FIRE MANAGEMENT PLAN

Proposed subdivision of Lot 71 and Lot 700- Darch

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1. INTRODUCTION

This Fire Management Plan has been written using the Model Fire Management Guidelines per the joint FESA/Dept of Planning "Planning for Bushfire Protection" May 2010 where these were considered appropriate.

The land involved comprises Lots 71 and Lot 700, Lansdale Road, Darch in the City of Wanneroo and has an area of 2.1 hectares. The proposal is to subdivide the area into 26 individual lots with separate titles and 24 units in a cluster arrangement. Currently the land supports only veldt grass, weeds and lupins and three trees and the intention is to clear the two Lots totally before development commences.

On the east side the property adjoins a road reserve on which a northern extension of Mirrabooka Avenue will be constructed in the future. East of the road reserve is a well developed suburb not capable of supporting a fire. To the south is a Western Power substation with a mostly bitumen ground surface which would not support a running fire. There is a potential source of a fire from the facility in the event of an explosion or electrical arcing but according to Western Power the likelihood of this happening is low. Many power lines enter the substation and run along the east and south side of the property.

The property is bounded on the north side by Landsdale Road and on the north side of Landsdale Road there is a patch of vacant private land sloping away to a valley. This land is covered with weeds plus a few trees and clumps of shrubby vegetation. It is possible under the influence of a northerly wind that a fire could burn up this valley and throw embers into Lots 71 and 700. In time it is highly likely this vacant land will be built upon and the fire threat from this direction will disappear.

The main fire threat to the property is along its western boundary where it adjoins Landsdale Park Conservation Reserve, a "Bush Forever" property of about 10 hectares and vested with the Shire of Wanneroo. This is typical Banksia woodland of the northern coastal plain. Much of the reserve was severely burnt about two years ago and is now largely thick with regenerated scrub species. Because the fire was so hot it is unlikely to carry a fire for the next two or more years.

Discussion with the Conservation Maintenance section in the City of Wanneroo indicates that the intention is to carry out fuel reduction burning in all native bushland reserves within the City including the Bush Forever Reserve adjoining Lots 71 and 700. The year of the next burn is not certain as the City prefers to decide when to burn based on fuel sampling to determine the quantity of fuel that has accumulated. FESA guidelines are also used to decide when the fuel level has reached the stage where protective burning in the cooler months of the year will be scheduled. As is the case in much of metropolitan Perth, burning has its detractors which makes burning a political as well as a technical issue and it to their credit that the City of Wanneroo is not opposed to the burning of reserves provided burning is carried out in a professional manner and considers the environmental values represented in a reserve.

Provided burning in response to fuel sampling measurements continues and burning is carried out before or when fuel quantities reach the FESA recommended upper limit of 8 tonnes per hectare the intensity of a summer bushfire burning in Banksia woodland fuels should be such that fire fighting crews have a reasonable prospect of suppressing a wildfire burning in the reserve under summer conditions. The prospect of effective suppression will be increased if instead of burning the reserve in a single burn the area is divided into a number of cells each of which can be burnt in different years resulting in the reserve always containing a mix of fuel ages. There is however no guarantee and nor will the City of Wanneroo commit (nor is legally requirement) to carry out fuel reduction burning of the reserve in the future and the owners of Lots 71 and 700 has no authority or legal power to demand burning takes place. Consequently housing construction and the safety of future residents on Lots 71 and 700 has to take into account that an uncontrolled fierce fire in the reserve burning in long unburnt fuels is a possible scenario which needs to be planned for. The history of past fires in Banksia woodlands has been that once fuel levels build up beyond 5-7 years of age it is almost inevitable once a source of ignition, strong winds and high summer temperatures coincide that a fierce fire occurs.

2. AIM OF THIS PLAN

Bush fires have always been a part of the environment on the Swan Coastal Plain. With the extension of urban development the impacts of bushfires has diminished due to tracts of native vegetation being replaced by housing and other urban infrastructure. The exception is where urban development adjoins or is surrounded by remnant areas of native or exotic vegetation carrying moderate to high levels of fuel. Urban areas can also be at risk from bushfires that are burning intensely as they approach the interface between bushland fuels and or pine plantations and the suburbs. This was graphically illustrated at Canberra in 2003 when fires burning north of the Federal Capital showered burning embers into the outer suburbs and destroyed several houses before the fires were contained.

The aim of this plan is to set down the responsibilities of all parties and the measures that need to be taken that will reduce:

- The risk of fires starting on Lots 71 and 700
- The impacts of wildfires on residents and housing on these Lots from fire originating on the Lots.
- The impact of wildfires on adjoining land from a wildfire originating on the Lots.
- The impact of wildfires on residents and housing on the Lots from fires burning in the Landsdale Park Conservation Reserve.

Protection of human life must take priority over other all other assets. Buildings and equipment can be insured against loss and replaced, rare plant and animal species may be reintroduced, but human lives are irreplaceable.

3. OBJECTIVES

There are two main objectives dealt with in this plan.

3.1 To ensure the safety of residents and housing on Lots 71 and 700 Landsdale Road from damage from bushfires.

3.2 To minimise the possibility of fire escapes from Lots 71 and Lot 700 into Landsdale Park Conservation Reserve or other adjoining areas.

4. DESCRIPTION OF THE AREA

4.1 General

The land is typical of the northern sandplain. The dune country is infertile sand which drains freely but in the swales soils commonly contain organic matter and stay moist for much longer than in upslope dune country. Swamps and lakes are common on the lowest water gaining sites. Most of the land in the locality has been cleared in the past for urban use, mainly for housing. There are parks and golf courses and there are still some market gardens operating.

In the long term most vacant land is likely to be converted to housing or other urban use.

4.2 Climate

The climate is Mediterranean characterised by relatively mild winters and a long dry summer with temperatures sometimes exceeding 40 degrees C during summer. On most summer days a sea breeze in the afternoon results in a drop in temperature, but an increase in strong gusty winds. Most of the rainfall occurs during the months of May to July with usually negligible rain from December to March unless a local thunderstorm occurs. Consequently fuels in Banksia woodlands can readily burn from December to April depending on when the break of the season occurs.

4.3 Topography

The land is largely flat to gently undulating with slopes $<10^0$ on the remnant sandy dunes of the Bassendean Dune series with swamps and lakes common in the swales.

4.4 Bushfire fuels

Where housing or other urban infrastructure has replaced the original Banksia woodlands and swamp vegetation, bushfire fuels no longer exists. Any significant area of remnant Banksia woodlands will continue to accumulate fuel and can sustain a hot bushfire under summer conditions.

4.5 Land use

As described in Section 4.1 and illustrated in the aerial photo of the locality (see Appendix One), housing and other urban infrastructure is the main land use except for some residual Banksia woodlands, market gardens and sporting areas including a golf course.

4.6 Assets

The major assets are housing and other urban infrastructure. These are normally only threatened by fires close to or adjoining remnant native vegetation except if a major bushfire to the north showered burning embers into urban areas.

4.7 Access

The locality is well served by existing main access roads and streets. A new major road (an extension of Mirrabooka Avenue) is proposed in the future.

4.8 Water supply

All the urban developed areas are connected to the mains water supply system. Market gardens and golf courses commonly tap into the upper aquifer with bores for irrigation use. The Bassendean Dunes which support the remnants of the banksia woodlands are very dry sands which drain very freely whilst the water gaining sites in depressions between the dunes are often moist all year.

5. FIRE PROBLEM

5.1 Bushfire history

Fires would have occurred regularly prior to housing development in this area, but these days fires are confined to the remnant stands of Banksia woodlands as in Landsdale Conservation Park where fuel reduction in the past has only occurred as a result of summer bushfires.

5.2 Bushfire risk

The risk of bushfires occurring in the remnant native vegetation of Landsdale Park Conservation Reserve is high whenever long-unburnt fuels are present. Otherwise the risk of bushfires is low because urbanisation has replaced the vegetation that normally burns in a bushfire.

5.3 Bush Fire Hazard

Once fuel levels in remnant areas of Banksia woodlands such as Landsdale Park Conservation Reserve reach 8 tonnes per ha (normally 5 or more years of accumulation since the last burn) they are highly flammable. During summer, fires burning in these fuels will spread rapidly, often from west to east under the influence of a strong sea breeze. But winds from other quarters can also result in high rates of spread. Under these conditions and when fuel levels

reach 8 tonnes per hectare the prospects of suppressing a fire before the entire area is burnt out are unlikely.

5.4 Bushfire threat

There are two threats from bushfires to this property:

- There will be a threat to housing adjoining or close to areas of long unburnt Banksia woodland fuels, especially those downwind of a fire burning in summer when a strong sea breeze is blowing. Reducing the fuel quantity by a regular fuel reduction burning program will reduce this threat considerably.

- If a major bushfire was burning to the north and if a northerly wind was blowing, it is possible that burning embers could fall into the property.

5.5. Summary of bush fire potential issues

There is little the developer could do to reduce the number of fires starting. The measures outlined in Section Six, e.g. firebreaks and encouraging the City of Wanneroo to prepare a strategic burning plan and carrying out fuel reduction burning in remnant areas of Banksia woodlands are the best actions to take. If a fire then occurs it will burn less fiercely due to less fuel available and this helps fire crews control fires without compromising their safety.
The benefits of past fuel reduction burning in slowing the progress of bushfires and their intensity so fire crews can suppress a fire have been documented many times. Burning on a regular basis is very appropriate for the protection of people, assets and the environment. There is good scientific evidence to show that provided burning is planned for and carried out in a professional manner that there are no adverse affects on biodiversity. Much of the WA flora and fauna has evolved in the presence of fire and deteriorates in the absence of mild intensity fire. On the other hand fierce fires of high intensity usually have a long lasting deleterious impact on biodiversity.

6. FIRE MITIGATION STRATEGIES

6.1 Hazard management

Native vegetation fuels should not normally exceed 8 tonnes per hectare to ensure fire crews have a reasonable prospect of controlling a fire under summer conditions and without placing themselves in unnecessary danger.

Fuel reduction burning is the only practical method of reducing fuels over large areas of native vegetation such as Banksia woodlands. The Local Authority is best placed to prepare a strategic burning plan for areas under their jurisdiction, and to carry out the necessary burning under mild conditions on fine days during winter.

6.2. Bushfire Risk Management

Restrictions issued by The Bureau of Meteorology on days of extreme fire weather or above for the metropolitan area are adequate. Implementation of the various fire management actions later listed are designed to minimise the impact of fire should one occur. This is a much better approach than relying only on a suppression strategy after a fire starts.

6.3 Future development

Any future developments that adjoin large areas of remnant vegetation need to take into account the fuel loads that build up year after year unless reduced by mild burning. Locating new subdivisions adjoining long unburnt vegetation will always increase the risk of fire damage to people and property unless a fuel reduction burning program is in place.

6.4 Access and fire breaks

These are described in detail for Lots 71 and 700. The road network in the general locality is adequate and in good condition.

6.5 Public Education

Information provided by FESA in their publications "Planning for Bush Fire Protection" and "winter burning" are downloadable free of charge from the FESA website. These answer most queries including what steps individuals can do in the event of a fire occurring and how to carry out fuel reduction burning of small areas of native vegetation. A copy of the FESA publication "Planning for Bush Fire Protection" will be provided to the landowner/tenant upon occupation of the premises. A copy of this Fire Management Plan will be available to the landowner/tenant upon request.

6.6. Fire safer areas

Housing and infrastructure close to native vegetation needs to be located sufficient distance from the vegetation so that in the event of a fire the maximum BAL the buildings will be exposed to will be less than 40, i.e. $< 40kW/m^2$ as set out in "Planning for Bushfire Protection Guidelines-May 2010. Also construction should be according to the specifications set out in ASA 3959-2009, "Building in Bushfire Prone Areas" which for a BAL of 40 are Levels 3 and 8.

Local Government and FESA may accept a fire barrier such as a masonry or brick wall constructed (according to FESA specifications) between the buildings and the vegetation so that the BAL the buildings are less exposed to radiant heat from a fire.

It is possible now that the final report of the Royal Commission into the February 2009 fires in Victoria has been handed down that some changes will be made to ASA 3959-2009. The construction specifications outlined in ASA 3959-2009 for the six BAL levels are never a

guarantee that housing will survive and residents of housing in the proposed subdivision may choose to leave their home before the arrival of a bad fire.

Residents deciding to evacuate before the arrival of a fire need to make that decision early on and not leave their departure until the last minute when smoke will reduce visibility. All doors and windows need to be shut, shutters on windows closed and blinds drawn before leaving.

6.7 Assessment of fire management strategies

At the end of each fire season the body corporate or manager representing the owners of sub lots in the subdivision should review the works program listed in Sections 6.9 and 6.10 and decide if any changes should be made before the following summer and record information on any burning that has taken place in the previous year whether by wildfire or planned fuel reduction burning that will temporarily lower the level of fire risk to all parties in the subdivision.

This Fire Management Plan should be formally reviewed in 5 years time by a person qualified and experienced in rural fire management. Any notes made against items on the Works Programs will provide useful information for whoever carries out the review of this fire management plan in five years time.

6.8 Implementation of the Fire Management Plan

The works program and checklist described in Section 6.7 and detailed in Appendix 7.3 should be used to schedule each item to be carried out and record when it is completed. This should be signed off by the body corporate or manager of the subdivision as each task is completed. In this way the Fire Management Plan becomes a working document and should be stored in a safe place where it is readily located.

6.9 - Specific Fire Mitigation Strategies- Lots 71 and 700 Landsdale Road- Darch

6.9.1 Access and Fire breaks

The existing cyclone fence along the western boundary is actually located within the reserve, and the City of Wanneroo has indicated that it should be removed. To improve fire protection of housing adjacent to the eastern edge of the reserve it is desirable that a fire fighting unit can enter the reserve and either fight an approaching fire directly or wet down the fuel in advance of the fire. To ensure the unit does not become bogged in dry sand the existing fire break needs to be upgraded to year round access standards. They (the City of Wanneroo) intend to allow the current fire accessway/firebreak to naturally regenerate. A new accessway capable of supporting a fully laden heavy duty fire unit (10+tonnes) of crushed limestone along the eastern side of the reserve is to be constructed by the developers (and west of their new

fence).This will be 3m wide, compacted, and have passing bays every 200 metres to allow fire fighting trucks to be able to pass each other. Two gates are also required at the South East (SE) and North East (NE) corner of the reserve to allow entry and exit of a fire fighting truck. These gates are also required to allow exit at either corner for fire crew safety. The gates would be locked and keys held by fire fighting brigades likely to attend a fire in the reserve. Fire crews normally carry bolt cutters so that if keys could not be located in the event of a fire in the reserve they could still gain entry.

A formal request should be made to the City of Wanneroo to:

- Provide two locked gates at the NE and SE corners of the reserve to allow entry and exit at either end by a fire fighting truck.
- Provide keys to the locked gates to fire agencies likely to attend a fire occurring in the reserve and also to the body corporate/or managers of the subdivision.

All the above works to be on the basis that all costs are borne by the developer. Western Power may be prepared to contribute to costs as access for fire units into the reserve to attack and control fires could prevent fire damage to sub station equipment.

6.9.2 Native vegetation - fuel management in the Landsdale Park-Conservation Reserve

In the publication "Fire and ecosystems of south west of WA: impacts and management" (2003), edited by Dr I Abbott and Dr N Burrows of the Department of Environment & Conservation there is a description of the diverse array of adaptive traits possessed by plant and mammal species of the SW region. These enable them to persist in a fire prone environment.

To strike a compromise between protection of life and property and long-term survival of the health of native flora and fauna, periodic fuel reduction burning in the Conservation Reserve is strongly recommended. The City of Wanneroo and FESA have agreed to inspect the fuels in this Reserve regularly to determine when the site is to be prescribed burnt. The Reserve lends itself to being subdivided into a series of cells bounded by existing tracks that would enable fuel reduction burning to be carried out under mild burning conditions in the winter months. This will ensure the whole reserve is unlikely to be burnt out in one fire. The situation in the past where the entire Reserve has been burnt out in a severe summer fire about every ten years is harmful for biodiversity in the Reserve and endangers adjoining housing and residents when a fire occurs.

6.9.3 Grass fuel management

During the development phase on the Lots, weed and grass growth could become a fire hazard to adjoining housing during summer and autumn. To minimise this risk the developers will need to apply a herbicide or physical means to control grass growth in the spring before the fire season commences.

On the north side of Landsdale Road is a patch of vacant private land supporting a growth of weeds and grasses and some native trees. A fire on this area during summer months under the influence of a northerly wind could throw burning embers ahead of the fire front as far as Lots

71 and 700. It is recommended that the developer raises this issue with the City of Wanneroo and requests that the City takes steps to minimise the fire hazard on this block.

6.9.4 Fire equipment

It is not recommended that future residents of housing on Lots 71 and 700 provide themselves with special fire fighting gear. Provided the yards are maintained free of inflammable fuel and a garden hose is available to extinguish embers landing on properties in the event of a summer fire in the Conservation Reserve, this should be sufficient.

6.9.5 Water Supplies

No special provision is required; the mains water supply can provide water to allow owners with garden hoses to extinguish any embers arriving from a fire in the Conservation Reserve.

6.9.6 Building Protection

The Bushfire Attack Level (BAL) to 40 requires a separation distance of >10 metres between buildings and vegetation or provision of a masonry wall to serve as a flame barrier. The City of Wanneroo has agreed to the installation of a 2.2m high colorbond and masonry pier fence along the true boundary of Lots 71 and 700.

The developer has agreed to extend the height of a colorbond and pier wall to 2.2m along the western and southern sides of Lots 71 and 700.

Table Two on pages 13 and 14 summarises the distance from fire hazards impacting on the proposed subdivision from the North, South East and West. Also shown are the owner/manager of the fire hazard, the recommended hazard management method, the Bushfire Attack Level (BAL) and the construction level required for the respective BAL. The 2.2m high colorbound and pier wall along the western and southern boundaries of Lots 71 and 700 will protect housing facing the southern boundary from flames and embers if a fire was burning in the SE corner of the reserve.

This Fire Management Plan acknowledges that the owners/managers of land adjoining or close to Lot 71 and 700 are not obliged to carry out the bushfire protection measures recommended in this plan, such as fuel reduction burning in the Conservation Reserve. Consequently measures have to be taken that will provide protection to people and buildings if the reserve burns under severe conditions when carrying a fuel load >8t/hectare.

Planning for Bush Fire Protection, a joint publication of FESA and the Dept of Planning and Infrastructure. Edition 2 of May 2010 lists guidelines for house and building protection outside the building itself. For housing in rural areas the first 20 metres surrounding the perimeter of the house or other buildings (termed the building protection zone or BPZ) is required to be a low fuel zone, This means the zone being kept free of all inflammable material during the fire season e.g. firewood or fuel drums must not be located within the BPZ. Gas bottles need to be stored in an insulated covered box so they will not be exposed to direct heat from flames. The first two metres adjoining the building must be kept virtually fuel free.

Clearly these requirements cannot be met on the sub lots in this proposed subdivision as each sub lot size is too small relative to the size of the house. Nevertheless the principle should be

followed by each sub lot owner to maintain house surrounds free of flammable material that could be ignited by embers from a hot fire burning in the Conservation Reserve.

Table Two: Distance to fire hazards from the perimeter of proposed sub lots
Fire hazard management responsibility- owner of sub lot or corporate body.
Fire hazard management responsibility - other property owners or authorities.

Direction from house	Metres to fuel hazard from external perimeter of housing	Fuel type	Owner/Agency of Fuel hazard	Fuel management required	Bushfire Attack Level (BAL)	Building Construction Level required
North	40m to vegetation on north side of Landsdale Rd along drainage line.	Grass, weeds and paperbark trees	Owner Lot No	Manage fuel build up by herbicide sprays in Spring	LOW-< 12.5	No special construction required.
South	18 m	Western Power substation Possible arcing of power in dense smoke	Western Power.	Western Power to control annually any grass and weeds Maintain sub station in good condition.	LOW- < 12.5	No special construction required, only regular maintenance.
South	10m	Banksia woodland	City of Wanneroo	Monitor ground fuel loadings and undertake reduction burning when appropriate.	BAL 29 with fuel reduction programme (8 tonnes per ha)	Recommend maximum 8t/ha of fuel in reserve.
East	35m	Weeds and grasses on Road verge of future extension of Mirrabooka Avenue.	City of Wanneroo	Herbicide to be applied in Spring annually until roadwork Extensions are completed.	LOW-< 12.5	No special construction required
West	11.0	Banksia woodland	City of Wanneroo	Monitor ground fuel loadings and undertake reduction burning when appropriate.	BAL 40 with fuel reduction programme (8 tonnes per ha)	Recommend maximum 8t/ha of fuel in reserve.

Table Two: (Continued).Distance to fire hazards from the perimeter of proposed sub lots
Fire hazard management responsibility- owner of sub lot or corporate body.
Fire hazard management responsibility - other property owners or authorities.

Direction	Metres to	Fuel type	Owner/Agency	Fuel	Bushfire	Building

from house	fuel hazard from external perimeter of housing		of Fuel hazard	management required	Attack Level (BAL)	Construction Level required
West	11.0	Banksia Woodlands	Developers	Construct houses to ASA standard	BAL 40 for sub lots 1-11, with fuel reduction programme (8 tonnes per ha)	3 and 8 for sub lots 1-11 if FESA accepts a 2.2 m high colourbond wall as a flame barrier
NSE	All housing on subdivision	Banksia woodland	Owners/.residents of all housing on the subdivision	Ensure no build up of inflammable material on each sublot	BAL 19 for all Lots except 1-11 (BAL 29)	Sub lot owners to keep their Lot free of inflammable material during the fire season
South	10 -14	Banksia woodland	Developer	Colorbond wall for 32m from SW corner as a flame barrier to protect S edge of sublots 10 and 11	BAL 29 with Colorbond wall	2.2 m minimum height

6.9.7. Building construction levels- sub lots on Lot 71 and Lot 700

A 2.2m high colorbond and masonry pier wall is to be constructed to ensure buildings on sub Lots 1-11 are only subject to a BAL of 40 (Building Level 3 and 8) if an uncontrolled fire in the reserve approaches the boundary between the reserve and sub lots 1-11.

The remaining proposed buildings on the development are further than 20 metres from the vegetation in the reserve and would only be exposed to a BAL of 29 or less from a severe fire burning in the reserve. Consequently constructing these buildings to a Level 3 and 7, or Level 3 and 6 specifications would be adequate.

The relationship between distance between different vegetation types and the exterior of buildings and the BAL the buildings would be exposed to from a hot fire is shown below. The woodland vegetation is applicable to the Banksia woodland fuels in the Bush Forever Reserve adjoining Lots 71 and 700.

Determination of Bushfire Attack Levels (BAL)- FDI 80 (Western Australian conditions)					
Vegetation classification	Bushfire attack Levels (BAL's)				
	BAL-FZ	**BAL-40**	**BAL-29**	**BAL-19**	**BAL- 12.5**
	Distance (m) of the site from the predominant vegetation type				
	For flat ground- O degree slope				
Forest	< 16	16-< 21	21-< 31	31-< 42	42-< 100
Woodland	< 10	10-< 14	14-< 20	20-< 29	29-< 100
Shrubland	< 7	7-< 9	9- < 13	13- <19	19-< 100

6.9.8 Other Fire Protection measures

To protect the rear of houses on proposed sub lots 1-11 from direct flame attack from a fire in the Conservation Reserve a 2.2m high colorbond and pier wall will be erected by the

developer on the western edge of the property facing the reserve. This fence will also extend along the southern boundary of Lots 71 and 700. The actual height of the colorbond and pier wall has been agreed to by FESA and City of Wanneroo. It is desirable that the colorbond and pier wall continues south along the boundary of the Western Power substation to prevent flame and embers from entering the southern parts of Lots 70 and 700. Gates or access ways through the colorbond wall at the rear of sub lots 1-11 should not be provided as it could provide access into the reserve and a potential for children from experimenting with fire and inadvertently setting the conservation reserve alight.

7. SUMMARY OF RECOMMENDATIONS

7.1 The City of Wanneroo will, after approval :

- Allow for a 3 metre wide compacted limestone accessway/firebreak to be constructed along the eastern boundary of the reserve and capable of supporting a fully laden heavy duty fire unit (10+tonnes) and with passing bays at 200 m intervals or as advised by FESA.
- Removal of the current cyclone fence (in incorrect position).
- Provide locked gates at the NE and SE corners of the reserve to allow safe entry and exit at either end for fire fighting trucks.
- Provide keys to the locked gates to fire agencies likely to attend a fire occurring in the reserve and also to the body corporate/or managers of the subdivision.
- Undertake Annual inspections to monitor ground fuel loadings.

Disclaimer
Neither the Developer nor the Consultant preparing this Bushfire Management plan take responsibility for the impacts of a future bushfire on any values at the proposed development... We have done our best in this Plan to alert everyone to the threat of bushfires, and to suggest measures to minimise these threats and potential bushfire damage, but there may occur an unusual combination of events or human actions or lack of actions which could not reasonably have been expected at the time of Plan preparation. Neither the Developer nor the Consultant take responsibility for the standard of bushfire preparedness or damage mitigation undertaken.

Appendix 8.1: Aerial overview of locality and land use surrounding Lot 70 and Lot 700

Appendix 8.2: Proposed subdivision of Lot 71 and 700


Remnant vegetation
Landsdale Road
Proposed future sublots
Mirrabooka Ave
2.2 m high colourbond and pier fence
Bushland Forever Conservation Reserve
Proposed future sublots
4m wide limestoned accessway
Existing accessway
Western Power Substation
Hepburn Avenue
1
2
3
4
5
6
7
8
9
10
11

Appendix 8.3- Proposed sub lot layout –Lot 70 and 700 Landsdale road

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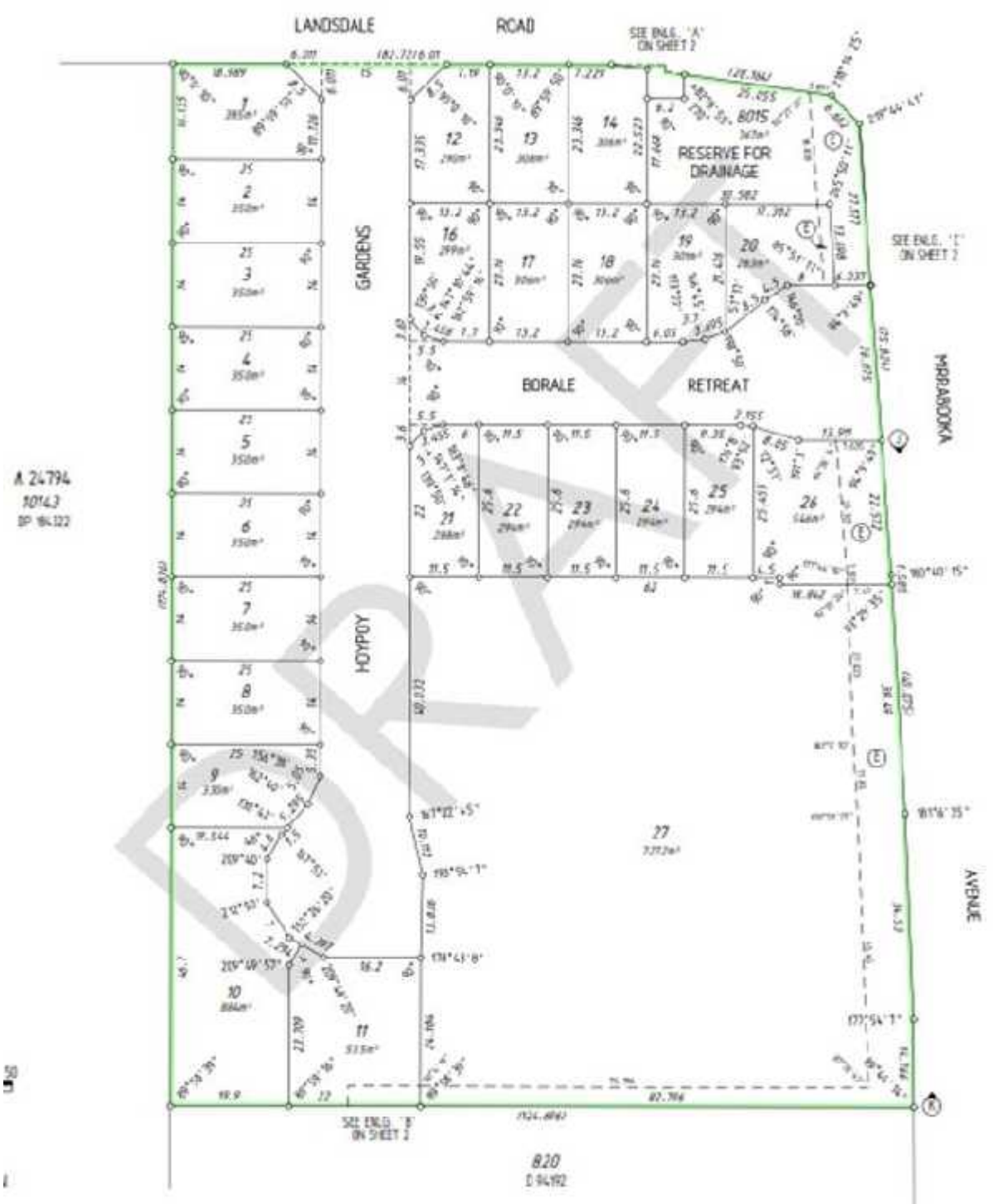

Appendix 8.4 – Site detail, western boundary


Current accessway to be revegetated
Current fence position (to be removed)
Lot western boundary and 2.2m high fence position. Colourbond and piers.
4m Limestoned accessway
Correct location boundary
Edge of buildings setback (2.4m from boundary fence)
10m setback
3 m
4 m
3.0 m
2.2m high Colourbond and pier fence.

Appendix 8.5 – Yearly Works Program

Responsibility- owner/managers of sub lot

Responsibility - other property owners or authorities.

Task	Timing Date to be Completed	Specifications	Signed & date Complete	Signed & date Complete	Signed & date Complete	Signed & date Complete	Signed & date Complete
4m wide access road in reserve at rear of sub lots1-11	Nov 30th	Check for clear access, gates Ok, locks OK					
Fence at rear of sub lots 1-11 to withstand a flame attack.	Nov 30th	Check condition and suitability to withstand a flame attack.					
Debris build up surrounding exterior of all housing on sub lots and group housing	Nov 30th	Manager/ body corporate to remind tenants/owners to keep exterior of houses free of debris including leaves in gutters during fire season.					
Building construction level	Nov 30th	Check that all housing still complies with ASA 3959 levels as at time of construction.					
Leaves in gutters	Weekly in fire season	Keep free of leaves					

The ASA3959-2009 construction specifications for buildings likely to be exposed to increasing levels of BAL are summarised below:

Bushfire Attack Level (BAL) kW/m^2	**Construction specification**
< 12.5	No special requirement
12.5	Level 3 and 5
19	Level 3 and 6
29 (Max level normally used by FESA)	Level 3 and 7
40	Level 3 and 8
FZ (Flame zone)	Level 3 and 9

8.6 Guidelines and specifications

8.5.1 General

The publications listed in 7.4.1 were referred to in preparation of this Plan and Lot owners may need also to refer to them. In most cases these guidelines and specifications can be downloaded free of charge by visiting the Home Page of the agency or organisation concerned. The exception is ASA 3959-2009 "Construction of Buildings in Fire Prone areas" which has to be purchased.

When an ASA document is purchased from SAI Global by paying a licence fee ($75 for ASA 3959-2009) the licence holder is restricted in copying and distributing all or part of the document. This is unfortunate as it prevents the inclusion of parts of ASA 3959-2009 in this Plan. It is recommended that the developer and the body corporate or manager of the proposed subdivision each purchase a copy, bearing in mind that ASA 3959-2009 may be revised after release of the Victorian Royal Commission Final Report into the February 2009 bushfires.

Most guidelines and specifications change over time. The FESA/Dept of Planning guidelines can be downloaded free of charge ex the FESA website. Each year before the fire season the body corporate or manager of the subdivision should call a meeting of owners and their tenants to remind them on measures to protect their assets by cleaning up debris from the exterior of housing, removing leaves from gutters and what to do in the event of a fire in the Conservation Reserve, e.g. shut windows, doors and if deciding to leave to leave early.

8.5.2 Guidelines referred to in preparing this plan.

- **Planning for Bushfire Protection- guidelines Edition 2-May 2010.** A joint publication by FESA and WA planning Commission. Freely d*ownloadable from the FESA website*

- **City of Wanneroo:** Fire and Ranger information, contacts etc ex the City website.

- **ASA 3959-2009- Construction of buildings in bushfire prone areas.** *Downloadable from SAI Global website for a fee of about $75. This standard is a revision of ASA 3959-1999 made in the aftermath of the Victorian bushfires In February 2009. May be revised again after the release of the final report of the Vic Royal Commission.*

8.7 Glossary of fire terms

There are several glossaries available to help explain bushfire terms. The Australasian Fire Authorities Council's "Glossary of Rural Fire Terminology" is a 25 page document used mainly in the Eastern States. This can be downloaded by visiting website www.cfs.org.au The Bushfire Front has a comprehensive fire terminology glossary more relevant to WA. It can be downloaded free from http://bushfirefront.com.au.

These documents are not included in this Fire Management Plan because of their size.

8.8 References

References used in preparation of the Fire Management Plan in addition to the documents listed in 7.4 Guidelines and Specifications are:

- **1985: Forest Fire Behaviour Tables for Western Australia**. Department of Conservation and Land Management. R.J Sneeuwjagt and G.B Peet. This is the definitive work on fire behaviour in native forest type fuels in the South West of WA and covers fuel reduction burning and fire suppression strategies using a series of Tables to determine when effective and safe burning is possible, how to carry out fuel reduction burning and also how to calculate rates of spread of bushfires to plan fire suppression.

- **1997: Grassfires-fuel, weather and fire behaviour**. CSIRO Bushfire Behaviour and Management Group. P Cheney and A Sullivan

- **2003: "Fire and ecosystems of south west of WA: impacts and management**", edited by Dr I Abbott and Dr N Burrows of the Department of Environment & Conservation.

Appendix 8.9 - Fire Management Plan – Compliance Checklist

Element Number	Does the proposal comply with the performance criteria by applying acceptable solution as below.	Yes/No	If No, explain how the proposal satisfactorily complies with the appropriate performance criterion. Attach additional information if required.
1. Location.	Ditto A 1.1	Yes	
2. Vehicular access.	Ditto A 2.1	Yes	
	Ditto A2.2	Yes	
	Ditto A 2.3		
	Ditto A 2.4	N/A	No Battleaxes
	Ditto A 2.5	Yes	
	Ditto A 2.6	Yes	
	Ditto A 2.7	Yes	
	Ditto A 2.8	Yes	On Bushforever site only
	Ditto A 2.9	Yes	On Bushforever site only
	Ditto A 2.10	Yes	On Bushforever site only
3. Water	Ditto A 3.1	Yes	Hydrants and reticulated water supplies comply with FESA and Water Corp standards

	Ditto A 3.2	N/A	
	Ditto A 3.3	N/A	
4. Siting of development	Ditto A 4.1	Yes	BAL rating for dwellings on the western boundary (sublots 1 – 11) is BAL 40. All other sublot BAL ratings are max of 29, ranging to 12.5 (Low). Suitable protection for sublots 1 – 11 will be via a 2.2m high colorbond metal fence. Instalation of this fence ahs been discussed and agreed to with FESA and City of Wanneroo officials.
	Ditto A 4.2	Yes	No grassland adjacent
	Ditto A 4.3	Yes	Building Protection Zone Standards will be implemented for Sublots 1 – 11
	Ditto A 4.4	Yes	Not applicable. Insufficient space for HSZ in builtup residential areas.
5. Design of develoment	Ditto A 5.1	Yes	Development is designed and will be established to the level of the bush fire hazard, especially in relation to Sublots 1- 11 on western boundary.
	Ditto A 5.2	N/A	Development meets all appropriate standards

Application Declaration.

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

Full name. John Stewart Evans, South West Fire Service, 1 Norman road, Busselton, WA 6280.

Applicant signature…  …. Date …15 June 2011…