Clarence City Council

Bushfire Management Plan

Waverley Flora Park
Mornington/Bellerive

Revised
January 2017
Clarence City Council

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1.Introduction

This Bushfire Management Plan (BMP) is the second revision and expansion of the previous BMP for Waverley Flora Park (WFP) prepared by AVK Environmental Management and North Barker Ecosystem Services and will operate for a period of 5 years after which another review is recommended.

It should be noted that this BMP is not an operations plan and does not deal directly with "response" to bushfires. Operational procedures are dealt with in various documents prepared by the Tasmania Fire Service (TFS) and other emergency services.

1.1 Aim

The aim of this BMP is to provide a framework for bushfire management that meets Clarence City Council's land management objectives for the site, as set out in Council's *Bushfire Management Strategy for Council Owned and Controlled Land*, *Bushfire Management Strategy - Best Management Practice Guidelines* and Strategic Plan.

It must be noted that it will not be possible to prevent bushfires occurring in the reserve. Unless these fires are suppressed quickly, there is a risk that large destructive fires may develop. Depending on weather conditions, such fires may burn a substantial portion of the bushland in and adjoining the reserve causing damage to assets and environmental values, and even loss of life. This BMP aims to lessen these risks by minimising the risk of fires starting in the reserve, and minimising the risk of injury or damage to assets in and surrounding the reserve.

This plan also provides for the use of fire as a management tool to:

- Target area for maximum risk reduction
- reduce bushfire hazard to protect assets from bushfires
- maintain the long-term viability of the native vegetation in the reserve
- assist in the removal of weeds and the regeneration of degraded bushland.

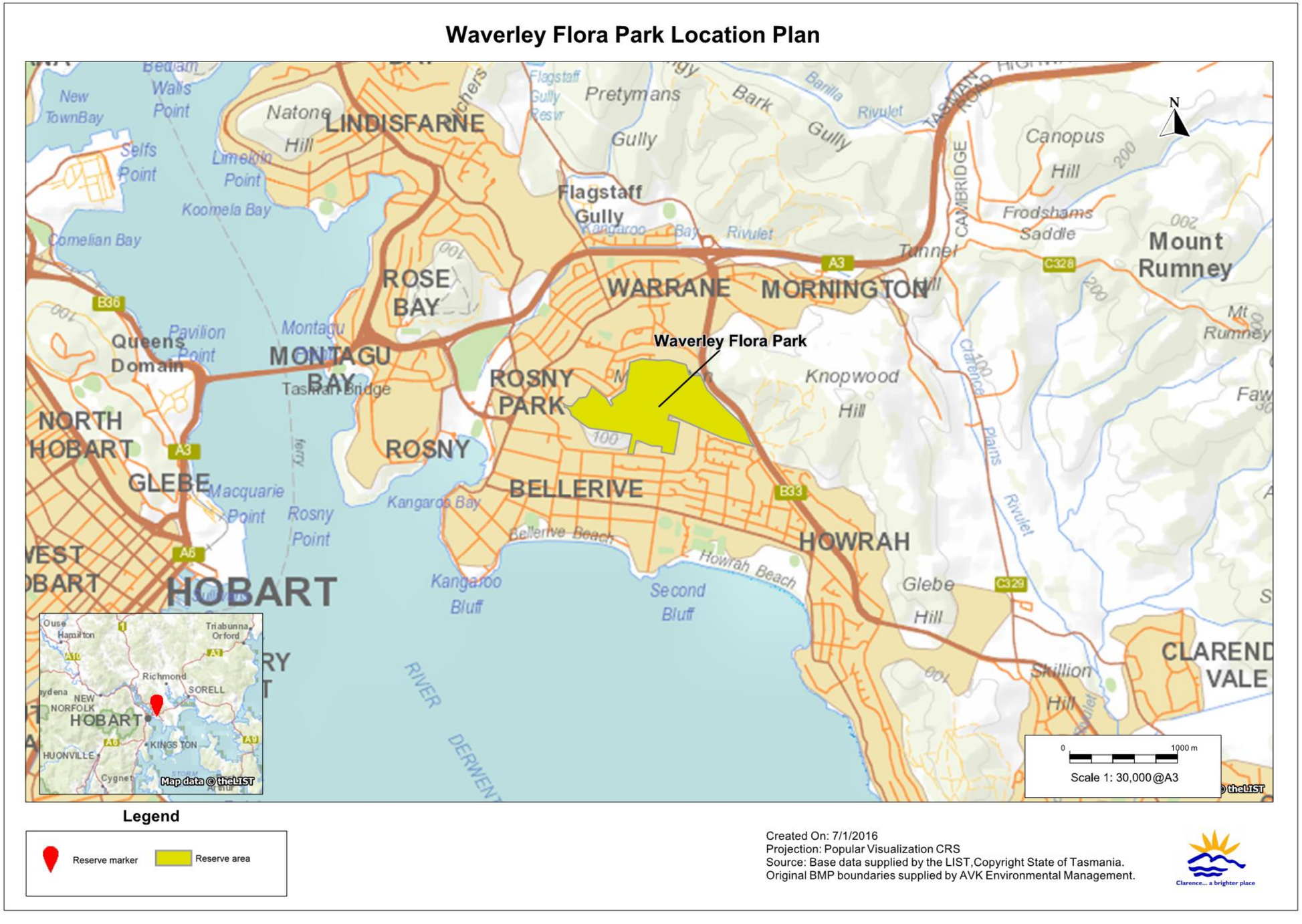
1.2 Location and Description

Waverley Flora Park covers 82^{ha} within the suburbs of Bellerive (south) and Mornington (north) (see figure 1). The South Arm Highway runs along the eastern boundary of the park and separates it from bushland areas on Knopwood Hill.

The park is situated on an east-west ridgeline and includes two prominent hills, Mornington Hill (165 metres) and a lower knoll (125 metres) connected by a broad saddle. The park is highly visible from most parts of the Hobart/Clarence region, and comprises a substantial portion of the forested ridgelines on the eastern shore of the Derwent River.

Waverley Flora Park has been mapped as a bushfire-prone area under the *Clarence Interim Planning Scheme 2015.* Any future developments within or adjacent may require a Bushfire Risk Assessment and a Bushfire Hazard Management Plan.

Figure 1 – Location of the park



1.2.1 Geology and Soils

The geology of Waverley Flora Park consists of three distinct formations (de Gryse, 1999).

Permian mudstone behind Alford Street adjacent to the South Arm Highway. Soils on this substrate are thin and well drained.

Lower Triassic sandstones which form most of Mornington Hill. This rock has been quarried at a number of points around the hill. Soils on this substrate are variable in thickness and usually well drained.

Jurassic dolerite which forms most of the western portion of the park. Soils on this substrate are relatively fertile compared to other soils in the park, but quite thin.

1.2.2 Vegetation

The major vegetation communities in the park are shown in figure 2. Vegetation types and community boundaries within the park are based on TASVEG 3.0 mapping, checked and modified where required following a survey of the park. Vegetation community boundaries outside the park have not been checked for accuracy but are shown to give an indication of the surrounding vegetation. The majority of the vegetation in the park has a shrubby woodland structure with *Eucalyptus amygdalina* forest and woodland on sandstone (DAS) the dominant plant community. Other vegetation communities include *Eucalyptus ovata* forest and woodland (DOV), *Eucalyptus viminalis* grassy forest and woodland (DVG) and *Allocasuarina verticillata* forest (NAV). There is also a small area of lowland *Themeda* grassland (GTL) in the western part of the park.

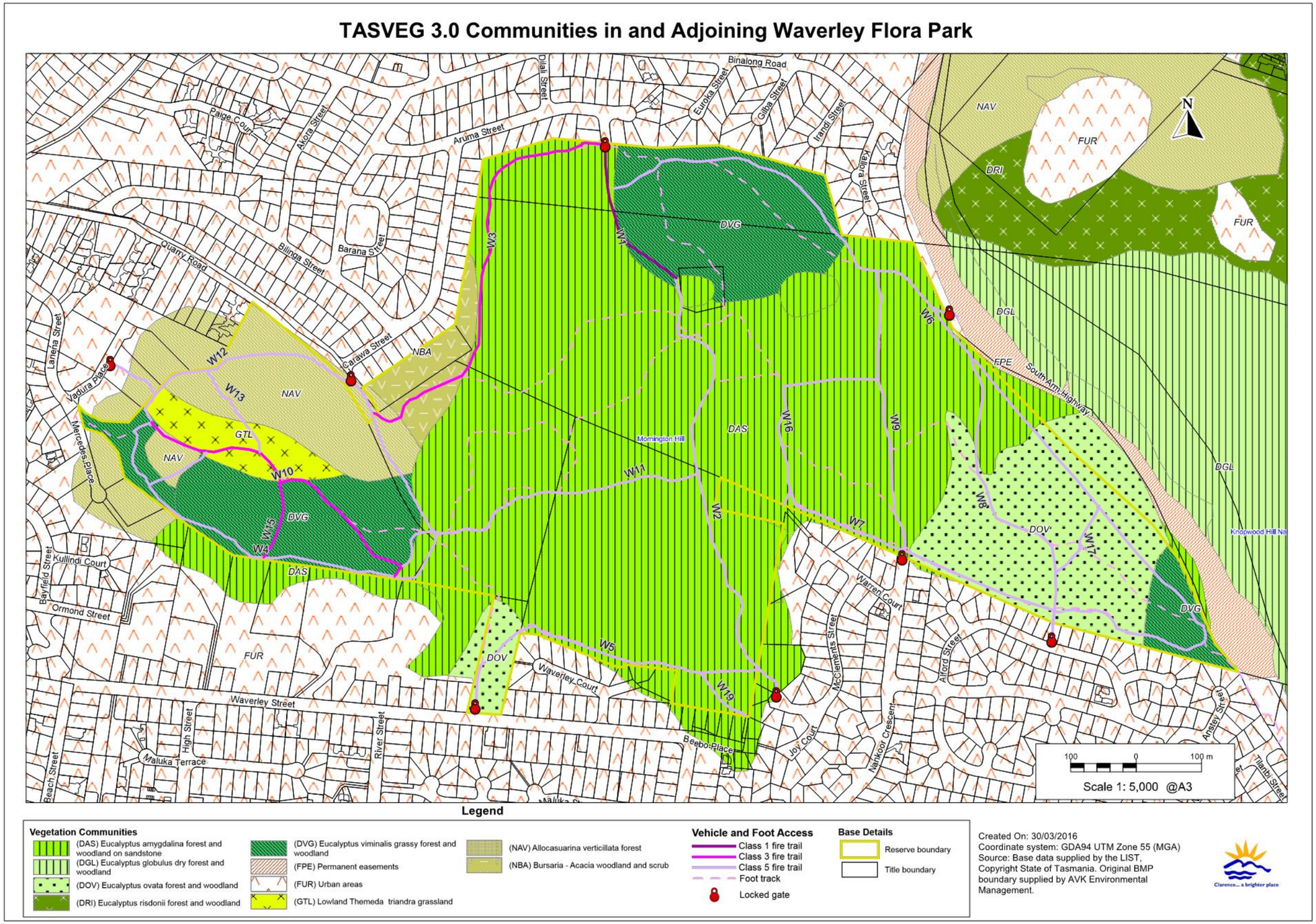
Eucalyptus amygdalina forest and woodland on sandstone (DAS) and *Eucalyptus ovata* forest and woodland (DOV) are listed as threatened native vegetation communities under the *Nature Conservation Act 2002.*

A detailed assessment of the vegetation in the park was undertaken by de Gryse (1990), and updated in de Gryse (1999). This included an assessment of the level of disturbance, woody-weed invasion and population dynamics. In addition, Clarence City Council engaged Tasflora to develop a Reserve Activity Plan (RAP) for Waverley Flora Park in May 2013. This document has been in place since May 2013 and due for review in 2018.

1.2.3 Park Usage

Waverley Flora Park is an important recreational area for activities such as; walking, bike riding, dog exercising, jogging, bird watching and flora enthusiasts. The Waverley Street entrance to the park has a small children's play park maintained by Council.

Figure 2 – Vegetation types in the park



1.3 Bushfire Management Objectives

Bushfire management within Waverley Flora Park will meet the following broad management objectives:

1. Protection of life, assets and adjoining property from bushfire
2. Minimise the risk of fires starting and spreading in the park
3. Protection and enhancement of the ecological and visual values provided by the park
4. Protection of infrastructure and cultural heritage values within the park
5. Recovery, maintenance and enhancement of vegetation communities and fauna habitat within the park
6. Minimisation of soil loss resulting from fire, or bushfire management activities.

The actions recommended to attain each of these objectives are listed in section 5.1.

1.4 Park Management Responsibilities

Management of the park is the responsibility of Clarence City Council. Clarence City Council has a responsibility under the *Fire Service Act (1979)* to take all reasonable precautions to prevent any fire lit on their property from spreading onto neighbouring property. This BMP will help to fulfil that "duty of care". The TFS is responsible for suppressing bushfires within the park.

2. Bushfire Risks

Extreme fire conditions can occur in southern Tasmania when dry winters and springs are followed by summers where fuels are very dry. Under these conditions, fires can be expected to move quickly under the influence of strong, dry, north-westerly winds, and then move more or less at right angles on a broad front when the subsequent south-westerly wind change arrives. Fires that start under these conditions can reach a very high intensity, even in areas with relatively low fuel loads, and are very difficult to control until the weather conditions abate.

2.1 Bushfire History and Causes

Detailed documentation on bushfires/planned burning within the park started in 1998. Prior to this there are no records documented. During the review of the previous BMP the former Municipal Fire Control Officer (serving early 1970s to mid-1990s) provided information that fuel reduction burning commenced in the park in the 1970s.

Recorded bushfire history (1998-2015) of the park is shown on figure 3 and planned burn history (2011-2015) is shown on figure 4. A more extensive history of planned burning with the park is available from Councils Fire and Bushland Management upon request.

2.1.1 Bushfires

Data supplied by the TFS and Clarence City Council showed that within the duration of the previous BMP (2011-2015) the TFS attended ten incidents within the park. Five of these where scrub fires, three being maliciously started, one undetermined and one from a campfire. The remaining five incidents were grass fires. One started from a campfire, two were malicious and two ignition sources were undetermined. All fires were <1^{ha} and relatively easy to control due to the extensive fire trail and tracks network within the park. Two of the maliciously lit fires locations were very close in consecutive years. This location has now been identified for targeted hazard reduction burning.

During February 1998 a 20ha bushfire burnt across the southern portion of the reserve. This fire directly threatened dwellings on the southern side of the park along Waverley Street and Waverley Court.

The 1967 Black Tuesday bushfires impacted sections of the southern side of the reserve above Waverley Street.

The original bushfire management plan for the park noted a history of frequent fires, both planned and unplanned throughout the park. The effects of this on the vegetation in the park have been documented in a number of studies (de Gryse, 1990; Fensham, 1991; Kearon, 1993).

2.1.2 Planned Fires

During the 5 year period covered by the previous BMP Clarence City Council conducted 22 planned burns within the park (figure 4). A heavy emphasis was put on vegetation management units (VMUs) on the eastern side of the reserve behind Alford Street and Beebo Place to try and reverse adverse effects of the 1998 bushfire on the vegetation in this area.

Fuel reduction burning has been occurring within the park from the 1970's.

Figure 3 – Bushfire history (1998-2015)

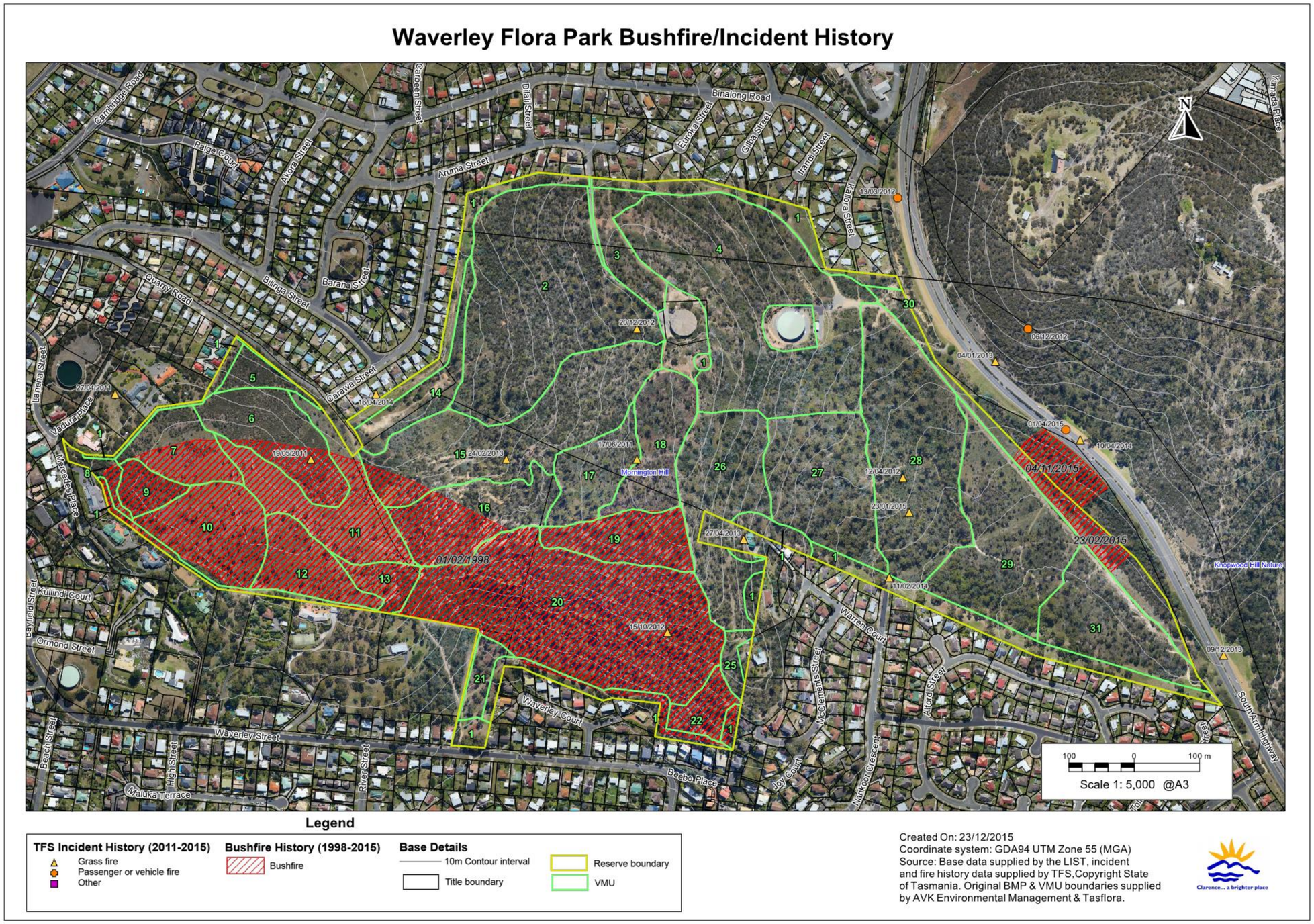
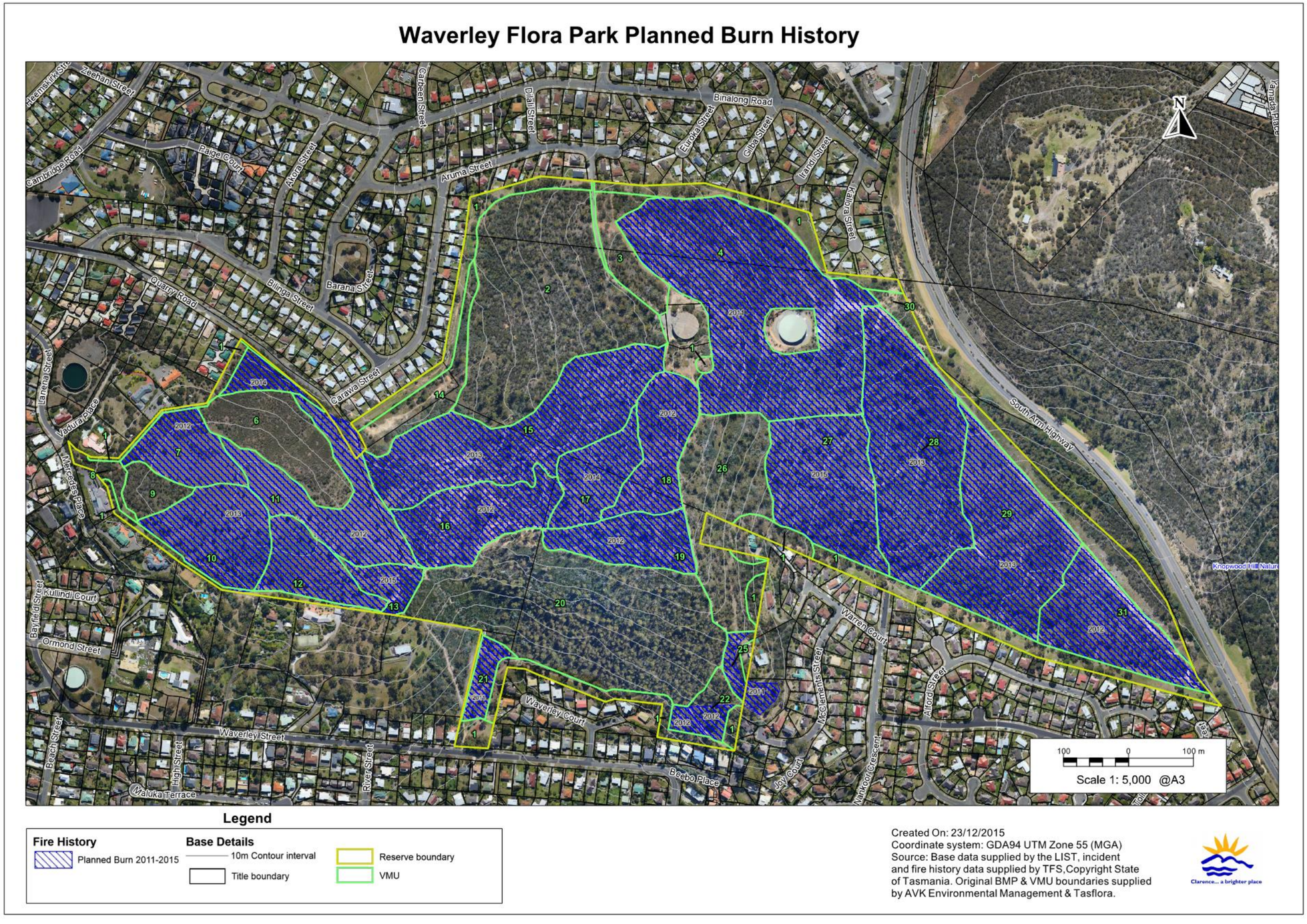


Figure 4 – Planned burn history (2011-2015)



2.2 Fuel Types and Hazard Levels

The higher the intensity of a bushfire the greater its destructiveness and the more difficult it is to control. As the intensity of a bushfire increases it becomes progressively more difficult to contain and suppress the fire. Very high intensity (> 4000 kW/m heat output at the fire front) fires with flame heights greater than 10m are generally uncontrollable (NSW Rural Fire Service, 1997). Although grass fires rarely attain a very high intensity, they can move much faster than forest fires, thereby making them difficult to contain.

Bushfire intensity is a function of the heat content of the fuel, the quantity (load) of fuel, and the rate of spread of the bushfire. The heat content of vegetation fuels is roughly constant, and rate of spread is largely a function of slope and weather conditions (wind speed and relative humidity). It has been found that the quantity and distribution of fine fuels are the main factor influencing bushfire behaviour. Larger fuels burn during a bushfire but do not contribute significantly to the spread of a bushfire (NSW Rural Fire Service, 1997).

Fine fuels consist of dead plant matter less than 6 mm in diameter and live plant matter less than 2 mm in diameter (including grasses, bracken, leaves, bark, and twigs and branches) (Marsden-Smedley, 2009). Fine fuel load (measured in tonnes per hectare) has therefore been used as a convenient measure of the underlying bushfire hazard in areas dominated by woody vegetation. The fine fuel load at any given time is a balance between the rate of fuel build-up, and factors that remove fuel, such as litter decomposition and fire. In the absence of fire, fuel loads in forests and woodlands with a shrubby or heathy understorey build up to a quasi-equilibrium state where the rate of fuel production equals the rate of decomposition. The maximum levels vary for different vegetation types and also for the same vegetation types in different locations (Conroy, 1988). The time taken to reach equilibrium fuel loads also varies, ranging from about 2 years in some native grasslands to about 20 to 40 years in dry eucalypt forests (Marsden-Smedley, 2009).

However, it has been found that fuel structure is possibly more important than the total fine fuel load in determining bushfire behaviour (Marden-Smedley, 2009). Fuel in forests, woodlands and shrublands can be categorised into four layers with differing effects on bushfire behaviour (Hines et al., 2010). These layers are:

- **Surface fine fuel**; leaves, bark, small twigs and other fine fuel lying on the ground. These fuels provide the horizontal continuity that allows a bushfire to spread.
- **Near surface fine fuel**; grasses, low shrubs, bracken etc. up to about 0.5 m above the ground surface. Fuels in this layer will burn when the surface fuel layer burns and will increase bushfire intensity.
- **Elevated fuels**; larger shrubs and small saplings with most of the fuel closer to the top of this layer and a clear gap between them and the surface fuels. These interact with the two lower fuel layers to further increase bushfire intensity. They also contribute to the vertical continuity of fuel that allows fire to 'climb' into the tree canopy.

- **Bark fuels**; flammable bark on trees, saplings and large bushes from ground level to the canopy. Loose fibrous bark on stringy-bark eucalypts, and candle bark on some gums can generate large amounts of burning embers which can start spot fires ahead of the main fire front.

Canopy fuels are not usually included in fuel hazard assessments in forests and woodlands, but are included in shrubland and heath fuel types where they are equivalent to elevated fuels. If there is sufficient fuel in the lower fuel layers to start the canopy fuel burning (called a crown fire) bushfire intensity can increase considerably. Crown fires in forests are generally considered uncontrollable (Luke and McArthur, 1986).

The main fuel factor that influences the rate of spread of a bushfire is the quantity of near surface fuel whereas total fine fuel load is the main factor influencing bushfire intensity (Gould et al 2007).

In grasslands and grassy woodlands the degree of curing (dryness) of the fuel is considered at least as important as the actual fuel load (Cheney and Sullivan, 2008). Grass goes through an annual cycle with new growth in spring drying out over summer. The bushfire hazard in grassland areas is greatest when the grass is fully cured which usually occurs during the period from December to April depending on seasonal breaks and significant summer rainfall events. However, grasslands that are not grazed or slashed over winter can burn in spring if cured grass from the previous growing season is still present.

Unlike bushland dominated by woody plants, grasslands can accumulate fuel very rapidly, and therefore burning is not a very effective method of hazard reduction. As grass fuel decomposes faster than eucalypt leaves and twigs, and is more likely to be eaten by herbivores, fuel loads in grasslands and grassy woodlands can fluctuate from year to year (Cheney and Sullivan, 2008).

Fuel loads can be roughly categorised in terms of the potential threat they pose as follows:
Low - < 5 tonnes per hectare
Moderate - 5 to 15 tonnes per hectare
High - >15 tonnes per hectare.

The characteristics of each fuel type in the Waverley Flora Park are given in table 1. The TASVEG 3.0 codes of the vegetation types in figure 2 corresponding to each fuel type are listed under the fuel type.

Table 1 – Characteristics of the different fuel types in the park

FUEL TYPE	FUEL HAZARD CHARACTERISTICS	BUSHFIRE BEHAVIOUR AND CONTROL
Heathy forest / woodland DAS	Canopy, bark, elevated, near surface and surface fuels all present. Shrub layer to about 1m in height and dense, some areas have shrubs up to 3m high. Dominant fuel loading is near surface fuels a mixture of grasses and heathy shrubs. In VMU 20 dominant fuel loading is near surface fuels - bracken with a mixture of grasses and heathy shrubs. Leaf and bark fall around trees contributes to a gradual build-up of fuel, particularly around the base of trees. Average duff layer 20-40mm thick. Generally moderate overall fuel loads in areas that have had planned burning since 2011, but high in areas with no recent planned burning. Low-moderate amount of dead standing trees present. Grass component of the fuel load builds up rapidly after fire.	Can burn with moderate to high intensity depending on the degree of fuel accumulation. Significant ember attack on structures downwind of the bushfire and spotting across containment lines can be expected. Capable of carrying a bushfire at any time of year if there is a sufficient amount of litter on the ground. Tree cover can sustain a crown fire and the eucalypts, particularly old hollow trees and those with rough bark, will be a source of burning embers which can carry a bushfire over nearby fire control lines (roads, fuel breaks) and threaten nearby buildings. Hazard reduction burning is effective in removing accumulated litter, elevated fuels and the bark fuels largely responsible for spotting, but grass and bracken fuels can be replenished within a year or two after a burn.
Grassy forest / woodland DOV DVG	Some canopy, near surface and surface fuel all present, bark fuels only present on rough barked trees and shrubs. Low-moderate fuel loads on western side of park, moderate to high fuel loads in northern section of DVG. Grass cover generally sparser and lower in height than in open grassland. Leaf and bark fall around trees contributes to a gradual build-up of fuel, particularly around the base of trees. Grass component of the fuel load can build up fuel rapidly after a bushfire.	Can burn with moderate to high intensity depending on the degree of fuel build-up. Significant ember attack on structures and spotting across containment lines can be expected. Capable of carrying a bushfire at any time of year if there is a sufficient amount of litter on the ground, and/or cured grass. Tree cover is generally too sparse to sustain a crown fire, however, the eucalypts, particularly old hollow trees and those with rough bark, will be a source of burning embers which can carry a bushfire over nearby fire control lines (roads, fuel breaks) and threaten nearby buildings. Hazard reduction burning is effective in removing accumulated litter and the bark fuels largely responsible for spotting, but grass fuels can be replenished within a year after a burn.
Shrubland NAV NBA	Moderate overall fuel loads, predominantly elevated and bark fuels. High proportion of the fuel finely divided and elevated up to 4 m. Relatively low surface and near surface fuel loads except where the shrub cover is sparse.	Where shrub canopies touch it can sustain a running crown fire of high intensity on days of extreme fire weather that would be difficult to control. Dense thickets are difficult to access. Significant ember attack on nearby structures and spotting across containment lines can be expected. Difficult to prescribe burn in cool weather due to low surface and near surface fuel loads.

FUEL TYPE	FUEL HAZARD CHARACTERISTICS	BUSHFIRE BEHAVIOUR AND CONTROL
Unmanaged grassland GTL	Native and introduced grasses, near surface and surface fuels present. Potential for dense elevated fuels to about 1 m high following wet winters and springs. Flammability dependant on degree of curing of the grass. Grass fuels can be replenished within a year after a burn.	Can generate rapidly moving, moderate intensity fires in late summer and early autumn. Fires can occur at other times of the year if the cured standing crop from the previous year's growth persists. Likely to be relatively little spotting so fires can usually be stopped at roads and fuel breaks, however, fires may be uncontrollable in extreme conditions.

Current fuel loads in the park are variable, reflecting predominantly on the 22 recent planned burns within the park. Two small bushfires <1ha in 2014 and 2015 in VMU 30 and the 1998 bushfire on the southern side of the park also influence current fuel loading.

In general, areas with grassy/shrub understorey that have had recent planned burning reflect fuel loads on average of low to moderate 5-10$^{t/ha}$. Areas with grassy/shrub understorey and no recent planned burning/bushfires have fuel loadings of moderate to high 8-15 $^{t/ha}$.

Areas in the west of the park with grassy woodland vegetation and recent planned burning have on average low fuel loads <5 $^{t/ha}$. Other sections of grassy woodland in the park have fuel loads in the moderate range of 8-10 $^{t/ha}$.

VMU 22 is predominantly bracken that is promoted by frequent burning. These fuels cannot be effectively reduced by planned burning and bracken is to be controlled as outlined in section 4.4.1

On the south facing slope is VMU 20 which also has a high volume of bracken/shrubby understorey with high fuel load build up since the 1998 bushfire. It is recommended that bracken is controlled as outlined in section 4.4.1 post next scheduled planned burn.

2.3 Bushfire Threat and Risk to Persons

The main bushfire threat to the park is considered to come from fires that start at the western end of the park, or around the Quarry Road entrance, on days with northerly to westerly winds and very high or greater fire dangers. As occurred in February 1998, these fires could rapidly run through the park threatening residential areas on the southern side. Persons caught in the park by such fires would also be at high risk if they are not able to quickly move to surrounding residential areas.

2.4 Assets at Risk from Bushfire

Assets potentially at risk from bushfire include; dwellings, infrastructure, and other items (such as ornamental and regeneration plantings) which would cost money to replace; as well as items of scenic, cultural and natural heritage value which could be damaged or destroyed by bushfire, or bushfire suppression activities. Each landowner has an obligation to reduce a bushfire hazard where it is a threat to neighbouring properties. However, even with extensive fuel reduction burning, the risk of high intensity bushfires occurring in the park cannot be eliminated. Therefore, consideration must be given to protection measures that will reduce the risk of fire damage to assets in and surrounding the park. Assets within and surrounding the park that are considered at risk from bushfires are shown in figure 5.

2.4.1 Bushfire Risk to Natural Heritage Assets

The conservation value of the plant communities in the Park is given in table 2. A number of plant species of conservation value occur within the park. These are listed in table 3 along with their response to fire if known. No threatened fauna has been recorded within the park on the *Natural Values Atlas*, However both the endangered swift parrot (*Lathamus discolor*) and the Tasmanian bettong (*Bettongia gaimardi*) have been reported in the park (de Gryse, 1999), an adjoining resident has also reported a small population of eastern barred bandicoots (*Perameles gunnii*) in the park. The swift parrot is known to breed in the nearby Meehan Range (Brereton 1997) and has a potential food source in the *Eucalyptus ovata* forest within the park. The habitat requirements and preferred bushfire management of these species is given in table 4. The reserve contains a range of habitats which are important for supporting a diversity of native bushlife. A variety of canopy layers, dead trees and hollow logs provide nesting and foraging habitat for birds and mammals (Tasflora, 2013)

The total number of vascular plant species recorded in the park is 280 including 191 indigenous and 89 introduced species (de Gryse, 1999). This represents over a third of the species known to occur within Clarence City, and makes the park very important for the conservation of biodiversity within Clarence City.

Table 2 – Conservation values of native plant communities

TASVEG 3.0 CODE	EQUIVALENT FLORISTIC COMMUNITY[1]	Conservation Status[2]
DAS	DRY-hAM-sand Grassy *E. amygdalina* forest	THREATENED NATIVE COMMUNITY
DOV	DRY-gOV Grassy *E. ovata* forest	THREATENED NATIVE COMMUNITY
DVG	DRY-gVIM Grassy *E viminalis* woodland	Not threatened
NAV	DRY-in VERT Inland *A. verticillat*a low forest	Not threatened
GTL	Various floristic associations	Not threatened
NBA	None described	Not threatened

1. Forest Practices Authority (2005)
2. *Nature Conservation Act 2002*

Figure 5 – Assets at risk from bushfire

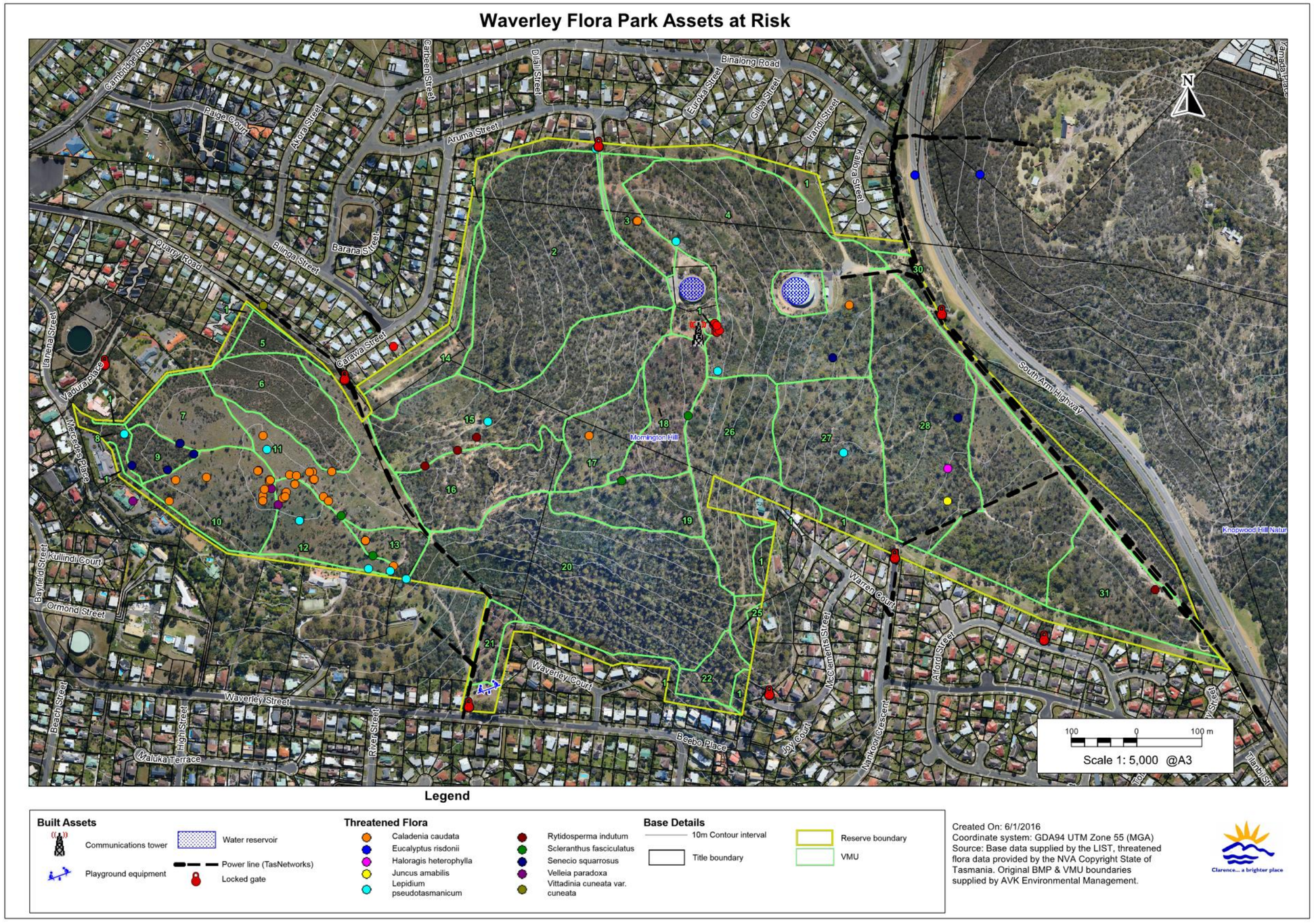


Table 3 - Plant species of conservation value and preferred bushfire management

SPECIES	CONSERVATION STATUS[1]	OCCURRENCE	RESPONSE TO BUSHFIRE AND MANAGEMENT	*ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999* (EPBC Act) STATUS
Arthropodium strictum chocolate lily	RARE	Extensive population below track in *E. viminalis* woodland recorded in 2003.	Noticeable flush of regeneration from seed following bushfire. Plants also regenerate from tuberous rootstock.	Not threatened
Caladenia caudata tailed spider orchid	VULNERABLE	Scattered populations on ridge above Winifred Curtis entrance and south of the crest of Mornington Hill near the water reservoir.	Known populations elsewhere are subject to moderate to high fire frequency. Potential for additional populations in the cleared areas in the western part of the park. Fire frequency in suitable habitat is moderately high.	VULNBERABLE
Haloragis heterophylla variable raspwort	RARE	Single un-attributed record from the eastern end of the park.	Likely to regenerate from rootstock after bushfire.	Not threatened
Juncus amabilis gentle rush	RARE	Single un-attributed record from the eastern end of the park.	Regenerates from rootstock after bushfire.	Not threatened
Lepidium pseudotasmanicum shade peppercress	RARE	Recorded (A. North 2001 and 2010 pers. Obs.) beside the track above the Quarry Road entrance.	Regenerates, sometimes prolifically, from seed after bushfire.	Not threatened

SPECIES	CONSERVATION STATUS[1]	OCCURRENCE	RESPONSE TO BUSHFIRE AND MANAGEMENT	*ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999* (EPBC Act) STATUS
Rytidosperma indutum tall wallaby grass	RARE	Previously recorded near the eastern boundary of the park where it is abundant within the transmission line easement.	Likely to regenerate from rootstock and establish from seed after bushfire.	Not threatened
Scleranthus fasciculatus spreading knawel	VULNERABLE	Scattered plants recorded in the western and central parts of the park.	May survive cool burn, likely to regenerate from seed following a bushfire.	Not threatened
Senecio squarrosus rigid grassland groundsel	RARE	Recorded in 2009 above Winfred Curtis entrance following a burn.	Known to proliferate in dry forest after bushfire.	Not threatened
Velleia paradoxa spur velleia	VULNERABLE	Localised population in vicinity of geological boundary between dolerite and sandstone.	Sets seed in second year from seedlings/rootstocks and disperses seed in summer. Schedule burns in autumn to allow plants to seed and provide a competition free seedbed and possible moisture to support seedling through winter.	Not threatened

1. Tasmanian *Threatened Species Protection Act* 1995

Table 4 - Fauna of conservation value and preferred bushfire management

SPECIES	CONSERVATION STATUS[1]	HABITAT AND PREFERRED BUSHFIRE MANAGEMENT	*ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999* (EPBC Act) STATUS
Eastern barred bandicoot *Perameles gunnii*	Tasmanian Status Not Threatened	Grasslands (both native and introduced) and grassy woodlands. Dense cover of regrowth is likely to be unsuitable habitat. **Mosaic burning will ensure open habitats are maintained and help mitigate devastating bushfires.**	VULNERABLE
Tasmanian bettong *Bettongia gaimardi*	Not listed but 'Protect some areas within high quality habitats'[2]	Widespread and well represented in dry sclerophyll forest. Research suggests that activity at a site usually increases immediately following a bushfire but subsequently declines as the dense regrowth provides less favourable habitat (Driessen et al 1991). The relationship between bettong abundance and bushfire is not clear-cut and it has been suggested that frequent firing of habitat will cause a long-term decline in the species richness and abundance of soil fungi (Johnson, 1997). These fungal species are associated with the litter layer and organic matter near the soil surface and are thus sensitive to fire. Fire is thought to synchronise fruiting cycles within populations of fungi so that they trigger a pulse sporocarp production and this is followed by years of low sporocarp production (Johnson, 1997). **Management should maintain a diversity of bushfire age classes in dry forest ensuring both a spatial and temporal mosaic and help mitigate devastating bushfires.**	Not threatened
Masked owl *Tyto novaehollandiae*	Endangered	This species requires large hollows for suitable nesting. There are no known breeding populations in the park although it contains suitable habitat. Overfrequent fires leads to loss of large hollow bearing trees, although occasional fires can help in the creation of hollows. **Avoid burning trees with large hollows during planned burns.**	VULNERABLE

SPECIES	**CONSERVATION STATUS[1]**	**HABITAT AND PREFERRED BUSHFIRE MANAGEMENT**	***ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999* (EPBC Act) STATUS**
Swift parrot *Lathamus discolor*	Endangered	Known to breed in the Meehan Range and likely to nest elsewhere. Nests in hollows in old growth eucalypts (Brereton 1997). Blue gums (*Eucalyptus globulus*) provide a preferred foraging habitat although swamp gums (*E. ovata)* are recognised as being particularly important as an alternative nectar source. The swift parrot feeds in the tree canopy and therefore an extensive, high-intensity bushfire that scorched the canopy could reduce the potential food resources for this species within a reserve. However, a temporary loss of food resources in a reserve due to a localised bushfire is unlikely to have a significant impact on regional food sources for this species. **Management should aim to avoid crown damage to larger trees by keeping planned burns at a low intensity and reducing the bushfire hazard to reduce the intensity of bushfires.**	ENDANGERED

1 - Tasmanian *Threatened Species Protection Act* 1995
2 - Vertebrate Advisory Committee, 1994.

The fire sensitivity and flammability ratings of the vegetation types in the park according to Pyrke and Marsden-Smedley (2005), is given in table 5.

Table 5 – Fire attributes of the native vegetation

TASVEG 3.0	FIRE SENSITIVITY	FLAMMABILITY
DAS	Low	High
DOV	Low	High
DVG	Low	High
NBA	Low	High
NAV	Low	Moderate
GTL	Low	High

Flammability classification of Tasmanian vegetation (Pyrke & Marsden-Smedley, 2005)

FLAMMABILITY	CRITERIA FOR FLAMMABILITY
Very high	Will burn readily throughout the year even under mild weather conditions, except after recent rain (i.e. less than 2–7 days ago).
High	Will burn readily when fuels are dry enough but will be too moist to burn for lengthy periods, particularly in winter. Fuels will be dry enough to burn on most days from late spring to early autumn.
Moderate	Extended periods without rain (i.e. two weeks at least) and/or moderate or stronger winds are required for these communities to burn.
Low	These communities will burn only after extended drought (i.e. four weeks without rain) and/or under severe fire weather conditions (i.e. forest fire danger index > 40).

Note: recently burnt stands of low or moderate flammability classes may have a higher flammability rating.

Fire sensitivity classification of Tasmanian vegetation (Pyrke & Marsden-Smedley, 2005)

FIRE SENSITIVITY	ECOLOGICAL IMPACT OF BUSHFIRE	MANAGEMENT RECOMMENDATIONS
Extreme	Any bushfire will cause either irreversible or very long-term (> 500 years) damage.	Suppress all bushfire. Highest priority for bushfire suppression.
Very high	A single bushfire will cause significant change to the community for 50–100 years and will increase the probability of subsequent fires changing the community permanently.	Suppress all bushfire. High priority for bushfire suppression.
High	A fire-adapted community requiring at least 30 years between fires to maintain the defining species. Bushfire intervals greater than 80 years are required to reach mature stand structure.	Suppress all bushfire, but give higher priority to stands burnt less than 80 years ago.
Moderate	A fire-adapted community requiring at least 15 years between fires to maintain the defining species.	Suppress fires in stands burnt less than 20 years ago.
Low	Highly fire-adapted or non-native vegetation. A single bushfire will generally not affect biodiversity, although repeated short intervals (i.e. < 10 years) may cause long- term changes.	Suppression usually not an ecological priority except in specific situations (e.g. a recently burnt stand of a threatened species).

The low fire sensitivity of the native vegetation in the park indicates that it is highly fire adapted and a single bushfire will generally not adversely affect biodiversity, though repeated fires at intervals of less than 10 years may cause long-term changes in floristics and vegetation structure (Pyrke & Marsden-Smedley 2005). The moderate to high flammability rating of the native vegetation in the park in Pyrke & Marsden-Smedley (2005) indicates that the bushland in the park will burn readily when fuels are dry but may be too moist to burn for long periods during winter. Fuels will generally be dry enough to burn on most days from late spring to early autumn.

2.4.2 Bushfire and Habitat Management

The main bushfire risk to natural heritage assets in the park is from bushfires that burn the whole of the park as well as fire regimes (planned or unplanned) that are outside the thresholds within which a particular plant community, or habitat for flora and fauna species, has viability in the long-term. Fire regimes within the thresholds of a particular plant community will help maintain its long-term viability, whereas fire regimes outside the thresholds are likely to lead to progressive changes in the structure and floristics of the plant community, and loss of habitat for the fauna favouring that plant community.

High intensity bushfires that burn the whole of the park can damage or destroy valuable fauna habitat including:

- Tree hollows used as nests and dens by many birds and arboreal mammals.
- Mature, senescing or dead trees that can be important invertebrate, bird and reptile habitat, and take a long time to replace.
- Understorey species that provide nest and shelter sites as well as a food source for many bird and mammal species.
- Fallen logs, bark and leaf litter that provide shelter and a food source for invertebrates, frogs, reptiles, birds and mammals.

Species may be lost from the park if they cannot recolonise from nearby areas, or survive in unburnt patches.

Bushfires often stimulate the spread of environmental and other weeds. However, some weed species provide significant protection and food sources for fauna (for example, gorse and blackberry) and removal of these species should be carefully managed to ensure they are progressively replaced by equivalent native species habitat.

Planned burning of the native vegetation in the park at the optimum frequency for its long-term viability is considered the best way to conserve important habitat for both flora and fauna in the park. Planned burning in a mosaic pattern along with maintenance of fire trails is the best way to minimise the risk of a bushfire burning the whole of the park. The bushfire management requirements of the different plant communities/habitats in the park are given in table 6.

These plant communities have been grouped together according to their bushfire management requirements.

Table 6 - Bushfire management requirements of the plant communities in the park

TASVEG 3.0 MAPPING UNITS	BUSHFIRE IMPACTS AND BUSHFIRE MANAGEMENT AIMS
Heathy dry sclerophyll forests and woodlands	
DAS - *Eucalyptus amygdalina* forest and woodland on sandstone	Bushfire controls the establishment of a dense shrubby understorey which would reduce light penetration to the ground layer. This can help maintain a diversity of heathy shrubs and herbs. Frequent fires can encourage a dense bracken layer that can suppress other ground layer species. Bushfire provides an opportunity for fire dependent species to germinate. **Optimal bushfire interval for maintaining these communities is 15-25 years.** **Exclude bushfire from representative areas to provide controls for monitoring the effects of fire.**
Grassy dry sclerophyll forests and woodlands	
DVG – *Eucalyptus viminalis* grassy forest and woodland DOV – *Eucalyptus ovata* forest and woodland	Infrequently burnt sites develop a dense shrubby understorey. Kangaroo grass (*Themeda triandra*) can die out after an extended absence of bushfire, or other method of biomass reduction (Lunt & Morgan, 1998). Frequent fires (< 5 years) can inhibit tree regeneration and eliminate the shrubby component Sites overlying dolerite and other more fertile soils have markedly more rapid rates of regeneration than low fertility soils derived from mudstone and sandstone. Overfrequent burning regimes in forest overlying mudstones has contributed to loss of topsoil and erosion. Extended absence from bushfire can result in a build-up of fuel causing hot and damaging burns. A temporal and spatial mosaic burning pattern would assist with tempering the effects of a devastating bushfire. **Optimal bushfire frequency is 5-20 years on fertile sites.** **Exclude bushfire from most areas on mudstone, which due to low fertility have low biomass growth rates and are drought stressed.**

TASVEG 3.0 MAPPING UNITS	BUSHFIRE IMPACTS AND BUSHFIRE MANAGEMENT AIMS
Non eucalypt forests/woodlands	
NBA –*Bursaria / Acacia* woodland and shrub	This community is typically derived from eucalypt woodland. It is a degradation phase often associated with extended periods of moderate to high intensity grazing or other disturbance. Fire regimes will influence the nature of regeneration. Important to allow a period free from bushfire where eucalypts can re-establish if desired. **Optimal bushfire frequency is 5-20 years.** **Exclude bushfire from representative areas to provide controls for monitoring the effects of bushfire.**
NAV – *Allocasuarina verticillata* Forest	Extended absence of fires leads to a closed canopy and a dense litter layer that has a low density and diversity of ground layer species, although it may be important for invertebrate species. Frequent low intensity fires benefit *Allocasuarina verticillata* over the adjacent eucalypt dominated communities (Kirkpatrick, 1985). **Preferred bushfire interval in inland reserves is between 15-25 years.**
Grasslands	
GTL – Themeda grassland	Bushfire intervals > 5 years may lead to a loss of biodiversity in grassy sites (Lunt & Morgan, 1988). Frequent bushfires (< 5 year intervals) may lead to a loss in diversity of invertebrates. **Low fire sensitivity and high flammability – appropriate bushfire interval 3-5 years** (Pyrke & Marsden-Smedley 2005).

2.4.3 Bushfire Risk to Built and Cultural Assets

During the BMP review process Aboriginal Heritage Tasmania (AHT) completed a requested search of the Aboriginal Heritage Register (AHR) regarding the area inside the BMP boundary. There are no known Aboriginal heritage sites within the park.

Infrastructure in the park includes two covered water reservoirs, power lines, a radio repeater, metal boom gates, playground equipment and signage. Of these, only the power lines, radio repeater, playground equipment and signage are likely to be damaged by bushfire. The main built assets at risk from bushfire are the buildings and infrastructure in the residential areas that surround the park.

The degree of bushfire danger at any particular time is a combination of fine fuel quantity, slope, and the prevailing weather conditions. The actual risk of a bushfire causing damage to an asset is a function the degree of danger, the probability of a bushfire igniting, and any measures taken to prevent the bushfire causing damage.

The four major modes of attack by bushfires that can cause damage to assets are:

1. wind-blown burning debris
2. radiant heat which can ignite flammable materials ahead of the fire front and shatter glass
3. flame contact
4. strong winds generated or intensified by the bushfire.

The potential for damage to buildings in the path of large fires burning out of the park will depend largely on:

- whether the bushfire will approach upslope or downslope
- the quantity and distribution of fuel surrounding the building
- whether they are defended during the bushfire
- their design
- if the building was constructed to Australian Standard 3959-2009, *Construction of Buildings in Bushfire-prone Areas*
- How well they have been maintained.

The Australian Standard for Construction of buildings in bushfire-prone areas (AS:3959 – 2009) uses a Fire Danger Index (FDI) of 50 to determine the Bushfire Attack Level (BAL) for buildings that need to comply with the standard. An FDI of 50 is the boundary between Very High and Severe Fire Danger Rating.

There is insufficient data available to assess the likelihood of a high intensity bushfire starting in the park; however there is sufficient fine fuel within the park to sustain a high intensity bushfire on days of extreme fire danger. The bushfire risk to the built and cultural heritage assets within and surrounding the park has been assessed using a procedure adapted from the National Emergency Risk Assessment Guidelines (NEMC, 2010). The assessment process is explained in section 5.4 of *Clarence City Council Bushfire Management Strategy for Council Owned and Controlled Land*, and the results and proposed management strategies are shown in table 7. This assessment process has been analysed and meets compliance with AS/NZS IOS:31000-2009. Note that the assessment in table 7 only considers the risk from fires starting in, or passing through the park. Some assets may face a greater bushfire risk from nearby bushfire hazards that are not under the control of Clarence City Council.

Some assets, such as Aboriginal heritage sites, may not be directly damaged by bushfire but may be damaged by bushfire management and bushfire suppression activities, such as constructing fire control lines. These risks are noted under "other risks" in table 7 if these assets are found in the reserve.

NOTE: It was not possible to inspect assets on properties adjoining the park. The risk assessment therefore makes the following assumptions about these assets:

- Landowners/residents have established and are maintaining a defendable space to TFS specifications around vulnerable assets, either wholly within the lot, or up to the boundary with the park where there is insufficient space within the lot. Where this is not the case the asset may face a much higher bushfire risk than indicated in the risk assessment.
- All dwellings adjoining the park are well maintained to resist attack by wind-blown burning embers. Where this is not the case the asset may face a much higher bushfire risk than indicated in the risk assessment.

The management strategies recommended in table 7 will reduce the existing bushfire risk to built and cultural assets but in most cases will not eliminate it. Active protection of an asset during a bushfire can greatly reduce the bushfire risk. Assets at medium and high risk of damage from bushfire will need to be protected during planned burns in the park.

Table 7 - Bushfire risk assessment for built and cultural assets

RISK CATEGORIES

LOW – asset of low value or considered to have a low risk of damage from bushfires in the reserve due to its construction, location, or protection measures already in place.

MODERATE – asset is vulnerable to damage by bushfires and could face attack by a moderate to high intensity bushfire, but has features that will reduce the intensity of the fire attack, or provide some protection from fires. Further bushfire protection measures are required.

HIGH – asset is of high value, is vulnerable to damage by bushfires and could face attack by a high intensity bushfire with few, if any, features that would reduce the intensity of fire attack. Further bushfire protection measures are required.

ASSET AT RISK	RISK ANALYSIS (See section 5.4 of the Bushfire Management Strategy)								OTHER BUSHFIRE RISKS	PROPOSED MANAGEMENT STRATEGIES
	A	B	C	D	E[1]	F	G	Level of Risk		
Power line from Quarry Road to Waverley Court	5	3	3	3	2	2	4	2160 High		Maintain existing easement. Clear at least 1m around the base of each pole.
Power line along the eastern boundary of the park with connection to Nankoor Crescent	5	2	3	3	2	1	4	720 Moderate		Maintain existing easement. Clear at least 1m around the base of each pole.
Dwellings bordering the northern side of the park at 27, 29, 31, 33, 35, 37, 39, 41, 43 and 45 Carawa Street and along Aruma Street	5	2	3	2	2	1	6	720 Moderate		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain a minimum 15m wide outer zone along the park boundary to complement the defendable space on the lots. See MP 6 in the Best Management Practice Guidelines.
11 Warren Court	5	2	3	2	2	1	6	720 Moderate		Advise residents of the need to maintain an adequate defendable space around their dwellings. Property leases 0.1[ha] of Council land within reserve adjacent to property. Maintain a strategic fuel reduction zone between the fire trail and leased area boundary with fine fuel loads less than 8 tonnes per hectare by burning or hand clearing.

ASSET AT RISK	RISK ANALYSIS (See section 5.4 of the Bushfire Management Strategy)								OTHER BUSHFIRE RISKS	PROPOSED MANAGEMENT STRATEGIES
	A	**B**	**C**	**D**	**E[1]**	**F**	**G**	**Level of Risk**		
27 McClements Street	5	2	3	2	2	1	6	720 Moderate		Advise residents of the need to maintain an adequate defendable space around their dwellings. Property leases 0.05[ha] of Council land within reserve adjacent to property. Maintain a minimum 20m wide outer zone along the park boundary to complement the defendable space on the lots. See MP 6 in the Best Management Practice Guidelines.
Dwellings bordering the eastern side of the park at 14, 16, 18, 20, 24 and 25 McClements Street	5	2	3	2	2	1	6	720 Moderate		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain a minimum 20m wide outer zone along the park boundary to complement the defendable space on the lots. See MP 6 in the Best Management Practice Guidelines. Maintain a strategic fuel reduction zone between the fire trail and the outer zone with fine fuel loads less than 8 tonnes per hectare by burning or hand clearing.
Radio repeater	5	3	3	2	2	1	2	360 Moderate		Clear all trees, shrubs and bushes within 10m of the tower.
Dwellings bordering the southern side of the park 4, 6, 15, 17, 19, 21, 23, 25 and 27 Waverley Court.	5	1	3	2	2	1	6	360 Moderate		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain a minimum 20m wide outer zone along the park boundary to complement the defendable space on the lots. See MP 6 in the Best Management Practice Guidelines.

ASSET AT RISK	RISK ANALYSIS (See section 5.4 of the Bushfire Management Strategy)								OTHER BUSHFIRE RISKS	PROPOSED MANAGEMENT STRATEGIES
	A	**B**	**C**	**D**	**E[1]**	**F**	**G**	**Level of Risk**		
Dwellings bordering the southern side of the park at 122 and 124 Waverley Street and Beebo Place	5	1	3	2	2	1	6	360 Moderate		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain a minimum 20m wide outer zone along the park boundary to complement the defendable space on the lots. Maintain adjoining VMUs with fine fuel loads < 10 tonnes per hectare. See MP 6 in the Best Management Practice Guidelines.
Dwellings bordering the eastern side of the park at 13, 18 and 19 Warren Court	5	1	3	2	2	1	6	360 Moderate		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain a outer zone along the park boundary to complement the defendable space on the lots as required to achieve a 30m wide defendable space around the three dwellings. See MP 6 in the Best Management Practice Guidelines.
Dwellings bordering the northern side of the park at 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23 and 25 Carawa Street	4	1	3	2	2	1	6	288 Moderate		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain a minimum 15m wide outer zone along the park boundary to complement the defendable space on the lots. See MP 6 in the Best Management Practice Guidelines.
Town houses bordering the park at 51 Quarry Road	4	2	1	2	2	1	6	192 Low		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain a 15m wide outer zone within the park adjoining the town houses.

ASSET AT RISK	RISK ANALYSIS (See section 5.4 of the Bushfire Management Strategy)								OTHER BUSHFIRE RISKS	PROPOSED MANAGEMENT STRATEGIES
	A	**B**	**C**	**D**	**E[1]**	**F**	**G**	**Level of Risk**		
Dwellings bordering the western side of the park along Mercedes Place	4	2	1	2	2	1	6	192 Low		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain a minimum 10m wide outer zone along the park boundary to complement the defendable space on the lots and provide access. See MP 6 in the Best Management Practice Guidelines.
Dwelling bordering the southern side of the park at 60 Waverley Street	5	2	3	2	0.2	1	6	72 Low		Advise residents of the need to maintain an adequate defendable space around their dwelling. No works required within the park.
Dwellings bordering the northern side of the park at the ends of Euroka Street, Gilba Street, Irandi Street and Kallora Street	3	2	3	2	0.2	1	6	43 Low		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain the existing outer zone between the fire trail and the park boundary to complement the defendable space on the lots. See MP 6 in the Best Management Practice Guidelines.
Dwellings bordering the park at the northern end of Anstey Street	3	2	3	2	0.2	1	6	43 Low		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain the existing 25m to 30m wide outer zone along the park boundary to complement the defendable space on the lots. See MP 6 in the Best Management Practice Guidelines.

ASSET AT RISK	RISK ANALYSIS (See section 5.4 of the Bushfire Management Strategy)								OTHER BUSHFIRE RISKS	PROPOSED MANAGEMENT STRATEGIES
	A	**B**	**C**	**D**	**E[1]**	**F**	**G**	**Level of Risk**		
Dwellings bordering the southern side of the park at 40a, 48 and 58 Waverley Street	3	2	3	2	0.2	1	6	43 Low		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain a minimum 5m wide outer zone along the park boundary to complement the defendable space on the lots and provide access. See MP 6 in the Best Management Practice Guidelines. Issue hazard abatement notices as required to ensure bushland on 50 Waverley Street is maintained as a fuel modified buffer zone.
Dwellings bordering the southern side of the park along Alford Street, Nankoor Crescent and the northern side of Warren Court	5	1	3	2	0.2	1	6	36 Low		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain the existing outer zone between the fire trail and the park boundary to complement the defendable space on the lots. See MP 6 in the Best Management Practice Guidelines.
Dwellings bordering the northern side of the park along the northern side of Quarry Road	4	1	3	2	0.2	1	6	28 Low		No works required within the park.
Dwelling on 6a Euroka Street	3	2	3	1	0.2	1	6	21.6 Low		BAL assessment conducted July 2014 by Pitt & Sherry Building Surveying. Dwelling constructed to BAL 12.5 standards in AS:3959-2009.
Dwellings bordering the southern side of the park at 86 and 98 Waverley Street	3	1	3	2	0.2	1	6	21 Low		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain existing 15m wide outer zone around the playground equipment in the adjoining part of the park. See MP 6 in the Best Management Practice Guidelines.

ASSET AT RISK	RISK ANALYSIS (See section 5.4 of the Bushfire Management Strategy)								OTHER BUSHFIRE RISKS	PROPOSED MANAGEMENT STRATEGIES
	A	**B**	**C**	**D**	**E[1]**	**F**	**G**	**Level of Risk**		
Playground equipment at the Waverley Street entrance to the park	3	1	3	3	0.2	1	4	21 Low		Maintain existing 15m wide outer zone around the playground equipment in the adjoining part of the park. See MP 6 in the Best Management Practice Guidelines.
Dwellings bordering the western side of the park along Vadura Place	4	2	1	2	0.2	1	6	19 Low		Advise residents of the need to maintain an adequate defendable space around their dwellings. Maintain a minimum 5m wide outer zone along the park boundary to complement the defendable space on the lots and provide access. See MP 6 in the Best Management Practice Guidelines. Issue hazard abatement notices as required to ensure the vacant lot at 4 Vadura Place is maintained as a fuel modified buffer zone.
Water reservoirs	5	3	3	0	2	1	1	0 Minimal	Smoke and ash contamination of water in the reservoirs is an issue during planned burns and bushfires. Both water reservoirs within the park are roofed, reducing the risk of contamination. The reservoir located near the western boundary (38A Lanena Street) is also covered.	Liaise with TasWater regarding protection measures for water supplies before any planned burns near water reservoirs.

1 – Note that the risk analysis score in column E only indicates that there is enough space to provide a defendable space between bushland in the reserve and an adjoining asset. It does not indicate that a defendable space has been established on the adjoining property, or if established is being adequately managed.

3. Bushfire Management Issues

3.1 Existing Bushfire Management

3.1.1 Implementation of the Previous Bushfire Management Plan

As part of this revision of the BMP for Waverley Flora Park, a review of the success of the implementation of the recommendations in the previous BMP was carried out. The review found that of 19 recommendations 11 had been fully implemented, 7 had been partly implemented and 1 has not been implemented. The community bushfire awareness program was partially implemented. Implementing this with a communication plan is highly desirable for the overall success of the reviewed BMP.

The full findings of the review are in Appendix A.

3.1.2 Planned Burning

The previous BMP recommended 22 planned burns in 18 VMUs within the park. These 22 planned burns were all successfully carried out in addition to two small bushfires <1^{ha} in VMU 30. VMU 1 had extensive heap burning during 2015 to reduce fuel loads in the outer zone behind Akuna Street and Warren Court.

An amended burning schedule for the next 5 years has been included in this plan (see table 9). This includes areas to be managed for strategic hazard reduction where burns are triggered by fuel build up rather than a schedule based on the requirements of the vegetation.

3.1.3 Vehicle Access Routes and Foot Tracks

The park has a network of fire trails which gives access to most of the perimeter, as well as the interior. There is also an extensive network of informal foot tracks and mountain bike tracks within. Locked gates prevent unauthorised vehicle access to fire trails and service roads; however during 2015 there had been a high volume of illegal trail bike usage.

The location of the trails within the park considered necessary for bushfire management are shown in figure 6 and described in table 8. Each fire trail has been assigned a usage class and its current condition assessed against the standard for their assigned usage class in MP 1 in the *Clarence City Council Bushfire Management Strategy – Best Management Practice Guidelines.*

The existing trails and foot tracks provide adequate access to all areas of the park for bushfire management, and are used as fire control lines for the planned burning recommended in this plan.

Fire trails in the reserve are at a good standard at time of review. W9 can be periodically wet due to a leaking TasWater reservoir. W18 has also been closed and subsequently removed from figure 6 and table 8.

In November 2015 W1, W2, W3, W4, W5, W6, W7, W8, W9, W10, W11, W12, W13, W16 were identified under the Hobart Fire Protection Plan as strategic fire trials.

Strategic fire trails are those that provide important access routes for firefighting, through or along the perimeter of bushland areas, and are potential control lines for major fires. These trails need to be maintained to a standard that allows for all weather vehicle access by fire fighting vehicles. This will generally be Class 3 in the PWS fire trail classification system (Hobart Fire Management Area, 2016).

Figure 6 – Vehicle and foot access

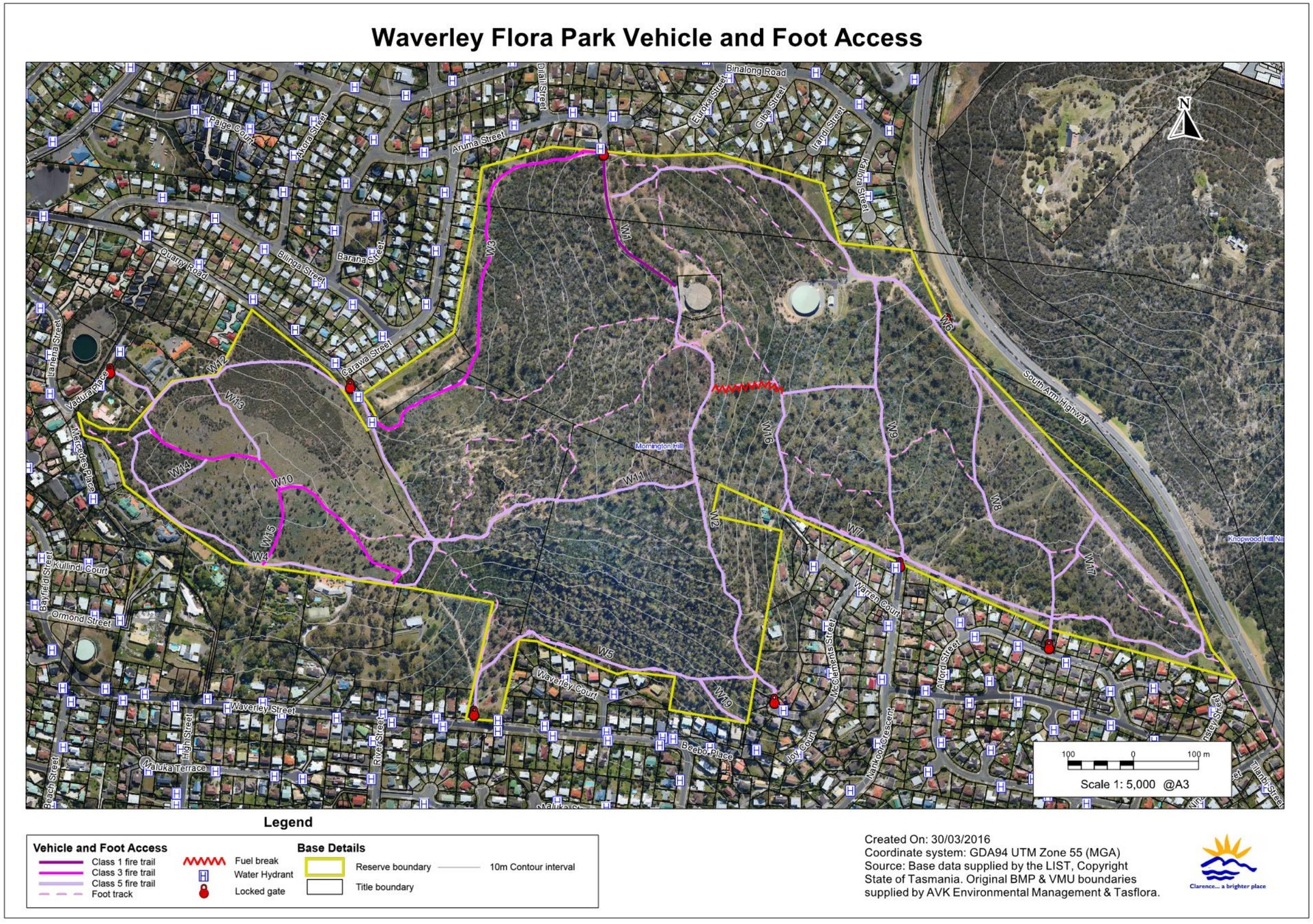


Table 8 - Condition and maintenance of fire trails

Assigned vehicle usage class (see MP1):	Maintenance priority:
Class 1 – all 2WD and 4WD vehicles	**High** priority - major through routes and fire control lines
Class 3 – all weather 4WD, light and heavy 4WD vehicles (category 3, 4 & 5 tankers)	**Medium** priority - important access and escape routes and minor fire control lines
Class 5 – dry weather and/or high clearance 4WD, light 4WD (category 5 tankers), also includes trails with sharp bends and dead end trails with small turning areas.	**Low** priority - minor access routes and boundaries of vegetation management units.

The trail usage class describes the suitability of the fire trail if properly maintained, not necessarily its condition at the time of inspection.

MP refers to Management Procedures in *Clarence City Council Bushfire Management Strategy – Best Management Practice Guidelines

FIRE TRAIL ID	USAGE CLASS	STRATEGIC FIRE TRAIL UNDER HOBART FIRE PROTECTION PLAN[1]	MAINTENANCE PRIORITY	LOCATION AND CONDITION AT DECEMBER 2015	ACTION REQUIRED	MANAGEMENT CONSTRAINT
W1	1	YES	High	Runs from the end of Aruma Street to the water reservoir. Road is sealed and meets usage class 1 specifications.	Inspection and maintenance as specified in MP2.	NO
W2	3/5	YES	High	Runs from the water reservoir to McClement's Street. Unsurfaced trail; the section of this trail from the water reservoir to the junction with W11 meets usage class 3 specifications. The section from here to McClement's Street is sandy and steep in sections and meets Class 5 specifications The McClement's Street entrance to the trail has a locked slip rail with step entry/departure angles.	Monitor erosion from McClement's Street entrance to junction (JCN) W2 and W11. Monitor McClement's Street entrance for motorbike access. Clear encroaching vegetation at McClement's Street entrance as required.	Steep sections with Mod-High erodible soil.

FIRE TRAIL ID	USAGE CLASS	STRATEGIC FIRE TRAIL UNDER HOBART FIRE PROTECTION PLAN[1]	MAINTENANCE PRIORITY	LOCATION AND CONDITION AT DECEMBER 2015	ACTION REQUIRED	MANAGEMENT CONSTRAINT
W3	3	YES	High	Runs along the park perimeter from Quarry Road to Aruma Street. Trail is trafficable with some rough sections. The trail does not meet usage class 3 specifications.	Clear vegetation where required to meet class 3 specifications.	NO
W4	5	YES	High	Runs from Quarry Road to Vadura Place via the southern boundary of the park. Mostly unformed trail, steeper sections slippery when wet. Section along the southern boundary of the park is rough and narrow in places. Access to Vadura Place is currently through an undeveloped lot adjoining the park. If this lot is developed a new connection with either Mercedes Place or Vadura Place will be required. The trail meets most class 5 specifications.	Clear vegetation where required to meet class 5 specifications. Inspection and maintenance as specified in MP2.	Threatened flora within proximity. Preferably undertake maintenance in Autumn when not in seed setting period. May require permit from DPIPWE Threatened Species Section.
W5	5	YES	High	Runs from Waverley Street to W2. Parts of the trail are surfaced and would meet usage class 3 specifications. The steep section at the eastern end requires monitoring/maintenance as required due to erodible soils.	Inspection and maintenance as specified in MP2.	Steep sections with Mod-High erodible soil

FIRE TRAIL ID	USAGE CLASS	STRATEGIC FIRE TRAIL UNDER HOBART FIRE PROTECTION PLAN[1]	MAINTENANCE PRIORITY	LOCATION AND CONDITION AT DECEMBER 2015	ACTION REQUIRED	MANAGEMENT CONSTRAINT
W6	5	YES	High	Runs from W1 to the eastern corner of the park. Connects to the end of W7. Trail is also accessible from the South Arm Highway. Currently meets class 3 specifications however steeper sections adjacent to South Arm highway can be slippery after rain.	Inspection and maintenance as specified in MP2 on steeper sections.	NO
W7	3/5	YES	High	Runs along the outer zone to the north of Alford Street and Warren Court. Accessible from Nankoor Crescent and Alford Street. Trail is only partly formed but access is easy across the outer zone which ranges from about 15 m to 30 m wide. The western end of the trail is steep and slippery when wet. The trail does not meet all usage class 3 specifications. Section from Nankoor Crescent to JCN W16 is class 5 only.	Inspection and maintenance as specified in MP2.	NO
W8	5	YES	Medium	Runs from the Alford Street entrance to W6 on the eastern boundary. Drainage is a problem in some sections and needs to be improved. Low section may be boggy after rain. Steep section at JCN W8/W6 slippery after rain. Trail meets some class 3 specifications.	Install remedial drainage methods to sections affected by erosion. Inspection and maintenance as specified in MP2.	NO

FIRE TRAIL ID	USAGE CLASS	STRATEGIC FIRE TRAIL UNDER HOBART FIRE PROTECTION PLAN[1]	MAINTENANCE PRIORITY	LOCATION AND CONDITION AT DECEMBER 2015	ACTION REQUIRED	MANAGEMENT CONSTRAINT
W9	5	YES	Medium	Runs from Nankoor Crescent to W6 in the north-east corner of the park. Trail has a rough surface and steeper sections. Trail is subject to erosion problems due to leaking TasWater reservoir. Trail has significant channel eroded, sealed water track alignment has not helped with issue. Rocks and wattle tree at Nankoor Crescent entrance make hard to negotiate corner. Trail meets class 5 specifications.	Address erosion issues; install drainage that allows for periodically high volumes of water. Remove wattle and rocks at Nankoor Crescent entrance. Inspection and maintenance as specified in MP2 particularly after significant rainfall.	NO
W10	3	YES	Medium	Runs in a loop from W4 close to the Mercedes Place entrance to the park to W4. Trail is in a good condition and surfaced. Trail doubles as a walking track. The trail meets usage class 3 specifications.	Inspection and maintenance as specified in MP2.	Threatened flora within proximity. Preferably undertake maintenance in Autumn when not in seed setting period. May require permit from DPIPWE Threatened Species Section.
W11	5	YES	High	Runs from W2 to W4 through the old quarry. Unsurfaced trail, the section of the trail from W2 to the quarry is sandy but trafficable. The section through the quarry has some rough sections. Caution must be used when driving at night.	Inspection and maintenance as specified in MP2.	NO

FIRE TRAIL ID	USAGE CLASS	STRATEGIC FIRE TRAIL UNDER HOBART FIRE PROTECTION PLAN[1]	MAINTENANCE PRIORITY	LOCATION AND CONDITION AT DECEMBER 2015	ACTION REQUIRED	MANAGEMENT CONSTRAINT
W12	5	YES	Medium	Runs from the Quarry Street entrance to the Vadura Street entrance along the western boundary of the park. Trail is narrow and partly overgrown. Access at the Quarry Road end requires a difficult sharp turn.	Cut back encroaching vegetation on trail verge to class 5 specifications. Inspection and maintenance as specified in MP2.	NO
W13	5	YES	Low	Runs from W10 to W12. The trail meets usage class 5 specifications.	Inspection and maintenance as specified in MP2.	Threatened flora within proximity. Preferably undertake maintenance in Autumn when not in seed setting period. May require permit from DPIPWE Threatened Species Section.
W14	5	NO	Low	Links W4 and W10. Trail is in good condition. The trail meets class 5 specifications.	Inspection and maintenance as specified in MP2.	Threatened flora within proximity. Preferably undertake maintenance in Autumn when not in seed setting period. May require permit from DPIPWE Threatened Species Section.

FIRE TRAIL ID	USAGE CLASS	STRATEGIC FIRE TRAIL UNDER HOBART FIRE PROTECTION PLAN[1]	MAINTENANCE PRIORITY	LOCATION AND CONDITION AT DECEMBER 2015	ACTION REQUIRED	MANAGEMENT CONSTRAINT
W15	3	NO	Low	Links W4 and W10. Trail is in good condition. The trail meets usage class 3 specifications.	Inspection and maintenance as specified in MP2.	Threatened flora within proximity. Preferably undertake maintenance in Autumn when not in seed setting period. May require permit from DPIPWE Threatened Species Section.
W16	5	YES	Medium	Runs in a loop from the northern end of Warren Court to W9. Section running upslope from Warren Court is grassed, stable and in good condition. The steep downhill section to W9 is eroded at the western. The trail does not meet all usage class 5 specifications.	Monitor eroded section of trail, improve drainage if required to prevent further erosion. Inspection and maintenance as specified in MP2.	NO
W17	5	NO	Low	Links W6 to W8. Trail is in good condition but low section may become boggy when wet. Vegetation needs cutting back on trail verges. The trail meets most usage class 5 specifications.	Cut back encroaching vegetation on trail verge to class 5 specifications. Inspection and maintenance as specified in MP2.	NO

FIRE TRAIL ID	USAGE CLASS	STRATEGIC FIRE TRAIL UNDER HOBART FIRE PROTECTION PLAN[1]	MAINTENANCE PRIORITY	LOCATION AND CONDITION AT DECEMBER 2015	ACTION REQUIRED	MANAGEMENT CONSTRAINT
W19	5	NO	Low	Runs from W5 to the Beebo Place entrance to the park. This entrance is only a foot track. The trail does not meet all usage class 5 specifications.	Inspection and maintenance as specified in MP2.	NO

1 - Strategic fire trails have been identified in the Hobart Fire Protection Plan. Strategic fire trails will be signposted.

The previous BMP recommended two short links that could improve emergency vehicle access within the park:

Link 1: Link from the end of the fire trail around the eastern and northern boundary (W6) to the water reservoir access road (W1). The fire trail was previously separated from the road by a deep drain, and access involved a detour via the water reservoir.

This link has been established since the previous review. This now meets class 3 specifications.

Link 2: Link from the western end of W7 along the boundary to the north of Warren Court to the western end of Warren Court.

This link has been established since the previous review. This now meets class 5 specifications.

The western portion of the park is currently accessed from Quarry Road or through a vacant lot along Vadura Place. This will need to be replaced with another vehicle access to Mercedes Place or Vadura Place if the vacant lot is developed. Maintaining vehicle access into the western portion of the park is important for fire fighter safety if there is bushfires in that part of the park as well as allowing easy access to water supply for firefighting.

3.1.4 Water Supply

As at December 2015 there are two water sources within the park, both fire hydrants located near the Quarry Road entrance on W4 (see figure 6) near the junction of fire trails W3 and W4. Both hydrants need to be marked properly. Additional water for firefighting and bushfire management can be easily obtained from fire hydrants in the streets surrounding the park.

3.1.5 Fuel Breaks and Defendable Spaces

A fuel break (sometimes called a "firebreak") is a strip of cleared, or partly cleared, bushland constructed and maintained to slow, or stop, the progress of a bushfire to assist in its control. They are not the same as defendable spaces which are maintained around vulnerable assets to protect them from bushfires. Fuel breaks in grassland can be effective in stopping fires if cleared down to mineral earth, but where trees and shrubs are present wind-blown burning embers will usually carry a bushfire across a fuel break. Therefore, in bushland with shrubs and trees the only benefit of a fuel break is to provide access for firefighters and a boundary for back burning operations. Currently there are no standards or guidelines for fuel breaks in Tasmania.

One fuel break has been established in the park, running from fire trail W2 to W16. This is maintained annually.

The powerline easement that crosses the park from the Nankoor Crescent entrance to W6 forms a partial fuel break.

A defendable space is an area of managed vegetation around an asset likely to be at risk from bushfire that protects it from direct flame contact and intense radiant heat, as well providing an area where fire fighters can defend the asset.

The Tasmania Fire Service document *Bushfire Survival Plan 2015-2016* recommends that a defendable space includes two 'zones':

- An inner zone (formerly Bushfire Protection Zone or BPZ) where flammable materials are minimised.
- An outer zone (formerly Fuel Modified Buffer Zone or FMZ) where a low level of flammable material is permitted.

In the inner zone, flammable materials on, under and around your home should be moved away from the house.

In the inner zone:

- Include non-flammable areas such as paths, driveways, and mowed lawns.
- Use non-flammable mulch, do not use woodchips or bark.
- Locate any dams, orchards, vegetable gardens and any effluent disposal areas on the fire-prone side of the home.
- Use radiation shields and windbreaks such as stone or metal fences and hedges using low-flammability plants.
- Remove fire hazards such as wood piles, rubbish heaps and stored fuels.
- Replace all highly-flammable plants with low-flammability plants.
- Prune lower branches on trees and remove flammable shrubs from under and between trees.
- Rake up bark and leaves and keep roofs and gutters clear of flammable debris.

The TFS notes that it is not necessary to remove all vegetation from the inner zone. Individual trees rarely cause houses to burn in bushfires.

Trees can screen a building from windblown embers while protecting it from radiant heat. Smooth barked trees are less likely to catch fire than those with rough bark. No tree should be able to fall on the building.

In the outer zone, small-sized natural fuels (such as leaf litter, bark, sticks, tussocks and some shrubs) should be removed and larger fuels (trees and shrubs) should be cut back to reduce the intensity of an approaching bushfire.

Natural fuels, both on the ground and between the ground and any larger trees, should be reduced by selective removal of vegetation, both horizontally and vertically, followed by ongoing maintenance.

In the outer zone:

- Retain established trees to trap embers and reduce wind speeds.
- Selectively remove small trees and shrubs to create clumps (rather than a continuous wall of trees) separated by open areas.
- Remove the vegetation between the ground and the bottom of the tree canopy, to a height of at least two metres.
- Minimise fine fuels at ground level, such as grasses and leaf litter.

The existence and adequacy of defendable spaces on individual lots adjoining the park was not surveyed as part of this BMP. Nevertheless, it must be stressed that establishment and maintenance of defendable spaces around residences bordering the park is essential for bushfire protection. Clarence City Council and individual landowners need to co-operate to provide and maintain adequate bushfire protection.

Most of the park boundary with adjoining private property has been provided with outer zones ranging from 3m to approximately 30m wide (see figure 8). These are well maintained and most have vehicle access making them effective control lines. Most of the existing outer zones along the park boundary are wide enough to meet TFS requirements for an outer zone, and should provide adequate protection for adjoining properties, provided that the portion of these properties between the dwelling and the park is maintained as an inner zone.

The western section of VMU1 (managed as an outer zone) behind Waverley Court, Beebo Place and McClement's Street should be widened as required to a minimum 20m width for adequate risk reduction. This is detailed in table 7.

3.1.6 Bushfire Detection and Suppression

The park is highly visible from surrounding suburbs and it is likely that any fires would be promptly reported. Most of the park has effective perimeter and internal access which should allow the TFS to rapidly reach and contain fires within the park, provided they are familiar with the location of access points and fire trails. The location of the park on a ridge means that fires in the park will tend to burn upslope away from surrounding dwellings, unless there are very strong winds. Fires approaching residential areas will generally be moving downslope which will reduce their intensity. In this situation the perimeter fire trails and outer zone could be effective control lines.

3.2 Weeds

Environmental weeds occur throughout the park and are a key management issue affecting its natural values (see figure 7). While much primary weed control work has been undertaken by Councils Fire and Bushland Crew and the Waverley Flora Park Landcare Group to control weed infestations, follow-up maintenance activities will be required for many years (Tasflora, May 2013)

Several weed species found in the reserve are classified as declared weeds under the Tasmanian *Weed Management Act 1999* and/or Weeds of National Significance (WONS). Where possible these weeds will be targeted as a priority to prevent their further spread.

Blackberry *(Rubus fruticosus),* boneseed (*Chrysanthemoides monilifera),* Montpellier broom *(Genista monspessulana)* and gorse *(Ulex europaeus)* are present declared weeds and WONS.

Declared weeds in the reserve that are not listed as WONS include pampas grass *(Cortaderia species),* fennel *(Foeniculum vulgare)* and Spanish heath *(Erica lusitanica).*

Other environmental weeds present within the park are: agapanthus *(Agapanthus praecox subsp. Orientalis),* blue periwinkle *(Vinca major)*, bluebell creeper *(Billardiera heterophylla),* cape wattle (*Paraserianthes lophantha)*, cotoneaster (*Cotoneaster* Sp.), mirror bush *(coprosma repens)*, radiata pine *(Pinus radiata)*, sweet briar *(Rosa rubiginosa)*, sweet pittosporum *(Pittosporum undulatum)* and tree lucerne *(Chamaecytisus palmensis).*

Bracken fern (*Pteridium esculentum*), although a native plant, is a concern in the reserve as it has come to dominate a small section behind Waverley Court. It is a greater bushfire hazard than many other understorey species and at high density can exclude other native species. As bracken recovers faster than other understorey species after bushfire, it can quickly dominate areas that are burnt frequently. It also builds up an elevated fuel load in 2 to 3 years, thus making burning an ineffective method of hazard reduction (AVK Environmental Management, 2011). Bracken control is therefore an important component of bushfire management in the Park.

The planned burning recommended in this plan can assist a weed control program, and it is recommended that weed control and bush regeneration activities be integrated with the planned burning program in this plan. MP 8 in *Clarence City Council Bushfire Management Strategy - Best Management Practice Guidelines* includes guidelines for integrating weed management with planned burning, and for minimising the risk of weed invasion following bushfires. These guidelines should ensure that fires in the park do not worsen existing weed problems, or cause weeds to spread.

There was evidence that garden rubbish and prunings are being dumped in the park along the rear of Carawa Street on the western side of the park. This increases fuel loads close to dwellings as well as introducing weeds into the park.

3.3 Biodiversity Conservation

Following the 1998 bushfire in the western portion of the park there was a dense regrowth of acacia and she-oak in what had previously been grassy woodland. This regrowth threatened to replace an area with high species diversity, including a number of threatened plant species, with a dense shrubland dominated by just two species. The 2006-2011 BMP sought to restore a more open grassy vegetation by burning the area frequently in order to thin out the shrub regrowth. This approach was not successful as the first burn was not hot enough to completely kill the shrubs and the vegetation did not build up fuel quickly enough to allow a second burn. It was decided that manual and machine thinning of the shrub layer followed by burning of the cut vegetation was the only practical means to achieve a grassy woodland structure. During the previous BMP this area has been mechanically slashed by Council's Fire and Bushland Crew annually with brush cutter's and stems sprayed. Given the high volume of woody shrubs and rocky ground cutting and pasting at ground level is impracticable, resulting in some exposed dead stems. This regime is to continue until 2021 and effectiveness assessed at the next BMP review.

The park is significant for supporting the largest, most accessible and most viable population of the nationally listed orchid *Caladenia caudata* in the Hobart region. The core populations of this species cover several adjoining VMUs which reduces the risk of any single management regime adversely impacting the whole population. The site is regularly visited and is often inspected as part of an informal public wildflower walk undertaken each spring.

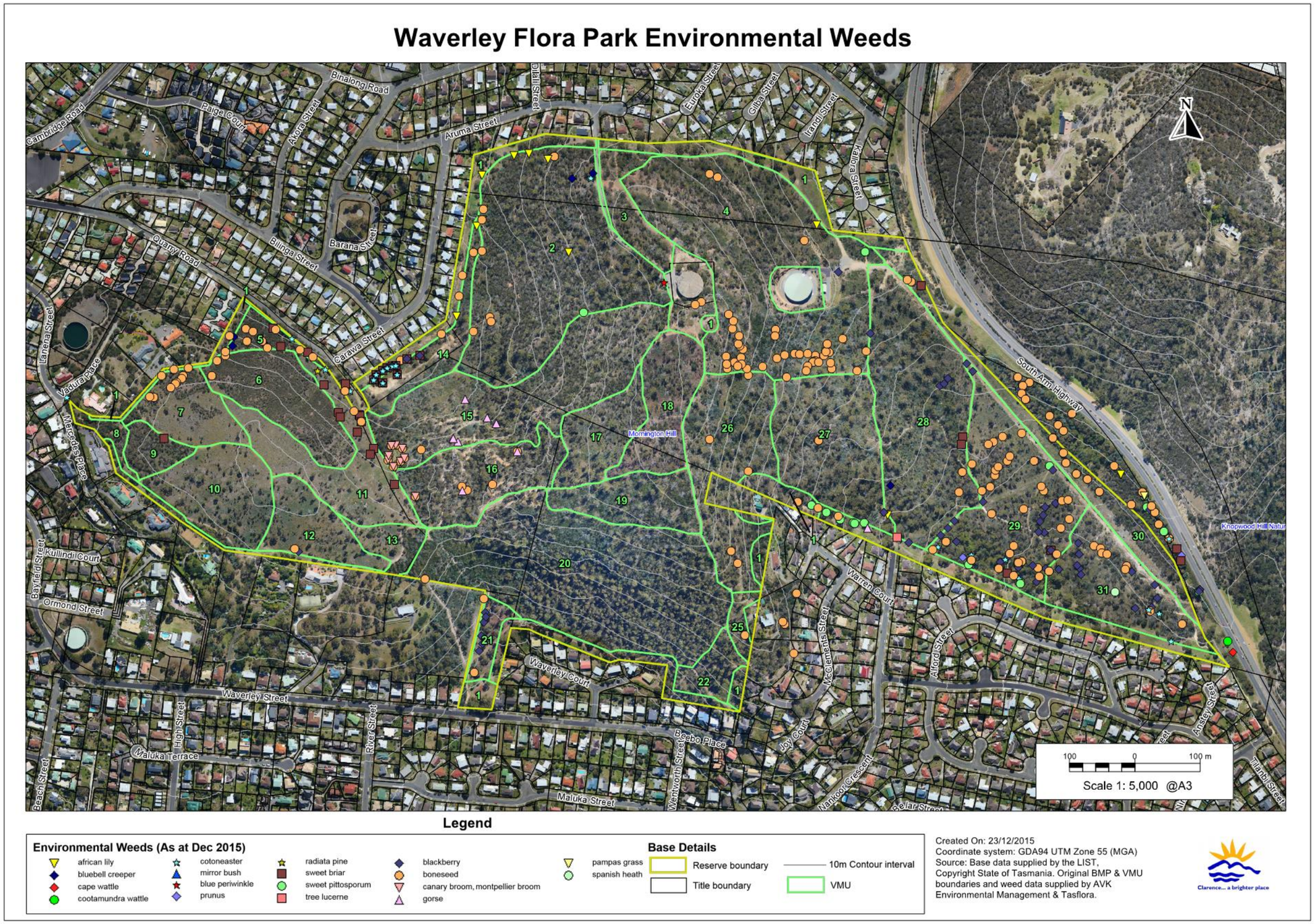
During 2013 Vegetation Monitoring Plots (VMPs) with photo point monitoring were established by Council's Fire and Bushland Management in VMU 10, 19, 28 and 29. These plots are reassessed annually with the objective to provide long term data on effectiveness of regimes adopted in this BMP. See table 9 for recommendations on additional threatened species monitoring.

3.4 Stakeholder and Community Concerns

At the commencement of the project Clarence City Council sent a letter to all landowners adjoining the park and to other stakeholder groups informing them that the BMP was being revised and inviting them to have input into the revised plan for the park by sending in a written submission, attending a community "walk and talk" in the park, or by contacting the reviewer directly. The community "walk and talk" was held in the park on 28 November 2015 and was attended by eight community members and a Council representative. Four written comments were received. The community concerns about bushfire management in the park expressed during the walk and talk and in written submissions are summarised in Appendix B along with Council's response.

The main community concerns included the threat of bushfire to the western side of the park above Waverley Court, Waverley Street and Beebo Place as most residents had experienced the 1998 bushfire that impacted this area; and adequacy, maintenance and understanding of the outer zones around the perimeter of the park, illegal access by trail bikes and impact from fire towards birdlife within the park.

Figure 7 – Environmental weeds in reserve



4. Plan Implementation

To ensure that the recommendations in this plan are fully implemented, Clarence City Council will ensure that TFS brigades likely to attend bushfires within the park are familiar with the plan, and its contents are issued to the TFS.

4.1 Bushfire Risk Reduction Strategy

The overall bushfire risk reduction strategy recommended for the park can be summarised as follows:

- Reduce ignitions through prosecution of arsonists, and prompt reporting of fires.
- Maintain access points and fire trails to enable the TFS to rapidly contain fires that start in the park, and ensure the TFS are familiar with the location and condition of fire trails in the park.
- Maintain defendable spaces in the park to protect assets within and adjoining the park.
- Carry out strategic planned burning to reduce bushfire hazards in the park.
- Encourage neighbouring residents to maintain defendable spaces around their homes.

4.2 Community Education, Awareness and Involvement

To ensure successful implementation of this BMP it will be necessary to inform key sectors of the community about bushfire management issues in the park. This should include surrounding residents and those with special interests in the park, or whose activities can affect assets within the park. The community education process is detailed in section 5.7 of *Clarence City Council Bushfire Management Strategy for Council Owned and Controlled Land*. This was not implemented during the previous BMP, and has a heavy influence in the effectiveness of this BMP.

In particular, adjoining residents should be advised that dumping garden waste and other rubbish in reserves increases the bushfire hazard and makes firefighting along the bushland/urban interface more difficult and dangerous for fire fighters. It also contributes to the spread of weeds. Residents should also be advised that they are not authorised to remove vegetation in a Council reserve, even if it is recommended in the BMP. If residents have any concerns about the bushfire hazard in the reserve near their home, they are encouraged to contact Council's Fire and Bushland Vegetation Management Co-ordinator.

4.3 Planned Burning

The native plant communities in the park are considered dependent on bushfire to maintain their structure and floristics in the long term. Periodic burning will help to maintain diversity in the understorey, and allow bushfire dependent species to germinate and establish. However, there is a need to minimise damage to important habitat elements (such as dead trees, old logs and stumps) during these burns, and to ensure adequate retention of unburnt patches of each forest type to act as refugia for recolonisation of burnt areas.

The approach adopted in this plan is to use planned burning both for asset protection in areas targeted for maximum risk reduction and for habitat management. Areas burnt for habitat management will have the additional benefit of reduced bushfire hazard for a period following each bushfire.

4.3.1 Vegetation Management Units (VMU)

The planned burning program in this plan is based on the division of the dry forest and woodland habitats into a mosaic of VMUs (see figure 8). VMUs can be burnt at a frequency, season and intensity that is optimal for the plant communities within each unit or excluded from fire if the vegetation does not require burning or the VMU is being managed by other means. The bushfire management requirements of the vegetation communities within the park are given in table 6.

The previous bushfire management plan divided the park into 31 VMUs based on the vegetation types in the park, and the presence of suitable control lines in the form of fire trails and foot tracks. These have been reduced to 29 to allow a more strategic approach to planned burning and control of bracken. The reduction in VMUs is based on the amalgamation of VMU 22, 23 and 24. These VMUs will now be identified as VMU 22.

4.3.2 Planned Fire Regimes

The approach adopted in this plan is to use planned burning for a combination of asset protection in areas targeted for maximum risk reduction and for habitat management.

Planned burning operations should be carried out following the seed-setting period of native species and after the nesting period of the understorey bird species in the reserve. Where possible hollow logs and dead trees should be protected from fire due to their fauna habitat value. This can be achieved by using wet lines around the tree or log, or raking fine fuels away from logs or the base of hollow trees, and rapidly extinguishing fires at these points should they occur.

This BMP covers a 5-year period, after which another review is recommended. Burns within the park have been scheduled in table 9. To allow for flexibility in budgeting and planning, and for unfavourable weather, the burns can take place in the year following that recommended in table 9, if required. If a bushfire burns more than half of a VMU, the whole of the VMU should be considered to have been burnt and the schedule adjusted accordingly. In order to create a mosaic of native bushland with different bushfire histories, VMUs should generally not be burnt within 2 years of adjoining VMUs.

Figure 8 – Vegetation management units in the park

Table 9 – Bushfire management in the park

VMU[1]	AREA (ha)	BUSHFIRE MANAGEMENT OBJECTIVES and PRESCRIPTIONS	NOTES and PRECAUTIONS [2, 3, 4]	LAST BURNT	NEXT BURN
1	6.1	OBJECTIVES: Maintain as outer zone to protect adjoining dwellings. Reduce the extent and density of weeds. PRESCRIPTION: See table 7 for widths, and MP 5 in the Best Management Practices Guidelines for outer zone specifications.	Pile burns only if required Section around radio repeater conations threatened plant species *Arthropodium strictum* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning.	Not known	Pile burns only
2 DAS	6.9	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 15 to 25 years.	Contains the threatened plant species *Lepidium pseudotasmanicum* [1]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Protect water reservoir infrastructure from damage. Contact TasWater before burning. Protect adjoining property during burns.	2001	2017
3 DVG	0.9	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 5 to 15 years.	Contains the threatened plant species *Lepidium pseudotasmanicum* [1], *Caladenia caudata* [3, 4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Protect water reservoir infrastructure from damage. Contact TasWater before burning.	2010 (part)	Assess next plan

VMU[1]	AREA (ha)	BUSHFIRE MANAGEMENT OBJECTIVES and PRESCRIPTIONS	NOTES and PRECAUTIONS [2, 3, 4]	LAST BURNT	NEXT BURN
4 DAS DVG	7.8	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 10 to 15 years.	Contains the threatened plant species *Arthropodium strictum* [4], *Caladenia caudata* [3, 4], *Lepidium pseudotasmanicum* [4] and *Senecio squarrosus* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Protect water reservoir infrastructure from damage. Contact TasWater before burning. Protect communications tower from damage. Do not burn during the nesting/seed setting period. Protect adjoining property during burns.	2010	2025
5 NAV	0.5	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 10 to 15 years.	Protect adjoining property during burns. Do not burn during the bird nesting/seed setting period.	2014	2024
6 NAV	2.1	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 15 to 25 years.	Contains the threatened plant species *Caladenia caudata* [3, 4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Do not burn during the bird nesting/seed setting period.	2006	2021

VMU[1]	AREA (ha)	BUSHFIRE MANAGEMENT OBJECTIVES and PRESCRIPTIONS	NOTES and PRECAUTIONS [2, 3, 4]	LAST BURNT	NEXT BURN
7 GTL NAV	1.4	OBJECTIVES: Maintain as open grassland and grassy woodland. Maintain groundcover to minimise erosion. Allow recruitment of canopy species and limit shrub cover to 30% total cover. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 3 to 5 years.	Contains the threatened plant species *Senecio squarrosus* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Do not burn during the bird nesting/seed setting period. Protect adjoining property during burns. Control shrub density using the procedure in section 4.4.2.	2012	2016 2020 2023
8 DVG	0.3	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 15 to 25 years.	Protect adjoining property during burns. Contains the threatened plant species *Senecio squarrosus* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning.	1998	2018
9 NAV DVG	0.5	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 15 to 25 years.	Contains the threatened plant species *Senecio squarrosus* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Do not burn during the bird nesting/seed setting period. Protect adjoining property during burns.	2005	2020

VMU[1]	AREA (ha)	BUSHFIRE MANAGEMENT OBJECTIVES and PRESCRIPTIONS	NOTES and PRECAUTIONS [2, 3, 4]	LAST BURNT	NEXT BURN
10 DVG GTL	2.15	OBJECTIVES: Maintain as open grassland and grassy woodland. Maintain groundcover to minimise erosion. Allow recruitment of canopy species and limit shrub cover to 30% total cover. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 3 to 8 years.	Contains the threatened plant species *Caladenia caudata* [3, 4], *Senecio squarrosus* [4] and *Velleia paradoxa* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Do not burn during the bird nesting/seed setting period. Protect adjoining property during burns. Control shrub density using the procedure in section 4.4.2. Vegetation Monitoring Plot (VMP) 009 to be measured pre and post burn. Share threatened species information with Natural Values Atlas.	2013	2018 2021
11 NAV DVG GTL	2.5	OBJECTIVES: Maintain as open grassland and grassy woodland. Maintain groundcover to minimise erosion. Allow recruitment of canopy species and limit shrub cover to 30% total cover. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 2 to 4 years.	Contains the threatened plant species *Caladenia caudata* [3, 4], *Lepidium pseudotasmanicum* [4] and *Scleranthus fasciculatus* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Avoid burning within the power line easement. Contact TasNetworks before burning. Do not burn during the bird nesting/seed setting period. Control shrub density using the procedure in section 4.4.2. 2020 engage consultant to undertake total organic carbon content sampling pre and post burn at previously sampled sites.	2013	2017 2020 2023

VMU[1]	AREA (ha)	BUSHFIRE MANAGEMENT OBJECTIVES and PRESCRIPTIONS	NOTES and PRECAUTIONS [2, 3, 4]	LAST BURNT	NEXT BURN
12 DVG	1.4	OBJECTIVES: Maintain as open grassy woodland. Maintain groundcover to minimise erosion. Allow recruitment of canopy species and limit shrub cover to 40% total cover. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 3 to 8 years.	Contains the threatened plant species *Caladenia caudata* [3, 4], *Lepidium pseudotasmanicum* [4], *Scleranthus fasciculatus* [4] and *Velleia paradoxa* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Establish monitoring plot for threatened species, distribute results to Natural Values Atlas. Do not burn during the bird nesting/seed setting period. Protect adjoining property during burns. Control shrub density only through planned burning.	2015	2019 2023
13 DAS DVG	0.6	OBJECTIVES: Maintain as grassy woodland. Maintain groundcover to minimise erosion. Allow recruitment of canopy species and limit shrub cover to 60% total cover. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 8 to 10 years.	Contains the threatened plant species *Caladenia caudata* [3, 4], *Lepidium pseudotasmanicum* [4] and *Scleranthus fasciculatus* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Do not burn during the bird nesting/seed setting period. Protect adjoining property during burns. Control shrub density using the procedure in section 4.4.2.	2015	Assess next plan
14 NBA	1.1	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 5 to 10 years.	Protect adjoining property during burns. Do not burn during the bird nesting/seed setting period.	2001 (part)	2016 2021

VMU[1]	AREA (ha)	BUSHFIRE MANAGEMENT OBJECTIVES and PRESCRIPTIONS	NOTES and PRECAUTIONS [2, 3, 4]	LAST BURNT	NEXT BURN
15 DAS NBA	4.8	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 10 to 15 years.	Contains the threatened plant species *Austrodanthonia induta* [4], *Caladenia caudata* [3, 4], *Lepidium pseudotasmanicum* [4] and *Rytidosperma indutum*[4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Potential fall hazards; low cliffs and steep slopes. 2024 engage consultant to undertake total organic carbon content sampling pre and post burn at previously sampled sites.	2013	2024
16 DAS	2.2	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 15 to 25 years.	Contains the threatened plant species *Austrodanthonia induta* [4] and *Rytidosperma indutum*[4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Potential fall hazards; low cliffs and steep slopes.	2012	Assess next plan
17 DAS	1.4	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 10 to 15 years.	Contains the threatened plant species *Caladenia caudata* [3, 4] and *Scleranthus fasciculatus* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Do not burn during the bird nesting/seed setting period.	2014	Assess next plan

VMU[1]	AREA (ha)	BUSHFIRE MANAGEMENT OBJECTIVES and PRESCRIPTIONS	NOTES and PRECAUTIONS [2, 3, 4]	LAST BURNT	NEXT BURN
18 DAS	1.8	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 10 to 15 years.	Contains the threatened plant species *Scleranthus fasciculatus* [4] and *Lepidium pseudotasmanicum* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2].	2012	2022
19 DAS	1.5	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 15 to 25 years.	Contains the threatened plant species *Scleranthus fasciculatus* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Vegetation Monitoring Plot (VMP) 010 to be measured pre and post burn.	2012	Assess next plan
20 DAS	7.7	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Cool Autumn burn with minimal scorch. Monitor bracken control post 2016 planned burn.	Avoid burning within the power line easement. Contact TasNetworks before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2].	1998	2016

VMU[1]	AREA (ha)	BUSHFIRE MANAGEMENT OBJECTIVES and PRESCRIPTIONS	NOTES and PRECAUTIONS [2, 3, 4]	LAST BURNT	NEXT BURN
21 DOV	0.4	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 10 to 15 years.	Avoid burning within the power line easement. Contact TasNetworks before burning. Protect adjoining property during burns. Only burn in conjunction with blackberry control. Consult DPIPWE Threatened Species Section before burning. Contains DOV[2].	2011	2021
22 DAS	0.65	OBJECTIVES: Maintain in a fuel reduced condition to protect adjoining houses. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. **VMU 22, 23 and 24 amalgamated into VMU 22 in 2016.** PRESCRIPTION: Burn when fine fuel loads exceed 10 tonnes per hectare, but not in the same year as VMU 25.	Protect adjoining property during burns. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Control bracken using the procedure in section 4.4.1.	2009 (Part)	When fuel loads >10 tph
25 DAS	0.5	OBJECTIVES: Maintain in a fuel reduced condition to protect adjoining houses. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Burn when fine fuel loads exceed 10 tonnes per hectare, but not in the same year as VMU 22.	Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Protect adjoining property during burns.	2011	When fuel loads >10 tph

VMU[1]	AREA (ha)	BUSHFIRE MANAGEMENT OBJECTIVES and PRESCRIPTIONS	NOTES and PRECAUTIONS [2, 3, 4]	LAST BURNT	NEXT BURN
26 DAS	3.2	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 15 to 25 years.	Contains the threatened plant species *Scleranthus fasciculatus* [4] and *Lepidium pseudotasmanicum* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Protect adjoining property during burns.	2001	2017
27 DAS	3.2	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 15 to 25 years.	Contains the threatened plant species *Arthropodium strictum* [4] and *Lepidium pseudotasmanicum* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2]. Do not burn during the bird nesting/seed setting period. Protect adjoining property during burns. Mountain bike park within VMU.	2015	Assess next plan
28 DAS DOV	5.0	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 10 to 15 years.	Contains the threatened plant species *Haloragis heterophylla* [4], *Juncus amabilis* [4] and *Senecio squarrosus* [4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2] and DOV[2]. Avoid burning within the power line easement. Contact TasNetworks before burning. Do not burn during the bird nesting/seed setting period. Protect adjoining property during burns. Vegetation Monitoring Plot (VMP) 011 to be measured pre and post burn.	2013	Assess next plan

VMU[1]	AREA (ha)	BUSHFIRE MANAGEMENT OBJECTIVES and PRESCRIPTIONS	NOTES and PRECAUTIONS [2, 3, 4]	LAST BURNT	NEXT BURN
29 DAS DOV	4.1	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 5 to 10 years.	Avoid burning within the power line easement. Contact TasNetworks before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2] and DOV[2]. Protect adjoining property during burns. Vegetation Monitoring Plot (VMP) 012 to be measured pre and post burn.	2013	2019
30 DAS DOV	1.6	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn or spring burn every 10 to 15 years.	Avoid burning within the power line easement. Contact TasNetworks before burning. Consult DPIPWE Threatened Species Section before burning. Contains DAS[2] and DOV[2].	2014/ 2015 (Part – Wildfire)	Assess next plan
31 DOV DVG	2.5	OBJECTIVES: Maintain the structure and floristics of the vegetation community. Maintain groundcover to minimise erosion. Allow recruitment of canopy species. Reduce the extent and density of weeds. PRESCRIPTION: Autumn burn every 5 to 10 years.	Contains the threatened plant species *Austrodanthonia induta*[4]. Obtain a permit from DPIPWE Threatened Species Section before burning. Consult DPIPWE Threatened Species Section before burning. Contains DOV[2]. Protect adjoining property during burns. Do not burn during the bird nesting/seed setting period.	2012	2021

[1] TASVEG 3.0 codes of vegetation types in the unit.

[2] *Nature Conservation Act 2002*

[3] *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

[4] Tasmanian *Threatened Species Protection Act* 1995

4.3.3 Preparation and Supervision

The VMUs scheduled for burning should be inspected some months before the proposed burn to check that the scheduling and burning prescriptions are still appropriate and to determine whether weeds are present that require treatment before burning. Where treatment of weeds is required, it should be carried out at least 3 months in advance of the burn to allow treated weeds to desiccate. Disturbance of the treated infestations (by mechanical means, slashing or burning) within this period may reduce the herbicide's effectiveness, and regeneration from rootstock is likely to occur.

Successful implementation of the planned burns in this plan requires trained personnel and special equipment. Each planned burn recommended in this plan must have a burn plan prepared by someone who has completed the Forestry Tasmania "Develop Prescribed Burning Plans" course or equivalent. All persons engaged in planned burning or firefighting in the reserve must have completed the Forestry Tasmania "Forest Fire Fighting" course or equivalent.

If the planned burning is contracted out, the contractor must be able to meet the required training accreditation in the previous paragraph, as well as provide evidence of experience in carrying out broadscale low intensity fuel reduction burns.

4.4 Bushland Management

In May 2013 Tasflora developed the *Waverley Flora Park Reserve Activity Plan 2013-2018*. This document aims to ensure the reserve is sustainably managed and links directly to the BMP through the preservation and enhancement of its natural, cultural and social values.

Bushfire can provide the disturbance that many introduced species need to spread to new areas, as well as to expand existing populations. Other bushfire management activities, such as construction and maintenance of fire trails, and bulldozing of fuel breaks during bushfire suppression, can also provide opportunities for weeds to colonise native bushland. Fire can also be used as a tool to manage weed infestations. Some species are best controlled by herbicide application to regrowth following a bushfire. Other species can sometimes be controlled by the application of a fire regime that stimulates germination of seed but kills the regrowth before it has been able to flower.

The planned burning recommended in this plan can assist a weed control program, and it is recommended that weed control activities be integrated with the management burning program in this plan. MP 8 in *Clarence City Council Bushfire Management Strategy - Best Management Practice Guidelines* includes guidelines for integrating weed management with management burning, and for minimising the risk of weed invasion following bushfires. These guidelines should ensure that fires in the park do not worsen existing weed problems, or cause weeds to spread.

It should be noted that bush regeneration plantings in previously cleared areas might increase the bushfire hazard. Any proposals for bush regeneration in the park should be considered in the context of this BMP to ensure that they do not compromise bushfire protection measures proposed in this plan.

In general, plantings should not be allowed:

- on inner zones and outer zones established around assets at risk
- on fuel breaks
- Within 2m of the edge of fire trails.

4.4.1 Control of Bracken (*Pteridium esculentum*)

Where indicated in table 9, control of bracken should be undertaken after burns by cutting off the heads of the bracken annually in summer. Heads should be cut just below the lowest frond on each stem. This can be done by hand or with a brushcutter; a vehicle-mounted slasher should not be used. Cutting of the heads should continue each year until regenerating native shrubs and trees reach the height of the bracken heads and then discontinued. It should be noted that this method of control will fail if it is not carried out consistently.

The largest area of bracken in the park is in VMU 20 and 22. Manual control of bracken in VMU 22 is manageable; however VMU 20 would be difficult due to the size of the unit and the steep slopes. The previous strategy recommended controlling bracken by letting natural regrowth of shrubs gradually shade out the bracken. This requires that fire be excluded for a relatively long period. This control method has been reviewed and manual control will be trialled in locations throughout VMU 20 post next scheduled planned burn for the duration of this BMP through a combination of hand weeding and brush cutting as specified above.

4.4.2 Control of Shrub Regrowth

Dense thickets of acacia and she oak increase the bushfire hazard and reduce biodiversity by inhibiting understorey species. Dense thickets of she oak also put additional stress on eucalypts growing in the thickets, particularly during drought, which can lead to dieback and death. This was occurring in the western section of the park in previous BMPs. Planned burning was trialled during previous BMPs to control regrowth but was unsuccessful. Manual removal was then trialled by the utilisation of a machine and drum mulcher.

Whilst the use of heavy machinery in VMUs 7, 10, 11, 12 and part of 13 was effective, it caused ground disturbance which may be detrimental to the eucalypts and orchids in these VMUs.

For the duration of the previous BMP manual removal has been undertaken by brush cutter, then pasted with suitable herbicides and residue burnt through a combination of heap burning and regular broadscale planned burns. This regime will continue for VMUs that have had a maximum shrub density prescribed in table 9 for the duration of this BMP and evaluated upon this BMPs review. The review will also evaluate if burning alone is an effective control mechanism for shrubs.

For this regime to be successful mechanical thinning is required annually.

The suggested procedure is as follows:

- Where eucalypts are present, remove shrubs within 5-10 m of the base of the trees. If this is not sufficient to meet the total cover target, remove further shrubs at random, preferably older senescent shrubs.
- Remove shrubs by cutting the stem and pasting the exposed stump with herbicide.
- If the VMU is scheduled for burning this should be carried out at least 3 months before a scheduled burn. The cut upper part of the stem should be left on the ground as fuel for the subsequent planned burn.
- If a VMU is not scheduled for planned burning, cut shrubs should be piled and burnt on site.
- Aim to retain a mix of the different shrub species that naturally occur in the area.

5. Bushfire Management Recommendations

The management actions recommended to meet the objectives of the plan in section 1.3 have been summarised and classified using the following criteria:

URGENT - Actions required to reduce a very high risk to life or property.

ESSENTIAL - Actions required to improve safety, or inadequate bushfire protection measures in high risk areas.

- Actions that are essential for control & suppression of bushfires, and/or conservation of threatened species.

RECOMMENDED - Actions required to improve inadequate bushfire protection measures in moderate risk areas.

- Actions required to ensure on-going effective bushfire management, or conservation of biodiversity.

ROUTINE - Maintenance of bushfire control resources and protection measures.

Urgent actions need to be undertaken as soon as possible.

Where applicable the desirable timing of other actions has been coded as follows:

A - Inspect and maintain annually, or as specified in the relevant MP

A/S - Timing as specified in the bushfire management plan

1, 2, etc - Carry out action within the time period specified (years)

1A, 2A etc - Construct within the next 1, 2 etc years and then inspect and maintain annually, or as specified in the relevant MP.

Management actions have been linked to generic MP's in *Clarence City Council Bushfire Management Strategy – Best Management Practice Guidelines*. Performance indicators have also been provided for each management action. These should be used to determine if the specific objectives of this bushfire management plan have been achieved. They should be monitored when the plan is revised every 5 years. Where performance targets are not being achieved, a review of the relevant portion of the plan should be undertaken.

5.1 Management Action Summary

RECOMMENDED ACTION	OBJECTIVE (section 1.3)	PRIORITY	RESPONSIBILITY	PERFORMANCE INDICATORS
1) Develop/commence a community education program, including an information sheet, as outlined in section 5.7 of the Bushfire Management Strategy, to inform the community of bushfire management issues in the reserve and to ask them to report any smoke, or suspicious activity, on days of total fire bans to the police.	1, 2	REC - 1	Clarence City Council Fire and Bushland Management Tasmania Fire Service	Educational material distributed to adjoining residents, park users and other interest groups. Reduction in rubbish dumping within the reserve and residents planting in Council managed outer zones. Reduction in the incidence of illegal fires on and around the park.
2) Ensure that authorities planning bushfire control operations in the park are aware of the location of cultural heritage assets, to mitigate impacts.	4	REC	Clarence City Council Fire and Bushland Management Tasmania Fire Service	No cultural heritage assets damaged during bushfire management or control operations in the park.
3) Offer familiarisation tour of the park for local TFS brigades prior to the start of the fire permit period each year.	1, 2, 4	ROU - A	Clarence City Council Fire and Bushland Management Tasmania Fire Service	Local TFS brigades familiar with bushfire management assets in the park.
4) Implement the bushfire protection measures in section 2.4 for protection of assets in and around the reserve.	1, 4	E	Clarence City Council Fire and Bushland Management Private landowners TasWater	Bushfire protection measures in the park implemented and maintained. No assets lost.
5) Erect appropriate signs for Strategic Fire Trails as identified in Table 8.	1, 4	REC - A	Clarence City Council Fire and Bushland Management	Signs erected.

RECOMMENDED ACTION	OBJECTIVE (section 1.3)	PRIORITY	RESPONSIBILITY	PERFORMANCE INDICATORS
6) Erect appropriate signage for two hydrants at Quarry Road entrance outlined in section 3.1.4 Water Supply and figure 6.	1, 2, 3, 4	REC - A	Clarence City Council Fire and Bushland Management TasWater	Signs erected.
6) Ensure all fire trails shown on figure 6 are inspected and maintained in a trafficable condition at all times according to table 8 and MP 2.	2, 4	ROU - A	Clarence City Council Fire and Bushland Management	Vehicle access routes inspected as required in MP 2, and maintained in a trafficable condition for Council and TFS vehicles.
7) Inspect gates regularly to ensure that locks are in place and functioning. Ensure that the local TFS brigade and other emergency services have keys to the gates on trails giving access to the park.	1, 2	ROU - A	Clarence City Council Fire and Bushland Management	No unauthorised use of fire trails in the park. Security lock system implemented, keys distributed to TFS brigades and other emergency services.
8) Treat any weeds in areas to be burnt under this BMP according to MP 8. Ensure follow-up weeding is carried out after planned burns and bushfires.	3, 5	REC – A/S	Clarence City Council	Pre and post-fire weed control carried out in any weed infested VMUs burnt under this plan. Minimal coppicing or regrowth of weeds from treated rootstock. All declared noxious weeds removed. Reduction in extent of other weeds.
9) Carry out vegetation monitoring as detailed in table 9.	3, 5	E	Clarence City Council DPIPWE Threatened Species Section	Vegetation monitoring plots set up and surveyed and data on the population size and extent of threatened species recorded before planned burns. Re-surveyed annually.

RECOMMENDED ACTION	OBJECTIVE (section 1.3)	PRIORITY	RESPONSIBILITY	PERFORMANCE INDICATORS
10) Consult with the DPIPWE Threatened Species Section when planning burns or manual shrub removal in VMUs or fire trails containing populations of threatened flora and fauna.	3	E	Clarence City Council Fire and Bushland Management DPIPWE Threatened Species Section	All planned burns carried out according to the requirements of threatened flora and fauna. All required permits obtained before burns or other management activities likely to affect threatened species.
11) Control native shrubs and bracken in the units indicated in table 9 using the procedures in section 4.4	3, 5	REC	Clarence City Council	Native shrub density kept within specified limits in designated VMUs.
12) Maintenance of outer zones as outlined in Table 7.	1	REC - A	Clarence City Council Fire and Bushland Management	All outer zones compliant with specifications outlined in table 7.
13) Coordinate bushfire management, weed management and other management activities, such as bush regeneration, using the procedure in MP 9.	3, 5	REC - A	Clarence City Council	Meetings held as recommended in MP 9 and the outcomes recorded.
14) Ensure all personnel engaged in planned burning activities in the reserve have the appropriate level of training and equipment as outlined in section 4.3.3 and the minimum equipment listed in MP 7	1, 2, 4	E	Clarence City Council Fire and Bushland Management	All personnel are able to demonstrate the required level of training and minimum levels of equipment.
15) Erect appropriate signs on tracks and roads to warn park users of planned burns.	1	E	Clarence City Council Fire and Bushland Management	No users of the park injured by planned burns.

RECOMMENDED ACTION	OBJECTIVE (section 1.3)	PRIORITY	RESPONSIBILITY	PERFORMANCE INDICATORS
16) Carry out planned burning according to the schedule in table 9 using the procedure in MP 7.	1, 2, 3, 4, 5	E - A/S	Clarence City Council Fire and Bushland Management	Mosaic of burnt VMUs maintained.
17) Avoid burning the whole of any population of a threatened or rare plant species in a single fire.	3	E	Clarence City Council Fire and Bushland Management Tasmania Fire Service	All planned burns carried out according to the requirements of threatened flora and fauna. Minimal decline in the populations of threatened or rare flora and fauna due to fire.
18) Implement the recovery procedures in MP 12 following planned burns and bushfires.	1, 5, 6	E	Clarence City Council Fire and Bushland Management	Post-fire recovery carried out after planned burns and bushfires. No users of the park injured by fires or the effects of fires.
19) Record bushfire management activities and bushfires using the procedures in MPs 10 and 11.	3, 4, 5	REC - A/S	Clarence City Council Fire and Bushland Management	Records maintained of bushfire management activities on Council's GIS database.
20) Regularly revise burning schedules and prescriptions to ensure they incorporate the most recent information on the fire ecology of flora, fauna and plant communities of conservation value in the park.	3, 5	REC - A/S	Clarence City Council Fire and Bushland Management	Bushfire management plan revised every 5 years.
21) Improve vehicle access at Nankoor Crescent entrance.	1, 4	ROU	Clarence City Council Fire and Bushland Management	Wattle and rocks removed at entrance. Vehicles turning abilities increased at entrance.

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Appendix A

Implementation of the previous bushfire management plan

The following codes have been used in assessing implementation of the previous Bushfire Management Plan for Waverley Flora Park:

IS – Implemented successfully

PI – Partly implemented

NI – Not implemented

NA – Not applicable (to be implemented at a later time, or dependent on another incident or action).

RECOMMENDED ACTION	CODE	COMMENT
1) Develop a community education program, including an information sheet, as outlined in section 5.7 of the Bushfire Management Strategy, to inform the community of bushfire management issues in the park and to ask them to report any smoke, or suspicious activity, on days of total fire bans to the police.	PI	A formalised community education program has not been designed. Public exhibition of Councils *Bushfire Management Strategy for Council Owned and Controlled Land*, *Bushfire Management Strategy Best Management Practice Guidelines* and the previous BMP for the park has taken place. Various TFS community bushfire preparation events have been attended and represented by Council Fire and Bushland Management throughout municipality.
2) Implement the bushfire protection measures in section 2.4 for protection of built assets in and around the park.	IS	The bushfire protection measures in section 2.4 of the previous plan have been largely implemented. Some outer zones have been extended/re-established all requiring ongoing maintenance.
3) Erect appropriate signs on tracks and roads to warn park users of planned burns.	IS	Planned burns do not commence without appropriate signage. No users of the park were injured during planned burns.
4) Ensure that authorities planning wildfire control operations in the park are aware of the location of cultural heritage assets, and ensure they are not damaged by machinery movement or other activities.	PI	Previous BMP for Waverley Flora Park published publicly. Extent of effectiveness unknown. Future reviews/Geographic Information System (GIS) data to be given to TFS upon completion of review process.
5) Implement the recovery procedures in management procedure (MP) 12 following planned burns and wildfires.	IS	Post fire recovery has been carried out after planned burns and two small wildfires.
6) Carry out fire trail repairs and maintenance listed in table 8.	IS	Fire trails in good condition and meet current PWS usage standards. On-going monitoring occurring.
7) Ensure all fire trails shown on figure 5 are inspected and maintained in a trafficable condition at all times according to MP 2 and fire trail signs are in place and legible.	PI	Fire trails in good condition and meet current PWS usage standards. On-going monitoring occurring. Some fire trail signage present. Strategic fire trails to be sign posted at commencement of 2016-2021 BMP.
8) Inspect gates regularly to ensure that locks are in place and functioning. Ensure that the local Tasmania Fire Service Brigade and other emergency services have keys to the gates on trails giving access to the park.	PI	Gates/locks regularly audited. Illegal access by motorbikes regular occurrence from Kallora Street, Binalong Road and South Arm Highway. Extensive preventative work has been undertaken throughout 2015.

RECOMMENDED ACTION	CODE	COMMENT
9) Conduct a familiarisation tour of the park for local TFS brigades prior to the start of the fire permit period each year.	NI	Familiarisation tour not taken out. TFS attend periodic incidents within park. Familiarisation tour to be offered upon request from TFS.
10) Carry out planned burning according to the schedule in table 9 using the procedure in MP 7.	IS	All scheduled planned burns from previous plan carried out successfully.
11) Treat any weeds in areas to be burnt under this bushfire management plan according to MP 8. Ensure follow-up weeding is carried out.	IS	Ongoing post-burn monitoring of planned burns implemented. Contractors utilised as required.
12) Control native shrubs and bracken in the units indicated in table 9 using the procedures in section 4.4	PI	Slashing of bracken not carried out. This regime to be evaluated for inclusion in next BMP review.
13) Consult with the DPIPWE Threatened Species Section when planning burns or manual shrub removal in VMUs containing populations of threatened flora and fauna.	IS	DPIPWE specialists contacted and relevant permits acquired and stored at commencement of each planned burning season.
14) Avoid burning the whole of any population of a threatened or rare plant species in a single bushfire.	IS	Mosaic burning regime for VMUs utilised for annual burning programs. Spot lighting periodically used in VMUs with threatened species.
15) Carry out vegetation monitoring as detailed in section 5.10 of the Bushfire Management Strategy including the recovery of any populations of threatened or rare flora and fauna burnt by wildfires or planned burns.	PI	VMUs 10, 18, 28 and 29 have vegetation monitoring plots established 2012 and assessed annually. VMUs 11 and 15 have total organic carbon content monitoring plots established 2014.
16) Regularly revise burning schedules and prescriptions to ensure they incorporate the most recent information on the fire ecology of flora, fauna and plant communities of conservation value in the park.	IS	Regimes and prescriptions have been analysed throughout life of previous BMP. During 2015 review process all VMUs regimes and prescriptions have been evaluated to suit best outcomes for asset protection and ecological burning.
17) Coordinate bushfire management, weed management and other management activities using the procedure in MP 9.	PI	Coordination of activities has been undertaken. Meetings as recommended in MP9 not carried out.
18) Ensure all personnel engaged in planned burning activities in the park have the appropriate level of training and equipment as outlined in the bushfire management strategy, and the minimum equipment listed in MP 7.	IS	Extensive training has been delivered to Council Fire and Bushland Crew during term of previous BMP. Ongoing training will be recommended on a needs basis.
19) Record bushfire management activities and wildfires using the procedures in MPs 10 and 11.	IS	Since 2013 Council has developed extensive GIS Fire Management context. All available historic fire management information has been input and updated annually.

Appendix B

Summary of community concerns and comments

in the initial round of community consultation

COMMUNITY CONCERNS and COMMENTS	COUNCIL'S COMMENT
Trees cut down on embankment behind Ainstey Street and left.	Informed resident embankment is not Council managed land (managed by Department of Infrastructure, Energy and Resources). Council does however manage the walking track that runs behind the properties 14, 12 and 10 Anstey Street. If the cut down trees on the embankment are an easy fix Council will remove.
Dumping of furniture within reserve.	Informed resident Council endeavours to get on top of rubbish dumping's fairly promptly within park. Requested resident to contact Council with any future dumping's and will be actioned ASAP.
Leo Cripps (Former Municipal Fire Control Officer 1970's-1990's) offered to pass on previous knowledge.	Had informal meeting with Leo Cripps, recorded valuable fire history/operational history formerly undocumented within park.
Increased clearance of fine trees and bush close to houses which back onto to park behind Waverley Street. Particularly trees that are taller than they are distance from houses.	Council will thin vegetation to meet current outer zone specifications.
Gratefully acknowledged planned burn adjacent to property 51 Quarry Road. Commented 9 month period prior to ground greening up post burn. Commented on necessity of keeping outer zone cleared of vegetation.	Acknowledged positive feedback. Outer zone adjacent to properties will continually be maintained. Next plan burn for VMU 5 scheduled 2024.
Residents on southern side of park (Waverley Street, Waverley Court, Beebo Place area) expressed concerns from potential bushfire impacts to properties after experiencing 1998 bushfire in park.	Acknowledged concerns, informed VMU 20 will have planned burn in 2017/2018 planned burning program. VMU 22 will also have annual bracken control.
Residents commented on spread of bracken on southern side of park.	Previous treatment not working, Council to trial new regimes for duration of revised BMP.
Resident asked if TFS has plan for suppressing bushfires within park?	Very hard for TFS to have a documented plan on how to suppress bushfires within park. This is due to many uncertain factors eg: wind direction/speed, FDI on day, residual humidity, planned burn history, TFS resources available on day and fires ignition point.
Timing of planned burns in regard to nesting birds.	Council Fire and Bushland Management to continue relations with resident as required when scheduling planned burns in park. VMU's as required have prescription not to burn during bird nesting period.
Questions on orange paint on selected mature trees with metal tag's.	Explained to residents these are reference trees to locate permanent vegetation monitoring sites within park.

COMMUNITY CONCERNS and COMMENTS	COUNCIL'S COMMENT
Request to remove larger diameter fuels within outer zone behind Warren Court properties.	Explained finer more combustible fuels removed within outer zones 2015 maintenance. Larger diameter fuels less combustible and left for biodiversity. Will be added to 5yr works program and continually maintained with the removal of some larger fuels.
What are outer zone standards?	Briefly explained AS:3959-2009 Construction of Buildings in Bushfire-prone Areas.
Query on why larger trees are left in outer zone?	Explained selection of healthy larger trees left as can provide shielding from ember attack under bushfire. Also commented limbs below 2metres will be removed on any larger trees in outer zone.
Concern over increased level of motorbike activity within park during last 18 months.	Acknowledged concerns, explained what preventative measures Council has undertaken over last 12 months restricting access. Given size of park and many private properties backing onto park managing this is very challenging. Council is aware, have had communications with police and are continually monitoring.
Resident in Warren Court wanting to know what level of risk is to their home in event of bushfire?	Given location of their property main method of impact from bushfire for property would be ember attack. Council is striving to meet current TFS standards for risk reduction adjacent to surrounding properties.
Resident asked how to make their home more bushfire safe.	Commented AS:3959-2009 Construction of Buildings in Bushfire-prone Areas. Recommend resident access TFS website for easy to access documents on preparing homes for bushfire.
Resident asked if TFS have keys to Council boom gates?	Responded yes they do.