Bushfire Assessment
Bulk Earthworks Project Application and Industrial Development Concept Plan Application
CSR Lands, Erskine Park

23 August 2006

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Erskine Park
23 August 2006

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Limitations:

The timing of implementation of the actions contained within the works schedule for this Bushfire Risk Management Plan will be determined by the timing of vegetation removal as part of the Lenore Lane upgrade works and proposed revegetation of the site.

CONTENTS

ABBREVIATIONS

AHD	Australian Height Datum
APZ	Asset Protection Zone
BFCC	Bushfire Co-ordinating Committee
BFMC	Bushfire Management Committee
BFRMP	Bushfire Risk Management Plan
CAPZ	Community Asset Protection Zone
CGP	CGP Management Pty Ltd
CSR	CSR Limited
DA	Development Application
DEC	Department of Environment and Conservation
DIPNR	Department of Infrastructure Planning and Natural Resources
EEFMZ	Environmental and Ecological Management Zones
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act, 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act, 1999
EPEA	Erskine Park Employment Area
ESD	Ecologically Sustainable Development
FFT	Fire Frequency Threshold
HLA	HLA-Envirosciences Pty Limited
LEP	Draft Penrith Local Environment Plan
LGA	local government area
Km	kilometre
M	metre
NES	National Environmental Significance
NHZ	Natural Heritage Management Zone
NSW	New South Wales
PB	Prescribed Burn
PCC	Penrith City Council
RF Act	Rural Fires Act 1997
RFS	Rural Fire Service
SEPP	State Environmental Planning Policy
SMZ	Strategic Fire Management Zone
SREP	Sydney Region Environment Plan
t/ha	Tonnes per hectare
TSC Act	Threatened Species Conservation Act 1995
WD	Wheel Drive

1 INTRODUCTION

HLA-Envirosciences Pty Limited (HLA) was commissioned by CSR Limited (CSR) to prepare a Bushfire Assessment (BA) for CSR lands at Erskine Park referred to as the site, to ensure that the proposed project complies with the *Rural Fires Regulation 2002*.

This BA will provide the land manager with information and procedures necessary for the management of bushfire risk at the site. It has been prepared in accordance with the relevant planning framework that regulates the management of bushfire risk, while having regard to environmental matters such as pollution and biological conservation.

This BA utilises relevant biophysical relationships of the site during the determination of management strategies and work schedules. It will focus on the provision of workable management directives to safeguard the property assets whilst also considering the ecological impacts on the surrounding areas of native vegetation.

At the outset it is important to note that this BA is to accompany a Project Application for bulk earthworks works and Concept Plan application for industrial development.

1.1 Background

This BA has been prepared in accordance with the *Rural Fires Act, 1997* (RF Act) to reflect the duty of care that land owners have to '*prevent bush fires on, and to minimise the danger of the spread of fire*' on or from property managed by that organisation.

1.2 Site Location and Context

The site is located in the eastern sector of the Penrith Local Government Area (LGA). It is bounded to the west by Mamre Road, to the south by rural properties and the Sydney Water pipeline and to the north west by the industrial development sites and to the north by Lenore Lane. For the purposes of this BA the site comprises part Lot 5 in DP 1094504 and land managed by the Department of Lands for the purposes of a Crown Road Reserve to the immediate south of the CSR lands at Erskine Park. For site location refer to **Figure 1**.

The site is generally level to gently sloping. Small creek channels originate in the east and flow towards the southwest, trending off site then back on site to the west. A second creek lies in a riparian corridor to the north of the site in the area immediately to the south of Lenore Lane. These creeks have intermittent water flow. Land to the west of the proposed project contains a large landfill that has been in use for many years and which was previously a quarry. Much of the land has been cleared for agricultural activities.

Land uses surrounding the site are rural/rural residential in nature however land is slowly being redeveloped for industrial/warehouse activities as evidenced by the development to the west and northwest of the site.

Other important landholdings/land managers (note: stakeholders) include the Pacific Power transmission line easement located to the north of the site and the Sydney Water pipeline to the south of the site.

1.3 Primary Objectives

The primary fire-management objectives as they relate to the site are as follows:

- Protect life, property and community assets from the adverse impacts of fire;
- Develop and implement cooperative and coordinated fire-management arrangements with fire authorities, council, the local bushfire management committee and neighbours;
- Manage fire regimes to maintain biodiversity; and
- Assist other fire agencies, land management authorities and landholders in developing appropriate fire management practices for the Erskine Park Precinct.

1.3.1 Responsibilities

CSR will meet its fire suppression responsibilities under the RF Act by liaising with Penrith City Council (PCC) to ensure that:

- Bushfire management plans for the suppression of fire and mitigation of fire hazards across the site are prepared and implemented;
- Appropriate fire-suppression actions are initiated for all fires detected within the site;
- District bushfire management plans are implemented;
- Appropriate arrangements exist with fire authorities for fire-fighting activities; and
- Fuel management programs are conducted in accordance with the provisions of district bushfire management committee risk management plans and any relevant BFRMP.

Details regarding the specific management objectives for the site are discussed in **Section 5.3.1**.

2 LEGISLATION, POLICIES AND GUIDELINES

2.1.1 Commonwealth Statutes

2.1.1.1 Environment Protection and Biodiversity Conservation Act, 1999

The *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) prohibits Actions that are likely to have a significant impact on matters of national environmental significance (NES matters), including activities associated with fire management, without certain procedures first being followed. NES matters protected by the EPBC Act that are relevant to the site include:

- Listed threatened species and communities; and
- Listed migratory species.

It is an offence to carry out an action that will or is likely to have a significant impact on one of the above NES matters without obtaining an approval from the Commonwealth Environment Minister. A person who is proposing to carry out an Action which may have a significant impact on one of the above NES matters is required to refer the proposed Action to the Commonwealth Environment Minister for a determination as to whether it is a "controlled action" (i.e. an action that requires the approval of, or the environmental assessment nominated by, the Environment Minister).

The proposed works do not impact upon the above NES matters.

2.1.2 State Statutes

A number of Acts and regulations govern the responsibilities of land managers in respect to fire management and suppression. These are:

- *Environmental Planning and Assessment Act 1979;*
- *Fire Brigades Act 1989;*
- *Native Vegetation Conservation Act 1997;*
- *Occupational Health and Safety Act 2000;*
- *Protection of the Environment Operations Act 1997;*
- *Rural Fires Act 1997;*
- *Rural Fires Regulation 1997;*
- *Threatened Species Conservation Act 1995; and*
- *Workplace Injury Management and Workers Compensation Act 1998*

A brief description for each of these Acts and/or regulations is provided below.

Environmental Planning and Assessment Act, 1979

Under the *Environmental Planning and Assessment Act 1979* (EP&A Act), the Rural Fire Service (RFS) is responsible for fire management activities within the site.

This BA has been prepared to inform an Environmental Assessment (EA) being carried out by CSR to accompany its Project Application for the proposed project. The EA addresses the impact of the proposal on the physical, cultural, social and economic environments.

Fire Brigades Act, 1989

The *Fire Brigades Act 1989* relates to the protection of persons and property from fire. Fire districts may be declared over land within a LGA. In addition, the Act covers the authority of the officer in charge and the actions that may be undertaken by an officer in charge of a fire to protect and save life and property, and to extinguish a fire.

Native Vegetation Conservation Act, 1997

The *Native Vegetation Conservation Act, 1997* governs the clearing of native vegetation in NSW. There are provisions for clearing of these lands where the clearing is authorised under the RF Act or the *State Emergency and Rescue Management Act 1989*.

Occupational Health and Safety Act 2000

The *Occupational Health and Safety Act 2000* covers the health, safety and welfare of persons at work. Every employer has the responsibility of ensuring the health, safety and welfare of all employees and other people in the workplace by providing safe plant and systems of work, and training and supervision. Employees also have a responsibility to take care of others in the workplace. In the event of an accident, the proper authorities must be notified as prescribed in the regulation.

Occupational Health and Safety Regulation 2001

Sets out specific provisions to ensure the requirements of the *Occupational Health and Safety Act 2000* are met.

Protection of the Environment Operations Act 1997

This Act has provisions to protect the NSW environment from human activities. In particular, this relates to policies that need to be taken into account by a determining authority when considering the likely impact of an activity under the *EP&A Act.* The Act also enables the Environment Protection Authority (EPA), (now part of the Department of Environment and Conservation (DEC)) to prohibit the burning of fires in the open or in incinerators such as hazard reduction burns.

Rural Fires Act 1997

The RF Act establishes the NSW Rural Fire Service, comprising the Commissioner and other staff of the Rural Fire Service, fire control officers and deputy fire control officers, and volunteer rural firefighters. The Act has provisions relating to:

- The prevention, mitigation and suppression of bushfires;
- The co-ordination of bushfire-fighting and bushfire prevention;
- The protection of persons and property; and
- The protection of the environment by requiring that activities are ecologically sustainable.

The responsibilities of the Bush Fire Coordinating Committee (BFCC) are specified in the Act.

Rural Fires Regulation 1997

The regulation details the eligibility for membership of and the functions of bushfire management committees. The regulation specifies when it is permitted to burn buildings and other structures inside rural fire districts or to use spark arresters. Safety issues for rural fire districts, fire safety equipment, roadside fire protection, lighting of fires for cooking, and use of tobacco in rural areas are detailed under the regulation. There are clauses setting out the types of notices and the manner in which they are issued.

Rural Fires and Environmental Assessment Legislation Amendments Act 2002

This Act was passed by both houses of the NSW Government to amend the RF Act and the EP&A Act with respect to bushfire prone lands, bushfire hazards, bushfire emergencies and other purposes such as environmental assessment and its relationship with Acts of this nature. Important issues introduced by this amendment Act include:

- The need for public authorities to report yearly operations, within 3 months of the end of the financial year, to the Commissioner of the RFS;
- The issuing of bushfire hazard reduction certificates in accordance with a BFRMP;
- The duration of a bushfire hazard reduction certificate (12 months); and
- Exemptions from environmental assessment for the implementation of a fire break during emergencies.

State Emergency and Rescue Management Act 1989

The *State Emergency and Rescue Management Act 1989* relates to coordinated arrangements for managing emergencies across NSW. The Act also details the provisions for the declaration of a state of emergency.

Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) provides for the protection of all threatened plants and animals native to NSW (with the exception of fish and marine plants). One of the objects of this Act is to ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed. The Act also provides for the conservation and recovery of threatened species and for the management of threats to species.

Workplace Injury Management and Workers Compensation Act 1998

The objectives of the *Workplace Injury Management and Workers Compensation Act 1998* are to:

- Assist in securing the health, safety and welfare of workers and, in particular, preventing injury;
- Provide for treatment, management and rehabilitation of injuries;
- Provide injured workers and their dependants with income support; and
- Ensure contributions by employers are commensurate with the risks faced, taking into account strategies and performance in injury prevention, injury management, and return to work.

2.1.3 Environmental Planning Policies

Bushfire Risk Management in the Penrith LGA area is also affected by the operation of the following planning instruments:

- State Environment Planning Policy (SEPP) No.19 Bushland in Urban Areas;
- Sydney Region Environment Plan (SREP) 20 – Hawkesbury – Nepean River;
- Draft Penrith Local Environment Plan (LEP) – Flora and Fauna Conservation;
- Penrith Heritage LEP (2 Items of Significant vegetation);
- Penrith Register of Significant Trees and Gardens;
- Penrith Remnant Native Vegetation Inventory; and
- Regionally significant Vegetation (as listed in any relevant Regional Vegetation Management Plan).

2.1.4 State Guidelines

Planning for Bushfire Protection

Guidelines published by the RFS and Department of Infrastructure, Planning and Natural Resources (DIPNR), titled *Planning for Bushfire Protection* (RFS, 2002), provide local government planners and decision makers, the building industry and the public with an effective tool for the construction of residential dwellings within bushfire prone areas. It also assists the RFS in its role of protecting a range of residential related developments within bushfire prone environments by describing the necessary requirements for development within these areas. The purpose of these guidelines is to:

- Assist planners in the identification and management of bushfire prone areas;
- Provide a set of planning controls designed to minimise the threat of bushfire in high-risk areas; and
- Identify suitable bushfire protection measures necessary for the safety of the development and fire fighters.

The assessment of bushfire hazard potential is based on an analysis of hazards such as vegetation and slope. As the guidelines are based on a 1:50 year maximum fire event (Fire Danger Index = 80), aspect is no longer considered a factor influencing fire behaviour.

An analysis of vegetation and slope for a given site allows for the determination of an Asset Protection Zone (APZ). An APZ must consist of an Inner and Outer Protection Area, which are designed to perform specific functions in the management of bushfire events. The size of these zones is calculated using bushfire behaviour under extreme weather conditions.

Bushfire Environmental Assessment Code

Land management agencies such as the NSW DEC, State Forests of NSW, Department of Lands or a local authority wishing to undertake bushfire hazard reduction work may use the streamlined approval process, and will be able to certify bushfire hazard reduction works on their own land and on adjoining land where proposals encompass their own lands. The streamlined approval process does not apply to areas of statewide significance such as SEPP No.14-Coastal Wetlands, SEPP No.26-Littoral Rainforests, or Critical Habitat declared by the Director-General of DEC.

In limited cases, as defined in this Code or the schedules, where bushfire hazard reduction work is likely to adversely impact on an important environmental attribute, a Certificate may not be granted on the basis that greater evaluation of the impact is required. If a Certificate is not granted it is not a refusal to undertake hazard reduction as an approval may still be sought under the existing environmental legislative system. The Code cannot be used to gain approval for operations such as land clearance, burning of domestic or industrial rubbish, or circumventing other regulations such as Tree Preservation Orders. The Code does not apply to fire trail construction or maintenance.

This Code only covers:

(a) Mechanical hazard reduction that includes the maintenance or establishment of APZ using slashing, mulching/chipping of timber and brush and tree removal as well as the use of graders, dozers and ploughs; and

(b) Prescribed Burning.

2.2 Local Fire Management Plans

2.2.1 Penrith Bushfire Risk Management Plan

The RF Act requires the BFCC to establish a Bush Fire Management Committee (BFMC) in each LGA containing a rural fire district, or fire district with a bushfire risk. One role of the BFMC is to prepare a draft BFRMP for its area of responsibility.

In the case of private property, it is the responsibility of PCC to develop a program for communicating the BFRMP strategies to private land managers and ensuring that the land managers implement the strategies.

The plan identifies the level of bushfire risk across the Penrith LGA and establishes strategies, which the responsible land managers will implement to manage the bushfire risks identified.

The strategies established in the BFRMP address the bushfire hazard, the vulnerability of assets to fire, the safety of the community and fire fighters, the protection of the land and environment from fire, and recognise that biodiversity management includes the application of appropriate fire regimes upon the landscape.

3 EXISTING ENVIRONMENT

3.1 The Proposal

The proposed project involves bulk earthworks to enable development for the purpose of industrial development. The land will be fringed to the south by a biodiversity corridor.

3.2 Physical Characteristics

3.2.1 Climate

The climate in the Penrith Bush Fire District is warm-subtropical with a well-defined summer/autumn rainfall peak (January to March), with a dry winter and spring. The temperature and rainfall conditions vary across the Penrith LGA. The rainfall can be unreliable during the normal late winter/spring period. Winter and early spring frosts generally cause the grasslands to cure rapidly.

Key features are:

- Average monthly summer temperature – High 28^{o}C;
- Average monthly winter temperature – Low 4.5 ^{o}C;
- Average monthly summer rainfall 64 mm;
- Average monthly winter rainfall 13 mm; and
- Average annual rainfall total <800 mm.

Bushfire Season
The start of normal fire seasons coincides with strong southwest to northwest winds, which often prevail during late winter and spring (August/September). The majority of serious bushfires occur from this period until the onset of summer rains which normally start from December and continue through to autumn. Longer fire seasons are experienced when summer rainfall is lower than normal, with the bushfire season extending through summer to early autumn.

Serious bushfires have occurred late in the season under dry summer conditions. Dangerous bushfire seasons are most commonly associated with two or more of the following factors in combination:

- Occurrence of an extended drought period.
- Lower than average rainfall through winter.
- Persistent southwest to northwest winds in late winter/early spring.
- Prolific fuel resulting from a strong growing season the previous summer.
- Extreme fire danger days are most often associated with strong west to northwesterly winds, particularly where the drought indices are low.

Bushfire Hazard Reduction Burning Period

Hazard Reduction burning is generally carried out in the cooler late autumn, winter and early spring months. In years of winter rain the program has been extended into late spring early

summer. Due to various constraints; weather, volunteer resource availability, fuel moisture conditions, No Burn Days and prevailing fire conditions, the window of opportunity to carry out the Hazard Reduction Burning program can be as little as 5-10 days of the year.

3.2.2 Topography

Reference to the Erskine Park U7352-6, 1:4000 Series orthophotomap indicates that the Site has an overall topographic gradient falling from the east to the west.

3.2.3 Drainage and Water Quality

As discussed earlier, small creek channels originate from the eastern extent of the site and flow towards the southwest. A second creek lies in the Riparian corridor immediately to the south of Lenore Lane.

Post development the containment of surface waters will be facilitated by a series of man-made detention basins designed to capture and manage water quality prior to its release into off-site lands.

3.2.4 Geology and Soils

Based on an inspection of the Penrith 1:100,000 Geological Map Sheet (NSW Department of Minerals and Energy 1991) the regional geology is dominated by carbonaceous clay stones and shales of the Wianamatta Group, with localised breccia and basic igneous intrusions.

Soils at the site generally consist of clays overlying bedrock. Clay soils are residual, derived from in-situ weathering of the bedrock. Alluvial clays and silty clays are present within the creek beds.

3.2.5 Land Use

The CSR lands have in the past been cleared for agriculture, quarrying, landfilling and associated infrastructure, an airstrip, formation of tracks and waste disposal.

The proposed works encompass clearing of vegetation, benching of the site, provision of detention basins and initial landscaping to enable development for industrial/warehousing purposes. Land to the south of the proposed project will be revegetated and managed as part of CSR's proposal to establish a Biodiversity Conservation Corridor the south of the site.

3.3 Biological Characteristics

3.3.1 Flora

The site is known to have contained a total of 152 native species and 64 exotic species within four vegetation communities these being:

- Grey Box Woodland – a sub unit of Cumberland Plain Woodland;
- Sydney Coastal River Flat Forest, comprising areas of Swamp Oak Forest;
- Creek lines and artificial wetlands; and
- Grassland.

Two significant flora species have been recorded on site. These are:

- *Grevillea juniperina* subsp *juniperina* (regionally significant); and
- *Pultenaea microphylla* (regionally significant). (It is noted that subsequent field surveys have confirmed that this species is not present in the locality

3.3.2 Fauna

Previous studies of the whole of the CSR lands at Erskine Park and adjoining areas have resulted in the identification of 112 fauna species, which consists of 74 avifauna, 20 mammal, 12 reptile and 6 amphibian species. Included in the fauna population is the *Succinea macgillivarayi* that is rare over its former range of Western Sydney.

One endangered species the Cumberland Plain Land Snail *Meridolum corneovirens* has been recorded (Biosis 1999).

3.3.3 Weeds

The following weed species have been recorded on site. The first five species are declared noxious in the Hawkesbury River County Council area:

1. Salvinia molesta - *Salvinia molesta*;
2. Blackberry *Rubus fruticosus (agg. spp.)*;
3. Pampas Grass *Cortaderia spp;*
4. African Boxthorn *Lycium ferocissimum*;
5. Noogoora Burr *Xanthium spp*;
6. Sharp Rush;
7. African lovegrass;
8. Bridal Creeper;
9. Briar; and
10. African Olive.

These species have been encountered within bushland areas and there is potential for these species to invade and damage undisturbed environs of high conservation value.

3.4 Fire Environment

3.4.1 Fuel Loads

The fire triangle involves three critical elements, these being heat, oxygen and fuel. In a bushland environment. It is generally accepted that only fuel can be successfully monitored and managed to minimise the risk of bushfire events.

Management of this contributing element starts with the evaluation of fuel loads throughout a given management area or unit. Typically fuel loads are measured in tonnes/hectare (t/ha) and are determined by sampling a variety of vegetation strata including forest floor and shrub layers.

3.4.2 Fire History

Prior to 1948, bushfires regularly occurred in the pastoral and forested areas of the Penrith City Council area. From 1948 hazard reduction commenced and a fire trail network was progressively established. Major wildfires have now been virtually excluded from large parts of the Penrith LGA.

Significant fire seasons have occurred in the Penrith City Council area in 1968, 1977, 1981, 1990, 1993/94, 1997/8 and 2000. These seasons coincided with extended drought periods and fires burnt extensive areas of the LGA.

3.4.3 Vegetation and Fire Behaviour

The type and arrangement of vegetation plays a major role in determining how a bushfire will behave. Each broad vegetation type occurring in the Penrith LGA is capable of supporting fires of varying severity. The main vegetation types and their bushfire characteristics are summarised below.

Moist Sclerophyll forests

These forests generally carry high fuel loads (up to 50 t/ha) but will not usually carry low intensity fire because of their moist nature. After extended dry periods however, they can support very high intensity fires. These can kill younger trees and severely damage mature trees.

Dry sclerophyll forests

Dry sclerophyll forests generally have a dry understorey of grasses and shrubs, which burn readily under a much broader range of conditions than other forest types. Moderate to high fuel levels (up to 25 t/ha) and relatively open canopies allow sunlight and wind to quickly dry available fuels, giving these forests the potential to support high intensity bushfires. These forests will support low intensity prescribed fire in most years – hazard reduction in these forests can help to protect adjacent areas of moist sclerophyll forest from wildfire.

Pastoral lands, grasslands and open woodlands

Fire behavior in these vegetation types is dominated by the influence of grass fuels. Fires occur most readily once grass is cured beyond 70%. In heavy grass fuels, fires may be intense but will only persist for a short time, and hence are less hazardous relative to forest and heath fires. Grass/woodland fires are open to the influence of wind and typically have high rates of spread (relative to forest and heath vegetation). Grass fire behaviour is reduced dramatically by reducing the height and continuity of grass fuels – most often achieved by grazing.

Severely disturbed forests

Dry sclerophyll forest which has had the under storey removed and has had thinning of the canopy are classified as severely disturbed forests. Low to moderate fuel levels (up to 15 t/ha) and relatively open canopies allow sunlight and wind to quickly dry available fuels giving these forests the potential to support low to moderate intensity bushfires.

4 FIRE MANAGEMENT INFRASTRUCTURE

4.1 Fire Management Access

Fire management access refers to roads, tracks and trails that can be used for fire management and fire suppression operations. It is anticipated that access trails which will enable 4WD access for maintenance and other related purposes will form part of the strategy for the Biodiversity Conservation Corridor which adjoins the site to the south.

A classification system used to summarise the nature of fire management access is provided in **Table 1**.

Table 1: Fire Management Access Classification System

Trail Classification	Type	Description	Colour Code
1	Sealed Road – Public	Access by 2WD permitted	Red
2	4WD Trail (Light Tanker)	4WD trail capable of being used by Category 9 tanker (no heavy tanker access)	Green

4.2 Fire Management Utilities

Fire management utilities include infrastructure that assists in the control of wildfires and fire management operations. This includes dams, maintained watering points and reticulated water systems.

The proposal includes detention ponds to contain stormwater flow and the subdivision will be serviced with reticulated water. The exact location of fire hydrants and connections to reticulated water on the site are still to be determined, and will be finalised during the detailed design phase for the project.

4.3 Fire Management Facilities

Fire management facilities are locations or sites from which fire management operations can be co-ordinated and controlled.

Fire management facilities available for the site include the industrial/warehouse premises that will be established on the site. A forward communications point would be established at the Bush Fire Brigade station which is located to the north of the site on Lenore Lane.

5 BUSHFIRE RISK

5.1 Description of the Bushfire Risk

The bushland adjoining the site, while posing a bushfire hazard to adjoining urban and industrial areas, also contains values that are at risk from a bushfire. Bushfires are likely to have a varied impact on the scenic quality, soil stability, and a number of threatened species existing in some areas. However, if fire frequency is too short, fire may have long-term impacts on ecological processes, vegetation communities, and threatened species. The bushfire risk to these areas ranges from minor to major.

The greatest existing cause of bushfire is by incendiarism and or arson. Ignition records for the area show that the incidence of incendiarism is increased during school holidays. Increasing visitation and urban growth are thought to be the main contributing factors to increased incidence of incendiarism (PCC BFMP 2000). There is evidence of many dumped cars that have been burnt out, particularly along the southeastern parts of the site.

Without adequate bushfire risk management, the loss of infrastructure, injury and possible loss of life may occur in a bushfire burning under severe conditions.

5.2 Bushfire Risk Management Zones of Penrith LGA

To manage the medium fire risk of the study area, a series of management zones have been allocated in accordance within those as determined by PCC in their LGA BFRMP. These are discussed in the following section.

5.2.1 Bushfire Risk Management Zones in Penrith BFRMP

The Penrith BFMC has identified four management zones, at a regional scale, within the Erskine Park Employment Area (EPEA). These regional classifications assist significant landholders, such as CSR, in the preparation of location specific fire management plans by providing guidance in desired land management outcomes.

These zones are:

- **Asset Protection Zone (APZ):** To protect human life, property and highly valued public assets;
- **Strategic Fire Management Zone:** To provide strategic areas of fire protection that will reduce the speed and intensity of bushfires, and reduce the potential for spot fire development;
- **Land Management Zone:** To meet relevant land management objectives in areas where Asset Protection or Strategic Fire Management Zones are not appropriate; and
- **Fire Exclusion Zone:** To exclude fires (both bushfire and hazard reduction burning) due to the presence of fire intolerant assets such as rainforest or pine plantations.

5.3 Bushfire Risk Management Zones for Subject Lands

5.3.1 Specific Management Objectives

Land management objectives are an important basis for the development of a BFRMP. For the CSR lands these objectives have been developed to be implemented in liaison with the Penrith BFMC. The objectives are:

- To facilitate the effective coordination of policies and activities to achieve the sustainable use of the site's environment;
- To ensure the continuing stability and productivity of the biophysical elements of the site;
- To ensure that the site is managed within its capability in a manner which retains options for future use;
- To conserve and manage areas and features of significant ecological, physical and scientific importance;
- To minimise legal liability from any fires escaping to adjacent property by producing objectives and following through with Actions that will reduce the risk of fire on, or spreading from the site;
- Maintain Fuel Free and Fuel Reduced Zones in the vicinity of structures either on site or adjoining the site;
- Identify major, rare and threatened flora and fauna communities and individual species giving consideration to their conservation value and/or ecological function at a local regional and national level, with respect to the fuel management program;
- Reduce or where practical prevent any impact of fuel management programs from the site on water quality;
- Prevent and control weed infestation following fuel reduction programs, through monitoring and removal actions;
- Identify, record and incorporate fire advantages into Fuel Management programs;
- Protection of life, property and assets from bushfire damage to be given priority in considering a fuel management program;
- Adopt a 10 year fuel reduction treatment program, unless environmental considerations dictate otherwise;
- Liaise with Penrith BFMC to develop a systematic process to record all characteristics of bushfires and fuel management programs; and
- Consider the full range of fuel reduction methods available in determining the most suitable technique.

5.3.2 Bushfire Risk Management Options

It is important to recognise that, no single option is likely to provide sufficient protection from bushfires. A range of options needs to be implemented to reduce the bushfire risk to an acceptable level. **Table 2** describes the various options available to minimise the bushfire risk.

Table 2: Bushfire Risk Management Options

Reduce the Hazard	**Programs to reduce the level of fuel available to burn in a bushfire.** Examples of hazard reduction strategies include hazard reduction burning; slashing or ploughing of firebreaks, or manual clearing of bushfire hazards.
Reduce Ignitions	**Programs to reduce the number of deliberate and accidental human made ignitions.** Examples of ignition reduction strategies include total fire bans, arson investigation programs, restricting vehicular access and issuing of permits to burn during the bushfire danger season.
Reduce Vulnerability	**Programs to increase the resilience of community and environmental / ecological assets to bushfires.** Examples of vulnerability reduction strategies include staff/contractor education programs.
Residual Risk	**Bushfire risk management strategies are designed to reduce the level of risk; but will not eliminate the risk entirely.** Some level of residual risk may remain, which will be managed with fire response strategies such as fire suppression operations, early fire detection, and evacuation.

5.3.3 Bushfire Risk Management Zones

Specific fire management zones have been identified for the site to protect life/property and to conserve biodiversity. These bushfire hazard management zones identify specific management aims and objectives for specific areas within the site. The attributes of each zone, including threatened species, vegetation communities and fire history, are described and strategies and actions to achieve the management objectives are outlined for each area. This zoning approach assists in measuring performance against the identified aims for that zone.

The Bushfire Hazard zones are derived from the BFMP for the Penrith LGA developed in 2000. Penrith LGA has been divided into zones defined by bushfire hazard which are rated as high, moderate and low bushfire hazard. The subject site is rated as **low**.

Fire management zones used to divide the site into smaller manageable land units are listed as follows:

- Community Asset Protection Zones (CAPZ) for the protection of identified assets within the site. This zone encompasses urban, industrial, primary production and transport and service infrastructure;
- Environmental and Ecological Fire Management Zones (EEFMZ) (for the maintenance of natural heritage values). This zone encompasses Aboriginal significance, historical areas, Threatened Species, Endangered Populations, Endangered Ecological Communities, Critical Habitat, and catchments.

Details regarding the nature of these zones are provided below

Community Asset Protection Zones

The use of CAPZ around the site identifies areas for new or ongoing works to reduce damage potential from unplanned fire events. Two zones of this classification have been established in accordance with the following management objectives:

- Maintain fuel loads below 10 t/ha;
- Protect employees, contractors, emergency personal and site assets; and
- Establish control lines for the suppression of unplanned bushfire events.

The maximum width of the proposed works/distances, a requirement of the Bushfire Environmental Assessment code, is defined as the perimeter for each CAPZ. A summary of CAPZ identified within the site is provided in **Table 3**.

Table 3: Community Asset Protection Zones

Name	Reference	Last Fire	Existing Management Strategy
CAPZ 1	Eastern sector	None	N/A due to change in land use
CAPZ 2	Western sector	None	N/A due to change in land use

Environmental and Ecological Fire Management Zones

The purpose of EEFMZs is to protect biophysical elements important to the local area, region, state and/or nation. Matters such as wetlands, rainforests, threatened species, cultural values and water quality may form the main management issues within a zone of this classification.

Two zones of this classification have been established in accordance with the following management objectives:

- Maintain fuel loads below 20 t/ha;
- Exclude fire from sensitive environments such as wetlands;
- Conserve biodiversity such as threatened species; and
- Maintain / implement appropriate FFT for the sustainable management of vegetation contained within these zones.

A summary of EEFMZ identified within the site is provided in **Table 4**.

Table 4: Environmental and Ecological Fire Management Zones

Name	Reference	Last Fire	Existing Management Strategy
EEFMZ1	Northern Sector	None	None
EEFMZ2	South eastern and western corridor	None	None

6 IMPLEMENTATION

This section addresses:

- Who is responsible for implementing bushfire management;
- Issues to be considered when implementing bushfire management;
- Methods of hazard reduction;
- Biological conservation;
- Adjoining landowners;
- Pollution control; and
- Pest and weed management.

6.1 Responsibility for Implementation

Implementation of bushfire management is the responsibility of CSR or any future landowners in close collaboration with Penrith BFMC.

6.2 Issues to be considered in Implementation

There are a number of issues that need to be considered when implementing bushfire management. These are listed as follows:

- Issue of Permits to Burn;
- Use of Appropriate Fire Regimes;
- Tree Preservation Orders; and
- Excluded lands.

Details regarding these issues are discussed in the following sections.

6.2.1 Issue of Permits to Burn

Certificates are issued on a yearly (financial) basis provided sufficient information regarding future hazard reduction activities and past fuel management regimes have been reported in accordance with the RF Act and the *Rural Fires and Environment Assessment Legislation Amendment Act 2002*.

Certificates issued under the Bushfire Environmental Assessment Code are only applicable to APZ and Strategic Fire Management Zone (SMZ) as identified in the Code and the district BFRMP.

Section 66

The RF Act establishes a system under which Councils may issue notices to private landowners and leaseholders for the purpose of removing bushfire hazards from their land. The Section 66 notice may set out the circumstances, conditions under which, places at which, manner and time within which, the bushfire hazard reduction work must be completed. Development of the Erskine Park lands of the type envisaged by the zoning instruments is likely to negate the need for Council to issue a Section 66 notice.

6.2.2 Use of Appropriate Fire Regimes

In accordance with the principles of Ecologically Sustainable Development (ESD), Bushfire Coordinating Committee Policy and the *Bushfire Environmental Assessment Code 2003* (RFS, 2003a), appropriate fire regimes should be used wherever possible.

A fire regime is essentially the combination of fire frequency (usually measured by the number of years between fires – both wild and prescribed), fire intensity and season of fire occurrence. This combination is referred to as Fire Frequency Threshold (FFT). For fire regime information to be useful in planning, the range of variation for each fire attribute should be identified over time, rather than simply identifying averages (eg. useful information for fire frequency is both the minimum and maximum periods between fires and the median for the period between fires).

Appropriate fire regimes relevant to vegetation of the site are provided in **Table 5**, as specified by Penrith BFMP (2000).

Table 5: Recommended Fire Frequency Thresholds for Vegetation of the site

Vegetation Type	Description	A decline in biodiversity is predicted if there is:		
Wet sclerophyll forest	Moist forest system	Three or more consecutive fires with each of the fires being less than 20 years apart	Two or more high intensity fires with a scorch of the canopy within a period of 100 years	No high intensity fire within a period of 1-2 hundred years
Dry sclerophyll forest	Dry forest system Severely disturbed forest system	Three or more consecutive fires with each of the fires being less than 5 years apart	No fires for 30 years	
Cleared / non vegetated	Non forest system Permanent water bodies Urban systems	Not applicable		

FFTs used in the preparation of this plan are based on the *Bushfire Environment Assessment Code 2003*. These FFTs should be adopted, where practicable, to assist the conservation of biological values across the site, particularly within the EEFMZ.

6.2.3 Tree Preservation Orders

A Tree Preservation Order (TPO) applies to the City of Penrith. Any landholder wishing to remove trees as defined in the current TPO must first apply to Council. Council officers may grant approval if the proposed clearing is consistent with the strategies laid out in this Plan. However, approval under the TPO does not constitute approval to clear or injure under any other legislation.

Any proposal to clear or prune trees for the purpose of bush fire hazard reduction should be discussed with Council officers before works are carried out.

6.2.4 Excluded Lands

The purpose of excluded lands is to identify those areas of Crown land (including unoccupied Crown land), which an adjoining land owner is required to gain approval before entering for the purpose to carry out bush fire hazard reduction works along a property boundary with a fence. Adjoining landowners should approach the relevant land management agency for approval before entering the land. There are no excluded lands abutting the site.

6.3 Hazard Reduction Methods

6.3.1 Prescribed Burns

Due to the sensitivity of the vegetation communities to be protected in the Biodiversity Conservation Corridor and the revegetation that will occur within the Corridor, it is recommended that no prescribed burns be undertaken for a minimum of four years. This program will allow the establishment of vegetation and natural regeneration of parts of the site post land development.

The following information relates to post the four-year time frame.

Prescribed Burns (PBs) are the most effective fire management tool available in the management of zones designated for the protection of life and property (assets), suppression of wildfire (strategic) and conservation of biodiversity (natural heritage). The use of this method will be influenced by seasonal conditions and occurrence of wildfires. The PB schedule forms part of the operation schedule contained within this plan, which can be reviewed each year to reflect changes to management priorities.

Intensity

Low intensity prescribed burning would be conducted in accordance with the guidelines in the booklet *Guidelines for Low Intensity Hazard Reduction Burning* (RFS, 2003b). Moderate intensity prescribed burning can only be used under the *Bushfire Environment Assessment Code 2003* where a fire fighting agency is in attendance and conducting the burn in accordance with an accredited burn plan.

Notification

The landowner of the Biodiversity Conservation Corridor will liaise with Penrith BFMC to organise a PB. Members of the Bushfire services will undertake the activities.

6.3.2 Mechanical Fuel Reduction

Mechanical fuel reduction activities are often used in conjunction with PB's to achieve management objectives where biological or physical constraints prohibit the regular use of fire. Slashing, mowing, turbo mulching or selective tree and shrub removal form the main mechanical methods available to the manager when implementing hazard reduction activities. These techniques are often engaged in areas close to threatened plants, sensitive receptors such as residents or buildings that are incompatible with the use of fire. Other practical uses for this method of hazard reduction include clearing along fence lines and trails to improve access or preserve these assets.

Important considerations that need to be taken into account when undertaking mechanical hazard reduction activities are listed as follows:

- Fuel removal by hand and mowing is permissible on all slopes, provided a risk assessment for works on steep slopes is appropriately considered;
- Slashing or mulching is not permitted on slopes of greater than approximately 18°;
- Ploughing or grading is not permitted on slopes greater than 10°. This action must not reshape the soil surface or result in re-direction of surface water runoff. Any soil material relocated by ploughing or blading, eg. Windrows, must be immediately re-distributed evenly back across the firebreak. Other important matters associated with ploughing include:
  - All topsoil must remain on the soil surface;
  - Action is required to minimise soil erosion of the ploughed or graded area after the fire season;
  - Natural or assisted revegetation should be encouraged;
  - No more than 30 m width from the asset is to be cleared using grading or ploughing.

6.4 Biological Conservation

If threatened species, populations, or endangered ecological communities are identified within the management area, the management actions identified within the schedule must be incorporated as a condition of certification for the recommended hazard reduction Activity (RFS, 2003d).

Minimising detrimental impacts on the environment can best be achieved through a broad cyclical mosaic of hazard-reduced areas.

The presence of threatened species or areas of conservation significance may require that strategies other than hazard reduction burning be adopted.

In some areas perimeter control may mean that there is a decline in biodiversity of natural areas adjacent to areas of increased risk though a core area may be able to be managed with fire regimes more suited to ecological maintenance.

6.4.1 Threatening Processes

“High Frequency Fire resulting in the disruption of life cycle processes in plants and animals, and loss of vegetation structure and composition” is listed as a “Key Threatening Process” under the TSC Act.

However the fire history for the site as recorded by PCC would indicate that the high frequency fire is not an issue for the site.

6.5 Adjoining Landholders

A number of land holders adjoin the site. Service infrastructure, such as the power transmission lines and the water pipeline, require special consideration prior to conducting a PB.

6.6 Pollution Control

6.6.1 Smoke Management

Prescribed burning generates smoke, which periodically affects the atmosphere in the region during autumn and early winter. Smoke is also generated by activities other than prescribed burning, with smoke generated from prescribed burning contributing only a small proportion of fine particle emissions relative to other smoke emissions (NEPC, 1997).

Prescribed burning smoke is relatively isolated at any one time. Hazardous concentrations, involving smoke from prescribed burning combining with atmospheric pollutants, occur infrequently. For example, in the Sydney area, the number of days per year when such conditions has occurred (since routine fine particle monitoring began in 1994) is just one or two days per year (NEPC, 1997).

Smoke is a consideration when burning close to roads and residential/urban areas due to visibility issues and driver safety.

Weather conditions would be monitored and, where practicable, consistent with the overall aims of the burning operation, lighting patterns will reflect the need to minimise smoke drift into smoke sensitive areas. Specific traffic control measures would be put in place where there is any likelihood of hazards due to smoke on roads.

Operational measures to reduce the impact of smoke during the implementation of hazard reduction burns are to be incorporated into burning prescriptions for all hazard reduction burning operations. Areas requiring special protection from the adverse effects of smoke will be considered by Penrith BFMC as part of any proposals for hazard reduction burning.

Standards relating to the effects of smoke

Any proposed hazard reduction burns within vegetated areas of the site will be classified as 'large' (i.e. fires greater than one hectare) as defined under the *Bushfire Environmental Assessment Code, 2003* (RFS, 2003a). The following matters need to be addressed prior to the implementation of a large PB:

Residential Dwellings
Consideration of residential dwellings within 200 m of a large fire. At least 24 hours notification of the intended date of the PB, within the distance specified above, is required.

Major Roads
For large fires the RFS must provide traffic management signage to warn of the activity in accordance with the best practice guidelines.

Power Lines
The Penrith RFS must also inform and consult with local power supply authorities at least seven days before conducting a large smoke fire.

6.6.2 Catchment Protection – Soil and Water Quality Management

Vegetative cover is important in maintaining stream flow, preserving water quality and ensuring a high level of erosion control.

Maintenance of full vegetation cover in and adjacent to drainage lines can be achieved by exclusion of fuel reduction burning from these areas, or by burning under mild conditions, using the gradient from upper slope to gully.

Operational measures to protect soil and water values during the implementation of hazard reduction burns are to be incorporated into burning prescriptions for all hazard reduction burning operations. As such, the method of hazard reduction should be selected to minimise the impact on soils and catchments. In general, it is considered that best practice involves compliance with *Guidelines for Low Intensity Hazard Reduction Burning* (RFF, 2003b).

6.7 Pest and Weed Management

Many pest species are strongly influenced by the presence of fire. Weed species may spread and out compete with native species after fire events. Vertebrate pests (such as foxes and cats) may gain an advantage during post fire periods through improved competition over native species. In contrast, rabbits may be advantaged by the lack of clearance by fire, effectively reducing predatory influences exerted by foxes and native birds of prey.

If there are noxious or environmental weeds within the area where work is to be undertaken, the certifying/issuing authority will impose conditions, if required, regarding follow up treatment and machinery hygiene (RFS, 2003d). Herbicides can only be used within this Code for removing weeds. Their use must be consistent with the label and the requirements of the *Pesticides Act 1978*.

It should be noted that herbicides should not be used within 100 metres of any species listed in the NPWS Threatened Species Hazard Reduction List, unless the List states otherwise (RFS, 2003d).

7 ASSESSMENT

The proposed project will be surrounded by industrial development to the north, northeast and west. The former landfill area to the east will be capped and rehabilitated, primarily with low growing species which will not compromise the cap. Accordingly, there will be little vegetation on three sides of the site which would be likely to host or initiate a bushfire that might threaten the proposed project.

Land to the south of the proposed project forms part of the Biodiversity Conservation Corridor. This land is to be revegetated using locally endemic species and will form part of an east-west corridor of lands containing remnant and new vegetation.

Buildings to be located on the site are to be set back from the southern boundary of the site. This setback will provide access for fire fighting vehicles and will serve as an Asset Protection Zone. The bulk earthworks for the proposed project will also create a building platform which is elevated above the lands of the Biodiversity Conservation Corridor.

Vegetation to be planted in the section of the Biodiversity Conservation Corridor adjoining the site is to be staggered, with taller species located to the south, away from the site.

The bushfire risk likely to affect the proposed project is considered to be low based on the following:

- Buildings within the proposed project will be set back from the boundary by a minimum of 6 metres.
- The area between the proposed buildings and the Biodiversity Conservation Corridor will be hardstand with little or no vegetation.
- Vehicle access will be available to the industrial development/Biodiversity Conservation Corridor interface.
- The building pad for the proposed project will be elevated above the Corridor lands.
- Vegetation within the Corridor will comprise lower growing species adjacent to the proposed project, with taller species being located further to the south within the corridor.
- The taller species to be planted in the Corridor would be located at a distance that would not enable them to fall on the proposed development if they were subject to a bushfire when fully mature.

8 REFERENCES

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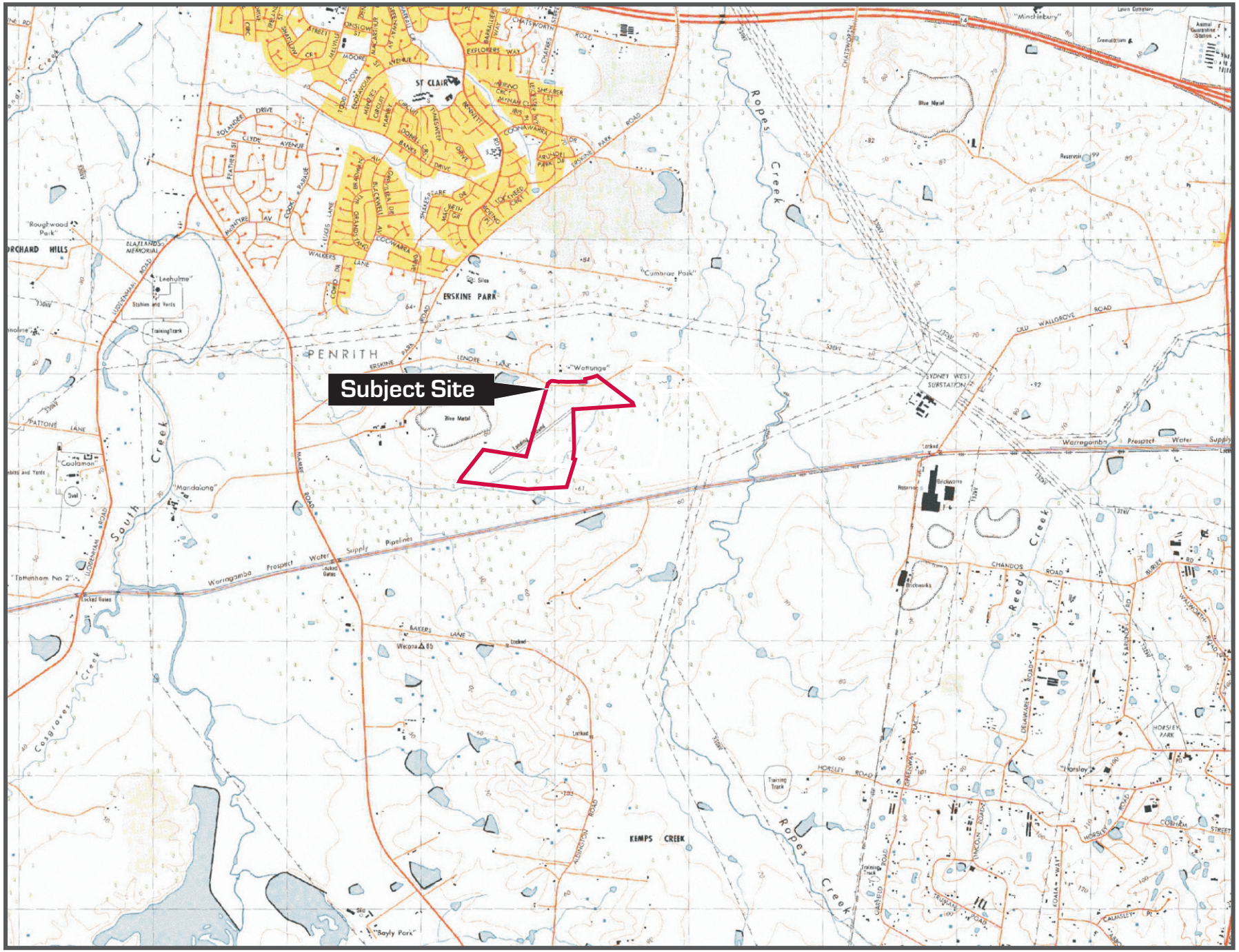
Figures



PROJECT-FILE NAME S6000631
DATE 18 August 2006
DRAWN TO
APPROVED

Approximate bulk earthworks area

0 1km

Subject Site
CSR
Bushfire Assessment
The Eastern Erskine Park Lands

HLA

FIGURE
1