Fire Mitigation Plan
~ Coomba ~

Great Lakes Council

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EXECUTIVE SUMMARY

Great Lakes Council, Fire Mitigation Plan – Coomba has been prepared for the areas including Coomba Park and Charlotte Bay Villages, Shallow Bay, Coomba Bay, Whoota, Wallingat and rural environs.

Funding through the Natural Disaster Risk Management Studies Programme assisted in the preparation of this report. The administration is with the NSW State Emergency Management Committee, through the Department of Transport and Regional Services (DOTARS).

Greater understanding of fire management planning by the community and planners provides a primary mechanism to protect life and property during fire events.

The areas mapped Bush Fire Prone Land guide fire management strategies in development assessment and strategic planning tools for hazard reduction works.

The bushfire mitigation program within this report identifies fire management zones such as asset protection zones, strategic fire advantage zones, land management zones, fire exclusion zones and highlights fire prevention and mitigation.

The management of hazardous fuels, or mitigation against imminent bushfires through cooperative education programs, reduces the risk to life and property throughout the area.

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Introduction

Great Lakes Council has prepared this Draft Fire Mitigation Plan, to provide a comprehensive guide for fire management planning within the Coomba area. Council has the responsibility to manage community land in a manner that assists fire fighting authorities during fire operations and the protection of assets and life.

The Fire Mitigation Plan – Coomba (the Plan) covers the Coomba Park village proper, Coomba Park (rural area) Shallow Bay, Coomba Bay, Whoota, Charlotte Bay, and Wallingat. The Plan encompasses Council land including road reserves and Crown land in and around the village and within the rural environs. Consideration is given to management by other authorities, agencies and private property objectives and management strategies.

The Plan provides fire management guidelines and incorporates statutory obligations to manage bushfire risks and to protect life and property.

Within the study area, the main rural village is Coomba Park, situated on the edge of Wallis Lake, southwest of Forster (Figure 1). Access is along Coomba Park Road, northwest of the intersection with the Lakes Way. Charlotte Bay, also a village is adjacent to the Lakes Way in Pacific Palms where local shops, post office and service station are frequented by locals and visitors to the area. Rural properties within Shallow bay, Coomba Bay, Whoota, and Wallingat divide some of the forested area with cleared land between Charlotte Bay and Coomba Park.

The area within 1-2km of Coomba Park is cleared (now maintained grasslands) link with the village. Throughout the areas, forest regeneration occurs due to changing management practices (formerly broad-scale clearing in some area) which in places link to bushland corridors with private property and Wallingat National Park (WNP). The Parks and Wildlife Division of DEC manage WNP, which borders the western side of the study area.

Fire behaviour is greatly influenced by slope, aspect and fuel types. Understanding the effects of fire with forest types, fuel arrangements and knowing the influence of these on fire behaviour is important when assessing fire hazards and risks when planning fire management strategies.

Wallis Lake Catchment and the surrounding environment is important to ensure both natural systems and the Lakes system are enhanced to maintain integrity. The high habitat qualities within the area that are retained provide the buffer between saline and freshwater forest types which ensures a continuous cover and improved water quality. Much of the Wallingat River is surrounded by vegetation (on private land and in national park) and extends east to Wallis Lake, although fragmented provided disjunct corridors for local flora and fauna.

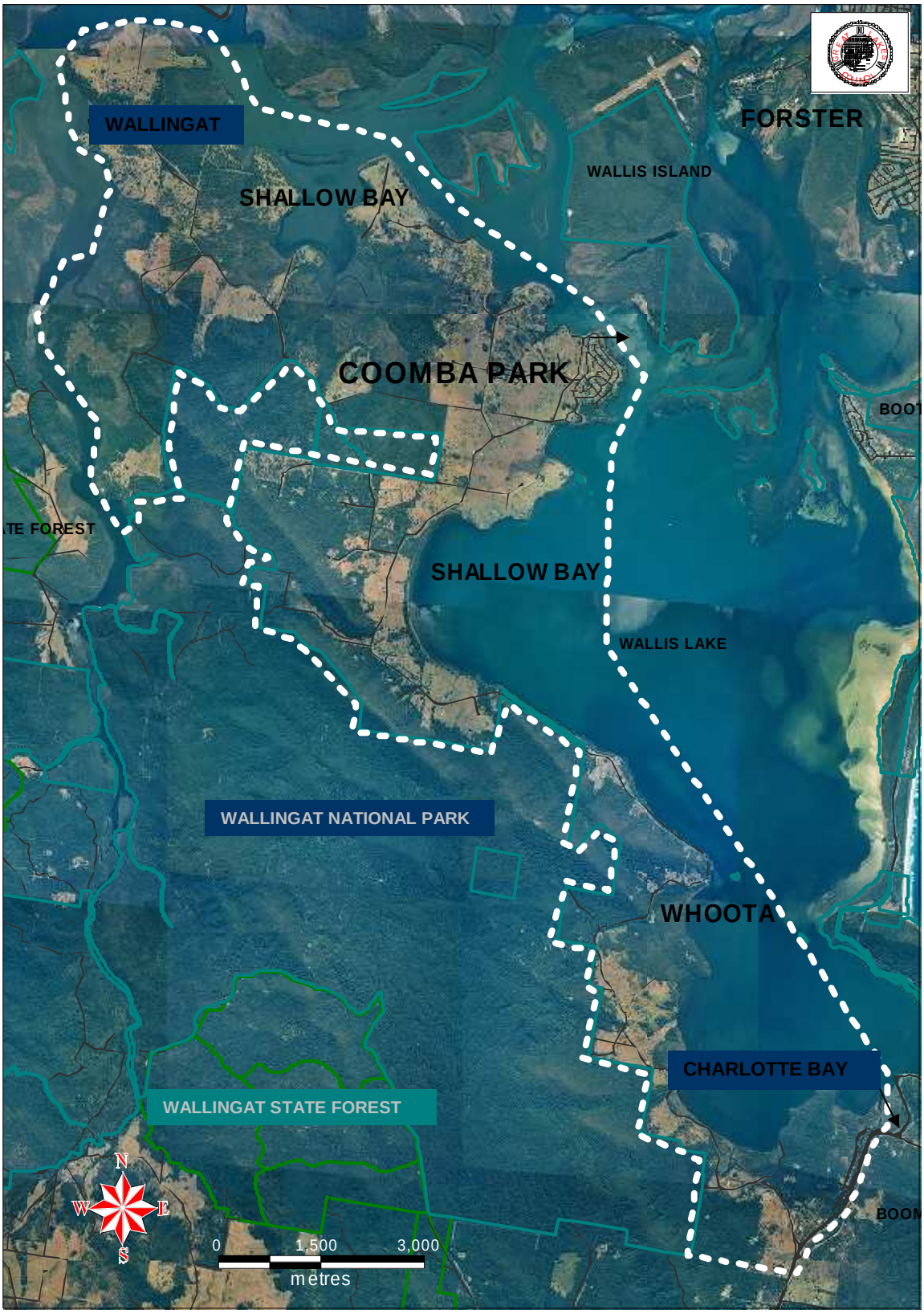


Figure 1: Location of Coomba Park and Charlotte Bay villages and the study area boundary.

Scope and Purpose

This report is a tool to guide fire management planning. Specifically, it assists Council land managers in applying processes, using appropriate assessment methods and to identify strategic management programs, for bushfire affected land and bushfire prone land.

The plan considers overall bushfire hazards and risks within Council owned and managed land (Council Land) within the Forster area. These fire management strategies are comprehensive within the plan identifying programs and activities necessary for Council to protect life and property, community assets and to meet fire and environmental management responsibilities and obligations.

These strategies have been guided by documents prepared by the NSW Rural Fire Service (RFS) including:

- ✓ *Bush Fire Environmental Assessment Code* for NSW, February 2006 (commonly known as 'The Code' and referred to as the BFEAC) and
- ✓ *Planning for Bush Fire Protection, A guide for Councils, planners, fire fighting authorities, developers and home-owners, 2001* (PFBFP).

In addition an environmental assessment considers and reports on the environmental impacts of proposed hazard reduction works, under such legislation as the *Threatened Species Conservation Act 1995 (TSC Act)* and the EP&A Act.

The field assessments and analysis on Council Land incorporates threats to life and property from adjoining areas, overall bushfire risks, subsequent bushfire hazard ratings, existing land management practices, necessary approved fire management works, vegetation types and fire history. The proposed mechanical hazard reduction works and fire regimes involved scientific analysis of fire threat and frequencies and the anticipated bushfire impact on the community.

Active management and involvement in ongoing hazard reduction by the community is important. The reduction of ground fuels and implementation of home protection plans to prepare properties against the effects of fires, improves the success of overall fire mitigation works.

Consultation with the stakeholders, neighbours, RFS and the Parks and Wildlife Division of DEC enabled a coordinated approach between Council, fire specialists and affected neighbours.

The Plan has been prepared with reference to various legislative and planning controls. These include specific fire legislation such as the *Rural Fires Act 1997* (RF Act) and the *Rural Fires Regulation 2002*. In addition specific policies, strategies, plans and guidelines are considered during the preparation of the fire management plan are tabulated below.

Plans, Policies, Strategies and guidelines		
Local Government	**Fire related**	**Building Environment**
Council Policy for Bush Fire Protection for Rural dwellings and subdivisions 1993	Planning for Bushfire Protection (RFS 2001)	Building Code of Australia - AS3959 Construction of Building in bushfire prone areas Standards Australia, 1999
Great Lakes Council Current Policy Register	Bush Fire Environmental Assessment Code for NSW (RFS 2006).	Planning for Bushfire Protection (RFS 2001)
Councils Policy for Fire Management for Council Controlled Natural Areas 1996	Lower Hunter Zone Bush Fire Risk Management Plan (BFMC 2004)	Building in bushfire prone areas. (RFS 2004g).
Great Lakes Local Environmental Plan 1996 (LEP)	Great Lakes Plan of Operations. (RFS 2004d).	Building in bushfire prone areas. Guidelines for single dwellings development applications (RFS 2004e).
Mapped Bushfire Prone Land	**Natural resource**	Building in bushfire prone areas. Guidelines for subdivisions applications. (RFS 2004f).
Council Development Control Plans (DCP)	Integrated Catchment Management Plan for the Lower North Coast 2002 (DIPNR 2002)	
Council Tree Preservation Order (TPO)	Supplementary State of the Environmental Report (GLC 2004)	
Draft Vegetation Strategy, Eastern Portion. Great Lakes Council. Volume 1 & 2. (GLC 2004b)		

Understanding the document

The fire management plan has been prepared to give strategic and operational outcome to fire responsibilities of Council and be used as an educational tool for property owners. The plan has been divided into 2 parts, with 9 sections to assist in the interpretation of the process and prepared outcomes.

Part 1 – Background Information
Section 1 introduces the processes.
Section 2 — 6 provides background information for fire management.

Part 2 – Fire Mitigation Plan
Section 7 identifies and discusses the local environment, features and local fire issues.
Section 8 overviews the bushfire risks to Coomba FMP study area.
Section 9 identifies works program.
Appendices gives background details on various fire management planning policies, background information and other data to assist in the interpretation of the plan.

The flow chart in Figure 2 demonstrates the steps in the preparation of the plan. The dictionary in appendix I identifies references to fire planning and operations.

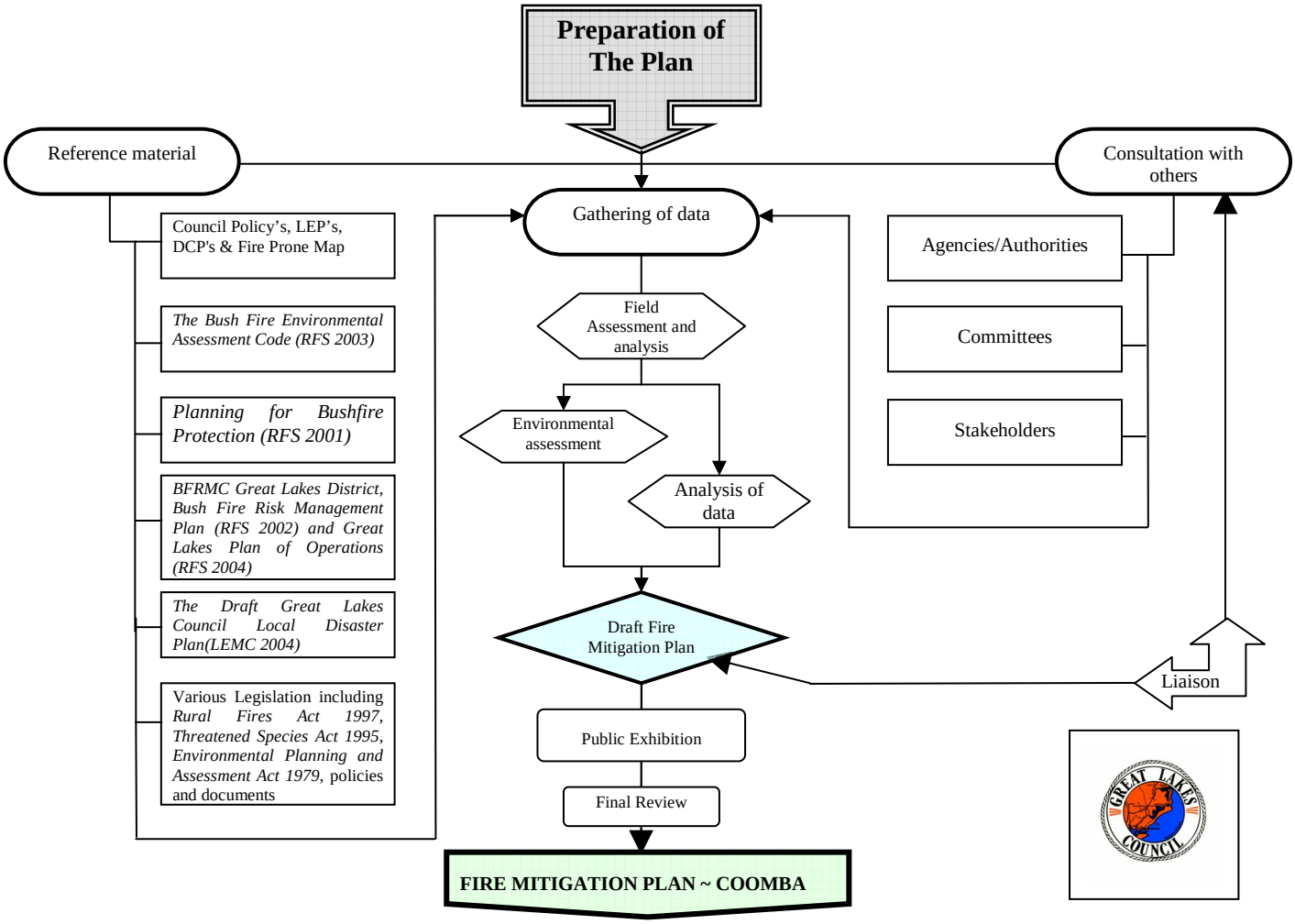


Figure 2: The planning process.

The planning process

The fire fighting functions apply to the various fire fighting authorities, during bushfires and emergency incidents. The plan provides additional information available for use during fire operations and concurrently meets the objectives of the RF Act.

Fire Management Objectives

Councils overall fire management objectives are defined within the *Great Lakes Council Management Plan* (Appendix II) and Councils policy for *Fire Management for Council Controlled Natural Areas.* Councils fire management objectives are consistent with statutory obligations and policies and are to:

- Protect life and property in or immediately adjacent to Council Land from bushfires.
- Minimise the spread of bushfire into or from Council Land.
- Minimise risk and reduce threat of bushfires on fire fighters and the community.
- Suppress or contain bushfire on Council Land.
- Reduce the risk of damage to assets and the environment.
- Maintain biodiversity and integrity of the natural environment.
- Promote participation of the community in implementing property fire management and Home Bush Fire Survival Planning.
- Inform the community of bushfire hazards and promote fire management planning in Bush Fire Prone Areas.
- Provide financial support and resourcing requirements to the NSW Rural Fire Service.
- Provide financial support and resourcing requirements to the State Emergency Service.
- Continue to annually evaluate and review the *Disaster Management Plan*.

Management Strategies

Council has identified their key fire strategies of the plan as:

- *To create fire management zones to assist in providing fuel reduced areas adjacent to assets.*
- *To implement fire mitigation programs to ensure ongoing fuel management continued for protection of community assets.*
- *To provide information for the community on bushfire works and to review in relation to Council's proposed activities.*
- *Acknowledge there are potential ignition risks of bushfires within parks and adjacent roadsides from natural and un-natural causes.*
- *Undertake environmental assessment for hazard reduction works to ensure steps towards sustainable actions area implemented.*

SECTION 2

Fire Management Responsibilities and Obligations

Under the RF Act public authorities and all land managers are responsible for preventing the occurrence of bushfires on and to mitigate against the spread of fires from entering or leaving their land.

Great Lakes Council

Council manages land within the local government area (LGA) including parks and reserves, formed and unformed road reserves and individual parcels of land.

Under the RF Act, the *State Emergency and Rescue Management Act 1989*, and the Rural Fires Regulation 2002 Council are:

- ✓ *A certifying authority to issue Bush Fire Hazard Reduction Certificates for Council managed land;*
- ✓ *Responsible for the identification of Bush Fire Prone Lands within the Council Area under section 146 of the EP&A Act which is certified by the Commissioner of the NSW RFS;*
- ✓ *Responsible for regulating property development & building construction through Local Environmental Plans (LEP) & Development Control Plans (DCP) to reduce hazards from bush, grass or rural fires. The Council refer developments under Section 100B to the Commissioner for certification of Bush Fire Safety Authorities;*
- ✓ *Responsible to ensure each DCP addresses bushfire hazard management and Council development controls in Bush Fire Prone Areas; and*
- ✓ *A consenting authority for development with consultation with the RFS in compliance with the RF Act under Section 79B and the EP&A Act and the Environmental Planning and Assessment Regulations 2000.*

Council contributes funds towards the operating costs of the RFS and the Emergency Services, to provide and maintain such items as fire fighting vehicles and facilities provide equipment and training of volunteers. Council also contributes towards employment of officers within the RFS to facilitate emergency services and mitigate hazards within LGA.

Bush Fire Management Committee

The Bush Fire Management Committee meets specific requirements under the RF Act. Great Lakes are within the Lower Hunter Zone Bush Fire Management Committee (BFMC), which

includes members from 2 other LGA's. A Council officer and an elected Councillor represent Great Lakes Council on the Committee.

The committee prepares the BFMC, Bush Fire Risk Management Plan (BFRMP), the BFMC, Plan of Operations, meets reporting requirements within the RF Act and is responsible for the promotion of public education programs relating to the bush and grass fire threat throughout the local area..

Great Lakes Council Local Disaster Plan

As constituted under the *State Emergency and Rescue Management Act, 1989* and within the State DISPLAN, Council has a committee member on the Great Lakes Local Emergency Management Committee (LEMC). The Local Disaster Plan guides determination of a local emergency and appointment of the Incident controller of the appropriate combat agency during fires in urban and rural areas.

The *Great Lakes Council Local Disaster Plan* (DISPLAN) assists in the arrangements at a local level to prevent, prepare for, respond to and recover from emergencies.

NSW Rural Fire Service

The NSW Rural Fire Service (RFS) work cooperatively with Council to ensure the effective allocation of funding, management, maintenance, support, of fire and emergency operations. The RFS also assists other emergency service organisations at incidents and at emergencies under the control of those organisations.

The RFS function is to provide bush fire fighting services and provide the resources including appliances and personnel resources to combat rural fires within the LGA, rural fire district. The network of Rural Fire Brigade Stations and equipment across the Great Lakes Area are managed by the RFS and maintained through Council depots.

Council has conferred to the Commissioner of the RFS a range of functions under the RF Act as they relate to issuing of s66-s70 notices, bush fire hazard complaints and the issuing of bush fire hazard reduction certificate in accordance with the Code. The issuing of bushfire hazard advice notices on private land is accompanied by the RFS authorised BFHRC for private landholders to undertake works. Other authorities certify their own bushfire hazard activities.

The RFS also provides community education, fire fighters and specialist to mitigate and suppress fires by assisting in emergencies and daily incidents such as wild fires, motor vehicle accidents, floods and storm damage events.

NSW Fire Brigade

The NSW Fire Brigade (NSWFB) responds to and manages emergency incidents, as well as educating the community through prevention programs and to build community resilience by preparing for emergencies.

> ✓ *'The NSWFB provides fire protection, urban search and rescue, hazardous material response, natural hazards response, emergency life support, terrorist consequence management and other emergency management capabilities. The NSWFB works cooperatively to develop and implement plans for emergency services throughout NSW, through the maintenance of strategic working alliances with other emergency and support services' (NSW Fire Brigade 2004).*

NSW Department of Environment and Conservation (Parks and Wildlife Division)

The Parks and Wildlife Division of the Department of Environment and Conservation (DEC) (commonly known as the National Parks and Wildlife Service (NPWS)) are a recognised fire authority and public land manager who implement fire and environmental management obligations under the *Threatened Species Act 1995* (TSC Act) and other related legislation. The organisation prepares fire management plans and identifies fire management strategies in accordance with DEC plans, policies and procedures such as those detailed in the "NPWS Fire Management Manual" (NPWS 2001).

DEC undertakes operational fire fighting cooperatively with other agencies and landholders. DEC fire management planning and approach to fire suppression, mitigation and prevention is to meet fire legislation, planning objectives that sustain ecological processes and principles, and which maintains the protection of life, property and environmental assets.

Department of Planning and Infrastructure (Forests)

Department of Planning and Infrastructure (DPI), (Forests) formerly State Forests (SF) provide resources and support for emergency fire management, to protect life, property, community assets and forest values.

Their Fuel Management Plans identify fire management zones, appropriate fire regimes, and hazard reduction works including the use of prescribed burns as a management tool for reducing forests fuels and to identify practices that are economically and ecological sustainable.

NSW Department of Lands

NSW Department of Lands (DL) has a responsibility for bushfire management on Crown Land, Crown Roads and Crown Reserves. This land is often fragmented, by settlements or are linear (foreshores, roadways, waterway areas), with varying conservation values. The Crown Reserve System promotes "...the cooperative care, control, and management of Crown reserves by the community with assistance from the Department of Lands, other government agencies and reserve users." (DL 2005). By Crown Land managers delegating to the local

government authority (managers of crown land), enable Council to cooperatively plan and implement fire management objectives.

Hazard reduction, environmental assessment and the preparation of a fire plans (by Reserve Trusts) during the management of reserves assist in protecting assets, neighbouring assets and communities as required by the DL (DL 2005b).

Country Energy/TransGrid

Country Energy recognises that vegetation management is important to prevent the spread of bushfires and prevent the ignition from electricity lines. Country Energy environmental policy and commitment to meeting legislative requirements ensures the environment is protected and enhanced for future generations, during service operations and fire prevention management.

The authority, TransGrid is responsible for the high voltage transmission lines and associated assets, which traverse the state and are generally, located in rural and semi-rural areas. TransGrid risk approach to asset management assumes that every transmission line has the potential to be impacted by fire, or to initiate fire, including bushfire.

TransGrid, although have assets within the LGA, have no known transmission lines within the Coomba study area.

TransGrid has also prepared a Bush Fire Risk Management Plan that identifies strategies, policies and procedures that are based on the principles of risk management and specifically on bushfire risk management (TransGrid 2003).

MidCoast Water

MidCoast Water is responsible for the supply of reticulated water and sewage system within some areas in Great Lakes LGA and the management of waste water through the facilities in Forster, Tuncurry, Hawks Nest, Bulahdelah and Stroud.

During fire fighting operations, authorised personnel access fire hydrants throughout some localities to supply fire appliances with fire fighting water. The readily available supply in some urban and rural areas assists in the suppression of wild fires or use during hazard reduction activities.

MidCoast Water ensures the protection of facilities by undertaking fire mitigation works around their own assets to required levels in the various fire management zones (FMZ's).

Private Landholders

The broader community actively undertakes hazard reduction works in and around their properties. As landholders become aware of changes to fire regulations further hazard

reduction works are implemented. . These works complement works by other landholders or land managers in and around villages, townships and rural areas.

The emphasis on the responsibility for owner/occupiers to minimise the occurrence and the spread of fire, and to meet legislative requirements when bushfire hazard reduction is required, is highlighted through community education programs. Hazard reduction works can provide reduced fuels, safer environs and protection of community assets including biodiversity within forested areas.

Appendix III can assist landholders with being prepared for bushfires by providing steps and options to take and assist in fire prevention and hazard reduction. Additional information can be sourced on the RFS website or the local fire control centres and Rural Fire Brigades.

SECTION 3

Bush Fire Risk Description

Bush Fire Risk

Bush fire risk analysis is a mechanism to undertake risk assessments (in the field) on assets including life and property, natural and cultural heritage. By preparing for the imminent advancement of a bushfire incident, hazard reduction activities can serve to quell the intensity and subsequent detrimental affects on the community or the asset.

The BFRMP is an indicator for Council in prioritising bush fire mitigation works. Within this document the resultant bushfire risk ranking (extreme, major, moderate, minor or insignificant) identifies ranking of an area (or special area) depending on the ability for assets (built/natural) withstand or recover from a fire event).

Bush fire risk is defined as: The chance of the bushfire igniting, spreading and causing damage to assets within the community or reducing biodiversity of areas within natural areas.

The Plan incorporates field assessment of assets, the potential localised bushfire risks, hazard reduction requirements with outcomes that also consider environmental legislation and guidelines. The fire management strategies included within section 8 identify fire mitigation works proposed in asset protection zone (APZ's), strategic fire management zones (SFAZ), land management zones (LMZ) and fire exclusion zones (FEZ) within the study area.

Overview of the BFRMP Bush Fire Risks within the Study Area

Coomba Park and Whoota extreme bushfire risk category is a result of the close proximity of bush land areas directly adjacent to the village and that some building construction designs are not built to design as defined for "*bushfire prone lands*". The management of fire hazards, through reducing fuels within bushland areas, assists in the protection of the community. Vegetation management lessens the impact on residents, visitors and fire fighters during a fire incident that may occur.

The Australian landscape has adapted and evolved due to fires. Lightning strikes are a natural phenomenon and have been known historically to occur throughout the area. Seasonal thunderstorms along the coastline and further inland are a source of ignition as well as other ignition sources which range from arson, escaped hazard reduction, accidental ignition and motor vehicle accidents.

Existing Features

There is an extensive coverage of continuous vegetation communities within the study area and on the Lake edge as well as disjunct to the west, south-west from Coomba Park on higher elevations along the range. These areas are likely to sustain bushfires if ignited, and have a fire path leading to Coomba Park, Charlotte Bay villages and parallel to the foreshore within the various rural communities (Figure 3). Combined with the proximity to the range, knowing local fire behaviour the indication for spotting from wild fires burning in the range is that the wildfire could affect these coastal areas and start spot fires near to residents.

Whoota area is down-slope of the majority of the fire risk associated with the range. Open grassland areas west of Coomba Park and east of the forested areas, can sustain grass fire, which behave differently to forest fires.

Various advantage lines exist both naturally and man made including roads, transmission lines, waterways, lakes and wet gullies. These are all used during fires as control lines however spotting which can occur during extreme fire weather conditions, with low humidity, high air temperatures, high winds and fuel levels, may be as far as 5 kilometres from any direction across such advantage lines.

Coomba Park abuts Wallis Lake and provides water sources for residents, fire fighters and aerial water bombing craft. This moister environment can assist in providing environmental conditions to slow the movement of fires and reduce the longevity of fires by providing sea breezes, moist conditions and changes in vegetation type and available ground fuels. There are also lake accesses through Council or Crown Reserves for refuge or as vehicle watering points.

In addition the Coomba Park road provides strategic fire advantage and the adjacent properties to the roadway that have been cleared enhance protection to the community. Refuge areas are found within existing cleared areas such as road intersections, gravel areas adjacent to roadways (either on old carriage ways/gravel pits).

The pattern of urban development within townships and villages, often divided by vacant properties is conducive to ignition of fires from ember attack such as those in Coomba Park (Figure 4). The surrounding area around Coomba Park is predominantly managed pasture or maintained open space. The small area of remnant bush within the village provides a hazard adjacent to properties; however APZ's are maintained adjacent to assets thus reducing the fire risk. In the event of a fire, fire fingers are able to extend amongst both developed and undeveloped residential properties, along road verges, through back yards, vacant blocks and open space areas.

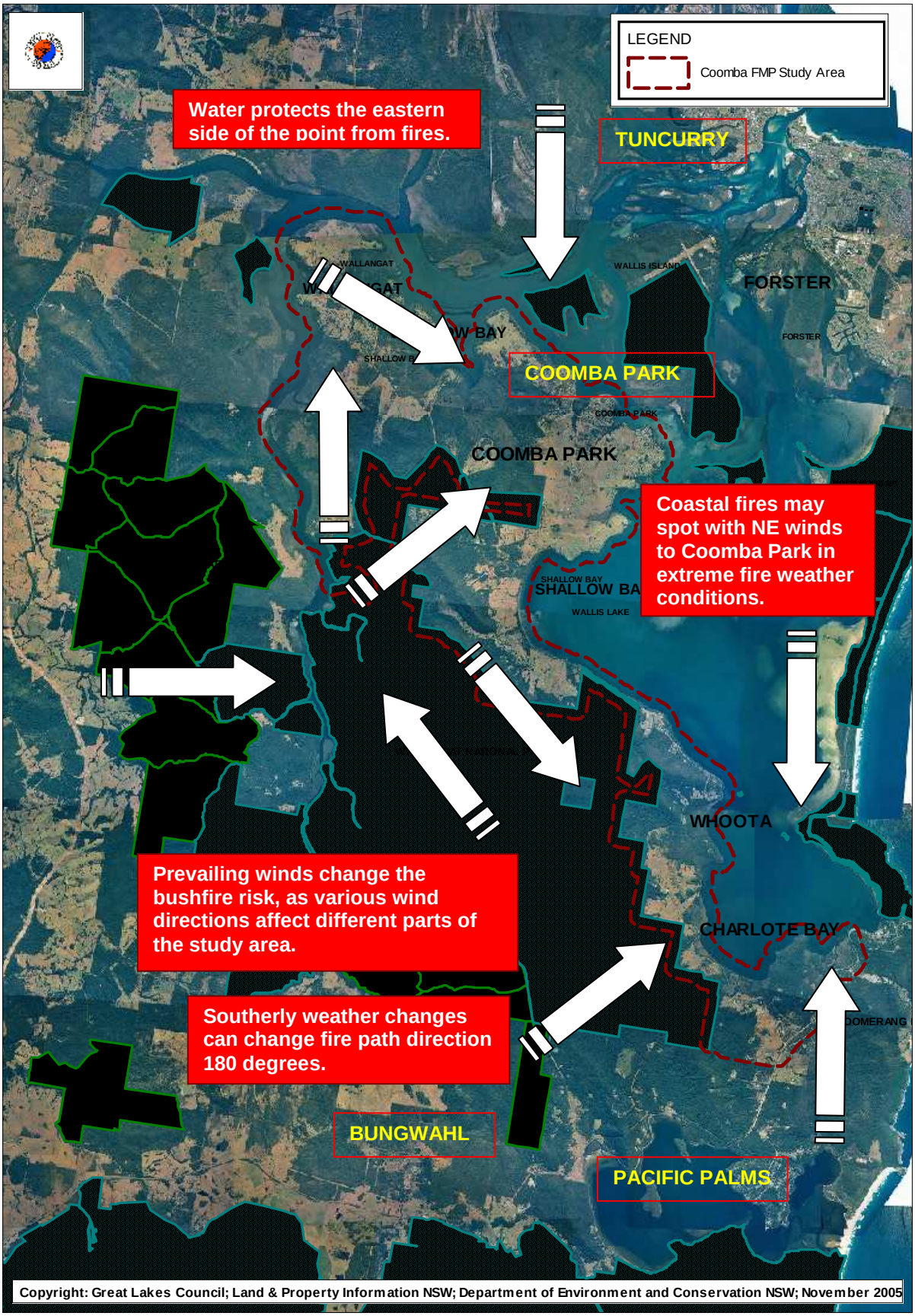


Figure 3: Bush fire risk to Coomba Park and rural environs.

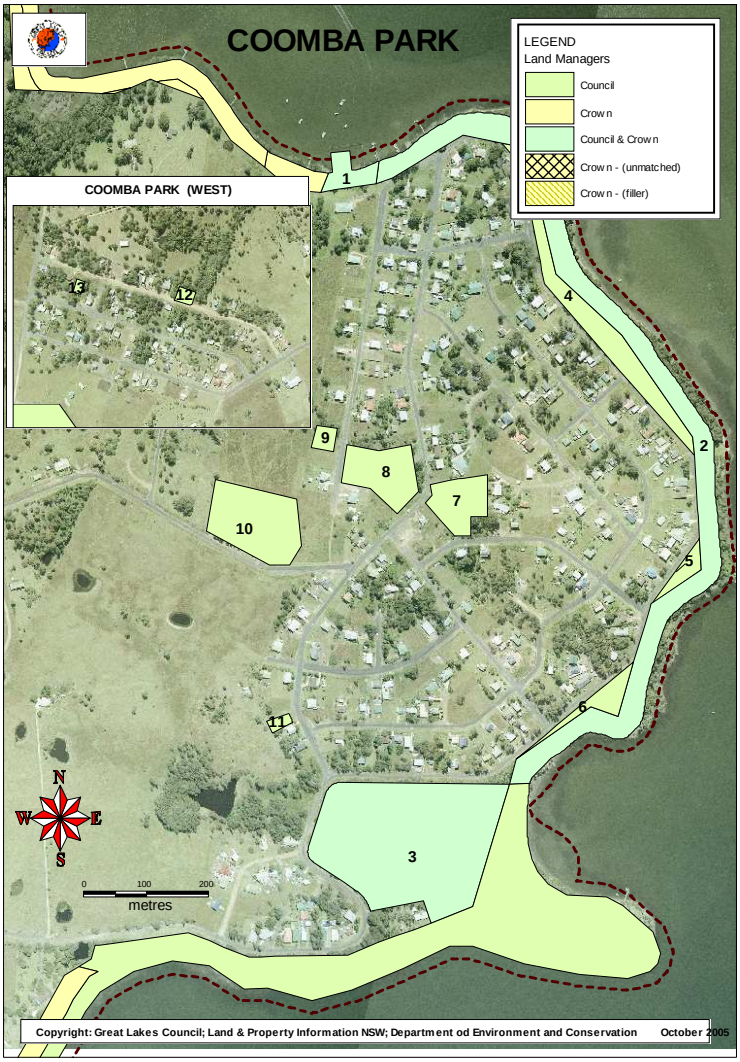


Figure 4: Development within Coomba Park.

Coomba Park immediate areas are predominantly exposed to grass fires, adjoined by remnant forest areas that can slow the spread of fires in appropriate conditions. Grass fires spread faster, burns quickly and not as intense (due to less ground fuels) as a forest fire with equivalent fire ground conditions.

The terrain within the area has a variety of slopes that range from 0-5º in the low—lying areas to 15º on the undulating elevated slopes and at times greater than 18 º in steeper areas on the edge of the Wallingat Range. The steeper slopes enable fires to run in places at a greater rate of spread than those with lesser slope. The type and arrangement of fuels affect fire spread and techniques for fire fighting.

Whoota and Shallow Bay has a variety of land holdings including small holdings, rural and residential properties. The majority of these properties are accessed from the Coomba Road northeast towards Wallis Lake or southwest towards WNP.

Charlotte Bay urban area abuts Wallis Creek and Wallis Lake to the west and north protecting the village area from fires from this direction. The Lakes Way assists dividing the area from fires moving in a south and easterly direction within Pacific Palms.

Risk to Life and Property

The BFRMP identifies Coomba Park and Whoota as being within an *extreme bushfire risk.* The rural areas of Coomba Park, Wallingat, Shallow Bay and Charlotte Bay are identified as being within *major and moderate bushfire risk* areas. The closer the bushfire threat the higher the risk. The BFRMP assessment identified and used set criteria in determining the bushfire risk. Council has summarised the assessment of both urban and rural developments (Appendix VI). This assists planners when implementing fire management under the various legislative documents and procedures.

Eleven localities have been identified where life and property[1] are directly threatened from the spread of fire from adjacent bushland to the rural/residential interface (Table 1) (Figure 5).

Table 1: Risk to life and property.

Code	Location	Description of risk	BFRMP Risk Rating
LP1	Coomba Park Village – Foreshore	Eastern residential edge of Coomba Park and bushland interface east of Coomba Park linking with Coomba Foreshore Reserve.	Extreme
LP2	Coomba Park Village – West	Western residential edge of Coomba Park and bushland/grassland interface west of Coomba Park linking with small rural residential properties.	Extreme
LP3	Coomba Park Village (West) – North	Northern residential edge of Coomba Park (West) and the bushland/grassland interface north linking with small rural residential properties primarily cleared.	Extreme
LP4	Coomba Park Village (West) – South	Southern residential edge of Coomba Park (West) and the bushland/grassland interface north linking with small rural residential properties primarily cleared.	Extreme
LP5	Coomba Park – Burraneer Road	Western bushland edge within private land and the interface with rural properties south of Burraneer Road.	Moderate*
LP6	Wallingat – Shallow Bay Road	Eastern bushland/grassland interface (linking with WNP) within rural properties along Coomba Road (west of Coomba Park).	Major/Moderate*
LP7	Wallingat – Shallow Bay Road	Western bushland edge, linking with WNP, within private land and the interface with rural properties along Shallow Bay Road.	Major/Moderate*
LP8	Shallow Bay - West	Western bushland interface (linking with WNP) within rural properties in Shallow Bay.	Major*
LP9	Whoota - West	Bushland interface (linking with the western edge of WNP) within rural properties in Whoota.	Extreme
LP10	Charlotte Bay - South	Bushland interface (linking with the western edge of WNP) within rural properties in Charlotte Bay.	Major/Moderate*
LP11	Charlotte Bay - West	Western bushland interface (linking with WNP) within rural properties in Charlotte Bay.	Major*

[1] Life and Property is identified on figures as LP with corresponding number identified in Table 5
* Derived from the BFRMP bush fire risk description.

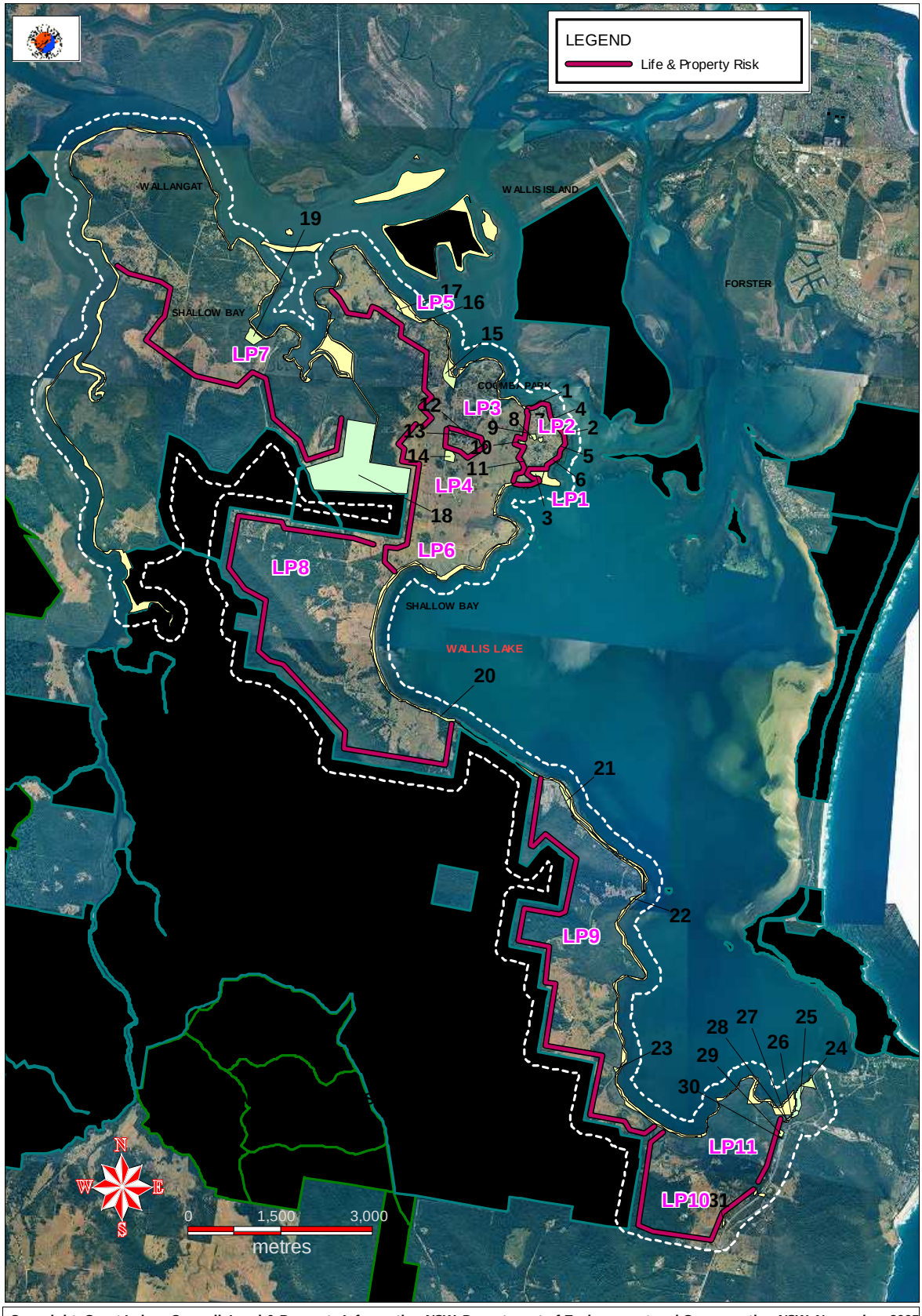


Figure 5: Location of life and property risk.

In addition all of Coomba Park and Charlottes Bay village areas, the majority of Whoota are identified as *bushfire prone land*. The rural area of Coomba Park, Wallingat, Whoota, Shallow Bay has parts identified as *bushfire prone land*. Bush fire prone land developments require further bushfire assessment to be undertaken as part of development assessments submitted to Council (referral to the RFS). Legislation requires new development to met standards within the *Planning for Bush Fire Protection Guidelines, 2001 (PFBFP).* The standard of construction (level 1, 2 or 3) is derived through the development assessment process for fire protection, guided by the ASA 3959 and the PFBFP documents.

Potential ember attack during a bushfire incident from adjacent burning bushland re-enforces the importance and requirement for householders to mitigate against the fire threat and for residents to undertake their own fire preparedness activities.

Risk to Natural Heritage

The BFRMP identifies and classifies Council Reserves as major, moderate and minor environmental and ecological risk rating[2] (Table 2). The risk rating (major, moderate or minor) indicates the effects of fire on the land identified or the actual level of impact of fire on the environment and the risk to remain sustainable with current conservation values. Those areas of major risk are affected more than areas with minor risks.

Near to Coomba Park is WNP, which is classified as a major environmental and ecological risk. Inappropriate fire regimes can impact the natural heritage values of the national park and local vegetation formations neighbouring the area, along with disturbances such as clearing or extensive under scrubbing on other lands. Reducing the impact of fire on areas, by planning to reduce fuels or the spread of fire, improves biodiversity and the natural integrity of the area.

Assessment of the fire risk within reserves adjacent to assets and identifying fire threats is part of the analysis within the plan. Fire regimes for hazard reduction burning are also described within code for SFAZ and LMZ's which consider biodiversity with burning practices.

There are higher risks to the conservation values to many of these areas as they are within Key Habitat and Regional Corridors and have high conservation values linking with WNP and Wallis Lakes Estuary. When assessing the regional status of ecosystems within the LGA, (mapped of by the North East Comprehensive Regional Assessment (CRA)), the priority identified Swamp oak as a vulnerable, severely depleted community and requires further protection. In decreasing priority for local vulnerable status (paperbark) and rare status (mangrove, swamp and rainforest) the conservation of these communities during fire management is important.

[2] Environmental & ecological risk rating is the affect on the biodiversity and natural values of the area

Table 2: Risk to natural heritage.

ID	Council Managed Land	Reserve	Vegetation Community	Vegetation Formation	Environmental & Ecological Risk Rating
Coomba Park					
1	Tidal Pool	Tidal Pool	Cleared/ Forest red gum	Sclerophyll grassy woodlands	Minor/ Moderate
2	Coomba Park Foreshore	RES 1008 (CL R85529)	Salt water swamp/ Swamp oak/ Palm	Estuarine & saline wetlands/ Swamp sclerophyll forest/ Rainforest	Major
3	Coomba Aquatic Gardens	RES 5066	Palm/ Swamp oak	Rainforest	Major
4	Coomba Park Foreshore	RES 1008	Salt water swamp/ Swamp oak	Estuarine & saline wetlands/Swamp sclerophyll forest	Major
5	Coomba Park Foreshore	RES 1008	Forest red gum	Sclerophyll grassy woodlands	Major
6	Coomba Park Foreshore	RES 1008	Forest red gum/Swamp oak	Sclerophyll grassy woodlands/ Swamp sclerophyll forest	Major
7	Public Recreation Space	RES 5105	Cleared/ Spotted gum-Ironbark/Grey gum	Dry sclerophyll shrub/grass forest	Minor
8	Public Recreation Space	RES 5109	Forest red gum/ Swamp oak	Sclerophyll grassy woodlands/ Swamp sclerophyll forest	Moderate
9	Public Reserve	RES 5067	Swamp oak	Swamp sclerophyll forest	Moderate
10	Coomba Park Community Hall	RES 5016	Cleared	Grassland	Minor
11	Lot 88 DP 222756	Lot 88 DP 222756	Cleared	Grassland	Minor
12	Public Reserve & Road Reserve	Lot 129 Sec 2 DP 222755 & RR	Swamp oak/ Cleared	Swamp sclerophyll forest/ Cleared	Moderate/ Minor
13	Lot 97 DP 222755	Lot 97 DP 222755	Swamp oak	Swamp sclerophyll forest	Minor
14	Quarry	Lot 632 DP 785425	Cleared	Grassland	Insignificant
15	Public Reserve	Lot 54 DP253666	Swamp oak/ Cleared	Swamp sclerophyll forest/ Grassland	Major
16	Reserve	RES 5063	Cleared/ Swamp oak	Swamp sclerophyll forest/ Grassland	Minor
17	Reserve	RES 5064	Tallowwood/Sydney blue gum	Wet sclerophyll forest	Major
18	Coomba Park Recreation Reserve	RES 129 (CL R1003668) GLC Trusteeship	Paperbark/ Grey gum/Grey ironbark/White mahogany/ Swamp oak/ Mangrove	Swamp sclerophyll forest/ Dry sclerophyll shrub/grass forest	Major
19	Public Reserve	Lot 7 DP 813507	Mangrove	Estuarine & saline wetlands	Major
20	Public Reserve	RES 5196	Grey gum/Grey ironbark/White mahogany/ Swamp oak/ Flooded gum	Dry sclerophyll shrub/grass forest/ Swamp sclerophyll forest/ Wet sclerophyll forest	Major/ Minor

ID	Council Managed Land	Reserve	Vegetation Community	Vegetation Formation	Environmental & Ecological Risk Rating
Whoota					
21	Reserve	Lot 2 DP 238509	Cleared/ White mahogany/ Red mahogany/Grey ironbark/Grey gum	Grassland/ Dry sclerophyll shrub/grass forest	Major/ Minor
22	Reserve	Lot 1 DP 245928	Swamp oak/ Flooded gum	Swamp sclerophyll forest/ Wet sclerophyll forest	Major/ Minor
23	Reserve	Lot 21 DP 245522	Cleared	Grassland	Major/ Minor
Charlotte Bay					
24	Public Rec & Resting Place	RES 87194 (RES 82)	White mahogany/ Red mahogany/Grey ironbark/Grey gum/ Salt water swamp	Dry sclerophyll shrub/grass forest/ Estuarine & saline wetlands	Major
25	Wallis Creek Foreshore Reserve	RES 22 (R69391) GLC Trusteeship	White mahogany/ Red mahogany/Grey ironbark/Grey gum/ Paperbark/ Swamp oak	Dry sclerophyll shrub/grass forest/ Swamp sclerophyll forest	Major
26	Wallis Creek Foreshore Reserve (Access & Wharf)	RES 22 (CL R69389) GLC Trusteeship	Cleared/ Paperbark/ Swamp oak	Grassland/ Swamp sclerophyll forest	Major/ Minor
27	Wallis Creek Foreshore Reserve	(CL R69391) GLC Trusteeship	Cleared/ Dry blackbutt	Grassland/ Dry sclerophyll shrub/grass forest	Major/ Minor
28	RES 84099 BFB	RES 84099	Cleared/ Dry blackbutt	Grassland/ Dry sclerophyll shrub/grass forest	Major/ Minor
29	SES R94358	RES 114	Cleared/ Dry blackbutt/ Swamp oak	Grassland/ Dry sclerophyll shrub/grass forest/ Swamp sclerophyll forest	Moderate/ Minor
30	Public Reserve	RES 115 & Part Road Reserve	Swamp oak/ Cleared	Swamp sclerophyll forest/Cleared	Moderate/ Minor
31	Reserve	Lot 24 DP 236679	Cleared/ Dry blackbutt	Grassland/ Dry sclerophyll shrub/grass forest	Moderate/ Minor

The compilation of the table within appendix VII assists planners to determine by desktop an overview of the vegetation types that are reviewed on site through each assessment determination. The vegetation category (type 1, 2 or 3 from the PBFP), guides the identification of fire management zones for new developments and subdivisions can assist during development assessment.

Risk to Cultural heritage

The conservation and protection of significant cultural heritage (Aboriginal and non-Aboriginal heritage) is important when undertaking any activity. The BFRMP does not specifically identify any archaeological or aboriginal heritage sites in or around the study area.

In addition the DEC (Parks and Wildlife Division) maintained Aboriginal Heritage Information Management System (AHIMS) search for Aboriginal Objects and Aboriginal Sites were consulted as part of the process.

Clause 21 of Great Lakes Local Environmental Plan, 1996 makes provision for significant 'Heritage items' and guides their enhancement and protection. Within Great Lakes, Schedule 2 does list 3 heritage items as local and regional (but not of state significance) within the study area.

Field Assessment Methodology

Field assessments are undertaken to provide data for analysis for managers. The assessment process is an acceptable process for fire managers to determine the hazard and risk analysis of bushfire within and adjacent to Council managed land.

The contributing factors to the assessment include; the distance of the bushfire hazard to the asset (Threat) and, where the potential severity is influenced by the bushfire or by bushfire hazards (Risk). The overall fuel hazards are given as low, moderate, high, very high and extreme ratings. The assessment includes using factors such as;

- ✓ vegetation type and separation distance of canopies;
- ✓ overall fuel loads, (bark, surface, elevated);
- ✓ slope;
- ✓ fuel quantity; and
- ✓ size of combined risk areas.

The hazard assessment also considers fire resistance construction standard of a building (or asset) (no standard, level 1, 2 or 3), Bush Fire Prone Land, BFRMP ratings including the hazard and risk rating and the risk management zone.

The assessment outcomes are based on potential extreme weather conditions, and the ability of an asset to recover from or withstand a bushfire.

Hazard reduction activities and seasonal influences affect vegetation growth rates and the resultant rating of the existing hazard. Variations in growth rates affect overall fuel loads, the ability to ignite and the rate of spread of fire. The preferred fire intensity within fire management zones adjacent to assets is ideally low—moderate. Fires may spread from adjoining areas or ignite as spot fires within the FMZ.

The Commissioner of the NSW Rural Fire Service has certified Bush Fire Prone Land within Great Lakes Council under *section 146* of the RF Act. Bush Fire Prone Land was identified using bushfire vegetation mapping categories[3]. This provides a basis for planners and fire

[3] Refer to Appendix V for Criteria for mapping bushfire prone land

manager's to identify areas where specific conditions apply to new developments and where hazard reduction activities are implemented to reduce the impact of bushfire on life and property.

Detailed site inspections capture hazard assessments and local environmental effects. Outcomes incorporate legislative requirements for fuel reduction and apply techniques with limited impact to local ecological values, yet simultaneously considering conservation and protection of life and property.

Recommendations for bushfire risk mitigation works are described within section 8.

SECTION 4

Hazard Reduction

Guidelines for hazard reduction

Hazard reduction works are carried out to protect dwellings, buildings or other assets susceptible to fire. This provides a safer environment for fire fighters to work around whilst protecting people and assets during a fire.

Hazard reduction reduces or removes fuel to minimise potential damage to life, property and the environment if a bushfire does occur.

Management of fuels

Graduated fuel management of hazards adjacent to developments is important to ensure provisions are in place to assist in reducing the risk and the threat of fire whilst still maintaining at least a degree of the visual and environmental amenity of the area. These zones are commonly referred to as fire management zones including asset protection zones, strategic fire management zones, land management zones and fire exclusion zones.

Asset Protection Zone (APZ) *is an area surrounding an asset where ground fuel (often including the shrub layer) has been reduced to minimise the ignition and spread of fire and provide a refuge area for fire fighters and landowners to fight a bushfire.*

Strategic Fire Management Zone (SFAZ) *is the area adjacent to the APZ or are strategically located within fire paths (where APZ's are not in place) to reduce the severity of fires and the impact on the community. These areas complement works within APZ or other SFAZ and provide protection for fire fighters, watering points, significant sites or essential services.*

Land Management Zone (LMZ) *is the area of conservation and heritage value.*

Fire Exclusion Zone (FEZ) *is the area where fire is excluded from the area as fire regime thresholds have been met.*

Each zone has specific management strategies that can be implemented to meet management objectives (Table 3). Council has adopted the fire management zones and strategies as defined within the BFRMP.

Table 3: Fire management zones.

Fire Management Zones[4]	Objectives	Type of works	Notes
Asset Protection Zone (APZ)	❑ Protect life and property ❑ Mitigate against ignition of fires ❑ Prevent the spread of fires ❑ Reduce intensity of fires ❑ Minimise impact to conservation values within the area	✓ reduce fuel levels by mechanical means ✓ reduce fuels by hazard reduction burning ✓ reduce fuels by grazing ✓ works authorised within approved Development Applications ✓ works certified by Environmental Impact Assessment/The Code	▪ maintain average overall fuel levels (OFL) at moderate whereby levels are 8t/ha or below in an outer protection area (OPA) ▪ maintain fuels 5t and below per hectare in the inner protection area (IPA) ▪ burn to reduce fine fuels by approximately 70-100%
Strategic Fire Advantage Zone (SFAZ)	❑ Protect life and property ❑ Mitigate against ignition of fires ❑ Prevent the spread of fires ❑ Reduce intensity of fires ❑ Minimise impact to conservation values within the area ❑ Enhance adjacent APZ works	✓ reduce fuel levels by mechanical means ✓ reduce fuels by hazard reduction burning ✓ reduce fuels by grazing ✓ maintain or construct fire advantages/fire trails ✓ works authorised within approved Development Applications ✓ works certified by Environmental Impact Assessment/The Code	▪ maintain average overall fuel levels at high and below. Burn to reduce fine fuels by approximately 50-80%
Land Management Zone (LMZ)	❑ Minimise impact to conservation values within the area	✓ reduce fuels by hazard reduction burning ✓ environmental assessment to be undertaken ✓ maintain existing fire advantages/fire trails ✓ construct fire advantages/fire trails ✓ works certified by Environmental Impact Assessment/The Code for ecological burning	▪ minimise works except for rehabilitation when required ▪ Burn to provide a mosaic pattern of burnt areas
Fire Exclusion Zone (FEZ)	❑ Minimise impact to conservation values within the area	✓ maintain existing fire advantages/fire trails ✓ construct fire advantages/fire trails ✓ works certified by Environmental Impact Assessment/The Code	▪ minimise works except for rehabilitation when required ▪ hazard reduction & biodiversity burning excluded

[4] These zones are equivalent to the those defined within the Lower Hunter Zone, BFMC Bush Fire Risk Management Plan, 2002

Identification and implementation of hazard reduction activities for existing buildings are guided by conditions within the RFS publication of the *Bush Fire Environmental Assessment Code for NSW in 2006 (BFEAC)*. The widths of APZ fuel reduced areas are calculated using predetermined widths appropriate for various slopes (Appendix IV). Vegetation types and the floristic structure affect the implementation of mechanical on ground works. Retaining hospices (clumps/groups of trees/shrubs) of existing plants is to minimise impact on conservation values and improve community protection from the fires.

*The Planning for Bush fire Protection, 2001 (PBFP) identifies s*pecifications for asset protection zones, perimeter roads and fire trails, access and their construction standards for new developments. Reference to this manual is important for planners, developers and the community to understand bushfire protection and preparedness in bushfire prone land (Appendix IV).

The *BFEAC and the PBFP* guide hazard reduction work requirements for existing buildings as well as future developments and subdivisions. The BFEAC or other environmental assessment may be required to undertake mechanical fuel reduction activities or to initiate low—moderate intensity hazard reduction burns.

Hazard reduction options include:

- Hand removal of shrubs;
- Tree removal;
- Clearing away fuels such as leaves, pruning's and clippings;
- Clearing out gutters;
- mechanical mowing, slashing, ploughing, trittering5; bulldozing;
- Reducing fuels by grading or; and
- Hazard reduction burning including pile burning (1.5m high piles) or prescribed burning of vegetation.

Encouraging a discontinuous vegetation layer ensures the environment is protected, when incorporating conservation of the remnant vegetation and reduction of elevated and ground fuels. Retaining a stand of vegetation is important as this can often act as a shield against strong winds, flying embers, and radiant heat on assets and provides protection on leeward side of these hospices.

[5] Trittering – mechanical mulching of the vegetation into smaller pieces

SECTION 5

Fire Preparedness and Community Education

Preparedness

The community is responsible for providing protection for themselves and their respective assets on their land from fire threat. By actively preparing property and homes against fires, possible fire ignitions and threats is a proactive approach to fire management.

Having a background to bushfire regulations, how to prepare for grass and bushfires, what to do when fire approaches, what actions to take and consider and equipment required to assist during a fire event is part of being prepared.

There are several actions that can be undertaken including:

Reduce possible ignition sources within properties.
Reduce risk of ignition of the building and objects.
Ensure designated access is clear for fire fighters.
Reduced ground/fine fuels within the area.

Statistic shows, that by properly preparing a home and implementing appropriate strategies before the fire event, extensive damage can be reduced or even prevented.

SECTION 6

Ecological Considerations

Introduction

The plan promotes the integration of the protection and enhancement of the environment to ensure continued provision of environmental services and biodiversity whilst concurrently protecting life, property and community assets. Legislative guidelines initiate and explicitly require specific responses to meet these principles.

Further to these basic conservation requirements, is the completion of an environmental assessment to identify potential impacts of any proposed works which may effect the environment.

The *National Strategy for the conservation of Australia's biodiversity, 1996* promotes an integrated approach to conserve biological diversity and to meet community objectives. Ecologically sustainable development (ESD) meets the needs of Australians today, while conserving our ecosystems for the benefit of future generations (Department of Environment and Heritage 1992).

Fire and biodiversity in the Australian landscape is known to play an important role in determining the health and integrity of vegetation communities and fauna. This relates to both inter fire intervals (over and under frequent fire) and fire severity. Consideration to fire regimes and the management of fire on the environment is important when implementing fire management practices within natural areas.

Biodiversity Thresholds

Fire is a natural phenomenon however some landscapes are more adapted to fire whilst others are generally intolerant of fires, such as rainforests. Those that burn less frequently are moist forests but fires are more common in coastal heath, drier forests and woodland areas (Native Vegetation Advisory Council 1999).

Fire frequency affects the survival of plants and animals and longevity of populations. Minimal fire frequency enables enhancement of the environment whereas, inappropriate fire frequency disrupts the existing processes and thus biodiversity. *"Clearing of vegetation; and high frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition"* are recognised as key threatening processes (TSC Act 1995).

Species loss is expected when frequency of fires goes beyond known biodiversity thresholds. Recurrent disturbance interrupts plant life cycle processes such as maturation, seed

production and development of fire resistant organs (Bradstock *et al* 1995). Also, too infrequent fire intervals promote species loss and reduced diversity to both plant and animal communities.

The fire history (intensity and regularity) of an area directly influences the future requirement for a particular fire regime. A mosaic of burns (age classes) within a localised area varies existing fuel loads and resultant fire intensity within each vegetation community. Interruptions to natural systems from unplanned fires in bushland areas adjacent to urban fringes, recreational areas and road easements affect planning decisions. Consideration of these effects when planning hazard reduction burning reduces the impact on biodiversity.

The management of ground fuels is directly related to the years since individual fire events. Field analysis to assess fuel loadings enables managers to identify predicted fire behaviour from field assessments (NPWS 2003b) and therefore appropriately manages against risks.

Appendix VII, is an example of the quantitatively analysis of fine fuel accumulation that has been projected for the Sydney Region (NPWS unpub.). The managers accept the use of these tables to guide fuel accumulation using the age since last fire parameter. These fine fuel load graphs (including litter, herbs & shrub layer) can be applied to forested areas within the Great Lakes LGA. The graph demonstrates that immediately after fire open forests have a marked increase in fuels to year 5, whereby after this period accumulation slows and exponentially increases to a point where decomposition and successive changes eventually has minimal variation from its standard range (15 years +). Within rainforest formations fuel accumulates rapidly in the first 2 years then remains static as decomposition maintains a balanced environment (Refer to Appendix XIII). Fire behaviour and intensity is affected by such factors as fuel accumulation and fuel loads.

Fire management objectives must ensure that there is, within an area, a mosaic pattern of burns with a range of age classes (time since fire) within each different vegetation community type (Bradstock *et al 1995*). This ensures seedlings mature and deposit viable seeds in the seed bank before the next fire.

Bradstock *et al 1995* defined fire regimes desirable to met conservation objectives and enhance species diversity. The related plant responses to fire frequency are seen below. A decline in population of plant species can be generally be expected in fire-tolerant communities (except rainforests, etc) when:

- ✓ *There are more than 2 consecutive fires less than 6-8 years apart (fire sensitive shrubs decline).*
- ✓ *Intervals between fires exceed 30 years (herbs and shrubs with short lived individuals and seed bank decline).*
- ✓ *3 or more consecutive fires occur at intervals of 15 – 30 years (sub-dominant herbs and shrubs decline).*

- ✓ *Occurrence of more than 2 consecutive fires which consume less than 8-10 tonnes/hectare of surface fuel (species with heat-simulated seed banks in the soil decline) (Bradstock et al 1995).*

Appendix VIII identifies the currently accepted biodiversity thresholds for all 65 vegetation communities within Great Lakes LGA, (as identified within the *Draft Great Lakes Vegetation Survey 2003) as* adopted from the DEC (Parks and Wildlife Division) (DEC 2005a; Bradstock *et al 1995*).This has been correlated with vegetation formation from Appendix IX and from of the Planning for Bushfire Protection, 2001 (Appendix 2 – Category 1, 2, or 3). Within this table specific minimum fire regime for SFAZ from within the Code has been collated.

The threatened species hazard reduction list within the Code (NSW RFS 2004g) are also referred to during the decision making process to identify the type of hazard reduction work that can be applied including hand removal, tree removal, slashing, trittering and burning.

Conservation Values

The Great Lakes area has demonstrated locally important and recognised significant ecological values, as described in documented reports and studies. On a local level the management of habitats and enhancement of conservation corridors, promotes diversity within the environment through appropriate fire management. The Great Lakes Council area has existing fauna corridors and predicted key habitat areas, which have been defined by the DEC (DEC 2005b).

The mechanism for national and state environment protection and biodiversity conservation is the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the TSC Act.

The TSC Act lists endangered populations (within Schedule 1, Part 2 of the TSC Act) and endangered ecological communities (within Schedule 1, Part 3 of the Act) in NSW. Two (2) endangered populations and eight (8) listed ecological communities potentially occur locally. This includes:

Endangered Koala, Hawks Nest and Tea Gardens population.
Endangered Emu population in the NSW North Coast Bioregion.
Lowland Rainforest on floodplain in the NSW North Coast Bioregion.
Littoral Rainforest in the NSW North Coast Bioregion.
Coastal Saltmarsh in the NSW North Coast Bioregion.
Swamp Oak Flood Plains in the NSW North Coast Bioregion.
Freshwater Wetland on Coastal Floodplains in the NSW North Coast Bioregion.
River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast Bioregion.
Sub-tropical Coastal Floodplain Forest of the NSW North Coast Bioregion.
Swamp Oak Floodplains of the NSW North Coast Bioregion and

Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast Bioregion (TSC Act 1995).

The NSW Scientific Committee determines those species considered to be endangered (Schedule 1, Part 1), presumed extinct (Part 4), vulnerable (Schedule 2) and also activities deemed to be key threatening processes (Schedule 3). Such determinations are listed within the TSC Act. Table 4 shows the conservation significance within Great Lakes.

Fire managers need to have regard to conservation guidelines and consider management of various species and the impact through hazard reduction work, wildfire and disturbances, as well as key management guidelines from threat abatement plans.

Table 4: Conservation significance within Great Lakes.

Conservation significance within Great Lakes LGA	Status – EPBC. Listed as Endangered (E) & Vulnerable (V)	Status – TSC. Listed as Endangered (E) &Vulnerable (V)	Total Number
State & Nationally Threatened flora species	3 (E) & 8 (V)	5 (E) & 10 (V)	15
State & Nationally Threatened fauna species (26 mammals, 2 reptiles, 7 frogs & 47 birds)	4 (E) & 7 (V)	12 (E) & 70 (V)	82
International migratory wader species (JAMBA[6], CAMBA[7], Bonn Convention[8])	35	-	35
International migratory waterbird species (JAMBA, CAMBA, Bonn Convention)	21	-	21
International migratory near-shore seabird species (JAMBA, CAMBA, Bonn Convention)	7	-	7
Rare or threatened Australian plants (ROTAP)	-	-	7
Flora species recorded in Great Lakes LGA	-	-	1,428
Fauna species recorded in Great Lakes LGA	-	-	499

The Draft Great Lakes Council Vegetation Strategy, Volume 1 and 2, 2004, details vegetation community descriptions and regional and local status as well as the significance and conservation values of vegetation communities. It also details the association with vegetation communities of threatened fauna and flora, International migratory species, and rare or threatened plants (ROTAP). Also from within this report the regional status of vegetation within Great Lakes has been determined (Refer to Appendix X).

[6] Japan-Australia Migratory Bird Agreement (JAMBA)
[7] China-Australia Migratory Bird Agreement (CAMBA)
[8] Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)

Environmental Considerations

During the preparation of the fire mitigation plan and the subsequent operational works, planners have gathered field data and reviewed available background information. By referring to the following checklist (which includes reports and various documents) planners can ensure the process considers the range of potential issues and that hazard reduction activities on Council land meet both legislative and policy objectives:

Checklist	**Reference Material Source**
✓ Planning for Bush Fire Protection, 2003	RFS
✓ Environmental Assessment Code for NSW, 2006 (the Code)	RFS
✓ Threatened Species/Threatened species hazard reduction list for the Code within each LGA	DEC/ RFS
✓ Geographic information system layers	GLC/ RFS
✓ Documentation on threatened and vulnerable species that have specific management consideration to fire or mechanical impacts	RFS/DEC
✓ Updated Atlas of the NSW Wildlife records/Local records	DEC/GLC
✓ Updated fire history records	RFS/DEC
✓ Species impact statements	GLC/DEC
✓ Environmental impact assessments or reviews of environmental factors	GLC/RFS
✓ Eight part tests that apply to the area	GLC
✓ Management plans for the area	GLC/DEC
✓ Strategic plans	GLC
✓ Detailed Local Environmental Studies	GLC/DEC
✓ Local Environmental Plans (LEP's)	GLC
✓ Updated changes to planning zones	GLC
✓ Development controls and conditions on private development	GLC
✓ Consideration to State Environmental Planning	Commonwealth & State Gov
✓ Changes relating to the *Native Vegetation Act, 2003*	DOP

PART 2

Draft Fire Mitigation Plan

~ Coomba ~

SECTION 7

Coomba and our Living Environment

Location

Within the study area, the main rural village is Coomba Park, situated on the edge of Wallis Lake, approximately 7.5 kilometres southwest of Forster. Access is along Coomba Park Road, 22 kilometres northwest of the intersection with the Lakes Way at Charlotte Bay. Coomba Park village areas cover 84.25 hectares for residential living.

In addition, the rural area including; Coomba Park, Shallow Bay; Whoota; Charlotte Bay and Wallingat covers approximately 5,099 hectares. Council managed land within the study area includes residential properties, road reserves, various reserves and parks for recreation and environmental protection (Table 5) which cover approximately 146 hectares. Within and surrounding Coomba Park the reserves consist of remnant vegetation, not cleared (or regenerating) (Figure 6) which provide habitat and conserve highly significant areas such as coastal swamps (adjacent to the lake) recorded by the State of Environmental Protection 14 (SEPP 14), or are considered EEC.

The coastal climate and the rural living setting attract residents and visitors to the local area. Wallis Lake is used for both recreational and commercial industries including fishing and oyster farming. The Lakes provides boat access to Forster-Tuncurry, and too the ocean through Cape Hawk Harbour.

Wallis Lake Region is also a well known tourist destination with increased population during the holiday seasons where the local natural attractions including, beaches, rivers, lakes and National Parks are frequented. Cabins, B&B Accommodation, Camping and Tourist Parks provide holiday or overnight stays.

Coomba Park is a large rural community, with locals being active in providing services, including being members of the Rural Fire Service, State Emergency Service, Aquatic Club, and the Coomba Park and District Progress Association. Wallis Lake is used regularly by residents and visitors for recreational purpose including swimming, boating enthusiasts and fisherman. This waterway enables access to other river and ocean areas via various boat ramps and jetties.

Coomba Park supports professional oyster farmers and fisherman who have leases and licences in Wallis Lake. Having such industries locally, and areas of high conservation values, the conservation of Wallis Lake catchments and the surrounding environment is important to ensure both natural systems and the Lakes system are enhanced to maintain integrity. The riparian and low lying forests adjacent to the foreshore adjacent to Wallis Lake are considered to have high habitat qualities, and retained provide the buffer between saline and

freshwater forest types which ensures a continuous cover and improved water quality. Much of the Wallingat River is surrounded by vegetation (on private land and in national park) and extends east to Wallis Lake, although fragmented provided disjunct corridors for local flora and fauna.

The area within 1-2km of Coomba Park is cleared (now maintained grasslands) link with the village. Throughout the areas, forest regeneration occurs due to changing management practices (formerly broad-scale clearing in some area) which in places link to bushland corridors with Wallingat National Park (WNP). The Parks and Wildlife Division of DEC manage WNP, which borders the western side of the study area.

Fires are a natural occurrence around Coomba Park and rural areas. Fire behaviour is greatly influenced by slope, aspect and fuel types. Understanding the effects of fire with forest types, arrangements and knowing the influence of these on fire behaviour is important when assessing fire hazards and risks when planning fire management strategies.

Table 5: Council managed land within the study area.

No	Property Name	Reserve No	Lot & DP	Size (Ha)	Recreation type
Coomba Park					
1	Tidal Pool	Tidal Pool	Lot 7007 DP 1075725	0.3463	Public Reserve
2	Coomba Park Foreshore	RES 1008 (CL R85529)	RES 1008 (CL R85529)	5.066	Crown Land Reserve
3	Coomba Aquatic Gardens	RES 5066	Lot 176 DP 222756	5.264	Community Land
4	Coomba Park Foreshore	RES 1008	Lot 11,12,312 DP 216499	1.464	Public Garden & Res Sp
5	Coomba Park Foreshore	RES 1008	Lot 11,12,312 DP 216499	0.2146	Public Garden & Res Sp
6	Coomba Park Foreshore	RES 1008	Lot 11,12,312 DP 216499	0.3516	Public Garden & Res Space
7	Public Recreation Space	RES 5105	Lot 19 DP 222757	0.663	Community Land
8	Public Recreation Space	RES 5109	Lot 13 DP 216499	0.894	Community Land
9	Public Reserve	RES 5067	Lot 261 DP 216499	0.1294	Public Reserve
10	Coomba Park Community Hall	RES 5016	Lot 13 DP 263471	1.521	Public Reserve
11	Lot 88 DP 222756	Lot 88 DP 222756	Lot 88 DP 222756	0.6479	Public Reserve
12	Public Reserve	Lot 129 Sec 2 DP 222755	Lot 129 DP 2222755	0.1157	Community Land
13	Lot 97 DP 222755	Lot 97 DP 222755	Lot 97 DP 222755	0.0523	Operational Land
14	Quarry	Lot 632 DP 785425	Lot 632 DP 785425	2.841	Operational Land
15	Public Reserve	Lot 54 DP 253666	Lot 54 DP 253666	4.434	Community Land
16	Reserve	RES 5063	Lot 55 DP 253666	0.2687	Community Land
17	Reserve	RES 5064	Lot 56 DP 253666	0.8663	Community Land
18	Coomba Park Recreation Reserve	RES 129 (CL R1003668) GLC Trusteeship	Lot 24 DP 753211	104.6	Public Recreation
19	Public Reserve	Lot 7 DP 813507	Lot 7 DP 813507	4.05	Community Land
20	Public Reserve	RES 5196	Lot 5 DP 600830	1.3578	Community Land
			SUB TOTAL	**135.1476**	
Whoota					
21	Reserve	Lot 2 DP 238509	Lot 2 DP 238509	1.7178	Public Reserve
22	Reserve	Lot 1 DP 245928	Lot 1 DP 245928	0.3037	Community Land
23	Reserve	Lot 21 DP 245522	Lot 21 DP 245522	0.4912	Community Land
			SUB TOTAL	**2.5127**	
Charlotte Bay					
24	Public Rec & Resting Place	RES 87194 (RES 82)	Lot 420 DP 753168	2.2871	Public Reserve
25	Wallis Creek Foreshore Reserve	RES 22 (R69391) GLC Trusteeship	Pt. CL R69391 GLC Trusteeship	3.1538	Crown Land Reserve
26	Wallis Creek Foreshore Reserve (Access & Wharf)	RES 22 (CL R69389) GLC Trusteeship	CL R69389 GLC Trusteeship	0.9168	Crown Land Reserve
27	Wallis Creek Foreshore Reserve	(CL R69391) GLC Trusteeship	RES 69391	0.2768	Crown Land Reserve
28	RES 84099 BFB	RES 84099	RES 84099 BFB	0.1457	BFB Purpose
29	SES R94358	RES 114	Lot 271 DP 7533168	0.8.36	SES Purpose
30	Public Reserve	RES 115 & Part Road Reserve	Lot 7123 DP 1020314 & road reserve	0.1184	Crown Land & Road Reserve
31	Reserve	Lot 24 DP 236679	Lot 24 DP 236679	0.5067	Community Land
			SUB TOTAL	**8.2089**	
32	Crown Land	Wallis Lake Foreshore & environs			
			TOTAL - COOMBA	**145.7692**	

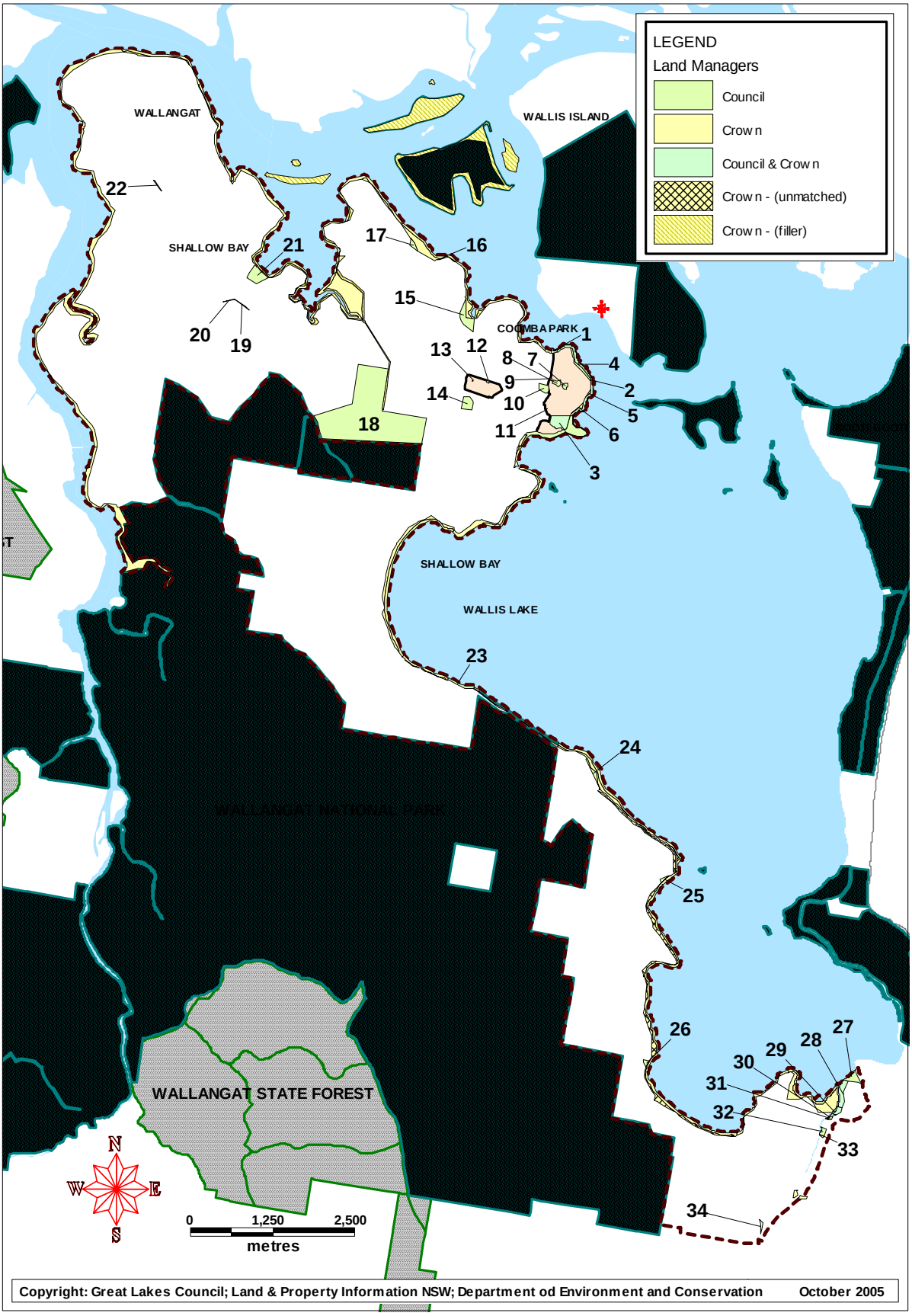


Figure 6: Location of Council managed land in the study area.

Road Access

Coomba Park is accessed from the Lakes Way via Coomba Park Road, south of Forster. Coomba Park Road meanders along or is nearby Wallis Lake Foreshore protecting the eastern part of the study area from fire spread. Charlotte Bay is adjacent to the Lakes Way where the village has access along a secondary side road, giving access to services and residences.

Within parts of Coomba Park the formed bitumen roadways (7-12 metre) are kerbed and guttered (K&G) and in other areas are edged with gravel. The roadways within Coomba Park are generally looped and provide two-way access throughout. Council and neighbouring property owners maintain the road verge, which provides additional fuel reduced areas and protected areas adjacent to residential properties.

Within the study area Whoota, Shallow Bay, Coomba Park and Wallingat are accessed from secondary or gravel roads from Coomba Park Road. The furthermost distance to Wallingat to the north and the central area of Coomba Park via the roadway (primary access) is 27 kilometre, 22 kilometres respectively from the Lakes Way.

The bituminised roadways including the Lakes Way enables support fire appliances to have good access from Forster, Pacific Palms, Green Point and Bungwahl Brigades. The Coomba Park Road allows good egress for fire fighting units, residents, and visitors for use during fires fighting or use as an escape route.

Development adjacent to the roadways within small—holdings often assists in strategic fuel reduction for fire management but also have vegetation remaining undisturbed on the property. Those properties partially cleared often support small remnant forested stands, or bushland area set-aside for regeneration.

Community Assets

The Great Lakes Local Environmental Plan 1996 (GLLEP) define zones within Coomba Park and Charlotte Bay as Village (Zone No. 2) and Coomba environs as; Wetlands and Littoral Rainforest (Zone No. 7(a)); Conservation (Zone No. 7(b)); Scenic Protection (Zone No. 7(c)); Small Holdings (Zone No. 1(d)); Rural (Zone No. 1a) and Forestry (Zone No. 1(f)). Council managed lands are located within a variety of these zones.

The Coomba area is predominantly land comprising of smallholdings, with residential properties within/adjacent to bushland areas that have often have been partially cleared. The study area (5,191 hectares) has approximately 1729 hectares of cleared land being 33% of the area, which is being used for agricultural purposes or maintained as open space. The large area of available grassland with dams as water sources supports locally established populations of eastern grey kangaroo and red necked wallabies.

Within Coomba Park neighbourhood facilities such as the Community Hall, RFS Fire Station, shop, Golf Club, Aquatic Club and amenities exist within the area. The community and Council promote the use of Coomba Park Foreshore Reserves, Coomba Park Aquatic Park and

the swimming enclosure. Residents and visitors can participate in various recreational activities including swimming, barbeques and picnicking adjacent to the reserves. The foreshore reserve and boat ramp provides boating and fishing enthusiasts, access to the waterways within Wallis Lake. These maintained areas also provide fire protection by reducing available fuels in an APZ and SFAZ.

The western area abuts WNP which parts were formerly Wallingat State Forest (SF) before becoming a national park to protect the conservation values in the area. "*Timber getting*" historically occurred within the local area, as well as harvesting by Forests (NSW). Wallingat State Forest in 1998 was recognised as aesthetically significant forest area for the visual backdrop, Wallingat Forest Drive and the Wallingat River Picnic area (Areas of aesthetic significant within forested areas in the NSW CRA Regions 1998). Recreational activities within WNP and the SF encourage visitors to the region to experience the remote forests and waterways including the Wallingat River.

Evidence of disturbances in Coomba Park from development and the extent of forest surrounding Coomba Park can be seen in Figure 7. Ongoing developments within Coomba have altered the former vegetation structure, now dissected and under-scrubbed within the rural area, creating a discontinuous forested landscape.

The existing cleared areas are predominantly associated with maintained properties, agricultural activities, and fire management or practices supporting hobby farmers. Maintained APZ's and SFAZ's within reserves and road reserves provide fire protection by reducing available fuels.

Current statistics show 255 residential properties with dwellings exist within Coomba Park village. These comprise a mixture of permanent residents and absentee owners. The Great Lakes Council, Supplementary State of the Environmental Report, 2002/2003 records the population distribution for Coomba Park and Coomba rural area being 329 and 243 respectively.

Coomba Park has a mixture of dwellings built to the Australian Building Standard AS 3959 since the approval of the subdivision in 1962. These have various fire regulations and development approvals in relation to fire management zones, building structure and protection in event of a fire.

Additionally Council approved buildings complied with the following Council bushfire protection policies and guides by the Department of Bush Fire Services before legislative changes took affect in 2003 to improve building in bushfire prone lands:

- Policy for Bush Fire Protection for Rural dwellings/subdivisions (1993),
- Policy for fire management for council controlled natural areas (1996), and
- The Department of Bush Fire Services, "Planning for Bush Fire Protection, A guide for land use planners, fire authorities, developers and home owners"(1991).

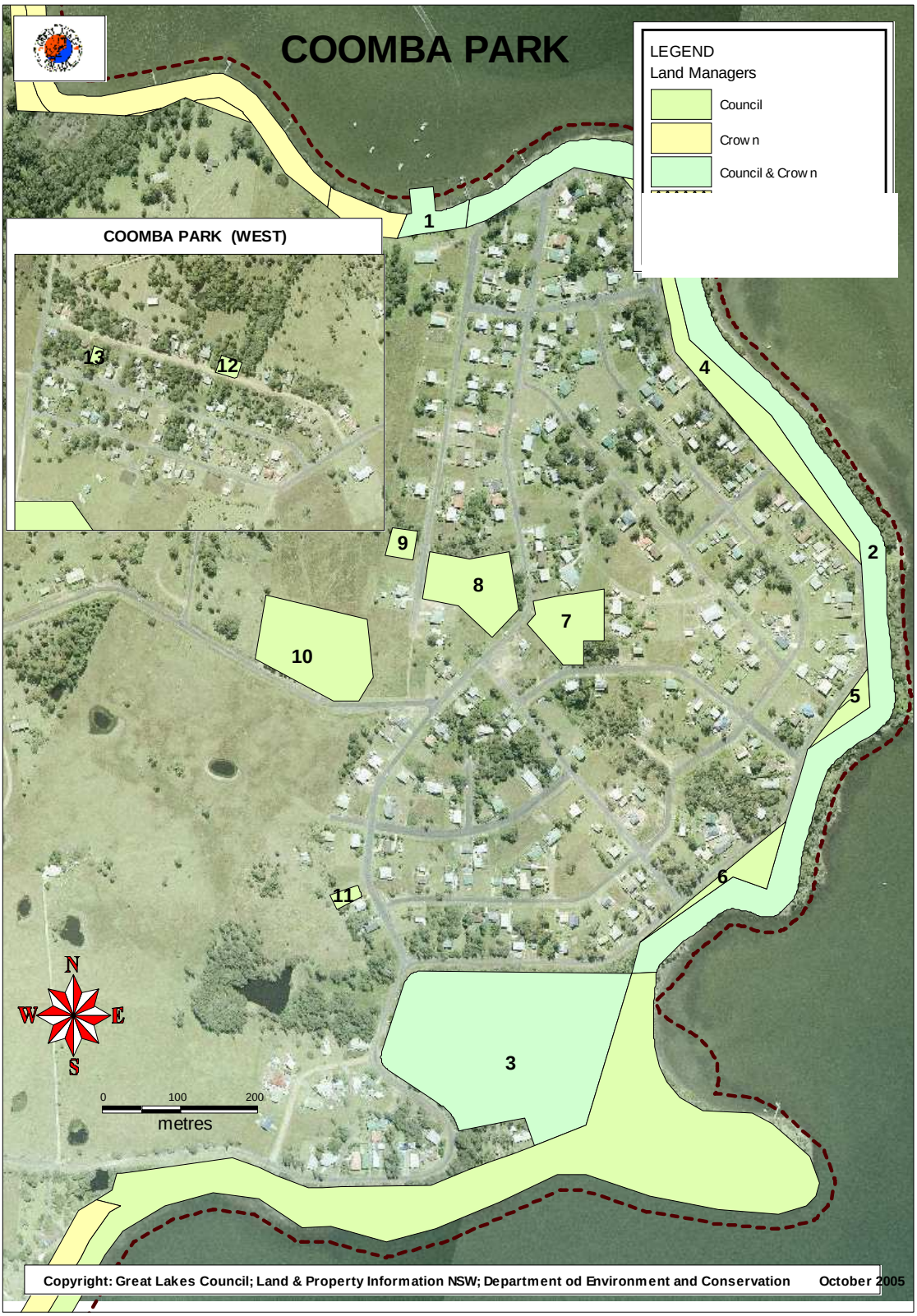


Figure 7: Development within Coomba Park.

Since the enforcement of the document "Planning for Bushfire Protection 2003", development within the area is required to meet legislative building standards that comply with both standard and non-bushfire standards (depending on the criteria of the fire assessment). Additionally, The Code provides guidelines for fire protection of existing buildings.

Public Utilities

Electricity infrastructure in the study area is maintained Country Energy who are responsible for domestic transmission lines along Coomba Park Road (and multiple lines networked across the area) in the Coomba Park area. Service lines are the main feeder line, which provides service to properties within the village and rural areas.

Reticulated water and sewage is not available within Coomba park and rural locations therefore sewage management is maintained by individual property owner's on-site systems. These systems require a license by Council and are to comply with operational monitoring processes. However within Charlotte Bay these services are available in some localities.

Telstra provides and maintains the communication network services through underground and overhead lines.

Service localities, maintenance points or junction boxes and underground electricity and telephone access points are identified by posts or marked on the ground within the vicinity of site, on roadways or easements.

Natural and Cultural Heritage

The study area is located entirely within the Wallis Lakes Catchment area (Wallis Lake Estuary Management Plan 2005) and is immediately adjacent to Wallis Lake. While the village area is relatively small, it forms part of the wider Catchment area. It therefore requires ongoing management to enhance and manage biodiversity and influences environmental values adjacent to the village and within the rural areas.

The 80 hectares of the village zones, which includes approximately 16 hectares of Council parks is surrounded by residential properties that have been cleared (predominantly within Coomba Park); few remain with vegetation communities that originally existed in the area. Some have regeneration of bushland areas which are significant for conservation values within the local area. Fire management in these areas must consider the existing environmental values.

Council parks, road reserves and residential properties link with surrounding vegetation and which includes Wallingat National Park (WNP). Within the study area the vegetation structure is predominantly dry sclerophyll forest with a grass or shrubby understorey and swamp sclerophyll forests. Some areas lack some of the sub dominant and ground cover layers as a consequence of human interaction (i.e. slashing). Limited smaller areas support estuarine

and saline wetlands on the foreshore, with wet sclerophyll forest integrating with the surrounding drier forests.

Former vegetation survey and mapping projects involved a review of aerial photograph interpretation and targeted traverse (ground-truthing). Vegetation communities were delineated on the basis of the height/ density and major floristics of the canopy as well as other structural descriptors and land use influences.

From these surveys and the vegetation community types described within the Draft Great Lakes Vegetation Strategy 2004, within the study area 27 natural vegetation communities were identified, along with 2 modified forms (urban & cleared). The communities are tabulated below, where the forest type are those described in the Research Note No 17 (Forest Commission of NSW 1989)and a map of the location of the vegetation communities is provided in Figure 8. The provided vegetation data is expected to have local variation as detailed ground—truthing would provide further floristic details, in addition to the existing mapped vegetation. This information is evolving and amended as ground truthing and survey work leads to maps being updated and enhanced.

Table 6: Vegetation Communities in the study area.

Community Type	Forest Type
Palm	7
Palm/Flooded Gum	7/48
Swamp Mahogany	30
Swamp Mahogany/Grey Gum	30/60
Swamp Mahogany/Paperbark	30/31
Paperbark	31
Paperbark/Swamp Oak	31/32
Paperbark/Blackbutt	31/37
Paperbark/Swamp Oak	31/32
Swamp Oak	32
Mangrove	33
Moist Blackbutt	36
Dry Blackbutt	37
Sydney Blue Gum	46
Tallowwood/Sydney Blue Gum	47
Flooded Gum	48
White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum	60
Grey Gum/Grey Ironbark/White Mahogany	62
Spotted Gum - Ironbark/Grey Gum	74
Forest Red Gum	92
Smoothbarked Apple	105
Heath	223
Salt Water Swamp	231salt
Swamp	231und
Sand Ridge	233
Mixed Woodland	W
Mixed Regrowth	R

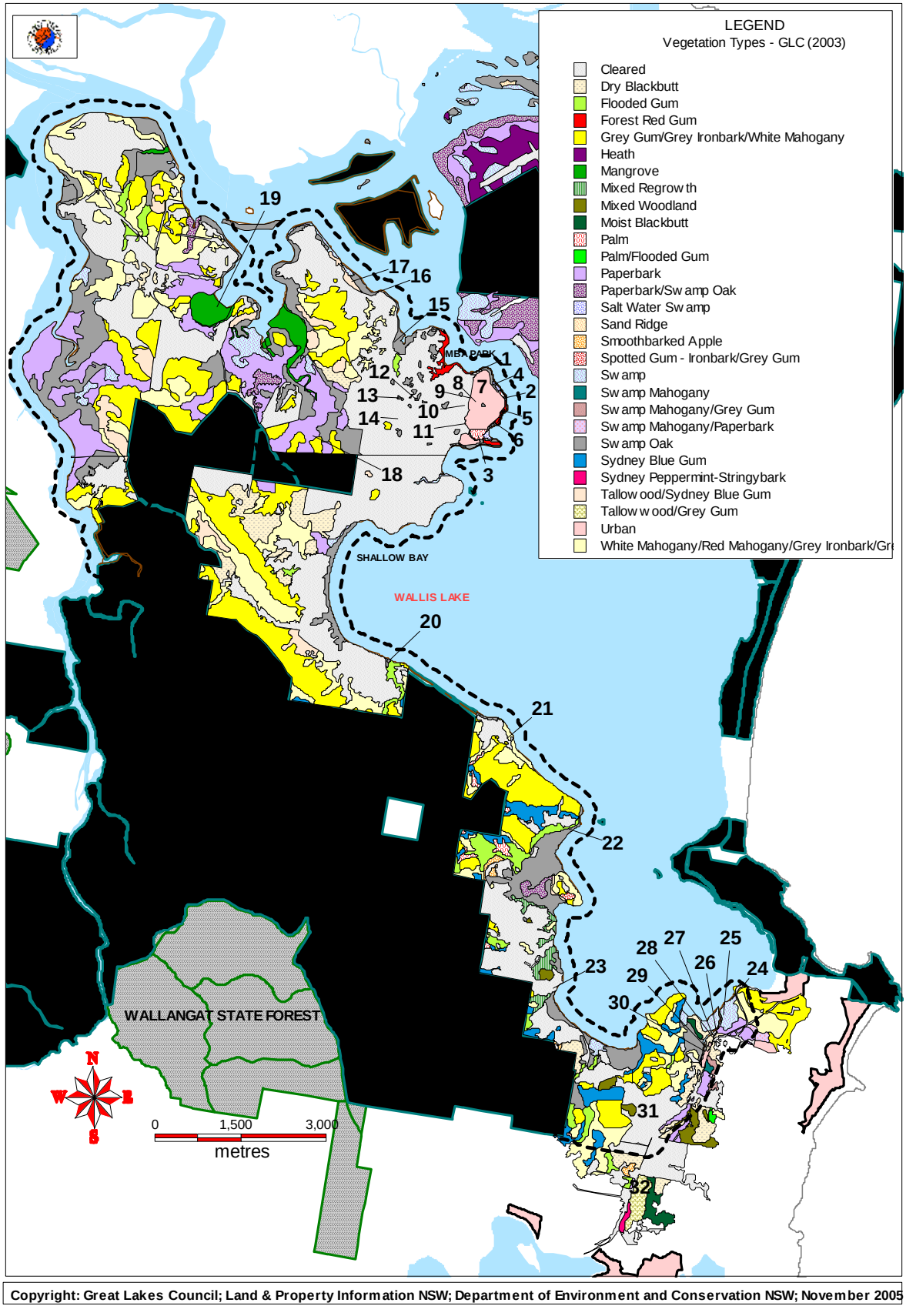


Figure 8: Vegetation within the study area.

The wider vegetation formations in which these vegetation communities are present include dry sclerophyll grassy woodland, dry sclerophyll scrub/grass forest, swamp sclerophyll forest, heathlands, wet sclerophyll forest, grasslands and rainforest within and adjacent to residential properties of Coomba Park and rural areas. Further, there are areas of wetlands including freshwater and saline communities, and which require the appropriate hazard reduction management practice to be implemented with respect of environmental sensitivities.

From this analysis, it is evident that several vegetation communities exist that are likely to be classified as Endangered Ecological Communities (Coastal Saltmarsh and Swamp Oak or Swamp Sclerophyll Forest on Coastal Floodplain) or listed on the TSC Act. These areas are of high conservation value and would legally require management practices to protect these areas. Other vegetation communities mapped in Coomba environs are also considered regionally rare, regionally vulnerable, severely depleted, a private land priority for conservation, and/or have a 100% conservation target within the Lower North Coast of NSW (refer to Appendix X).

The conservation values of Council natural areas within the study area provide an important buffer and contribute to habitat and environmental services in the local landscape. As such, proper recognition of the inherent values of such vegetation is considered essential in any fire management regime for Coomba. Coomba Park Recreation Reserve 129 is within the area defined as Key Habitat and Regional Corridor which extends into the adjacent conservation area of WNP (NPWS, 2005b).

The conservation value of the local landscape including the WNP and WSF is significant (WNP bounds the study area). These vegetated areas conserve and protect many environmental attributes and communities, including those considered to be endangered, severely depleted or inadequately conserved in the NSW North Coast.

By recognising local vegetation types and understanding the complexity of fire the enhancement and conservation of the environment can be achieved. These forest types have been grouped as vegetation formations (Figure 9) described by the RFS for fire management and are used to identify for the frequency and intensity of prescribed burning. These have led to the identification of fire regimes to meet biodiversity thresholds[9] for fire management planners within various vegetation formations (Figure 10).

[9] Refer to Table 15 or appendix VIII

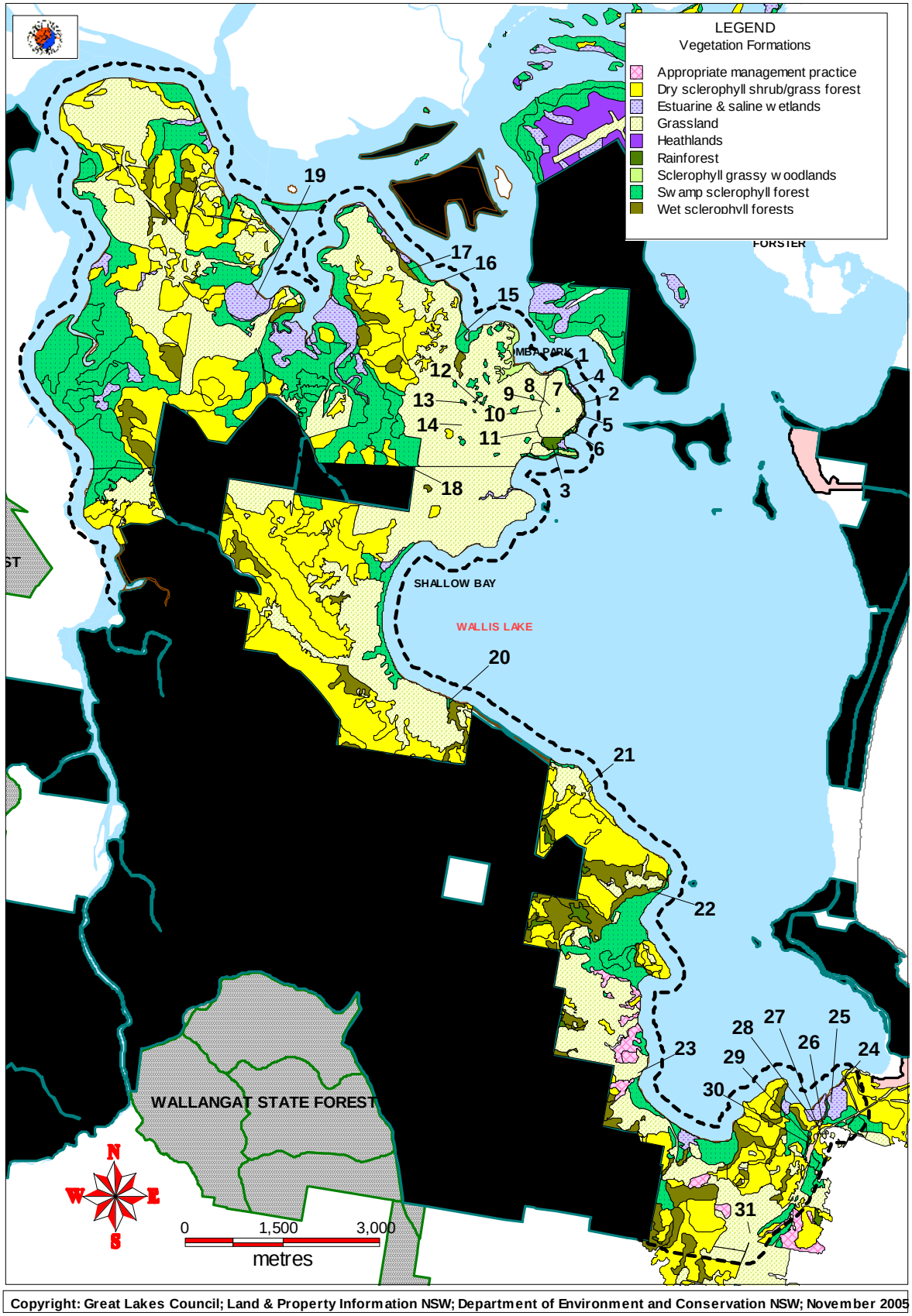


Figure 9: Vegetation formation for fire management

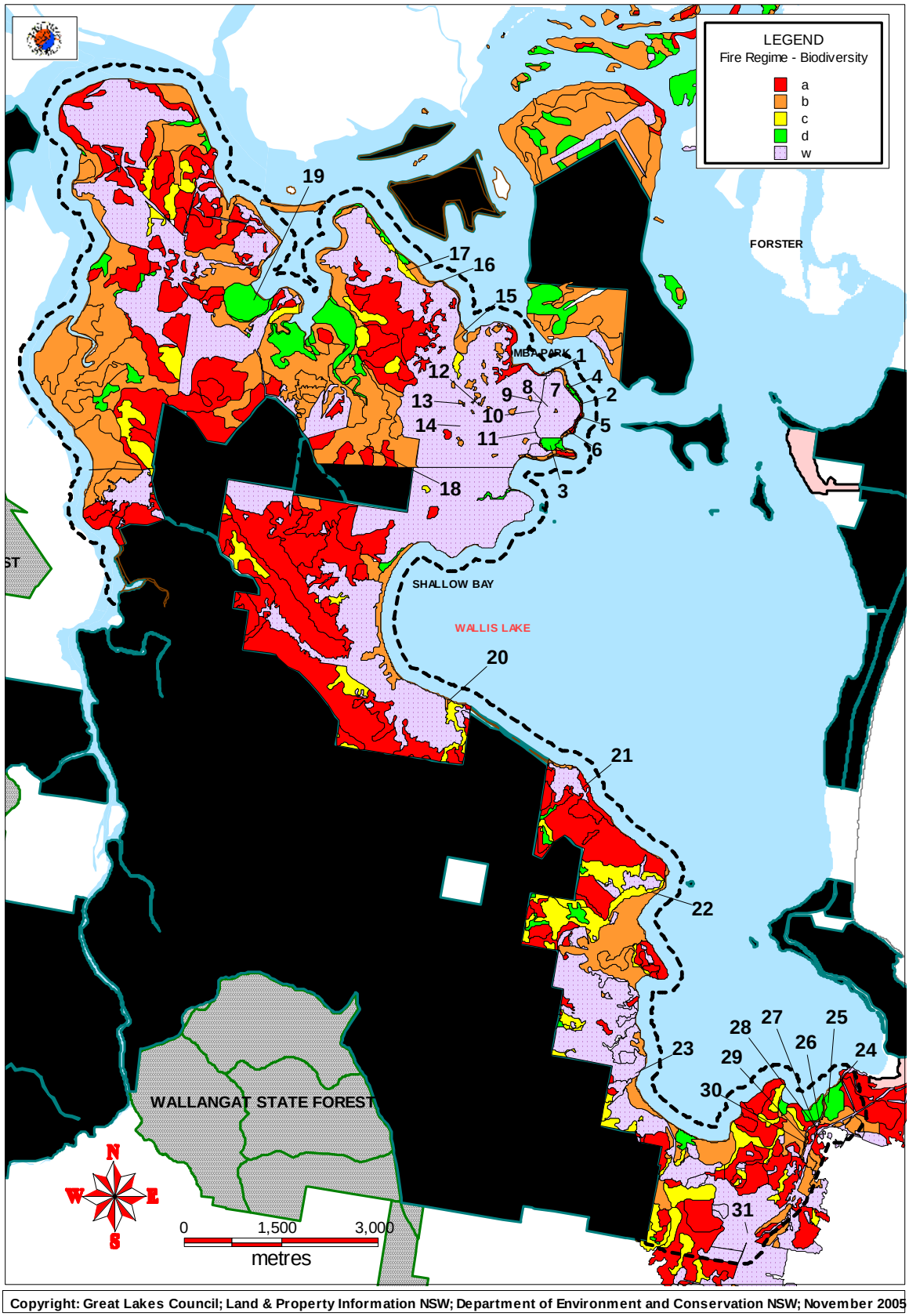


Figure 10: Biodiversity fire regimes applied to local vegetation

The biodiversity thresholds guide management decisions in reviewing the frequency of fires (for hazard reduction or for biodiversity) and assists to locate areas within natural vegetation that are drier and thus support fire more readily.

In addition Council liaised with the DEC (Parks and Wildlife Division) regarding information within the maintained Aboriginal Heritage Information Management System (AHIMS) search for Aboriginal Objects and Aboriginal Sites within the study area. The hazard reduction proposals identified within the plan meet guidelines by the DEC and have no impact on existing recorded sites in Council managed land.

Clause 21 of Great Lakes Local Environmental Plan, 1996 makes provision for significant 'Heritage items' and guides their enhancement and protection. Within Great Lakes, Schedule 2 does not list any heritage items as local, regional or of state significance within the study area.

Water Supply/Fire Fighting Water Supply/Aerial Access

Coomba Park and rural residents supply household water from privately installed rainwater tanks. Since the introduction of the more recent regulations, new residential properties are required to provide an additional specified fire fighting water tank and connections, which are available for fire appliance use during a fire event for protection of that dwelling. Coomba has various access points to the lake providing unlimited water supply for protection and suppression operations.

Charlotte Bay has reticulated water along the Lakes Way that extends to the Pacific Palms area. Fire hydrants provide water to fire fighters in the event of fire incidents.

There is a designated helicopter landing pad within Coomba Park along with one located within Smiths Lake, or by approval during emergencies within Booti Booti National Park (BBNP), the DEC works depot at the Ruins. Wallis Lake provides an unlimited supply of water during aerial operations.

Fire history

Fires are known have regularly occurred within Coomba study area during the past 16— years and being within 8 kilometres of the coast is often influenced by coastal weather. Planned prescribed burns and wild fires have burnt the forested and along coastal areas within DEC (Parks and Wildlife Division) and DPI (Forests) estate. Fires locally have occurred mostly in spring, when the relative humidity are lower in late winter and early spring, often without known cause or from suspected arson.

Wildfire have occurred in the vicinity of Coomba Park, Shallow Bay, Wallingat and Charlotte Bay during various bushfire seasons including; 1968–69, 1974–75, 1976–77, 1979–81, 1982–83, 1984–85, 1986–87, 1989–90, 1991–92, 1993–94, 1994–95, 1996–97, 1997–98 and 2000–2003 (DEC 2005b and NSW RFS 2005b).

During this 37 —year period, fires were recorded during 17 fire seasons. Wild fires have occurred in heathlands, dry sclerophyll scrub forest, swamps forest, rainforest, semi-mesic grassy forest types that occur on the higher elevations within the WNP and WSF and in coastal areas north and south of Charlotte Bay. Fire paths are consistent with following the northwest—southeast ridgelines within the State Forest, National Park and private property in the local area.

Within the local area the larger fires occurred in 1968-69, 1979-80, 1991-92 and 2002-2003. Much smaller fires have occurred in the area for which the local brigades have been in attendance; however detailed maps of their localities were unavailable.

Coastal fires occurred south of Charlotte Bay in 1980-83, 1984-87, 1988-89, 1990-91 and 1991-92. Coastal fires occurred during different fire seasons than those in the south, north of the village along the coastal area occurred in 1979-80, 1987-88, 1990-91, 1992-93, 1994-95, 2001-2002 and 2004-2005. The 1990-91 being a major fire season occurring in all areas.

Coomba Park has had wild fires burn within the village and adjacent rural area and nearby on Wallis Island. The Wallis Island fire burnt the majority of the island threatening properties and assets during extreme fire weather event but natural features contained the fire in the island. Coomba Park property owners also undertake agricultural burns or hazard reduction burns to reduce fuels or provide green pick which have known to have been within Coomba Park village and surrounding area.

The use of existing fire trails and fire advantage lines such as a constructed dozer lines, assist in fire operations.

The DEC (since 1999) and DPI (Forests) (former State Forests) implemented prescribed burns in compartments (in former State Forest area) and National Park areas as part of their active fire management in WSF and WNP. These were recorded in 1984-85, 1985-86, 1989-90, 1971-72, 1994-95, 1996-97 and 2002-2003(DEC 2005b and NSW RFS 2005b).

Rural properties outside the surrounding State Forest and National Park are known to undertake burning for land management purposes and hazard reduction through the non-bushfire season. These low or moderate intensity burns, do not threaten Coomba Park and the rural areas during optimum manageable weather conditions.

Fire Trails/Fire Advantages/Control Lines

Fire trails are designed to provide access for fire fighting personnel and fire fighting units during incidents or planned fire operations. The fire trail register managed by the RFS records registered fire trails across the State.

Various existing fire advantages along secondary roadways within the study area, which include the villages road system and Lakes Way assist in fire operations. Wallis Lake prevents fires approaching the village from the east, however in extreme fire events, spotting may occur east along the coast.

Council have no designated fire trails within the study area however unformed roadways, tracks may be used as fire advantages in the event of a fire.

The categories of fire trails are recorded as being of primary access for) fire appliance sizes (heavy, , medium and light and secondary access by light fire appliances (sometimes medium—heavy).

Fire advantage lines are also located within private property and the adjacent public lands and may be accessed by the small—medium size fire appliances or utilised as fire control lines during fire incidents.

Weather

The Australian Bureau of Meteorology (BOM) identifies climate zones by rainfall incidents and defines the Great Lakes LGA to be within a warm humid, mainly summer rainfall sub tropical zone. However, the area is at the boundary of the uniform rainfall and the mostly summer rainfall zones. Typically the local climate is warm—temperate, with generally warm to very warm summers and mild to cool winters.

Climatic data is available for four areas within or immediately adjacent to the LGA, at Forster, Coolongolook, Girvan State Forest and Nelson Bay (Bureau of Meteorology). Climatic details of these areas and historical relative humidly records (1961–1990) for Williamtown are documented in Appendix XI.

During the fire season the mean daily minimum temperature, on the coast is 13^{o}C in October and rises to a mean daily maximum of 27.5^{o}C in February. Monthly rainfall is highest in February and reducing from highest to lowest in January, December, March, November, April, and October respectively.

BOM records have shown that major fires in New South Wales such as the January 1994 experienced the worst conditions such as when a deep low-pressure systems occurring near Tasmania, brought strong, dry, westerly winds to the coast (BOM 2005b).

The BOM assist fire fighting authorities to predict fire weather and monitor bushfire weather during fire fighting operations. The local fire season is typically during the spring early summer, when the climate is hot with occasional strong winds from summertime cold fronts, which can lead to extreme fire danger periods. Lack of rain, low relative humilities and high winds contribute to increased fire danger (BOM 2005b). In most years, the summer rainfall in January brings the normal fire season to an end, although some drier years have extended beyond this period.

The drought indices (forest/grassland) are derived from the Keetch Byram Drought Indices (KBDI) and collectively with temperature, relative humility, wind speed, rainfall and duration identifies the fire danger rating.

The fire danger indices assist authorities to declare fire danger ratings (none, low, moderate, high, very high & extreme) and to work out fire behaviour in relation to predicted rates of spread that is affected by the soil dryness (KBDI). As the forest fire drought index (FFDI) increases so does the fire rating (RFS 2003c).

BOM provide fire weather warnings (bushfire alerts) during the bushfire danger period to the NSW RFS who broadcasts conditions and requirements, such as total fire bans and the issuing of fire permits for the lighting of fires.
The local coastal wind patterns distinctly change from the morning to the afternoon in which patterns are affected by coastal sea breezes.

Generally prevailing fire weather winds during winter and spring within Great Lakes LGA are predominantly from the south-west to north-west and shifting winds in summer from the west to north-west to the south-east to north- east in the afternoon's. Southerly changes up the coast also cause unpredictable fire weather conditions, which push strong hot winds preceding the cold front that often experiences moist cooler conditions.

Resources

The responsibility of identification and supply of adequate RFS resources within the rural fire district lies with the RFS. The Council in liaison with the RFS certify the existing number of resources and upgrades proposed by the RFS. Annual funding from the Council ensures the upkeep and improvement of vehicles and fleet vehicle.

In the event of an incident, other fire fighting authorities may be contacted by the RFS for assistance. Within the LGA there is a fleet of fire fighting appliances form 23 locations. The distances to Coomba Park from other brigade stations are shown in Figure 11.

Charlotte Bay is adjacent to a well-maintained secondary roadway being the Lakes Way. Similarly Coomba Park is 22 kilometres from the Lakes way long the secondary road; Coomba Bay Road. This allows efficient response time when neighbouring brigades are required

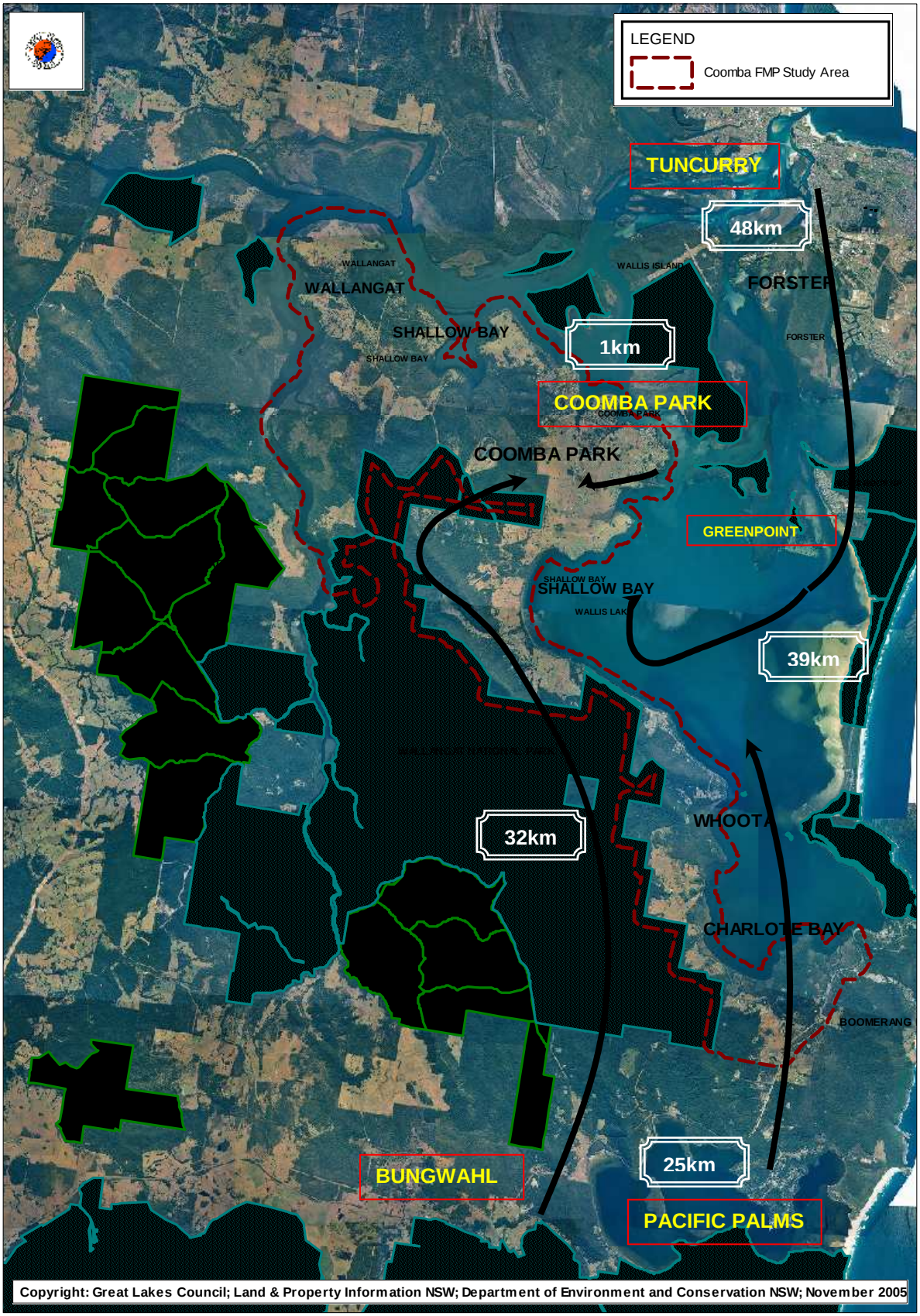


Figure 11: Distance to Coomba Park from other Rural Fire Brigade Station location.

Key Fire Issues for the Study Area

Throughout the preparation of the Plan fire issues have been highlighted, being both of a positive and negative nature. From this summary of fire issues, land managers can easily identify, both at a planning level and during operational fire management, issues to be considered.

Key Fire Issues
✓ A large number of assets occur within Coomba Park and Charlotte Bay Villages.
✓ The NSW Rural Fire Service rates Coomba Park and Whoota as having an extreme fire risk.
✓ Discontinuous vegetation and grasslands surround Coomba Park.
✓ In extreme fire weather conditions the fire path in forested areas is aligned with the northwest—southeast ridgeline.
✓ The lake provides a reliable water supply for fire fighting in the villages and rural area.
✓ Parks and reserves contain recreational facilities that need protection.
✓ Rural residential properties (small holdings) occur between Charlotte Bay and Wallingat used for agricultural purpose break up the forest areas.
✓ A proportion of private landholders have FMZ's, fire trails and fire advantages to assist in fire operations.
✓ Hazard reduction burning occurs in private property and within WNP and WSF.
✓ Landholders need to have properties prepared to protect their assets in the rural area and to assist fire fighters from Coomba Park or other brigades.
✓ Potential fire ignitions along roadsides or from lightning strikes during the spring and summer months within forest lands including WNP.
✓ The majority of Wallingat, Shallow bay, Coomba Bay, Whoota and Charlotte Bay are mapped as Bush Fire Prone Land and parts of Coomba Park.
✓ Bushfire Prone building standards apply to some structures that occur in the study area with on-site water supplies available (Mains water supply in Charlotte Bay).
✓ Dwellings upslope of Coomba Road with inconsistent standards of fire access to assets.

SECTION 8

Management Strategies

Management strategies for each asset protection zone, strategic fire management zone or land management zone outlined guide manager decisions. These have been mapped and identified within each reserve or managed land. To assist with understanding the code on the figures refer to identification (ID) seen within Table 7 which identifies the relationship with the figures. These figures 12-14, correspond with the zone objective and identified works for each fire management zone.

Table 7: Terminology used on figures.

ID	Description
LP	Life and property
A1	Asset Protection Zone reference number (preceded by locality code)
S1	Strategic Fire Management Zone reference number (preceded by locality code)
C1	Land Management Zone for conservation reference number (preceded by locality code)
E1	Fire exclusion Zone reference number (preceded by locality code)
Hs	Cultural heritage including Cultural Heritage and Aboriginal Heritage
Fl/ Fa	Threatened flora/ Threatened fauna
EEP/ ECC	Endangered populations/ Endangered ecological communities

Table 9-14 contains relevant fire objectives and hazard reduction works applied to a particular zone, which accordingly varies depending on the proposed management techniques. The overviews include zones to protect assets, are strategic or are for conservation, to meet management fire objectives, assist in the prevention of fires, and to reduce the risk of bushfire. Implementation and maintenance by Council is managed as part of the annual work program.

The key element to hazard reduction activities are those strategies identified by Council within Table 8. This correlates the life and property bush fire risks to each fire management zone, to show the relationship of management with each location. Each FMZ highlights the zone objective, specifying the protection of properties with appropriate maintenance types.

Table 8: Specific strategies applied to fire management zones.

1	Create and/or maintain APZ and SFAZ specifications on Council land for adjacent existing developments.
2	Create and/or maintain fire advantage lines to provide access for fire fighters
3	Promote to the community, education on importance of hazard reduction and Council proposed works.

Council has taken into consideration neighbouring fire management strategies adjacent to Council land. It is recognised that private landholders and other authorities have evolving management practices and fire strategies may alter from existing works in the future.

Therefore an annual review of fire management strategies both in the field and those referenced within other contemporary planning documents is important to ensure management is cohesive and evolutionary.

Asset protection zones

Using the criteria described within the Plan for determining APZ's, ten (10) APZ's have been identified within Council Land (reserves) and 21 within Council Road Reserves (Figure 11-13 and Table 9 & 11). Consideration to existing APZ's on private properties, enable Council fire management strategies meet fire protection requirements.

The responsibility for maintenance of the existing APZ's on private property within Coomba Park lie with private landholders (inner and outer fire protection areas when associated with new and existing dwellings). These zones have not been mapped but meet legislative requirements and are guided by other planning documents referred to earlier within this plan.

Strategic Fire Advantages

Twelve (12) individual SFAZ's (within an area of 2.3293ha) are recorded in reserve areas and road reserves within Council land (Figure 12-14 and Table 11-14). In addition 5 roadways are considered strategic in urban areas within Coomba Park and Charlotte Bay.

The overall fire mitigation plan objectives have led to the identification of specific objectives and strategies to be implemented. Standard strategy options that can be applied to individual SFAZ's are detailed in Table 11. Table 11 & 14 contain relevant objectives and the strategy(s) applied to a particular zone, which accordingly varies depending on the proposed management techniques. To meet management objectives, assist in the prevention of fires and to reduce the risk of bushfire, implementation and maintenance by Council is managed as part of annual work program.

Mechanical SFAZ within bushland areas including public reserve areas and road reserves assist in protecting assets, strengthening adjacent APZ or providing strategic areas able to be used during fire operations, refuge areas or locations to strategically backburn during fire incidents.

Council road reserves adjacent to managed major and minor roads use mechanical hazard reduction methods. This roadside slashing along the road verge to a distance of 2.5 metres either side in both urban and rural areas widens the existing fire break (being the bitumen or gravel roadways) and assists in mitigating the spread of fire to adjacent properties (Table 10).

Fire advantages are used during fire operations to limit the spread of bushfires or used as a control line. The line/area constitutes fuel reduced areas (limiting fire spread), whether natural (like rainforests; rivers; lakes; rocks) or man made (fire trails; road;

APZ's and SFAZ's). These are recorded as existing features available for use during fire incidents and are not necessarily maintained as fire trails or require specific maintenance regimes. Change is imminent and reference to these are intended as a guide only, as other management and planning decisions by managers may alter suitability in the future. Liaison with the responsible manager is required to confirm presence/absence of such a fire advantages for fire control lines. Consideration to fire fighter safety is imperative when working under or near power lines.

Land Management Zones

Thirty-two (32) LMZ's (Conservation Zones (C)) have been identified within Council Land ((Figure 12-14 and Table 13).). Council individually coded these zones and identified objectives within each zone, along with biodiversity thresholds (Table 14). The implementation of ecological based fire regimes of irregular mosaic burn patterns and minimal intervals between burns is important for managing larger zones containing species that require fire for enhancement of biodiversity of the area.

Regeneration of disturbed areas within reserves consistent with management of public reserves and recreation areas objectives is important when managing for fire and the conservation of areas.

Ecological Considerations

Within the study area there are communities that appear to satisfy the criteria for listing as endangered ecological communities (EEC). The TSC Act guides the conservation and enhancement of these areas. Fire management planning incorporates legislation and objectives of biodiversity enhancement in areas nearby or within communities such as these. In addition the Code (2006) has provisions for the protection of biodiversity including guidelines for burning in SFAZ and LMZ's by identifying fire regimes for each zone by incorporating past fire history with current management.

The Wallis Lake Foreshore area is within the riparian zone and requires protection when the fire regime has either been exceeded (within areas of high conservation values) or the vegetation type does not support burning for biodiversity (Table 14).

This includes areas where any occurrence of fire inhibits the ability of vegetation to fully recover to former complexity within vegetation types including estuarine and saline wetlands and rainforest. Areas classified as being SEPP 26 or SEPP 14 is significant and management of theses areas is important to ensure their continued enhancement to conservation values.

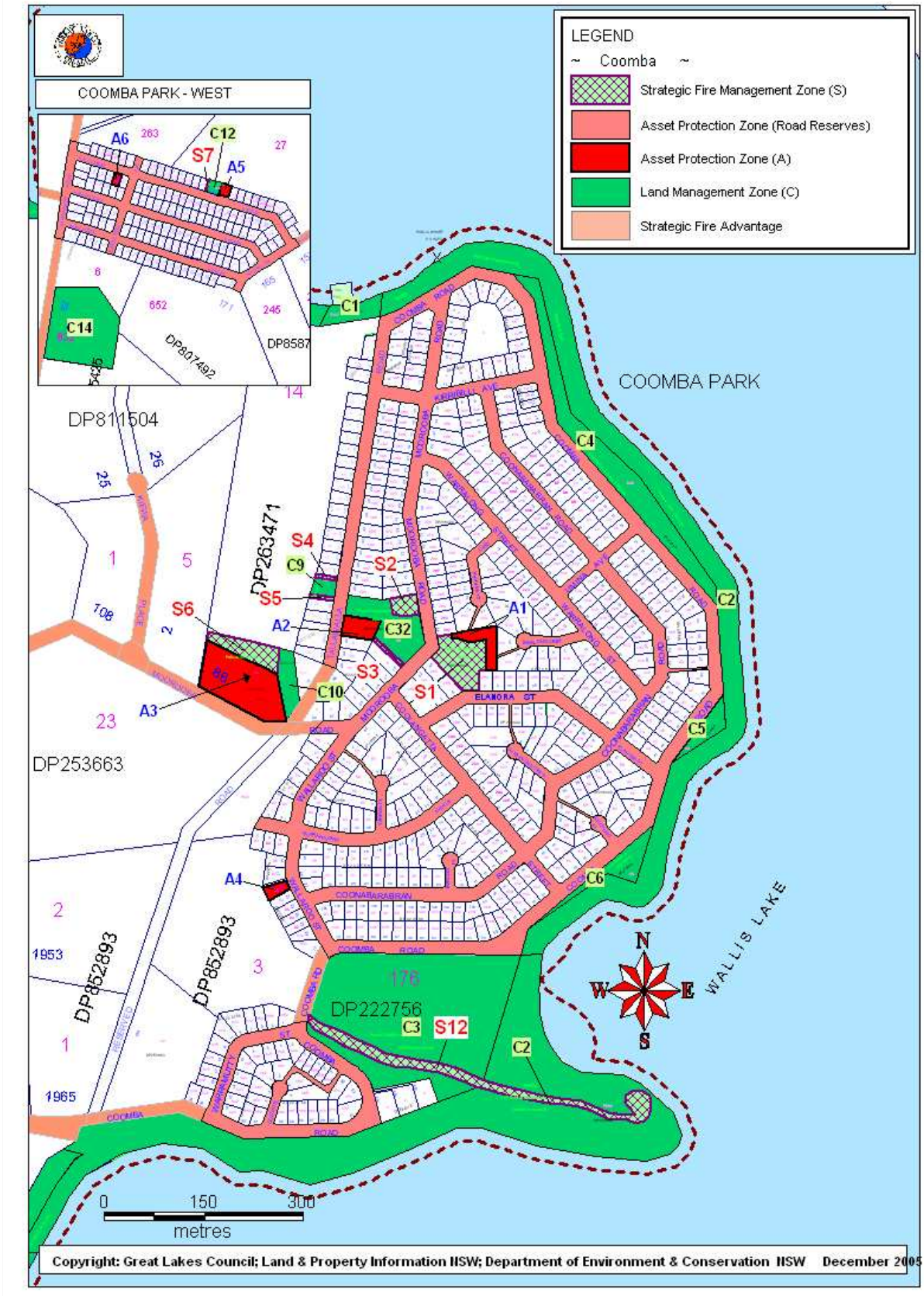


Figure 12: Fire management zones within Council managed land in Coomba Park.

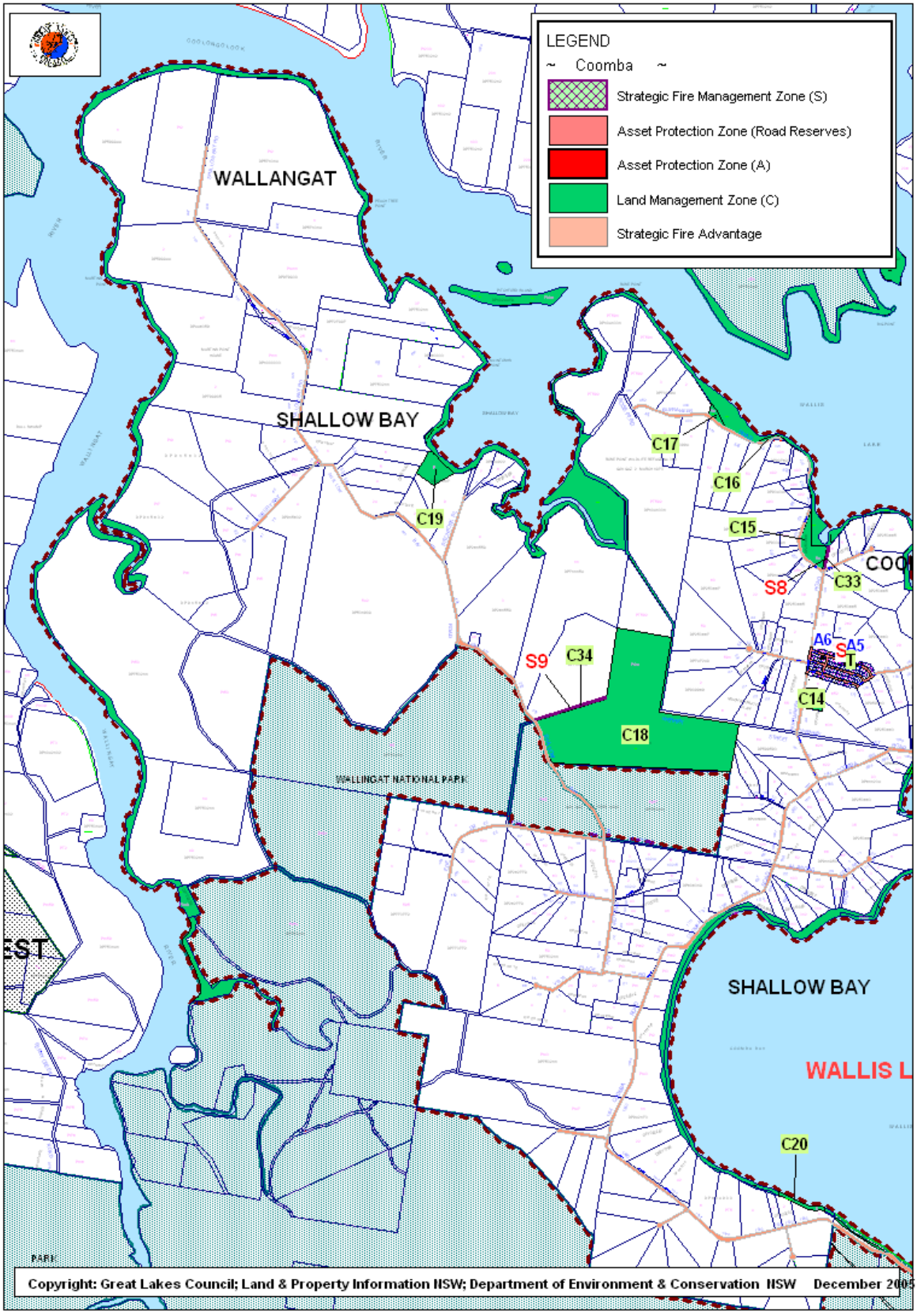


Figure 13: Fire management zones within Wallingat, Shallow Bay and Coomba Park.

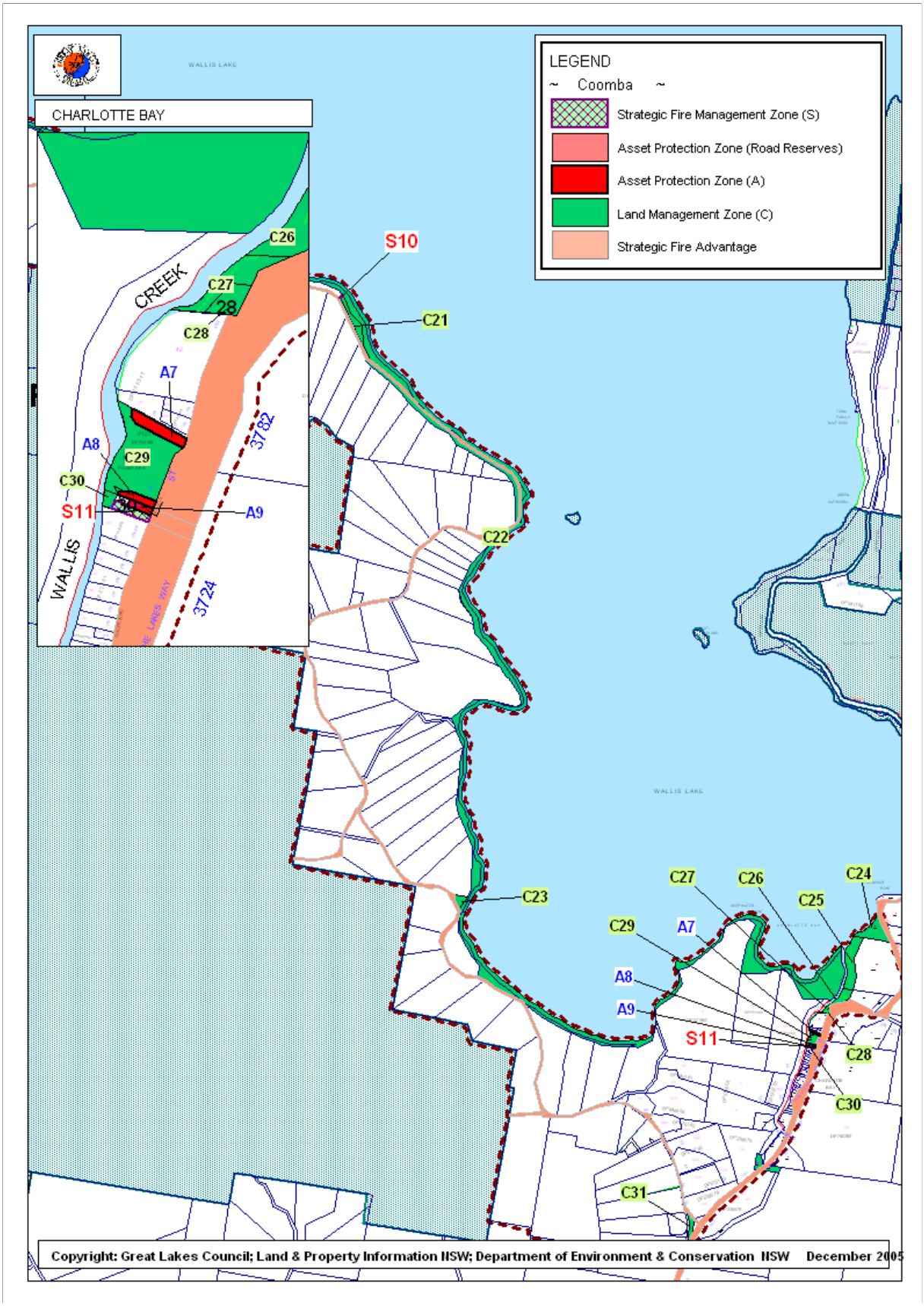


Figure 14: Fire management zones within Charlotte Bay.

Table 9: Specific fire objectives applied to asset protection zones.

Life & Property Code	APZ Code (CP)	Council Managed Land	Reserve	Zone Objective	Size (WxL) (m)	Area (HR) (ha)	Maintenance Type	Vegetation Community
LP1	A1	Public Recreation Space	RES 5105	• To protect the bushland interface north & east of 4 properties linking with the reserve.	17x171	0.1860	Mowing/ Hand removal	Cleared/ Spotted gum-Ironbark/Grey gum
LP2	A2	Public Recreation Space	RES 5109	• To protect the bushland interface west of 1 property linking with the reserve.	30x48	0.1575	Mowing/ Hand removal	Cleared
LP2	A3	Coomba Park Community Hall	RES 5016	• To protect the Community Hall assets and adjacent interface linking with the reserve.	71x146	0.9283	Mowing/ Hand removal	Cleared
LP2	A4	Operational Land	Lot 88 DP 222756	• To protect the bushland interface north of 1 property linking with the reserve.	20x36	0.0648	Mowing/ Hand removal	Cleared
LP3	A5	Public Reserve	Lot 129 Sec 2 DP 222755 & Road Reserve	• To protect the bushland interface west of 1 property linking with the reserve.	24x54	0.0677	Mowing/ Hand removal	Swamp oak/Cleared
LP3	A6	Operational Land	Lot 97 DP 222755	• To protect the bushland interface south of 1 property linking with the reserve.	18x30	0.0523	Mowing/ Hand removal	Swamp oak
LP11	A7	SES R94358	RES 114	• To protect the bushland interface south of the adjacent property and surrounding the SES sheds within the reserve.	14x80	0.1125	Mowing/ Hand removal	Cleared/ Dry blackbutt/ Swamp oak
LP11	A8	SES R94358	RES 114	• To protect the bushland interface adjacent to the SES storage shed and Pump Station within the reserve.	10x51	0.0449	Mowing/ Hand removal	Cleared/ Dry blackbutt/ Swamp oak
LP11	A9	Public Reserve	RES 115 & Part Road Reserve	• To protect the area surrounding the SES shed and Telstra exchange within the reserves.	10x33	0.0326	Slashing/ Hand removal	Swamp oak
LP1	A10	Coomba Aquatic Reserve	RES 5066	• To protect the bushland interface west of 1 property linking with the reserve.	20x38	0.0700	Mowing	Swamp oak
				Total	**669m (L)**	**1.7166**	**Hectares**	

Table 10: Specific fire objectives and strategies applied to asset protection zones within road reserves.

Life & Property Code	APZ Code (CP)	Council Managed Land	Zone Objective	Width (APZ)	Length (m)	Area (ha)	Maintenance Type	Existing Management
Asset Protection Zones within Road Reserves – Roadside slashing/road maintenance								
Coomba Park								
LP1 & 2	Rd-A1	Barrabrui Street	• To protect adjacent residential properties. • To assist in mitigating the spreading of bushfire throughout Coomba Park or into adjacent reserves. • To provide access and refuge areas through the village areas. • To protect or enhance adjacent APZ and/or SFAZ; LMZ; FEZ.	20	240	0.48	Mowing/ Slashing/ Road maintenance	Part Public-sealed Rd - edges mowed Part Public-unsealed Rd - edges mowed Part unformed
LP1 & 2	Rd-A2	Barcoo Place	• As above	15	54		As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A3	Binalong Crescent	• As above	15	104		As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A4	Burraneer Road	• As above	20	234	0.468	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A5	Burranjurra Avenue	• As above	20	332	0.664	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A6	Coomba Road	• As above	20	2181	4.362	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A7	Coonabarabran Road	• As above	20	1224	2.448	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A8	Dandanong Crescent	• As above	15	84		As above	Public-unsealed Rd - edges mowed
LP1 & 2	Rd-A9	Elanora Street	• As above	20	393	0.786	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A10	Gilgai Place	• As above	15	67		As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A11	Illawarra Crescent	• As above	15	126		As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A12	Kamarooka Street	• As above	20	484	0.968	As above	Public-sealed Rd - edges mowed

Life & Property Code	APZ Code (CP)	Council Managed Land	Zone Objective	Width (APZ)	Length (m)	Area (ha)	Maintenance Type	Existing Management
Asset Protection Zones within Road Reserves – Roadside slashing/road maintenance								
Coomba Park								
LP1 & 2	Rd-A13	Kirribilli Avenue	• As above.	20	236	0.472	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A14	Kooyong Place	• As above	15	44	0.088	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A15	Moorooba Road	• As above	20	898	1.796	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A16	Tallawalla Road	• As above	20	514	1.028	As above	Public-sealed Rd - edges mowed Part unformed
LP1 & 2	Rd-A17	Umina Avenue	• As above.	20	161	0.322	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A18	Wallaroo Street	• As above	20	352	0.704	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A19	Wangaree Street	• As above	20	428	0.856	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A20	Warralong Street	• As above	20	483	0.966	As above	Public-sealed Rd - edges mowed
LP1 & 2	Rd-A21	Warramutty Street	• As above	20	188	0.376	As above	Public-unsealed Rd - edges mowed
LP1 & 2	Rd-A22	Yallambee Street	• As above	20	552	1.104	As above	Public-unsealed Rd - edges mowed
LP1 & 2	Rd-A23	Yarran Place	• As above	15	85			Public-sealed Rd - edges mowed
Charlotte Bay								
LP11	Rd-A24	Charlotte Bay Street	• To protect adjacent residential properties. • To assist in mitigating the spreading of bushfire throughout Coomba Park or into adjacent reserves. • To provide access and refuge areas through the village areas. • To protect or enhance adjacent APZ and/or SFAZ; LMZ; FEZ.	20	749	1.498	Mowing/ Slashing/ Road maintenance	Public-sealed Rd - edges mowed

Table 11: Specific fire objectives applied to SFAZ's.

Life & Property Code	SFAZ Code (CP)	Council Managed Land	Reserve	Zone Objective	Size (WxL) (m)	Area (HR) (ha)	Maintenance Type	Vegetation Community
Coomba Park								
LP1	S1	Public Recreation Space	RES 5105	• To protect the bushland interface surrounding community facilities within the reserve.	70x60	0.4776	Mowing/ Slashing/ Hand removal	Cleared/ Spotted gum-Ironbark/Grey gum
LP2	S2	Public Recreation Space	RES 5109	• To protect the bushland interface south of the adjacent property linking with the reserve.	30x40	0.1146	Mowing/ Slashing/ Hand removal	Forest red gum/ Swamp oak/Cleared
LP2	S3	Public Recreation Space	RES 5109	• To protect the bushland interface north of the adjacent property linking with the reserve.	6x60	0.0386	Mowing/ Slashing/ Hand removal	Forest red gum/ Swamp oak/Cleared
LP2	S4	Public Reserve	RES 5067	• To protect the bushland interface south & east of the adjacent property linking with the reserve.	6x33	0.0197	Slashing/ Hand removal	Swamp oak
LP2	S5	Public Reserve	RES 5067	• To protect the bushland interface north & east of the adjacent property linking with the reserve.	6x36	0.0221	Slashing/ Hand removal	Swamp oak
LP2	S6	Coomba Park Community Hall	RES 5016	• To protect the bushland interface north of the community facilities within the reserve. • To assist in mitigating the spreading of bushfire through the reserve	20x11	0.2866	Mowing/ Slashing/ Hand removal	Cleared
LP3	S7	Public Reserve	Lot 129 Sec 2 DP 222755	• To protect the bushland interface east of the adjacent property linking with the reserve.	3x30	0.0009	Mowing/ Hand removal	Swamp oak
LP9	S10	Reserve	Lot 21 DP 245522	• To protect the bushland interface on the boundary east of the adjacent property linking with the reserve and foreshore reserves. • To assist in mitigating the spreading of bushfire into the reserves.	6x23	0.0169	Mowing/ Slashing	Cleared

Life & Property Code	SFAZ Code (CP)	Council Managed Land	Reserve	Zone Objective	Size (WxL) (m)	Area (HR) (ha)	Maintenance Type	Vegetation Community
LP11	S11	Public Reserve	RES 115 & Part Road Reserve	• To protect & enhance adjacent APZ. • To provide access and refuge areas • To assist in mitigating the spreading of to adjacent Service Station.	12x52	0.0558	Mowing/ Hand removal	Swamp oak
LP1	S12	Coomba Aquatic Gardens	RES 5066	• To provide access and refuge areas • To prevent the spread of bushfire north & south within the reserve. • To provide an advantage line to access the internal area of the reserve.	12x52	0.0558	Mowing/ Hand removal	Palm/ Swamp oak
				Total	**297m (L)**	**2.3293**	**Hectares**	

Table 12: Specific fire objectives and strategies applied to SFAZ's in road reserves.

Life & Property Code	SFAZ Code (CP)	Council Managed Land	Reserve	Zone Objective	Size (WxL) (m)	Area (HR) (ha)	Maintenance Type	Vegetation Community
Strategic Fire Advantage Zones within Road Reserves retained as bushland areas								
LP5	S8	Road Reserve Adjacent to Lot 54 DP 253666	Adjacent to Lot 54 DP 253666	• To protect the bushland interface on the boundary west of the adjacent property linking with the reserve.	6x192	0.1157	Slashing removal	Swamp oak/ Cleared
LP6 &7	S9	Road Reserve adjacent to Coomba Park Recreation Reserve	Adjacent to RES 129 (CL R1003668) GLC Trusteeship	• To protect the bushland interface on the boundary south of the golf course linking with the reserve. • To provide an advantage line to access the internal area of the reserve. • To assist in mitigating the spreading of bushfire south into the reserve.	6x640	0.3849	Slashing/ Hand removal	Paperbark/ Grey gum/Grey ironbark/White mahogany/ Swamp oak/ Mangrove
				Total	**832m (L)**	**0.5006**	**Hectares**	

Life & Property Code	SFAZ Code (CP)	Council Managed Land	Reserve	Zone Objective	Size (WxL) (m)	Area (HR) (ha)	Maintenance Type	Vegetation Community
Strategic Fire Advantage Zones within Road Reserves in urban areas – Roadside slashing and maintenance								
Coomba Park								
LP1&2	Rd-S1	Coomba Road		• To assist in mitigating the spreading of bushfire throughout. • To provide access and refuge areas. • To protect or enhance adjacent APZ and/or SFAZ; LMZ; FEZ.	15x1351	2.0265	Mowing/ Slashing/ Road maintenance	Public-sealed Road with slashed 2.5m road verge abutting adjacent forest area.
LP2	Rd-S2	Kiewa Place		• As above	15x275	0.4125	As above	As above
LP1&2	Rd-S3	Moorooba Road		• As above	15x814	1.221	As above	As above
Charlotte Bay								
LP11	Rd-S4	The Lakes Way		• As above	15x1412	2.118	As above	As above
LP11	Rd-S5	Kookie Avenue		• As above	15x1390	2.085	As above	Public-unsealed Road with slashed 2.5m road verge abutting adjacent forest area.

Table 13: Specific fire objectives applied to Council land management zones.

Life & Property Code	LMZ Code (CP)	Council Managed Land	Reserve	Zone Objective	Vegetation Community
LP1	C1	Tidal Pool	Tidal Pool	• To protect the environmental values within the reserve and maintain biodiversity thresholds. • To protect cultural heritage values within the reserve. • Suppress bushfires. • Implement hazard reduction burns to maintain biodiversity. • Implement Catchment management objectives adjacent to enhance Wallis Lakes. • Protect riparian areas from inappropriate burning regimes. • Conserve and protect the integrity of areas with high conservation values or areas with highest regional priority status for conservation targets. • Regenerate disturbed area.	Cleared/ Forest red gum
LP1	C2	Coomba Park Foreshore	RES 1008 (CL R85529)	• As above.	Salt water swamp/ Swamp oak/ Palm
LP1	C3	Coomba Aquatic Gardens	RES 5066	• As above.	Palm
LP1	C4	Coomba Park Foreshore	RES 1008	• As above.	Salt water swamp/ Swamp oak
LP1	C5	Coomba Park Foreshore	RES 1008	• As above.	Forest red gum
LP1	C6	Coomba Park Foreshore	RES 1008	• As above.	Forest red gum/Swamp oak
LP1	C7	Public Recreation Space	RES 5105	• To protect the environmental values within the reserve and maintain biodiversity thresholds. • To protect cultural heritage values within the reserve. • Suppress bushfires. • Implement hazard reduction burns to maintain biodiversity. • Protect riparian areas from inappropriate burning regimes. • Conserve and protect the integrity of areas with high conservation values or areas with highest regional priority status for conservation targets. • Regenerate disturbed area.	Cleared/ Spotted gum-Ironbark/Grey gum
LP2	C8	Public Recreation Space	RES 5109	• As above.	Forest red gum/ Swamp oak
LP2	C9	Public Reserve	RES 5067	• As above.	Swamp oak
LP2	C10	Coomba Park Community Hall	RES 5016	• As above.	Cleared

Life & Property Code	LMZ Code (CP)	Council Managed Land	Reserve	Zone Objective	Vegetation Community
LP2	C11	Lot 88 DP 222756	Lot 88 DP 222756	• As above.	Cleared
LP3	C12	Public Reserve	Lot 129 Sec 2 DP 222755	• As above.	Swamp oak
LP3	C13	Lot 97 DP 222755	Lot 97 DP 222755	• As above.	Swamp oak
LP4	C14	Quarry	Lot 632 DP 785425	• As above.	Cleared
LP5	C15	Public Reserve	Public Reserve	• To protect the environmental values within the reserve and maintain biodiversity thresholds. • To protect cultural heritage values within the reserve. • Suppress bushfires. • Conserve and protect the integrity of the adjacent Crown land. • Implement hazard reduction burns to maintain biodiversity. • Implement Catchment management objectives adjacent to enhance Wallis Lakes. • Protect riparian areas from inappropriate burning regimes. • Conserve and protect the integrity of areas with high conservation values or areas with highest regional priority status for conservation targets. • Regenerate disturbed area.	Swamp oak/ Cleared
LP5	C16	Lot 55 DP 253666	RES 5063	• As above.	Cleared/ Swamp oak
LP5	C17	Reserve	RES 5064	• As above.	Tallowwood/Sydney blue gum
LP6 &7	C18	Coomba Park Recreation Reserve	RES 129 (CL R1003668) GLC Trusteeship	• To protect the environmental values within the reserve and maintain biodiversity thresholds. • To protect cultural heritage values within the reserve. • Suppress bushfires. • Implement hazard reduction burns to maintain biodiversity. • Conserve and protect the integrity of the adjacent WNP. • Protect riparian areas from inappropriate burning regimes. • Conserve and protect the integrity of areas with high conservation values or areas with highest regional priority status for conservation targets.	Paperbark/ Grey gum/Grey ironbark/White mahogany/ Swamp oak/ Mangrove

Life & Property Code	LMZ Code (CP)	Council Managed Land	Reserve	Zone Objective	Vegetation Community
LP7	C19	Public Reserve	Lot 7 DP 813507	• To protect the environmental values within the reserve and maintain biodiversity thresholds. • To protect cultural heritage values within the reserve. • Suppress bushfires. • Conserve and protect the integrity of the adjacent Crown land. • Implement hazard reduction burns to maintain biodiversity. • Implement Catchment management objectives adjacent to enhance Wallis Lakes. • Protect riparian areas from inappropriate burning regimes. • Conserve and protect the integrity of areas with high conservation values or areas with highest regional priority status for conservation targets. • Regenerate disturbed area.	Mangrove
LP8	C20	Public Reserve	RES 5196	• As above.	Grey gum/Grey ironbark/White mahogany/ Swamp oak/ Flooded gum
LP9	C21	Reserve	Lot 2 DP 238509	• As above.	Cleared/ White mahogany/Red mahogany/Grey ironbark/Grey gum
LP9	C22	Reserve	Lot 1 DP 245928	• As above.	Swamp oak/ Flooded gum
LP9	C23	Reserve	Lot 21 DP 245522	• As above.	Cleared
LP11	C24	Public Rec & Resting Place	RES 87194 (RES 82)	• As above.	White mahogany/Red mahogany/Grey ironbark/Grey gum/ Salt water swamp
LP11	C25	Wallis Creek Foreshore Reserve	RES 22 (R69391) GLC Trusteeship	• As above.	White mahogany/Red mahogany/Grey ironbark/Grey gum/ Paperbark/ Swamp oak
LP11	C26	Wallis Creek Foreshore Reserve (Access & Wharf)	RES 22 (CL R69389) GLC Trusteeship	• As above.	Cleared/ Paperbark/ Swamp oak
LP11	C27	Wallis Creek Foreshore Reserve	(CL R69391) GLC Trusteeship	• As above.	Cleared/ Dry blackbutt
LP11	C28	RES 84099 BFB	RES 84099	• As above.	Cleared/ Dry blackbutt

Life & Property Code	LMZ Code (CP)	Council Managed Land	Reserve	Zone Objective	Vegetation Community
LP11	C29	SES R94358	RES 114	• As above.	Cleared/ Dry blackbutt/ Swamp oak
LP11	C30	Public Reserve	RES 115 & Part Road Reserve	• As above.	Swamp oak
LP10	C31	Reserve	Lot 24 DP 236679	• To protect the environmental values within the reserve and maintain biodiversity thresholds. • To protect cultural heritage values within the reserve. • Suppress bushfires. • Implement hazard reduction burns to maintain biodiversity.	Cleared/ Dry blackbutt
Various	C32	Coomba Foreshore Reserve and adjacent Crown Land	Crown Land	• To protect the environmental values within the reserve and maintain biodiversity thresholds. • To protect cultural heritage values within the reserve. • Suppress bushfires. • Implement hazard reduction burns to maintain biodiversity.	Various

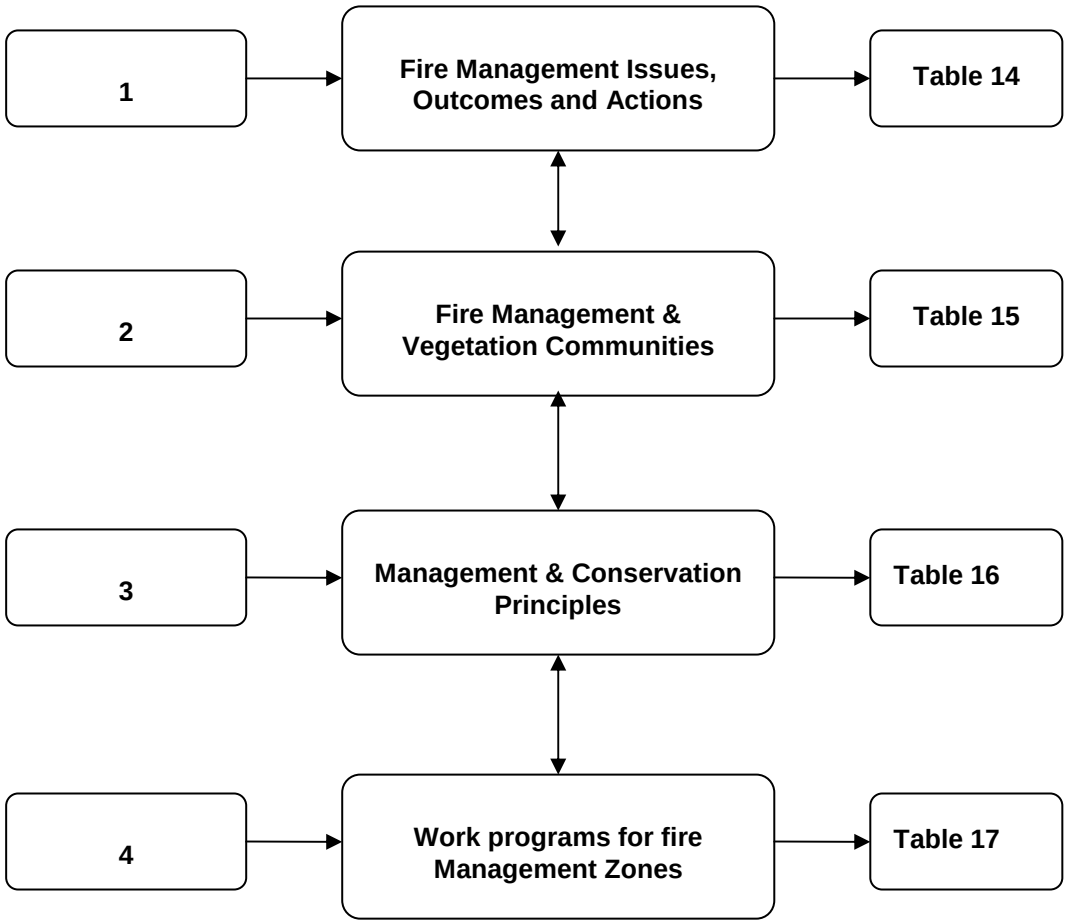
SECTION 9

Summary

Fire Mitigation

The plan has reviewed and provided strategic guidelines for planners to implement. The fire management outcomes reflect Council management requirements through the identification of specified on-ground works (discussed previously through various sections within the plan).

The key fire issues listed through the plan reiterate the direction of Councils fire management planning and the necessity to implement work program to mitigate against the bushfire risk. The chart below identifies the steps taken during the preparation of the plan and links the following tables presented in the concluding section of the plan.



1 .Fire Management issues are the identified key fire issues distributed in the plan. In response Councils provides resultant actions to the respective outcomes. These have been identified from collating and collaborating with on-ground assessment fire management legislation, polices and guidelines.

2. The biodiversity thresholds and fire regimes to be applied to vegetation within the Coomba study area have been summarised within this table. The associated vegetation formation (as described by the RFS) for burning in SFAZ guides managers in the frequency for hazard reduction and ecological burning.

3. The implementation of fire mitigation activities by Council ensures guidelines within the plan are met. The table particularly identified guidelines for conservation principles, the implementation and monitoring of fire management zones. Ongoing programs that link with other management objectives ensure targeted outcomes are adhered too.

4. Specified work programs within APZ and SFAZ's within the study area, has operational emphasis particularly guiding work schedules.

These tables should be referred to for detailed management of each fire management zone. The on ground management of APZ's and SFAZ's can be implemented by a variety of methods including;

Council parks maintenance (primarily slashing)
Council open space maintenance (primarily mowing)
Council road maintenance
Council drainage reserve maintenance

The management of areas, described by width and length gives an indicative size; at times the areas are variable for the total length hence the minor discrepancies. Reference to the map size and shape overcomes any issues.

Monitoring of fire hazards will guide slashing and mowing regimes within fire management zones which will be in accordance with this Plan guidelines and using reference material such as the *Overall Fuel Hazard Guide Sydney Basin* (NPWS 2003) to assess fuel loads within Council Land. Slashing too frequent in bushland areas encourages introduced grasses and weeds to invade and in the long-term, changes vegetation structure (as grasses become more abundant with increased slashing frequency) s.

Disturbances in natural areas often encourage the invasion of weeds. These weeds are classified as being noxious or an environmental weed. Management of pest plants within these areas is guided by legislation to suppress, control or eradicate these species. The

approved methods of application of registered herbicides on weed species are detailed within the NSW Agricultural, *'Noxious Environmental weed control handbook 2004–2005'.* Managers are able to integrate manual weed control, herbicide control and to specify weed management practices with fire mitigation works to ensure minimal impact of pest plant introductions to manage fire management zones.

Management Issues

Through the preparation of this plan key fire issues have been identified with subsequent outcomes required to mitigate these issues (see below). The plan outcomes reflect management requirements by undertaking on ground works to specified requirements as discussed through various sections within the plan. The actions identified below guide Councils fire management guidelines.

Table 14: Fire management issues and Council actions.

Key fire issues	Outcomes	Actions
❑ A large number of assets occur within Coomba Park often with absentee owners.	✓ Promotion of fuel management to owners is important to promote mechanical works within Coomba Park and environs.	✓ Request assistance for RFS to undertake community education.
❑ Coomba Park and Whoota is surrounded by contiguous vegetation, rated as an extreme fire risk by the RFS.	✓ In the event of a fire Coomba potentially could be surrounded on three sides.	✓ Provide fire management zones to reduce fuels.
❑ In extreme fire weather conditions the fire path is aligned with the ridgeline.	✓ Potential threat from spotting across the ridge encourages land managers to reduce risks.	✓ Ensure asset protection zones are maintained to reduce impact from radiant heat.
❑ Parks and reserves contain recreational facilities that need protection.	✓ Assets require protection from fire threat.	✓ Reduce ground fuels within reserves.
❑ Adjacent landholders that have asset protection zones, strategic fire advantage zones, fire trails or fire advantages assist in fire operations.	✓ Maintenance of these areas is important to ensure continued fire mitigation works to reduce fire effects to the community.	✓ Monitor fire fuel loads through work programs.
❑ Wild fires and hazard reduction burning occurs in Wallingat National Park and Wallingat State Forest.	✓ Fires reduce the bush fire risk to Coomba Park and environs. ✓ Maintain biodiversity and protect sensitive areas such as riparian areas.	✓ Review hazard reduction techniques on Council Land and implement burning in strategic fire management zones works when required to complement adjacent activities.
❑ There is a need for landholders to be prepared as additional fire fighting resources are sought from	✓ Landholders to implement hazard reduction programs and prepare fire protection plans.	✓ Promote to the community the importance of preparation for fires.

Key fire issues	Outcomes	Actions
outside Coomba Park		
❑ Area is serviced by fire fighting vehicles from nearby towns and locations	✓ Resources are available to protect Coomba Park and environs are adequate.	✓ Continued liaison with RFS to ensure operational resources are adequate.
❑ Potential fire ignitions from: • adjacent to Coomba Road, The Lakes Way and minor roadways • lightning strikes during the spring and summer months.	✓ Heightened awareness and diligence to fire preparedness knowing the increased threat in these periods.	✓ Education of the community to assist in the preparation of homes in bushfire areas.
❑ The majority of the study area is mapped as Bush Fire Prone Land.	✓ Development consents for building specifications are affected by fire provisions in this area. ✓ Provide APZ & SFAZ adjacent to assets as per the guidelines within the Code. ✓ Implement fuel reduction works as guided by the BFRMP.	✓ Meet legislative requirements during development assessment. ✓ Meet requirements for protection of the community following guidelines for fire management.

Table 15: Biodiversity thresholds[10] and fire regimes to be applied to vegetation.

Fire Regime	Biodiversity Thresholds Within Strategic Fire Advantage and Land Management Zones (NPWS 2001)	Vegetation Community Type (Council 2003) *[#1 and #2 indicate options for the same community]	Forest Type (Council, DVS, 2003)	Vegetation Group (Category 1,2,3) PBFP	The Vegetation Formation Described By The RFS For Minimum Fire Frequency For SFAZ (BFEAC)	Minimum Year Fire Frequency (BFEAC)
Coomba Park, Wallingat, Whoota and Charlotte Bay						
a	▪ Avoid 3 or more consecutive fires, with each of <5 years apart ▪ Avoid inter fire periods of >30 years ▪ Avoid 2 or more successive fires that totally scorch or consume the tree canopy ▪ Avoid 3 or more consecutive fires of low intensity	Dry Blackbutt	37	1	E1. Dry sclerophyll shrub/grass forest	5
		Forest Red Gum - #1	92	1	D. Sclerophyll grassy woodlands	5
		Grey Gum/ Grey Ironbark/ White Mahogany	62	1	E1. Dry sclerophyll shrub/grass forest	5
		Spotted Gum – Ironbark/ Grey Gum	74	1	E1. Dry sclerophyll shrub/grass forest	5
		White Mahogany/ Red Mahogany/ Grey Ironbark/ Grey Gum	60	1	E1. Dry sclerophyll shrub/grass forest	5
b	▪ Avoid 3 or more consecutive fires, with each of <8 years apart ▪ Avoid 3 or more consecutive fires, with each of the fires >15 years apart ▪ Avoid inter fire periods of > 30 years ▪ Avoid 2 or more consecutive fires that consume < 10t/ha of surface fuels	Forest Red Gum - #2	92	1	B2. Semi mesic grassy forests	10
		Heath	223	2	G. Heathlands	7
		Paperbark	31	1	C. Swamp sclerophyll forests	7
		Paperbark/ Blackbutt	31/37	1	C. Swamp sclerophyll forests	7
		Paperbark/ Swamp Oak	31/32	1	C. Swamp sclerophyll forests	7
		Swamp - #1	231	3	J. Freshwater wetlands	6
		Swamp Mahogany	30	1	C. Swamp sclerophyll forests	7
		Swamp Mahogany/ Grey Gum	30/60	1	C. Swamp sclerophyll forests	7
		Swamp Mahogany/ Paperbark	30/31	1	C. Swamp sclerophyll forests	7
		Swamp Oak	32	1	C. Swamp sclerophyll forests	7

[10] Biodiversity thresholds adapted from Bradstock et al 1995; NSW National Parks and Wildlife Service described within *the Draft Fire Management Strategies for Myall Lake National Park and Island Reserves, 2003a.*

Fire Regime	Biodiversity Thresholds Within Strategic Fire Advantage and Land Management Zones (NPWS 2001)	Vegetation Community Type (Council 2003) *[#1 and #2 indicate options for the same community]	Forest Type (Council, DVS, 2003)	Vegetation Group (Category 1,2,3) PBFP	The Vegetation Formation Described By The RFS For Minimum Fire Frequency For SFAZ (BFEAC)	Minimum Year Fire Frequency (BFEAC)
c	▪ Avoid more than 1 fire every 30 years ▪ Avoid inter-fire periods > 200 years	Flooded Gum	48	1	B1. Wet sclerophyll forests	25
		Moist Blackbutt	36	1	B1. Wet sclerophyll forests	25
		Sydney Blue Gum	46	1	B1. Wet sclerophyll forests	25
		Tallowwood/ Sydney Blue Gum	47	1	B1. Wet sclerophyll forests	25
d	▪ Any fire occurrence (a limited recovery ability exists)	Mangrove	33	3	K. Estuarine & saline wetlands	na
		Palm	7	3	A. Rainforest	na
		Swamp - #2	231	3	K. Estuarine & saline wetlands	na
w	▪ Use a, b, c, d options for biodiversity thresholds	Mixed Forest Regrowth Mixed Pine Mixed Woodland Vine		1,2,3	W. Appropriate management practice	na

Table 16: Conservation principles applied to hazard reduction works within each zone.

Type of Zone	Conservation Principle	Implementation	Monitoring
Asset Protection Zone **- slashing** **- tree removal**	Provide hospices within the area to maintain biodiversity, promote longevity of plants, buffer radiant effects from fire, reduce wind and provide habitat for fauna. Minimal thinning to meet canopy width specifications by the RFS. Tree removal of smaller, unhealthy, species with minimal impact on species using the habitat, in particular the Koala. Maintain habitat trees, seed trees and significant trees within zone.	Mechanical slashing of areas to protect assets. Tree removal by retaining stumps is preferred. Approval for stump removal of smaller trees assessed during site evaluation. Maximum overall fuel loads average is moderate.	Monitor fuels loads and changing vegetation community to guide slashing regimes to maintain appropriate fuel loads. Assess conservation values of the area and assess regrowth of slashed area and the impact on the local environment. Survey for threatened species.
Asset Protection Zone **-burning**	Burn area prescription to reduce fine fuels by 50-70% and elevated fuels by <50%. Ensure buffer zones within the burn area to protect impacts of erosion on steeper and riparian areas.	Fire regime is applied as frequently as needed to ensure the maximum overall fuel loads average is moderate.	Monitor fuels loads. Survey for threatened species.
Fire Advantages (Can be within Strategic Fire Advantages Zones or Asset Protection Zones) **- slashing** **- tree removal**	Natural or mechanical reduced fuels to provide corridors of lineal barriers or improved access to assist fire fighters to combat fire. Minimise soil erosion and ensure stumps are retained (below ground level) with approved tree removal.	Recognition of natural barriers or areas previously disturbed (not maintained). Within existing maintained areas (APZ/SFAZ), implement mechanical slashing of areas to reduce fuels to compliment management within APZ or SFAZ or adjacent zones.	Monitor accessibility and conservation values. Survey for threatened species.
Strategic Fire Advantage Zone **-slashing** **-tree removal** **(Mechanical or hand removal)**	Reduce fuels to provide corridors of lineal barriers or improved access to assist fire fighters to combat fire. Often related to drainage reserves, access & Services easements. Provide hospices within the area to compliment adjacent APZ or SFAZ. Minimise soil erosion and ensure stumps are retained (below ground level) with approved tree removal.	Mechanical slashing of areas to reduce fuels to compliment adjacent APZ. Maximum overall fuel loads average is high. Frequency less than within an APZ.	Monitor fuels loads. Survey for threatened species.
Strategic Fire Advantage Zone – burning	Burn area prescription to reduce fine fuels by 50-70% and elevated fuels by <50%. Mosaic burn 50-70% of the total area. Consider biodiversity thresholds for fire intensity and regularity.	Ecological based fire regimes of irregular mosaic burn areas integrated with protection of the community by providing fuel reduced areas, to compliment adjacent APZ or SFAZ. Maximum overall fuel loads average is high.	Monitor fuels loads. Survey for threatened species. Record fire frequency and intensity to meet prescriptions.
Land Management Zone **- burning**	Mosaic burn of up to 50% of the area to be burnt. Consider biodiversity thresholds for fire intensity and regularity.	Ecological based fire regimes of irregular mosaic burn areas. Protect riparian area conservation values.	Record fire frequency and intensity to meet prescriptions.
Fire Exclusion Zone	Hazard reduction and biodiversity burning excluded.	Conservation area.	Record fires.

Table 17: Specific works program applied to fire management zones.

(Refer to Table 10—15 for related objectives and strategies)

APZ Code (CP)	HR Name/ Location		Required Maintenance Size by GLC (width & length in metres & area in hectares)		Maintenance Type	
1. Council parks maintenance (primarily slashing) 2. Council open space maintenance (primarily mowing) 3. Council road maintenance 4. Council drainage reserve maintenance					1 - 4 (and/or) maintenance type options	
ASSET PROTECTION ZONES						
A1	Public Recreation Space	RES 5105	17x171	0.1860	Mowing/ Hand removal	2
A2	Public Recreation Space	RES 5109	30x48	0.1575	Mowing/ Hand removal	2
A3	Coomba Park Community Hall	RES 5016	71x146	0.9283	Mowing/ Hand removal	1
A4	Lot 88 DP 222756	Lot 88 DP 222756	20x36	0.0648	Mowing/ Hand removal	2
A5	Public Reserve	Lot 129 Sec 2 DP 222755 & Road Reserve	24x54	0.0677	Mowing/ Hand removal	1
A6	Lot 97 DP 222755	Lot 97 DP 222755	18x30	0.0523	Mowing/ Hand removal	1
A7	SES R94358	RES 114	14x80	0.1125	Mowing/ Hand removal	1
A8	SES R94358	RES 114	10x51	0.0449	Mowing/ Hand removal	1
A9	Public Reserve	RES 115 & Part Road Reserve	10x33	0.0326	Slashing/ Hand removal	1
A10	Coomba Aquatic Gardens	RES 5066			Mowing/ Hand removal	1
			TOTAL	**1.65 hectares**		
STRATEGIC FIRE MANAGEMENT ZONES						
S1	Public Recreation Space	RES 5105	70x60	0.4776	Mowing/ Slashing/ Hand removal	2
S2	Public Recreation Space	RES 5109	30x40	0.1146	Mowing/ Slashing/ Hand removal	1
S3	Public Recreation Space	RES 5109	6x60	0.0386	Mowing/ Slashing/ Hand removal	1
S4	Public Reserve	RES 5067	6x33	0.0197	Slashing/ Hand removal	1
S5	Public Reserve	RES 5067	6x36	0.0221	Slashing/ Hand removal	1
S6	Coomba Park Community Hall	RES 5016	20x11	0.2866	Mowing/ Slashing/ Hand removal	1
S7	Public Reserve	Lot 129 Sec 2 DP 222755	3x30	0.0009	Mowing/ Hand removal	1
S8	Road Reserve Adjacent to Lot 54 DP 253666	Adjacent to Lot 54 DP 253666	6x192	0.1157	Slashing removal	1
S9	Road Reserve adjacent to Coomba Park Recreation Reserve	Adjacent to RES 129 (CL R1003668) GLC Trusteeship	6x640	0.3849	Slashing/ Hand removal	1
S10	Reserve	Lot 21 DP 245522	6x23	0.0169	Mowing/ Slashing	1
S11	Public Reserve	RES 115 & Part Road Reserve	12x52	0.0558	Mowing/ Hand removal	1

APZ Code (CP)	HR Name/ Location		Required Maintenance Size by GLC (width & length in metres & area in hectares)		Maintenance Type	
1. Council parks maintenance (primarily slashing) 2. Council open space maintenance (primarily mowing) 3. Council road maintenance 4. Council drainage reserve maintenance					**1 - 4 (and/or) maintenance type options**	
S12	Coomba Aquatic Gardens	RES 5066	12x52	0.0558	Mowing/ Hand removal	2
			TOTAL	**2.33 hectares**		

APPENDICES

APPENDIX I – Dictionary

back burning: the application of fire to combustible matter so as to provide a fire break to control or suppress a fire or protect persons, property or the environment from an existing or imminent danger arising out of a fire, incident or other emergency.

Bush fire: includes a grass fire.

Bush fire danger period: a period fixed by or under section 81 or 82 of the *Rural Fires Act 1997.*as a bushfire danger period.

Bush fire hazard reduction certificate (BFHRC): a certificate referred to in section 100D of the *Rural Fires Act 1997.*

Bush fire hazard reduction notice: a notice under section 66 of the *Rural Fires Act 1997.* .

Bush fire hazard reduction work:

(a) the establishment or maintenance of fire breaks on land, and
(b) the controlled application of appropriate fire regimes or other means for the reduction or modification of available fuels within a predetermined area to mitigate against the spread of a bushfire,
but does not include construction of a track, trail or road.

Bush fire prone land has the same meaning as it has in the *Environmental Planning and Assessment Act 1979*.

bushfire risk management plan (BFRMP): a plan prepared under Division 4 of Part 3 for the purpose referred to in section 54 of the **Rural Fires Act 1997**.

fire fighting appliance includes all vehicles, equipment and other things used for or in connection with the prevention or suppression of fire or the protection of life or property in case of fire.

fire fighting authority :means the following:

(a) the Service,
(b) New South Wales Fire Brigades,
(c) the National Parks and Wildlife Service,
(d) the Forestry Commission,
(e) any other body prescribed by the regulations for the purposes of this definition.

fire permit: a permit issued under section 89 of the *Rural Fires Act 1997.*

local authority means:

(a) in relation to land that is situated within an area within the meaning of the *Local Government Act 1993*—the council of the area.

managed bushfire hazard reduction work means bushfire hazard reduction work that is carried out in accordance with a bushfire risk management plan.

Bush Fire Management Committee **(BFMC)***:* a Committee constituted under Part 3 of the *Rural Fires Act 1997.*

plan of operations: a plan prepared under Division 4 of Part 3 for the purposes referred to in section 53 of the *Rural Fires Act 1997.*

public authority means:

(a) any public or local authority constituted by or under an Act other than this Act, or
(b) any Government Department, or
(c) a statutory body representing the Crown, or
(d) a State owned corporation, or
(e) any person prescribed by the regulations as a public authority.

(*Rural Fires Act 1997 No 65)*

Definitions within the *State Emergency and Rescue Management Act 1989*

combat agency *means the agency identified in Displan as the agency primarily responsible for responding to a particular emergency.*

Displan *means the State Disaster Plan*

emergency *means an emergency due to an actual or imminent occurrence (such as fire, flood, storm, earthquake, explosion, accident, epidemic or warlike action) which:*

(a) endangers, or threatens to endanger, the safety or health of persons in the State, or
(b) destroys or damages, or threatens to destroy or damage, property in the State,

being an emergency which requires a significant and co-ordinated response.

emergency services organisation *means the Police Service, Fire Brigades, Rural Fire Brigades, Ambulance Service, State Emergency Service, Volunteer Rescue Association or any other agency which manages or controls an accredited rescue* unit

APPENDIX II – Council fire management objectives

Council fire management objectives are defined within the *Great Lakes Council Management Plan*[11], , as seen below.

Purpose:

- ✓ *'To protect life and assets through the provision of services which prevent and mitigate the occurrence of fires and other emergencies. (Assets include but not restricted to economic, social, environmental and heritage values found on both public and private lands).*

Objectives:

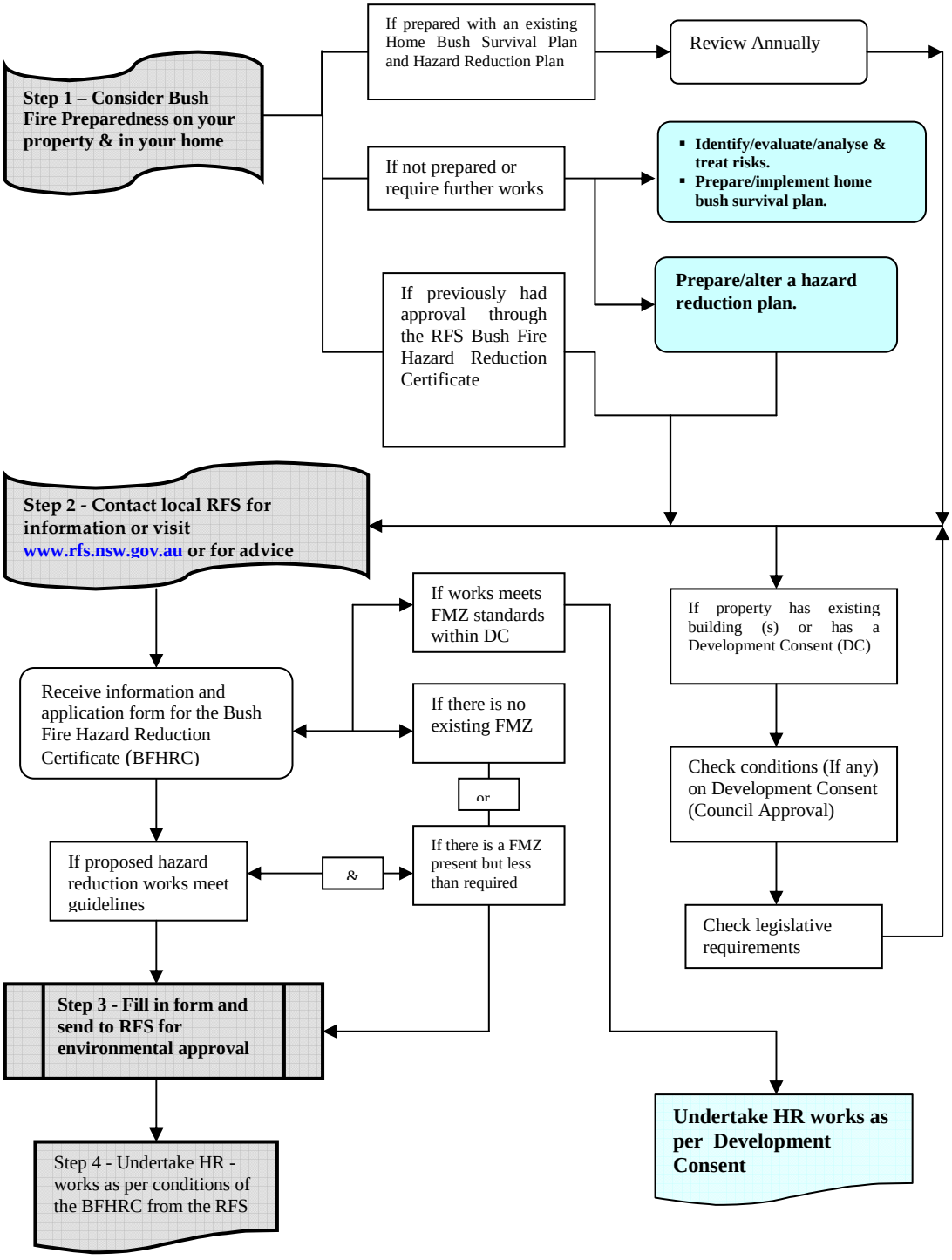
- ✓ *'Council shall provide financial support and resourcing requirements, as necessary, to enable the Rural Fire Service to effectively perform their responsibilities in accordance with the negotiated service level agreement.*

- ✓ *'Council shall provide financial support and resourcing requirements, as necessary, to enable the State Emergency Service to effectively perform their responsibilities in our local government area.*

- ✓ *'Council shall continue to evaluate and review the Disaster Management Plan for our local government area, in collaboration with the local Rural Fire Service, State Emergency Service and other relevant agencies, annually and where necessary due to legislative changes occurring from time to time.'*

[11] The current GLC Management Plan needs to be referred to for amendments to the purpose and objectives which may be changed from time to time.

APPENDIX III- What you can do to assist with fire mitigation and hazard reduction.



HR – Hazard Reduction
BFHRC – Bush Fire Hazard Reduction Certificate

FMZ – Fire Management Zone
DC - Development Consent through Council

Bush Fire Preparedness - Readiness of householders/property owners in the event of an imminent bushfire

APPENDIX IV – Fire Mitigation

The Local Environmental Plan (LEP) permits strategic bushfire hazard reduction within applicable zones across the Great Lakes LGA.

The LEP provides the mechanism to achieve bushfire objectives and protection measures and identifies criteria specified in bushfire prone areas appropriate to the potential level of the hazard.
DCP's support the objectives of the LEP and can detail bushfire protection measures necessary for the protection of life and property in the event of a bushfire event.

Two core documents including the NSW Rural Fire Service *Planning for Bushfire Protection (2001b) and the Bushfire Environmental Assessment Code (2003a)* assist with guiding specific fuel management practices and fire prevention works on both new and existing developments.

Referral to these along with other reference material from the NSW Rural Fire Service assist in planning for bushfire mitigation works.

The Building Code of Australia (BCA) provides guidelines to building in bushfire prone areas within the AS3959 Construction of buildings in bushfire prone areas.

These guides collectively assist the community and managers to:

- assess bushfire protection of properties
- recognise vegetation type and fire effects
- identify building setbacks
- consider the local environment
- reduce the impact of imminent bushfire attack
- provide adequate fire management zones
- implement fuel management practices and

promote fire prevention programs to the community.

The bushfire risk assessment of hazards is undertaken which assist in the development of fire management zones known as *Asset Protection Zones* (APZ) and the *Strategic Fire Advantage Zones* (SFAZ).

Asset Protection Zones for existing structures
An APZ represents the area surrounding a development, which is managed to reduce the bushfire hazard to an acceptable level. Its main purpose is to provide a buffer between any habitable structure and the bushfire hazard, and progressively reduce fuel loads.

For bushfire planning purposes APZ's are generally included within the property being developed, however it may incorporate areas of land off the development site where such land has a compatible use (eg. road, sporting field, or developed lot). Each APZ varies in form and width, according to vegetation type, slopes and **form of construction**. When slopes are greater, depths are increased to reduce impact from higher intensity fires.

Where existing assets require fire mitigation works the guidelines within the BFEAC assists in preparing fire management strategies for an area. Guidelines for maximum distances for APZ can be seen below:

Maximum Distance of an Asset Protection Zone from the Asset (or Adjacent Asset)		
	Residential Building	*Building - Shed*
Upslope		
<18	20 metres	10 metres
Downslope		
>0 – 5°	25 metres	10 metres
>5 – 10°	30 metres	10 metres
>10 – 15°	40 metres	10 metres
>15 – 18°	50 metres	10 metres

(RFS 2006)

Asset Protection Zones for new developments
When considering "new development" including new, alterations or additions to residential or industrial buildings refer to *Planning for Bushfire Protection (200b1)* to define fire management zones.

The table below extracted from this document shows the APZ minimum requirements that apply to both residential and special protection developments, for each vegetation groups and slope variations.

The APZ will comprise of two components, being the Outer Protection Area (OPA) and the Inner Protection Area (IPA).

Outer Protection Area
The OPA is located between the hazard and the IPA often linking with the area originally forming part of the bushfire hazard and is located on the bushland side of the perimeter road. In this area, vegetation is managed so cover is not continuous and fuel loads generally do not exceed 8 tonnes per hectare or in grasslands height should be maintained below 10 centimetres.

Within Bush Fire Prone Areas		APZ -Vegetation Group 1* (Forest [wet sclerophyll forest, dry sclerophyll forest])		APZ -Vegetation Group 2* (Woodlands, tall heath, and wetlands [scrub, open Shrub, closed heath])		Vegetation Group 3* (Rainforest [Closed Forest], open woodlands, grasslands †[12])
	Slope	Residential	Special Protection	Residential	Special Protection	Both
Upslope	>5°	20 m	60 m	20 m	30 m	20 m
	5°–0	30 m	75 m	30 m	40 m	20 m
Downslope	>0 – 5°	40 m	80 m	35 m	50 m	20 m
	>5 – 10°	50 m	90 m	40 m	60 m	20 m
	>10 – 15°	60 m	100 m	50 m	80 m	20 m
	>15 – 18°	70 m	100 m	60 m	100 m	20 m

(RFS 2001b)

Outer Protection Area – cont

The fine fuel loadings are maintained so that the intensity of a fire is reduced along with a corresponding reduction in the level of direct flames, radiant heat and ember attack on the IPA. The depth of the OPA varies from 0–10 metres deep for residential development or up to 15 metres in depth for special protection developments.

Inner Protection Area

The IPA extends from the edge of the development to the edge of the OPA. Within this area, fuel loads are strictly managed so that there is minimal fine fuels **available** that can become involved in fire at close to the development and therefore minimises direct flame contact and radiant heat. Any vegetation within this area **must not provide a path for the transfer of fire** to the development — ie **fuels are discontinuous**.

While trees and shrubs or other vegetation may occur, the **canopy must not touch or over hang the building** and be far enough away from the dwelling not to ignite the house by direct flame or radiant heat emission. In addition, species that produce excessive amounts of ground fuel in a short period or fire danger period.

There is preference to retain smooth bark species over rough barked species. The more fibrous bark increases the fire hazard rating as they assist with the spread and spotting capabilities of a fire. Retain discontinuous vegetation to provide a barrier to reduce the effects from radiant heat and ember attack.

Perimeter Road, Fire Trail and Access Roads

The perimeter road or fire trail lies between the OPA and the boundary of the allotment or the reserve.

* The APZ requirements are based on **Level 3 construction** in accordance with AS3959–1999. Where opportunities exist to increase APZ depth, then the site assessment methodology for bushfire attack, required setbacks and construction levels set out in Appendix 3.3 (of the *Guidelines*) must be applied.

† scrubland, , mallee also are within Group 3 vegetation but occurs western NSW areas.

12 Small remnants forests (less than 1ha) may be considered to be equivalent to the specifications for group 3 vegetation.

The fire trail can form part of the IPA that provides fire fighters access to structures and APZ's to conduct back burning or hazard reduction, property protection or provide refuge for fire fighters.

The PBFP guidelines identify specifications and design including construction standards, turn around areas, signage and environmental controls for perimeter road, fire trail and access roads.

APPENDIX V - Mapping Bushfire Prone Land

In August 2002 amendments came into effect to the *Environmental Planning and Assessment Act 1979* and the *Rural Fires Act 1997to improve protection of people property and the environment from bushfires.*

*C*ouncils are required to map bushfire prone lands within their local government areas with consultation with the Commissioner of the NSW Rural Fire Service.

Councils are required to place specification of bushfire prone land on section 149 Planning Certificate. The Commission issues fire safety authority (section 100B of the *Rural Fires Act*) for special purpose developments of bushfire prone land.

The criteria for bushfire prone land mapping requires vegetation to be divided into 3 groups as per Appendix 2 in the *Planning for Bush Fire Protection (2001)* document:

a) **Vegetation Group 1** – Forest
b) **Vegetation Group 2** – Woodlands, tall heath and wetlands
c) **Vegetation Group 3** –Rainforests, open woodlands, grasslands, shrubland and mallee.

Once vegetation classes have been determined and mapped across a council area, application of **bushfire vegetation categories** to the vegetation groups must be completed. The *Guideline – Bush Fire Prone Land Mapping, NSW Rural Fire Service, 2004* defines the criteria for **Bush Fire Vegetation Categories**[13] **using the above mapped** Vegetation Groups and is as follows: –

(i) Vegetation Group 1 and 2, greater than 1 hectare **– Bush fire Vegetation Category 1**
(ii) A 100 metre external buffer to Bush fire Vegetation Category 1 vegetation polygon—**Buffer zone Category 1**
(iii) Vegetation Group 3, greater than 1 hectare – **Bush fire Vegetation Category 2**

A 30 metre external buffer to Bushfire Vegetation Category 2 vegetation polygon —Buffer zone Category 2

(iv) Areas less than 1 hectare within, or partially within
(v) 100m lateral separations from a bushfire vegetation category 1, are —**Bush fire Vegetation Category 2.** or
(vi) 30m lateral separations from a bushfire vegetation category 2 are —**Bush fire Vegetation Category 2.**

Vegetation **excluded** from the above mentioned vegetation groups include:

i. Areas of "Vegetation groups" 1, 2 and 3, less than 1 hectare and not less than 100m lateral separation from a Bushfire Vegetation Category 1, or not less than 30m lateral separation from a Bushfire Vegetation Category 2, are excluded; or
ii. Areas of "Managed grassland" including grassland on, but not limited to, public lands, grazing land, recreational areas, commercial/industrial land, airports/airstrips and the like are excluded; or
iii. Areas of managed gardens and lawns within curtilage of buildings;
iv. Managed botanical gardens;
v. "Agricultural lands" used for annual and/or perennial cropping, orchard, market gardens, nurseries and the likes are excluded; or
vi. Mangroves.

(RFS 2004h*; 2004e)*

[13] The NSW Rural Fire Service owns bushfire prone mapping and is held in custody by Council

APPENDIX VI – Bush Fire Risk Description

A summary of the criteria for the identification of bushfire risk of an area, from the Lower Hunter Zone, Bush Fire Management Committee, Bush Fire Risk Management Plan can be seen within the table below:

Bush Fire Risk Description

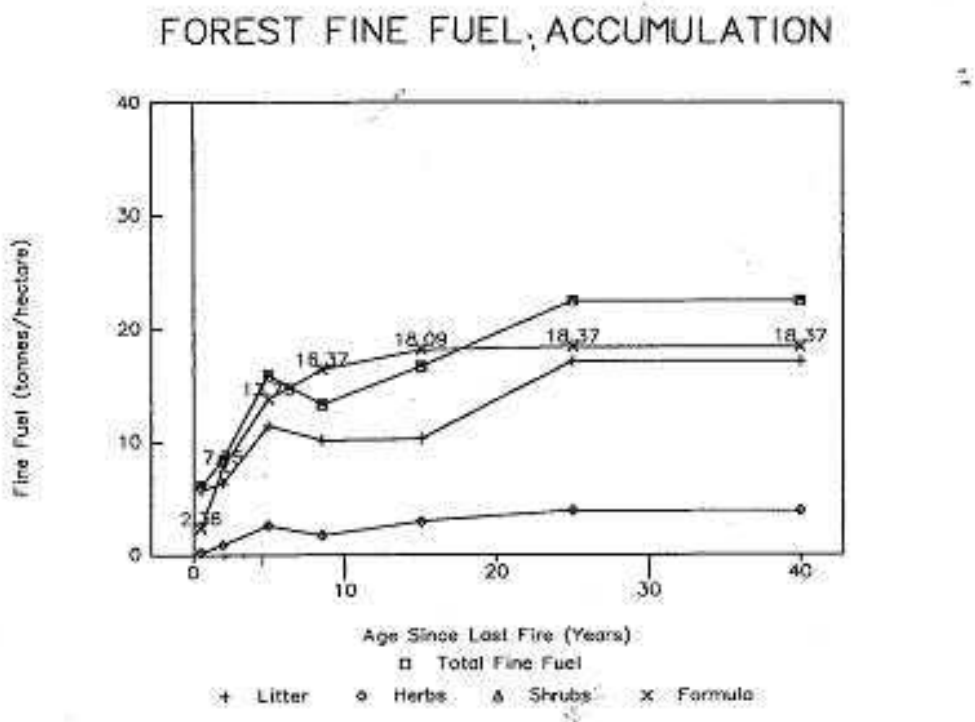
Development Type ***X — absent, ✔— present)***	***Bushfire Threat[14]***	***Bushfire Risk[15]***	***Consideration to Asset Protection/ Building Design[16]***
Urban/bushland interface/ Multiple Occupancies	Within 100m	Extreme	✗
Urban/bushland interface/ Multiple Occupancies	Within 100m	Major	✔
Urban/bushland interface	100m – 2.5km	Major	✗ and ✔
Environmental/Ecological Assets	Any	Major	✔
Remote Rural Residential Development	Any	Major	✗ and ✔
Agricultural areas	Any	Moderate	✗

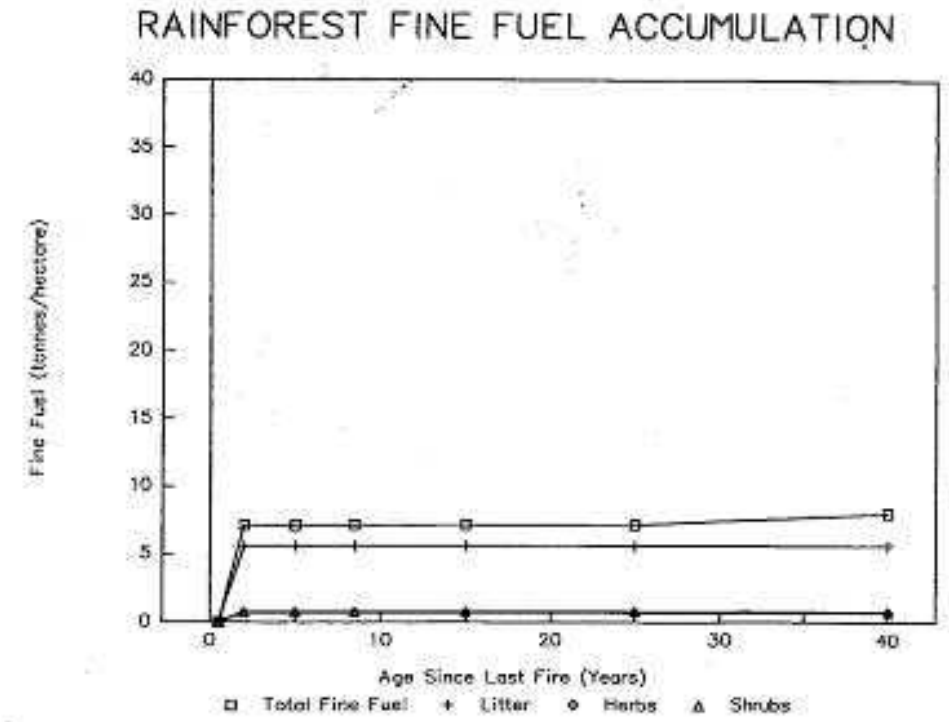
[14] How close assets are located to the hazard

[15] Level of risk as defined within the *Bushfire Risk Management Plan 2001*

[16] Consideration to fuel reduced areas (property protection), housing design and perimeter roads

APPENDIX VII- Fine Fuel Accumulation





(NPWS unpub.)

APPENDIX VIII – Biodiversity Thresholds for Vegetation Communities

Biodiversity thresholds[17] and fire regime to be applied to vegetation communities in Great lakes LGA.

Fire Regime	Biodiversity Thresholds Within Strategic Fire Advantage and Land Management Zones (NPWS 2001)	Vegetation Community Type (Council 2003) *[#1 and #2 indicate options for the same community]	Forest Type (Council, DVS, 2003)	Vegetation Group (Category 1,2,3) PBFP[18]	The Vegetation Formation Described By The RFS For Minimum Fire Frequency For SFAZ (BFEAC)	Minimum Year Fire Frequency (BFEAC)
a	▪ Avoid 3 or more consecutive fires, with each of <5 years apart ▪ Avoid inter fire periods of >30 years ▪ Avoid 2 or more successive fires that totally scorch or consume the tree canopy ▪ Avoid 3 or more consecutive fires of low intensity	Blackbutt – Bloodwood/ Apple	41	1	E1. Dry sclerophyll shrub/grass forest	5
		Blackbutt/ Scribbly Gum	40	1	E1. Dry sclerophyll shrub/grass forest	5
		Blackbutt/ Sydney Peppermint/ Smooth-barked Apple	42	1	D. Sclerophyll grassy woodlands	5
		Dry Blackbutt	37	1	E1. Dry sclerophyll shrub/grass forest	5
		Forest Red Gum - #1	92	1	D. Sclerophyll grassy woodlands	5
		Grey Gum/ Grey Ironbark/ White Mahogany	62	1	E1. Dry sclerophyll shrub/grass forest	5
		Ironbark	84	1	E1. Dry sclerophyll shrub/grass forest	5
		Ironbark/ Smooth-barked Apple/ Stringybark	84/106	1	E1. Dry sclerophyll shrub/grass forest	5
		Mahogany/ Ironbark/ Grey Gum/ Blackbutt	60/37	1	E1. Dry sclerophyll shrub/grass forest	5
		Red Bloodwood	126	2	D. Sclerophyll grassy woodlands	5
		Scribbly Gum	117	1	E1. Dry sclerophyll shrub/grass forest	5
		Smooth-barked Apple	105	1	E1. Dry sclerophyll shrub/grass forest	5
		Spotted Gum	70	1	E1. Dry sclerophyll shrub/grass forest	5
		Spotted Gum – Ironbark/ Grey Gum	74	1	E1. Dry sclerophyll shrub/grass forest	5
		Sydney Peppermint	128	1	E1. Dry sclerophyll shrub/grass forest	5
		Sydney Peppermint/ Stringybark	115	1	E1. Dry sclerophyll shrub/grass forest	5
		White Mahogany/ Red Mahogany/ Grey Ironbark/ Grey Gum	60	1	E1. Dry sclerophyll shrub/grass forest	5

[17] Biodiversity thresholds adapted from Bradstock et al 1995; NSW National Parks and Wildlife Service described within the *Draft Fire Management Strategies for Myall Lake National Park and Island Reserves, 2003a*.

[18] **Vegetation Group 1** - Forest (wet sclerophyll forest, dry sclerophyll forest)
Vegetation Group 2 - Woodlands, tall heath, and wetlands (scrub, open Shrub, closed heath)
Vegetation Group 3 - Rainforest (Closed Forest), open woodlands, grasslands (PBFP 2001)

Fire Regime	Biodiversity Thresholds Within Strategic Fire Advantage and Land Management Zones (NPWS 2001)	Vegetation Community Type (Council 2003) *[#1 and #2 indicate options for the same community]	Forest Type (Council, DVS, 2003)	Vegetation Group (Category 1,2,3) PBFP18	The Vegetation Formation Described By The RFS For Minimum Fire Frequency For SFAZ (BFEAC)	Minimum Year Fire Frequency (BFEAC)
b	▪ Avoid 3 or more consecutive fires, with each of <8 years apart ▪ Avoid 3 or more consecutive fires, with each of the fires >15 years apart ▪ Avoid inter fire periods of > 30 years ▪ Avoid 2 or more consecutive fires that consume < 10t/ha of surface fuels	Banksia	107	2	G. Heathlands	7
		Disturbed Heath	219/223	2	G. Heathlands	7
		Forest Red Gum - #2	92	1	B2. Semi mesic grassy forests	10
		Heath	223	2	G. Heathlands	7
		Heath Paperbark	31/223	2	G. Heathlands	7
		Paperbark	31	1	C. Swamp sclerophyll forests	7
		Paperbark/ Blackbutt	31/37	1	C. Swamp sclerophyll forests	7
		Paperbark/ Smooth-barked Apple/ Sydney Peppermint	31/106	1	C. Swamp sclerophyll forests	7
		Paperbark/ Swamp Oak	31/32	1	C. Swamp sclerophyll forests	7
		Red Mahogany	68	1	E2. Dry sclerophyll shrub/grass forest	7
		Red Mahogany/ Smooth-barked Apple	68/105	1	E2. Dry sclerophyll shrub/grass forest	7
		Rough-barked Apple	129	1	C. Swamp sclerophyll forests	7
		Scrub	224	2	G. Heathlands	7
		Swamp - #1	231	3	J. Freshwater wetlands	6
		Swamp Mahogany	30	1	C. Swamp sclerophyll forests	7
		Swamp Mahogany/ Forest Red Gum	30/92	1	C. Swamp sclerophyll forests	7
		Swamp Mahogany/ Grey Gum	30/60	1	C. Swamp sclerophyll forests	7
		Swamp Mahogany/ Paperbark	30/31	1	C. Swamp sclerophyll forests	7
		Swamp Mahogany/ Swamp Oak	30/32	1	C. Swamp sclerophyll forests	7
		Swamp Oak	32	1	C. Swamp sclerophyll forests	7
		Tallowwood - #1	45	1	B2. Semi mesic grassy forests	10
		Tallowwood/ Grey Gum	45/60	1	B2. Semi mesic grassy forests	10
c	Avoid more than 1 fire every 30 years Avoid inter-fire periods > 200 years	Flooded Gum	48	1	B1. Wet sclerophyll forests	25
		Flooded Gum/ Paperbark	48/31	1	B1. Wet sclerophyll forests	25

Fire Regime	Biodiversity Thresholds Within Strategic Fire Advantage and Land Management Zones (NPWS 2001)	Vegetation Community Type (Council 2003) *[#1 and #2 indicate options for the same community]	Forest Type (Council, DVS, 2003)	Vegetation Group (Category 1,2,3) PBFP18	The Vegetation Formation Described By The RFS For Minimum Fire Frequency For SFAZ (BFEAC)	Minimum Year Fire Frequency (BFEAC)
		Inland Brush Box	53	1	B1. Wet sclerophyll forests	25
		Ironbark/ Grey Gum/ Flooded Gum	60/48	1	B1. Wet sclerophyll forests	25
		Moist Blackbutt	36	1	B1. Wet sclerophyll forests	25
		Sydney Blue Gum	46	1	B1. Wet sclerophyll forests	25
		Sydney Blue Gum/ Paperbark	46/31	1	B1. Wet sclerophyll forests	25
		Tallowwood - #2	45	1	B1. Wet sclerophyll forests	25
		Tallowwood/ Sydney Blue Gum	47	1	B1. Wet sclerophyll forests	25
		Tallowwood/ Sydney Blue Gum/ Brushbox	47/53	1	B1. Wet sclerophyll forests	25
d	Any fire occurrence (a limited recovery ability exists)	Fig/ Giant Stinger	6	3	A. Rainforest	na
		Fig/ Myrtle	6/23	3	A. Rainforest	na
		Headland Brushbox	25	3	A. Rainforest	na
		Mangrove	33	3	K. Estuarine & saline wetlands	na
		Myrtle	23	3	A. Rainforest	na
		Palm	7	3	A. Rainforest	na
		Palm/ Myrtle	7/23	3	A. Rainforest	na
		Swamp - #2	231	3	K. Estuarine & saline wetlands	na
		Tuckeroo	24	3	A. Rainforest	na
		Yellow Tulipwood	22	3	A. Rainforest	na
NA	Not Applicable	Natural Grassland	230	3	No prescribed fire on headlands[19]	na
		Pine	-	1 or 2	Other	na
		Rock/Sand	-	na	Other	na
w	**Use a, b, c, d** options for biodiversity thresholds	Introduced Scrub	221	1,2,3	W. Appropriate management practice[20]	na
		Mixed Forest Regrowth Mixed Pine Mixed Woodland Vine		1,2,3	W. Appropriate management practice	na

[19] Not described in BFEAC schedule
[20] W. Variable within each vegetation formation

APPENDIX IX - Vegetation formations for NSW

Vegetation formations for NSW to be applied to the Bush Fire and Environmental assessment Code for asset protection zones and strategic fire advantage zones.

A. Rainforests	Forests dominated by trees with soft broad leaves (non eucalypts), with vines, ferns and palms in the understorey. Coast and tablelands in mesic sites on fertile soils.
B1. Wet sclerophyll forests	Tall forests of dominated by straight-trunked eucalypts with dense understories of shrubs with broad soft leaves, ferns and herbs. Relatively fertile soils in high rainfall parts of coast and tablelands.
B2. Semi-mesic grassy forests	Tall forests dominated by straight-trunked eucalypts, with mixed grassy understories and sparse occurrences of shrubs with broad soft leaves. Coast and tablelands in high rainfall regions and along major inland watercourses on relatively fertile soils.
C. Swamp sclerophyll forests	Forests of hard-leaved trees (eucalypts, paperbarks, casuarinas) with scattered shrubs and continuous groundcover of water-loving sedges and herbs. Floodprone flats and plains and riparian zones principally along the coast and inland rivers.
D. Sclerophyll grassy woodlands	Woodlands of eucalypt trees, with dry understories of grasses, herbs and sometimes scattered shrubs. Rolling terrain with fertile soils and moderate rainfall on the coast, tablelands and western slopes.
E1. Dry sclerophyll shrub/grass forests	Eucalypt forests with mixed understories of hard-leaved shrubs and grasses. Moderately fertile soils in moderate rainfall areas of the coast, tablelands and western slopes.
E2. Dry sclerophyll shrub forests	Low forests and woodlands dominated by eucalypts, with understories of hard-leaved shrubs and sparse groundcover (few grasses or sedges). Regions receiving high to moderate rainfall on the coast, tablelands and western slopes, often in steep areas.
F. Semi-arid woodlands	Open woodlands dominated by eucalypts, acacias and casuarinas, with open understories of hard-leaved shrubs, grasses and forbs, including many ephemeral species. Low-moderate rainfall regions of the near western plains, including infrequently flood-prone sites.
G. Heathlands	Dense to open shrublands dominated by shrubs with small, hard leaves and sedges. High rainfall regions of the coast and tablelands on infertile soils, often in exposed topographic positions.
H. Alpine complex	Mosaics of low herbfields, grasslands and shrublands. High, snow-prone parts of the southern ranges.
I. Grasslands	Closed tussock grasslands with a variable compliment of herbs and few if any woody shrubs or trees. Fertile soils of the tablelands and western floodplains.
J. Freshwater wetlands	Swamp forests, wet shrublands or sedgelands, usually with a dense groundcover of sedges. Throughout NSW on peaty or gleyed soils with impeded drainage.
K. Estuarine and saline wetlands	Low forests, shrublands and herbfields of mangroves, succulent shrubs (saltmarsh) or marine herbs (sea grasses). Coastal estuaries and saline sites of the western plains.
M. Arid and semi-arid shrublands	Open shrublands of hard-leaved shrubs, hummock or tussock grasses and ephemeral herbs. Low rainfall regions of the far western plains.

(RFS 2005)

APPENDIX X - CRA Vegetation Unit Distribution and Conservation Value

The Lower North East Comprehensive Regional Assessment (CRA) and DEC (Parks and Wildlife Division) used broad scale mapping to assess the status of the ecosystem. The local vegetation community were ranked from highest regional priority to the lowest, including those ecosystems that are known to be vulnerable, rare, severely depleted and those that have private land priority.

Forest Type	CRA Name	Current area Lower North East CRA (Ha)	% of Original Extent Remaining	Status	RFA Cons. Target Met
92	Escarpment Red Gum	20,498	27.4%	▪ Vulnerable ▪ Severely Depleted ▪ Highly Inadequately Reserved ▪ Private land priority	No
129	Rough-barked Apple	2,636	18.8%	▪ Vulnerable ▪ Severely Depleted ▪ Private land priority	No
32	Swamp Oak	4,868	22.7%	▪ Vulnerable ▪ Severely Depleted ▪ Private land priority	No
107	Banksia	4,196	47.8%	▪ Vulnerable ▪ Private land priority	No
31	Paperbark	12,866	NA	▪ Vulnerable	No
224	Scrub	3,073	NA	▪ Vulnerable	Yes
68	Red Mahogany	65	100	▪ Rare ▪ Highly inadequately Reserved ▪ Private land priority	No (*)
45	Tallowwood	746	85.3%	▪ Rare ▪ Private land priority	No (*)
33	Mangrove	1,001	NA	▪ Rare ▪ Private land priority	No (*)
223	Heath	14,286	NA	▪ Rare ▪ Private land priority	No (*)
126	Red Bloodwood	5	100%	▪ Rare	Yes (*)
230	Natural Grassland	138	NA	▪ Rare	No (*)
231	Swamp	9,130	NA	▪ Rare	No (*)
6, 7, 22, 23, 24, 25	Rainforest	256,326	NA	▪ Rare	No (*)
36	Dry Grassy Blackbutt-Tallowwood	59,390	44.0%	▪ Severely Depleted ▪ Highly Inadequately Reserved ▪ Private land priority	No
60, 62	South Coast Shrubby Grey Gum	151,030	42.2%	▪ Severely Depleted ▪ Highly Inadequately Reserved ▪ Private land priority	No
42	Blackbutt-Sydney Peppermint-Smooth-barked Apple	1,382	38.8%	▪ Severely Depleted Private land priority	No
106	Stringybark-Apple	81,300	38.9%	▪ Severely Depleted ▪ Private land priority	No
84	Ironbark	89,985	43.0%	▪ Severely Depleted	Yes
30	Swamp Mahogany	2,177	46.9%	▪ Private land priority	No
48, 48/31	Wet Flooded Gum-Tallowwood	6,161	65.6%	▪ Private land priority	No
48	Coastal Flooded Gum	8,753	57.7%	▪ Private land priority	No
70, 74	Dry Foothills Spotted Gum	17,688	53.8%	▪ Private land priority	No
47	South Coast Tallowwood-Blue Gum	71,217	67.1%	▪ Private land priority	No

Forest Type	CRA Name	Current area Lower North East CRA (Ha)	% of Original Extent Remaining	Status	RFA Cons. Target Met
106, 128	Smooth-barked Apple-Sydney Peppermint-Stringybark	9,517	57.6%	-	No
41?	Dry Heathy Blackbutt-Bloodwood	2,889	58.5%	-	Yes
53	Open Coastal Brushbox	64,878	62.8%	-	Yes
37	Coastal Sands Blackbutt	17,312	64.0%	-	Yes
60	Dry Grassy Tallowwood-Grey Gum	178,516	67.6%	-	No
62	Grey Gum-Stringybark	16,056	69.5%	-	Yes
46	Southern Wet Sydney Blue Gum	41,695	72.8%	-	Yes
105	Smooth-barked Apple	18,751	73.7%	-	No
40, 117	Heathy Scribbly Gum	23,471	74.8%	-	Yes
117	Lowlands Scribbly Gum	9,724	84.3%	-	Yes
36	Mid Elevation Wet Blackbutt	6,981	88.6%	-	Yes
62	Moist Open Escarpment White Mahogany	38,495	90.2%	-	Yes
36	Wet Foothills Blackbutt-Turpentine	50,264	92.6%	-	Yes
115	Sydney Peppermint-Stringybark	13,778	99.4%	-	Yes
234	Rock	6,576	NA	-	Yes

(Great Lakes Council 2004a)

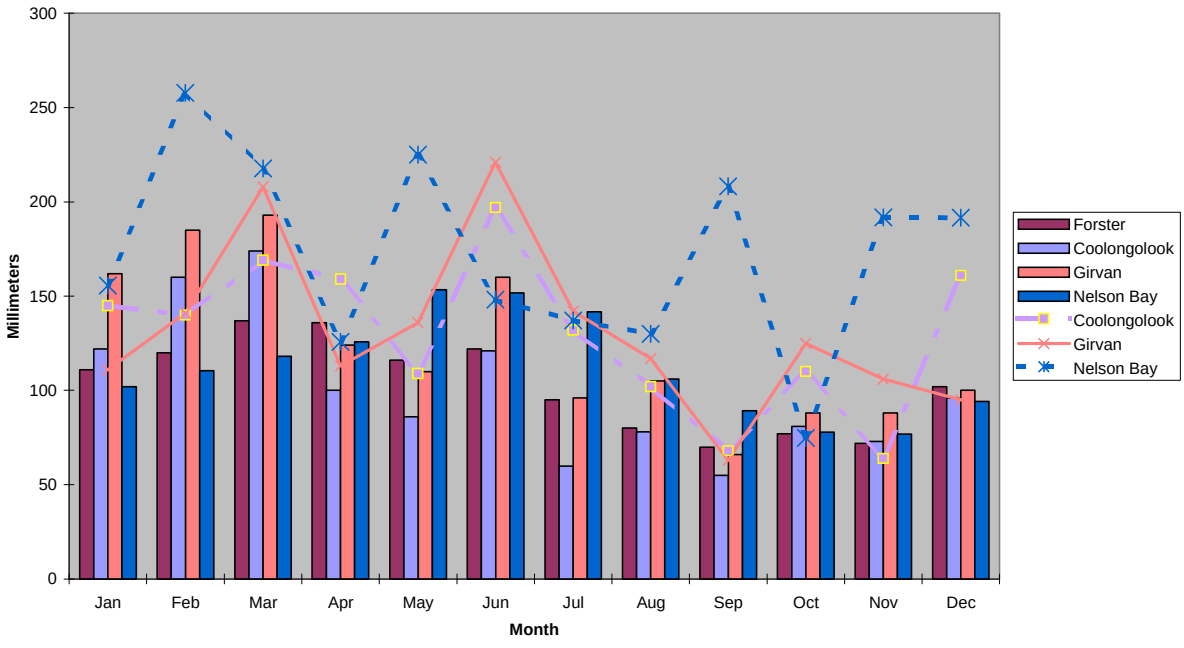
APPENDIX XI – Climate

Climatic details of the Upper Hunter and Lower Hunter weather districts.

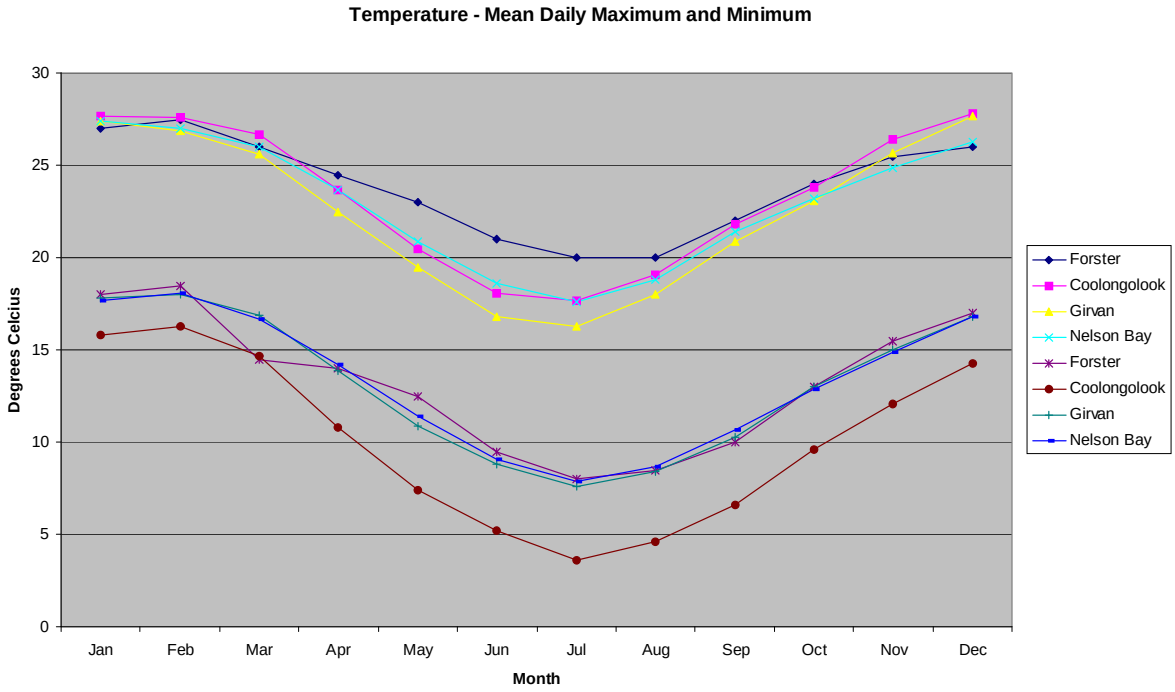
Climate Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ANN
Mean Daily Max. Temp (°C)													
Forster	27.0	27.5	26.0	24.5	23.0	21.0	20.0	20.0	22.0	24.0	25.5	26.0	23.9
Coolongolook	27.7	27.6	26.7	23.7	20.5	18.1	17.7	19.1	21.8	23.8	26.4	27.8	23.5
Girvan	27.4	26.9	25.6	22.5	19.5	16.8	16.3	18.0	20.9	23.1	25.7	27.7	22.6
Nelson Bay	27.4	27	26	23.7	20.9	18.6	17.6	18.8	21.4	23.2	24.9	26.3	23
Mean Daily Min. Temp (°C)													
Forster	18.0	18.5	14.5	14.0	12.5	9.5	8.0	8.5	10.0	13.0	15.5	17.0	13.3
Coolongolook	15.8	16.3	14.7	10.8	7.4	5.2	3.6	4.6	6.6	9.6	12.1	14.3	10.3
Girvan	17.8	18.0	16.9	13.9	10.9	8.8	7.6	8.4	10.3	13.0	15.0	16.8	13.1
Nelson Bay	17.7	18.1	16.7	14.2	11.4	9.1	7.9	8.7	10.7	12.9	14.9	16.8	13.3
Mean. Rainfall (mm)													
Forster	111	120	137	136	116	122	95	80	70	77	72	102	1238
Coolongolook	122	160	174	100	86	121	60	78	55	81	73	96	1205
Girvan	162	185	193	124	110	160	96	105	66	88	88	100	1477
Nelson Bay	102	110.4	118.1	125.8	153.4	151.7	141.7	106	89.2	77.9	76.8	94.3	1347.4
Highest Daily Rain													
Forster	-	-	-	-	-	-	-	-	-	-	-	-	-
Coolongolook	145	140	169	159	109	197	132	102	68	110	64	161	197
Girvan	111	141	208	113	136	221	142	117	63	125	106	95	221
Nelson Bay	155.7	257.8	217.7	125.7	225	148.1	137.2	130	208.3	74.9	191.8	191.5	257.8

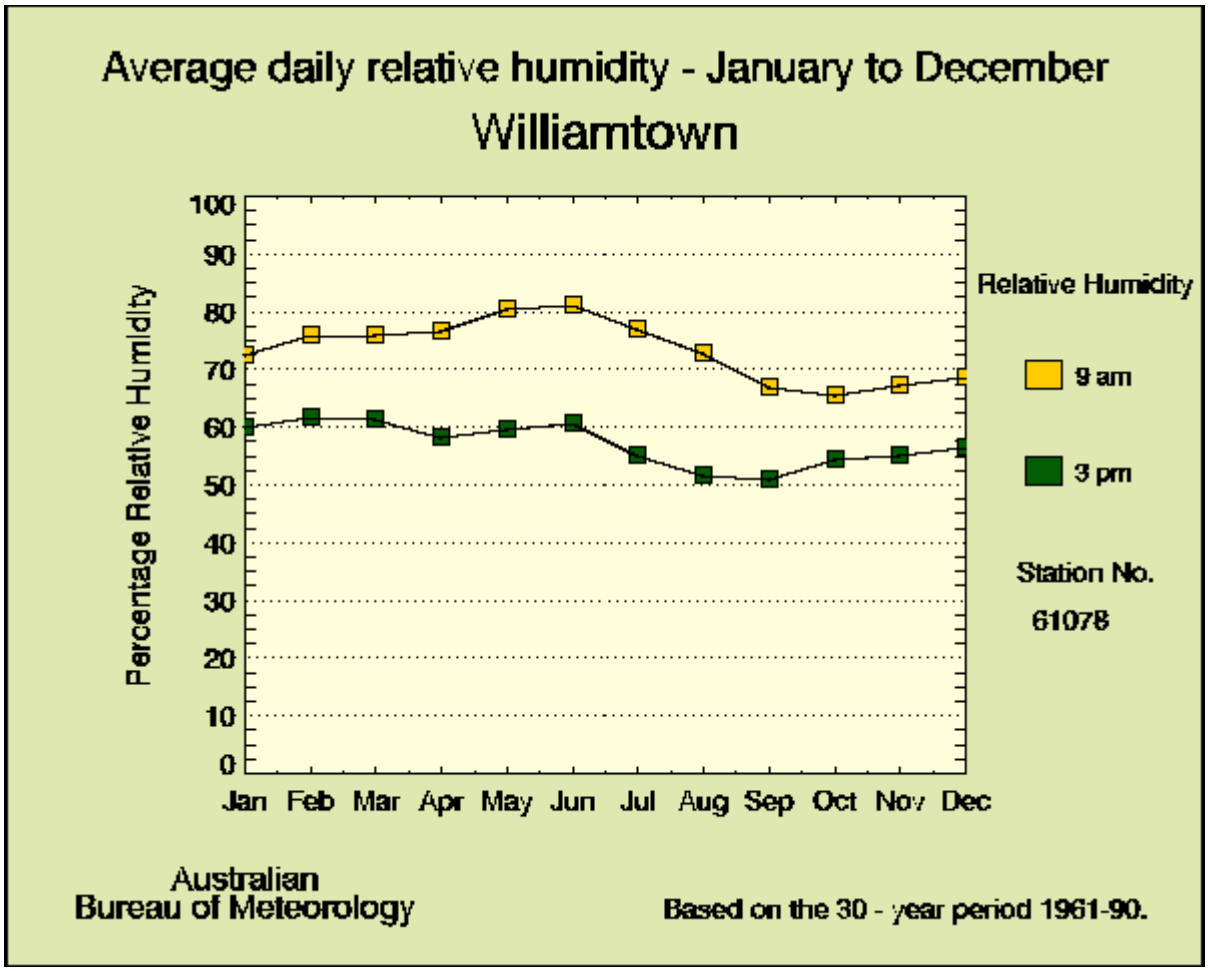
(Commonwealth of Australia, Bureau of Meteorology 2005a; Great Lakes Council 2004a)

Rainfall - Mean maximum (bar) and highest daily rain (line)



(Commonwealth of Australia, Bureau of Meteorology 2005a; Great Lakes Council 2004a)





(Commonwealth of Australia, Bureau of Meteorology 2005a; Great Lakes Council 2004a)

APPENDIX XII – Fire Fighting Appliance Definitions

The following category identification of all NSW Rural Fire Service appliances apply:

CATEGORY	MAIN IDENTIFICATION	SUB IDENTIFICATION		
Category 1	Heavy Fire Appliance	AWD	3,001L – 4,000L	B – V – F – G / D – S
Category 2	Medium Fire Appliance	AWD	1,601L – 3,000L	B – V – F – G / D – S
Category 3	Heavy Fire Appliance		3,001L – 4,000L	B – V – F – G / D – S
Category 4	Medium Fire Appliance		1,601L – 3,000L	B – V – F – G / D – S
Category 5	Heavy Fire Appliance	AWD	4,001L+	B – V – F – G / D – S
Category 6	Heavy Fire Appliance		4,001L +	B – V – F – G / D – S
Category 7	Light Fire Appliance	AWD	801L – 1,600L	F – G / D – S
Category 8	Light Fire Appliance		801L – 1,600L	F – G / D – S
Category 9	Mop Up Appliance	AWD	350L – 800L D –	S
Category 10	Urban Fire Appliance		1,601L +	B
Category 11	Urban Fire Appliance	AWD	1,601L +	B
Category 12	Personnel Transport			
Category 13	Bulk Water Carriers			
Category 14	Tanker Trailers			
Category 15	Boats			
Category 16	Command Vehicles			
Category 17	General Cargo Vehicles			
Category 18	Catering Vehicles			
Category 19	Communication Vehicles			
Category 20	Other Appliances/Vehicles			

Key:

AWD = All Wheel Drive, **B** = Breathing Apparatus (BA) Equipped,
V = Village (No BA),
F = Forest, **G** = Grassland only
D = Dual/Crew Cabin, **S** = Single Cabin

APPENDIX XIII - Terminology Identification for Localities

Terminology used to identify locations within fire management zones

Identification Key	Village/Town
BL	Blueys Beach
BB	Boomerang Beach
BU	Bulahdelah
BD	Bundabah
BW	Bungwahl
CP	Coomba Park
EB	Elizabeth Beach
F	Forster
HN	Hawks Nest
NB	Nabiac
N	Nerong
NA	North Arm Cove
PD	Pindimar
SR	Seal Rocks
SW	Shearwater
SL	Smiths Lake
TB	Tarbuck Bay
TG	Tea Gardens
T	Tuncurry

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