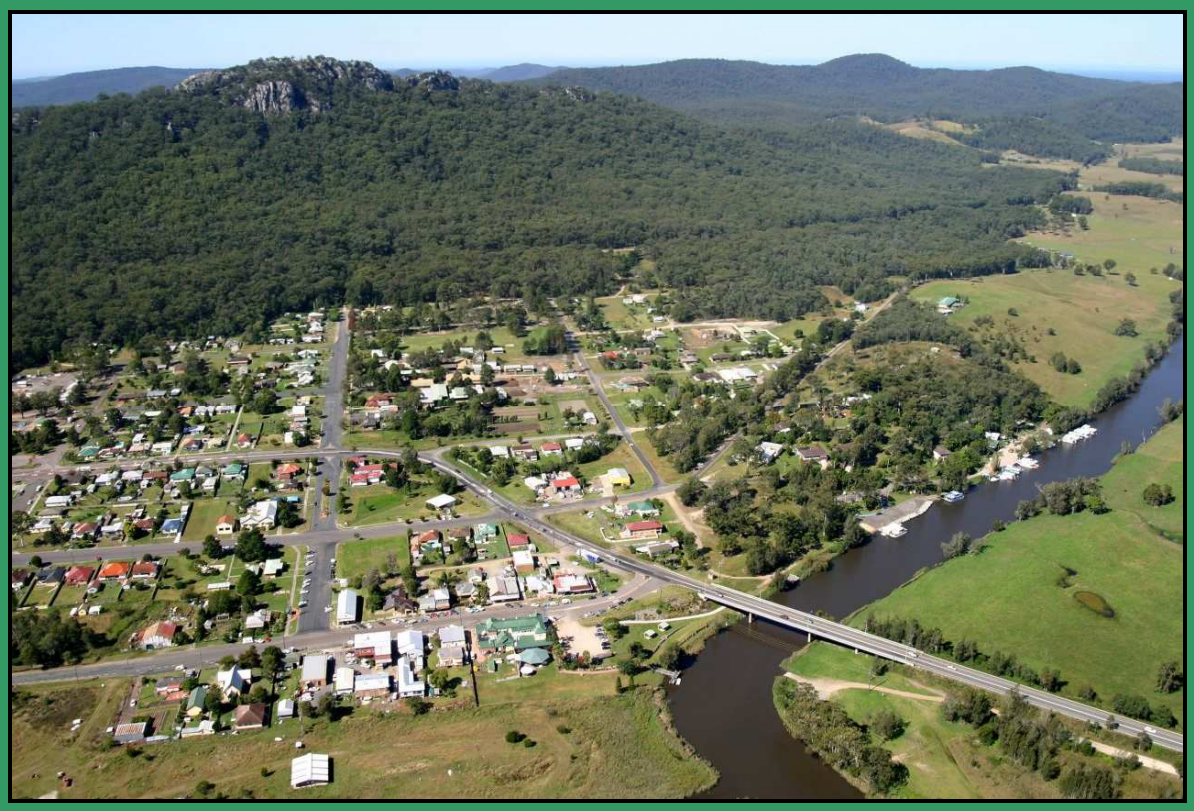
Fire Mitigation Plan

~ Coolongolook & Bulahdelah ~

October 2007



Great Lakes
COUNCIL

Fire Mitigation Plan
~ Coolongolook and Bulahdelah ~

October 2007

Adopted by Great Lakes Council: 23 October 2007
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Prepared by Great Lakes Council

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EXECUTIVE SUMMARY

Great Lakes Council's, Fire Mitigation Plan – Coolongolook and Bulahdelah has been prepared for the Coolongolook and Bulahdelah village and rural environs.

Funding through the Natural Disaster Risk Management Studies Programme assisted in the preparation of this report. The administration of the funding 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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PART 1 - SECTION 1

Introduction

Great Lakes Council (Council) has prepared this Fire Mitigation Plan to provide a comprehensive guide for fire management planning within Coolongolook and Bulahdelah urban and rural environs. 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 – Coolongolook and Bulahdelah (the Plan) covers these villages and encompasses Council land including road reserves and Crown land (managed by Council). The plan considers management by other authorities, agencies, private property owners and existing management strategies.

The study area has been mapped in two (2) parts; Coolongolook extends south and east to Curreeki Creek Road and Lockets Crossing and north to Willina Road and Brushy Creek; Bulahdelah study area extends south and west to the Myall River, east to Bulahdelah State Forest, and north to Markwell Road and Frys Creek.

Within the study areas, the villages of Coolongolook and Bulahdelah are situated inland on the hinterland of the coastal area (Figure 1). Coolongolook and Bulahdelah are accessed along the Pacific Highway. The coastal climate and the rural living setting within the Wallis Lake Region is also a well-known tourist destination with an increase of visitors during peek holiday periods.

Development of the Coolongolook and Bulahdelah area is predominantly rural and rural residential properties. Within the small urban areas development exist within mostly cleared areas with few areas of undisturbed forests, or regenerating forests from former disturbances. Although fragmented they provide corridors for local flora and fauna to areas with high habitat values.

Council also have reserves regularly maintained for recreational purposes, which pose no fire threat. Nearby large expansions of natural bushland exist within private, state forest and national parks outside these village areas.

Bushfires are a natural phenomenon within the local area, which burn at various fire intensities (depending on local factors), ultimately having more or less impact on life and property. The local bushfire risks vary due to fire behaviour, which 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.

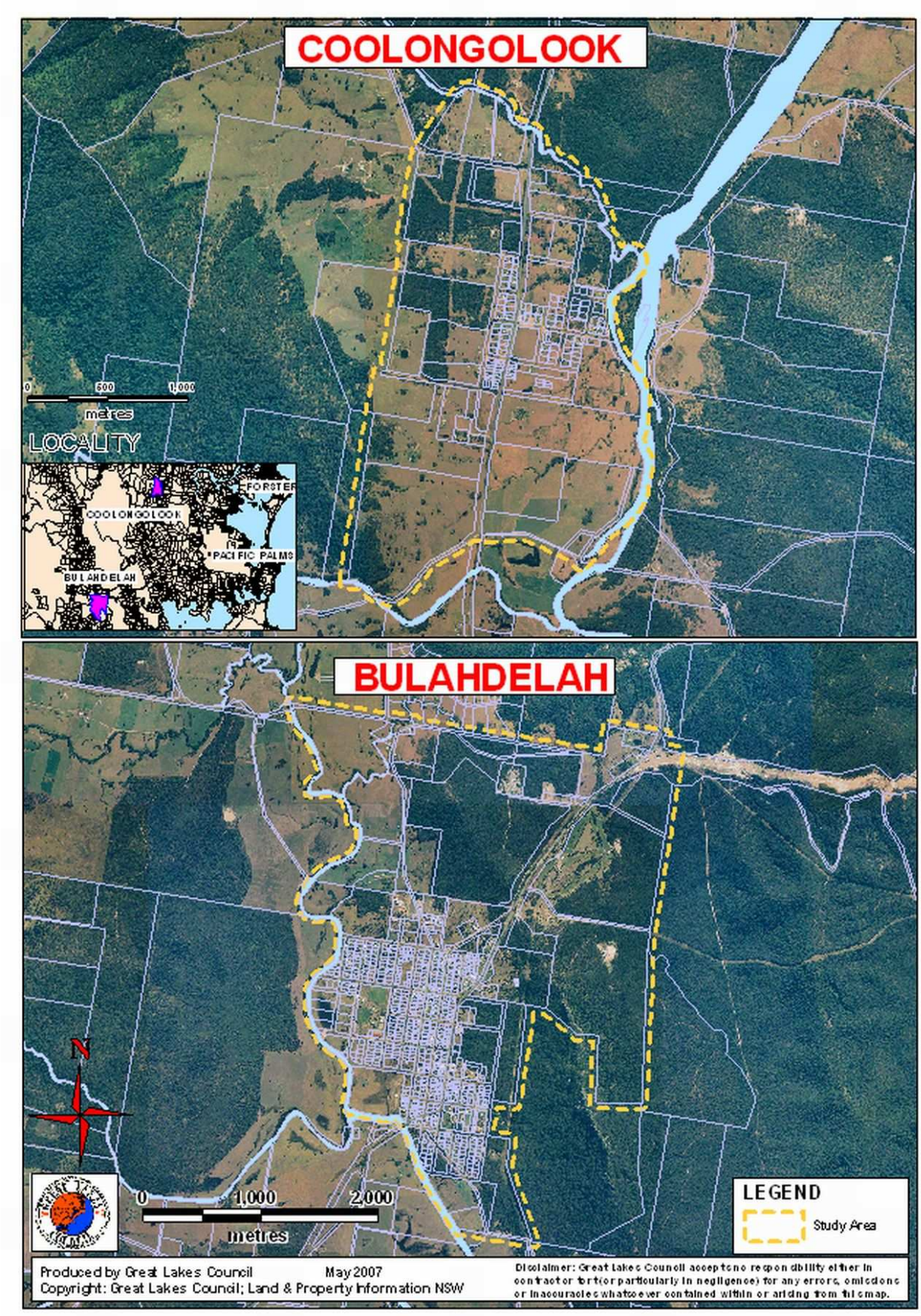


Figure 1: Location of Coolongolook and Bulahdelah and the study area boundary.

Scope and Purpose

The Plan provides fire management guidelines and incorporates statutory obligations to protect life and property and to manage bushfire risks. Specifically the Plan assists Council land managers in applying bushfire mitigation processes, using appropriate assessment methods and to identify strategic management programs within bushfire affected land[1]. It is also is tool to guide the community and managers to understand and apply the steps towards responsible fire protection measures.

The plan considers overall bushfire hazards and risks within Council owned and managed land (Council Land) within the Coolongolook and Bulahdelah urban and rural area. These comprehensive fire management programs are necessary for Council to meet fire and environmental management responsibilities and obligations to protect life and community assets.

Fire Management Objectives

Council's fire management objective is consistent with statutory obligations and policies and is:

- To manage the potential fire threat from within Council Land, by identifying bushfire protection measures to protect life and property using ecological sustainable management practices in line with existing legislation and Council Policy.

Fire Management Strategies

Council's proactive fire management programme takes steps by implementing preventative bushfire mitigation activities to meet key fire management strategies:

- Undertake strategic fire management planning and assess ongoing bushfire mitigation works effectiveness as set out within relevant legislation.
- Reduce the risk of damage, to life, property and environmental assets by identifying bushfire mitigation programs.
- Provide appropriate information to key government bodies and the community on Council fire management programs.
- Minimise the bushfire risk and reduce the threat of bushfires on fire-fighters and the community.
- Promote participation by the community for ongoing bushfire protection and review in relation to Council's adjacent proposed activities.
- Establish bushfire regimes to promote biodiversity thresholds.
- Maintain the biodiversity and integrity of the natural environment by minimising the impact of bushfire and mitigation measures on bushland.

[1] Bushfire Affected Land - Where life and/or property is directly threatened from the spread of fire or impacted by bushfire, includes those within Bush Fire Prone Land.

The planning process

The Plan has been guided by various documents, policies and procedures including those prepared by the NSW Rural Fire Service (RFS) and Council such as the:

- Bush Fire Environmental Assessment Code for NSW, February 2006 (commonly known as 'The Code' and referred to as the BFEAC);
- Planning for Bush Fire Protection, A guide for Councils, Planners, Fire Authorities and Developers, 2006 (PBP);
- *Rural Fires Act 1997* (RF Act) and the Rural Fires Regulation 2002 (RF Reg);
- Threatened Species Conservation Act 1995 (TSC Act);
- *Environmental Planning and Assessment Act 1979* (EP&A Act) and Environmental Planning and Assessment Regulations 2000 (EP&A Reg); and
- Great Lakes Council Management Plan (Extract within Appendix I).

These have assisted in formulating outcomes specifically for fire protection for life and property. The flow chart (Figure 2) demonstrates the steps in the preparation of the plan.

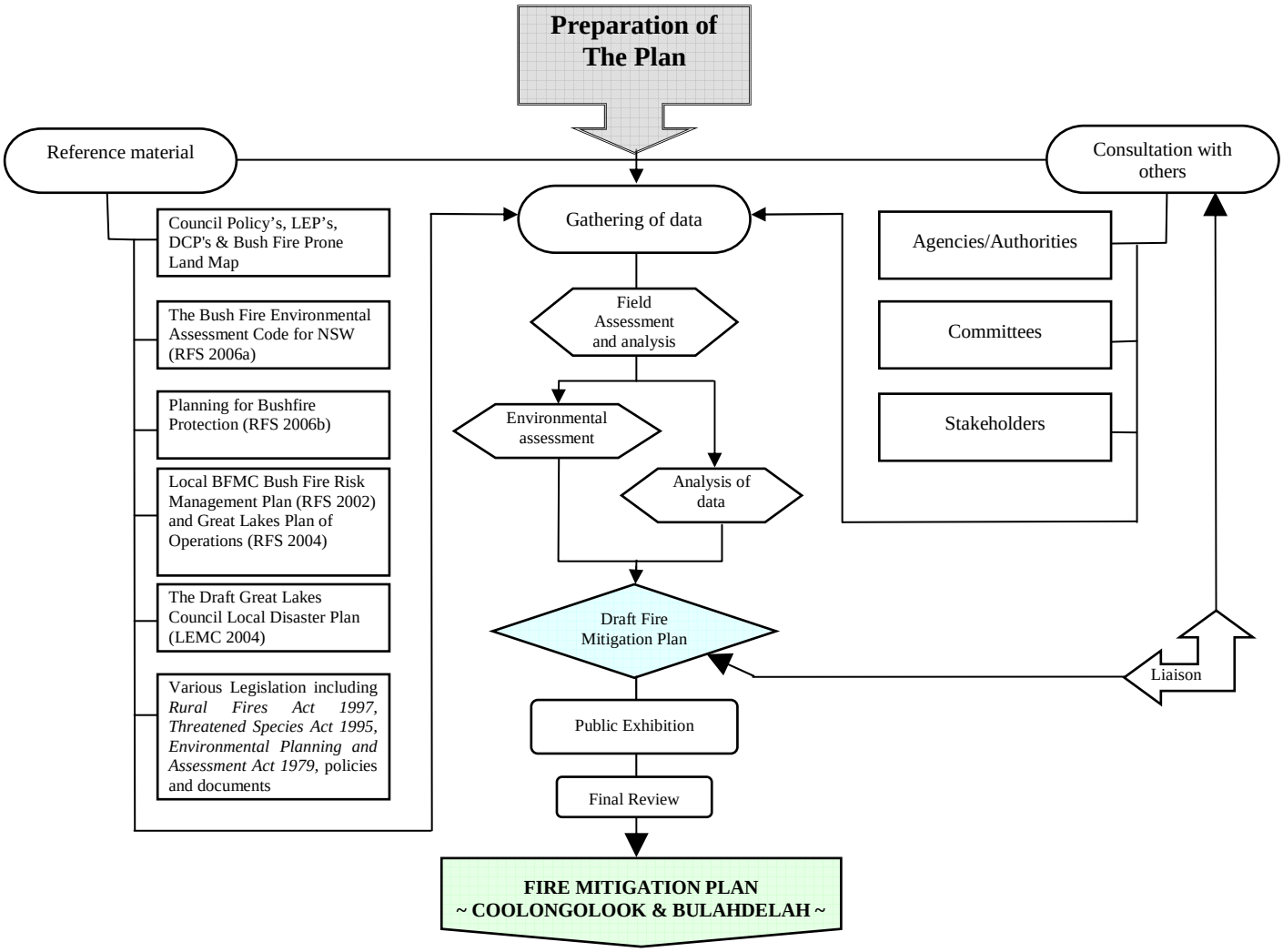


Figure 2: The planning process.

The fire mitigation plan meets fire responsibilities of Council, provides an educational tool for managers and the community and identifies on-ground operational works.

The plan also provides additional information to assist bushfire operations and concurrently meets the objectives of the RF Act. The fire fighting functions are undertaken by the various fire fighting authorities, during bushfires and emergency incidents during suppression and mitigation of bushfires on adjacent to or within Council Managed Land.

Understanding the document

The plan has been divided into 3 parts, with 8 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 – The Strategy

Section 7	—	Identifies and discusses the local environment, features and local fire issues.
Section 8	—	Identifies management strategies for fire management zones relating to assets in the area.

Part 3 – Other related fire information

Appendices	—	Provides background information on fire management planning referred to within the body of the Plan, and information to assist in the interpretation of the plan.
References	—	Reference material.

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 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 various Acts such as, the RF Act, the *State Emergency and Rescue Management Act 1989, and the Rural Fires Regulation 2002* the *EP&A Act* and the Environmental Planning and Assessment Regulations 2000 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 (Appendix II) 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.

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

A Bush Fire Management Committee for the LGA is required to meet specific requirements under the RF Act. A Council officer and an elected Councillor represent Council on the Great Lakes Bush Fire Management Committee (BFMC). The committee prepares the Bush Fire Risk Management Plan (BFRMP) and the Plan of Operations (Ops Plan) and meets reporting requirements within the RF Act. The BFRMP identifies the bushfire risk to assets within the local area and is a key document in providing information for the preparation of the Plan.

Great Lakes Local Emergency Management Committee

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 plan guides 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) works cooperatively with Council to ensure the effective allocation of funding, management, maintenance and 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 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, provides fire protection, as well as educating the community through prevention programs and to build community resilience by preparing for emergencies. The NSWFB also provides urban search and rescue, hazardous material response, natural hazards response, emergency life support, terrorist consequence management and other emergency management capabilities.

Department of Environment and Climate Change (NSW)

The Parks and Wildlife Division of the Department of Environment and Climate Change (NSW), (DECC) (formerly Department of Environment and Conservation (NSW)) (commonly known as the National Parks and Wildlife Service (NPWS)) are a recognised fire fighting authority and public land manager who implement fire and environmental management obligations under relevant legislation. The organisation prepares fire management plans and identifies fire management strategies in accordance with DECC plans, policies and procedures such as those detailed in the "NPWS Fire Management Manual" (NPWS 2001).

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 forest 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 Trustee's) during the management of reserves assist in protecting assets, neighbouring assets and communities as required by the DL (DL 2005b).

Country Energy/TransGrid

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

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.

MidCoast Water

MidCoast Water is responsible for the supply of reticulated water and sewage system within some areas in Great Lakes LGA. 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.

Private Landholders

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

Bushfire Risk Description

Overview of the Bushfire Risk Management Plan

Bushfire risk analysis is a mechanism to undertake risk assessments (in the field) on assets including the threat to life and property as well as natural and cultural heritage. By preparing for the imminent advancement of a bushfire, 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 bushfire 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) to withstand or recover from a fire event.

As described within the BFRMP, the bushfire risk categories within Coolongolook and Bulahdelah are a consequence of the proximity of bushland areas to the villages.

Bushfire 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.

Bush Fire Risks

The management of bushfire hazards, through reducing fuels within bushland areas, assists in the protection of the community. By maintaining FMZ's adjacent to assets the bushfire risk is reduced as there is less available fuels present. This subsequently reduces fire intensity and/or ease of ignitions.

Urban development is amongst these bushland interface areas and adjoins reserves retained for conservation and public recreation. These areas if ignited are likely to sustain bushfires, and may affect adjoining properties. Some of these areas protect environmental assets such as, key habitats (including SEPP 14), or are part of fauna corridors which link with existing regional reserve systems.

Active vegetation management lessens the impact on residents, visitors and fire fighters during a bushfire incident. As there is a chance of the adjacent bushland to burn and potentially be a source for ember attack, this re-enforces the importance and requirement for householders themselves to be prepared, and undertake their own fire mitigation works to reduce the fire threat.

The frequency of ignitions for bushfires is known to be greater near populated areas, as the opportunity is increased from accidental ignitions (motor vehicles; machinery; equipment;

ember attack) or deliberate ignitions (arson) (due to close proximity to residential areas). Other ignition sources include motor vehicle accidents, lightning or escaped hazard reductions. The likelihood of ignitions varies and can be reduced by educating the community to be fire wise. In addition, by preventing bushfires to spread rapidly or be of high intensity, reduces the likelihood and subsequent impact of bushfire on the community.

The spread of bushfire may be reduced by utilising existing fire advantages lines, both natural and man made including roads and tracks, transmission lines, waterways, lakes and wet gullies. These may be used as control lines during incidents, however spotting which can occur during extreme fire weather conditions, may extend as far as 5 kilometres from the source. Having these within urban and rural areas, or adjacent to assets reduces the bushfire risk as the fire run is limited.

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 the fire could spread. The preferred fire intensity within fire management zones (FMZ's) adjacent to assets is ideally low—moderate. Fires may spread from adjoining areas or ignite as spot fires within the FMZ's.

Topography affects the fire intensity and spread of fire. Steeper slopes enable fires to run in places at a greater rate of spread than those with lesser slope. Fires travel much faster uphill than downhill and with every 10 degree increase in slope; it doubles the rate at which the fire travels.

The type and arrangement of fuels available affect fire spread and fire behaviour in an area. Drier sclerophyll forests can burn more frequently and more intensively (depending on years since last fire) than Wet sclerophyll forests as fuel availability and accumulation rates differ for each vegetation community. Also the moisture content and quantity of fuel is important to fire behaviour as the ROS alters with aspect i.e. North-westerly aspects have lower fuel loads and are generally drier.

Bushfire 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.

The BOM assist fire-fighting authorities to predict fire weather and monitor bushfire weather during fire fighting operations. These fire-weather warnings (bushfire alerts) distributed during the bushfire danger period to the RFS who then broadcasts extreme bushfire conditions and requirements, such as total fire bans and the cancellations on the issuing of fire permits for the lighting of fires during 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. This assists in fire authorities being prepared for a particular level of alertness for existing bushfire weather conditions.

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) and therefore risks of bushfire.

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). This is evident by the number of fires recorded in the local area during this period. Similar weather patterns may strike at any time, causing higher fire risks as weather conditions; increased soil dryness, extremely low humidity's and high temperature are ideal fire conditions.

Field Assessment Methodology

The Plan incorporates site inspections; capture hazard assessments; potential localised bushfire risks and local environmental effects. The outcomes, details hazard reduction requirements for fuel reduction with applicable techniques, which meet legislative requirements, with limited impact to local ecological values, yet simultaneously, consider protection of life and property.

Field assessments are undertaken to provide data for analysis by managers. The assessment process follows guidelines provided by the RFS, and is an acceptable process for fire managers to determine and analyse the hazard and risk of bushfire within and adjacent to bushfire affected 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 quantitative assessment of overall fuel hazards (OFL), are given as low, moderate, high, very high and extreme ratings.
The field 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) (i.e. 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 the fire could spread. The preferred fire intensity within FMZ adjacent to assets is ideally low—moderate. Fires may spread from adjoining areas or ignite as spot fires within the FMZ's.

The fire management strategies included within section 8 identify fire mitigation works proposed in FMZ's including asset protection zones (APZ's), strategic fire management zones (SFAZ's), land management zones (LMZ's) and when necessary fire exclusion zones (FEZ's) within the study area.

Local features

Fragmented remnant bushland areas are a result of either extensive clearing for urban development or for agricultural purposes. This increases the complexity of fire fighting as land management is within multiple forested areas rather than a single unit. Subsequently this has increased the number of adjoining properties, the probability of ignition sources and potential impact on assets and the community.

The existing management and land use practices vary within each property. Property owners implement hazard reduction on individual properties, which assists in reducing fire intensity, and therefore threat to neighbouring assets. It also assists in dissecting potential fire paths, and increases the access to bushfires.

Having fire management zones within these fragmented bushland areas adjacent to residential areas assists in providing fuel reduced areas. Fire mitigation works that are implemented regularly on managed land within bushland areas or as part of the maintenance schedule for open space recreational area's, ensures improved fire management planning and a higher chance of limiting the impact from bushfire on the community.

Fire advantage lines exist within urban and rural areas including roads, tracks, transmission lines, waterways, lakes and wet gullies, which all can assist in fire operations. The provision of reticulated water assists fire fighters to suppress fires. Larger water bodies such as large dams or lakes can also provide additional water source for fire fighters and aerial water bombing craft.

With coastal sea breezes and movement of major fronts moving northward, fire paths can move 180 degrees during a bushfire depending on prevailing weather patterns (Figure 3). The coastal weather patterns including the onset of the afternoon sea breeze can bring with it a moister environment, which increases the relative humidity and associated conditions to slow the movement and reduce longevity of fires on the coastal areas.

Seasonal thunderstorms occur locally along the coastline and further inland, which are common in summer and are known to be a source of ignition of bushfires.

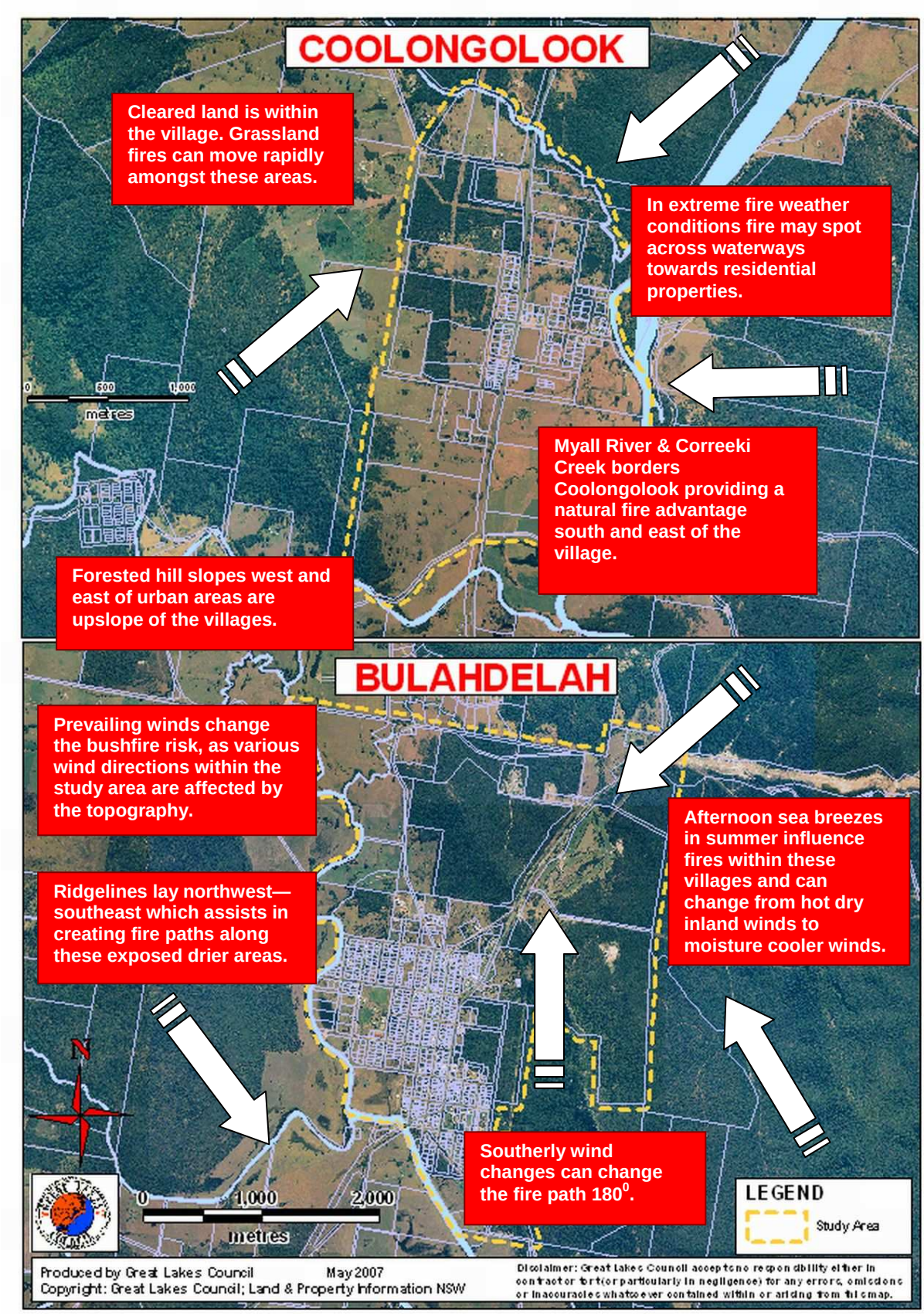


Figure 3: Bushfire Risk to Coolongolook and Bulahdelah.

Risk to Life and Property

The BFRMP identifies the bushfire risk rankings at various locations within the LGA including areas being within an insignificant, minor, moderate, major and extreme bushfire risk areas. The higher the risk (i.e. the closer the bushfire threat) the more chance fire has a greater impact on the asset or the community. 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 IV). This assists planners when implementing fire management under the various legislative documents and procedures.

Risk to Natural Heritage

A field assessment of the fire risk to adjacent assets from Council bushfire affected land and the identification of fire threats is part of the analysis within the plan. On site environmental assessment within these bushland areas although fragmented and small at time, often reveal the importance for the protection these habitats for local species, and at times individual threatened species or their habitat. In addition an environmental assessment and review of the significance and the impact on local reserve system ensures a greater understanding of environmental assets/values.

The North East Comprehensive Regional Assessment (CRA) assessed the regional status of ecosystems within the LGA, and identified vegetation communities that require further protection. Mapped Key Habitat or Regional Corridors have a high conservation value as a result of regionally mapped significant vegetation and the proximity of the regional status of ecosystems within the LGA is derived from the CRA. Reference to this data is important when implementing fire management planning (Appendix V).

When implementing fire management planning it is very important to protect or limit the impact on forested areas with conservation values. Areas, which have high conservation values and subsequently higher environmental bushfire risks, require special management practices, both within and nearby to ensure their ongoing environmental protection and enhancement. Any area classified as being classified as, SEPP 14 (Coastal Wetlands), and SEPP 26 (Littoral Rainforest) are environmentally significant and management of these areas is important to ensure their continued protection and enhancement of their conservation values.

Biodiversity–burning practices has been identified within the table (Appendix VI), which assists planners to review, by desktop, vegetation types, their vegetation formations and subsequent fire frequencies. Keith (2006) describes the vegetation formations (Appendix VII), which are also used widely for fire management and for bushfire protection assessment within the Code and the PBP.

Hazard reduction burning prescriptions for SFAZ and LMZ's are also included from the Code, which consider biodiversity in the determination of burning practices and intervals. The final

determination for burning regimes uses this information in conjunction with a site assessment.

This table and the digitally mapped interpretation (further within the plan) of this data assist planners when identifying fire management requirements for existing and new developments and subdivisions during the development assessment process.

Risk to Cultural heritage

The conservation and protection of significant cultural heritage is important when undertaking any activity as fire can have a detrimental affect on a heritage site or an aboriginal site. Management practices must be in place to ensure this when planning to undertake fire mitigation activities.

When interpreting approved fire management activities in relation to the DECC (Parks and Wildlife Division) maintained Cultural Heritage database (being the Aboriginal Heritage Information Management System, AHIMS), consideration to their impacts is important when planning Councils fire mitigation works. A request to search for Aboriginal Objects and Aboriginal Sites within the study area is 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 the LEP. Within Great Lakes LEP, Schedule 2 lists heritage items as local and regional (but not of state significance) within the LGA.

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 fuel levels to minimise potential damage to life, property and the environment if a bushfire does occur.

The BFEAC and the PBP guides hazard reduction work requirements for fire management zones of existing buildings and future developments and subdivisions by specifying hazard reduction areas, requirements for roads and perimeter fire trails.

Hazard reduction options include:

- Hand removal of shrubs.
- Tree removal.
- Clearing away fuels such as leaves, pruning and clippings.
- Clearing out gutters.
- Mechanical mowing, slashing, ploughing, trittering[2]; bulldozing.
- Reducing fuels by grading or and
- Hazard reduction burning including pile burning (1.5m high piles) or prescribed burning of vegetation.

Management of fuels

Graduated fuel management of hazards adjacent to development 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 FMZ's including APZ, SFAZ, LMZ and FEZ's.

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 is 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.

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

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 1). Council has adopted the FMZ's and strategies as defined within the BFRMP. New developments with APZ's comprise of two components, being the outer protection area (OPA) and the inner protection area (IPA).

The widths of APZ fuel reduced areas are calculated using predetermined widths appropriate for various slopes (Appendix VIII). 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 by providing a shield against strong winds, radiant heat and flying embers.

The BFEAC or other environmental assessment may be required to undertake mechanical fuel reduction activities or to initiate low-moderate intensity hazard reduction burns or biodiversity burns within APZ, SFAZ and LMZ's.

SFAZ can consist of fire advantages or fire trails within or surrounding a development or in remote areas in larger bushland areas. Fire trails are designed to provide access for fire fighting personnel and fire fighting units during incidents or planned fire operations or provide routes for evacuation for the community. Council and private property have a variety of fire trails and fire advantages (including unformed roadways) within the LGA that are identified as strategic fire advantages.

These fire trails have a classification system applied to them as defined by the Bushfire Management Committee. The categories of fire trails that exist within Great Lakes LGA include primary (access for heavy, medium and light fire appliances) and secondary (access by light fire appliances (sometimes medium-heavy)) Dormant—trails are those that are regenerating or have been rehabilitated but can be used as a control line in the event of a bushfire.

Table 1: Fire management zones.

Fire Management Zones[3]	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	▪ Existing assets maintain fuel levels 8t/ha or below& retain 30% for hospices ▪ Burn to reduce 80% fine fuels when appropriate ▪ Maintain OFL at moderate levels (8t/ha or below) in OPA and 5t/ha and below in the IPA for new developments.
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 ✓ 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

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

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 the 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 and consider potential environmental impacts of any, proposed fire management activities.

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. Mosaic burns, also creates habitat complexity and diversity and assists floral and faunal

assemblages. 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 IX, 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. 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 VI identifies the currently accepted biodiversity thresholds for vegetation formations (Keith 2006) for all 65 vegetation communities within Great Lakes LGA, (as

identified within the Draft Great Lakes Vegetation Survey 2004a: 2004b) as adopted from the DEC (Parks and Wildlife Division) (DEC 2005a; Bradstock *et al* 1995). Within this table specific minimum fire regime for SFAZ's and LMZ's 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 l 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. This is enhanced by the adaption of appropriate fire management. The Great Lakes Council area has existing fauna corridors and key habitat areas, which have been defined by the DEC (DEC 2005b). Great Lakes LGA has very significant faunal species diversity locally with four hundred and ninety-nine (499) faunal species identified. Also there is significantly high floral species diversity with one thousand four hundred and twenty-eight (1,428) floral species present. There is also twenty four (24) threatened species and seven (7) ROTAP species in the LGA.

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 (Schedule 1, Part 2 of the TSC Act) and endangered ecological communities (Schedule 1, Part 3 of the Act) in NSW. Three (3) endangered populations and ten (10) listed ecological communities occur locally. This includes:

- Endangered Koala, Hawks Nest and Tea Gardens population.
- Endangered Emu population in the NSW North Coast Bioregion.
- Rhizanthella slateri in the Great Lakes LGA.
- Lowland Rainforest on floodplain in the NSW North Coast Bioregion.
- Lowland Rainforest 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 in the NSW North Coast Bioregion.
- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast Bioregion and
- Themeda grassland on seacliffs and coastal headlands in the NSW North Coast Bioregion (TSC Act 1995)

There are some mapped vegetation communities types that are known or likely to constitute EEC. In a regional context those forest community types considered vulnerable are; Paperbark (31); Swamp Mahogany/ Paperbark (30/ 31); and Paperbark/ Swamp Oak (31/32). In addition, those forest types that may also constitute ECC includes Fig/Giant Stinger (6); Myrtle (23) and Myrtle and Fig/Myrtle (6/ 23); Palm (7), Palm/Myrtle (7/ 23) and Palm/Flooded Gum (7/ 48); Yellow Tulipwood (22); Tuckeroo (24); and Headland Brushbox (25) forests within Littoral Rainforest in the NSW North Coast Bioregion, and in the NSW North Coast Bioregion or within Lowland Rainforest on floodplain. Swamp (231) is considered to occur within Coastal Saltmarsh or Freshwater Wetland in the NSW North Coast Bioregion.

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 2 shows the conservation significance within Great Lakes.

Table 2: 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)**
State & Nationally Threatened flora species	3 (E) & 8 (V)	5 (E) & 10 (V)
State & Nationally Threatened fauna species (26 mammals, 2 reptiles, 7 frogs & 47 birds)	4 (E) & 7 (V)	12 (E) & 70 (V)
International migratory wader species (JAMBA[4], CAMBA[5], Bonn Convention[6])	35	-
International migratory waterbird species (JAMBA, CAMBA, Bonn Convention)	21	-
International migratory near-shore seabird species (JAMBA, CAMBA, Bonn Convention)	7	-

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 V) for consideration when identifying fire management strategies.

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.

[4] Japan-Australia Migratory Bird Agreement (JAMBA)

[5] China-Australia Migratory Bird Agreement (CAMBA)

[6] 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.	RFS
✓ Bush Fire Environmental Assessment Code for NSW.	RFS
✓ Threatened Species/Threatened species hazard reduction list for the Code within each LGA.	DECC/ RFS
✓ Geographic information system layers.	GLC/ RFS
✓ Documentation on threatened and vulnerable species that have specific management consideration to fire or mechanical impacts.	RFS/DECC
✓ Updated Atlas of the NSW Wildlife records/Local records.	DECC/GLC
✓ Updated fire history records.	RFS/DECC
✓ Species impact statements.	GLC/DECC
✓ Environmental impact assessments or reviews of environmental factors.	GLC
✓ Eight part tests that apply to the area.	GLC
✓ Management plans for the area.	GLC/DECC
✓ Strategic plans.	GLC
✓ Detailed Local Environmental Studies.	GLC/DECC
✓ 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 - SECTION 7

Coolongolook and Bulahdelah Bushfire Strategy

Location

Within the plan, the two (2) parts of the study area are Coolongolook and Bulahdelah, which are inland of Forster. Both are situated adjacent to the Pacific Highway. The study area includes 1,212 hectares of urban land, rural areas and some bushland areas with an estimated population in 2001 within Bulahdelah and Coolongolook (including Wootton and Bunyah) of approximately 1,161 and 380 respectively (GLC 2003).

Thirty-two (32) Council managed land properties are recorded within the study area. This includes rural, residential properties, road reserves (unformed – forested) and parks for recreation and environmental protection, which cover approximately 45 hectares. Of these, seventeen (17) individual parcels combine as fourteen (14) managed properties (including 1 forested road reserve), comprising 27 hectares being bushfire affected including Bushfire Prone Land (Figure 4, Table 3,). The information tabulated includes those such as the property name, Council reserve number and the corresponding vegetation community type present.

The remaining 18 hectares of small remnant bushland areas and cleared areas are used for recreational reserves or sports fields and are not considered to be affected by bushfire or be a bushfire hazard. In addition, 199 hectares of land is managed by other government agencies such as CL, DPI (Forest) and DECC (excluding road reserves). The remaining 969 hectares consist of both grassland and bushland areas within private holdings.

Community Assets

The Coolongolook and Bulahdelah study areas comprises of residential, commercial, special purpose and rural properties that are at times adjacent to bushland areas (Figure 4). Before legislative changes took affect in 2003, Council approved buildings complied with current policies at the time.

Dwellings built to meet requirements within the document "Planning for Bushfire Protection", and the Australian Building Standard AS 3959 has a bushfire standard structure, which can withstand a higher radiant heat flux. These fire regulations for development approvals have conditions to protect building in the event of a fire including hazard reduction requirements.

Additionally the Code provides guidelines for fire protection of existing buildings, which affects adjoining property owner's fuel reduction works.

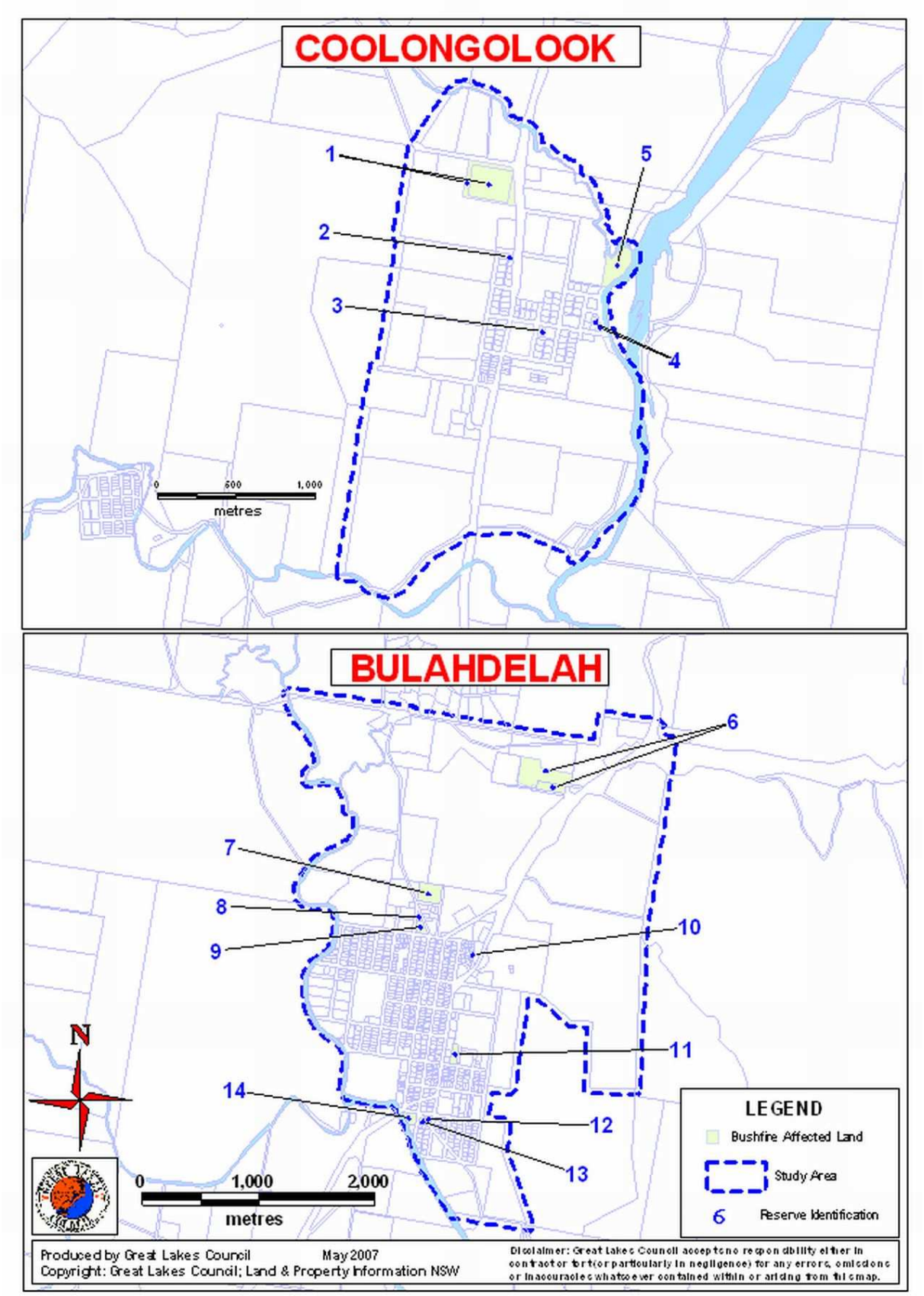


Figure 4: Location of Council managed land affected by bushfire in Coolongolook and Bulahdelah.

Table 3: Bushfire affected Council Managed Land within the study area.

ID	Property Name	Reserve Number	Lo t/ DP	Ha	Vegetation Community Type	Land Type	Managed by
COOLONGOLOOK							
1	CEMETERY COOLONGOLOOK	Crown Reserve - R 14674	Lot 16 DP 1001975	5.15	▪ Cleared ▪ White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum	Standard	Council
			R 14674	2.35	▪ Cleared ▪ White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum	Standard	Council
2	Cnr Lot 10 Sec 2 DP 758278	Cnr Lot 10 Sec 2 DP 758278	Cnr Lot 10 Sec 2 DP 758278	0.123	▪ Cleared	Operational	Council
3	Coolongolook Rural Fire Brigade	RES 48 (Crown R 83386)	Lot 9 Sec 15 DP 758278	0.142	▪ Cleared	Standard	Council
4	Cnr Lot 4 Sec 6 DP 758278 & Laneway	Cnr Lot 4 Sec 6 DP 758278 & Laneway	Cnr Lot 4 Sec 6 DP 758278	0.1162	▪ Cleared	Operational	Council
			Laneway	0.0321	▪ Cleared / Regrowth	Road Reserve - Forested	Council
5	Cedar Park	RES 68 (Crown R 85987)	Lot 23 DP 753160 RES 85987	2.792	▪ Cleared ▪ Flooded Gum	Community Land	Council
			SUB TOTAL	**10.71 Ha**			
BULAHDELAH							
6	BULAHDELAH LANDFILL (PART)	RES 81	Lot 127 DP 753150	1.601	▪ Cleared ▪ Sydney Peppermint	Standard	Council
	Addition to Landfill	Lot 23 DP 1089772	Lot 23 DP 1089772	7.157	▪ Cleared ▪ Sydney Peppermint/ Swamp Mahogany ▪ Smooth-barked Apple-Sydney Peppermint/Stringybark	Standard	Council
7	Cemetery	Lot 7015 DP 1002815	Lot 7015 DP 1002815	3.228	▪ Urban ▪ Cleared ▪ Smooth-barked Apple-Sydney Peppermint/Stringybark	Standard	Council & Crown
8	Pound	RES 67 (CL - R 85772)	Lot 7012 DP 1030824	0.216	▪ Urban	Standard	Council
9	Pound Holding Yard	RES 1 (CL - R 220)	Lot 7013 DP 1030824	0.813	▪ Urban	Standard	Council
10	RES 5179	RES 5179	Lot 16 DP 710307	0.223	▪ Urban	Community Land	Council
11	Council Works Depot-Bushfire-VRA Shed	Crown R 76622, Lot 7010 DP 1054330	Lot 7010 DP 1054330	0.9	▪ Urban ▪ Sydney Peppermint	Standard	Council
12	RES 5190	RES 5190	Lot 1 DP 718465	0.314	▪ Urban	Community Land	Council

ID	Property Name	Reserve Number	Lo t/ DP	Ha	Vegetation Community Type	Land Type	Managed by
13	Court House	Court House	Lot 204 DP 753154	0.219	▪ Urban	Community Land	Council
14	Church St Foreshore Recreation Reserve	RES 106 (CL - R 91201)	Lot 7011 DP 1054333	0.881	▪ Urban	Community Land	Council & Crown
			SUB TOTAL	**15.55 Ha**			
			STUDY AREA TOTAL	**26.26 Ha**			

Public Utilities

Country Energy maintains electricity infrastructure in the study area. Reticulated water and sewage is available within Coolongolook and Bulahdelah and is maintained by MidCoast Water.

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.

Road Access

Within the Coolongolook and Bulahdelah urban area the bituminised roadways enable fire appliances to have good access throughout on the Pacific Highway. This enables support appliances from other areas such as Wootton, Nabiac and Tea Gardens to reach these villages. This egress provides good access for fire fighting units, residents, and visitors for use during fires fighting or use as escape routes. Roadside slashing broadens existing strategic fire advantages, enhancing the ability to prevent the spread, and which can also limit ignitions along roadsides.

Fire Trails/Fire Advantages/Control Lines

Council has a variety of fire trails and fire advantages (including unformed roadways) within the study area that can be used as strategic fire advantages. Fire advantages that are used during fire operations limit the spread of bushfires or are used as a control line (line or an area). These provide fuel-reduced areas, which limit the fire spread, whether natural (like rainforests; rivers; lakes; rocks) or man made (fire trails; roadways; unformed road reserves; APZ's and SFAZ's).

The internal road system within the villages and rural area consist of primary and secondary roadways, which provide fire access around Coolongolook and Bulahdelah. The river and creeks prevents fires directly spreading into the study area from the south, however in extreme fire events, spotting may occur across the river, through pasturelands from other directions.

Water Supply/Fire Fighting Water Supply/Aerial Access

Bulahdelah urban areas have reticulated water from local water supplies provided by MidCoast water. Fire hydrants provide water to fire fighters in the event of fire incidents. Alternative water supplies on residential or rural properties are often from on site water tanks or farm dams. Myall River and the Coolongolook River provide an unlimited water supply for protection and suppression during aerial operations.

Fire history

Fires are known to have regularly occurred within and neighbouring the study area and being within the vicinity of the coast, fires are often influenced by variable coastal weather. Planned prescribed burns and wild fires have been known to occur in forested areas within the study area. Locally fires have occurred mostly in spring, when the relative humidity is lower. Wildfires may also occur in late winter and early spring often from escaped hazard reductions.

Wildfires have occurred in the vicinity of Coolongolook and Bulahdelah during various bushfire seasons mostly beyond the study area boundary within elevated forested area except for the very large 1968/69 wildfire. Wildfires have occurred within Koolonock and Meyers Range (east) and Kyle Range (west) of the villages including areas within Bachelor and Wank Wauk State Forest (near Coolongolook), Myall River State Forest and Myall National Park (near Bulahdelah).

Wildfires have occurred within and surrounding the Coolongolook study area during the following fire seasons; 1968/69, 1980/81-83, 1984/85, 1989/90-92, 1994/95, 2000/2001 and 2002/03-04 and within the Bulahdelah study area in; 1968/69, 1974-75, 19777/78, 1979/80, 1984/89, 1986/87-91, 1995/96-98, 2000/2001-2002 and 2005/2006 (DEC 2005b; NSW RFS 2005b).

A more recent wildfire in December 2006/07 spread through the Bulahdelah State Conservation Area, the Bulahdelah Landfill (RES 6) and The Bulahdelah Cemetery (RES 7), through Sydney Peppermint, Swamp Mahogany, White Mahogany/Red Mahogany/grey Gum/Grey Ironbark. Being of a dry sclerophyll nature and extreme fire conditions the fire spread rapidly upslope to the ridgeline. Moisture low—lying forested wetlands remained unburnt in patches indicating less favourable conditions in these areas. Part of this area was also burnt the previous year in 2005 adjacent to the Pacific Highway. Frequent burning puts pressure on the longevity /viability and further establishment of fauna and flora species.

Private and government properties owners are known to undertake burning for land management purposes and hazard reduction through the non-bushfire season such as the nearby State Forest. These low or moderate intensity burns, do not threaten Coolongolook and Bulahdelah and the rural areas during optimum manageable weather conditions.

Bushfire Weather

Typically the local climate is warm-temperate; with generally warm to very warm summers and mild to cool winters. However, the Coolongolook and Bulahdelah area is at the boundary of the uniform rainfall and the mostly summer rainfall zones. Climatic data is available within or immediately adjacent to the LGA and historical relative humidly records (1961-1990) for Williamtown are documented in Appendix X (Bureau of Meteorology).

The local fire season is typically during the spring and early summer, when the climate is hot with occasional strong winds from summertime cold fronts, which can lead to extreme

erratic fire danger periods. Lack of rain, low relative humilities and high winds contribute to increased fire danger (BOM 2005b). In most years, the higher summer rainfall in February brings the normal fire season locally to an end, although some drier years have extended beyond this period. The fire season is dampened locally from December to May with some recorded drier weeks between rainfall events leading to drier soil moisture contents and fuels. The highest monthly rainfall is in March, which is near the end of the declared fire danger period.

During the fire season the mean daily minimum temperature, inland is 10ºC in October and rises to a mean daily maximum of 28ºC in February. These higher temperatures in the summer period are when extreme fire events occur.

The months of August, September and October has the lowest monthly rainfall coinciding with maximum daily temperatures rising from 18ºC to 26ºC and increased escaped hazard reduction or wildfire events. July is when the rainfall drops dramatically with much reduced rainfalls in August to November.

The local coastal wind patterns distinctly change from the morning to the afternoon 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 southwest-northwest. The shifting winds in summer from the west-northwest to the southeast-northeast are influenced by afternoon sea breezes. Southerly changes up the coast also cause unpredictable fire weather conditions, which push strong hot winds preceding the cold front, often followed by moister cooler conditions.

Natural and Cultural Heritage

Coolongolook and Bulahdelah's urban interface is amongst cleared and forested land adjoining both private and public lands. The bushland corridors link with the fragmented parks, road reserves and undeveloped residential properties.

The 173 hectares of development within the urban of Bulahdelah (mixture of forest and not forested) is generally within and surrounded by mainly grassland areas (876 hectares) and fragmented forested areas (479 hectares) including approximately 16 hectares of which is Council managed land affected by bushfire and assessed within the plan.

The Coolongolook urban area consists predominantly of grassland areas (3,119 hectares) and a few fragmented forested areas (300 hectares) including approximately a total of 11 hectares of which is Council managed land affected by bushfire and assessed within the plan.

The existing vegetation communities, which are amongst urban developments, represent original forest types or altered formations. Although fragmented, these areas are significant for vegetation and fauna habitat and thus serve to enhance conservation values of the local area. Fire management in these areas must consider the existing environmental values.

Within the study area the vegetation formations are predominantly Grasslands and Dry sclerophyll forest, with some areas of Dry sclerophyll forest/Forested wetland, Grassy Woodlands, Forested wetland and Wet sclerophyll forests communities. Some areas lack sub dominant and ground cover layers or possess altered structure as a consequence of human interaction (i.e. logging, slashing). The open undeveloped cleared areas have a mixture of landscapes including maintained parks; regenerating forests; or consist of agricultural pastures.

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 structure and floristic 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 15 natural vegetation communities were identified, which cover approximately 3418 hectares within Coolongolook and 1355 hectares in Bulahdelah study area (including grasslands). The forest types are those described in the Research Note 17 (Forest Commission of NSW 1989) and a map of the location of the vegetation communities is provided in Figure 5.

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.

Grasslands (Cleared land) cover approximately 85% of the study area. The vegetation formations within and adjacent to residential properties of villages include in decreasing order; Dry sclerophyll forest (12% cover); with the remaining areas (each with less than 2% cover of the mapped area) including; Dry sclerophyll forest/Forested wetland, Grassy; Grassy Woodlands; Forested wetland and Wet sclerophyll forest communities.

All naturally vegetated areas require the appropriate hazard reduction management practice to be implemented with respect of environmental sensitivities, in due recognition of risk management and ecological values and thresholds.

Any vegetation communities' that would satisfy the definition of Endangered Ecological Communities (EEC) on the TSC Act or are recorded by the State of Environmental Planning Policy (SEPP) (such as Coastal swamps (SEPP 14) are areas of high conservation value and require management practices to protect these areas. These include Coastal Saltmarsh, Freshwater Wetlands, Swamp Oak or Swamp Sclerophyll Forest on Coastal Floodplain. None were identified within fire management zones on Council managed land.

There are other vegetation communities mapped outside the study area which are 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 V). These however did not affect works within the identified reserves.

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 the study area. For example Reserve identification number 6, is within the area defined by DECC as Key Regional Habitat and Reserve identification number 6 are within the Regional Corridor. These reserves are an important link, which extends into the surrounding bushland areas.

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 (Keith 2005) (Figure 6) and are used to identify the desired targets for the frequency and intensity of prescribed or biodiversity burns (Figure 7).

The RFS specify within the Code, minimum fire regimes to meet biodiversity thresholds[7] within strategic and land management zones specific to the study area (Table 4) which assist fire management decisions by land managers.

[7] Refer to Table 4 (Specific to Coolongolook and Bulahdelah) or appendix VI (Entire Great Lakes LGA)

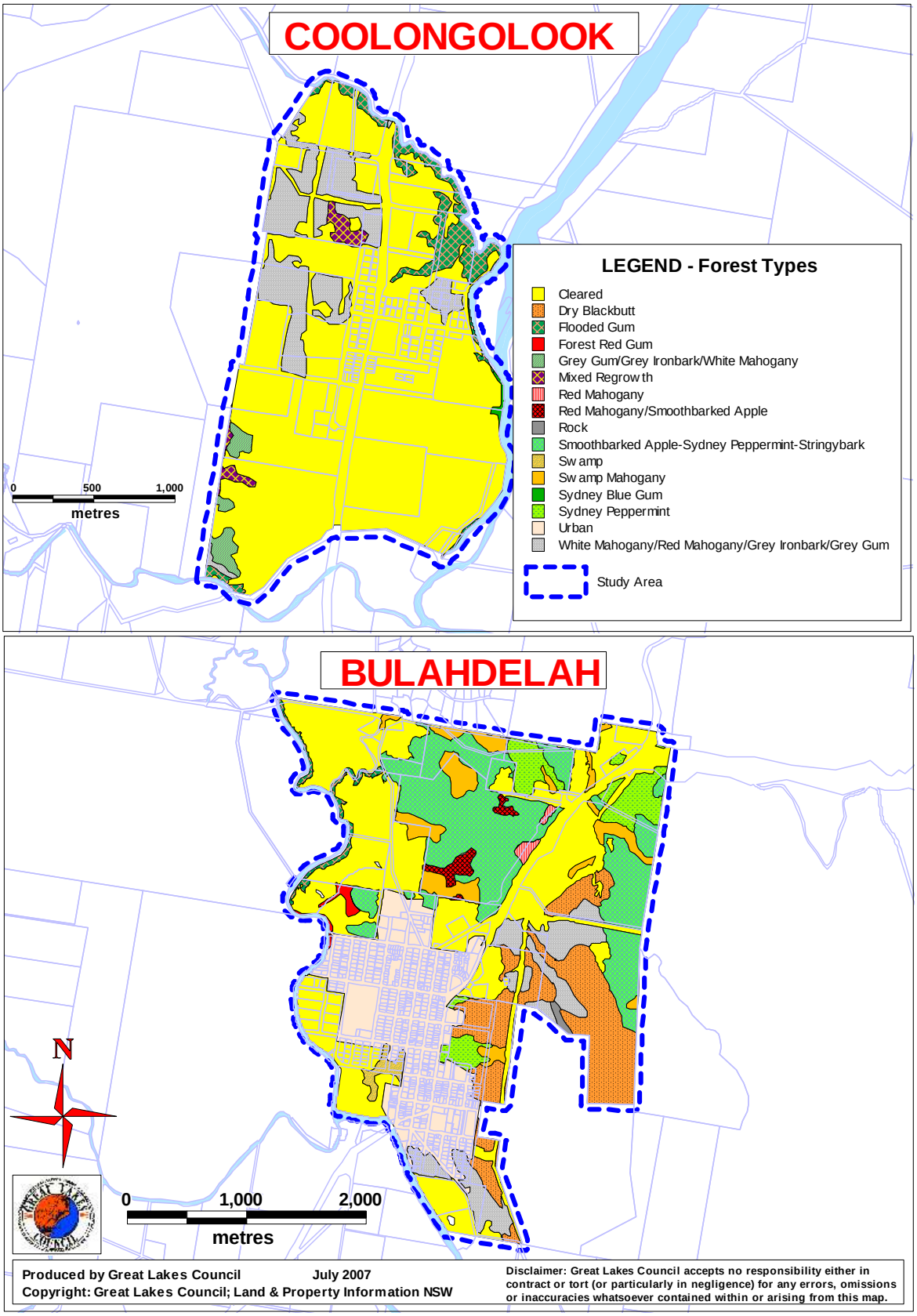


Figure 5: Vegetation Community Type within the study area.

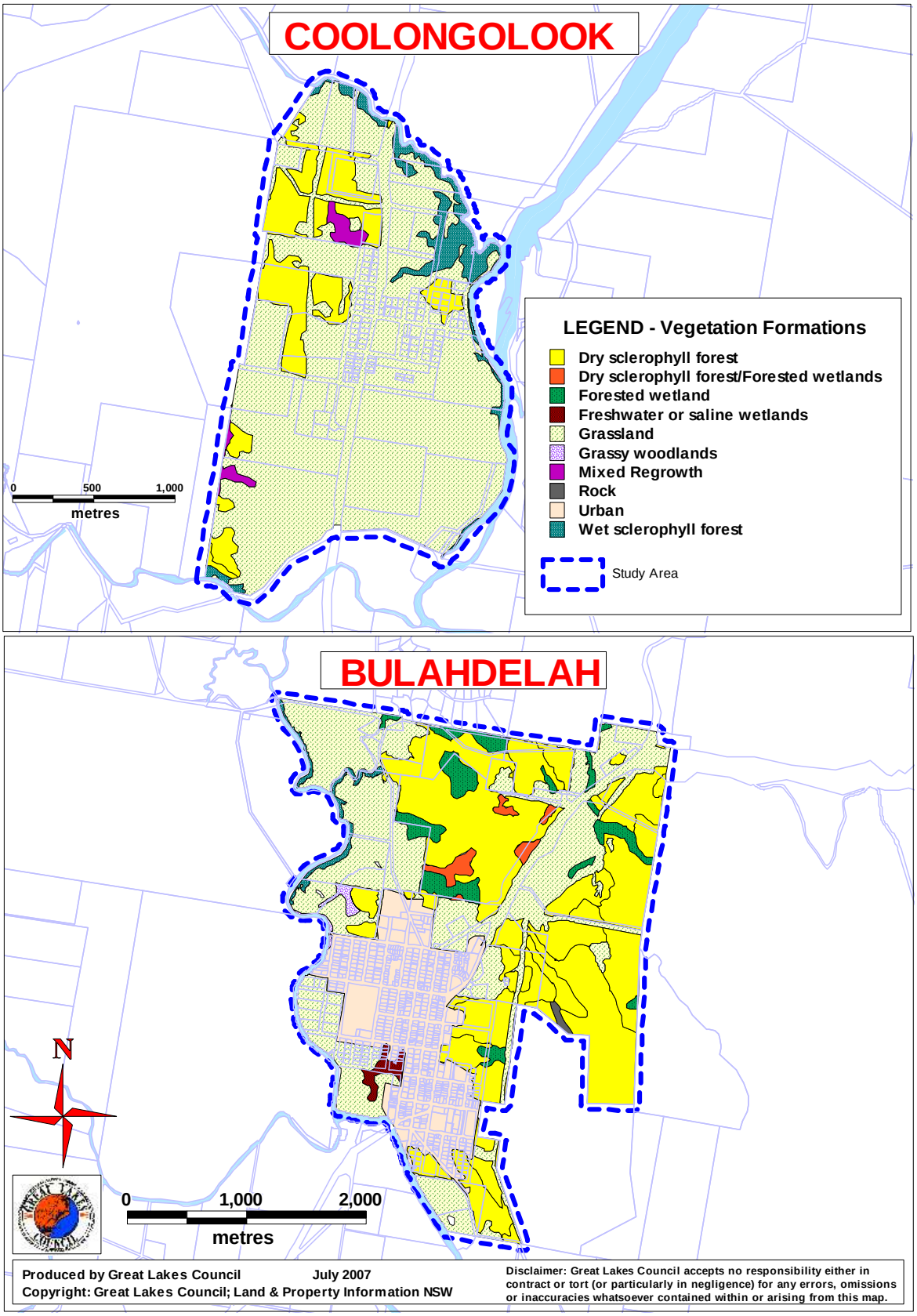


Figure 6: Vegetation formation for fire management

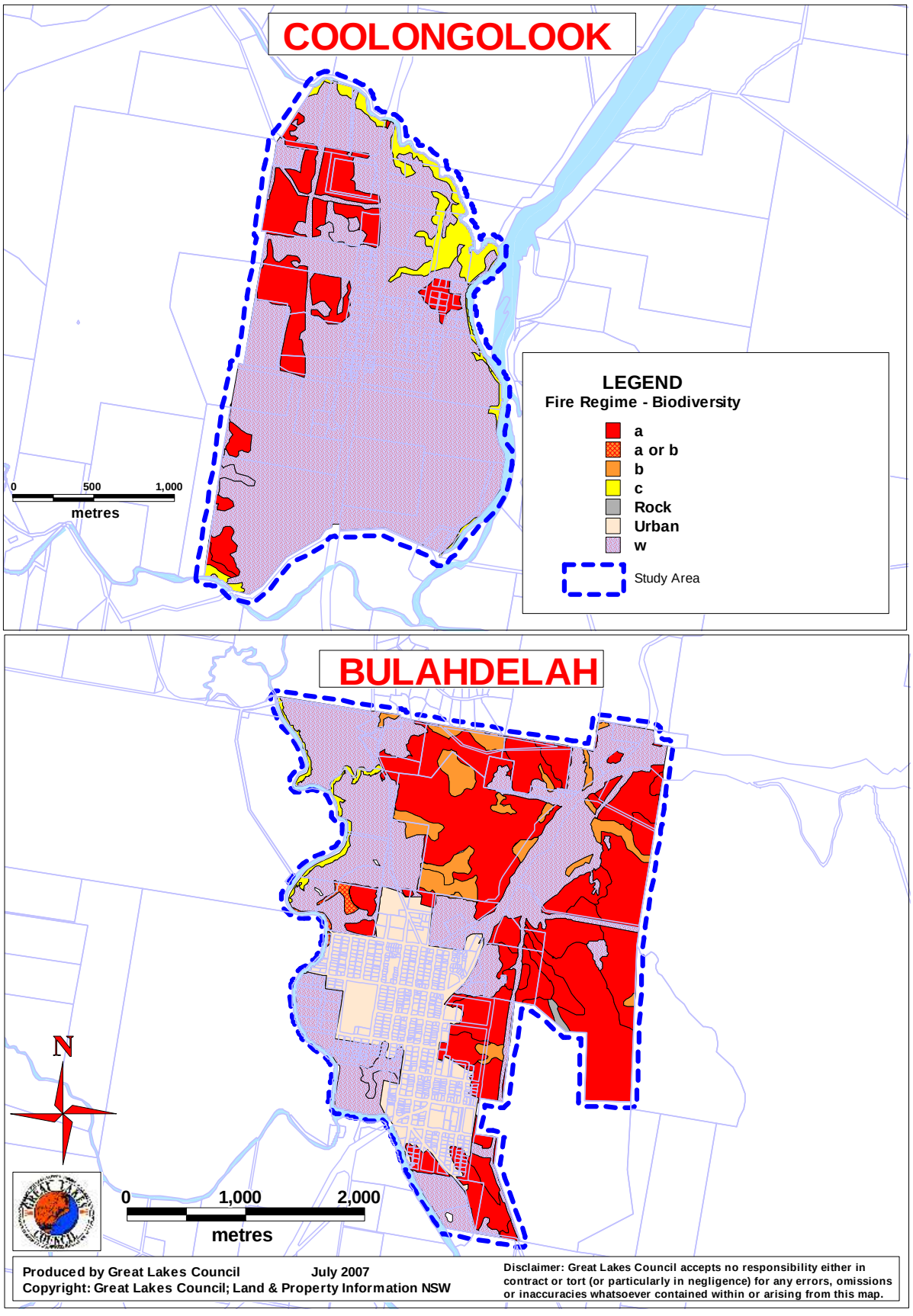


Figure 7: Biodiversity and fire regimes applied to local vegetation.

Table 4: Biodiversity thresholds and fire regimes to be applied to vegetation in Coolongolook and Bulahdelah.

Fire Regime	Biodiversity Thresholds [8]Within Strategic Fire Advantage (NPWS 2001) and Land Management Zones	Vegetation Community Type (Council 2004) *[#1 and #2 indicate options for the same community]	Forest Type (Council, DVS, 2003)	The Vegetation Formation (Keith 2004) Described By The RFS For Minimum Fire Frequency For SFAZ (BFEAC)	Minimum Year Fire Interval (BFEAC)[9] (SFAZ/LMZ)
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	Dry sclerophyll forests	5/8
		Forest Red Gum - #1	92	Grassy woodlands	5/8
		Grey Gum/ Grey Ironbark/ White Mahogany	62	Dry sclerophyll forests	5/8
		Smooth-barked Apple/ Sydney Peppermint/ Stringybark	106	Dry sclerophyll forests	5/8
		Sydney Peppermint	128	Dry sclerophyll forests	5/8
		White Mahogany/ Red Mahogany/ Grey Ironbark/ Grey Gum	60	Dry sclerophyll forests	5/8
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	Grassy woodlands	10/15
		Red Mahogany	68	Forested wetlands / Dry sclerophyll forests	7/10
		Red Mahogany/ Smooth-barked Apple	68/105	Forested wetlands / Dry sclerophyll forests	7/10
		Swamp - #1	231	Freshwater wetlands	7/10
		Swamp Mahogany	30	Forested wetland	7/10
c	❖ Avoid more than 1 fire every 30 years ❖ Avoid inter-fire periods > 200 years	Flooded Gum	48	Wet sclerophyll forests	25/30
		Sydney Blue Gum	46	Wet sclerophyll forests	25/30
d	Any fire occurrence (a limited recovery ability exists)	Swamp - #1	231	Freshwater wetlands	n/a
		Swamp - #2	231	Saline wetlands	n/a
NA	Not Applicable	Rock/Sand	-	Other	n/a
w	Use a, b, c, d options for biodiversity thresholds	Cleared/Grassland Mixed Forest Regrowth	220	Appropriate management practice	n/a w

Resources

Within the LGA there is a fleet of fire fighting appliances from 23 locations. The distances to Nabiac from other brigade stations, local to the area are shown in Figure 8. Coolongolook and Bulahdelah rural area has well maintained roadways including the Pacific Highway (Old and new) and The Lakes Way, which provide access and egress by the community and fire

[8] 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*.

[9] The Code specifies criteria and conditions when issuing a BFHRC for hazard reduction burning.

fighters. This allows efficient response time through the villages when neighbouring brigades are required.

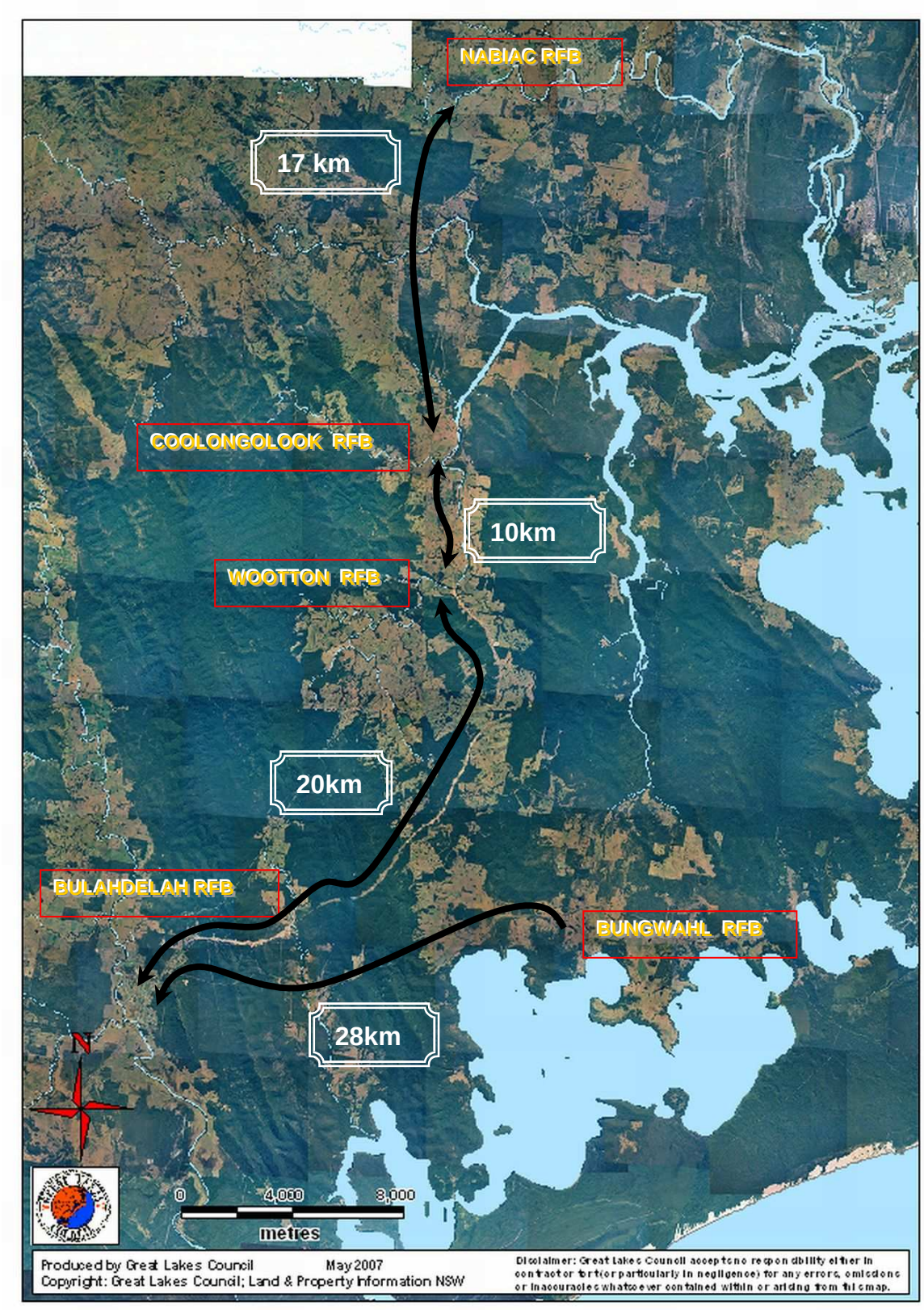


Figure 8: Distance to Coolongolook and Bulahdelah from other Rural Fire Brigade Station locations.

Risk to Life and Property

The BFRMP identifies Coolongolook and Bulahdelah study area as having *insignificant, minor, and moderate* bushfire risk rankings at various locations. The higher the risk (i.e. the closer the bushfire threat) the more chance fire has a greater impact on the asset or the community.

Eleven (11) localities have been identified where life and property[10] (LP) are directly threatened from the spread of fire or impacted by bushfire, from adjacent bushland to the urban interface (Table 5) (Figure 9). The bushland areas intermixed with the urban area of the Bulahdelah is the remnant of large scale clearing for agricultural purposes in this local area. Coolongolook although affected by land clearing, supports small fragmented remnant bushland areas amongst rural/residential and rural land although grasslands dominate the entire study area.

These surrounding bushland areas contain Dry sclerophyll forest, Grassy woodlands, Forested wetland and Wet sclerophyll forest communities which are able to support fire. These forested areas are on low-lying floodplains and undulating landscapes. Coolongolook and Bulahdelah are situated inland and are adjacent to the Coolongolook and Myall River; which assists in providing control lines, reduces the spread of fire and the threat from nearby bushfires (Figure 10).

Within the study area forested private land and Crown Land link with Council managed Land within Coolongolook and Bulahdelah. Historically within the local area, bushfires are influenced in the summer by north-southeast sea breezes and to a lesser degree southeast-southwest winds.

Table 5: Risk to Life and Property.

Code	Location	Description of risk	BFRMP Risk Rating
COOLONGOLOOK			
LP1	West	Western bushland interface west of the rural/residential properties.	Minor / Moderate / Major
LP2	Northeast	Northeastern bushland interface east of the rural/residential area of Coolongolook, west of the Coolongolook River.	Minor / Moderate / Major
LP3	Central	Grassland/bushland interface, within rural/residential properties, in the central area f the village.	Insignificant / Minor
LP4	East	Eastern bushland interface east of the rural/residential subdivision of Coolongolook, west of the Coolongolook River.	Minor / Moderate / Major

[10] Life and Property is identified on figures as LP with corresponding number identified in Table 1

Code	Location	Description of risk	BFRMP Risk Rating
COOLONGOLOOK			
LP5	South	Southern grassland interface adjoining rural/residential properties south of Coolongolook.	Insignificant / Minor / Moderate / Major
BULAHDELAH			
LP1	West	Western grassland/bushland interface adjoining rural/residential properties, west of Pacific Highway.	Minor / Moderate
LP2	Northwest	Northwestern grassland/bushland interface north and west of the urban area.	Insignificant / Minor / Moderate
LP3	West	Western grassland/bushland interface, of the urban area, east of the Myall River.	Insignificant / Minor
LP4	South	Southern grassland/bushland interface of the urban area, north of the Myall River.	Insignificant / Minor
LP5	East	Eastern bushland interface of the urban area adjacent to Bulahdelah State Forest.	Insignificant / Minor / Moderate
LP6	Northeast	The northeastern bushland interface, adjoining rural/residential properties, which link with the Golf Course and the Pacific Highway.	Minor / Moderate / Major

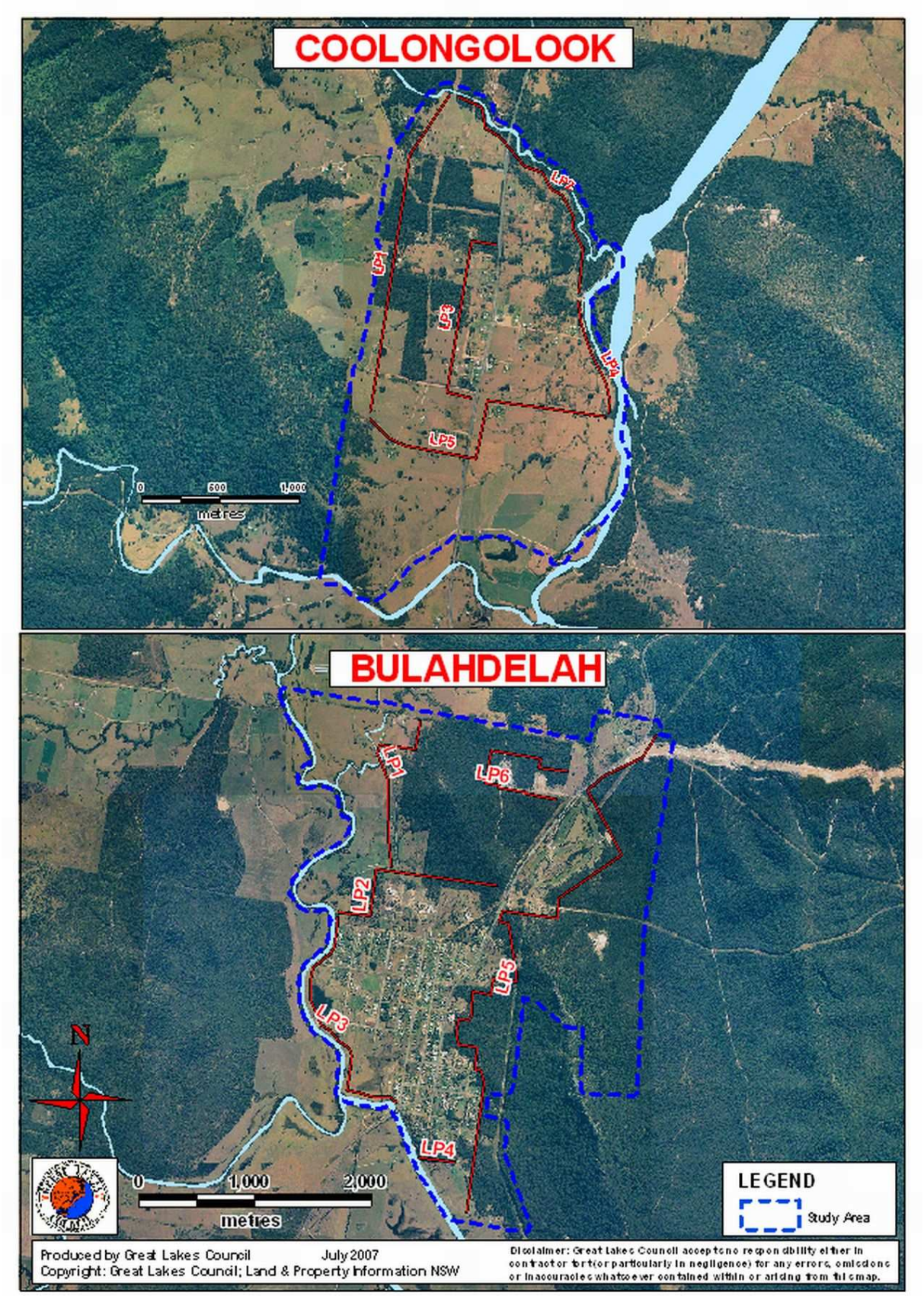


Figure 9: Location of Life and Property Risk.

Figure 10: Examples of Development within Coolongolook and Bulahdelah.

Risk to Natural Heritage

The BFRMP identifies and classifies Council reserves within Coolongolook and Bulahdelah as having *insignificant, minor, moderate and major bushfire environmental and ecological risks*[11]. Those Council managed areas affected by bushfire have been included within the table in appendix XI. The risk rating indicates the effects of fire on the land identified or the actual level of impact of fire on the environment.

The protection and enhancement of local reserves will assist in conserving habitats for local species, including threatened species recorded or likely to exist locally. Protection of forests adjoining these areas and corridors linking these to known reserve systems are all very important to conserve. This also includes vegetation community types, where the existing fire regime has either exceeded or does not support burning for biodiversity.

The Coolongolook and Myall River's and any creek or drainage lines that are part of a riparian zone require protection. It is important to implement sensitive mechanical hazard reduction activities in riparian areas to ensure the continued enhancement of these significant areas.

Within the study area there are no communities that appear to satisfy the criteria for listing as endangered ecological communities (EEC). The TSC Act guides the conservation and enhancement of these significant communities. Fire management planning incorporates legislation and objectives of biodiversity enhancement in areas nearby or within communities such as these.

The last recorded wildfire in Reserve 6 and 7 (in December 2006) burnt a majority of the reserve and if the next wildfire is in less than 5 years, means there will be a decline in biodiversity from being too frequently burnt. The adjacent Bulahdelah State Conservation Area is frequently burnt and combined with Council Reserve is highly significant and the continued protection and enhancement of the area is important. The reserve supports Forested wetland and Dry sclerophyll forests and is part of an important corridor linking with Bulahdelah State Conservation Area to the west and south which link with Bulahdelah and Wang Wauk State Forest.

Fire regimes have been identified for forest type within the study area (Table 4, Appendix VI), which incorporates fire frequencies from Bradstock *et al* (1995) and the RFS guidelines within the Code (2006a), which has provisions for the protection of biodiversity by defining guidelines for burning in SFAZ's and LMZ's.

The type of technique used to implement hazard reduction can be restricted but equally, assists in meeting bushfire requirements, having minimal impact on the environment and equally meeting legislation. Table 6 particularly focuses on conservation principles to be applied to activities in the field, which are implemented in a sensitive manner. In addition the

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

review for environmental assessment (appendix XII) specifies environmental safeguards and mechanical conditions when implementing activities on the ground.

Risk to Cultural heritage

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

Within Great Lakes LEP, Schedule 2 does list 5 heritage items and the adopted Draft Great Lakes Heritage Study list an additional 26 within the study area (partly adjoining) however these heritage items are not associated with, bushfire affected land within Coolongolook and Bulahdelah.

Table 6: 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. Retain 25-30% of total area of ground cover/elevated fuels for habitat. 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.

Key Fire Issues

The key fire issues (Table 7) have been identified through preparing the plan, which reiterates the direction of Councils fire management planning and the necessity to implement the bushfire mitigation work program to reduce the bushfire risk.

Table 7: Bushfire Risk Management.

Key Fire Issues	Actions
❖ A large number of properties are adjacent to grassland/bushland areas, which occur within the urban area.	✓ Provide FMZ's to reduce fuels by providing adjacent to assets, fuel reduced areas.
❖ In the event of a fire, adjoining properties with reserves will be fire affected.	✓ Strategically undertake fuel reduction activities to assist in minimising the spread of bushfire.
❖ Small fragmented bushland areas are recorded locally.	✓ Monitor fire fuel loads within asset protection zones through work programs.
❖ Spotting may occur across the urban areas, within fragmented bushland and grassland areas.	✓ Ensure asset protection zones within reserves are maintained to reduce bushfire hazards and impact from radiant heat on assets.
❖ Bushland areas require active fire management works to reduce fire potential.	✓ Apply sensitive hazard reduction works to maintain biodiversity.
❖ Adjoining properties need to be aware of adjoining FMZ's within reserves.	✓ Meet biodiversity requirements within bushland areas by programming fuel reduction burns to meet prescriptions.
❖ Increase community fire awareness and the importance of property protection from fire.	✓ Minimise tree removal and retain hospices for habitat.
❖ Minimise impact on bushland areas from inappropriate management techniques applied.	✓ Minimise the impact on bushland areas by applying environmentally sensitive activities, when implementing manual hazard reduction works
	✓ Implement community education for active property protection to reduce the chance and likelihood of bushfires occurring.
	✓ Educate the community to be bushfire aware and that the community can take steps to maintain and reduce the fire risk and impact on properties.

Outcomes
❑ Implemented strategic fire management planning.
❑ Reduced bushfire risk.
❑ Reduced bushfire hazards.
❑ Increased protection within bushland areas.
❑ Mapped bushfire regimes.
❑ Increased bushfire awareness.
❑ Coordinated bushfire management.

SECTION 8

Management Strategies

Management strategies for each APZ, SFAZ, LMZ or FEZ are outlined and guide manager's decisions for each property. These have been mapped and identified within each reserve or managed land. To assist with understanding the codes on the figures, refer to identification (ID) seen within Table 8, which identifies the relationship with the figures.

Table 8: Terminology used on figures within the plan.

ID	Description
8	Reserve identification number for bushfire affected land
LP	Life and property
A1	Asset Protection Zone reference number (preceded by locality code[12])
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)

The key elements to hazard reduction activities are those strategies identified by Council within Table 9.

Table 9: 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.

Table 10-15 contains relevant fire objectives and hazard reduction works applied to a particular zone, which may vary depending on the proposed management techniques.

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. Change is imminent and references to any other reports are intended as a guide only, as other management and planning decisions by managers may alter suitability 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 a total of twelve (12) APZ's have been identified within Council Land and reserves (Table 10-11 and Figure 11-16).

[12] Locality Code – An abbreviation of villages by letter (Coolongolook = C; Bulahdelah = BU)

Mechanical slashing within APZ's within bushland areas including public reserve areas, drainage reserves and road reserves, assists in providing fuel—reduced areas and increased protection of assets.

Strategic Fire Advantages

Mechanical slashing within SFAZ's and strategic fire advantages within bushland areas including public reserve areas, drainage reserves and road reserves, assist in protecting assets, strengthening adjacent APZ's or providing strategic areas to be used during fire operations.

Three (3) SFAZ's are recorded within Council land, which are fire trails (Table 12-13 and Figure 16-17) and one (1) SFAZ, which is maintained by hazard reduction burning.

Mechanical hazard reduction methods within Council road reserves adjacent to managed major and minor roads are authorised. This roadside slashing of SFA's, 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. This information is reported to the BFMC annually providing invaluable information to fire managers.

Land Management Zones

Council has mapped these zones and identified the vegetation communities within the identified 31 LMZ's within Council Managed Land. The fire management objectives in each LMZ vary depending on existing use (e.g. recreation) and/or environmental sensitivity are identified within Table 14.

Thirteen (13) LMZ's (C) have been identified within Council Land and reserves (Table 14-15 and Figure 11-16).

Biodiversity thresholds are described within (Table 4, Appendix IV) for the study area. The implementation of ecological based fire regimes of irregular mosaic burn patterns and minimal intervals between burns is important for managing bushland areas within larger zones.

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.

Where existing management within this zone, promotes cleared land, the land management type: whether lease area or commercial buildings, fire protection legislation applies to developments.

Environmental Constraints

The environmental assessment within appendix XII identifies environmental issues relating to fire mitigation works and identifies conditions and specifications of hazard reduction activities. The on-ground management of mapped fire management zones, described by width and length gives an indicative size. Reference to the map size and shape overcomes any discrepancies to the fire management zone.

Slashing too frequently 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 frequencies.

As part annual works program, monitoring of fire hazards is important as this guides the slashing and mowing regimes within FMZ's. Assessment is in accordance with this Plan guidelines and using reference material such as the Overall Fuel Hazard Guide Sydney Basin (NPWS 2003) or equivalent to assess fuel loads within Council Land.

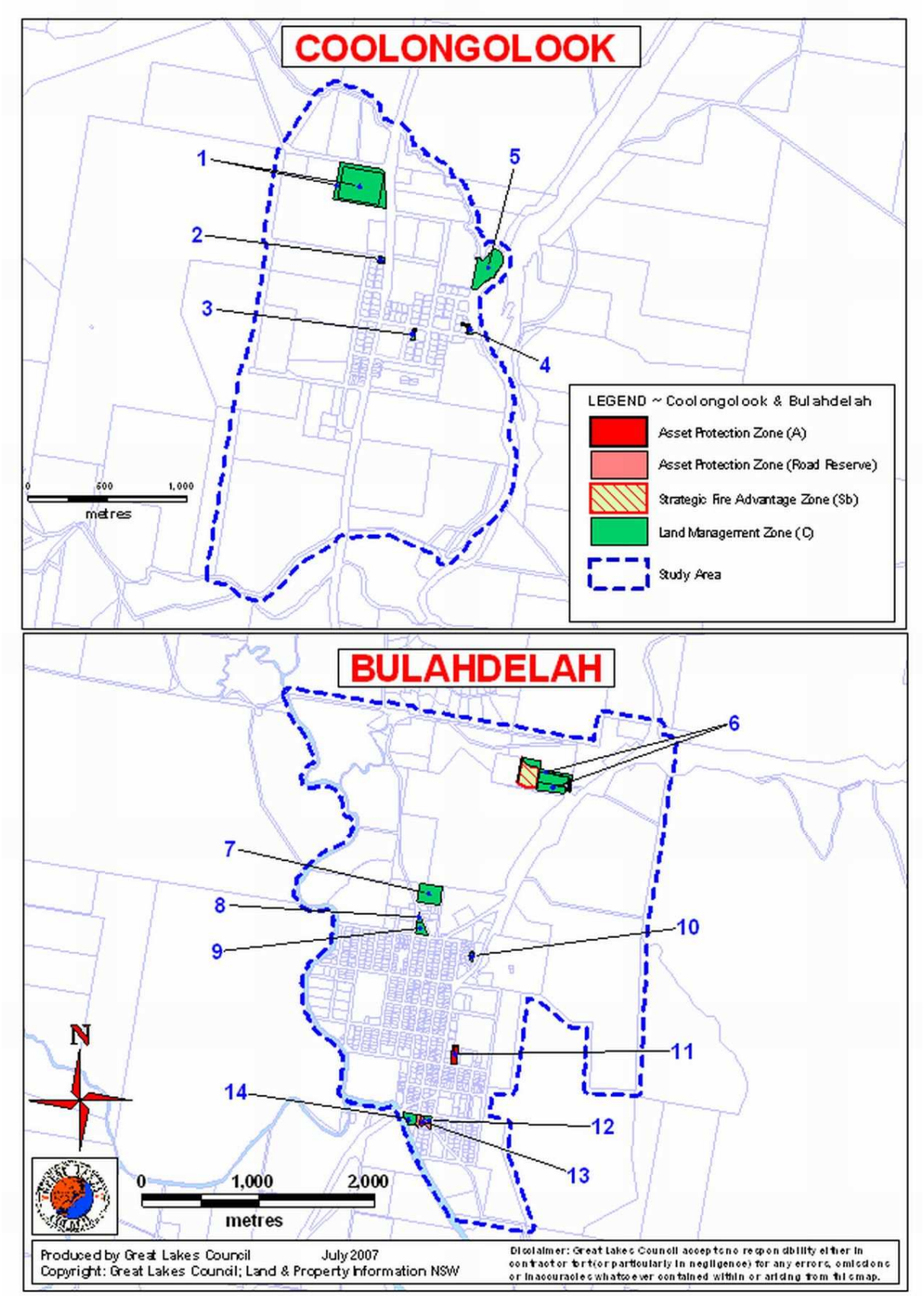


Figure 11: The overview of FMZ's within bushfire affected land in Coolongolook and Bulahdelah.

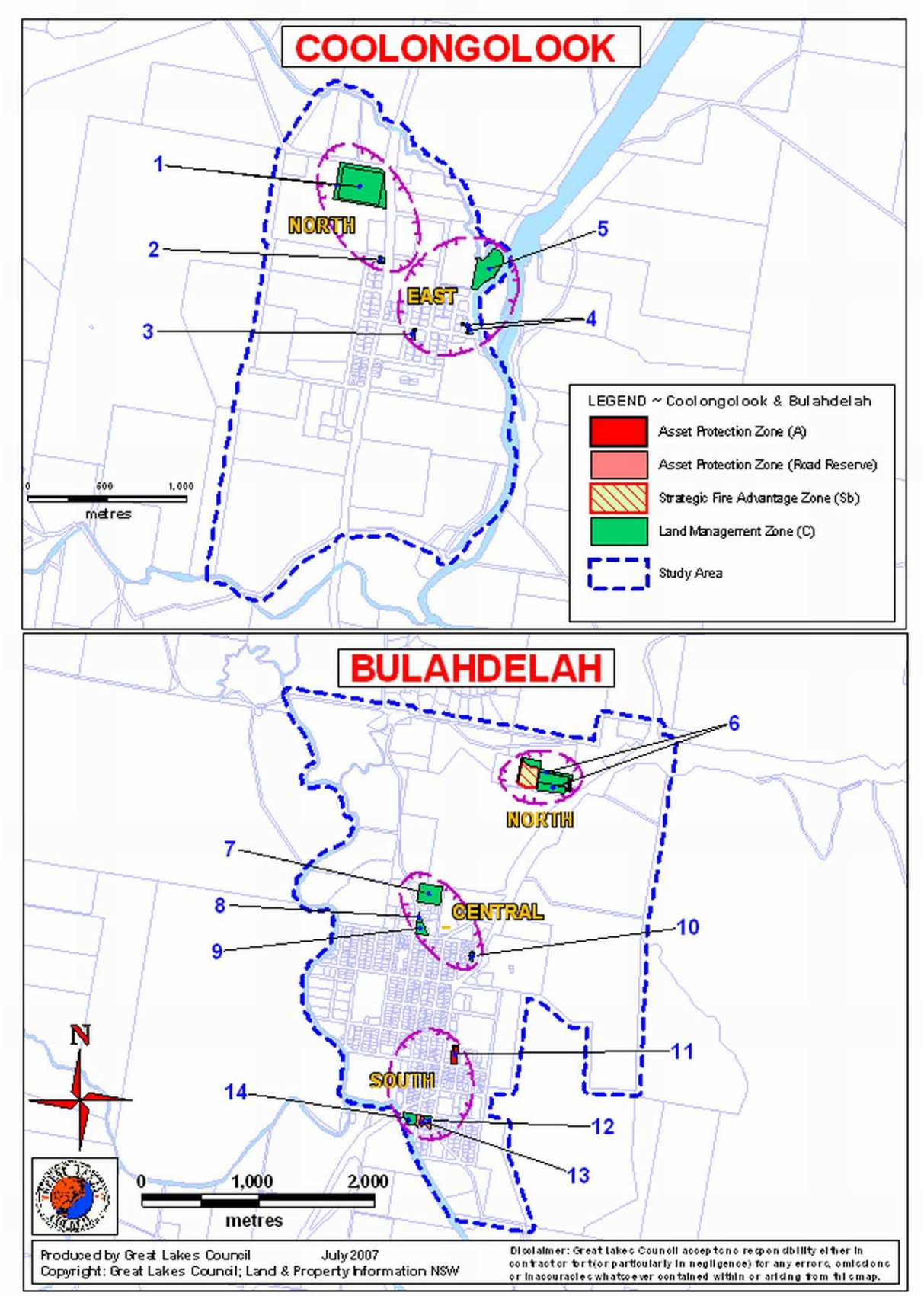


Figure 12: Inset maps of FMZ's within bushfire affected land in Coolongolook and Bulahdelah.

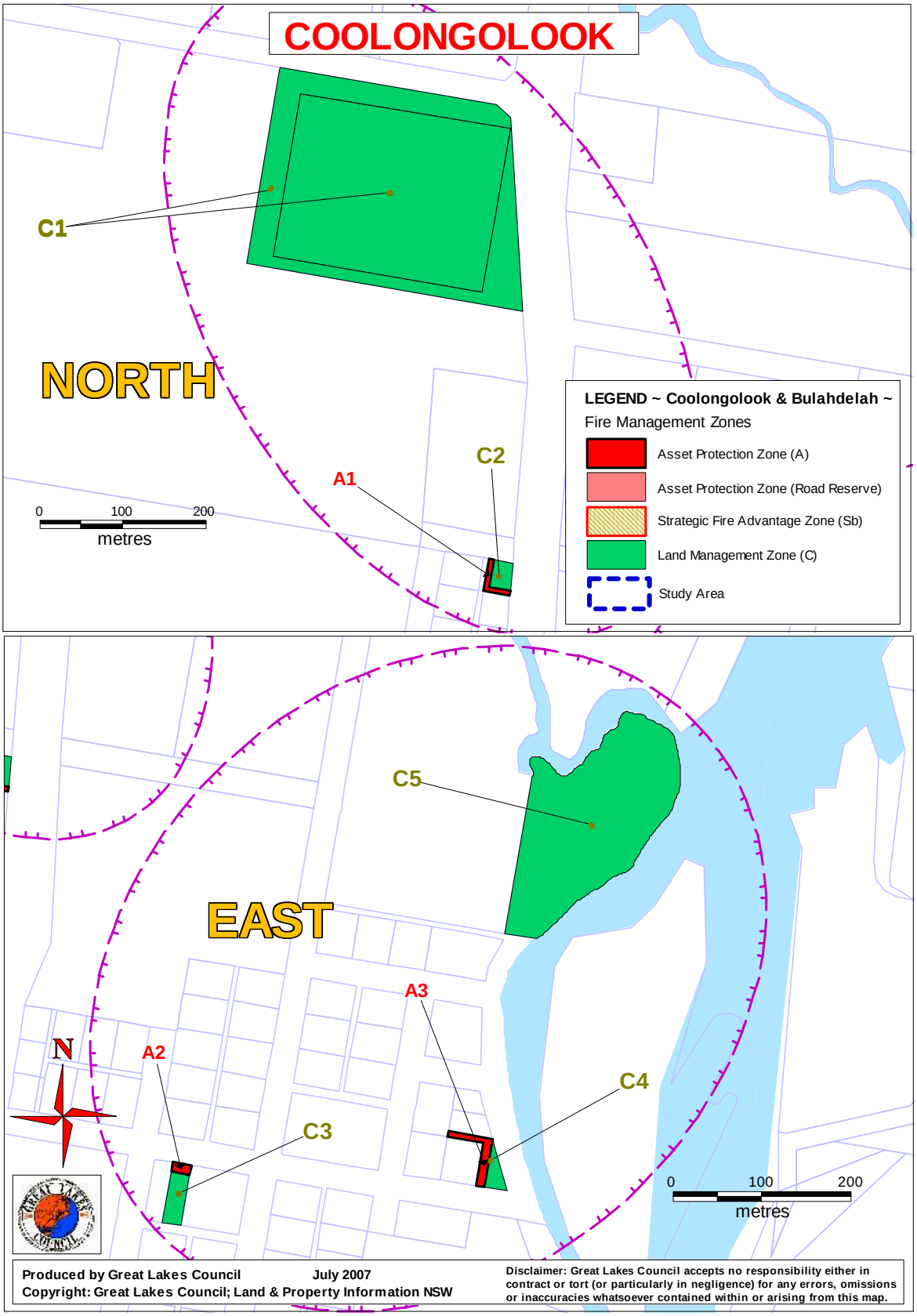


Figure 13: Fire management zones within the northern and eastern area of Coolongolook.

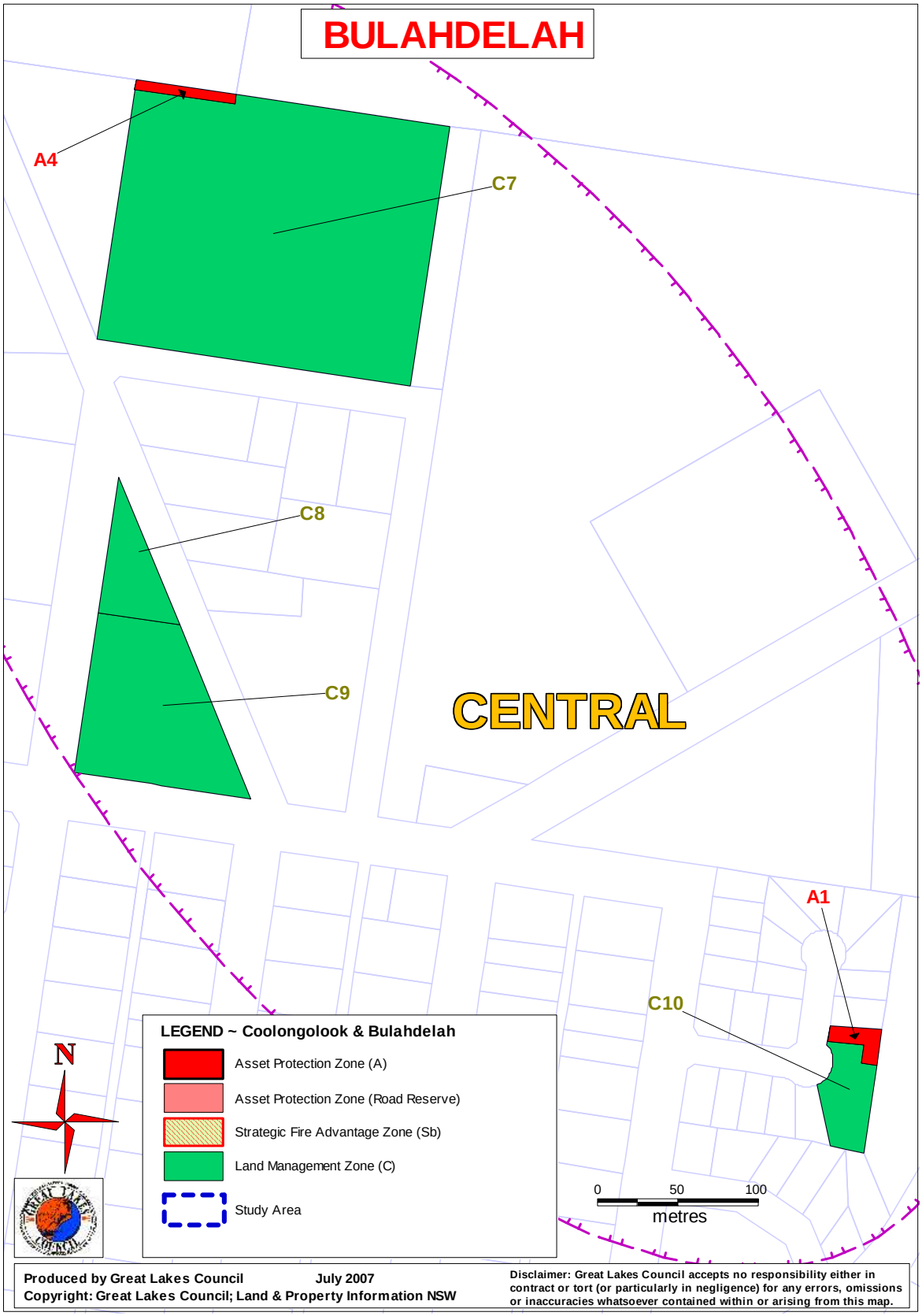


Figure 14: Fire management zones within the central area of Bulahdelah.

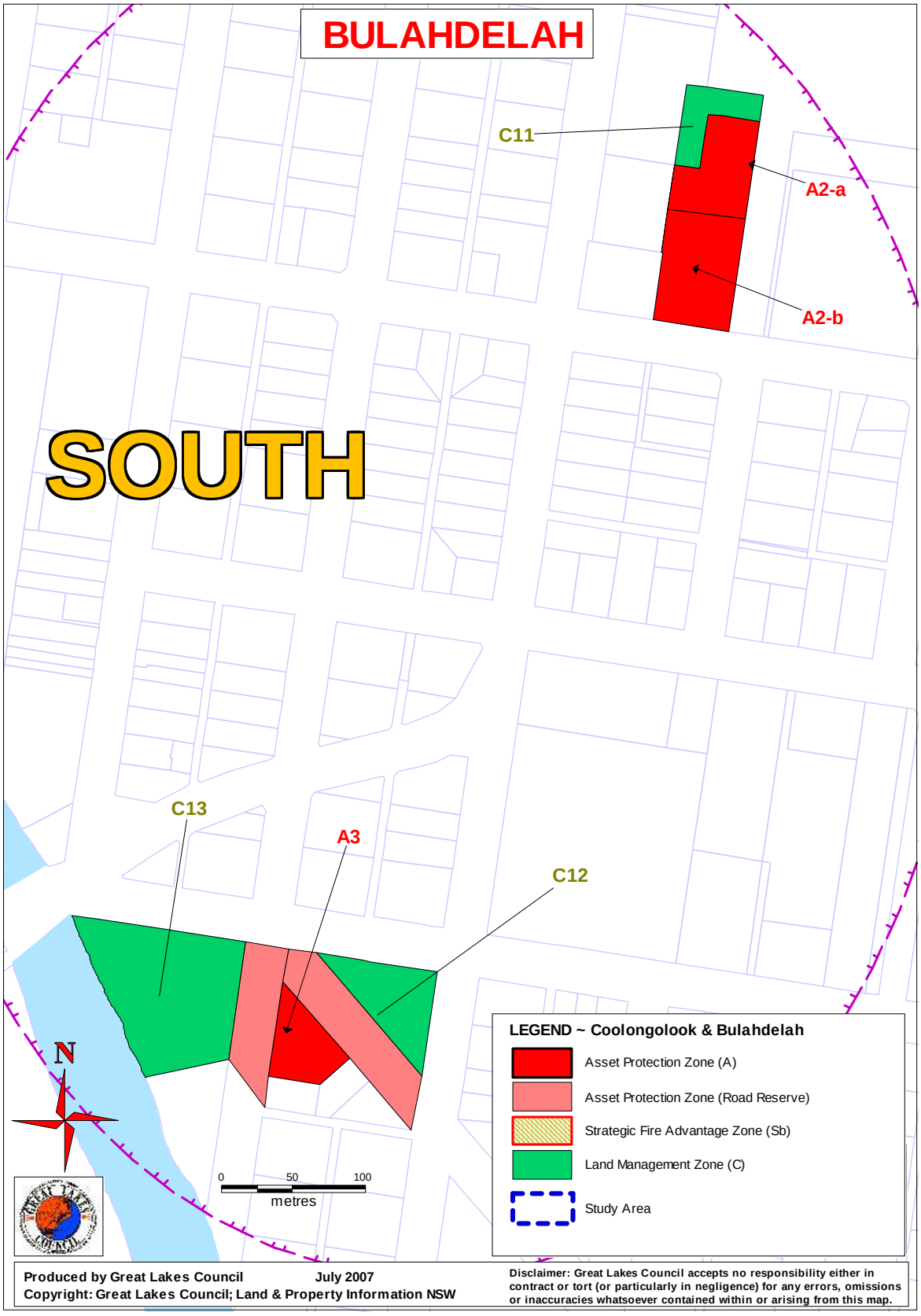


Figure 15: Fire management zones within the southern area of Bulahdelah.

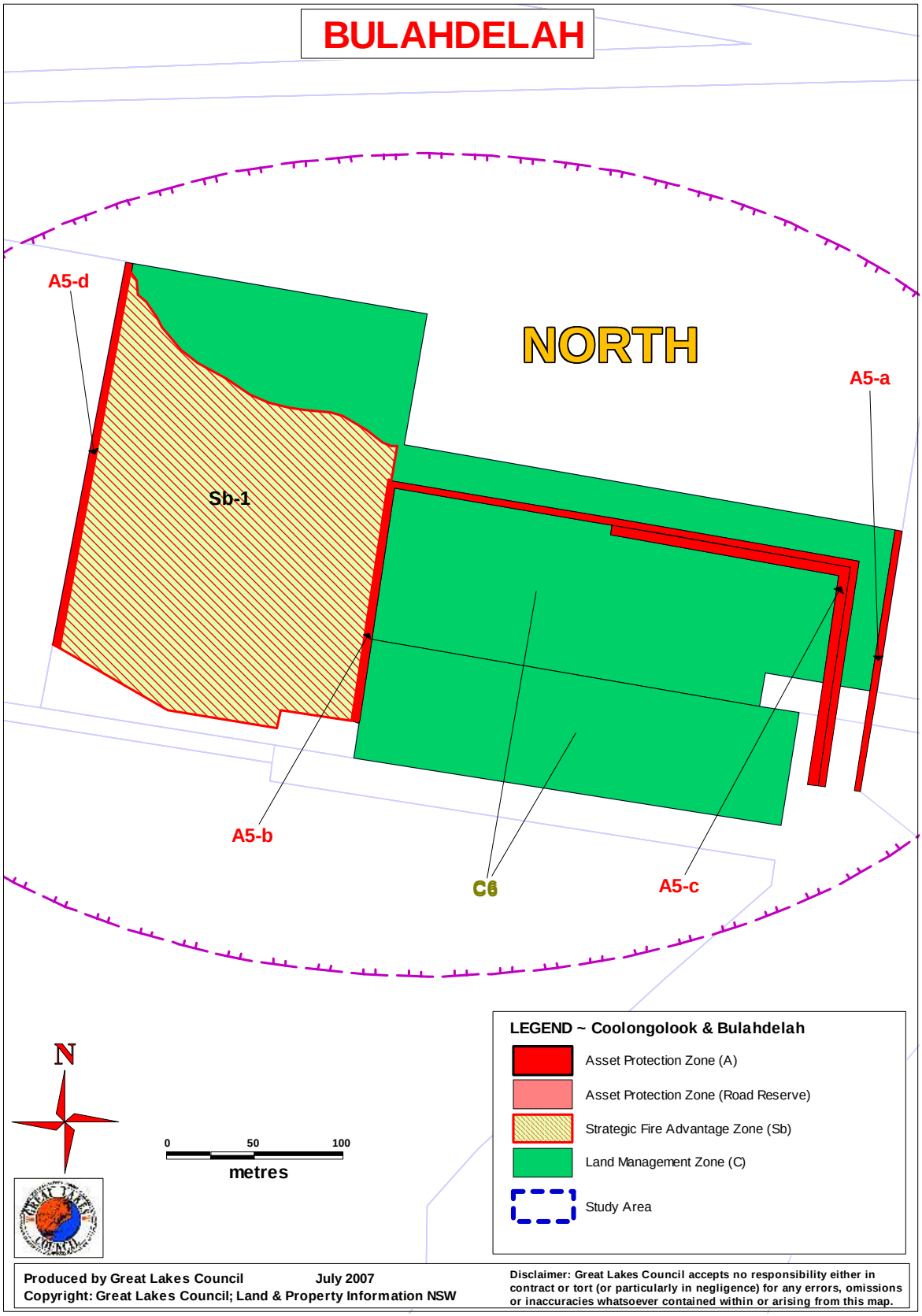


Figure 16: Fire management zones within the northern area of Bulahdelah.

Figure 17: Fire trails within Bulahdelah.

Table 10: Specific fire objectives applied to asset protection zones.

Reserve ID	APZ Code	Council Managed Land	Reserve	Zone Objective	Width (m)	Length (m)	Area (Ha)	Maintenance Type	Frequency of Maintenance[13]
Coolongolook (C)									
Reserves & Forested Road Reserves									
2	A1	Cnr Lot 10 Sec 2 DP 758278	Cnr Lot 10 Sec 2 DP 758278	• To protect the bushland interface north & east of two properties linking with the property.	6	73	0.0395	Hand removal / Mowing	Annual (Herb/shrub cover)
3	A2	Coolongolook Rural Fire Brigade	RES 48 (Crown R 83386) Lot 9 Sec 15 DP 758278	• To protect the grassland interface with the Rural Fire Brigade Station on the northern boundary of the property.	11	20	0.0231	Hand removal / Mowing	Bi-annual (Grassy ground cover)
4	A3	Cnr Lot 4 Sec 6 DP 758278	Cnr Lot 4 Sec 6 DP 758278	• To protect the bushland interface north& east of the property linking with the reserve and road reserve.	6-10	105	0.08	Hand removal / Mowing / Slashing	Annual (Herb/shrub cover)
				Sub Total		**198m**	**0.1426ha**		
Bulahdelah (BU)									
Reserves & Forested Road Reserves									
10	A1	RES 5179	Lot 16 DP 710307	• To protect the grassland interface south of the property linking with the Reserve.	10	56	0.0461	Hand removal / Mowing	Bi-annual (Grassy ground cover)
11	A2-a	Crown R 76622, Lot 7010 DP 1054330	Lot 7010 DP 1054330	• To protect the grassland/bushland interface surrounding the Rural Fire Brigade Station.	32-36	124	0.2275	Hand removal / Mowing / Slashing	Annual (Herb/shrub cover)
11	A2-b	Crown R 76622, Lot 7010 DP 1054330	Crown R 76622, Lot 7010 DP 1054330	• To protect the grassland interface surrounding the Council Depot.	55	80	0.392	Mowing / Slashing	Annual (Herb/shrub cover)
14	A3	Court House	Lot 204 DP 753154	• To protect the grassland interface surrounding the Court House.	51	71	0.1599	Hand removal / Mowing	Annual (Herb/shrub cover)
7	A4	Cemetery Lot 7015 DP 1002815	Lot 7015 DP 1002815	• To protect the grassland/bushland interface south of the boundary fence linking with the Cemetery.	6	63	0.0379	Mowing / Slashing	Annual (Herb/shrub cover)

[13] Frequency of maintenance: Monitor fuel loads within APZ's and adapt frequency of mechanical fuel reduction to meet the maximum average fuel hazard level to be 8 tonnes/hectare.

Reserve ID	APZ Code	Council Managed Land	Reserve	Zone Objective	Width (m)	Length (m)	Area (Ha)	Maintenance Type	Frequency of Maintenance[13]
6	A5-a	Addition to Landfill	Lot 23 DP 1089772	• To protect the grassland/bushland interface west of the boundary fence linking with the Landfill.	4	149	0.0601	Mowing / Slashing	Bi-annual (Grassy ground / Herb/shrub cover)
6	A5-b	Addition to Landfill	Lot 23 DP 1089772	• To protect the bushland interface outside of the perimeter fence surrounding the Waste Depot area within the Addition to Landfill properties.	4	527	0.2091	Mowing / Slashing	Annual (Herb/shrub cover)
6	A5-c	Addition to Landfill	Lot 23 DP 1089772	• To protect the bushland interface inside of the perimeter fence surrounding the Waste Depot area within the Addition to Landfill properties.	6	255	0.1467	Mowing / Slashing	Annual (Herb/shrub cover)
6	A5-d	Addition to Landfill	Lot 23 DP 1089772	• To protect the bushland interface east of the boundary fence linking with the Addition to Landfill and adjacent MidCoast Water property.	4	220	0.0878	Mowing / Slashing	Annual (Herb/shrub cover)
				Sub Total		**1545m**	**1.367ha**		
				Study Area - Total			**1.5097ha**		

Table 11: Specific fire objectives applied to APZ's within road reserves.

APZ Code	Council Managed Land	Zone Objective	Total Area of Road Reserve (Ha)	Width of APZ	Maintenance Type	Existing Management
Bulahdelah (BU)						
Rd-A1	Anne Street	• To protect adjacent residential properties.	0.4061	As per guideline within Plan.[14]	Mowing/ Slashing	Public-sealed road (Edges mowed – 2.5m each side)
Rd-A2	Crawford Street	• To assist in mitigating the spread of bushfire from adjacent bushland interface.	0.2888	"	Mowing/ Slashing	"

[14] Width of APZ: Variable widths depending on setback of adjacent assets and adjacent relevant hazard reduction works.

Table 12: Specific fire objectives applied to SFAZ's.

Reserve ID	SFAZ Code	Council Managed Land	Fire Trail ID	Zone Objective	Width (m)	Length (m)	Maintenance Type	Vegetation Community
Bulahdelah (BU)- Fire Trails (824m in Total)								
6	S1	Bulahdelah Landfill Addition	Whiskey Fire Trail (Secondary)	• To provide secondary fire trail access for fire fighting on the boundary, which links with the Tip Fire Trail within the property and with the adjacent Bulahdelah State Conservation Area.	4-6	149	Slashing of fire trail to a maximum width of 6m/turn-around areas	▪ Dry sclerophyll forest
6	S2	Bulahdelah Landfill Addition	Frys Creek Fire Trail (Secondary)	• To provide secondary fire trail access for fire fighting, north of the Tip and linking the Tip Fire Trail and the adjacent Bulahdelah State Conservation Area.	4-6	497	Slashing of fire trail to a maximum width of 6m/turn-around areas	▪ Dry sclerophyll forest ▪ Forested wetland
6	S3	Bulahdelah Landfill Addition	Tip Fire Trail (Secondary)	• To provide secondary fire trail access for fire fighting and linking the Frys Creek Fire Trail and roadway to MidCoast Water on the southern boundary of the Landfill.	4-6	178	Slashing of fire trail to a maximum width of 6m/turn-around areas	▪ Dry sclerophyll forest
				Total		**824m**		

Table 13: Specific fire objectives applied to SFAZ's applying biodiversity thresholds for burning.

Reserve ID	SFAZ Code	Council Managed Land	Reserve	Zone Objective	Area (Ha)	Maintenance Type	Vegetation Community
6	Sb-1	Bulahdelah Landfill Addition	Lot 23 DP 1089772	• To strengthen the adjacent APZ and mitigating the spread from the LMZ towards MidCoast Water and into the Bulahdelah Landfill. NOTE: The majority of this area has been under-scrubbed in 2007 and the regeneration of the area therefore means fuel accumulation will vary depending on the subsequent growth rates in this area.	3.041	Low— moderate intensity burn after 2014 or when the average fuel loads are greater than 22 tonnes per hectare. Slash adjacent fire trail to 4m when undertaking the burn for a control line.	▪ Dry sclerophyll forest
				Total	**3.041**		

Table 14: Fire management objectives applied to LMZ's

Zone Objective:	This will be achieved by:
❖ To protect the environmental values within the reserve and maintain biodiversity thresholds.	✓ Maintain adjacent FMZ's as per Tables 10-13 to minimize impact within LMZ's.
❖ To protect cultural heritage values within the reserve.	✓ Implement hazard reduction burns to maintain biodiversity.
❖ Conserve and protect the integrity of areas with high conservation values or areas with highest regional priority status for conservation targets.	✓ Implement hazard reduction activities to meet guidelines and conditions within the Code and the TSC Act, relating to mechanical and the use of fire within FMZ's to protect and enhancement of threatened species and their habitats.
❖ Protect riparian areas from inappropriate burning regimes.	✓ Implement Catchment management objectives adjacent to Coolongolook and Myall Rivers to enhance conservation objectives.
❖ To manage reserves as per management plans or existing use.	✓ Regenerate disturbed areas and promote re-establishment within FMZ to minimise any negative impact.
	✓ Suppress bushfires to maintain fire regimes to enhance biodiversity.
	✓ Implementing current land management practices as per policies, procedures and management plans.

Table 15: LMZ's within the Coolongolook and Bulahdelah study area.

Reserve ID	LMZ Code	Property Name	Reserve Number	Lot/ DP	Ha	Vegetation Community
Coolongolook (C) [15]						
1	C1	Coolongolook - Cemetery	Crown Reserve - R 14674	Lot 16 DP 1001975 & R14674	7.5	▪ Cleared ▪ White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum
			Crown Reserve - R 14674	R 14674	2.35	▪ Cleared ▪ White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum
2	C2	Cnr Lot 10 Sec 2 DP 758278	Cnr Lot 10 Sec 2 DP 758278	Cnr Lot 10 Sec 2 DP 758278	0.0832	▪ Cleared ▪ Regrowth
3	C3	Coolongolook Rural Fire Brigade	RES 48 (Crown R 83386)	Lot 9 Sec 15 DP 758278	0.1195	▪ Cleared
4	C4	Cnr Lot 4 Sec 6 DP 758278	Cnr Lot 4 Sec 6 DP 758278	Cnr Lot 4 Sec 6 DP 758278	0.0683	▪ Cleared ▪ Regrowth

[15] Locality abbreviation for each village (C & BU)

Reserve ID	LMZ Code	Property Name	Reserve Number	Lot/ DP	Ha	Vegetation Community
5	C5	Cedar Park	RES 68 (Crown R 85987)	Lot 23 DP 753160	2.792	▪ Cleared ▪ Flooded Gum
				SUB TOTAL	**12.91ha**	
Bulahdelah (BU)						
6	C6	Bulahdelah Landfill (part)	RES 81	Lot 127 DP 753150	1.601	▪ Cleared ▪ Sydney Peppermint
		Addition to Landfill	Lot 23 DP 1089772	Lot 23 DP 1089772	3.692	▪ Cleared ▪ Sydney Peppermint ▪ Swamp Mahogany ▪ Smooth-barked Apple/Sydney Peppermint/Stringybark
7	C7	Cemetery	Lot 7015 DP 1002815	Lot 7015 DP 1002815	3.191	▪ Urban ▪ Cleared ▪ Smooth-barked Apple/Sydney Peppermint/Stringybark
8	C8	Pound	RES 67 (CL - R 85772)	Lot 7012 DP 1030824	0.216	▪ Urban
9	C9	Pound Holding Yard	RES 1 (CL - R 220)	Lot 7013 DP 1030824	0.813	▪ Urban
10	C10	RES 5179	RES 5179	Lot 16 DP 710307	0.1774	▪ Urban
12	C11	Council Works Depot-Bushfire-VRA Shed	CR76622, Lot 7010 DP 1054330	Lot 7010 DP 1054330	0.1704	▪ Urban ▪ Sydney Peppermint
13	C12	Lot 1 DP 718465	RES 5190	Lot 1 DP 718465	0.314	▪ Urban
15	C13	Church St Foreshore Recreation Reserve	RES 106 (Crown R 91201)	Lot 7011 DP 1054333	0.881	▪ Urban
				SUB TOTAL	**11.06ha**	
				TOTAL	**23.97ha**	

PART 3 - APPENDICES

APPENDIX I - Council Fire Management

Council's overall fire management objectives are defined within the Great Lakes Council Management Plan[16], as seen below from an extract within the report.

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.'

[16] 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 II - Mapping Bushfire Prone Land

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

Councils 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 also required to place specification of bushfire prone land on section 149 Planning Certificate. Through development consent process the Commission issues fire safety authority (section 100B of the RF Act) for special purpose developments on 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; and
c) Vegetation Group 3 –Rainforests, open woodlands, grasslands, shrublands 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*[17]*, NSW Rural Fire Service, 2004* defines the criteria for Bush Fire Vegetation Categories 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**; and
iii) Vegetation Group 3, greater than 1 hectare – **Bush fire Vegetation Category 2**
iv) A 30 metre external buffer to Bushfire Vegetation Category 2 vegetation polygon –**Buffer zone Category 2**

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**.

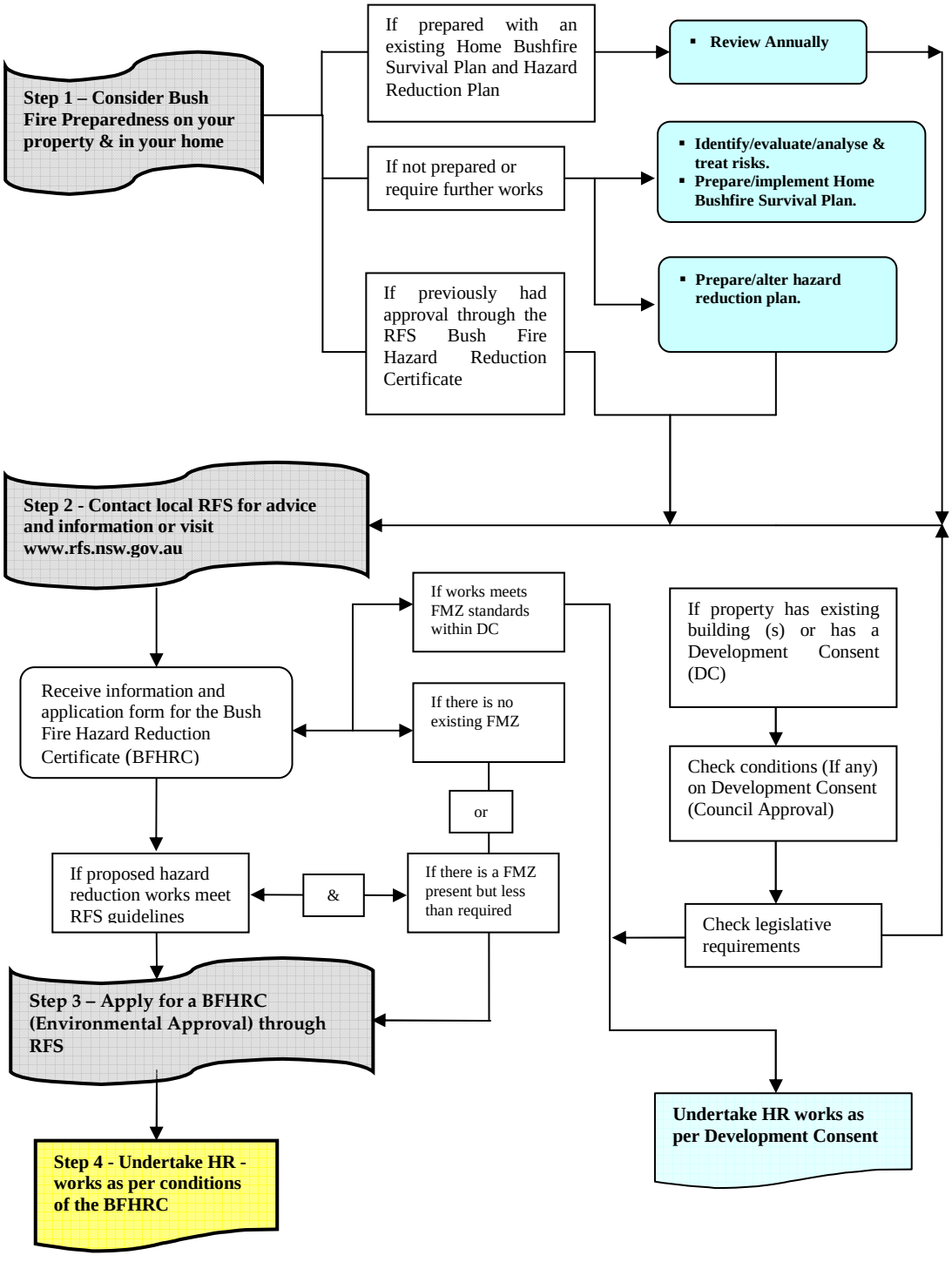
Vegetation excluded from the above mentioned vegetation groups include:
vii) Areas of "Vegetation groups" 1, 2 and 3, less than 1 hectare and not less than 100m lateral separation from a Bushfire Vegetation Category 1, or not less than 30m lateral separation from a Bushfire Vegetation Category 2, **are excluded**; or
viii) 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
ix) Areas of managed gardens and lawns within curtilage of buildings;
x) Managed botanical gardens;
xi) "Agricultural lands" used for annual and/or perennial cropping, orchard, market gardens, nurseries and the likes are excluded; or
xii) Mangroves.

Areas of national parks and state forest estate should be mapped as **Vegetation Category 1** in recognition of the land use and management regimes.

(RFS 2004e; 2004h)

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

APPENDIX III- What You Can do to Assist with Bushfire Mitigation.



DC – Development Consent through Council
FMZ – Fire Management Zone
BFHRC – Bush Fire Hazard Reduction Certificate
HR – Hazard Reduction
Bush Fire Preparedness – Readiness of householders/property owners in the event of an imminent bushfire

APPENDIX IV - Bushfire 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	***Bushfire Threat***[18]	***Bushfire Risk***[19]	***Consideration to Asset Protection/ Building Design***[20] ***× — absent, ✓— present***
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	×

[18] How close assets are located to the hazard

[19] Level of risk as defined within the Lower Hunter Zone BFMC, *Bushfire Risk Management Plan 2004*

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

APPENDIX V - 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
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

Forest Type	CRA Name	Current area Lower North East CRA (Ha)	% of Original Extent Remaining	Status	RFA Cons. Target Met
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 VI - Biodiversity Thresholds for Vegetation Communities

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

Fire Regime	Biodiversity Thresholds[21] Within Strategic Fire Advantage (NPWS 2001) and Land Management Zones	Vegetation Community Type (Council 2004) *[#1 and #2 indicate options for the same community]	Forest Type (Council, DVS, 2003)	Vegetation Formation (Keith 2004)	Minimum Fire Interval (years) (BFEAC)[22] (SFAZ/LMZ)
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	Dry sclerophyll forests	5 /8
		Blackbutt/ Scribbly Gum	40	Dry sclerophyll forests	5/8
		Blackbutt/ Sydney Peppermint/ Smooth-barked Apple	42	Dry sclerophyll forests	5/8
		Dry Blackbutt	37	Dry sclerophyll forests	5/8
		Coastal Sands Blackbutt	37	Dry sclerophyll forests	5/8
		Forest Red Gum -#1	92	Grassy woodlands	5/8
		Grey Gum/ Grey Ironbark/ White Mahogany	62	Dry sclerophyll forests	5/8
		Ironbark	84	Dry sclerophyll forests	5/8
		Ironbark/ Smooth-barked Apple/ Stringybark	84/106	Dry sclerophyll forests	5/8
		Mahogany/ Ironbark/ Grey Gum/ Blackbutt	60/37	Dry sclerophyll forests	5/8
		Red Bloodwood	126	Grassy Woodlands	7/10
		Scribbly Gum	117	Dry sclerophyll forests	5/8
		Smooth-barked Apple	105	Dry sclerophyll forests	5/8
		Smooth-barked Apple/ Sydney Peppermint/ Stringybark	106	Dry sclerophyll forests	5/8
		Spotted Gum	70	Dry sclerophyll forests	5/8
		Spotted Gum – Ironbark/ Grey Gum	74	Dry sclerophyll forests	5/8
		Sydney Peppermint	128	Dry sclerophyll forests	5/8
		Sydney Peppermint/ Stringybark	115	Dry sclerophyll forests	5/8
		White Mahogany/ Red Mahogany/ Grey Ironbark/ Grey Gum	60	Dry sclerophyll forests	5/8
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	Heathlands	7/10
		Disturbed Heath	219/223	Heathlands	7/10
		Forest Red Gum -#2	92	Grassy woodlands	10/15
		Heath	223	Heathlands	7/10
		Heath Paperbark	31/223	Heathlands or Freshwater wetland	7/10
		Sand Ridge (Relic dune landscape)	233	Heathlands	
		Paperbark	31	Forested wetland	7/10
		Paperbark/ Blackbutt	31/37	Forested wetland	7/10
		Paperbark/ Smooth-barked Apple/ Sydney Peppermint	31/106	Forested wetland	7/10
		Paperbark/ Swamp Oak	31/32	Forested wetland	7/10
		Red Mahogany	68	Forested wetlands / Dry sclerophyll forests	7/10
		Red Mahogany/ Smooth-barked Apple	68/105	Forested wetlands / Dry sclerophyll forests	7/10
		Rough-barked Apple	129	Grassy woodland or Forested wetland	7/10
		Scrub	224	Heathlands	7/10
		Swamp -#1	231	Freshwater wetlands	7/10
		Swamp Mahogany	30	Forested wetland	7/10

[21] 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*.

[22] The Code specifies criteria and conditions when issuing a BFHRC for hazard reduction burning

Fire Regime	Biodiversity Thresholds[21] Within Strategic Fire Advantage (NPWS 2001) and Land Management Zones	Vegetation Community Type (Council 2004) *[#1 and #2 indicate options for the same community]	Forest Type (Council, DVS, 2003)	Vegetation Formation (Keith 2004)	Minimum Fire Interval (years) (BFEAC)[22] (SFAZ/LMZ)
b		Swamp Mahogany/ Forest Red Gum	30/92	Forested wetland	7/10
		Swamp Mahogany/ Grey Gum	30/60	Forested wetland	7/10
		Swamp Mahogany/ Paperbark	30/31	Forested wetland	7/10
		Swamp Mahogany/ Swamp Oak	30/32	Forested wetland	7/10
		Swamp Mahogany/ Palm	30/7	Forested wetland	7/10
		Swamp Oak	32	Forested wetland	7/10
		Tallowwood - #1	45	Wet sclerophyll forests	10/15
		Tallowwood/ Grey Gum	45/60	Wet sclerophyll forests	10/15
c	❖ Avoid more than 1 fire every 30 years ❖ Avoid inter-fire periods > 200 years	Flooded Gum	48	Wet sclerophyll forests	25/30
		Flooded Gum/ Paperbark	48/31	Wet sclerophyll forests	25/30
		Inland Brush Box	53	Wet sclerophyll forests	25/30
		Ironbark/ Grey Gum/ Flooded Gum	60/48	Wet sclerophyll forests	25/30
		Moist Blackbutt	36	Wet sclerophyll forests	25/30
		Sydney Blue Gum	46	Wet sclerophyll forests	25/30
		Sydney Blue Gum/ Paperbark	46/31	Wet sclerophyll forests	25/30
		Tallowwood - #2	45	Wet sclerophyll forests	25/30
		Tallowwood/ Sydney Blue Gum	47	Wet sclerophyll forests	25/30
		Tallowwood/ Sydney Blue Gum/ Brushbox	47/53	Wet sclerophyll forests	25/30
d	Any fire occurrence (a limited recovery ability exists)	Fig/ Giant Stinger	6	Rainforest	n/a
		Fig/ Myrtle	6/23	Rainforest	n/a
		Headland Brushbox	25	Rainforest	n/a
		Mangrove	33	Saline wetlands	n/a
		Myrtle	23	Rainforest	n/a
		Palm	7	Rainforest	n/a
		Palm/ Myrtle	7/23	Rainforest	n/a
		Swamp - #1	231	Freshwater wetlands	n/a
		Swamp - #2	231	Saline wetlands	n/a
		Tuckeroo	24	Rainforest	n/a
		Yellow Tulipwood	22	Rainforest	n/a
NA	Not Applicable	Maritime Grassland	230	Grasslands. No prescribed fire on headlands[23]	n/a
		Pine	-	Other	n/a
		Rock/Sand	-	Other	n/a
	(Primary/fore dune landscape)	Sand Ridge	233	Heathlands/Beach	n/a, w
w	Use a, b, c, d options for biodiversity thresholds	Introduced Scrub	221	Appropriate management practice[24]	n/a
		Mixed Forest Regrowth Mixed Pine Mixed Woodland Vine Cleared/Grassland	220	Appropriate management practice	n/a w

[23] Not described in BFEAC schedule

[24] W. Variable within each vegetation formation

APPENDIX VII - Vegetation Formations for NSW

Vegetation Formations for NSW (Keith 2004)	
Vegetation dominated by trees (generally more than 5 m tall when mature).	
Wet sclerophyll forests (Grassy & shrubby subformation)	Tall forests (typically >30 m) dominated by tall straight-trunked eucalyptus, usually with soft-leaved shrubs, ferns or herbs in the understorey. Largely confined to moderately fertile soils in sheltered locations on the coast and escarpments where average annual rainfall exceeds 900 mm.
Forested wetlands	Forests or woodlands with an abundance of plant groups in the understorey that are unable to tolerate periodic inundation or waterlogging, particular sedges, rushes and reeds. Confined to damp, low-lying parts of the coast or adjacent to rivers, lakes or swamps in the inland.
Dry sclerophyll forests (shrubby & shrub/grass subformation)	Forests or rarely woodlands with in abundance of hard-leaved (sclerophyllous) shrubs in the understorey. Only rarely dominated by 'box' eucalypts. Ground cover often sparse and typically by sclerophyllous sedges, but may sometimes include reasonably continuous swards of grasses. Confined to coast, tablelands, and the western slopes where average annual rainfall exceed 500 mm, largely on infertile sandy or loamy soils.
Grassy Woodland	Woodlands, or rarely forests, typically 15-35 m tall through shorter at subalpine elevations. Ground cover continuous and dominated by perennial tussocks grasses, and are interspersed perennial herbs including 'geophhytic' orchids and lilies, but few ephemeral herbs and grasses. Shrubs generally sparse and typically not including chenopods or other drought tolerant species. Widespread on relatively fertile loam and clay loams of the coastal lowlands.
Saline Wetlands	Trees tolerant of (subjected to) tidal inundation, understorey sparse to non-existent. Restricted to tidal estuaries along the coast. (Mangrove Swamps)
Rainforests	Trees belonging to various plant families, their leaves broad and soft. Vines often occur in the tree canopies or understorey. Understorey typically includes ferns and herbs. Found on the coastal lowlands, islands and escarpment on fertile soils extending to restricted locations on the north-western slopes.
Trees absent, or present only as scattered emergent individuals.	
Freshwater wetlands	Dominated by shrubs, sedges, grasses or non-succulent herbs that tolerate permanent or periodic inundation or waterlogging with freshwater. Restricted to swamps with humic or gleyed soils on the coast, tablelands, western slopes and plains.
Saline Wetlands	Dominated by herbs (including succulents), grasses or rarely shrubs that tolerate periodic inundation or waterlogging with saline water. Restricted to tidal estuaries on the coast.
Heathlands	Vegetation dominated by hard leaved but not drought-tolerate shrubs, usually also with perennial sedges, herbs and grasses, though generally lacking ephemeral plants. Restricted to fertile soils, often on exposed sites along the coast and tablelands where average rainfall exceeds 800 mm.
Grasslands	Vegetation dominated by perennial tussock grasses with herbs. Shrubs rarely present. Generally found on clay soils on flat to undulating terrain on the coast, tablelands, western slopes and plains.

APPENDIX VIII - Fire Mitigation - A Guide to Requirement

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 (2006b) and the Bushfire Environmental Assessment Code (2006a) 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 AS 3959 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 (e.g. 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 following:

Maximum Distance of an Asset Protection Zone from the Asset (or Adjacent Asset)		
	Residential & Special Purpose Buildings	*Major Buildings*
Upslope		
<18^{o}	20 metres	20 metres
Downslope		
< 10^{o}	20 metres	20 metres
>10 – 15^{o}	30 metres	20 metres
>15 ^{o}	40 metres	20 metres

(RFS 2006a)

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 (2006b) to define fire management zones.

The tables below have been extracted from this document, which shows the APZ minimum requirements that apply to both class 1 and 2 buildings and special protection purpose developments, for each vegetation formation and slope variations.

The APZ can comprise of two components, being the Outer Protection Area (OPA) and the Inner Protection Area (IPA) with reduced ground fuels, as required within PBP. Forest and Woodland vegetation have distinct IPA and OPA. For all other vegetation the APZ is all managed as an IPA.

Inner Protection Area

The IPA is the area providing a defendable space and managing heat intensities at the building surface. Vegetation management priority is to prevent flame impingement by not allowing fine debris to accumulate close to the building. Secondly, removal of ground fuels and loose bark to reduce flame height and likely canopy fire also reduces heat output and ember generation.

While trees and shrubs or other vegetation may occur, the tree canopy does not overhang the roof, is not continuous and be far enough away from the dwelling not to ignite the house by direct flame or radiant heat emission.

Within this area, fuel loads are reduced with tree cover of less than 15%, located greater than 2 metres from any part of the roof line of the dwelling Trees should have lower limbs removed up to the height of 2 metres above the ground. Garden beds of flammable shrubs not located under trees, with a continuous link, or within 10 metres from an exposed door or window.

Retention of taller trees with canopies will assist in filtering out embers. The use of trees as windbreaks to trap embers and flying debris reduces wind spread, slows the rate of spread and traps bushfire radiant heat.

Outer Protection Area

When required, the OPA is narrower than the IPA and is located between the bushfire hazard and the IPA often linking with the bushland side of the perimeter road. In this area, vegetation is managed with a tree canopy cover of less than 30% and should have ground fuels managed (mowed) to treat shrubs and grasses annually (usually in September).

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, slowing the rate of spread and filtering embers on the IPA.

Perimeter Road, Fire Trail and Access Roads

The perimeter road or fire trail may be within APZ's surrounding buildings or be on the boundary of the allotment or the reserve.

The fire trail can form part of the IPA that provides fire fighters access to structures and a strategic control line. This can be then used to conduct back burning or hazard reduction, property protection or provide refuge for fire fighters. Property access roads provide safe access to rural landholdings for fire fighting and occupants.

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

The following tables are extracts from the PBP; however for a much greater understanding and depth into bushfire protection, refer to the full document.

Extract from Appendix 2 – PBP: Table A2.5 Minimum specifications for Asset Protection zones (m) for Residential and Rural residential subdivisions Purposes (for Class 1 and 2 buildings in FDI 80 Areas [</=29kW/m²]									
Vegetation Formation (Keith 2004)									
Vegetation Formations		Rainforest	Forests	Woodland	Plantation (Pine)	Tall Heath (Scrub)	Short Heath (Open Scrub)	Freshwater Wetlands	Forested Wetlands
Upslope/Flat		10	20	10	15	15	10	10	15
Effective Slopes - Downslope	>0 – 5°	10	20	15	20	15	10	10	20
	>5° – 10°	10	30	15	25	20	10	10	20
	>10° – 15°	10	40	20	35	20	15	15	30
	>15° – 18°	20	45	25	40	20	15	15	35

(RFS 2006b)

Extract from Appendix 2 – PBP: Table A2.6 Minimum specifications for Asset Protection zones (m) for Special Fire Purposes in Bushfire Prone Areas (</=10kW/m²]									
Vegetation Formation (Keith 2004)									
Vegetation Formations		Rainforest	Forests	Woodland	Plantation (Pine)	Tall Heath (Scrub)	Short Heath (Open Scrub)	Freshwater Wetlands	Forested Wetlands
Upslope/Flat		10	20	10	15	15	10	10	15
Effective Slopes - Downslope	>0 – 5°	10	20	15	20	15	10	10	20
	>5° – 10°	10	30	15	25	20	10	10	20
	>10° – 15°	10	40	20	35	20	15	15	30
	>15° – 18°	20	45	25	40	20	15	15	35

(RFS 2006b)

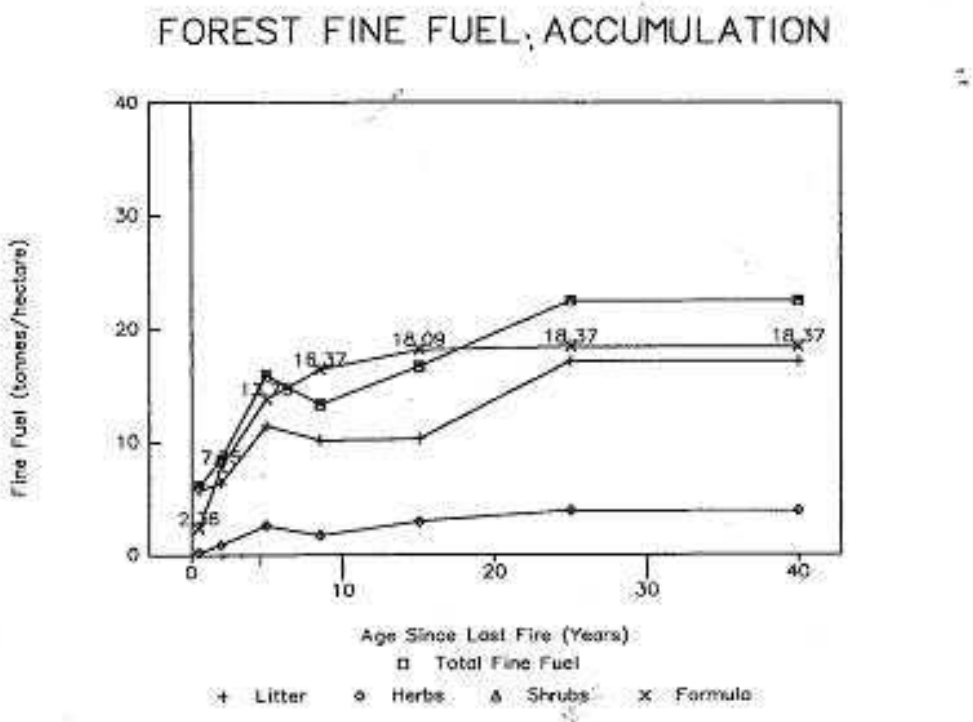
Extract from Appendix 2 – PBP: Table A2.Minimum specifications for Asset Protection zones (m) for Residential and Rural residential subdivisions Purposes (for Class 1 and 2 buildings in FDI 80 Areas [</=29kW/m2]									
Vegetation Formation (Keith 2004)									
Vegetation Formations		Rainforest	Forests	Woodland	Plantation (Pine)	Tall Heath (Scrub)	Short Heath (Open Scrub)	Freshwater Wetlands	Forested Wetlands
Upslope/Flat		10	20	10	15	15	10	10	15
Effective Slopes - Downslope	>0 – 5°	10	20	15	20	15	10	10	20
	>5° – 10°	10	30	15	25	20	10	10	20
	>10° – 15°	10	40	20	35	20	15	15	30
	>15° – 18°	20	45	25	40	20	15	15	35

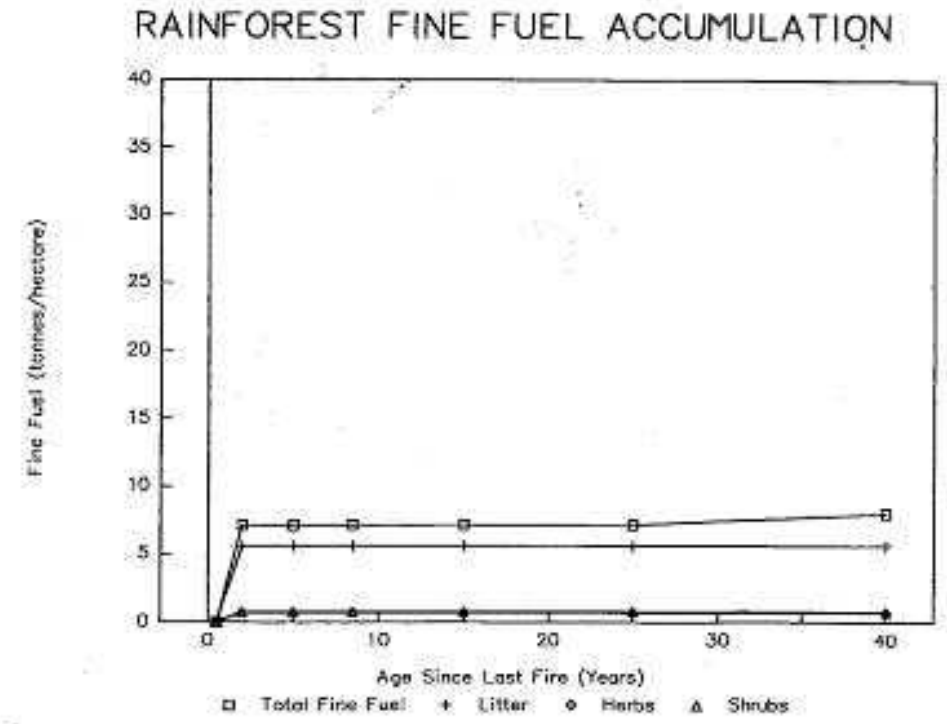
(RFS 2006b)

Extract from Appendix 2 – PBP: Table A2.7 Determining Allowable Outer Protection Area (m) for Forest Vegetation within an APZ			
Vegetation Formation (Keith 2004)			
Vegetation Formations		Forests/Woodlands	Forests/Woodlands – Special Fire Protection Purpose in Bushfire Prone Areas
Upslope/Flat		10	20
Effective Slopes - Downslope	>0 – 5°	5	20
	>5° – 10°	15	25
	>10° – 15°	20	30
	>15° – 18°	20	25

(RFS 2006b)

APPENDIX IX- Fine Fuel Accumulation





(NPWS unpub.)

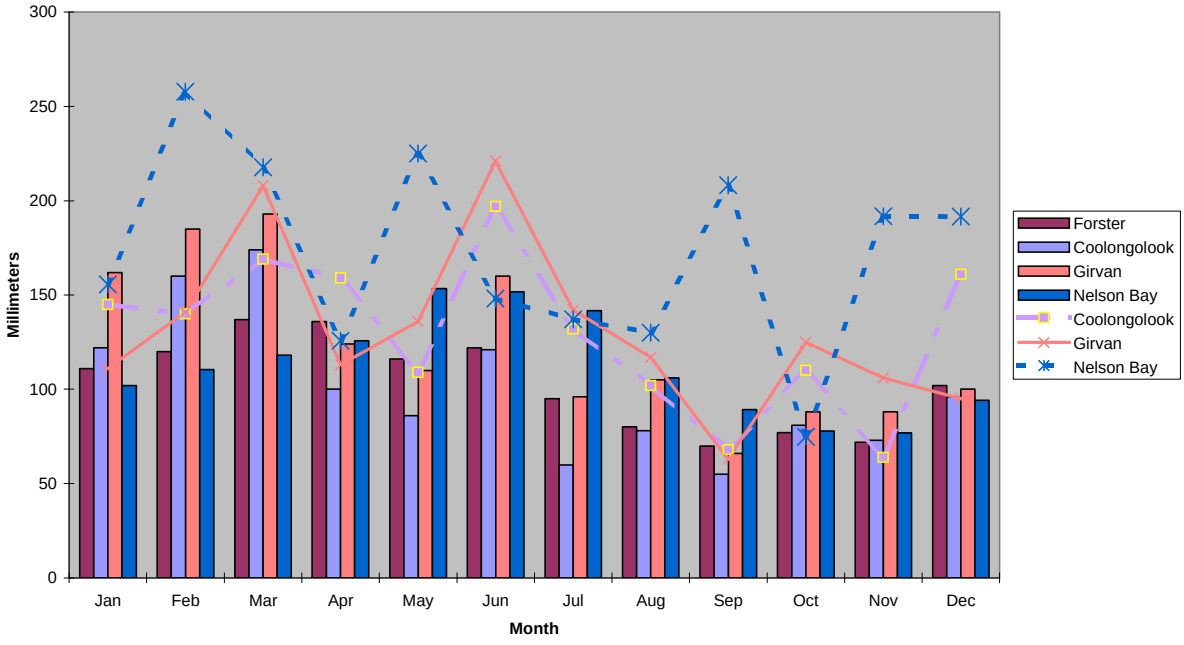
APPENDIX X - Climate

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

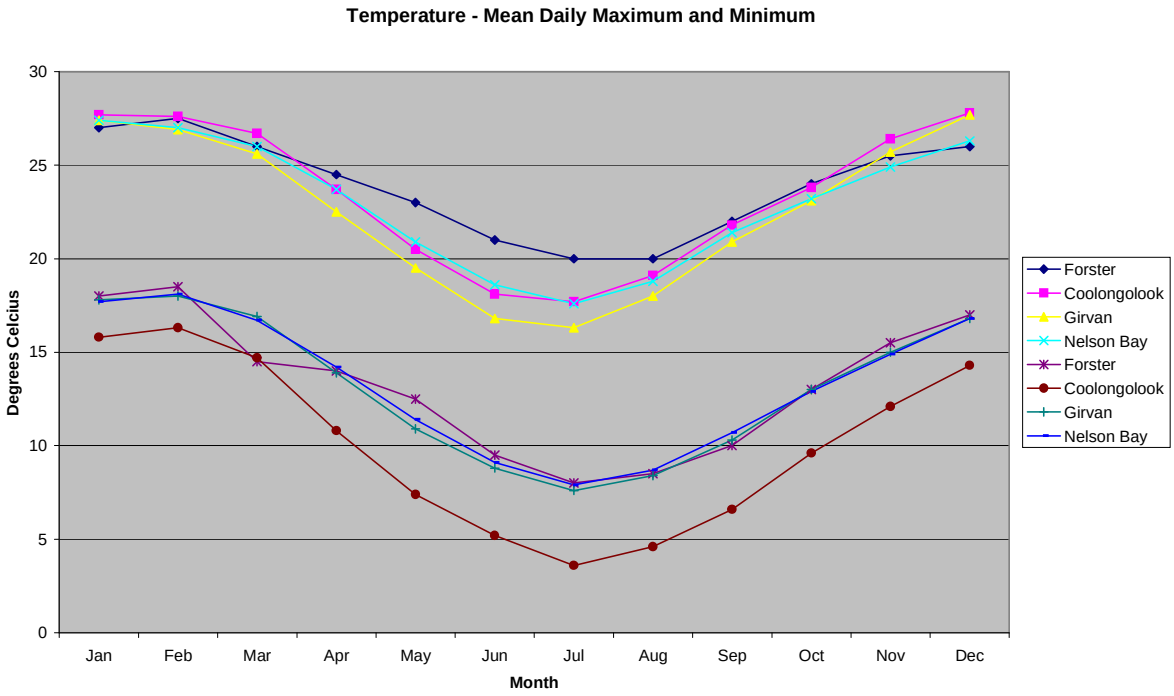
Climate Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ANN
Mean Daily Max. Temp (°C)													
Forster	27.0	27.5	26.0	24.5	23.0	21.0	20.0	20.0	22.0	24.0	25.5	26.0	23.9
Coolongolook	27.7	27.6	26.7	23.7	20.5	18.1	17.7	19.1	21.8	23.8	26.4	27.8	23.5
Girvan	27.4	26.9	25.6	22.5	19.5	16.8	16.3	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

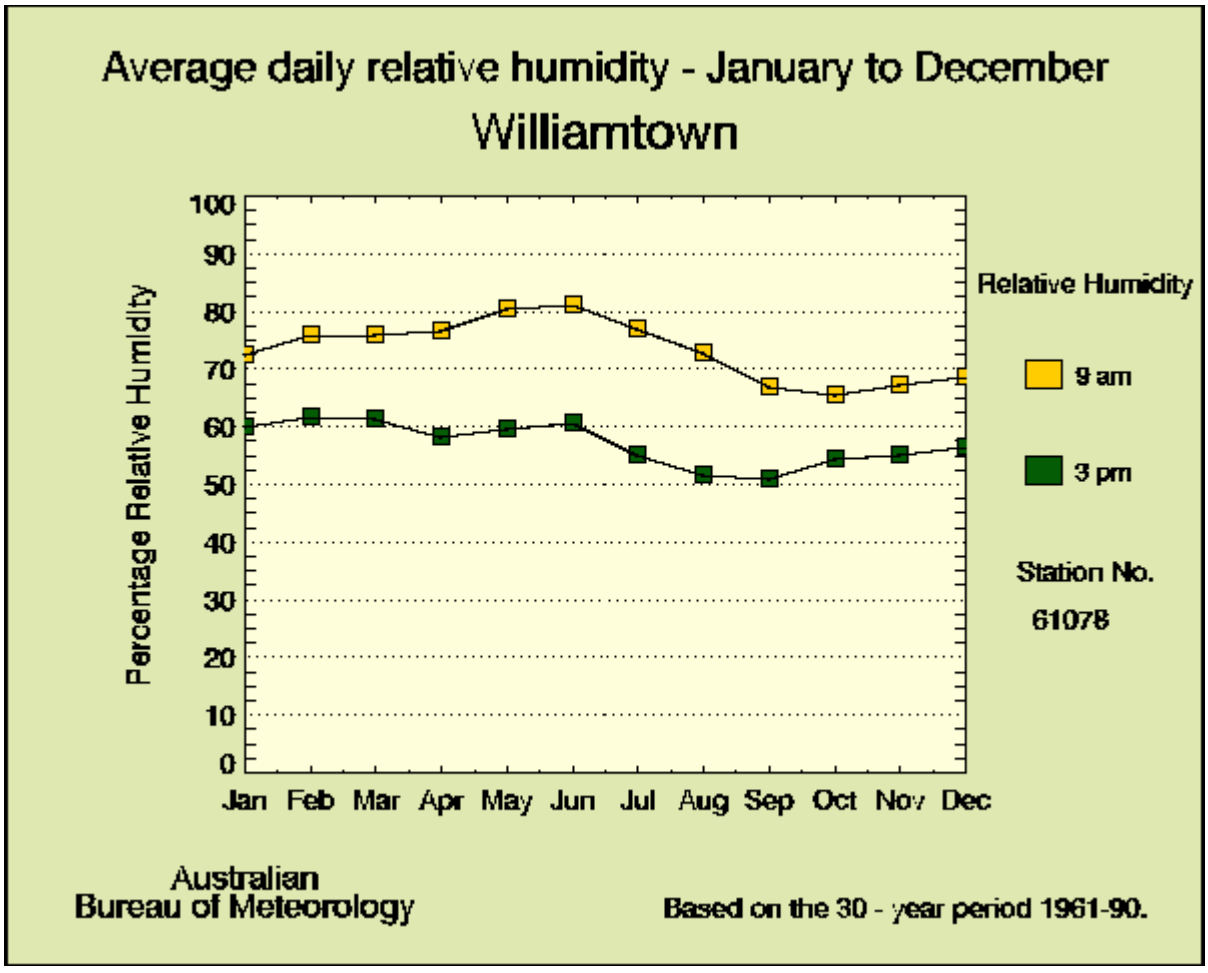
(Commonwealth of Australia, Bureau of Meteorology 2005a; Great Lakes Council 2004a)

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 XI- Bushfire Risk to Natural Heritage

ID	Council Managed Land	Lo t/ DP	Vegetation Community Type	Vegetation Formation	Environmental & Ecological Risk Rating (APZ/LMZ)
COOLONGOLOOK (C)					
1	Coolongolook - Cemetery	Lot 16 DP 1001975	▪ Cleared ▪ White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum[∝]	▪ Grassland ▪ Dry sclerophyll forest	Minor / Moderate / Major (C1)
		R 14674	"	"	Moderate / Major (C1)
2	Cnr Lot 10 Sec 2 DP 758278	Cnr Lot 10 Sec 2 DP 758278	▪ Cleared	▪ Grassland	Insignificant / Minor (A1 & C2)
3	Coolongolook Rural Fire Brigade RES 48 (Crown R 83386)	Lot 9 Sec 15 DP 758278	▪ Cleared	▪ Grassland	Insignificant (A2 & C3)
4	Cnr Lot 4 Sec 6 DP 758278 & Laneway	Cnr Lot 4 Sec 6 DP 758278	▪ Cleared	▪ Grassland	Insignificant / Minor (A3 & C4)
		Laneway	▪ Cleared / Regrowth	▪ Grassland ▪ Dry sclerophyll forest	Insignificant / Minor (A3)
5	Cedar Park RES 68 (Crown R 85987)	Lot 23 DP 753160, RES 85987	▪ Cleared ▪ Flooded Gum	▪ Grassland ▪ Wet sclerophyll forests	Minor / Major (C5)
BULAHDELAH (BU)					
6	Bulahdelah landfill (Part) RES 81	Lot 127 DP 753150	▪ Cleared ▪ Sydney Peppermint	▪ Grassland ▪ Dry sclerophyll forest	Insignificant / Minor (C6)
	Addition to Landfill	Lot 23 DP 1089772	▪ Cleared ▪ Sydney Peppermint/ Swamp Mahogany ▪ Smooth-barked Apple-Sydney Peppermint/ Stringybark	▪ Grassland ▪ Dry sclerophyll forest	Minor / Moderate / Major (A5-a-d & C6)
7	Cemetery	Lot 7015 DP 1002815	▪ Urban ▪ Cleared ▪ Smooth-barked Apple-Sydney Peppermint/ Stringybark	▪ Urban ▪ Grassland ▪ Dry sclerophyll forest	Insignificant / Minor / Moderate (A4 & C7)
8	Pound RES 67 (Crown R 85772)	Lot 7012 DP 1030824	▪ Urban	▪ Dry sclerophyll forest	Insignificant / Minor (C8)
9	Pound Holding Yard RES 1 (Crown R 220)	Lot 7013 DP 1030824	▪ Urban	▪ Urban	Insignificant / Minor (C9)
10	RES 5179	Lot 16 DP 710307	▪ Urban	▪ Urban	Insignificant (A1 & C10)
11	Council Works Depot-Bushfire-VRA Shed (Crown R 76622)	Lot 7010 DP 1054330	▪ Urban ▪ Sydney Peppermint	▪ Grassland ▪ Dry sclerophyll forest	Insignificant / Minor / Moderate (A2-a-b & C11)
12	RES 5190	Lot 1 DP 718465	▪ Urban	▪ Urban	Insignificant / Minor (C12)
13	Court House	Lot 204 DP 753154	▪ Urban	▪ Urban	Insignificant (A3)
14	Church St Foreshore Recreation Reserve RES 106 (CL - R 91201)	Lot 7011 DP 1054333	▪ Urban	▪ Urban	Insignificant / Minor (C13)

[∝] South Coast Shrubby Grey Gum – Severely Depleted; Highly Inadequately Reserved; Private Land Priority

APPENDIX XII - Environmental Assessment

REVIEW OF ENVIRONMENTAL FACTORS

GREAT LAKES COUNCIL

Activity Name:	Hazard reduction works within fire management zones including asset protection zone (APZ) and strategic fire advantage zone (SFAZ).
Plan Name:	Fire Mitigation Plan – Coolongolook and Bulahdelah
Location of Activity:	Coolongolook and Bulahdelah
Activities:	The creation and ongoing maintenance within the APZ and SFAZ as described within Section 8 of the Plan.
Reserves and managed land:	Refer to section 7 within the Plan. There is a total of 27 hectares of fourteen (14) reserves/managed lands affected by bushfire.

(1) Planning – Relevant Legislation

No	Act/Regulation	Comments
1.1	***Local Government Act 1993***	The proposed activities are compatible with the *Local Government Act 1993* and Great Lakes Council management practices.
1.2	***Environmental Planning and Assessment Act 1979***	Part 5 of the *Environmental Planning and Assessment Act 1979* requires an 'Environmental Assessment' to be conducted for all 'activities'. This REF is an 'Environmental Assessment' for the purpose of Part 5 of the Act. A 7-Part Test of significance for potential threatened species is required under the *Environmental Planning and Assessment Act 1979*.This REF is the assessment of the activities. Section 5A of the *Environmental Planning and Assessment Act 1979* requires the application of a 7-Part Test to assess the impact of 'activities' on threatened species, populations or ecological communities, or their habitats as declared under the *Threatened Species Conservation Act 1995*.
1.3	***Threatened Species Conservation (TSC) Act 1995***	All preliminary assessments within attachment 1 and 2, to determine the requirement for a 7-Part Test were conducted as part of this REF. This concluded that the proposed activities will have minimal impact on threatened species, populations or ecological communities, or their habitats as declared under the *Threatened Species Conservation Act 1995* and hence the proposed activities is permitted under the Act and an SIS is not deemed required.
1.4	***Local Environmental Plans, DCP's***	Proposed activities comply with Local Environmental Plan and Development Control Plans.
1.5	***Rural Fires Act 1997***	The proposed activities will assist Council to meet its statutory obligations under the *Rural Fires Act 1997*, and Regulations that specifically requires land owners/occupiers to prevent and minimise the spread of bush fires.
1.6	***NSW Heritage Act 1977***	There are no items listed under the *NSW Heritage Act 1977* within Council managed land affected by the activities.
1.7	***Plan of Management***	Council has generic plans of management (POM) for bushland reserves. The activities proposed are not inconsistent with approved generic POM. The proposed activities are also in accordance with providing ongoing protection of life and property of the community and within Councils management objectives.
1.8	***Council Policies***	The proposed activities are in accordance with "Fire Management For Council Controlled Natural Areas, 1996" and the Fire Mitigation Plan – Coolongolook and Bulahdelah (The Plan). The Plan provides fire

No	Act/Regulation	Comments
		management guidelines and incorporates statutory obligations to manage bush fire risks, to protect life and property, prevent and control bush fires. Concurrently, it considers and provides for public recreation, biodiversity and the conservation of the natural and cultural heritage of the area.
1.9	***Regional/District Strategies of Plans***	Within and adjoining the study area is Bulahdelah and Wang Wauk State Forest managed by Forests (NSW). Bulahdelah State Conservation Area and Myall Lakes National Park are within 10 kilometres of the study area and are managed by the DECC.
1.10	***Other Planning Controls or Agency approvals***	• *SEPP 14 (Coastal Wetlands)* – Under Section 4 of State Environmental Planning Policy No.14 (Coastal Wetlands). There are no recorded sites that occur within the study area. • *SEPP 26 (Littoral Rainforest)* – Under Section 4 of State Environmental Planning Policy No.16 (Littoral Rainforests). There are no recorded littoral rainforest areas that occur within the study area. • *SEPP 44 (Koala Habitat)* – Under Section 5 of State Environmental Planning Policy No.44 (Koala Habitat Protection). Koalas have been recorded locally and both potentially and core Koala habitat may occur within the study area
1.11	***Commonwealth Matters (eg Ramsar, World Heritage, National Estate)***	• *RAMSAR* – Proposed activities are not within a site listed under the RAMSAR convention. • *World Heritage* – Proposed activities is not within a World Heritage Area. • *National Estate* – Proposed activities is not in an area listed on the National Estate Register.
1.12	***Protection Of The Environment Operations Act 1997 (the POEO Act)***	s133 Prohibition by EPA of burning in open air or incinerators – (1) EPA is of the opinion that weather conditions are such that the burning of fires in the open while those conditions persist will contribute or is likely to contribute to air pollution to such an extent that the making of an order under this section is warranted. (2) The EPA may, by order published in accordance with this section, prohibit, unconditionally or conditionally, the burning of fires in the open or in all or any specified classes of incinerators. s134 Directions by authorised officers concerning fires 1 (b) air pollution from the fire is injurious to the health of any person or is causing or is likely to cause serious discomfort or inconvenience to any person. s139 Operation of plant The occupier of any premises who operates any plant (other than control equipment) at those premises in such a manner as to cause the emission of noise from those premises is guilty of an offence if the noise so caused, or any part of it, is caused by the occupier's failure: (a) to maintain the plant in an efficient condition, or (b) to operate the plant in a proper and efficient manner. s145 Littering generally – (1) Offence of littering. A person who deposits litter in or on a public place or an open private place is guilty of an offence. Schedule 2 Regulation-making powers – 6 Open fires or incinerators. The regulation or prohibition of the burning of fires in the open or in incinerators. 6B Emission of air impurities air impurity includes smoke, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, mists, odours and radioactive

No	Act/Regulation	Comments
		substances.
1.13	***Native Vegetation Act 2003/ Tree Preservation Order (TPO/, The*** **Bush Fire Environmental Assessment Code for NSW (RFS 2006)**	The Bush Fire Environmental Assessment Code for NSW, 2006 (the Code) is an environmental assessment where certified authorities are consenting bodies including Local Governments. Conditions for hazard reduction works under these guidelines enable works to be undertaken without the requirement for a review of environmental factor (REF). If the proposed works are beyond the Codes guidelines then reference to the *Native Vegetation Act* or the Councils TPO is required. Most of the existing works meet the guidelines of the Code however; more detailed environmental assessment is required for some works. Council has undertaken the preparation of a REF, to clarify works in more detail. Any additional fire mitigation works in Coolongolook and Bulahdelah would either require a HRC or a more detailed REF.

(2) The Activities

Assessment

Council managed land within the study area has been assessed for fuel loads, bush fire risk, fire threat and ecological considerations. The field environmental and habitat assessment enables details within each reserve to be collated to ensure hazard reduction works comply with legislative constraints and biodiversity thresholds. Further, within the Plan section 4 details guidelines for hazard reduction and section 6 for ecological consideration.

The assessment outcomes are based on likely extreme weather conditions, and the ability of an asset to recover from or withstand the expected bush fire as a consequence on its fire resistance standard. This period is when the most damage is expected as fire intensity is at its greatest.

To determine local habitat attributes a field assessment was undertaken to determine:

- Structural vegetation;
- Presence and frequency of habitat trees;
- Size class of trees;
- Density of shrub and ground covers;
- Presence of fallen timber;
- Presence of rock outcrops;
- Presence of wet area and water bodies;
- Extent of movement corridors;
- Extent of faunal refugia; and
- Implied conservation significance.

From these site assessments, and desktop analysis it is possible to identify if any potential significant habitat features exist. A list of potential threatened species assists in determining the effects on species and the local biodiversity.

Fire assessment

Bushfire management and mitigation measures are also guided by other documents such as the Lower Hunter Zone, Bush Fire Management Committee, Bush Fire Risk Management Plan (BFRMP).

Within section 3 of the Plan it states: 'Field assessments are undertaken to provide data for analysis for managers. The assessment process follows guidelines provided by the RFS, and are an acceptable process for fire managers to determine the hazard and risk analysis of bushfire within and adjacent to bushfire affected Council managed land.'

The contributing factors to the assessment include the distance of the bush fire hazard to the asset (Threat) and, where the potential severity is influenced by the bush fire or by bush fire 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 assessment is assisted by using the guide NSW National Parks and Wildlife Service, (2003b) Overall Fuel Hazard Guide Sydney Basin NSW Edition May 2003 (Ed. G. McCarthy). NSW National Parks and Wildlife Service, Hurstville.

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.

Assessment	Coolongolook and Bulahdelah
Bush Fire Prone Land	Approximately 60% and 70% of the study area, Coolongolook and Bulahdelah respectively is recorded as having bushfire prone lands (BFPL). The majority of the bushland areas within BFPL are noted as bushfire affected land.
Life and Property Bush Fire Risk Rating (Extracted from the BFRMP)	Insignificant, Minor, Moderate and Major
Environmental and ecological risks	Insignificant, Minor, Moderate and Major
Construction standard of neighbouring assets	No standard, Level, 1-3

Potential bushfire hazard can also be derived by undertaking assessment using the RFS guidelines for Bush Fire Risk Management Planning. Council, being part of this Committee is committed to the prevention and mitigation of bushfires and development of fire management plans. Appendix XIII tables the bush fire hazard and risks with particular relationship to assets around Council managed land using this methodology. This specifically uses the combination of known vegetation types, slopes and potential fire run distances to determine a bush fire hazard (in relation to vegetation type). This is the first step to identifying community risks, bushfire threat, hazards and consequences of hazards to the local community. The BFMC in time will amend the existing BFRMP using this information and guidelines.

Future Management

The public reserves, reserves, drainage reserves and road reserves will be continued to be managed for the protection of life and property and to mitigate the spread of fire within the reserves.

Impact on neighbouring properties

Graduated fuel management of hazards adjacent to development 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 FMZ's including asset protection zones, strategic fire management zones, land management zones and fire exclusion zones.

The management of these zones is a tool to assist in the monitoring and management of fuels that impact on a development, either nearby or at a distance from the asset. Each zone has specific management strategies that can be implemented to meet management objectives (Refer to section 4 of the Plan for further details).

Signs

Community education plays an important part to Councils management and implementation of fire mitigation works. Notification of neighbouring properties of intended work ensures mitigation works are promoted and encouraged with adjoining property owners.

Public education through signage of asset protection zones promotes fire management objectives to the wider community and assists in the long-term maintenance of the fire management zones (FMZ's).

Reversibility of Proposed Activities

According to the Fire Mitigation Plan – Coolongolook and Bulahdelah the dominant vegetation formations surrounding Coolongolook and Bulahdelah are Grassland and Dry sclerophyll forests with minority presence of Forested wetland, Wet sclerophyll forests and Swamp.

The Code certifies the mechanical mowing/ slashing and hand removal within APZ's and slashing within APZ's and SFAZ's. There are no conditions as part of the Code relating to any known threatened species within the areas of proposed works.

Mechanical hazard reduction by machinery may be reversed, as regeneration of forested areas is possible if slashing is removed from the area. Minimal impact by mowing/ slashing and hand removal on the vegetation ensures the biodiversity of the whole area is retained/appropriately managed.

By reducing fuels adjacent to assets and within other FMZ's this assists in reducing the fire intensity, which ultimately reduces the fire effect on the fauna and flora at the time of the fire.

Hazard reduction by burning within the described SFAZ's reduces fuels adjacent to Bulahdelah Landfill and MidCoast Water Sewage Treatment Plant. By undertaking this burn it also assists in limiting the spread of fire from the reserve to adjacent properties. Natural regeneration of the fire tolerant forest is consistent with known fire response of Australian fauna and flora.

(3) Alternatives

Hazard Reduction by Burning verses mechanical slashing in areas identified using fuel reduction by mechanical means:

While this alternative would achieve fire management objective hazard reduction by burning would have a greater environmental impact than frequently slashing these relatively small areas within identified APZ's and SFAZ's. Despite this, Coronial recognises that appropriate bushfire intervals are beneficial to ecological integrity.

The area that has been identified to be hazard reduced provides adequate protection for to Bulahdelah Landfill and MidCoast Water Sewage Treatment Plant by mechanical slashing.

Mechanical slashing verses Hazard Reduction by Burning in strategic areas using fuel reduction by burning option:

While this alternative would achieve fire management objective hazard reduction by slashing would have a greater environmental impact than infrequent low-moderate intensity burning within the identified SFAZ. Both the ground cover and the shrub layer would be removed and therefore would greatly interrupt the life cycles of both fauna and flora. A mosaic burn removing ground fuels means the shrub layer would be left intact allowing regeneration to occur more quickly.

The area that has been identified to be hazard reduced provides adequate protection for Bulahdelah Landfill and MidCoast Water Sewage Treatment Plant.

Do nothing:

Council have an obligation to protect life and property around Coolongolook and Bulahdelah. Council are required to meet its statutory obligation under Section 63 of the Rural Fires Act (1997) to minimise the spread of fire.

Fire fighting authorities would also have less ability to contain fires that within the rural/urban interface or access fire advantages around the villages if no fuel reduction works were undertaken.

(4) The Existing Environment

4.1 The location

Area (ha)	The proposed activities cover within APZ's approximately 1.51 hectares in managed lands and reserves. Within SFAZ's, activities cover approximately 0.4944 hectares for fire trails and 3.041 hectares within a strategic hazard reduction burn.
General Location	Within the urban and rural area of Coolongolook and Bulahdelah.
Neighbouring properties	Private property with variable setbacks with adjoining reserves.
Implied conservation values	Low, medium and high conservation values are determined to exist within the various reserves.
DECC Key Habitat	Recorded within the Bulahdelah study area into the surrounding rural areas, to the north and including State Forest, Crown Land Reserves and conservation areas such as Bulahdelah State Conservation Area.
Key Corridor (Fauna)	Occurs within the both Coolongolook and Bulahdelah study areas and links adjacent to the Bulahdelah State Conservation Area.
Soils	Coolongolook and Bulahdelah have a variety of soils landscapes including; Estuarine Landscape adjacent to the River; Alluvial Landscape in low-lying areas and on the river fringe; Residual Landscape on the flood plains; Transferral Landscapes in undulating areas; Colluvial and Erosional Landscapes on steeper slopes. Acid sulphate soils occur in low-lying areas of Coolongolook (within 60 metres of Coolongolook River) and Bulahdelah (within 800 metres of the Myall River).

4.2 Field assessment

Slope (°)	Generally ranging from 0-5 degrees slopes in low-lying areas with some elevated undulating areas within Transferral Landscapes; Colluvial and Erosional Landscapes. Conditions apply to steeper slopes >18 degrees.
Drainage/ Watershed	The APZ's and SFAZ's mechanical works including mowing, slashing and hand removal are within most areas of 0-5 degrees slopes. The broader watershed outside Council Managed Land, at times may be up to 18 degrees slopes.
Riparian areas	Conditions apply to hazard reduction works adjacent to riparian zones within APZ's and SFAZ's. Riparian buffers apply to various water bodies including those on 4th Order Streams and greater where a minimum requirement of 10 metres within APZ's (handheld machinery) and 20 metres (slashing) is necessary. No tree removal is permitted within 20 metres. Refer to the Code for more specific minimum distances for 1st to 4th Order Streams etc. for both APZ's and SFAZ's. Slashing is permitted within 5 metres of the 1st Order stream at Bulahdelah Landfill within the APZ's and the Fire Trail.

Vegetation	The detailed vegetation survey by Council identified 15 forest types within the study area as described within the GLC Vegetation Strategy, 2004 in summary these include; Dry Blackbutt; Forest Red Gum; Grey Gum/Grey Ironbark/White Mahogany; Smoothbarked Apple-Sydney Peppermint-Stringybark: Sydney Peppermint; White Mahogany/Red Mahogany/Grey Ironbark/ Grey Gum; Swamp (Freshwater or Estuarine); Red Mahogany; Red Mahogany/Smoothbarked Apple; Swamp Mahogany; Flooded Gum: Sydney Blue Gum; Mixed Regrowth; and Cleared/Grassland. A wildfire in December 2006 burnt the Landfill and part of the Landfill Addition to the north. There is evidence of shrub and ground cover being burnt but there was minimal evidence of canopy scorch. Within 6 months of the fire the regeneration of this area has occurred as the wildfire intensity was low—moderate in this area. However on the steeper slopes outside Council Managed Land the recovery has been slower within areas impacted by higher intensity fire. APZ works are within Grassland (cleared areas); White Mahogany/Red Mahogany/Grey Ironbark/ Grey Gum; Dry Blackbutt; Smoothbarked Apple-Sydney Peppermint-Stringybark; Sydney Peppermint; Swamp Mahogany; and Mixed Regrowth forest communities. The fire trail extends through Grasslands; Sydney Peppermint; Smoothbarked Apple-Sydney Peppermint-Stringybark; and Swamp Mahogany vegetation community types.
Habitat trees (Hollows/dead)	Hollow bearing trees are present within the local area but not impacted by fire mitigation works. Therefore, negative impacts on the habitat values for hollow-dependant fauna are minimal.
Size class of trees	Tree heights are generally between 8-15 metres for Forested Wetland Forest; 12-20 metres Dry Sclerophyll Forest; with generally a 40-60% cover in drier communities (occasionally 30%) and 60% cover in wetter communities.
Shrub and ground cover	Small trees and shrubs present, with ground covers present in most communities. Within each vegetation community, the species diversity is variable. Dry sclerophyll forests shrub layers are dry in nature and are sparse to moderate to a height of 3-5metres. Forested wetlands ground cover varies from sparse to dense to 2-metres in height. Shrubs may form a moderate to dense layer from 2-5 metres in height. Ground cover is sparse to moderate to 0.5 metres in height. The grassland areas have occasional trees or shrubs present and/or consist of groundcovers which occur within dry sclerophyll forest communities. Blady Grass is often intermixed with whiskey grass. When these areas are maintained for recreation, grasses predominantly occur and regenerating shrubs/trees are removed.
Fallen timber	There is evidence of some larger timber retained on the ground as well as smaller timber found amongst the litter layer, across most natural communities.
Rocky outcrops	None present.
Wet areas	Riparian zones are adjacent to the 1st Order stream within the Bulahdelah Landfill in low—lying areas within forested wetlands. Conditions apply to these and within drainage lines within FMZ's.
Corridors	The reserve areas although disjunct provide a habitat corridor which links with the adjoining bushland areas and provide corridors through and around the urban and rural areas. These are mapped key regional corridors in the study locality based on mapping by the DECC.

Faunal refugia	Within the various public reserves remnant vegetation provides habitat for birds and smaller arboreal animals. Larger reserves are very important to local species for habitat and refuge. It provides movement, dispersal through the reserves and into the very large high value remnant habitats. Important refuge habitat exists across most reserves including tree hollows.
Evidence of Threatened species	None recorded in the field during this assessment.
Noxious weeds	Noxious weeds have been recorded within Coolongolook and Bulahdelah area including; Blackberry, Crofton weed (W3 category weeds); Mist Flower, Mother-of-Millions (W2 category weeds). There are also environmental weeds within some of the reserves including Lantana, Asparagus weed (Ferny and Ground), Morning Glory (Coastal and Dunny Creeper) and Cassia. Whiskey Grass is predominant in some cleared areas not grazed or slashed regularly.
Cave, mines or tunnels	None recorded.
Past Disturbance	Clearing and mowing has occurred in areas maintained as open space areas and within reserve areas. In addition (authorised and in some cases unauthorised) clearing by neighbours has encroached within the adjoining reserve, and often leads to the dumping of rubbish (garden refuge) and establishment of escaped garden plants. There is minimal invasion of weeds or noxious weeds identified within FMZ's within natural bushland areas. Authorised maintenance by mowing/slashing of former FMZ occurs within some areas.
Water points	Rivers, creeks, dams, Coolongolook River Boat ramps and Myall River Picnic Area (Bulahdelah).
Fire disturbances	There is evidence of wildfires having occurred within reserve number 6 & 7 recently (December 2006) within Bulahdelah.
Fire Assessment	Within proposed FMZ's; there is a variation of fuel loads within the reserves in Coolongolook and Bulahdelah. Ongoing maintenance in managed open space areas or former FMZ's resulted in having low fuel loads. Reserves conserved for environmental protection and not managed for open – space had higher fuel loads present. Bark fuels – Low, moderate, high and very high (0 to 5t/ha) Surface fuels – Low. Moderate, high and very high (<4 to 12 t/ha) Elevated fuels – Low. Moderate, high and very high (0 to 10t/ha) **Overall Fuel Loads = Low to high/very high where bark hazard is low-moderate.** **Overall Fuel Loads = Low to high/very high where bark hazard is high.** **Overall Fuel Loads = Moderate to extreme where bark hazard is very high.**
Fire advantages	The APZ's and SFAZ's provide advantage lines for fire fighters behind residential properties, along laneways and unformed roadways. Access on managed reserves across mown open space areas enable fire fighters good egress in the event of a fire.
Additional comments regarding fire assessment	Adjoining properties are required to undertake hazard reduction works, which is certified by the NSW Rural Fire Service.

4.3 Significant features

Conservation Significance (National/state/local natural or cultural heritage values)	There is some mapped vegetation communities within the LGA that have state significance, as they are known or likely to be endangered ecological communities (EEC). This includes 'Swamp Sclerophyll Forest on Coastal Floodplains of the North Coast Bioregions'; Swamp Oak on Coastal Floodplains; Littoral Rainforest and Coastal Saltmarsh. Forests communities within the LGA considered regionally vulnerable with a 100% conservation target in the Lower North East of NSW by the Lower North East Comprehensive Regional Assessment (CRA) and the DECC are: ❑ 31 Paperbark (including those within modified forests) is a highly significant forest community. ❑ 30/ 31 Swamp Mahogany/ Paperbark (APZ and SFAZ works) ❑ 31/32 Paperbark/ Swamp Oak ❑ 32 Swamp Oak (SFAZ works) ❑ 92 Escarpment Red Gum In a regional context those forest community considered regionally rare or with a 100% conservation target in the CRA are: ❑ 45 Tallowwood ❑ 33 Mangrove ❑ 68 Red Mahogany (APZ works) ❑ 223 Heath ❑ 231 Swamp ❑ 6-7,22-25 Rainforest In a regional context those forest community considered being severely depleted in the CRA are: ❑ 37 Dry Blackbutt /45 Tallowwood ❑ 42 Blackbutt/Sydney Peppermint/Smoothbarked Apple Existing reserves and reserve management can serve to protect these areas from further degradation by unauthorised works. Authorised fire mitigation works occurs within two (2) of these vegetation communities; however the impact is minimal and is often within the transitional zone, or areas which have been formerly disturbed. FMZ works does occur within two communities intermixed with Red Mahogany community being White Mahogany/Red Mahogany/Grey Ironbark/ Grey Gum and Red Mahogany/Smoothbarked Apple forest communities. The activities will affect some riparian areas, but will have a minimal, short-term effect on the environment as works are conditioned and customised. The size of the works is minimal compared to the remaining area within the reserves.
State Environmental Protection Policy (SEPP)	Within the study area there are no mapped records of SEPP 14 or SEPP 26
Plants (ROTAP's or threatened species, communities, critical habitats and regionally significant species) Cont –	Six (6) plants are listed under Schedule 2 of the *Threatened Species Conservation Act, 1995,* which occurs in the vicinity of Coolongolook and Bulahdelah being *Asperula asthenes, Tetratheca juncea, Syzygium paniculatum, Cryptostylis hunteriana, Rhizanthella slateri and Angophora inopina.* These are associated with a mixture of forest communities including those within water courses, drier forests and woodland areas. ECC such as 'Swamp Sclerophyll Forest on Coastal Floodplains of the North Coast Bioregions' occur within the wider study area. Due to the locality of these recordings no further assessment was required as there is no impact on these species and communities from proposed activities.

Animal (regionally rare or threatened species, communities, critical habitats)	Seventeen (17) threatened species are known to occur within the study area or within 5km radius of activities within Coolongolook and Bulahdelah, based on site records and data contained in the Atlas of NSW Wildlife. A procedure for determining which of these species requires assessment under Section 5A of the EP&A Act has been undertaken within Attachment 1 & 2.
Water Catchment values including identified high conservation value subcatchment	The Coolongolook and Bulahdelah study area are respectively within the Wallis Lake and Myall Lakes Catchment areas. Conservation of the transitional zones on the river edge is important to many vegetation communities found within this zone. Council promote healthy waterways and activities in support of the management of the catchment values.
Known or potential for Indigenous heritage values	The Lower Hunter Zone, BFMC Bushfire Risk Management Plan does not identify any archaeological or aboriginal heritage sites in or near the urban area. In addition the DECC (Parks and Wildlife Division) maintained Aboriginal Heritage Information Management System (AHIMS) search for Aboriginal Objects and Aboriginal Sites did not identify any aboriginal sites affected by works within Council land where FMZ are proposed.
Historic heritage values (eg. historic places, movable heritage or relics)	The proposed activities do not impact on any areas of historic values recorded within the FMZ's in Coolongolook and Bulahdelah. Bulahdelah Mountain and the Myall Lakes are significant heritage features that will not be harmed by any of the works proposed.
Recreation	There will be minimal impact to recreational pursuits as the activities within the reserves are mechanical works which can occur at the same time public are visiting the reserve due to the small area of the reserve is being maintained.
Scenic and visually significant	Grasslands, Dry sclerophyll forests, and Forested wetlands surround the proposed activities within the various sites. The mechanical works will ensure the over storey shrubs and trees remains intact. The ground covers will be most affected with some impact on the shrub layer. The area will be slashed which ensure a ground cover remains within the FMZ's (although reduced in height) and that where appropriate 25-30% of the area is retained for habitat in forested areas. There is minimal impact on the soil by slashing/ mowing or hand removal. Where appropriate slashing shall be conducted five (5) centimetres above the ground to protect the land surface. The regrowth of the area ensures that plants can continue to mature and set seed. The frequency of works in the forest area ensures the fuel loads are maintained below 8 tonnes per hectare and occur at least annually. Grassed areas are periodically mown more frequently to ensure grass height remains to meet the required guidelines.
Education	Council encourages community education, which meet Council policies and guidelines within the FMP. Asset protection zone signs promote Council fire management activities.
Interests of external stakeholders (eg. apiarists, leaseholders)	The proposed activities are within 8 different reserves and 1 road reserve in Coolongolook and Bulahdelah with adjacent residents being of most interest to the works. The public exhibition of the Fire Mitigation Plan- Coolongolook and Bulahdelah enables the community to make comments on the activities proposed. In addition neighbouring properties may be advised by letterbox drop of the proposed activity or notified through other media such as radio or press release.

(5) Environmental Impacts

	Yes or No[25]	likely impact: negligible, low, medium or high adverse; positive, n/a	Justification for significance of impact including safeguards and receiving environment?
5.1 Physical issues			
1. Does the proposal disturb ground features including filling or excavation?	Yes	Negligible	Minimal impact on ground surface from construction of compacted fire trail with deposited gravel.
2. Does the proposal affect a waterbody, watercourse or wetland?	Yes	Negligible, low	Minimal compaction by heavy machinery (tractor) when slashing. Removal of debris repeatedly on an area may result in minimal soil disturbance. Erosion will be monitored throughout the implementation and completion of the works. Appropriate erosion control measures (sediment traps) will be put into place to prevent soil erosion as necessary. Works in riparian zones will be strictly controlled and minimised. The mosaic low intensity prescribed burn will ensure areas unburnt will be retained to ensure ash run off is minimal. No lighting within water courses to ensure ground cover is retained in riparian buffers.
3. Does the proposal change flood or tidal regimes, or is it affected by flooding?	Yes	Low	Undertake sediment and erosion control measures when maintaining the fire trail if necessary to retain soil stability in these sensitive estuarine areas. Ensure creek crossings design incorporates erosion control and bank stabilisation.
4. Does the proposal use or transport hazardous substances?	Yes	Negligible, low	A small amount of fuel will be used in mowers and whipper-snippers, drip-torch fuels which are carried in certified fuel containers in accordance with the Dangerous Goods Act.
5. Does the proposal generate or dispose of gaseous, liquid or solid wastes?	No	N/A	
6. Will activity emit dust, odours, noise, blasts or radiation in the proximity of residential areas?	Yes	Negligible	Increased noise generated from machinery mowing or slashing the areas.
7. Does the proposal affect coastline or dunes, alpine areas, karsts features, unique landforms or groundwater recharge areas?	No	N/A	

[25] If yes is selected, both other columns need to be completed. If no, just select n/a in the likely impact column.

	Yes or No[25]	likely impact: negligible, low, medium or high adverse; positive, n/a	Justification for significance of impact including safeguards and receiving environment?
8. Does the proposal affect erosion prone areas or areas with slopes greater than 18°?	No	N/A	No works present on steep slopes >18°. Slopes of 15-18° require erosion control netting or retention of fallen logs to reduce and prevent erosion.
9. Does proposal affect subsidence or slip areas?	No	N/A	
10. Does proposal affect areas with acid sulphate, sodic or highly permeable soils?	Yes	Negligible, low	Works below SL or 1-2m below SL affects acid sulphate soils. However the mechanical works within reserves will not be below SL and have minimal surface soil disturbance from machinery driving over the area while mowing or slashing. The acid sulphate soil risk only occurs within when works are below ground level.
11. Does the proposal affect areas with salinity or potential salinity problems, or groundwater recharge areas?	No	N/A	
12. Is the proposal within a SEPP 14 – Coastal Wetland or SEPP 26 –Littoral Rainforest or equivalent?	No	N/A	
5.2 Biological Issues			
5.2.1 Flora			
1. Have you accessed flora databases?	Yes		Refer to Attachment 2.
2. Has the site been surveyed for flora, including ROTAPs and threatened species?	Yes		No ROTAP or threatened species were found within the proposed FMZ's.
3. Were any habitats or species of significance or potential significance noted (eg. wildlife corridors, remnant vegetation, inadequately reserved plant communities)?	Yes	Low	Fire mitigation works occurs within one (1) regionally vulnerable community (Swamp Mahogany) however the impact is minimal as activities are within the transitional zone, where the land has been formerly disturbed. Activities are within recorded fauna wildlife corridors (DECC) however the FMZ's area is small with minimal disturbance to the understorey and ground cover with no impact on the tree canopy.
4. Does the site have cultural landscape values?	No	N/A	
5. Is the vegetation to be cleared or modified including any ROTAPs, threatened species or communities?	Yes	Low	The vegetation is to be modified, within the ground and shrub layers with no impact on ROTAP species. There are no threatened plant species recorded where works are proposed, however one (4) species was recorded within the study area and an additional one (1) within 5km radius of activities. No 7-Part Test of significance is required. Hospices are to be retained to provide habitat and discontinuous vegetation structure.

	Yes or No[25]	likely impact: negligible, low, medium or high adverse; positive, n/a	Justification for significance of impact including safeguards and receiving environment?
5.2.2 Fauna			
1. Have you accessed all available fauna databases (eg. DECC Wildlife Atlas)?	Yes		DECC threatened fauna and flora records have been viewed and details in particular of threatened species are within Attachment 1.
2. Has the site been surveyed for fauna, including for threatened species?	Yes		No threatened species were found within the FMZ's.
3. Were any habitats or species of significance (including threatened species) or potential significance noted?	Yes		Six (6) threatened species are known to occur within the study area and eleven (11) within a 5km radius of activities in Coolongolook and Bulahdelah, based on site records and data contained in the wildlife Atlas NSW. No 7-Part Tests of significance are required to assess the likely impact of the activity (Attachment 1 &2).
4. Does the activity displace or disturb fauna or create a barrier to movement?	Yes	Negligible, low	The mechanical slashing will disturb some fauna temporarily. The reduced habitat is very small in size. Hospices and adjacent conservation zone provides habitat for smaller reptiles, birds and insects.
5.3 Community Issues			
1. Does the proposal affect the existing use of community services or infrastructure including access or increased visitation?	Yes	Low/Positive	Some APZ's will allow access to the rear of houses or businesses. Leaving hospices to reduce visual access into these areas and thus discourage pedestrian access. Some areas require barriers such as bollards or gates to restrict access, where any such access is inappropriate. Policing of the private storage of equipment in any APZ will be conducted.
2. Does the proposal affect or change the transport requirements of an area?	Yes	Negligible	Machinery/ lawn mowers may be unloaded from vehicles on the roadside but disturbances are only temporary.
3. Does the proposal affect sites of importance to local or broader community for their recreational or other values?	No	N/A	
4. Has consultation with the potentially affected community been undertaken?	Yes	Low/Positive	The community has been notified of the Fire Mitigation Plan – Coolongolook and Bulahdelah that details the proposed activities. The Plan will be publicly exhibited.
5. Does the proposal affect the use of, or the community's ability to use, natural resources, especially water?	No	N/A	The public uses the open space areas that are also FMZ's. The community in these areas prefers the short grass.

	Yes or No[25]	**likely impact: negligible, low, medium or high adverse; positive, n/a**	**Justification for significance of impact including safeguards and receiving environment?**
6. Does the proposal affect the visual or scenic landscape?	Yes	Low	The proposed activities will cause short-term visual changes to the landscape, as the area will be able to be accessed and viewed from the adjoining properties.
5.4 Ecological Communities and General Impact			
1. Is the activity likely to cause a threat to the biological diversity or ecological integrity of a community?	No	N/A	
2. Is the activity likely to introduce noxious weeds, vermin, feral species or genetically modified organisms into an area?	Yes	Negligible	The disturbance of the ground layer species may enable weed species to invade. Targeted ongoing weed management will control the spread of weeds in these areas.
3. Is the activity likely cause a bushfire risk? or changes the fire regime	Yes	Medium/ Positive	The FMZ's are primarily to provide protection to the community in the event of a fire. The reduced ground fuels reduce the chance of fire.
Is the activity likely to have any other potential impact on flora, fauna or ecological communities?	Yes	Negligible, low	Disturbance to the shrub layer will impact on birds, mammals, reptiles and amphibians utilising the area. The changes within the FMZ's are minimal as the works are on the fringes of the already disturbed forest.
Bushfire prone areas	Yes	Negligible-high	66 % of the total study area is recorded and mapped as bushfire prone land.
5.5 Cultural Heritage Issues			
5.5.1 Aboriginal heritage			
1. Have you accessed the NPWS Aboriginal sites register?	Yes		A DECC Aboriginal Heritage Management System (AHIMS) search revealed no sites within the areas proposed for hazard reduction activities.
2. Has an assessment been carried out in order to determine the likelihood of occurrence of Aboriginal relics or places of significance?	Yes		No further aboriginal sites were located during field inspections.
3. Does the proposal affect Aboriginal relics or places of significance or importance to the Aboriginal community?	No	N/A	In areas which have not previously been subject to slashing, trittering or removal of many trees (or significant trees) the DECC (Cultural Heritage Division) is required to be contacted. No trees greater than 100cm were identified for removal. As a result of contacting DECC, there is no affect on recorded sites within the study area as none were within identified FMZ's.
4. Does the proposal affect areas nominated or declared as Aboriginal Places?	No	N/A	

	Yes or No[25]	likely impact: negligible, low, medium or high adverse; positive, n/a	Justification for significance of impact including safeguards and receiving environment?
5. Does the proposal affect areas subject to land claims or Native Title claims?	No	N/A	
5.5.2 Historic heritage			
1. Has the area been surveyed or assessed for heritage items or historical archaeological sites?	Yes		While there are known historic sites within Coolongolook and Bulahdelah, no known historic areas were identified as being within areas where hazard reduction works have been proposed.
2. Does the proposal affect known heritage items or historic archaeological relics?	No	N/A	
3. Has a conservation plan or other conservation assessment been prepared for the place? If so, is the proposed activity in accordance with the conservation plan or assessment?	No	N/A	
5.6 Biological issues during construction			
5.6.1 Natural Resource Use Issues During Construction and Operation			
1. Is the activity likely to result in the degradation of the reserve or any other area reserved for conservation purposes?	Yes	Negligible, low	The removal of some ground covers and shrubs within a small proportion of the reserves will have minimal effect on conservation values of the area.
2. Is the activity likely to involve the use, wastage, destruction or depletion of natural resources including water, fuels, timber or extractive materials?	Yes	Negligible	Removal of shrubs and ground covers from the area to a local refuge area ensures green waste does not remain in the FMZ's.
3. Is the activity likely to have any other impact on natural resources?	No	N/A	

Summary of environmental impacts

The overall impacts of the proposed activities are considered to be low. The activities are considered to have a positive impact on neighbouring properties. The main impacts will be the mechanical hazard reduction of the FMZ, which is localised, with short-term displacement of some fauna. These impacts, however, are not considered to be significant for the following reasons:

- The area that is involved is small compared to the total adjacent reserve area.
- Erosion controls will be implemented as required.
- No recorded threatened plant species are known to occur within the proposed activities area.
- The proposed activities will have no or minimal impact on the threatened fauna of the area (Refer to Attachment 1 & 2).

(6) Environmental Safeguards

The proposed activities within the FMZ's are to ensure activities meet legislative and policy guidelines. In addition to ensure environmental safeguards (Fire Mitigation Program) are implemented options for conditions guided by the Code, planning documents and legislation.

Environmental Safeguards

No.	Action
1	Prior to any hazard reduction works, the required APZ width within this plan is measured from the boundary of the reserve. N.B. In order to determine the required width of the APZ, the setback from the adjacent asset (house etc) combined with existing slope determines the maximum width as per the Code and defined specifically within the Plan. The APZ shall be staggered depending on the setback (of assets) within adjacent properties, to further minimise the area affected.
2	Under scrubbing shall be conducted sensitively, with selected understorey clumps marked to be retained. The area to be retained is approximately 30% of the total area.
3.	All trees and shrubs in excess of 3m to be retained, except where canopy separation or access trail is required. Determination for removal must be by an authorised Council Officer.
4.	Large fallen logs (where applicable) shall be retained, with care taken where epiphytes exist.
5.	Trees greater than 3m to be marked/approved for removal in consultation with the Parks and Recreation Section. In this case, trees shall be selected based on bark hazard (flammability), health, desirability (feed trees etc) and shall be clearly marked or area described for action.
6.	All Cabbage Tree Palms greater than 500mm in height shall be retained, as this is a protected plant.
7.	Rainforest shrubs and fire retardant plant species shall be selectively retained within the APZ.
8.	Protect & retain all bush rock.
9.	The works shall target noxious weeds and environmental weeds.
10.	Remove fuel reduction work debris from site to an authorised area for disposal. Approval to store removed fuel before disposal must be sought from an authorised officer.
11.	The DECC (Cultural Heritage Division) must be contacted to assess impact of proposed works when: ▪ Areas that have not previously been subject to slashing, trittering or removal of many trees (or significant trees) or trees are greater than 100cm diameter (at breast height) are identified for removal. Conditions will be given that apply to proposed works.
12.	Skirting (removal of lower branches) to separate tree canopy from the ground or understorey vegetation should be used in preference to tree removal where appropriate in consultation with the Parks and Recreation Section.
13.	Undertake field survey for target threatened species when specified within the REF, to ensure safeguards can be implemented to protect species, which occur or have moved into the area (Refer to the REF for further details).
14	In steeper areas retain fallen logs to assist in reducing and preventing soil erosion by placing across the slope to slow soil movement.
15	Herb and shrub layer retention at the base of the trees or left as clumps or hospices to provide cover for fauna.

(7) Conditions as Guided by the Code.

The following mechanical hazard reduction conditions are for works formally identified in the Plan. The list is to be reviewed for various FMZ as alternative conditions apply to each zone.

Hazard Reduction Conditions: Mechanical

✓	Preference shall be given to the retention of smooth barked trees and large trees with hollows.
✓	Trees and shrubs up to 3 metres in height may be removed as part of the hazard reduction activity approved as described within this report or specified on site by an authorised Council Officer.
✓	Dangerous trees may be removed but only with the approval of Great Lakes Council.
✓	Slashing and trittering shall not be carried out on slopes exceeding 18 degrees.
✓	The works shall be carried out in a manner to ensure the retention of topsoil on the ground surface.
✓	Council shall comply with any relevant management actions identified in the NPWS Threatened Species Hazard Reduction schedule.
✓	Council shall comply with any relevant management actions identified through referral to NPWS Cultural Heritage Division with regard to Aboriginal heritage sites.
✓	Soil moved by ploughing or blading shall be redistributed evenly over the effected area. Natural or assisted re-vegetation of the effected area is to be encouraged in order to prevent soil erosion.
✓	Where a fire break is to have a slope length greater than 60 metres, slashing/trittering is the preferred hazard reduction method. Mowing may be used when existing maintenance type compliments management objectives.
✓	This REF does not permit the use of graders and dozers to clear native vegetation.
✓	This REF does not permit the re-shaping of the soil surface or the redirection of overland flows.
✓	Mechanical hazard reduction works are excluded from within the riparian buffer zone. Widths vary depending on the classification of adjacent waterbody (1st–4th Order streams etc) to APZ's and SFAZ's. The type of tool or machinery affects maximum distances allowed from a stream, wetland, lake, lagoon or swamp being 5–20 metres (refer to Code)
✓	This certificate does not permit the removal of trees on slopes greater than 18 degrees.
✓	Herbicides shall not be permitted within 10 metres of any riparian area.
✓	Herbicides shall only be used in accordance with the *Pesticides Act 1999, the Protection of the Environment Operations Act 1997* and the directions on the herbicide container label.
✓	Restricted mechanical works within coastal dune vegetation within 100m of mean high water mark (HWM), freshwater wetlands and rainforests except the manual removal of noxious and environmental weeds.

(8) Conclusion & Recommendation

In considering the degree of impact of fire management works overall, high ranking is triggered if a number of individual categories are considered to be high, or if one particular category is particularly significant. Tick statement that applies.

☐	The proposal is not likely to have a significant impact on the environment. No further assessment is required. The proposal is recommended for unconditional approval
☑	**The proposal is not likely to have a significant impact on the environment. No further assessment is required. The proposal is recommended for conditional approval.**
☐	The proposal is likely to have a significant (medium or high) impact on the environment. It is recommended that an EIS / an EIS and SIS be prepared.
☐	The proposal will have a significant impact on the environment and or community/cultural values and it is recommended that the proposal not proceed

Wildlife Atlas Attachment 1

Information was derived from Council records and a search of the NSW Department of Environment and Conservation (DECC) Atlas of NSW Wildlife for threatened fauna and flora species present within the Coolongolook and Bulahdelah study area or within 5km. [Data from the database was extracted in May 2007 and contains data from sources including government agencies, non-government organisations and private individuals. (N.B. These data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. (DECC 2007). 'Copyright NSW Department of Environment and Conservation)]

Flora

Family	Species	Within the Study Area	Within 5km of Study Area	Threatened Species	ROTAP Code[26]
Rubiaceae	*Asperula asthenes (Trailing Woodruff)*	✓	✓	V	3VC
Elaeocarpaceae	*Tetratheca juncea (Black-eyed Susan)*	✓	✓	V	2K
Myrtaceae	*Syzygium paniculatum (Magenta Lilly Pilly)*	✓	×	V	
Myrtaceae	*Angophora inopina (Charmhaven Apple)*	×	✓	V	
Orchidaceae	*Cryptostylis hunteriana*	✓	×	V	3RCa
Orchidaceae	*Rhizanthella slateri*	✓	×	E	

Fauna

Family	Scientific Name	Common Name	Within Study Area	5km of Study Area	Legal Status
Class -Aves					
Cacatuidae	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	✓	✓	V
Ciconidae	*Ephippiorhynchus asiaticus*	Black-necked Stork	✓	✓	E1
Climacteridae	*Climacteris picumnus*	Brown Treecreeper	×	✓	V
Tytonidae	*Tyto novaehollandiae*	Masked Owl	✓	✓	V
Tytonidae	*Tyto tenebricosa*	Sooty Owl	×	✓	V
Tytonidae	*Tyto capensis*	Grass Owl	×	✓	V
Class - Mammalia					
Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll	×	✓	V
Phascolarctidae	*Phascogale tapoatafa*	Brush-tailed Phascogale	×	✓	V
Phascolarctidae	*Phascolarctos cinereus*	Koala	✓	✓	V
Phascolarctidae	*Phascogale tapoatafa*	Brush-tailed Phascogale	×	✓	V
Petauridae	*Petaurus norfolcensis*	Squirrel Glider	✓	✓	V
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	×	✓	V
Pteropodidae	*Petaurus australis*	Yellow-bellied Glider	×	✓	V
Vespertilionidae	*Miniopterus australis*	Little Bentwing-bat	✓	✓	V
Vespertilionidae	*Miniopterus schreibersii oceanensis*	Eastern Bent-wing Bat	×	✓	V
Class - Amphibia					

[26] ROTAP CODE: 2- Geographic range less than 100 km 3- Geographic range greater than 100 km
C- Adequacy of conservation not known but does occur in at least one conservation reserve.
K- Poorly known species but considered likely to be rare, vulnerable or endangered.
R- Rare species P- Protected under the NPWS Act, Schedule 12 E- Endangered

Family	Scientific Name	Common Name	Within Study Area	5km of Study Area	Legal Status
Elapidae	*Hoplocephalus stephensii*	Stephens' Banded Snake	×	✓	V
Hylidae	*Litoria brevipalmata*	Green-thighed Frog	×	✓	V

Section 5A EP&A Act 1979 – 7-Part Test of Significance Attachment 2

Threatened Species Considerations:

- *Are the activities likely to significantly affect threatened species, populations or ecological communities, or their habitat (s.5A EP&A Act 1979).* (Note: A species impact statement (SIS) is required if activities is on land that is, or is part of critical habitat or there is likely to be a significant effect as determined under s.5A of the EP&A Act 1979).

There are a number of threatened species (flora and fauna) that has been identified within the study area (and 5km radius from activities). Those that pertain to estuarine and water way areas, which do not inhabit forest areas, have been excluded form the assessment as works are not within these areas.

Those remaining are those defined as potential subject threatened species *"considered likely to occur within habitats of the study area that are impacted by hazard reduction works".* A preliminary assessment of the impact on species in the following table details a summary of habitat attributes and species requirements with regard to the impact of works on the species. A 7-Part Test is only required where there is a risk/chance of potential impact arising from the works such that significance of these risks can be ascertained.

Common Name / Status	Comments – Section 5A Assessment requirement	Assessment Not required ☒ (No significant impact) Required ☑
FLORA		
Black-eyed Susan **Black-eyed Susan-cont**	A shrub which occurs north of Wyong to Bulahdelah in dry sclerophyll and Woodland communities with low nutrient levels. Flowers between September and January with occasional plants flowering through the year. Research shows that in a study at Lake Macquarie two (2) native bees buzz pollinated these flowers. Fruiting only occurred in coincidence with flowers pollinated by these bees. The vulnerability is reinforced by the factor that the longevity of the soil seed bank is short, therefore limiting the capacity to recover from loss of standing plants. However the plant does have the ability to re-sprout from existing root stock if conditions are suitable. A change in ground cover species from disturbances, such as fire, encourages the formation of a dense understorey of Blady Grass or Bracken Fern, which can therefore exclude this plant. By being part of a healthy forest (without disturbances) encourages native bee inhabitants and continued co-existent plant survival. No species have been recorded in the fire mitigation works or found on site. Works occur in formerly cleared reserves or within a more closed forest than *Tetratheca sp.* prefers. If however plants are recorded during works there is to be: ***No tree removal*** *to occur within 20 metres; as this would increase light and change the habitat and environmental conditions for the species.* ***Minimal ground cover removal*** *for hazard reduction works not within 15*	×

Common Name / Status	Comments – Section 5A Assessment requirement	Assessment Not required ☒ (No significant impact) Required ☑
	metres (or otherwise specified by Council's Environmental Officer), to retain population and to ensure species diversity remains for co-existing species which assist in attracting pollinators to the plant. ***Implement a targeted survey*** *during the flowering period for any additional individuals.(August-December)* ***Moderate to high intensity fires*** *are considered desirable for this species (Low intensity fires kill plants and root stock). Survey area for any additional plants after a fire event.*	
FAUNA		
Glossy Black Cockatoo	Forages in Casuarina forests and inhabits coastal woodlands and drier forest areas, open inland woodlands or timbered watercourses although not frequently recorded in the study area. They prefer to nest in the hollows of large, old eucalypt trees, alive or dead. Although likely to inhabit and forage in the area there are no significant impacts on this species as tree removal is not required within the proposed works.	☒
Masked Owl	Relying on presence of high densities of tree hollows for nesting this species occupies drier more open forests than the Powerful Owl, where it forages mainly on ground mammals. Known to frequent modified forest areas and bushland fringes foraging for prey with a home range up to 1,100 hectares. The limited area modified for fire mitigation works has minimal impact on this species.	☒
Little Bentwing Bat/Eastern Bentwing Bat	Critically relying on caves for roosting sites, but forages through the understorey of woodlands and forest areas. No caves were located in the FMZ's for which these species may inhabit. No other structures locally are known to support this species in the study area. The small modification of the area would not adversely affect the lifecycles of this species. When implementing hazard reduction burning undertake low to medium intensity burning to minimise impact on habitat and protect large and hollow bearing trees.	☒
Squirrel Glider	In coastal areas, the nocturnal Squirrel Glider occupies Blackbutt, Bloodwood and Ironbark forest with heath understorey. The gliders are more likely to inhabit mature or old growth forest, as they require abundant tree hollows for refuge and nest sites. The proposed FMZ's have minimal hollows present. Squirrel Gliders have been recorded nearby to the proposed fire mitigation works however works occur within the understorey and not within the canopy where roosting sites occur.	☒
Yellow Bellied Glider	Prefers tall mature forest in regions of high rainfall. There are a minimal number of habitat trees locally or known hollows for this species to frequent. Winter flowering eucalypts and sap-site trees determine local distribution. Although likely to inhabit the area there are no significant impacts on this species.	☒

Koala	Being an arboreal marsupial inhabits forest and woodland communities. Koalas rely on over storey trees and shrubs for food and shelter, with preference to local species such as Tallowwood and Swamp Mahogany. There is both core and secondary habitat within the study area with recorded sightings of individual koala population locally. The activities are modifying the shrub and groundcover layers found within the FMZ's and do not affect Koalas preferred tree species for resting or feeding. Although under SEPP 44, there are listed Schedule 2 Koala feed trees, which do occur in some reserves. The minimal vegetation modification would not impact adversely on this species. When implementing hazard reduction burning undertake low-moderate intensity burning to minimise impact on habitat or fires that consume tree canopies.	×
Grey Headed Flying Fox	The Grey-headed Flying fox predominantly occurs in subtropical and temperate rainforests, heaths and swamps. Locally recorded in Wetland Forests in the study area may utilise tree species during flowering periods. They forage on the nectar and pollen in particular in *Eucalyptus*, *Melaleuca* and *Banksia's, all which* occur within the study area. The proposed activities will only modify surface (leaf litter) and near surface (shrubs) fuels and will have no impact on tree canopies where the Flying-fox feeds and roosts. However, no Grey-headed Flying-foxes have been sited within the proposed FMZ's.	×

As a consequence it is concluded that there would be insignificant impact on the lifecycles, habitat disruptions or conservation status of the potential species due to factors such as:

- The small area of works in relation to the adjacent larger are of the reserve retained for conservation;
- The minimal impact on species as they do not inhabit the understorey which has minimal modification;
- The retention of key habitat features including the protection of tree hollows and important vegetation;
- The retention of hospices and over storey and canopy species;
- The environmental safeguards and conditions enclosed within the Plan; and
- The low impact nature of proposed activity and the ability of the bushland area to sustain fire within biodiversity thresholds.

The discussion in the above table and the resultant conclusion; that there is **not significant impact on species**, and an additional Species Impact Statement (SIS) is not deemed required for any of the species.

APPENDIX XIII – Bushfire Threat of Assets

Life & Property Code	EXISTING ASSETS - Human Settlement (Bushland interface with residential properties on roadways)	IDENTIFY RISKS Vegetation Community	Vegetation Formation	ANALYSE RISKS Classification of Vegetation Type (BFRMP)	Distance from Hazard (On GLC Land)	Fire Run Distance	(Potential Bushfire Hazard (Threat) Rating - non-hazard, low, medium, high, very high) Bushfire Risk (Hazard Rating using Vegetation & Slope)	Threat Rating (Bush Fire Risk vs Distance from Hazard)
	Coolongolook							
LP3	The Pacific Highway	White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum / Flooded Gum / Cleared	Dry sclerophyll forests / Wet sclerophyll forest / Grassland	Forest	<30m/30-100m	>200m	Low - High-Very High	Medium-High
LP1	Willina Road	White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum / Cleared	Dry sclerophyll forests / Grassland	Forest	<30m/30-100m	>200m	Low - High-Very High	Medium-High
LP3	Glen Street	White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum / Cleared	Dry sclerophyll forests / Grassland	Forest	<30m	>200m	Low - High-Very High	Medium-Very High
LP5	Midge Street	White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum / Mixed Regrowth / Cleared	Dry sclerophyll forests / Grassland	Forest	<30m	51-100m	Moderate - High	Medium-High
LP4	Mimi Street	Flooded Gum / Mixed Regrowth / Cleared	Dry sclerophyll forests / Wet sclerophyll forest / Grassland	Forest	<30m/30-100m	>200m	Low - High-Very High	Medium-High
	Bulahdelah							
LP1	Markwell Road	Grassland / Smoothbarked Apple/Sydney Peppermint/Stringybark	Urban/Dry sclerophyll forests / Cleared	Forest	30-100m	101-200m	Low-High	Low-Medium
LP1	Flora Close	Grassland	Grassland	Forest	<30m/30-100m	>200m	Very High	High - Very High
LP5	Blanch Street	Sydney Peppermint/Grassland	Dry sclerophyll forests / Cleared	Forest	<30m	>200m	High - Very High	High - Very High
LP4	Crawford Street	White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum / Grassland	Dry sclerophyll forests / Cleared	Forest	<30m	51-100m	Moderate - High	Medium-High
LP4	Ann Street	White Mahogany/Red Mahogany/Grey Ironbark/Grey Gum / Grassland	Dry sclerophyll forests / Cleared	Forest	<30m	51-100m	Moderate - High	Medium-High
	Special Fire Protection							
LP5	St Josephs Public School	Sydney Peppermint / Dry Blackbutt / Grassland	Dry sclerophyll forests / Cleared	Forest	<30m	>200m	High - Very High	High - Very High

APPENDIX XIII – Bushfire Threat of Assets – continued

Life & Property Code	EXISTING ASSETS Economic
All	Urban Areas
LP1 & LP2	Bulahdelah Commercial Area
LP1	Coolongolook Cemetery
LP2	Bulahdelah Motel
Life & Property Code	**EXISTING ASSETS - Cultural Assets**
LP4 & 5	Various Historic sites in Bulahdelah

Life & Property Code	EXISTING ASSETS - Environmental
LP3 & 4	Myall River - Bulahdelah
LP2 & 4	Coolongolook River - Coolongolook
All areas	SEPP 44 - Koala Habitat
LP6	Vulnerable Community - Swamp Mahogany (30)
Various	**Reserves refer to Section 8**

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