

MAPS 1 & 2: FIRE HISTORY

ignitions have been recorded adjacent to the park (lightning, unknown and accidental).

continue as part of the park's annual works program.

Black Cypress Pine association

Montane swamp and wet heath

Granite Outcrop and associated

Scientific Name

Eucalyptus parvula

Dampiera fusca

area in the vicinity of Tinderry Peak and Tinderry Twin Peak.

Records show that since 1957 there have been 15 unplanned ignitions within the park. Causes included suspected arson and

lightning. There is limited recorded data prior to 1957. Note that the area has been managed by N PWS since 1981. Other

A number of prescribed burns have been implemented within the park by NPWS since gazettal in 1981. Approximately 1592

burns applied during previous land management operations. In 1973 aerial ignition fuel reduction was carried out on 8, 100

hectares of the higher areas of the central massif. It included the area bound by the East and West Tinderry Trails. The central

hectares have been burnt in planned fires in this time. The most recent being in 2010. There are limited records of prescribed

granite area was burnt again in May 1980. Trail and fire break construction and maintenance programs have been applied and will

There have been 15 wildfires recorded in the reserve between 1957 and 2009. A major fire in 1957 burnt out most of the reserve

reserve. Since gazettal in 1981, 2100ha have been burnt by wildfire. Lightning started both of the fires in 2001 and 2002. Rapid

December 2009 started off park near the intersection of Burra Rd and Tinderry Rd. This fire burnt approximately 1700ha of the

In the period 1957-1980 a number of significant fire events are recorded for the reserve. Since gazettal in 1981, 1592 hectares

have been burnt in planned fires and about 2100 ha in unplanned fires. Most of the reserve has experienced at least one fire in

Significant Flora Management Guidelines and Considerations

many years to reach maturity. Exclusion of fire from the site is therefore essential until juveniles

□ Data from past fire events suggests that 30% of this association was burnt in 1979 and it was

Ensure that the fire sensitivity of the community is considered when planning hazard reduction

□ Any fire may have a significant impact on this community and cause a decline in diversity and a

The Bluebell Swamp area is considered to be a part of the endangered ecological community (EEC), 'Montane Peatlands and Swamps', as listed under the NSW Threatened Species

□ Frequent or high intensity fires are listed as a threat to this community under the TSC Act. ☐This community may be periodically or permanently inundated with fresh water and may be

□ Ensure that the fire sensitivity of the community is considered when planning hazard reduction

☐ Many of the regionally significant plants found on the central granite area are at their limits of distribution or represent disjunct populations. These species include the wattle A. costiniana, and

□ *Podocarpus lawrencii* – fire sensitive and stands in reserve are relatively small (Doherty 1997).

restricted occurrences of Euclyptus latiuscula, E. fastigata, E. glauescens, E. perriniana (Doherty

Flora Management Guidelines

☐ Small tree with a dense, round crown of unusual small dark leaves. Very small distribution in the eastern edge of the Monaro. This species is restricted to

□The appropriate intensity and interval of fire to promote seed germination and

□ A single population consisting of 20 plants is located south of Tinderry Peak.

The species may germinate in large numbers after fires, rapidly colonising areas

and setting seed within two years post-fire. However, few (if any) standing plants

are observed in populations 20-30 years post fire. Flowers October to February.

tablelands above an altitude of 1000m and is often restricted to swampy areas and

precautionary approach to fire management is advised for this community.

Ranununculus productus in the swampy areas such as Bluebell Swamp.

vegetation regeneration is yet to be identified.

No fire more than once every 20 years.

□ Perennial sub-shrub to 30cm high. Highly restricted.

□ Adult and juvenile plants are killed by canopy fire and the population regenerates from seed banks. The juvenile life cycle stage is particularly vulnerable to a second fire and juveniles take

the last 52 years. The frequency and interval between fires has important implications relevant to biodiversity and fire

MAP 6: SIGNIFICANT COMMUNITIES

mature and a substantial seed bank accumulates.

☐ Monitor vegetative responses and sensitivity to fire.

vulnerable to peat fires when the substrate is dry.

and during wildfire suppression activities.

1997), Asterolasia sp nov (aff trimalioides).

The following species occurring within the reserve are regionally significant as they are at the limit of their distribution or represent disjunct populations:

Ranununculus productus, Grevillea oxyantha subsp. Oxyantha, Asterolasia sp nov (aff trimalioides). Many of these species occur in the central granite

The fire ecology of rare, threatened and regionally significant species occurring in the reserve is not well known. A precautionary approach is advised for

Eucalyptus latiuscula, E. fastigata, E. glauescens, E perriniana, Olearia Montana, Olearia rhizomatica, Taraxacum aristum, Acacia costiniana,

the use of fire as a management tool in areas of known threatened, rare or regionally significant species.

*Listed under the NSW Threatened Species and Conservation Act (TSC Act), 1995. Doherty, M. 1997, 'Vegetation Survey and mapping of Tinderry Nature Reserve', CSIRO, Canberra.

detection and attack together with aerial support minimised the burn area to less than 15 hectares. The most recent fire in

Prescribed Fire (extent & season) 2008/09 2004/05 1990/91 1984/85 1980/81 1972/73 Tinderry NR

Map 2: Fire History - Prescribed Fire

Yanununbeyan SCA Naylor Rd Burra Rd Ouesand	
MI Burra Keewong No State of the State of	
To go of the state	and the same
109 5 89 190 109 175 190 175 190 175 190 175 190 175 190 175 190 175 175 174 Woolpack Tinderry 55 75 18 95 175 175 175 175 175 175 175 175 175 17	oueanticy on R
Coffeys Rd Coffey	Wy Service of the ser
Lyons CK Lyons CK	

MAP 3: VEGETATION COMMUNITIES

th East Tablelands Dry Shrub/Tussock Grass | Scribbly gum/ Brittle gum/ Red stringy bark/ Broad

73 Eastern Tableland Dry Shrub/Grass Forest

Tableland Acacia Moist Herb Forest

Grass Forest

190 Rock Outcrops (granite)

*Based on Gellie vegetation mapping 2005

South Eastern Tablelands Dry Shrub/Grass/Herb

Montane Dry Shrub/Tussock Grass Forest

Eastern Tablelands Acacia/Herb/Grass Forest

Tablelands Dry Shrub /Tussock Grass Forest

Black Cypress Pine Association (Callitris

Brown barrel forest

Apple Box - Candlebark -

Manna gum/ Snow gum forest

Snow gum - Peppermint woodland

Broad Leaved Peppermint - Candlebark

Broad Leaved Peppermint

Manna gum/ Mountain gum forest

Snow gum/ Broad Leaved Peppermint woodland

Broad Leaved Peppermint - Brittle gum - Red

Stringybark - Mountain gum Red Stringbark -Scribbly gum - Broad Leaved

Montane swamp and wet heath

Granite outcrops

2941.03 19.56

1744.81 11.60

Map 3: Vegetation Communities

Ro Villa Ro	Hardy Rd	See table below for legend
	Nayli	See table below for legend
Burra Rd	Par de la companya del companya de la companya del companya de la	
MI Burra		Lighthouse Cx
Keewong Keewong		-gimbuse Ck
West Keewing	Mi Biylongong	Tinderry Crossing
		Horseshoe Hill
S S S S S S S S S S S S S S S S S S S		Ballinatad Ck
Waterholes C _k	Tinderry Nature Reserve	J & T
	as I was	
Je Tolia Ga	Tinderry Tinderry Twin Peak CK 5	Docking Ck
West West	Man Peak	Woolpack
2	Tindenry. Peak	Woolpack Ck Creek Reading Park
	MOUNT,	Mi Woolpack
Coffeys Rd	Z te Round	A A
, of the		Roberts Ck
	S/mons Ck	Tinderly Rd
Manage of the Control	Re many	Lyons Ck Ra

MAP 4: VEGETATION THRESHOLD ANALYSIS

These areas have experienced sustained (two or more) consecutive intervals between fires shorter than the recommended

minimum interval for this vegetation type. Any Rainforest / Mangrove / fire exclusion vegetation that has been burnt will be

Areas of vegetation that are repeatedly burnt at intervals shorter than recommended for the vegetation type may experience

These areas have already experienced one inter-fire interval less than the minimum interval recommended for this vegetation

ne post-fire age of the vegetation is greater than the recommended maximum inter-fire interval for this vegetation type.

f fire continues to be absent from the vegetation for a prolonged time, it is anticipated that plant species that require fire to

vegetation types are very rare and therefore significant. Long unburnt vegetation may also have other ecological values that

ake it important habitat for certain species in a given area. Careful consideration should be given before burning these

reas, and wherever possible the decision should be based on a scientific assessment and/or recommendation prior to

The time-since-fire age of the vegetation is greater than the minimum recommended inter-fire interval and less than the maximum recommended inter-fire interval. If a fire occurs before the number of years specified as the minimum interval has been reached it will move into the 'Vulnerable to Frequent Fire' category. If three or more fires occur in close succession the

stimulate flowering or seed production (and their seed banks) may begin to senescence. Long unburnt areas in some

type and/or the current time-since-fire is less than the minimum recommended interval. All unburnt Rainforest / Mangrove /

a decline in the abundance of plant species sensitive to frequent fire. If inter- fire intervals shorter than the recommended

minimum continue, these sensitive species are at risk of local extinction. Attempts should be made to minimise fire

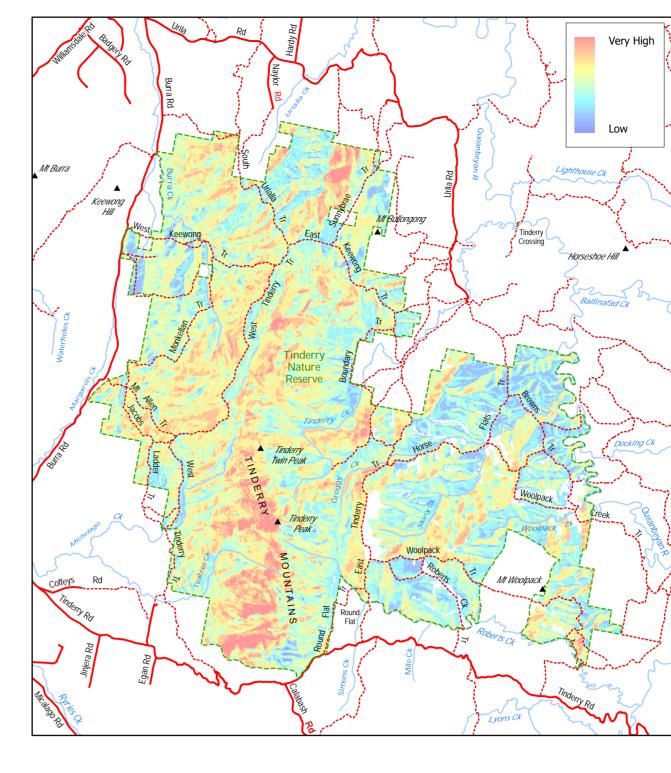
Threshold Interpretation and Management Guidelines

fire exclusion vegetation is in this category.

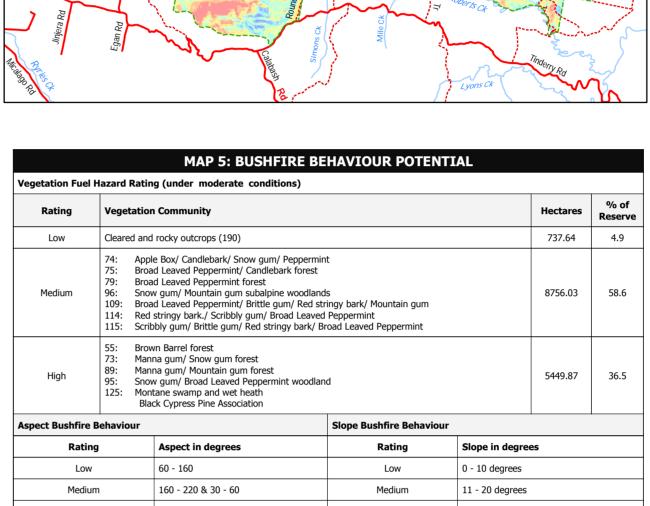
area will move into the 'Too Frequently Burnt' category.

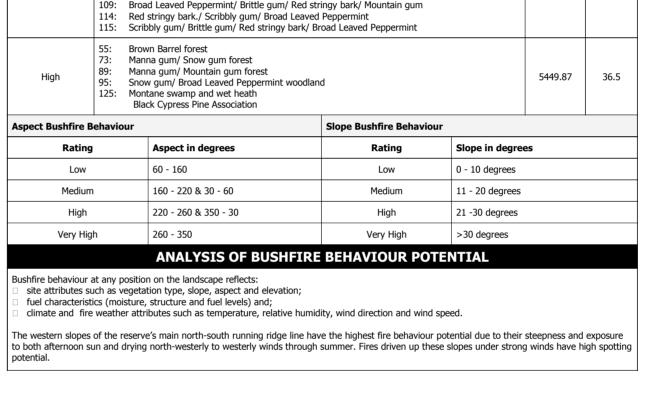
No Fire Regime Areas which do not have recommended fire intervals assigned to them, e.g. cleared land, rock etc.

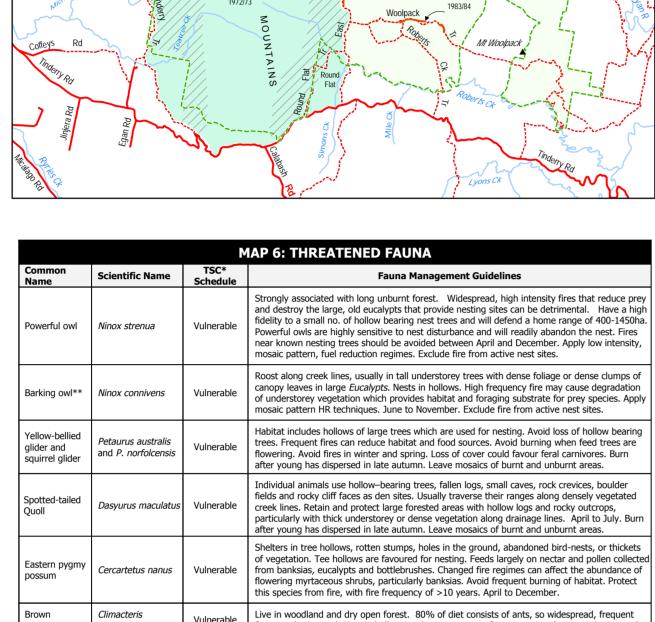
Map 4: Vegetation Threshold Analysis



Map 5: Bushfire Behaviour Potential







Powerful owl	Ninox strenua	Vulnerable	fidelity to a small no. of hollow bearing nest trees and will defend a home range of 400-1450ha. Powerful owls are highly sensitive to nest disturbance and will readily abandon the nest. Fires near known nesting trees should be avoided between April and December. Apply low intensity, mosaic pattern, fuel reduction regimes. Exclude fire from active nest sites.
Barking owl**	Ninox connivens	Vulnerable	Roost along creek lines, usually in tall understorey trees with dense foliage or dense clumps of canopy leaves in large <i>Eucalypts</i> . Nests in hollows. High frequency fire may cause degradation of understorey vegetation which provides habitat and foraging substrate for prey species. Apply mosaic pattern HR techniques. June to November. Exclude fire from active nest sites.
Yellow-bellied glider and squirrel glider	Petaurus australis and P. norfolcensis	Vulnerable	Habitat includes hollows of large trees which are used for nesting. Avoid loss of hollow bearing trees. Frequent fires can reduce habitat and food sources. Avoid burning when feed trees are flowering. Avoid fires in winter and spring. Loss of cover could favour feral carnivores. Burn after young has dispersed in late autumn. Leave mosaics of burnt and unburnt areas.
Spotted-tailed Quoll	Dasyurus maculatus	Vulnerable	Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky cliff faces as den sites. Usually traverse their ranges along densely vegetated creek lines. Retain and protect large forested areas with hollow logs and rocky outcrops, particularly with thick understorey or dense vegetation along drainage lines. April to July. Burn after young has dispersed in late autumn. Leave mosaics of burnt and unburnt areas.
Eastern pygmy possum	Cercartetus nanus	Vulnerable	Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, or thickets of vegetation. Tee hollows are favoured for nesting. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes. Changed fire regimes can affect the abundance of flowering myrtaceous shrubs, particularly banksias. Avoid frequent burning of habitat. Protect this species from fire, with fire frequency of >10 years. April to December.
Brown treecreeper	Climacteris picumnus	Vulnerable	Live in woodland and dry open forest. 80% of diet consists of ants, so widespread, frequent fires are detrimental. Nest in hollows and tree stumps so fires removing these are detrimental.
Koala**	Phascolarctos cinereus	Vulnerable	Koalas have been recorded south of the reserve (the most recent in early 2011). Koalas prefer mature trees. Due to impacts of past clearing and high intensity fires, the habitat in the reserve is presently unlikely to support its full carrying capacity for koalas. Fires that result in crown scorch will harm koalas by injuring or killing individuals, by reducing food supplies and increasing predation. Re-colonisation after widespread high intensity fires will be slow.
Rosenberg's monitor**	Varanus rosenbergi	Vulnerable	Occupy open forest and woodland where termites occur. Wildfire may affect habitat by destroying termite mounds (where eggs are laid) and reducing forest cover. Retain mosaic of burnt and unburnt areas.
Speckled Warbler	Pyrrholaemus saggitatus	Vulnerable	Ground dwelling bird in eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Large relatively undisturbed remnant is required for species to persist in an area. Nests located in slight hollow in the ground or base of a low dense plant, often among fallen branches and other litter. Lay eggs between August and January. Avoid large scale loss of habitat, fallen timber and destruction of ground habitat; therefore retain mosaic of burnt and unburnt areas. Nest on ground between August and January so vulnerable to spring-early summer fire.
Gang Gang Cockatoo	Callocephalon frimbriatum	Vulnerable	Favours old growth attributes for nesting and roosting. Individual pairs show a high fidelity to selected nest trees with frequent fire posing a threat to continued successful breeding. Further investigation required into the impacts of wildfire and hazard reduction burns on foraging and nesting resources.
Diamond Firetail	Stagonopleura guttata	Vulnerable	Feeds exclusively on the ground, on ripe and partly ripe grass and herb seeds, green leaves and insects (esp. during breeding season). Breed between August and January. Frequent fire should be avoided as it will modify and destroy ground and shrub layers within habitat. Retain dead timber on ground in open woodland areas. Nest and roost in shrubs and canopy from August-January so vulnerable to fire in this period.
Hooded Robin	Melanodryas cucullata cucullata	Vulnerable	Requires structurally diverse habitats featuring mature eucalypts, saplings, small shrubs and a ground layer of moderately tall native grasses. Often perches on low dead stumps and fallen timber to hunt insect prey. Breeds between July and November. Frequent fire may cause modification and destruction of ground habitat. Retain fallen timber on ground in open woodland areas.
Eastern False Pippistrelle and Eastern bentwing bat	Falsistrellus tasmaniensis and Miniopterus schreibersii oceanensis	Vulnerable	Usually roosts in eucalypt hollows. Avoid loss of hollow bearing trees used for roosting. Sensitive to disturbance to winter roosting and breeding sites. Hibernates in winter. Females pregnant in late spring and summer, and are vulnerable to fire at these times. Higher intensity fires that burn moist gullies may destroy roosting sites. More research needs to be undertaken into the effect of different burning regimes. Frequent or widespread fire will reduce feed trees. Retain a mosaic of burnt and unburnt areas. No burning during periods where maternity colonies are formed.

Vegetation Formation (Keith 2004)	Vegetation Community Description	Minimum Fire Interval	Maximum Fire Interval	Fire History Evaluation	Management Guidelines
Wet Sclerophyll Forests – shrubby formation	55 & 73	25	60	25% within threshold <1% long underburnt	Crown fires should be avoided in the lower end of the interval range (NPWS, 2004). A decline in species is predicted if: no understorey fire within 60 years absence of high intensity fire for over 400 years 2 or more canopy consuming fires occur within 100 years 3 or more fires occur < 25 years apart Frequent fires (c. 15-20 years) will favour the sclerophyllous species over rainforest elements. Conversely, long fire intervals (c.100 years) allow encroachment of more rainforest species (NPWS, 2004)
Wet Sclerophyll Forests – grassy formation	89	10	50	9% within threshold 2% long unburnt	□Some intervals > 15 years are desirable (NPWS, 2004) □Crown fires should not occur in the lower end of this range (NPWS, 2004) □A decline in biodiversity is predicted if: □ no understorey fire within 50 years □ absence of high intensity fire for over 400 years □ 3 or more fires occur <10 years apart
Dry Sclerophyll Forests – shrubby formation	75, 79, 109, 114 & 115	7	30	20% within threshold 50% long unburnt	□Some intervals > 25 years are desirable (NPWS, 2004) □A decline in biodiversity is predicted if 3 or more fires occur <7 years apart. □Too frequent fire may promote fire tolerant shrubs
Sclerophyll Grassy Woodland	95, 96 & 74	10	40	10% within threshold	 □ A decline in biodiversity is predicted if fires occur <10 years apart. □ High intensity fire should be avoided where possible. □ Occasion intervals of > 15 years are desirable (NPWS, 2004).
Freshwater Wetlands	125	6	35	1% within threshold 63% long unburnt	Some intervals > 30 years are desirable (NPWS, 2004). A decline in biodiversity is predicted if 3 or more fires occur < 6 years apart. Swamp and wet heath sites in the central granite area contain species found nowhere else in the reserve. The fire sensitivity of the community should be carefully considered when planning hazard reduction burns.
Rocky Outcrops	190	-	-		Detailed data relating to fire thresholds for vegetation found amongst the granite outcrops is lacking. A number of regionally significant and fire sensitive species occuramongst the granite outcrops. The fire sensitivity of the community should be carefully considered when planning hazard reduction burns. Frequent fire in these vegetation types tends to promote a shrubby understorey over the grass and herb layers and also to expose mineral soil (Doherty, 1997). Rather than reducing fuel levels frequent fire tends to increase the height and density of live fuel (Doherty, 1997)
-	Black Cypress Pine association	20	-	70% within threshold	□ Two fires occurring <20 years apart may cause species decline. □ The fire sensitivity of the community should be carefully considered when planning hazard reduction burns. □ Black cypress pine is highly fire sensitive and stands in the reserve are relatively small. □ Data relating to maximum fire interval is lacking

Soil and W	ater Management Guidelines
□Any disturt	pance to soil and slope stability will affect catchment and water quality values, as well as many amphibians, fish and other organisms.
	lity may be compromised by soil disturban ce and silt run off after fire.
	pance and exposure by fire may cause erosion.
	nposition after disturbance may decrease after fire (depending on fire intensity, fire interval, cover and patchiness of the fire) due to a n soil micro-organism activity. The presence of foams and retardants within the soil may also affect soil and micro -organism activity.
Fire Manag	gement Guidelines
Where poss	ible:
	uent and or high intensity fire in areas where the fine fuel range do es not meet the slope class thresholds. construction on slopes >25 degrees.
	eduction burning, ensure burn areas are strategically implemented across the landscape so that large areas and slopes are not left exp
	es or fuel breaks constructed during an incident should provide adequate drainage to prevent trail erosion.
Rehabilitat	ion of control lines or fuel breaks constructed during fire events will be addressed during the incident in the Incident Action Plan.

MAP 8: BUSHFIRE MANAGEMENT ZONES

e.g. protecting heritage or fire protection objectives

Map 8: Fire Management Zones

areas where APZs or SFAZs are not appropriate. the responsible land management agency.

□ As appropriate to achieve land management objectives □ To reduce the likelihood of spread of fires.

□To meet relevant land management objectives in □As per the land management and fire protection objectives of

swamps and heath, while the lower west macrorhyncha and brittle gum E. mannife	des there are occurrences of sub-alpine we ern slopes are predominantly covered with era. At intermediate altitudes on both the versional candle bark E. rubida. Manna gum I	an open dry forest association of red strin vestern and eastern sides of the range are	gy bark <i>Eucalyptus</i> large areas of broad-		
The Reserve is centred on the elevated north-south oriented Tinderry Range. The highest section of the Reserve is characterised by huge granite monolit extensive balds, shelves and steep slopes. Soils on the higher peaks are skeletal or alpine humic lithosols derived from granite. At lower elevations, metasediment parent material has developed into lithosols, yellow podsols, red podsolic soils, earthy sands and brown and grey brown podsols. Soils on t steeper slopes and deep soils at lower altitudes are highly erodible.					
providing water to the greater Queanbey and yield to these catchments.	ss of the Queanbeyan and Murrumbidgee Fan and Canberra area. Fire travelling thro Main access for management and fire sup	ugh the Reserve could have potential impa	icts on the water quality		
	f Tinderry Rd to the south; and Browns Tra		west recovering trail on		
Office of Environemt & Heritage	□Parks and Wildlife Group, National Parks and Wildlife Service □Southern Ranges Region, Queanbeyan Area	Government Areas	□Eden-Monaro Federal Electorate. □Monaro State Electorate. □Palerang and Cooma Monaro Local Government Areas		
Rural Fire Service	□ Lake George Bush Fire Management Committee and Zone □ Cooma Monaro - Snowy River Bush	Other Organisations	□Mogo Local Aboriginal Land Council □Murrumbidgee		

RESOURCE INFORMATON

inderry Nature Reserve was initially gazetted in 1981 and has a current area of 14891 ha. The Reserve is located in the southern tablelands of NSW 25km south of Queanbeyan and 6km east of Michelago. For the purpose of this Fire Management Strategy, Tinderry Nature Reserve will be referred to as the 'Reserve'. This strategy has been prepared in accordance with the policies and procedures detailed in the NPWS Fire Management Manual

The distribution of vegetation types follows patterns of elevation, slope and aspect. The Reserve rises from a low point of approx. 900m (asl) to 1619m

at Tinderry Peak. The lower western slopes are rain shadow affected while the higher elevations receive moisture from orthographic weather

2009/10, NPWS State Incident Plan 2007, Tinderry Nature Reserve Plan of Management 1998 and other relevant legislation.

		WC	ORKS P	ROGRA	M	
unilan-ede Pad	Burra Rd Burra Rd	Ra	Hardy Rd		Cat 1 - Important Cat 7 - Important Cat 9 - Important	Road
			State of A		Tinderry NR	Other rese
MI Burra \	Reewong Hill	South		The second	The second secon	Lighthouse Ck
		ewong Tr	East to Region	MI Bullandong	Tinderry Crossing	Harseshoe HIII
Waterholes Ck	Nonkellan	West II				Ballinated Cx
Waterh Mangales G	M 160		Tinderry Signature Reserve		Bonns	S. C.
100 may 100 ma		A Tino	terry Peak Augustalia	Horse		
Z 1	a The	TINDERRY	Tinderry Peak	Some	Woolpa	ck Creek
Michela	Rd	, sea 1.00 sea 2.00 s		Woolpack	Woolp. Mi Woolpack	> 4
Çoffeys Tinderry Ra			S NI A LN D W S Roun Flat	Stranger and the state of the s	N. S. M. Raper	00-1
Jinjera Rd.	The state of the s	W.	Simons Ck	Nile C.	The same of the sa	The en
Made of the state		~	Calebra St. A.		Lyons Ck	Tingeny Rd

Southern Ranges Region

Tinderry

Nature Reserve

Fire Management Strategy

2012

Mean Rainfall (mm)

Mean Temperature (°C)

Scale: Works Program map 1:85,000, Location map 1:1,000,000, other maps 1:115,000 ISBN: 978 1 74293 846 2; OEH: 2012/0800; Version: September 2012

This Map should be used in conjunction with air photos and ground reconnaissance during incidents and the development of incident action plans.

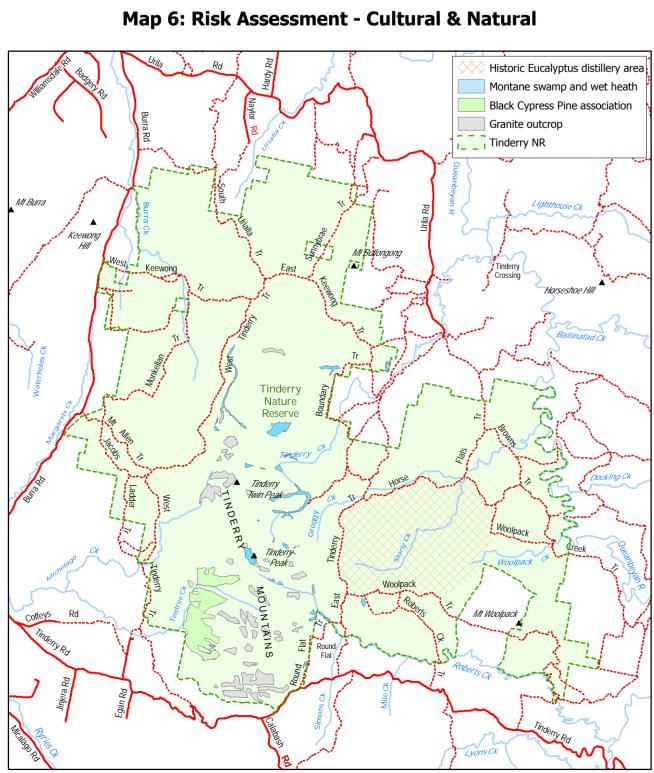
Copyright National Parks & Wildlife Service. These data are not guaranteed to be free from error or omission. The national Parks & Wildlife Service and its employees disclaim liability for any act done on the information in the data and any consequences of such acts or omissions. This map is based on Land and Property Information Standard 1:25000 Topographic Map Series.

Reproduced with permission of Land and Property Information.

Location

	MI Burra Ck		Contract of the second	Lighthouse Ck
	All All	MI BUILDINGONG	me me	
	Keewong Tr	To a line of the second	Tinderry Crossing	Horseshoe Hill
1		m 1	3	Ballinalad Cx
	Ses C. K. Ses C.	Tr Comments	The state of the s	
	Waterholes Ck. Linderland	Boundary		S TO
t	Tinderi Nature Reserv		- Bollings of	Sch
t	Tine	derry CK dumpy		Bocking OK
	Tinderry Twin Peak To DERRY Twin Peak To DERRY Twin Peak	Buebell		The state of the s
	ERRY	Tinderry Story	Woolpack	Greek Se
	Michaelago CK Tinderry Peak	Woolpack	Woolpack	Creek Something
	Coffeys Rd NTAIN	Raba	MI Woolpack	> 5
	Thatem Ra	Round Flat	12 Run	
	7 7 4 1		Roberts CA	
	The second secon	Simons Ck	1	That seems of the
)	The state of the s		Lyons Ck	Tingerty Rd
)		i	/ k \\	
.				

	WORKS PROGRAM					
Asset	Priority	Name, Area or Detail	Management Strategy	Proposed Works		
	High	West Tinderry, East Tinderry, East Keewong, West Keewong, Mount Allen, Boundary, Round Flat, Horse Flats and Browns Trails	Maintain all trails in accordance with trail classifications as identified on the Fire Operations Map for Tinderry Nature Reserve. All trails to be clearly signposted at intersections and trailheads.	 Assess trails and signage annually. Initiate maintenance programs and works as required or as specified in the Queanbeyan Area works program and Asset Management System (AMS). 		
Reserve Trails	Medium	Jacobs Ladder, South Urialla, Tussock Ridge, Woolpack, Woolpack Creek, Roberts Creek, Bluebell Swamp, Monkellan and Sunnybrae Trails	u aiirieaus.			
	Low	Dormant trails	Ensure trails remain current on Fire Operations Map.	Assess every 5 years.		
Land Management Zone	High	All of reserve (e.g. landscape, cultural heritage, threatened species, significant vegetation communities etc.)	Manage and protect natural & cultural heritage values with appropriate fire management regimes. Manage fire regimes where possible to ensure that minimum biodiversity thresholds are reached for all vegetation communities and some maximum thresholds are reached for all communities. Minimise impacts to sites from introduced fire and earth moving equipment during suppression operations.	 Prescribed burns will be used where deemed necessa maintain fire regimes within biodiversity thresholds specified or for other ecological purposes. Mosaic burns may be undertaken to reduce the likelih of the spread of fires where required. 		
Prevention	Medium	Operational assets (e.g. helipads, refuges, water points etc.) Liaison	Maintain assets. Liaise with Lake George and Cooma-Monaro BFMC and neighbours regarding fire prevention works around high risk assets and complementary management of fire trails and fire advantages outside of the reserve.	 Assess maintenance requirements annually and implement if required. Ongoing. 		
Information & Research	Medium	Fuel and vegetation monitoring Rare and threatened species monitoring/research	Continue measuring/monitoring fuels at all established sites, including photographic records Further investigate fire response of rare and threatened vegetation particularly in the central plateau area.	Monitor every 5 years and after fire events. Ongoing		
& Research	Low	Research	Liaise with academic and research institutions to encourage relevant fire management research within the Reserve.	Ongoing		
Fuel Management and Prescribed Burns	Medium	All of reserve where deemed appropriate.	Monitor and assess changes in potential hazards to life and property. Any proposed prescribed burn to be managed in accordance with OEH policy and agreements with the local Bush Fire Management Committee and neighbouring landholders.	Proposed prescribed burns negotiated with local Bush Management Committee and relevant neighbouring landholders once vegetation communities have reache minimum threshold.		



Key Guidelines					
Identified sites will be protected within the reserve and specific site protection strategies to be included in Incident Action Plans.					
DEH Cultural Heritage databases (HHIMS & AHIMS) must be accessed during incidents and in planning for hazard reduction burning or other works to					
ensure new records are considered. Aboriginal site information from AHIMS is sensitive and subject to a Memorandum of Understanding. Site data					
must be used appropriately.					
Protection measures will be addressed in impact assessments and operational plans for prescribed burns.					
Where possible trained officers will provide advice on site protection methods.					
Comply with the Tinderry Nature Reserve Conservation Management Plan in the event of a wildfire or prescribed burn.					
☐ The reserve was used extensively by Aboriginal people. It contains evidence of widespread use of the area with surveys					
la cation are a 70 and a staff at a stage of the Other wildow (for distance of the land and a stage of the st					

MAP 6: CULTURAL HERITAGE

□Where possible traine □	Where possible trained officers will provide advice on site protection methods.					
□Comply with the Tinde	erry Nature Reserve Conservation Management Plan in the event of a wildfire or prescribed burn.					
Aboriginal Heritage	□ The reserve was used extensively by Aboriginal people. It contains evidence of widespread use of the area with surveys locating over 70 open artefact scatter sites. Other unidentified sites may occur across the landscape, especially in riparian areas, swamps and rock outcrops. □ Open campsites and artefact scatters should be clearly identified and protected from damage from earth moving equipment during fire operations. Avoid ground disturbance within 30m of the site. □ During wildfire operations, efforts will be made to survey for Aboriginal sites ahead of earthmoving equipment. □ Encourage survey of Aboriginal sites after fires when site visibility is increased. □ Inspect affected sites after wildfire and apply erosion works where necessary.					
	□ Historic sites within the reserve include remains of eucalyptus distilleries and associated historic landscape features including coppiced and brachiated peppermint trees and remnants of old trails and camp sites. There are also survey markers, old horse and sheep yards, hut sites and old fences/gates. □ Eucalyptus distillery area − avoid use of earthmoving equipment within 30m of known distillery sites as recorded on HHIMS and in the OFH CIS detables.					

NPWS HHIMS database and protected during fire suppression and prescribed burning programs.

Prescribed burning or back burning activities should minimise the potential for site disturban

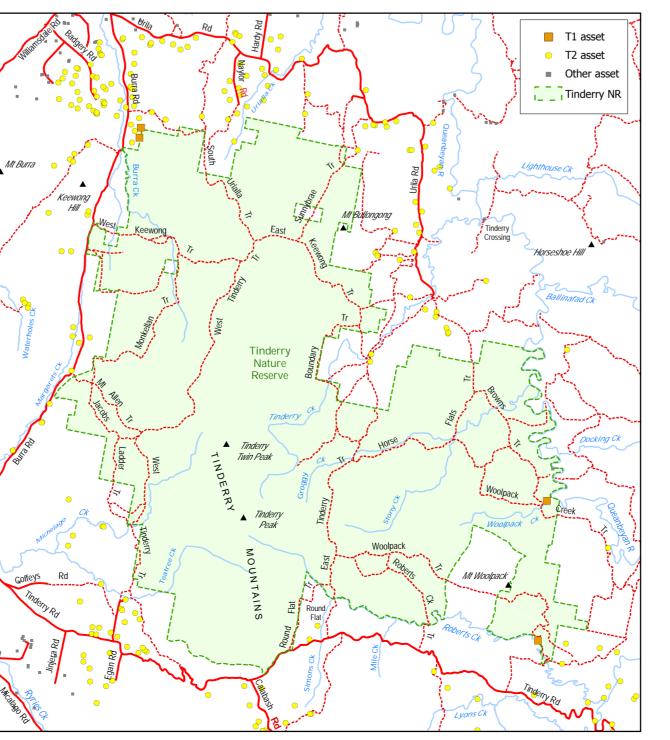
locations and the required management strategies for site protection.

Other sites may exist that have not been recorded on NPWS databases. Any new sites should be identified, entered into

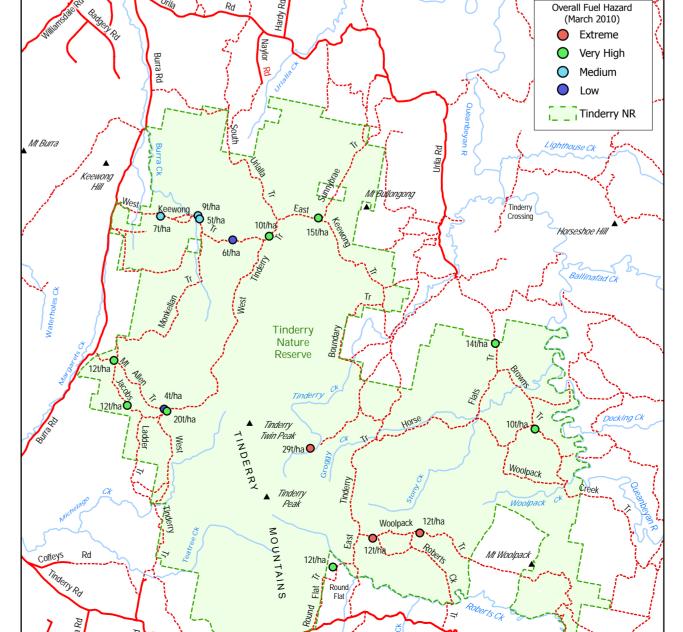
All personnel involved in control line construction and vehicle based fire suppression operations are to be briefed on site

Assets	1AP 7: RISK ASSESSMENT — Vulnerability	LIFE & PROPERTY Risk Mitigation
T1 – built assets inside and adjacent to (within 100m) the reserve boundary	4 assets are located either inside or within 100m of the reserve boundary and therefore are within the immediate area of the influence of the fire leaving the reserve.	□ Maintain and enhance the Tinderry Nature Reserve strategic fire trail system to provide for safe and efficient access to ass fire containment and fire fighter safety. □ Coordinate any fire management proposals with the RFS Lak George Zone, Cooma-Monaro Zone and landholders to include
T2 – private property within 3km of reserve boundary	214 assets are located within 3km of the reserve boundary. Properties to south vulnerable to fire leaving reserve under influence of north and north-westerly winds. Risk to properties from fire leaving the reserve on the north, north-west and west considered low as prevailing winds will generally push fire away from these areas. Limited risk to properties to the east.	private property. Contain all unplanned fire events as soon as possible by rapiresponding to reported ignitions. Implement annual fire management work schedule. Ensure operational guidelines are adhered to.
Private Property - Inholdings	The current inholdings are small and there are no built assets on them that require protection.	
Visitors to reserve	Vulnerable to impacts from fire within the reserve.	 □ As above □ Reserve closure may be implemented during periods of extreme fire danger, when the park is threatened by fire, or when a fire is burning on reserve.
Firefighting personnel	Vulnerable to impacts from fire and other fireground hazards.	□ As above □ Undertake a thorough evaluation of the possible risk to firefighters and support personnel before deploying crews on the fireground.

Map 7: Risk Assessment - Property



Montane swamp and wet heath Black Cypress Pine association Granite outcrop Land Management Zone



Overall Fuel Hazard

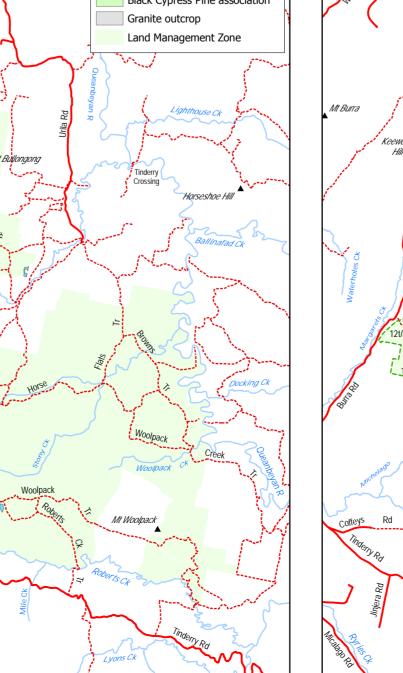


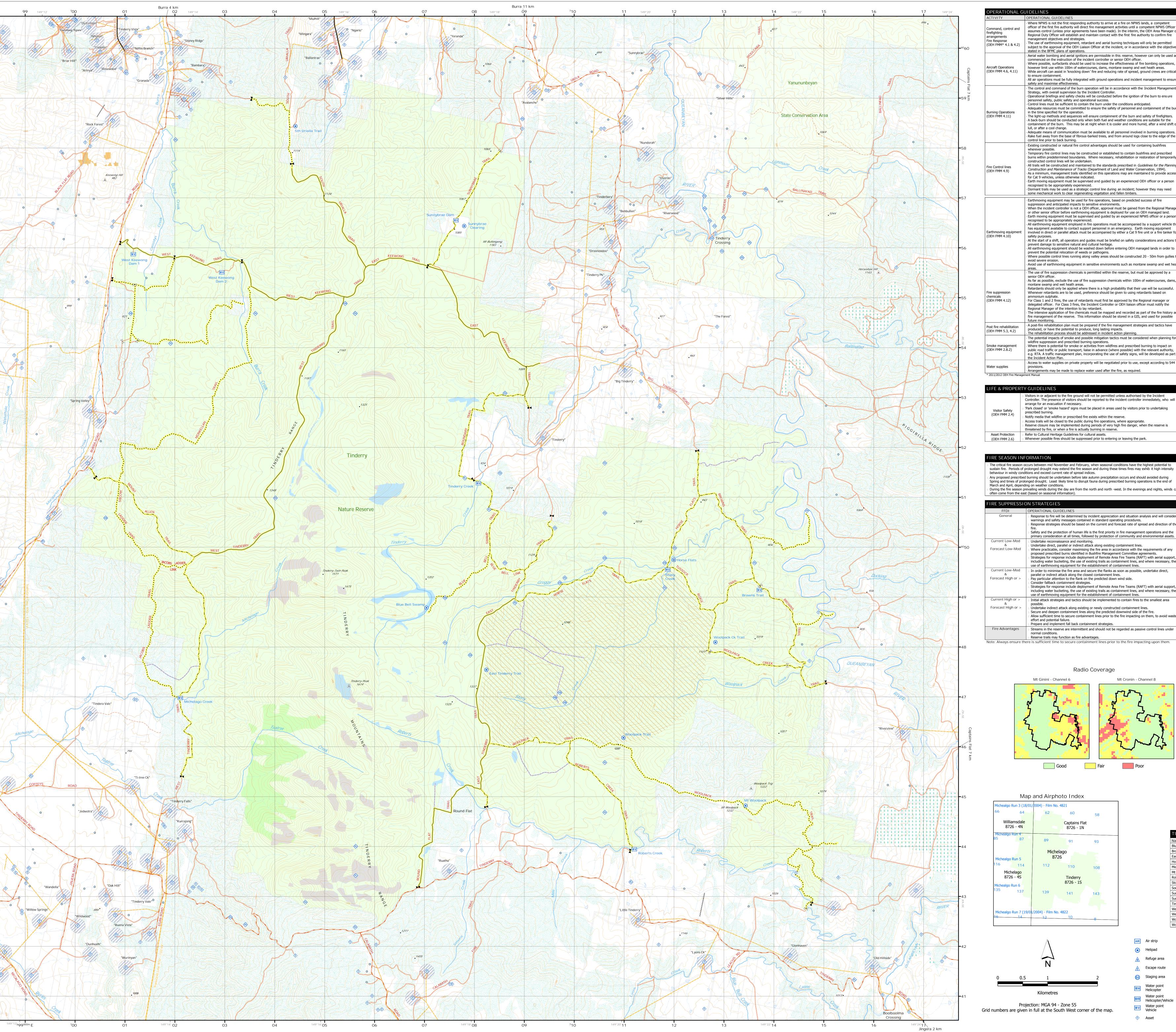
Sclerophyll Forests – shrubby formation	55 & 73	25	60	25% within threshold <1% long underburnt	□ absence of high intensity fire for over 400 years □ 2 or more canopy consuming fires occur within 100 years □ 3 or more fires occur < 25 years apart □ Frequent fires (c. 15-20 years) will favour the sclerophyllous species over rainforest elements. Conversely, long fire intervals (c.100 years) allow encroachment of more rainforest species (NPWS, 2004)
Wet Sclerophyll Forests – grassy formation	89	10	50	9% within threshold 2% long unburnt	□Some intervals > 15 years are desirable (NPWS, 2004) □Crown fires should not occur in the lower end of this range (NPWS, 2004) □A decline in biodiversity is predicted if: □ no understorey fire within 50 years □ absence of high intensity fire for over 400 years □ 3 or more fires occur <10 years apart
Dry Sclerophyll Forests – shrubby formation	75, 79, 109, 114 & 115	7	30	20% within threshold 50% long unburnt	□Some intervals > 25 years are desirable (NPWS, 2004) □A decline in biodiversity is predicted if 3 or more fires occur <7 years apart. □Too frequent fire may promote fire tolerant shrubs
Sclerophyll Grassy Woodland	95, 96 & 74	10	40	10% within threshold	□A decline in biodiversity is predicted if fires occur <10 years apart. □High intensity fire should be avoided where possible. □Occasion intervals of > 15 years are desirable (NPWS, 2004).
Freshwater Wetlands	125	6	35	1% within threshold 63% long unburnt	Some intervals > 30 years are desirable (NPWS, 2004). A decline in biodiversity is predicted if 3 or more fires occur < 6 years apart. Swamp and wet heath sites in the central granite area contain species found nowhere else in the reserve. The fire sensitivity of the community should be carefully considered when planning hazard reduction burns.
					□ Detailed data relating to fire thresholds for vegetation found amongst the granite outcrops is lacking. □ A number of regionally significant and fire sensitive species occur amongst the granite outcrops. □ The fire sensitivity of the community should be carefully

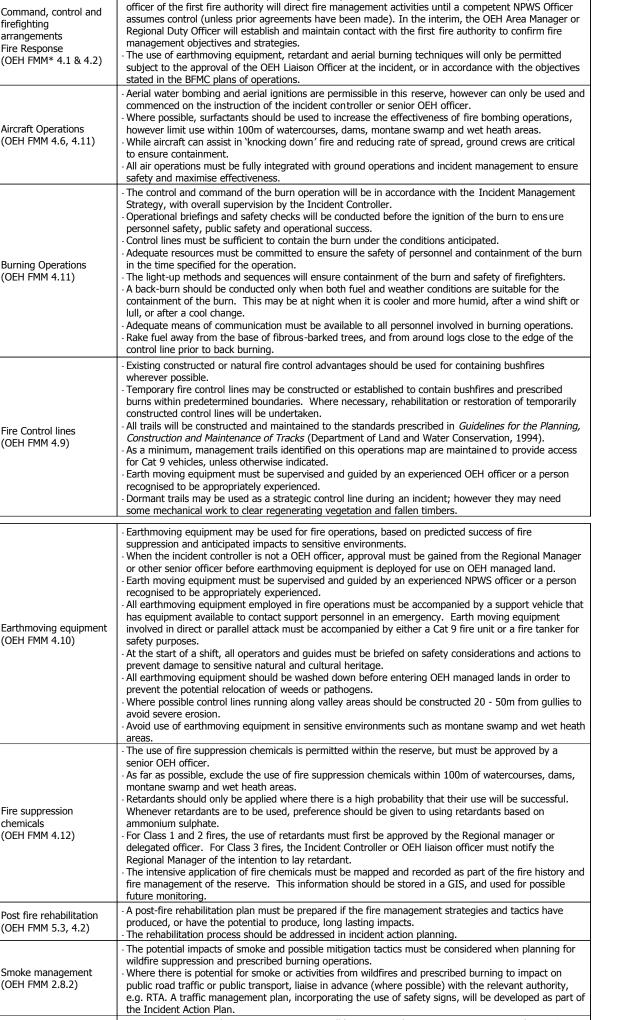
				the height and density of live fuel (Doherty, 1997)		(LMZ)	e.g. broad scale mosaic burning.	To undertake mosaic burning		
Pine on	20	-	70% within threshold	□ Two fires occurring <20 years apart may cause species decline. □ The fire sensitivity of the community should be carefully considered when planning hazard reduction burns. □ Black cypress pine is highly fire sensitive and stands in the reserve are relatively small. □ Data relating to maximum fire interval is lacking		Strategic Trails	□Trails that have been identified as having strategic value for fire suppression, fuel management programs and provides adequate access to assets.	□ These trails may not exceed 6m in width. □ Maintenance programs may include trail surface works, trimming, slashing, spraying and the use of prescribed fire. □ Trails must be assessed regularly and maintained as a part of the Queanbeyan area works program and Asset Management System (AMS). □ Trail classification must be clearly identified on operations maps.		
cative b	ative biodiversity thresholds based on broad state wide guidelines. NPWS, 2004: Kenny, B. et al. 'Guidelines for Ecologically Sustainable Fire									

Map 9: Overall Fuel Hazard

Fire Management Committee and



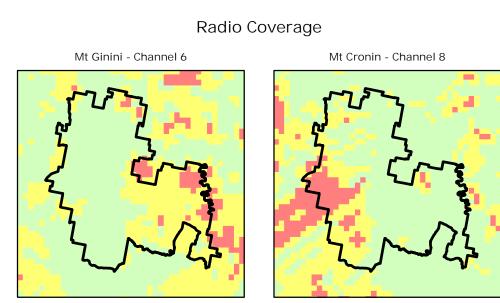


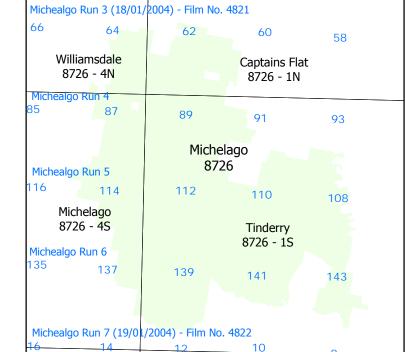


Controller. The presence of visitors should be reported to the incident controller immediately, who will Park closed' or 'smoke hazard' signs must be placed in areas used by visitors prior to undertaking Notify media that wildfire or prescribed fire exists within the reserve. Access trails will be closed to the public during fire operations, where appropriate. Reserve closure may be implemented during periods of very high fire danger, when the reserve is threatened by fire, or when a fire is actually burning in reserve. Asset Protection Refer to Cultural Heritage Guidelines for cultural assets.

The critical fire season occurs between mid November and February, when seasonal conditions have the highest potential to sustain fire. Periods of prolonged drought may extend the fire season and during these times fires may exhib it high intensity behaviour in windy conditions and exceed current rate of spread indices. Any proposed prescribed burning should be undertaken before late autumn precipitation occurs and should avoided during Spring and times of prolonged drought. Least likely time to disrupt fauna during prescribed burning operations is the end of During the fire season prevailing winds during the day are from the north and north -west. In the evenings and nights, winds can

FFDI	OPERATIONAL GUIDELINES
General	 Response to fire will be determined by incident appreciation and situation analysis and will consider warnings and safety messages contained in standard operating procedures. Response strategies should be based on the current and forecast rate of spread and direction of the fire. Safety and the protection of human life is the first priority in fire management operations and the primary consideration at all times, followed by protection of community and environmental assets.
Current Low-Mod & Forecast Low-Mod	 Undertake reconnaissance and monitoring. Undertake direct, parallel or indirect attack along existing containment lines. Where practicable, consider maximising the fire area in accordance with the requirements of any proposed prescribed burns identified in Bushfire Management Committee agreements. Strategies for response include deployment of Remote Area Fire Teams (RAFT) with aerial support, including water bucketing, the use of existing trails as containment lines, and where necessary, the use of earthmoving equipment for the establishment of containment lines.
Current Low-Mod & Forecast High or >	 In order to minimise the fire area and secure the flanks as soon as possible, undertake direct, parallel or indirect attack along the closest containment lines. Pay particular attention to the flank on the predicted down wind side. Consider fallback containment strategies. Strategies for response include deployment of Remote Area Fire Teams (RAFT) with aerial support, including water bucketing, the use of existing trails as containment lines, and where necessary, the use of earthmoving equipment for the establishment of containment lines.
Current High or > & Forecast High or >	 Initial attack strategies and tactics should be implemented to contain fires to the smallest area possible. Undertake indirect attack along existing or newly constructed containment lines. Secure and deepen containment lines along the predicted downwind side of the fire. Allow sufficient time to secure containment lines prior to the fire impacting on them, to avoid wasted effort and potential failure. Prepare and implement fall back containment strategies.
Fire Advantages	 Streams in the reserve are intermittent and should not be regarded as passive control lines under normal conditions.





Williamsda <mark>le</mark> 8726 - 4N		Captains Fla 8726 - 1N	
Michealgo Run 4 85 87	89	91	93
Michealgo Run 5	Miche 872		
Michelago	112	110	108
8726 - 4S Michealgo Run 6		Tinderry 8726 - 1S	
137	139	141	143
Michealgo Run 7 (19/0)	/2004) - Film No.	. 4822	
14	12	10	<u>Q</u>

		\bigwedge_{N}		
0	0.5	1	2	
		Kilometres		
	Projection	on: MGA 94 -	Zone 55	

		West Keewong Dam	n 2	Waterpoint – Vehi	
		Woolpack Trail	Remote Helipad		
		Woolpack Creek Tra	ail	Remote Helipa	ad
AIR	Air strip			hffa.r	Fire
•	Helipad		omestead		
R	Refuge area	^	storic site poriginal s		
Æ	Escape route	^	reatened		Fire
SA	Staging area	€ Th	nreatened	flora	
WH	Water point Helicopter	• Sp	oot height		•••
www	Water point	<u> </u>	ig station		Oth

INDERRY WAYPOINTS

East Tinderry Trail

Mt Woolpack

Roberts Creek

South Urialla Trail

Sunnybrae Dam

Tinderry Creek

Water point

Vehicle

Sunnybrae Clearing

Туре

Remote Helipad

Remote Helipad Remote Helipad Waterpoint – Vehicle

Remote Helipad

Remote Helipad

Remote Helipad Waterpoint – Vehicle

Waterpoint – Vehicle

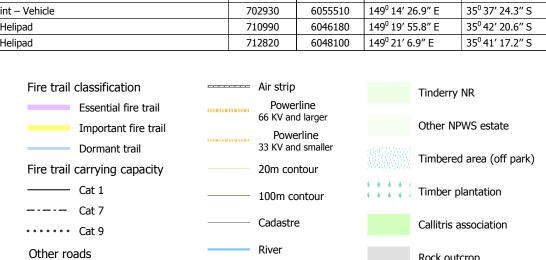
Waterpoint – Vehicle

Waterpoint – Vehicle Waterpoint – Vehicle

Waterpoint – Vehicle

		Woolpack Creek T	rail	Remote Helipa	ad
AIR	Air strip	(1)	Homestead	l buffer	Fire tr
•	Helipad				
		(HS)	Historic site	e	
R	Refuge area	A	Aboriginal	site	
E	Escape route	₽	Threatened	d fauna	Fire tr
SA	Staging area	₹Ē.	Threatened	d flora	
WH	Water point Helicopter	• 9	Spot heigh	t	• • • • •
hund	Water point	<u> </u>	Trig station	1	Other
WHV	Helicopter/Vehic	cle o i	Dam		

West Keewong Dam 1 Waterpoint – Vehicle



---- Disused track

712820 6048100 149⁰ 21' 6.9" E 35⁰ 41' 17.2" S ----- Air strip Tinderry NR 66 KV and larger Other NPWS estate Powerline 33 KV and smaller Timbered area (off park) 20m contour Timber plantation Callitris association Rock outcrop Sealed road Swamp & wet heath ---- Unpaved road Drainage line

Easting Northing Longitude Latitude

 Easting
 Northing
 Longitude
 Latitude

 707033
 6048790
 149° 17′ 16.1″ E
 35° 40′ 59.2″ S

 713710
 6049140
 149° 21′ 41.1″ E
 35° 40′ 42.7″ S

 708230
 6047540
 149° 18′ 4.9″ E
 35° 40′ 24.3″ S

 712000
 6049750
 149° 20′ 32.4″ E
 35° 40′ 24.3″ S

 702110
 6046980
 149° 14′ 1.9″ E
 35° 42′ 1.6″ S

 713430
 6044820
 149° 21′ 34.1″ E
 35° 43′ 2.9″ S

 711190
 6043940
 149° 20′ 6.1″ E
 35° 43′ 33.4″ S

 711880
 6049930
 149° 20′ 28.0″ E
 35° 40′ 30.9″ S

 704420
 6058430
 149° 15′ 23.3″ E
 35° 35′ 48.3″ S

 707790
 6056440
 149° 17′ 39.2″ E
 35° 36′ 50.3″ S

 707630
 6056550
 149° 17′ 55.3″ E
 35° 36′ 46.9″ S

 708080
 6051280
 149° 17′ 55.3″ E
 35° 39′ 37.7″ S

708080 6051280 149° 17′ 55.3″ E 35° 39′ 37.7″ S

701160 6055870 149⁰ 13′ 16.3″ E 35⁰ 37′ 13.8″ S

Eucalyptus distillery area

This map is based on Land and Property Information Standard 1:25000 Topographic Map Series. Reproduced with permission of Land and Property Information. ANAGEMENT ZONE GUIDELINES - Minimise size and intensity of wildfires, and manage to produce a mosaic burn pattern, where weather conditions permit. - Attempts can be made to increase burn patchiness by use of incendiaries, retardant, water bombing - Fire suppression chemicals may be used to suppress fire, however, minimise use within 100m of watercourses, dams, montane swamp and wet heath areas. - Protect mature trees and minimise felling large and hollow bearing trees during mop up activities. Prescribed fire will be used where deemed necessary for asset protection or ecological purposes. SIGNIFICANT VEGETATION COMMUNITIES - Within the montane swamp and wet heath areas wild fire is to be contained to as small an area as is feasible and consistent with minimising damage caused by suppression operations.

ISBN: 978 1 74293 846 2; OEH: 2012/0800; Version: September 2012

This Map should be used in conjunction with the current Tinderry Natutre Reserve

Fire Management Strategy, air photos and ground reconnaissance

during incidents and the development of incident action plans.

Copyright National Parks & Wildlife Service. These data are not guaranteed to be free

from error or omission. The National Parks & Wildlife Service and its employees disclaim

liability for any act done on the information in the data and any consequences of such acts or omissions.

Southern Ranges Region

Fire Operations Map

- Avoid the use of earth moving equipment within these areas especially in and around the Bluebell Swamp site which is considered to be part of the endangered ecological community (EEC), 'Montane Peatlands and Swamps' as listed under the NSW Threatened Species Conservation Act 1995 (TSC Act). and wet heath - Minimise use of fire suppression chemicals within 100m of this community. - This community may be vulnerable to peat fires when the substrate is dry. - Frequent and/or high intensity fire is listed as a threat to this community under the TSC Act. - Adult and juvenile plants are killed by canopy fire. Regeneration occurs from seed. Juvenile plants are particularly vulnerable to a second fire in short succession. Exclude fire from site until juveniles mature and a substantial seed bank has time to accumulate. - Ensure that the fire sensitivity of this community is considered when planning hazard reduction burns or during wildfire suppression activities. - The landscape attributes of the high peaks of the reserve are important and may be damaged by intense fires moving through the high granite areas. - There are a number of regionally significant plants found on the central granite outcrop area, many of which are at the limit of their distribution or represent disjunct populations. - Fires in granite outcrop areas to be contained to as small an area as is feasible and consistent with minimising damage caused by suppression operations.

Protection of Cultural Heritage (OEH FMM 4.2.7)	 During fire operations, Incident Management Teams should obtain information about Aboriginal and historic heritage. Aboriginal site information from AHIMS is sensitive and subject to a Memorandum Understanding. Site data must be used appropriately. Brief personnel involved in control line construction and vehicle based fire suppression operations or site locations and the required management strategies for site protection. Include in Incident Action Plans. Cultural Heritage Division staff released for the purpose of fire suppression activities should operate a specialist planning capacity, as part of an Incident Management Team, to ensure adequate protection of cultural heritage assets during fire suppression activities.
Scarred or carved trees	 - All fuel should be cleared from around identified trees when carrying out prescribed burning. - Fuel will be cleared around identified trees, where possible, as part of fire fighting. - Identified trees should be marked clearly before any control lines are constructed.
Stone arrangements, ceremonial rings, rock engravings, rock art, grinding grooves	 - Fuel must be cleared from in, on and around all identified stone or rock sites. Fuel clearing methods must not damage the site. Clear excess fuels from the site by hand. - Avoid new trail construction or ground disturbance within close proximity of site. Where possible, ensure site is protected by constructing trails or hand tool lines on the advancing fires side. - Avoid direct attack methods (including aerial water bombing) at known sites. Surfactants and retardants in aerial line drops may be used adjacent to, but not directly on sites. - Hazard reduction or back burning operations should minimise the potential threat of radiant heat and smoke (carbon deposition) on sites.
Burials, artefact scatters, middens, open camp sites	 - Sites must be clearly defined and marked wherever possible, and control lines must avoid (and attempt to protect) all Aboriginal sites whenever possible. - Avoid ground disturbance at or within close proximity of the site (30m). Earthmoving blades should raised in theses locations to avoid damage to sites on trails, unless'Consent to Destroy' has been obtained. - Avoid direct attack methods (including water bombing) at known sites. - Use of foam or aerial line drops may be use adjacent to, but not directly on sites.
Historic Heritage	 During fire operations, Incident Management Teams should obtain information about historic heritage from sources including the HHIMS database, the reserve Fire Management Strategy, Plan of Management and the Tinderry NR Conservation Management Plan. Brief personnel involved in control line construction and vehicle based fire suppression operations on site locations and the required management strategies for site protection. Include in Incident Action Plans. Prescribed burning or back burning operations should minimise the potential for site disturbance. Eucalyptus distillery area – avoid use of earthmoving equipment within 30m of known distillery sites as recorded on HHIMS and in the OEH GIS database.

NATIONAL PARKS & WILDLIFE	SERVICE	EMERGENCY SERVICES	000	COUNCILS	
Queanbeyan Area Office Fax 6229 7004 AM Queanbeyan Area Workshop 6297 8601 SE Incident Answering Service (AH) 1800 629 104 SE		POLICE - Queanbeyan AMBULANCE SES Queanbeyan SES Captains Flat Fire Brigade - Queanbeyan	6298 0599 13 12 33 6128 3400 6236 6190 6297 2332	Palerang Council 6238 Cooma-Monaro Council 6455 Mogo LALC 4474 Ngunnawal LALC 6297	
regional office (sindabytie)	0430 3333	ACT Emergency Services	6207 8333	OTHER ORGANISATIO	NS
RURAL FIRE SERVICE		Bureau		Wildcare (24 hr)	6299 1966
Queanbeyan Fire Control Centre Cooma-Monaro FCC	6297 1840 6455 0455	NEIGHBOUR INFORMATION	ON	Googong Foreshores	6207 2779
State Operations (24 hr)	8741 5401	Consult Queanbeyan Area databases			

G E N C Y / R E S O U R C E	CHANNE	M R X F R E Q	M T X F R E Q	NOTES
PWS(VHF)	6	81.2750	81.2750	Mt Gininim ay be marginal in some areas reserve
PW 5 (VHF)	8	78.7500	81.2500	Mt Cron+inm ay be marginnaoin e areas of threserve
PWS(VHF)	1 7	82.3875	82.3875	Channel to be determined by ground cre
I R E GORU N D	1 8	79.8375	79.8375	leaders, Division commanders etc. Any c
T K E GOKO N B	1 9	79.9625	79.9625	be noted in IAP.
FS (PMR)	6 3	419.025	409.575	Consult with RFS to determine primary
rs (rwk)	1 5	4 12 .8 2 5	4 03 . 47 5	commnuications during an incident.
FS (UHF) CB	1 4			
IRCRAFT	119.10 M	hState wide		
O M M U N I C A T I O N S	120.80 M	hState wide		
Fire Communication	122.80 M	hState wide		Unauthorised and inappro
raffic Advisory	123.45 M	hPzilots (chit o	ch`aītn)e Numb	ers" channel use off viation channels i
requencie-6、TFAF)	128.70 M	hState wide		a crim in al offence
	132.75 M	hState wide		
lobile Phone Cove c	ovgeerage is	m arginal in	valleys and	hill .shadow areas

DIO COMMUNICATIONS

