and considered to be unavoidable must have permanent hazard reduction measures implemented to the satisfaction of the WAPC, DFES and/or the local government authority
- structure plans in areas with moderate or extreme bushfire hazard levels must be supported by an assessment of the bushfire risk to ensure compliance with the performance criteria and acceptable solutions.

As development proceeds, all sites within 100 m of bushland areas will need to meet the criteria associated with an extreme bushfire hazard rating through the adoption of performance criteria and acceptable solutions as described in the bushfire protection guidelines. However, the site will also need to be managed during the staging of development activities, both situations will be described in this section.

5.1 Element 1 – Location

Intent: **To ensure that development /intensification of land use is located in areas where the bushfire hazard does not present an unreasonable level of risk to life and property.**

The majority of properties within the proposed development will be located in areas where the fire risk is manageable, as much of the site will be cleared during the development process. The subdivision is adjacent to areas of woodland to the west and north, pine forest to the east and scrubland to the south-east. The bushfire risks associated with building properties within 100 m of classified vegetation can be managed through the application of an appropriate BAL rating, as outlined in Section 4.5. Buildings on the western boundary adjacent to Bush Forever Site 295 will have a BAL–29 rating. If the western public open space (POS) is maintained as bushland additional properties will be allocated BAL–29 ratings and the lot identified as a local centre would be classified as BAL–FZ if it was to become lots for housing. This site will need to be

reviewed from a public building perspective and managed under the Building Code of Australia, as well as taking into consideration the building layout in proximity to the vegetation. Properties within 31 m of the pine plantation on the eastern boundary will have a BAL–19 rating. All other lots within 100 m of the classified vegetation are rated as BAL–12.5.

5.2 Element 2 – Access

Intent: **To ensure that vehicular access within a subdivision/development is safe in the event of a bushfire occurring.**

The development will have interconnected roads forming a grid pattern with no cul–de–sacs. The following performance criteria solutions can be demonstrated within the proposed subdivision (Western Australian Planning Commission *et al.,* 2010):

- a large neighbourhood connector that joins the development with the existing subdivision to the west, Old Yanchep Road to the east and Flynn Drive to the north
- more than two access routes are provided from the proposed subdivision to the existing road network
- public roads will meet the minimum requirements summarised in Table 5
- no permanent cul-de-sacs are planned
- no battleaxe blocks are planned
- no private driveways will be more than 50 m from a public road
- all lots will be urban lots
- access gates will be installed along the north-western boundary of the subdivision allowing allow access by fire fighting personnel to Bush Forever 925.

Table 5: Vehicle access standards to assist with bushfire protection

Standard	Public Roads	Comments
Minimum trafficable surface	6 metres	
Horizontal clearance	6 metres	
Vertical clearance	4 metres	
Maximum grade	1 in 8	
Maximum grade over <50 m	1 in 5	
Maximum average grade	1 in 7	
Minimum weight capacity	15 tonnes	
Maximum crossfall	1 in 33	
Curves minimum inner radius	12 metres	
Turning head	21 metre diameter for cul–de–sacs	
Signage	Not required	
Gates (vehicle access gates)	Two will be installed along the boundary between the subdivision and Bush Forever Site 295	
Personnel entry gates	Not required	
Design and construction	Approved by City of Wanneroo	
Turn around areas	Not required	

5.2.1 Fire Breaks and Emergency Vehicle Access Ways

If the western public open space (POS) is maintained as parkland no vegetation will be located within the proposed subdivision; as such, the installation of firebreaks or the construction of emergency vehicle access ways will not be required. Emergency access will be provided by the network of trafficable roads throughout the subdivision. Firebreaks are to be installed on adjacent properties in accordance with City Wanneroo requirements. If bushland is retained within the POS, access to the site will come from the trafficable road around the park.

5.3 Element 3 – Water

Intent: **To ensure that water is available within the subdivision to assist with defending life and property in the event of a bushfire.**

All houses within the subdivision will be connected to the Water Corporation's reticulated drinking water supply network. Hydrants connected to scheme water will be installed throughout the subdivision and are required:

- approximately every 200 m within the residential portion of the subdivision, including along roads where the greatest fire risk exists
- to comply with the *Water Corporation Design Standard 63* (Water Corporation, 2014).

Hydrants will need to be clearly identifiable, with markings installed by the developer prior to sign off. Hydrants will be marked with:

- blue 'cats eye' reflective indicators to the left of the centre line of the road
- small blue 'H' painted on the curbing
- white and red stripes around the power pole nearest to the hydrant.

Clearance on the placement of hydrants will be required from the Department of Fire and Emergency Services (DFES) and the Water Corporation. Hydrants or markings must not be covered or removed by contractors during works at the site. If they are covered over or damaged it will be the responsibility of the contractor to rectify the situation.

5.4 Element 4 – Siting of Development

***Intent*:** **To ensure that the siting of the development minimises the level of bush fire impact.**

Bush Forever Site 295 and Lot 902 will remain permanent bushfire hazards located to the west and north of the development. The pine plantation and scrubland to the east of the site also represents a bushfire hazard. Despite the presence of these vegetated areas, the development can be managed in a manner that minimises the level of bush fire impact through the of application fire management strategies.

5.4.1 Hazard Separation Zone – Moderate to Extreme Hazard Levels

The aim of the guidelines is to ensure that the siting of the development minimises the level of bush fire impact on properties in higher risk areas. For buildings within fire prone areas, an ideal hazard separation zone of at least 100 m between vegetation and building walls that includes a 20 m building protection zone is preferred (Figure 21) Where that is not possible, the construction standards within *AS 3959 –2009 Construction of Buildings in Bushfire Prone Areas* can be applied, as is the case for buildings on the northern,

eastern and potentially the western boundary of the subdivision. This allows the distance between buildings and the classified vegetation to be decreased; however, the construction standard must be increased in accordance with the assigned BAL level.

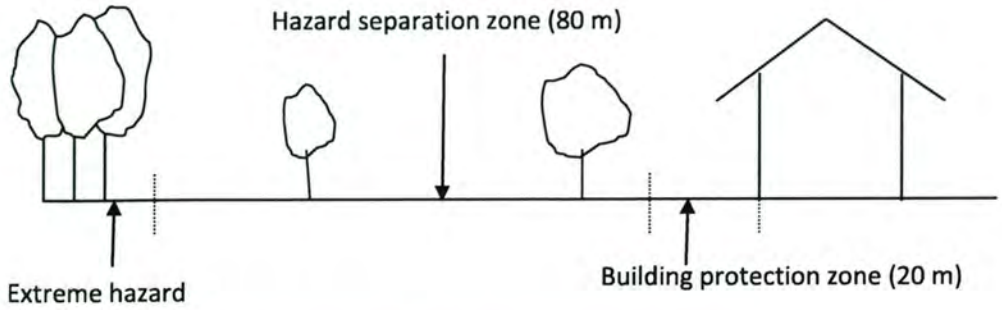


Figure 21: Ideal hazard separation zone between vegetation and buildings

The subdivision of the balance of Lot 9140 Flynn Drive, Banksia Grove has been designed to provide appropriate hazard separation and building protection zones between the offsite vegetation and building walls that incorporate the assigned BALs determined in accordance with Amendment 2 of AS 3959 –2009 (Figure 22). The hazard separation zone will provide a minimum 20 m building protection zone, and generally incorporate:

- a 15 m road reserve that will include paved road surface, kerbing, and pedestrian access ways
- a minimum 5 m building protection zone from the lot boundary to building wall
- additional distance to vegetation, as specified by AS 3959 –2009.

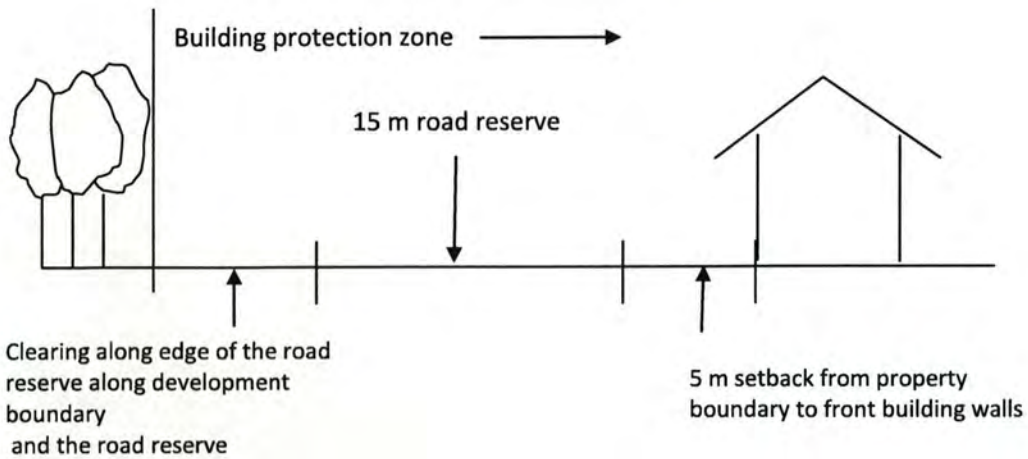


Figure 22: Reduced Hazard Separation Zone and Building Protection Zone in accordance with AS 3959 –2009

Those lots requiring construction that meets building requirements detailed in AS 3959 –2009 could expect to add a minimum of 4 - 10% additional costs for housing, with the actual cost dependent on the BAL, materials chosen and the builder engaged to carry out the work. Potential owners of these lots will need to be advised that there are additional building requirements to be met during the sales process. The relevant construction standards detailed in AS 3959 –2009 are provided in Table 6, buildings will need to comply with relevant sections of the Standard, such as Sections 3 and 5 or Sections 3 and 6.

Table 6: Construction level vs Bushfire Attack Level

BAL	AS 3959 –2009 Construction level		
Low	None specified	↓	Increasing requirements and associated construction costs
12.5	Sections 3 and 5		
19	Sections 3 and 6		
29	Sections 3 and 7		
40	Sections 3 and 8		
FZ	Sections 3 and 9		

(Source: AS 3959 –2009)

The relevant construction standards detail the requirements for:

- subfloor supports
- floors,
- external walls
- external doors, windows and other glazed elements
- roofs, including those of verandas, garages, and carports
- verandas, decks, steps, ramps and landings
- water and gas supply pipes.

5.4.2 Building Protection Zone

The aim of the building protection zone is to reduce the immediate threat to buildings and other infrastructure from fire. The building protection zone for the lots assigned a BAL rating will range from a minimum of 15 m to a maximum of 45 m from building walls, as specified elsewhere within this Fire Management Plan. Within this area:

- fuel loads will be reduced and maintained at no more than 2 tonnes per hectare
- tree crowns will be a minimum of 10 m apart
- lower branches of trees and shrubs are trimmed to reduce the potential of ignition from ground fires
- trees and shrubs will not be planted in clumps, kept to a height of less than 2 m and be a minimum of 2 m away from buildings
- have no dead material within the crown
- fences and sheds will be constructed from non-combustible material, such as colourbond, brick or limestone.

It should be noted that AS 3959 –2009 indicates that construction requirements for the next lower BAL may be applied where a wall is not exposed to the source of the bushfire attack because other portions of the building act as shielding (Figure 23). In an area determined to be BAL–19, walls not immediately facing the fire threat can be constructed in accordance with BAL–12.5. Note that no lessening of construction standards can occur in areas assessed as BAL–12.5.

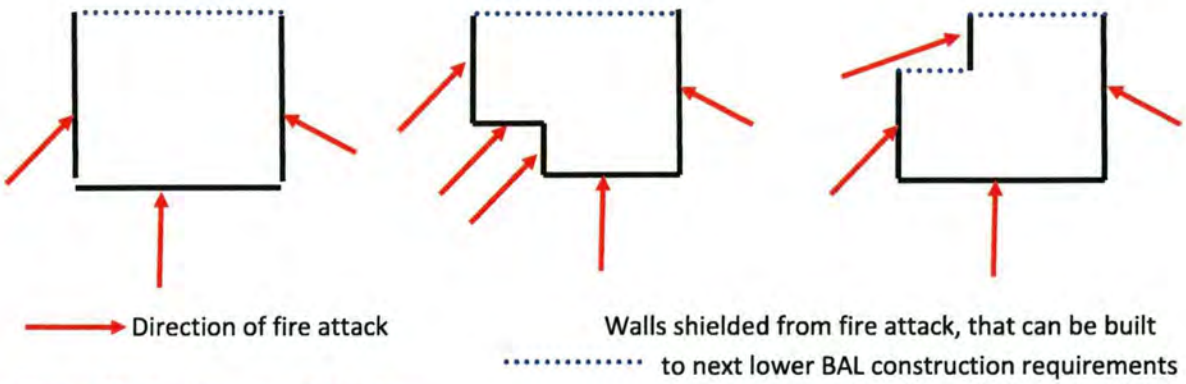


Figure 23: Shielding and BAL rating

5.4.3 Education

Housing in close proximity to the vegetated areas will always be subject to some risk from the effect of a fire, particularly smoke, radiant embers and potentially spot fires. It is recommended that lot owners within 1 km of the vegetation, particularly those with a BAL rating, are made aware of the potential risks and what to do in the event of a fire, such as:

- informing DFES as soon as a fire is noticed
- turning off evaporative air conditioners, or if possible, continue running water through the unit with the fan turned off
- if evaporative air conditioners haven't been used prior to smoke being detected, it is advisable to wet the filter pads with a garden hose or run the unit to wet the filter pads, then turn it off when smoke appears overhead
- ensuring accessibility is maintained to enable easy movement of emergency vehicles.

It is also recommended that residents are supplied with a copy of the current edition of the FESA publication *Survive –The Home Owner's Bush Fire Survival Manual* (2008). This information can be provided along with other information during sale negotiations with purchasers and material provided by the City to residents on a regular basis.

5.5 Element 5 – Design of Development

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

Except for the areas identified as being in proximity to classified vegetation (Figure 20), the design of the development complies with Element 4: Siting of Development. Properties that are exposed to a fire hazard are to comply with requirements of *AS 3959 –2009 Construction of Buildings in Bushfire Prone Areas*. The highest BAL within the development area is potentially BAL– 29 while all other properties were identified as BAL–19 and BAL–12.5. Note that consideration will need to be given to the local centre in terms of complying with the Building Code of Australia and general layout in proximity to vegetated areas if the western POS area is retained as bushland.

5.5.1 Assessment of Fire Management Strategies

The risk assessment process is composed of three key stages to determine the level of risk of damage to property and people in the event of fire within the proposed subdivision. The stages involved with the risk assessment process include:

- risk identification – identify and document the potential risks and impacts associated with the occurrence of fire at the site
- qualitatively ranking potential environmental impacts to establish relative significance
- establishing and documenting control measures to mitigate against potentially significant impacts.

Risk ranking is generally undertaken by assigning numeric likelihood and consequence levels to each identified risk issue. A risk matrix is presented based on the likelihood and consequence criteria outlined in Tables 7, 8 and 9. Once the level of risk has been determined, risks can be prioritised. For all significant risks, strategies should be established to ensure that the adequate controls are implemented (Table 10).

Table 7: Risk assessment likelihood descriptor

Level	Likelihood	Description
1	Rare	Very unlikely / may occur only in exceptional circumstances
2	Unlikely	Known to have occurred at some time
3	Probable	The event will probably occur, or has occurred under some conditions
4	Likely	The event is expected to occur under some conditions or has occurred more than once in recent years
5	Almost certain	The event is a common or frequent occurrence

Table 8: Risk assessment consequence classification

Level	Consequence	Description
1	Insignificant	Confined to immediate area, rapid clean–up, no damage to housing, or people
2	Minimal	Confined to isolated area, rapid clean–up, minimal damage, minor injuries
3	Moderate	Impact confined to the boundaries of the site or other vegetated area, clean–up may require external assistance, moderate damage or injury
4	Major	Major damage, significant but non–life–threatening injury, impacts within 1 km of site or vegetated area boundary, considerable clean–up using range of resources.
5	Catastrophic	Severe damage, loss of life, extensive clean–up and recovery period, requires ongoing operators and external resources

Table 9: Risk assessment matrix

		Consequence				
		1	2	3	4	5
Likelihood		Insignificant	Minor	Moderate	Major	Catastrophic
5	Almost certain	5	10	15	20	25
4	Likely	4	8	12	16	20
3	Moderate	3	6	9	12	15
2	Unlikely	2	4	6	8	10
1	Rare	1	2	3	4	5

- Extreme risk; immediate action required
- High risk; senior management attention needed
- Moderate risk; management responsibility must be specified
- Low risk; manage by routine procedures

The nature of the site and the proximity of offsite vegetation to be retained mean that the strategies described in this plan represent the best available options to reduce the risks associated with bushfire. Rapid response to fires within the vegetated areas will remain a key measure that will assist with limiting the spread of fire within and beyond the site boundary. Education of the community will contribute to the effectiveness of response measures. Outcomes of the risk assessment process and potential management strategies are shown in Table 10.

Table 10: Risks and management strategies

Issue	Potential Impact	Raw Risk			Management Strategies	Residual risk		
		Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level
Housing in areas in close proximity to vegetated areas								
Access to vegetation	▪ Difficulty responding effectively to fire within Bush Forever Site 295 ▪ Greater potential for fire spread before control ▪ Potential damage to nearby houses and residents	4	3	H	At the appropriate stage of development and to the satisfaction of the Wanneroo: ▪ Formalise access to Bush Forever Site 295 through the installation of two access gates along the subdivision boundary ▪ The City of Wanneroo ensures firebreaks are maintained on property adjacent to the development through its normal administrative processes ▪ Bush Forever site land manager maintain fire fuel loads at an acceptable level	2	2	L
Presence of taller vegetation within pine plantation	▪ Means of assisting spread of fire ▪ Transportation of embers and smoke at rooftop height	4	3	H	▪ Rapid response ▪ Resident and community education	2	2	L
Proximity of housing and residents to vegetation	▪ Damage and/or injury to housing, people, pets, environment	3	4	H	▪ Comply with AS 3959 –2009 ▪ Community awareness and education ▪ Rapid response ▪ Installation of gates along north-western subdivision boundary to allow emergency response access to Bush Forever Site 295	4	2	M

Issue	Potential Impact	Raw Risk			Management Strategies	Residual risk		
		Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level
Offsite vegetation								
Differing vegetation type in locations beyond site boundaries	• Fire occurring within offsite vegetation • Larger and more persistent embers from woody vegetation, with greater potential for movement within the air	2	3	M	• Relevant land managers/owners maintaining appropriate firebreaks and fire fuel loads in accordance with City of Wanneroo administrative requirements • Application of AS 3959 –2009 construction standards where appropriate for lots within 100 m of classified vegetation • Installation of gates along boundary between the reserve and the subdivision	2	2	L

5.6 Fire Protection – Subdivision Staging

The Fire Management Plan has the aim of ensuring the proposed development is designed with due consideration for fire safety. The developer also needs to ensure the protection of property and the environment during the various stages of construction. Each stage will incorporate a series of fire protection requirements until the subdivision is completed, including:

- clearing vegetation prior to building houses
- ensuring weeds are kept low around the development through the application of herbicide and slashing.

5.7 Implementation

Implementation of this Plan will commence immediately and will be the responsibility of the developer, Banksia Grove Development Nominees, until such time as relevant portions of the site are formerly handed over to the City of Wanneroo or the new owners of the lots. When installed, maintenance of any fencing, gates and access points will become the responsibility of the City of Wanneroo, with the ongoing maintenance requirements needing to be incorporated into annual budgeting processes. Likely tasks that will be involved with the implementation of this plan are described in Table 11.

Table 11: Implementation schedule

Activity	Responsibility	Maintenance	Responsibility
Ensuring bushfire protection of land and property during the various stages of the development	Developer	Clearing on-site vegetation and maintaining low fuel zones during staging activities	Developer
Installation of gates along north-west boundary of the subdivision	Developer	Ongoing as required	City of Wanneroo
Assessing fire fuel load within western POS and implementing mitigation strategies	Developer	Reducing fire fuel load in western POS as required	Developer until handover to the City of Wanneroo
Assessing and responding to fire fuel loads within offsite vegetated areas	Land manager or their delegate	Ongoing as required	Land manager or their delegate
Education	Developer and City of Wanneroo	Updating materials and information to reflect current policies, plans, knowledge, or accepted practice	Developer –during sale process City – during normal administrative activities to residents and rate payers
FMP review	Developer in consultation with City of Wanneroo	Ensure continued suitability of FMP by reviewing contents in conjunction with current site conditions	Developer

5.8 Plan Review

This Fire Management Plan has been developed based on current conditions at the site, but recognises that changes can occur over time and may be subject to review during further design processes. It is recommended that this plan be reviewed twelve months after initial endorsement and implementation to ensure its continued suitability and in the event any of the following occur:

- a fire occurs within the site boundary or a neighbouring property that spreads to the site
- if significant changes to the design occurs that would alter BAL ratings or other acceptable fire management solutions.

6.0 Summary

As development within the subdivision area at Lot 9140 Flynn Drive, Banksia Grove proceeds, a number of current fire management risks will be reduced through the clearing of vegetation; however, the classified vegetation around the proposed development represents a fire hazard to homes within 100 m. The network of roads within the subdivision is considered to be a key component in fire management. It is important that potential owners are advised of the building requirements as a means of minimising that risk.

6.1 Responsibilities

Responsibilities for bushfire preparedness and response within the development area at Lot 9140 are shared by the City of Wanneroo, the developer, DFES, and building owners.

6.1.1 Developer Responsibilities

The Developer is responsible for implementing key portions of this Fire Management Plan, including:

- considering bushfire hazards and risks associated with offsite vegetation during the subdivision design process and ensuring the risks are as low as reasonably possible
- providing appropriate information, including a copy of this Fire Management Plan, to potential purchasers and owners of lots within the development that have a BAL of 12.5 or greater to inform them of the bushfire risks and minimum building construction requirements
- arrange for the Section 70A notification on the titles of lots subject to this Fire Management Plan.

6.1.2 City of Wanneroo Responsibilities

It should be noted that the City of Wanneroo has the responsibility and powers under the Town Planning Scheme and the *Bush Fires Act 1954* to ensure that this Fire Management Plan and any special orders issued under the *Bush Fires Act 1954* are complied with. The City of Wanneroo will be responsible for:

- maintaining district fire-fighting facilities
- maintaining City equipment and apparatus for fire-fighting purposes in good condition
- providing appropriate advice for fire management to the developer and property owners
- ensuring appropriate information is included on titles of lots with a BAL of 12.5 or greater.

6.1.3 DFES Responsibilities

DFES will be responsible for:

- maintaining fire-fighting equipment in good condition and repair
- responding to fires within vegetated areas around the development in a timely manner in an effort to minimise the spread of fire and potential damage to nearby housing from ember attack.

6.1.4 Owner Responsibilities

It is the responsibility of individual property owners building houses near the vegetated areas to:

- maintain their property in a manner that minimises the potential for smoke and ember attack from nearby bushfires
- include ember shields for evaporative air conditioners
- recognise that fire appliances may not be available in the event of a large bushfire occurring
- respond to advice from the City of Wanneroo, DFES, or the developer in relation to maintaining properties in a manner that will reduce potential damage from ember attack.

7.0 References

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Appendix 1 Glossary

AHD	Australian Height Datum
AS	Australian Standard
BAL	Bushfire Attack Level
Building protection zone	Low fuel area immediately surrounding buildings (usually 20 m wide)
°C	Degrees Celsius
DFES	Department of Fire and Emergency Services (previously FESA)
DoP	Department of Planning
FESA	Fire and Emergency Services Authority (now DFES)
FMP	Fire Management Plan
FZ	Fire zone, or area where property or similar is under threat from flames
ha	Hectare
Hazard separation zone	area around buildings, including outbuildings, that has a reduced fire fuel loading as a means of reducing potential damage from bushfire, ideally 100 m from buildings to vegetation
km	Kilometres
kmh	Kilometres per hour
m	Metres
mm	Millimetres
NAC	Natural Area Consulting
pa	Per annum
VFSFB	Volunteer Fire Service Fire Brigade
WAPC	Western Australian Planning Commission

Appendix 2 Compliance Criteria for Performance Criteria and Acceptable Solutions

Element		Compliance						Report Section(s)	Response (if required)
		If 'no' to any element or sub-element, explain in writing how the proposal satisfactorily complies with the performance criterion P1 for this area of non-compliance and provide with this checklist							
Compliance with Element 1: Location									
The subdivision/development is located in an area where the bush fire hazard is manageable									
A1.1	The subdivision/development is located on land that is not subject to either an extreme bush fire hazard land classification or requires construction standards to BAL-40 for BAL-FZ	Yes		No	✓	N/A		4.4, 4.5, 5.1	
Compliance with Element 2: Vehicular access									
The internal layout design and construction of public and private vehicular access in the subdivision/development allows emergency and other vehicles to move through it easily and safely at all times									
A2.1	Two access routes – two different vehicular access routes, both of which connect to the public road network, are available to all residents/the public at all times	Yes	✓	No		N/A		5.2	
A2.2	Public roads must meet minimum requirements	Yes	✓	No		N/A		5.2	
A2.3	Cul-de-Sacs must meet minimum requirements	Yes		No		N/A	✓	5.2	No cul-de-sacs planned
A2.4	Battle axes must meet minimum requirements	Yes		No		N/A	✓	5.2	No battle-axe blocks planned
A2.5	Private driveways must meet minimum requirements	Yes		No		N/A	✓	5.2	No private driveways expected
A2.6	Emergency access ways must meet minimum requirements	Yes		No		N/A	✓	5.2	Access will be via gazetted roads within subdivision
A2.7	Fire service access routes must meet minimum requirements	Yes		No		N/A	✓	5.2	Access will be via gazetted roads within subdivision
A2.8	Gates must meet minimum requirements	Yes	✓	No		N/A		5.2	Comply with City of Wanneroo requirements
A2.9	Firebreak widths must meet minimum requirements	Yes	✓	No		N/A		5.2.1	Comply with City of Wanneroo requirements
A2.10	Signs must meet minimum requirements	Yes		No		N/A	✓	5.2	

Compliance with Element 3: Water									
The development is provided with a permanent and secure water supply that is sufficient for fire fighting purposes									
A3.1	Reticulated areas – the development is provided with a reticulated water supply, with fire hydrants in accordance with the specifications of the relevant water supply authority and FESA	Yes	✓	No		N/A		5.3	
A3.2	Non reticulated areas – water tanks with a hydrant or standpipe are provided and meet minimum requirements	Yes		No		N/A	✓		
A3.3	A dam or dams with permanent water all year is provided and meets minimum requirements	Yes		No		N/A	✓		
Compliance with Element 4: Siting of Development									
The siting (including paths and landscaping) of the development minimises the bush fire risk to life and property									
A4.1	Hazard separation – moderate to extreme - Every building is sited a minimum of 100 m from any classified vegetation or has its construction standard increased to align with the appropriate bush fire attack level for that location as per AS3959	Yes	✓	No		N/A		5.4.1	Construction standards as per AS 3959 – 2009 will apply to nominated areas
A4.2	Hazard separation – low bush fire hazard level – every building is a minimum of 20 m from any classified vegetation	Yes	✓	No		N/A		5.4.1	As above
A4.3	Building protection zone – every building is surrounded by a building protection zone that meets minimum requirements	Yes	✓	No		N/A		5.4.2	As above
A4.4	Hazard separation zone – every building and its contiguous building protection zone is surrounded by a hazard separation zone that meets minimum requirements	Yes	✓	No		N/A		5.4.1	As above
A4.5	Shielding – a reduction in the bush fire attack level due to shielding from direct flame contact or radiant heat via a stand-alone non-combustible structure shall be given consideration when meeting nominated conditions	Yes	✓	No		N/A		5.4.2	

Compliance with Element 5: Design of Development									
The design of the development is appropriate to the level of bush fire hazard that applies to the development site									
A5.1	Compliant development – development that complies with acceptable solutions A4.1, A4.2, A4.3, and A4.4 require no further special design requirements	Yes	✓	No		N/A		5.5	Construction standards as per AS 3959 – 2009 will apply to nominated areas
A5.2	Non-compliant development – for development that does not comply with acceptable solutions there is no acceptable solution and must be assessed under performance criterion P5	Yes		No		N/A	✓		

Applicant Declaration

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

Full name: Susan Catherine Brand

Applicant signature: Susan Brand

Date: 08 April 2015

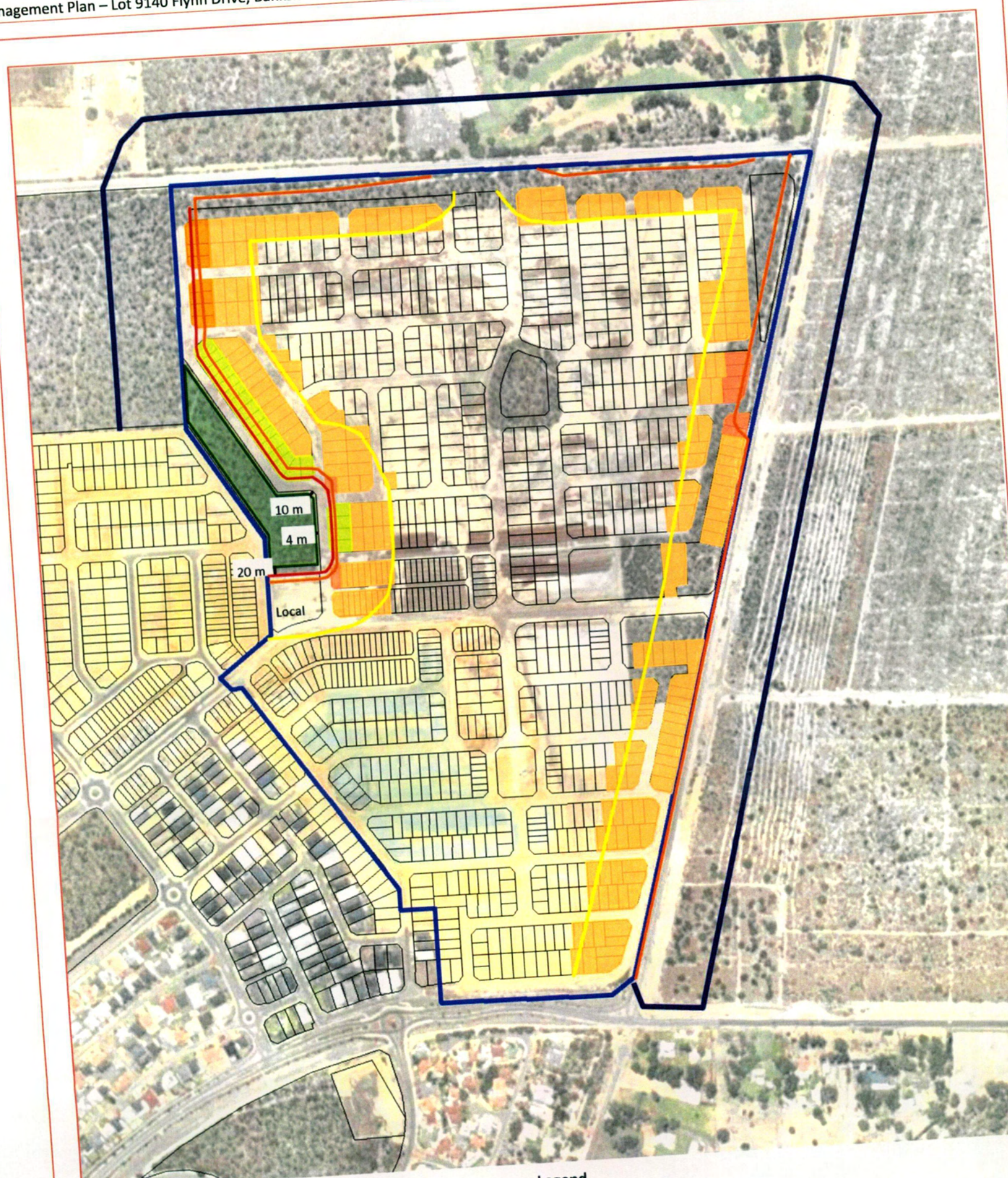

Figure 20: BAL ratings, Lot 9140 Flynn Drive, Banksia Grove