GAILILEE COAL PROJECT
INITIAL BUSHFIRE MANAGEMENT PLANNING
FRAMEWORK – MINE AND TRAIN LOADOUT FACILITY

Waratah Coal
THE NEW ENERGY IN COAL

Appendix - Initial Bushfire Management Planning Framework – Galilee Coal Project Mine and Train Load-out Facility

GALILEE COAL PROJECT
INITIAL BUSHFIRE MANAGEMENT PLANNING FRAMEWORK – MINE AND TRAIN LOADOUT FACILITY

Waratah Coal
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Waratah Coal
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1. Introduction

1.1 Background

Waratah Coal intends to establish a new coal mine and railway and supporting infrastructure to export highly volatile, low sulphur, steaming coal to international markets. The Galilee Coal Project will incorporate:

- a new coal mine and associated infrastructure located near Alpha in the Galilee Basin, Central Queensland;
- a rail network between the mine and the Abbot Point State Development Area (APSDA); and
- use of existing or future onshore coal infrastructure at the APSDA and port loading facilities at the Port of Abbot Point.

Waratah Coal proposes to mine 1.4 billion tonnes of raw coal from its existing tenements, Exploration Permit for Coal (EPC) 1040 and part of EPC 1079. The mine development involves the construction of four 9 Million Tonnes Per Annum (Mtpa) underground long-wall coal mines, two 10 Mtpa open cut pits, two coal preparation plants with raw washing capacity of 28 Mtpa.

The annual Run-of-Mine (ROM) coal production will be 56 Mtpa to produce 40 Mtpa of saleable export product coal. At this scale of operation, the capital expense of constructing the required rail and port infrastructure is economically viable over the life of the project.

Processed coal will be transported by a new railway system approximately 453 kilometre (km) in length that runs from the mine in the Galilee Basin to the boundary of the APSDA. The railway component includes a state of the art, heavy haul, standard gauge railway to support 25,000 tonne (t) train units. The rail will initially be built to transport 60 Mtpa, and will ultimately cater for a capacity of 400 Mtpa. As such, Waratah Coal has undertaken the assessments to support, and are seeking approval for, a rail capacity of 400 Mtpa. The final railway easement is expected to be on average 40-80 m wide (40 m wide in sensitive environmental areas where topography permits). In areas where cross-slope cuttings are required the width of the easement will be wider – up to 150 m (with two instances exceeding this – up to a maximum width of 184 m). The easement includes both the rail and a service road.

Until recently there was a commitment to utilise coal terminal, stockpiling and loading facilities being assessed as part of the North Queensland Bulk Ports (NQBP) T4-T9 and MCF proposals. However, given the recent Queensland Government directive to defer the approval process for the expansion of Abbot Point until the end of 2012, and the associated uncertainty over the T4-T9 and MCF proposals, the limit of the assessment for this project is now defined as the boundary of the APSDA.

Various supporting infrastructure will also be constructed as part of the project including the connection to new power and water supply infrastructure being proposed by Government.

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The project will be developed over three years. The mine will have a life of approximately 30 years, whereas the rail will continue to operate to support other projects.

The mine will be a combination of two surface mines and four underground mines with an ultimate export capacity of 40 Mtpa. The surface and underground mines will be supported by a purpose built Mine Infrastructure Area (MIA).

The raw coal will be washed for the export market with an overall product yield of 72%. The annual raw coal production will be 56 Mtpa to produce 40 Mtpa of saleable export product coal.

The mine general arrangement will incorporate the following operations producing raw coal:

- two surface mining pits in the B seam resource producing ten Mtpa total;
- two surface mining pits in the C and D seam resources producing ten Mtpa total;
- one long wall mine in the B seam producing nine Mtpa;
- three long wall mines in the C and D seam resources producing 27 Mtpa total;
- raw coal stockpiles at the underground mines;
- haulage roads to deliver raw coal from the surface mines to crushing and stockpile facilities;
- three overland conveyor systems to transport raw coal to the coal processing plants;
- three raw coal stockpiles to feed the coal preparation plants while providing blending capability;
- two coal preparation plants consisting of four 1,000 tonnes per hour (tph) modules each;
- two product coal stockpiles handling product coal to rail load out facilities;
- two railway turning loops each with a single coal load out facility;
- topsoil stockpiles and out of pit overburden spoil sites to create initial surface mining pit space;
- water management structures including dams, levee banks and sediment traps;
- tailings dams and coarse spoil disposal areas integrated into the mine spoil pile areas;
- refuelling and maintenance facilities;
- access roads, power lines and other services located in a central services corridor transgressing the entire resource area; and
- a mine office, communications, and associated amenities.

The surface mining method will be a combination of walking draglines for overburden removal in conjunction with truck and shovel fleets for partings removal and coal recovery.

An additional overburden removal system utilising large electric rope shovels loading onto overburden conveyors will also be used in conjunction with the draglines. This configuration offers the flexibility to create additional pit space by moving overburden over longer distances rather than through the use of walking draglines without the expense of truck and shovel fleets to achieve this.

The underground mining system is based on large scale long wall mining with each mine accessing the underground resource at 120 m depth through two cross measure drifts and a ventilation shaft.

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INITIAL BUSHFIRE MANAGEMENT PLANNING
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For the purpose of this Bushfire Management Plan (BMP) Framework, the train load-out facility is included in the related infrastructure.

The mine general arrangement is shown at **Figure 1**.

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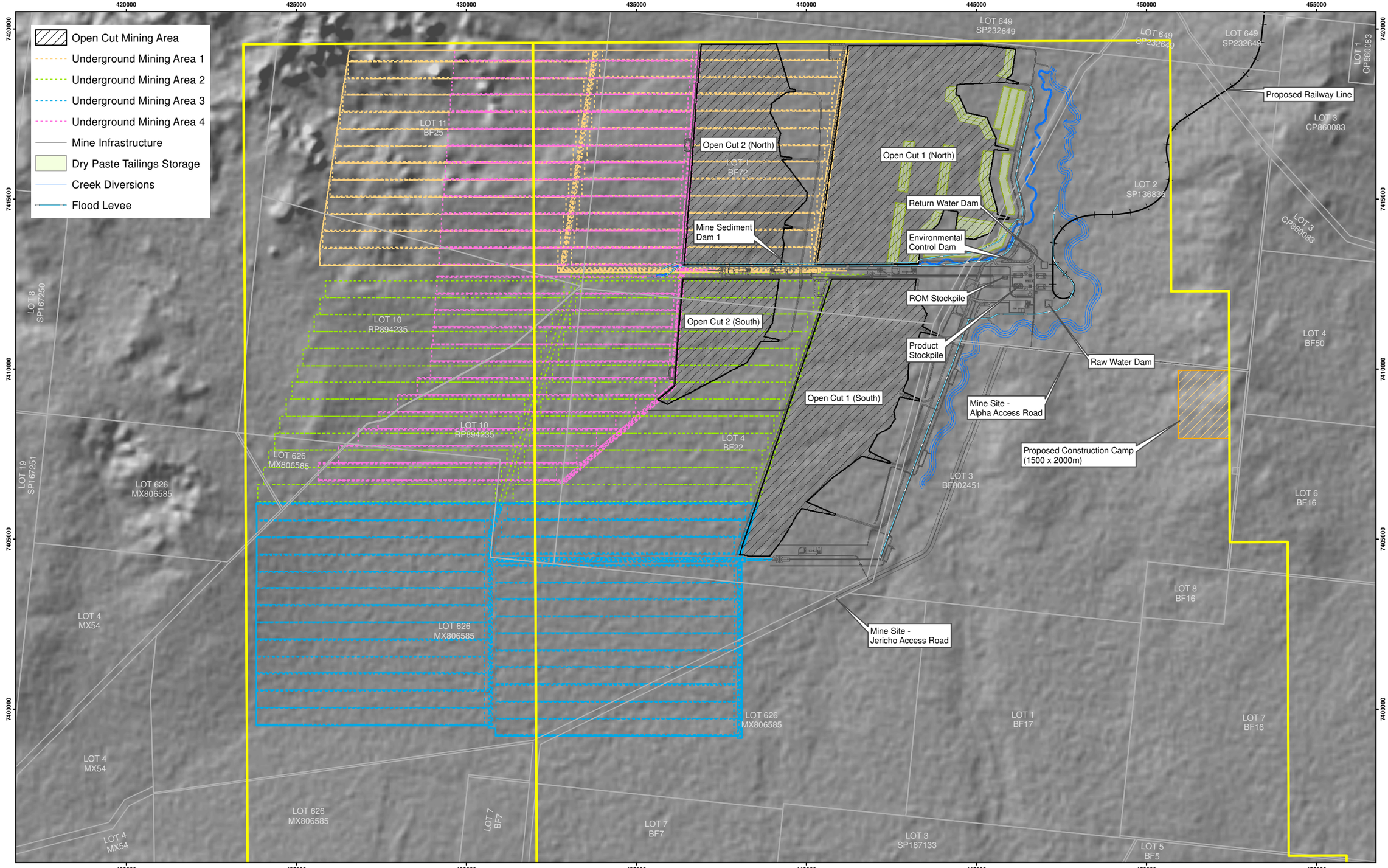

GALILEE COAL PROJECT (Northern Export Facility)

Waratah Coal
THE NEW ENERGY IN COAL

Mineralogy House, Level 7, 380 Queen Street, Brisbane Qld 4000, Australia

Source:	Cadastral Boundaries: DERM 2012 EPC Boundary: Department of Natural Resources and Mines (DNRM) 2012 Mine Detail: Waratah Coal Pty. Ltd. 2012 Background Image: Shaded relief: ESRI Data & amp; Maps 2006
Disclaimer:	This plan is based on or contains data provided by others. Waratah Coal Pty. Ltd. gives no warranty in relation to the data (including accuracy, reliability, completness, currency or suiability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to and use of the data. Data must not be used for direct marketing or be used in breach of privacy laws.
File:	File: WAR20-26-SEIS004a-FIG-1-MINE-INFRASTRUCTURE-ARRANGEMENT- Date: 14/11/2012

0 1,000 2,000 3,000 4,000 5,000
Metres

A3 Scale 1:100,000

Coordinate System: GDA 1994 MGA Zone 55 Projection: Transverse Mercator

EPC1040 & Part of EPC1079

Cadastral Boundary

FIGURE 1:

MINE INFRASTRUCTURE ARRANGEMENT

1.2 Scope

This document is a framework for which the BMP will be prepared. Once finalised, the BMP will form a module of the Galilee Coal Project Environmental Management System (EMS).

The BMP will be prepared in accordance with the State Planning Policy 1/03, Mitigating the Adverse Impacts of Flood, Bushfire and Landslide (SPP 1/03). The quantitative assessment within SPP 1/03 assesses three key characteristics of land that have been found to be the main determinants of the severity of bushfire hazard. These factors are vegetation communities, slope and aspect and SPP 1/03 uses the sum score of all three factors to assign a hazard score.

The overall hazard for the China First mine site and surrounding area will be assessed in detail once final design is completed and prior to the commencement of site operations. For the purpose of developing the BMP framework the QRFS have assessed the mine site as possessing a low to medium risk of bushfire (see **Figure 2**).

This framework document discusses likely key mitigation measures such as fire breaks, building construction practices, fire fighting equipment, fire detection and warning systems and makes preliminary recommendations for the development of a detailed evacuation plan to be completed before construction commences on the site.

CHINA FIRST PROJECT
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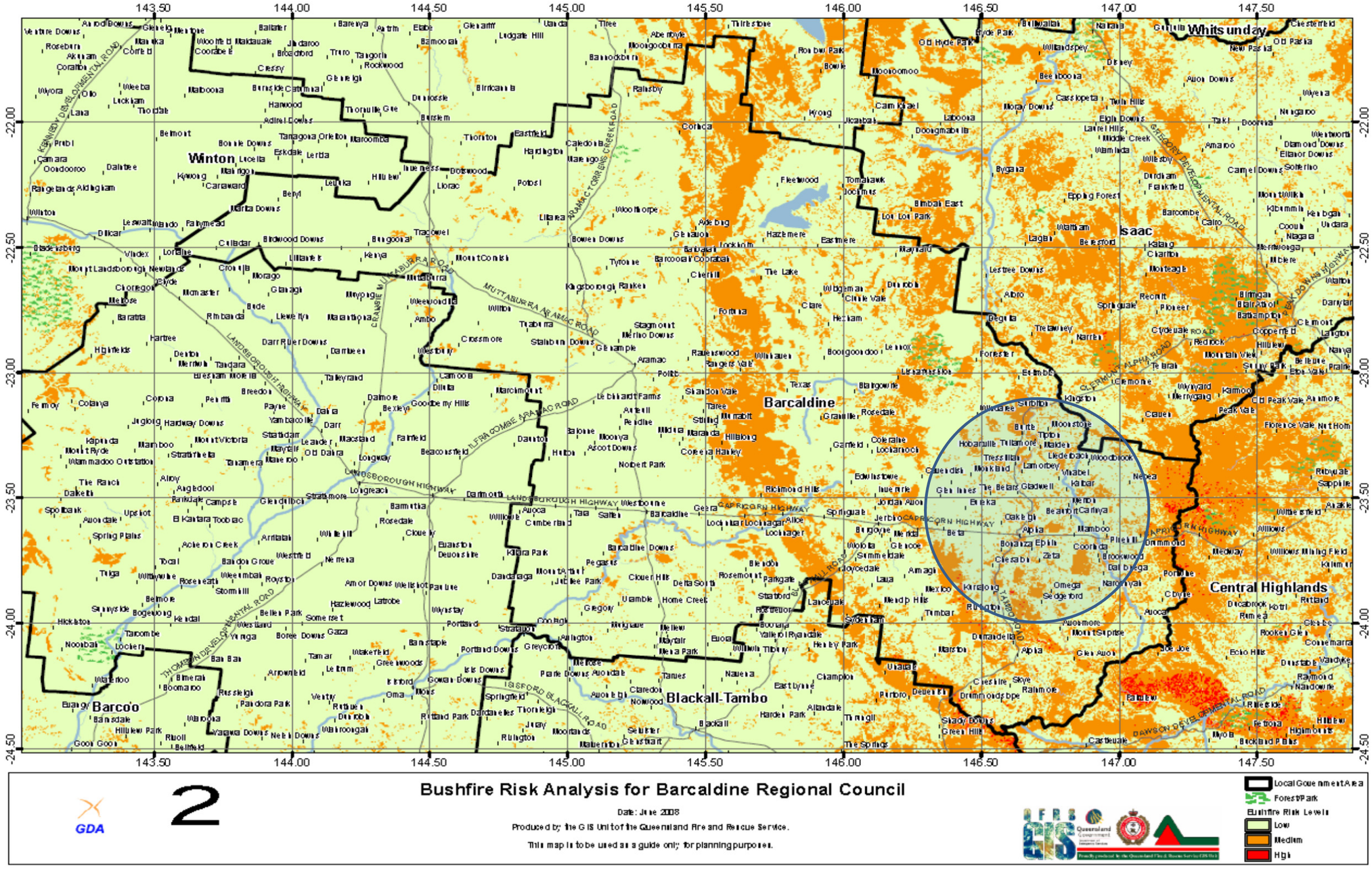
Figure 2. Bushfire risk analysis for Barcaldine Regional Council



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2. OBJECTIVES OF THE BUSHFIRE MANAGEMENT PLANNING FRAMEWORK

The objectives of the BMP framework are to establish the context that the BMP will be developed. Once developed the objectives of the BMP will be to:

- Comply with all regulatory requirements set out in the relevant legislation, planning schemes and the Environment Authority and project approval conditions;
- Ensure Waratah Coal environmental and other relevant strategies and policies are met and upheld;
- Ensure that effective hazard reduction practices are implemented and effectively monitored;
- Provide for the co-ordinated prevention and mitigation of bush fires for:
    - The protection of life, property and the environment within the local community;
    - Minimising the risk to fire fighters and the public by reducing the potential for severe bush fires; and
    - The protection, maintenance and, wherever possible, enhancement of the natural and cultural values of the area through the management of appropriate fire regimes.

3. RESPONSIBILITY

Implementation of the BMP will be the responsibility of Waratah Coal. The Environmental Superintendent will be responsible to the Mine Manager for ensuring the commitments contained within the BMP are met.

Hazard mitigation strategies will be coordinated by Waratah Coal, the Rural Fire Service and adjoining property owners / managers.

4. WARATAH COAL AND OTHER POLICIES AND STANDARDS

The Galilee Coal Project mine will operate in accordance with the Waratah Coal Health, Safety, Environment and Community (HSEC) management system. The HSEC system will cover all operational aspects and activities of the Galilee Coal Project and the Environmental Policy and supporting management system will prescribe the mandatory environmental performance requirements that support the aspiration of zero harm across the Project.

The HSEC management system will be developed to be consistent with internationally recognised standards. It will set benchmarks for the Project, to provide auditable criteria for the management system and to form the baseline from which the Project can deliver continuous improvement strategies.

5. EXISTING ENVIRONMENT

5.1 Climate

The mine site has a sub-tropical continental climate and in general winter days are warm and sunny and nights are cold (Bureau of Meteorology (BOM), 2010a). Summer days, as with most Australian locations tend to be hot and nights warm. Summer weather is influenced by a semi-permanent trough that lies roughly north-south through the interior of the state. The trough is normally the boundary between relatively moist air to the east and dry air to the west. It is best developed and generates most weather during spring and summer months. The position of the trough fluctuates diurnally due to vertical mixing and from day to day due to interaction with broad scale synoptic influences. The trough often triggers convection with showers and thunderstorms on its eastern side.

Meteorological data has been taken from multiple BOM weather stations to provide an indication of regional climate trends. Where possible, data has been taken from the Barcaldine, Emerald, Claremont and Blackall stations, as these are the closest to the location of the mine site. For some parameters, (such as evaporation), data was not available from the preferred stations. Where this occurred data was taken from the next nearest station. The location of each station and selected parameters is shown in **Table 1**.

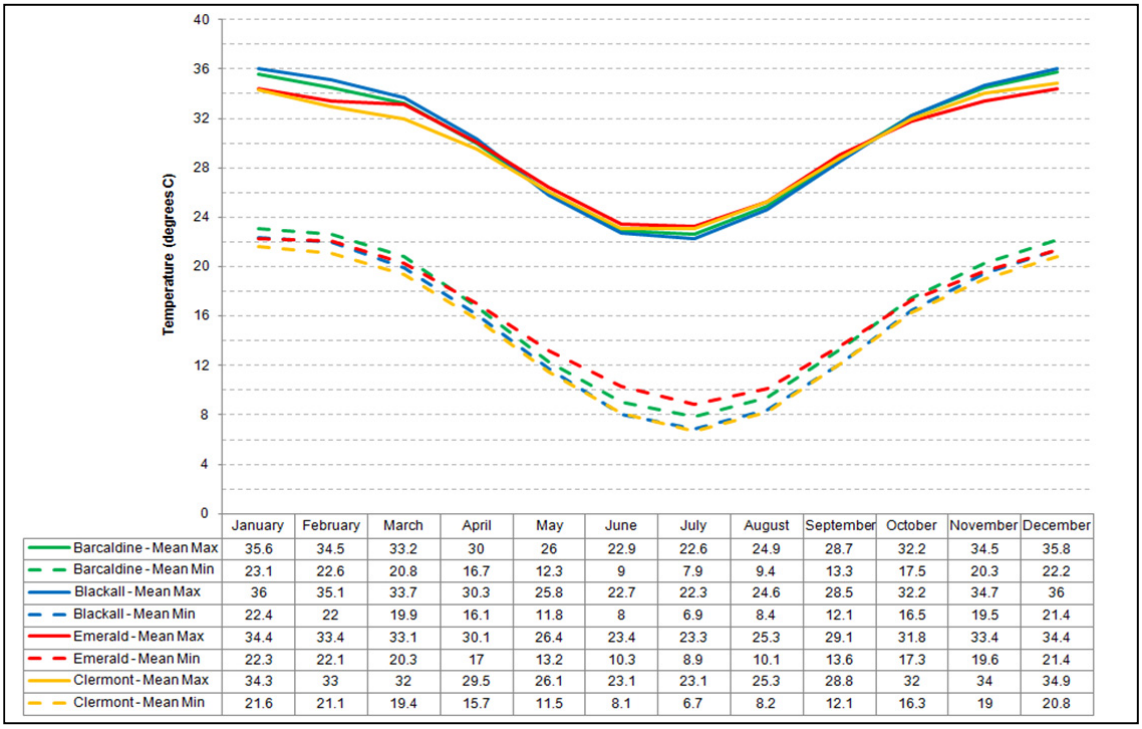
Table 1. Bureau of Meteorology monitoring site locations and parameters

Meteorology Station	Coordinates	Data Range	Parameters
Blackall Township	Latitude: 24.42°S Longitude: 145.47°E	1880-current	Temperature, rainfall, relative humidity
Longreach	**Latitude:** 23.44°S **Longitude:** 144.28°E	1949-current	Evaporation
Emerald Airport	**Latitude:** 23.57°S **Longitude:** 148.18°E	1981-current	Temperature, rainfall, relative humidity, evaporation, wind speed and direction
Clermont	**Latitude:** 22.82°S **Longitude**: 147.64°E	1870-current	Temperature, rainfall, relative humidity, evaporation
Barcaldine Post Office	**Latitude:** 23.55°S **Longitude:** 145.29°E	1886-current	Temperature, rainfall, relative humidity, evaporation wind speed and direction

5.1.1 Temperature

The long term monthly average temperatures within the study area display typical ranges for subtropical regions (see **Figure 3**). Longreach, being further inland, is generally hotter than the other monitoring stations in the region although it can be cooler during mid-winter. Mean monthly minimum temperatures can be as high as 19°C to 22°C in the summer and drop as low as 7°C in the winter. The mean maximum temperatures can range between 33°C to 36°C in the hottest months and drop to between 22°C and 25°C during the coldest part of the year.

Figure 3. Long term average temperature summaries



	January	February	March	April	May	June	July	August	September	October	November	December
Barcaldine - Mean Max	35.6	34.5	33.2	30	26	22.9	22.6	24.9	28.7	32.2	34.5	35.8
Barcaldine - Mean Min	23.1	22.6	20.8	16.7	12.3	9	7.9	9.4	13.3	17.5	20.3	22.2
Blackall - Mean Max	36	35.1	33.7	30.3	25.8	22.7	22.3	24.6	28.5	32.2	34.7	36
Blackall - Mean Min	22.4	22	19.9	16.1	11.8	8	6.9	8.4	12.1	16.5	19.5	21.4
Emerald - Mean Max	34.4	33.4	33.1	30.1	26.4	23.4	23.3	25.3	29.1	31.8	33.4	34.4
Emerald - Mean Min	22.3	22.1	20.3	17	13.2	10.3	8.9	10.1	13.6	17.3	19.6	21.4
Clermont - Mean Max	34.3	33	32	29.5	26.1	23.1	23.1	25.3	28.8	32	34	34.9
Clermont - Mean Min	21.6	21.1	19.4	15.7	11.5	8.1	6.7	8.2	12.1	16.3	19	20.8

5.1.2 Temperature Inversions

A temperature inversion refers to a layer of air in the atmosphere in which the temperature increases with height (instead of general profile of decreasing with height). During the night the ground is cooled by radiating heat into space. Air in contact with the ground then becomes cooler than the air above it, forming a typical night-time near-ground inversion layer. Inversions can form from other mechanisms, such as when warm air moves over a cool surface which can also form at high altitudes in the atmosphere.

The lack of convective mixing within the lower-level inversion layer means that lower-level pollution can be trapped within the inversion layer, resulting in high pollution levels. This phenomenon is much more pronounced over land than it is over water, as water holds its heat for longer than land does.

The temperature inversion strength and frequency have been estimated based on meteorological modelling output datum for 2008 from a central location within the project area. Analyses of the inversions show that strong inversions occur in 13% of occasions (see Table 2).

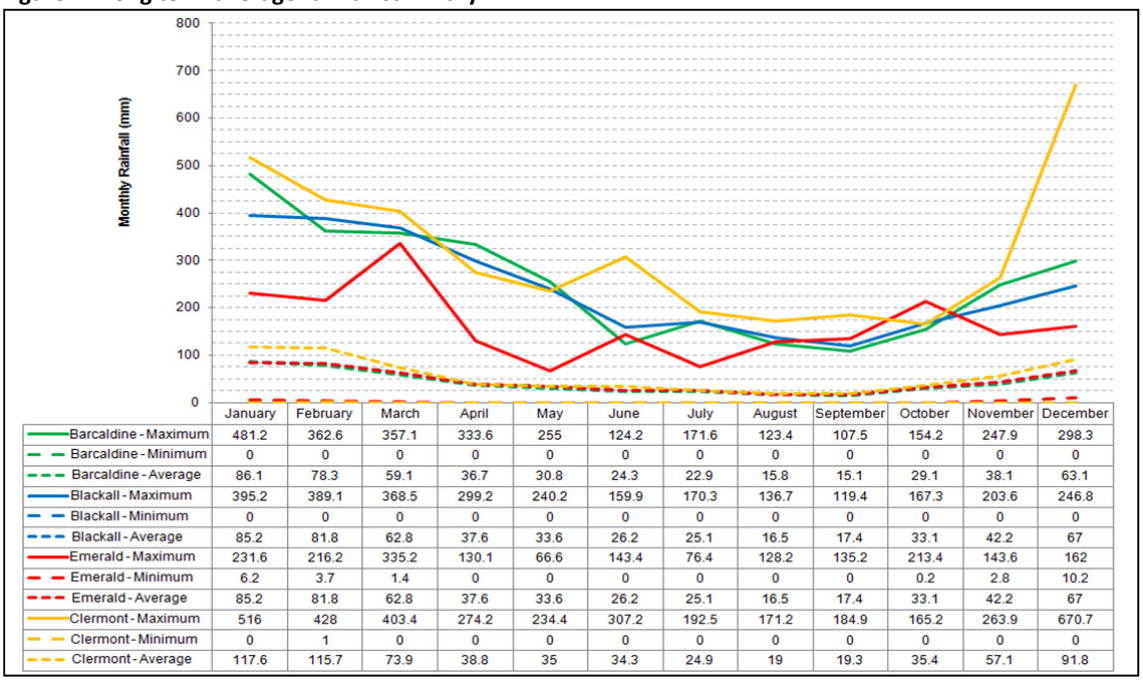
Table 2. Temperature inversion at night time in the project area

Night time inversion strength	Percentage of occurrence (%)	Number of hours
>3^{0}C per 100 m	13	1,169
>2^{0}C per 100 m	20	1,750
>1^{0}C per 100 m	30	2,595
>0^{0}C per 100 m	50	4,410

5.1.3 Rainfall

The long term monthly average of rainfall is presented in **Figure 4**. This summary shows a consistent pattern across the study region of 80-120 mm of rain per month, on average, during the summer months, dropping to average lows of 15-20 mm during winter.

Figure 4. Long term average rainfall summary



	January	February	March	April	May	June	July	August	September	October	November	December
Barcaldine - Maximum	481.2	362.6	357.1	333.6	255	124.2	171.6	123.4	107.5	154.2	247.9	298.3
Barcaldine - Minimum	0	0	0	0	0	0	0	0	0	0	0	0
Barcaldine - Average	86.1	78.3	59.1	36.7	30.8	24.3	22.9	15.8	15.1	29.1	38.1	63.1
Blackall - Maximum	395.2	389.1	368.5	299.2	240.2	159.9	170.3	136.7	119.4	167.3	203.6	246.8
Blackall - Minimum	0	0	0	0	0	0	0	0	0	0	0	0
Blackall - Average	85.2	81.8	62.8	37.6	33.6	26.2	25.1	16.5	17.4	33.1	42.2	67
Emerald - Maximum	231.6	216.2	335.2	130.1	66.6	143.4	76.4	128.2	135.2	213.4	143.6	162
Emerald - Minimum	6.2	3.7	1.4	0	0	0	0	0	0	0.2	2.8	10.2
Emerald - Average	85.2	81.8	62.8	37.6	33.6	26.2	25.1	16.5	17.4	33.1	42.2	67
Clermont - Maximum	516	428	403.4	274.2	234.4	307.2	192.5	171.2	184.9	165.2	263.9	670.7
Clermont - Minimum	0	1	0	0	0	0	0	0	0	0	0	0
Clermont - Average	117.6	115.7	73.9	38.8	35	34.3	24.9	19	19.3	35.4	57.1	91.8

5.1.4 Wind Speed and Direction

Wind roses show the frequency of wind occurrence by direction and strength. The bars correspond to the 16 compass points (N, NNE, NE, etc.). The bar at each wind direction in the wind rose diagram represents winds blowing from that direction. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds. With the resulting figure it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day.

Long term wind roses from two representative locations in the study area (one from the east and one from the west of the study area) show very different wind strengths although similar wind directions across the study area. Emerald, shown in **Figure 5**, is located east of the study area and has winds that are frequently from the east with more moderate winds. Barcaldine, to the west of the study area, also shows more winds from the east but has a higher frequency of low wind speeds. Calms form between 3% and 7% of monitored 9 am and 3 pm (see **Figure 6**).

Figure 5. Long term average 9 am and 3 pm wind roses from Emerald Airport

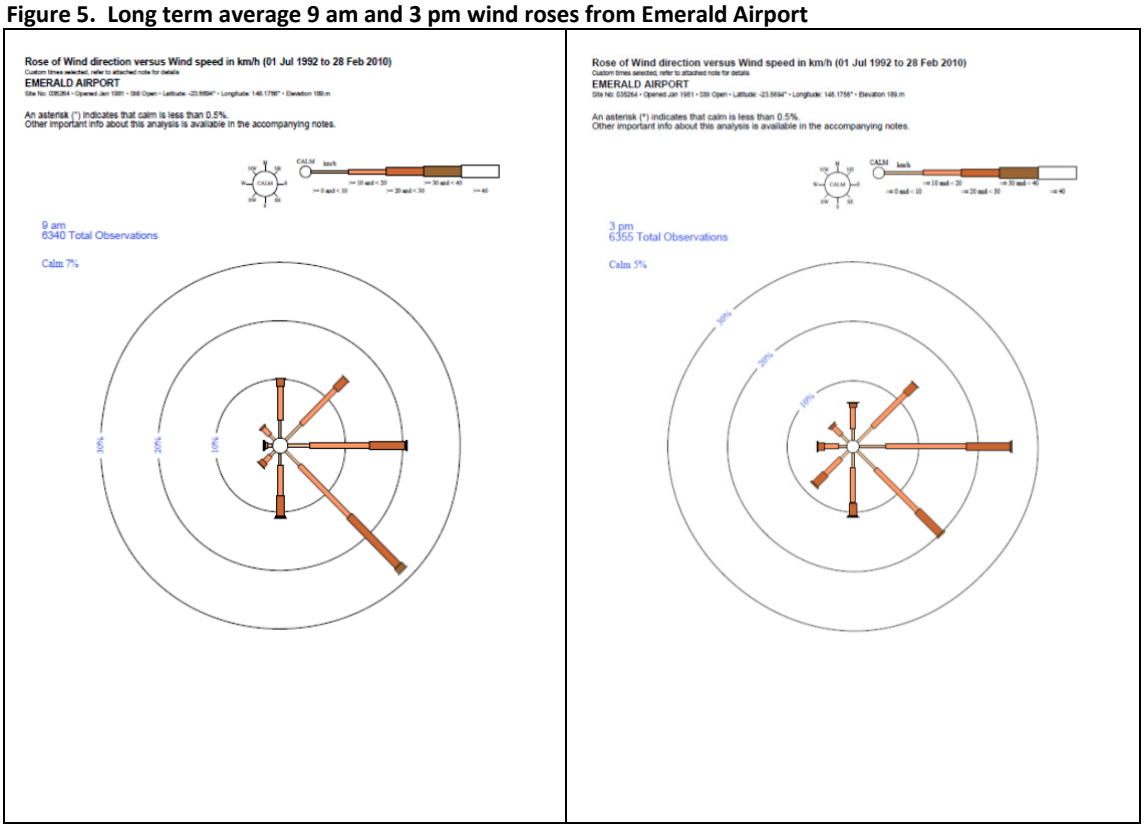
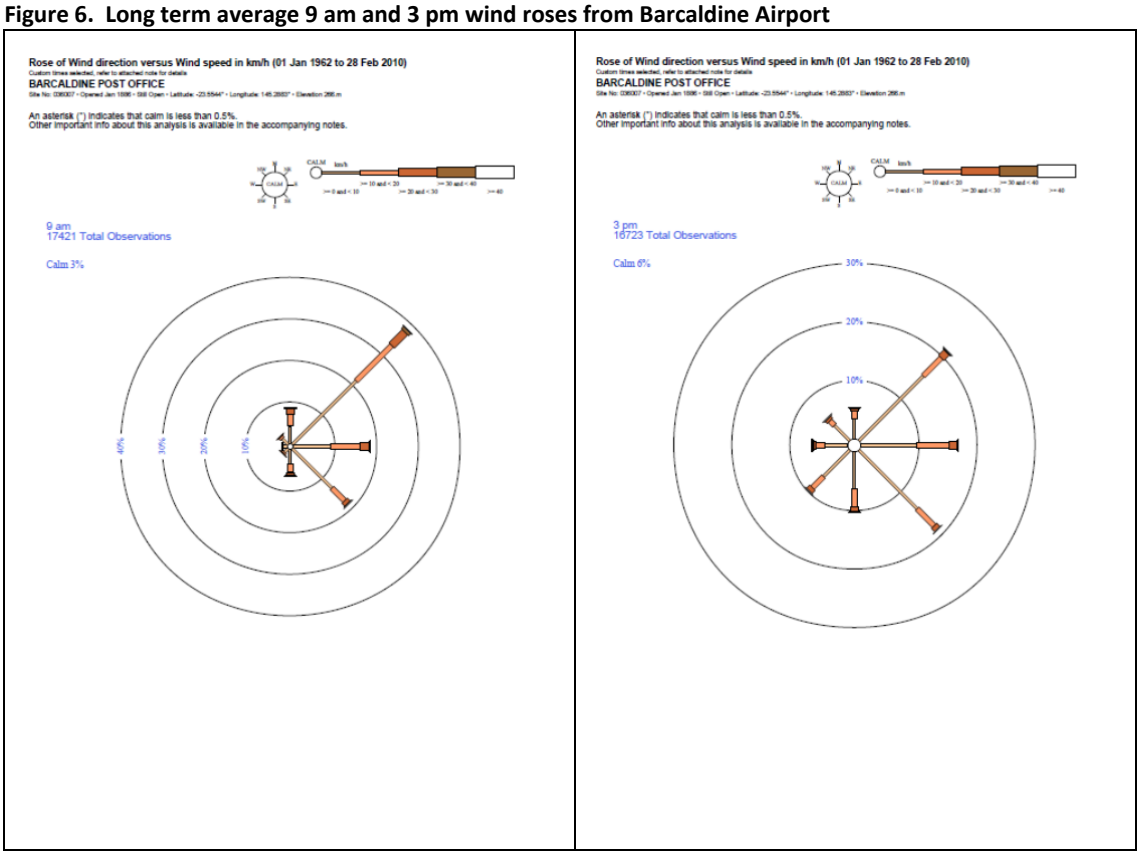


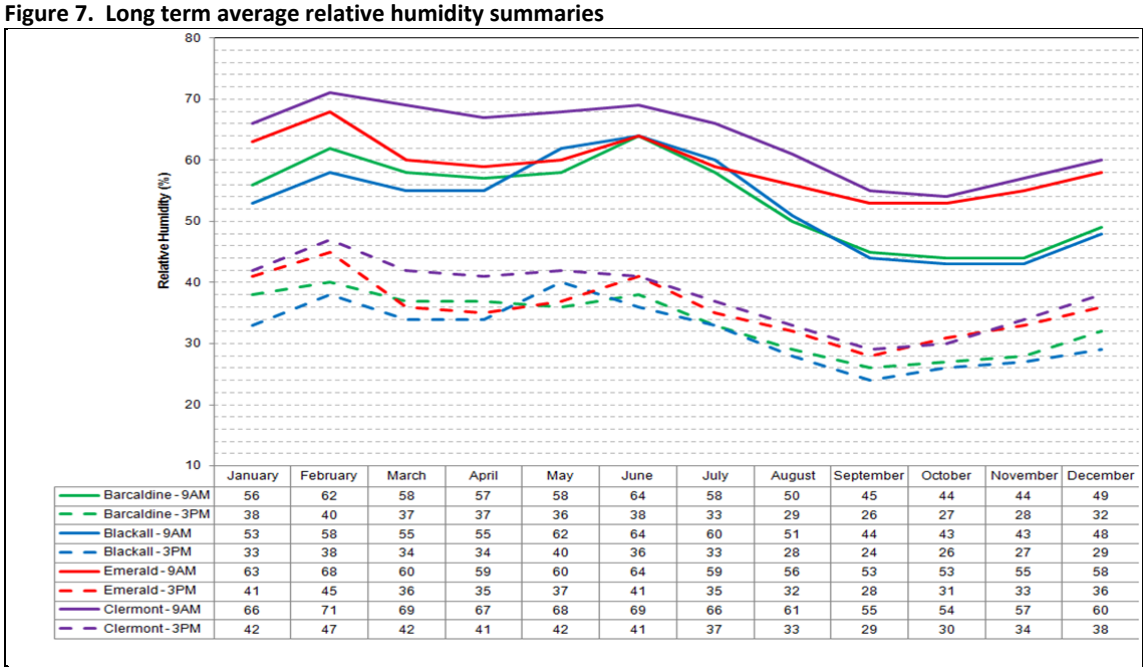
Figure 6. Long term average 9 am and 3 pm wind roses from Barcaldine Airport



5.1.5 Relative Humidity

Relative humidity in the study area is typically higher during the summer and autumn months and lower during the spring months. Relative humidity is affected by the distance from the sea with stations further from the ocean having less water vapour available and hence lower relative humidity's (Barcaldine is generally lower than Clermont and Emerald). The long term average relative humidity summaries recorded for the region are shown in **Figure 7**.

Figure 7. Long term average relative humidity summaries

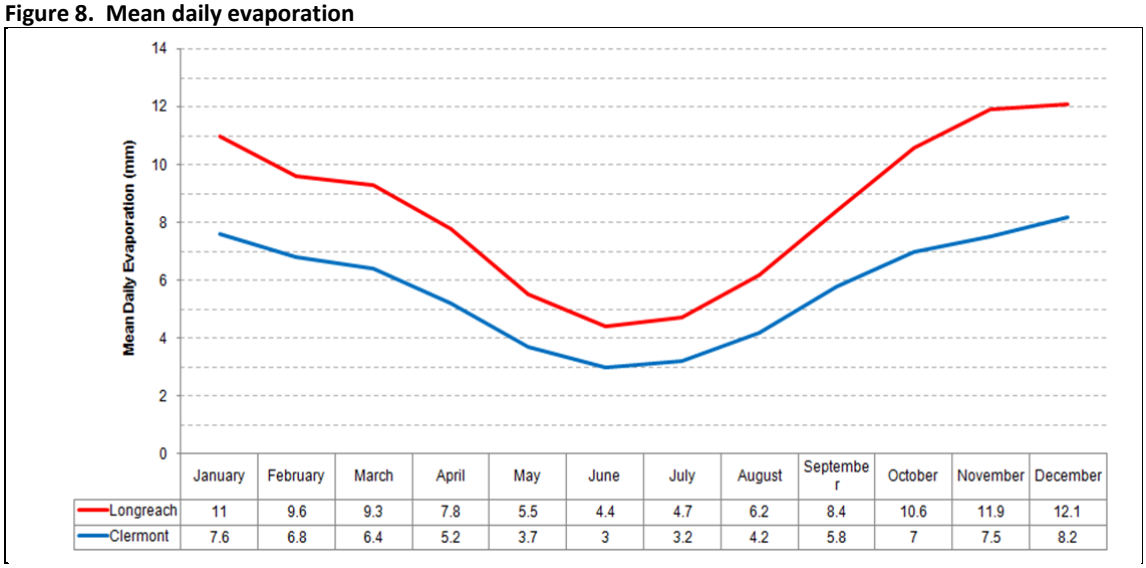


	January	February	March	April	May	June	July	August	September	October	November	December
Barcaldine - 9AM	56	62	58	57	58	64	58	50	45	44	44	49
Barcaldine - 3PM	38	40	37	37	36	38	33	29	26	27	28	32
Blackall - 9AM	53	58	55	55	62	64	60	51	44	43	43	48
Blackall - 3PM	33	38	34	34	40	36	33	28	24	26	27	29
Emerald - 9AM	63	68	60	59	60	64	59	56	53	53	55	58
Emerald - 3PM	41	45	36	35	37	41	35	32	28	31	33	36
Clermont - 9AM	66	71	69	67	68	69	66	61	55	54	57	60
Clermont - 3PM	42	47	42	41	42	41	37	33	29	30	34	38

5.1.6 Evaporation

During the summer months, longer hours of daylight, hotter temperatures and higher solar radiation results in evaporation rates higher than those experienced during the June to August cooler months. As can be seen in **Figure 8**, solar radiation is generally lower at Clermont than at Longreach.

Figure 8. Mean daily evaporation



	January	February	March	April	May	June	July	August	September	October	November	December
Longreach	11	9.6	9.3	7.8	5.5	4.4	4.7	6.2	8.4	10.6	11.9	12.1
Clermont	7.6	6.8	6.4	5.2	3.7	3	3.2	4.2	5.8	7	7.5	8.2

5.1.7 Surface Pressure

Hourly and monthly mean minimum, 5th and 95th percentile, median and maximum pressures are presented at **Figure 9** and **Figure 10**, respectively. The hourly graphs show that the median pressure is generally around 1014 hPa and that the pressure generally remains between 1002 and 1025 hPa. There appears to be a diurnal cycle in pressure, with maximums in the mid-morning (7 to 10 am) and minimums during the late afternoon (3 to 5 pm). This is due to a feature often referred to as atmospheric tides. This is where atmospheric solar heating, combined with upward eddy conduction of heat from the ground, generates internal gravity waves in the atmosphere at periods of the integral fractions of a solar day (primarily at the diurnal and semidiurnal periods).

An annual cycle is clearly visible in **Figure 9** which reflects the fact that the sub tropic anticyclone belt migrates north during winter resulting in higher pressures.

Figure 9. Hourly averages mean sea level pressure from 2001 to 2010

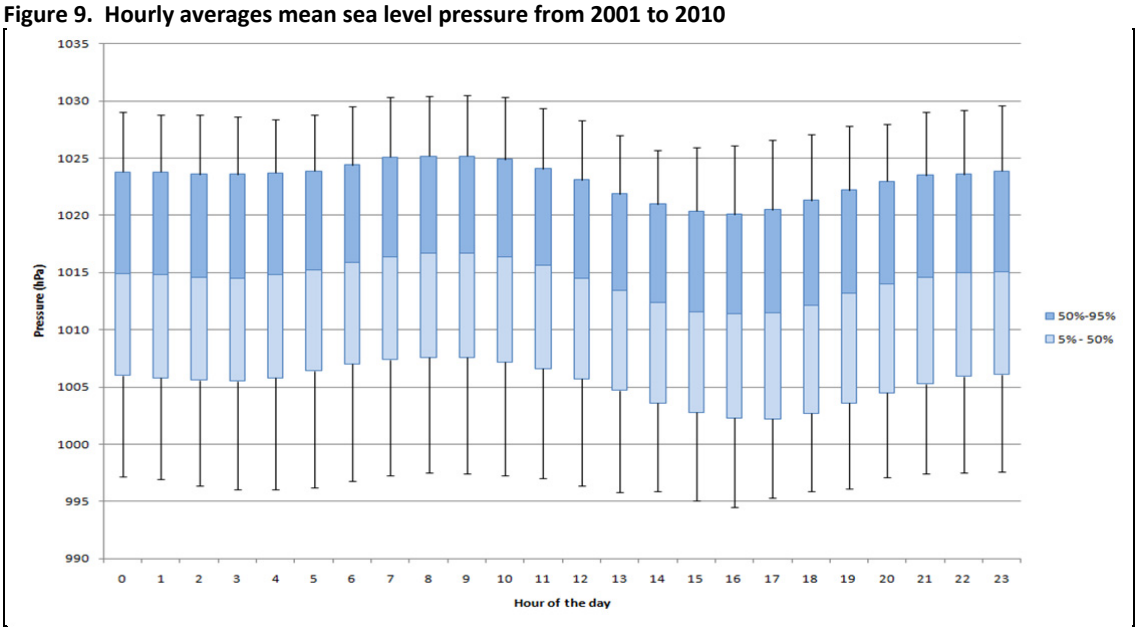
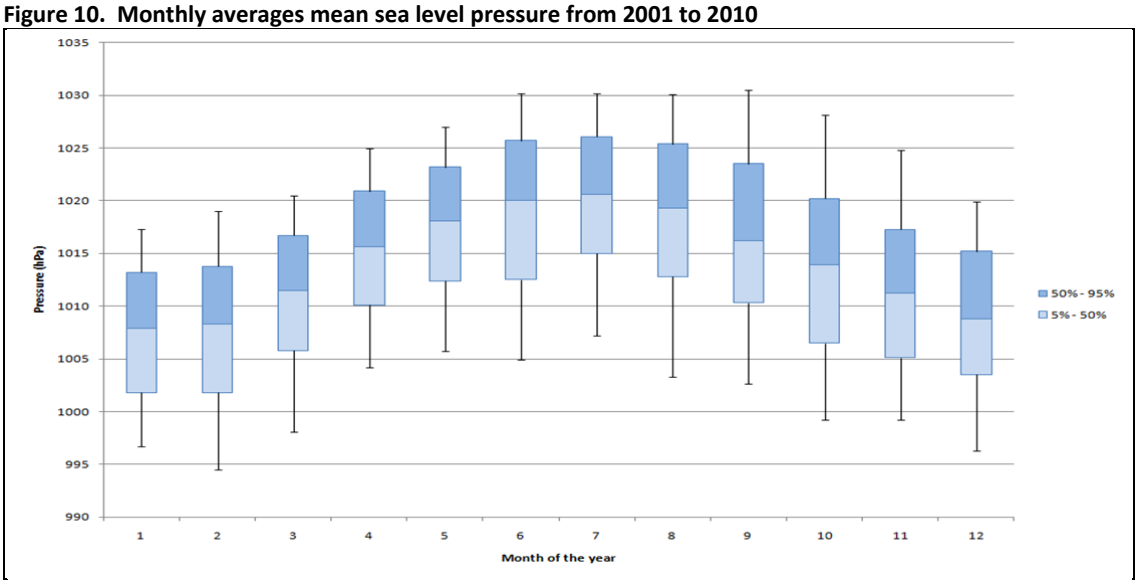


Figure 10. Monthly averages mean sea level pressure from 2001 to 2010



5.1.8 Climate Extremes

5.1.8.1 Droughts

Dry periods, or droughts are a natural part of life in Australia, particularly in the marginal areas away from the coast and ranges. A drought is generally considered to be an acute shortage of water resulting from a longer than usual period of time in which the water available from rainfall and water in storage is not enough to meet demand. Drought in Australia can typically be categorized into three general themes:

- a **meteorological drought** – where an area receives an extended period of below-average precipitation;
- a **hydrological drought** – where water under storage fall below a pre-determined capacity versus usage threshold; and
- an **agricultural drought** where there is insufficient moisture for average stock carrying capacity and / or crop production.

Research indicates that severe drought affects some part of Australia about once every 18 years. This does not indicate that severe drought regularly and predictably recurs every 18 years; intervals between severe droughts have varied from four to 38 years (BOM, 2010c). Severe droughts spanning several years have affected the east coast of Australia in each decade since the 1960s (BOM, 2010c).

Large areas of the region surrounding the mine site have been drought declared for most of the last decade. Whilst surrounded by drought declared areas, the previous Jericho Shire (now part of Barcaldine Regional Council) has not been drought declared since 15 March 2005 (Department of Primary Industries and Fisheries, 2010). Prior to that the area surrounding the mine had been drought declared since January 2003.

5.1.8.2 Thunderstorms and Lightning Strikes

The BOM has estimated that the study area experiences 15 to 25 thunder days per year (see **Figure 11**), some of which can result in destructive winds, intense rainfall and flash flooding. Since 1995 BOM has also been monitoring lightning flashes as both total lightning flash density (including intracloud flashes) and cloud to ground flash density per km^2 per year. **Figure 12** and **Figure 13** present long term (1995 - 2002) averages of expected annual lightning counts. These show that on average the study area might expect between 5 and 10 total flashes/km^2/year and 1 to 3 ground flashes/km^2/year.

Figure 11. Average annual thunder days between 1990 – 1999

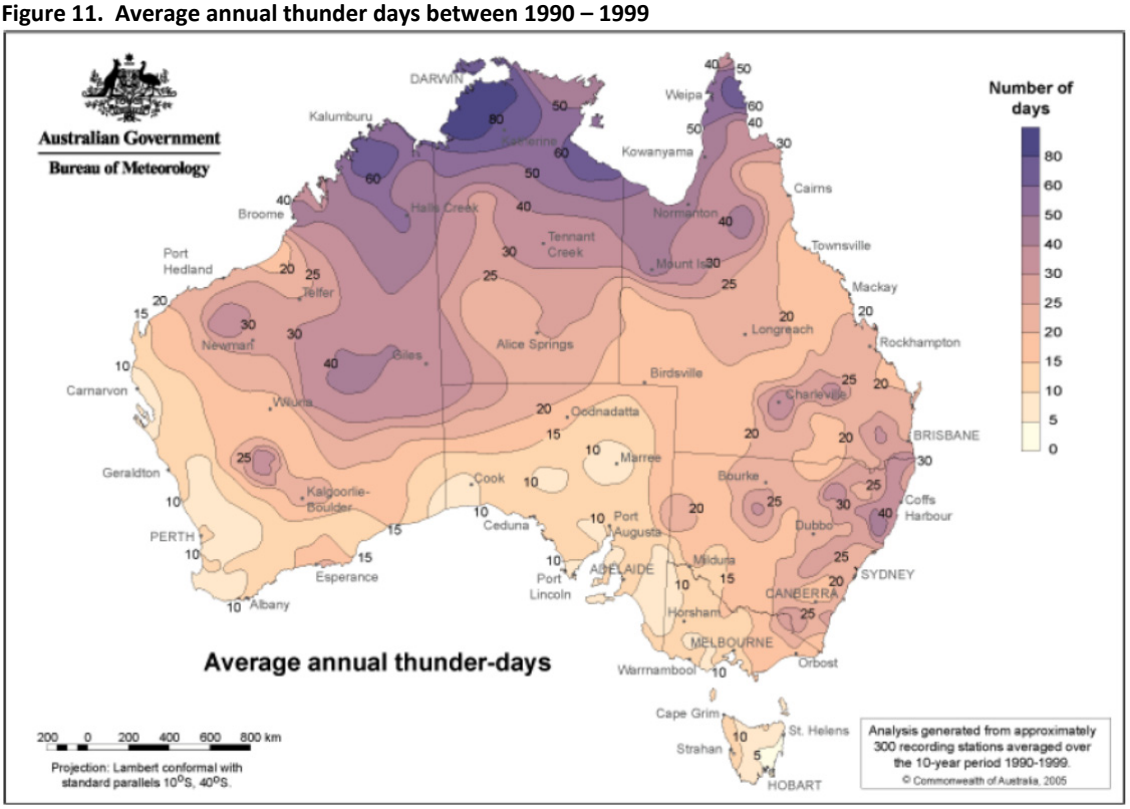


Figure 12. Average annual total lightning flash density between 1906 – 2006

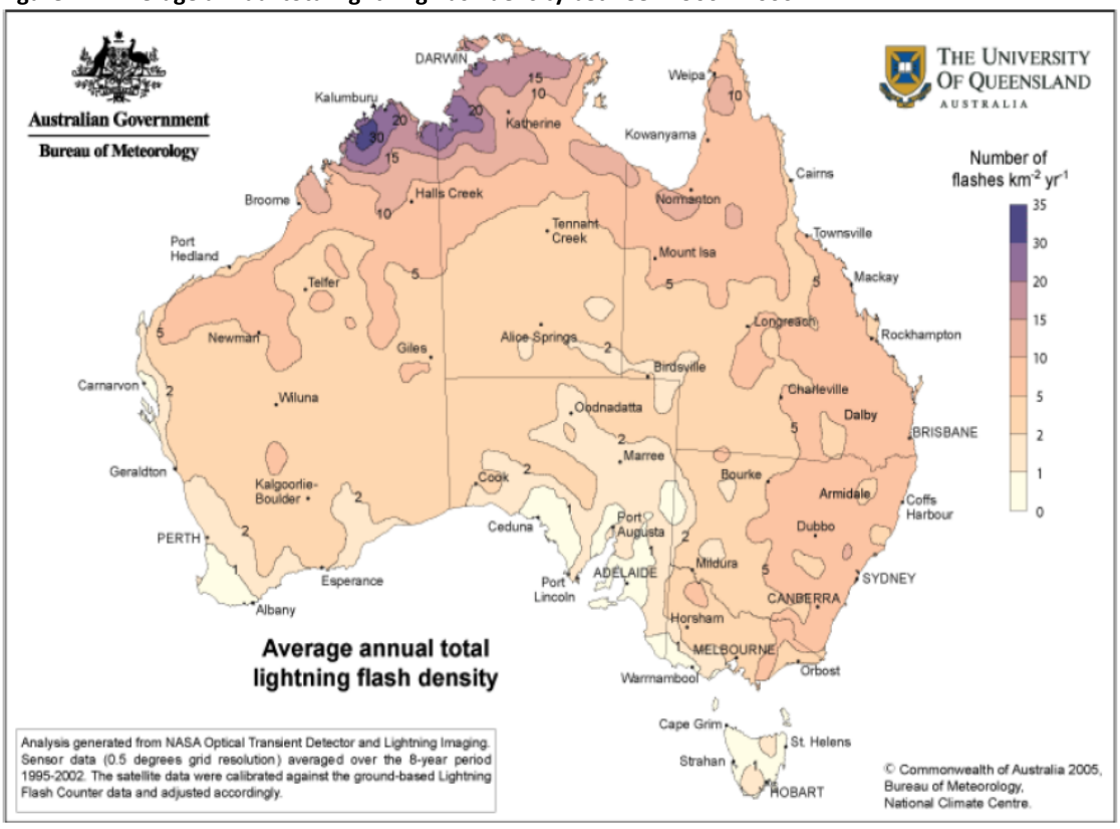
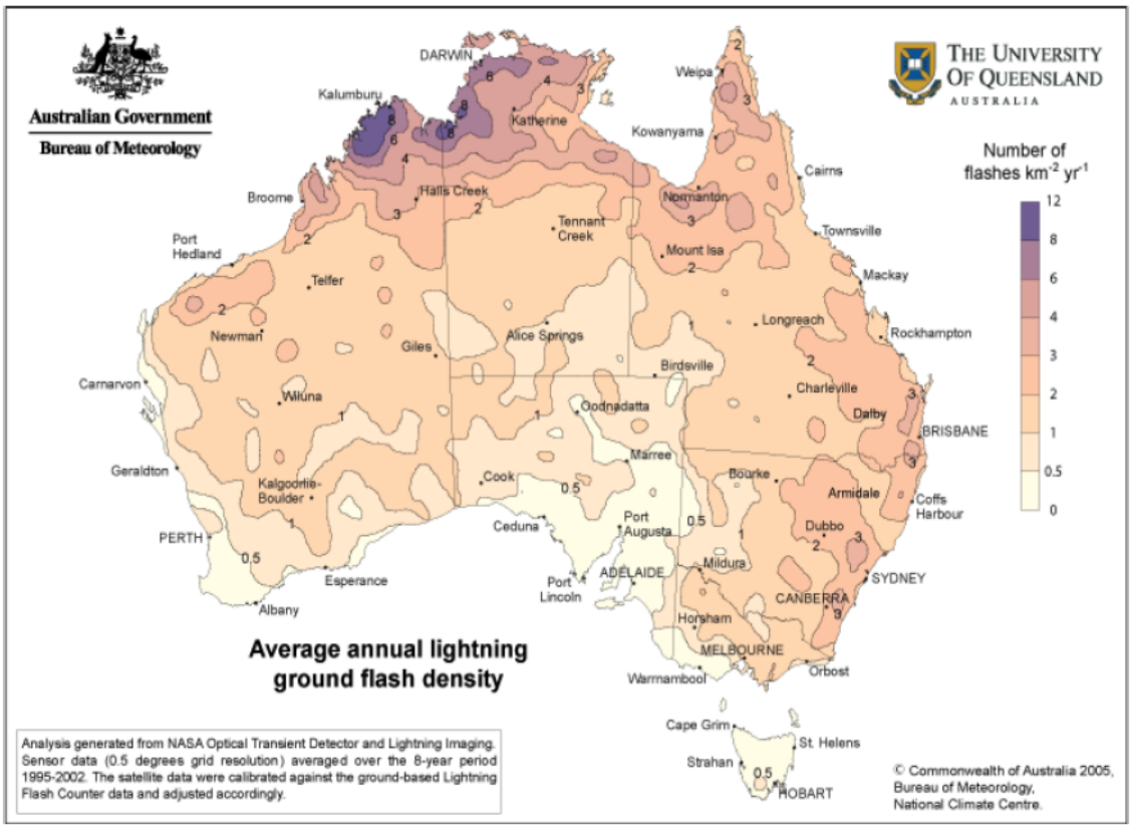


Figure 13. Average annual total lightning flash density between 1906 – 2006



5.2 Topography

The topography at the mine rises gently to the west up to 400 m AHD to outcrops of the Great Artesian Basin (GAB) sediments 20 km to 40 km west of the mine. Gently undulating plains occur throughout the majority of the mine area with strongly undulating to hilly land in the north-east corner of site.

5.3 Floristic Environment

The mine site is located within the Desert Uplands bioregion. This bioregion encompasses an area of about 70,300 km^2 and straddles the Great Dividing Range between Blackall and Pentland in central northern Queensland. The bioregion partly lies within the Galilee and Eromanga Basins. These basins consist of Mesozoic to Tertiary (less than 251 million years ago) sediments including major coal and gas deposits (ANRA 2009).

The vegetation of the bioregion consists predominantly of eucalypt and acacia woodlands (often with an open Spinifex understorey) and Acacia woodlands.

Most of the bioregion is under leasehold tenure and is used for cattle grazing and some sheep grazing in the west (DNRW 2006). Recent work by McCosker *et al*. (2009) suggests that there is some degree of compatibility between grazing management and biodiversity within this bioregion. The dominant land use across the study area is cattle grazing. A significant portion of the site is cleared of standing timber for cattle pastures. These areas are dominated by Buffel Grass (*Pennisetum ciliare*), an introduced invasive pasture species which is well established on rough, blade ploughed terrain on low, undulating hills (see **Plate 1**).

Plate 1. Buffel Grass pasture

Part of the mine surface clearance footprint occurs in the north and eastern parts of the Bimblebox Nature Refuge, an area gazetted under the *Nature Conservation (Protected Areas) Regulation 1994* (see **Plate 2**). The vegetation within this area consists predominantly of Poplar Box (*Eucalyptus populnea*) and Silver-leaved Ironbark (*Eucalyptus melanophloia*) open woodland (REs 10.5.12, 10.5.5). The Bimblebox Nature Refuge is identified as containing 'Special biodiversity values' and is of value as a 'Wildlife refugia'. It is mapped as being of Local Significance within the Desert Uplands Biodiversity Planning Assessment (EPA 2005).

The areas of RE 10.3.27 / 10.3.28 within the Bimblebox Nature Refuge are identified as containing Of Concern RE (Biodiversity status), ''Wildlife refugia', 'Disjunct populations', 'Taxa at limit of geographic range', 'Areas of high species richness' and 'Hollow-bearing trees' and is mapped as being of State Significance (EPA 2005).

Immediately to the south-west of the Bimblebox Nature Refuge the study area encompasses a woodland area with similar vegetation to that of the Bimblebox Nature Refuge. Dominant tree species include Silver-leaved Ironbark, Poplar Box and Lancewood (*Acacia shirleyi*). This area is identified as containing Of Concern RE (Biodiversity status), ''Wildlife refugia', 'Disjunct populations', 'Taxa at limit of geographic range', 'Areas of high species richness' and 'Hollow-bearing trees' and is mapped as being of State Significance (EPA 2005).

Partially cleared sandstone escarpments with some areas supporting Lancewood dominated woodlands are present to the north-west within the study area (see **Plate 3**).

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Plate 2. Bimblebox (*Eucalyptus populnea*) open woodland with native understorey

Plate 3. Lancewood (*Acacia shirleyi*) open woodland

To the east the mine surface clearance footprint transects a riverine habitat comprising several ephemeral watercourses including Lagoon Creek. The vegetation within this area is dominated by Poplar Box open

woodland and also contains patches of River Red Gum (*Eucalyptus camaldulensis*) (see **Plate 4**) and Brigalow (*Acacia harpophylla*). This area is mapped as being of Regional Significance (EPA 2005).

Plate 4. Poplar Box (*Eucalyptus populnea*) and River Red Gum (*Eucalyptus camaldulensis*) open woodland

5.3.1 Environmentally Sensitive Area

There are no Category A ESAs occurring within or adjacent to the study area.

The DEHP ESA mapping shows Endangered REs as Category B areas. Category B areas include REs listed as Endangered under the DEHP Biodiversity Status classifications (see **Table 3**). Two such REs (RE 10.3.25 and RE 10.4.3) occur as small patches in close proximity to the margins of the mine surface clearance footprint.

Bimblebox Nature Refuge is recognised by the DEHP ESA mapping as a Category C ESA. It comprises 8,000 ha of remnant semi-arid woodlands dominated by Poplar Box and Silver-leaved Ironbark. The canopy layer is generally open to sparse. The understory is largely made up of native shrubs, forbs and grasses and the weed cover is less than 5%.

EPA (2004) described the site as having high biodiversity values supporting a wide variety of native grass and fauna species. The vegetation in this area was found to range from average to very good condition with evidence of grazing, clearing for tracks, Buffel Grass invasion and patches of dieback present to varying degrees.

The Bimblebox Nature Refuge is known to contain the Near Threatened flora species, Large-podded Tick-trefoil (*Desmodium macrocarpum)*. Details about this species are provided in **section 5.3.3**.

There are no National Parks, State Forests or other ESA's mapped by DEHP as occurring within the study area.

5.3.2 Ecological Communities / Regional Ecosystems

In addition to the large portion of the site that has been cleared for grazing purposes, the review of the DEHP RE mapping identified 21 REs as occurring within the study area (see **Table 3**), two of which are Of Concern under the VM Act (RE 10.3.4 and RE 10.10.7). Two others listed as Least Concern under the VM Act are classified as Endangered under the DEHP biodiversity status (RE 10.3.25 and RE 10.4.3).

Table 3. Mapped REs Located Within the Study Area

Ecological Communities		Status			Present Within Mine Surface Clearance Footprint
RE Number	Description	EPBC Act	VM Act	Bio-diversity	
10.3.3	*Acacia harpophylla* and / or *Eucalyptus cambageana* low open woodland to open woodland on alluvial plains	-	LC	NOC	Yes
10.3.4	*Acacia cambagei* low open woodland to low woodland on alluvial plains	-	LC	OC	Yes
10.3.12	*Corymbia dallachiana* and *C. plena* or *C. terminalis* open woodland on sandy alluvial terraces (eastern)	-	LC	NOC	Yes
10.3.14	*Eucalyptus camaldulensis* and / or *E. coolabah* open woodland along channels and on floodplains	-	LC	OC	No
10.3.25	*Eremophila mitchellii* low open woodland on alluvial plains	-	LC	E	Yes
10.3.27	*Eucalyptus populnea* open woodland on alluvial plains	-	LC	OC	Yes
10.3.28	*Eucalyptus melanophloia* or *E. crebra* open woodland on sandy alluvial fans	-	LC	NOC	Yes
10.4.3	*Acacia harpophylla* and / or *Eucalyptus cambageana* open woodland on Cainozoic lake beds	-	LC	E	Yes
10.5.1	*Eucalyptus similis* and / or *Corymbia brachycarpa* and / or *Corymbia setosa* low open woodland to open woodland on sand plains	-	LC	NOC	No
10.5.5	*Eucalyptus melanophloia* open woodland on sand plains	-	LC	NOC	Yes
10.5.10	*Corymbia leichhardtii* open woodland on sand plains	-	LC	NOC	No
10.5.12	*Eucalyptus populnea* open woodland on sand plains	-	LC	NOC	Yes
10.7.3	*Acacia shirleyi* woodland or *A. catenulata* low woodland at margins of plateaus	-	LC	NOC	No
10.7.5	*Eucalyptus thozetiana* open woodland on scarps and on pediments below scarps	-	LC	OC	No

Ecological Communities		Status			Present Within Mine Surface Clearance Footprint
RE Number	Description	EPBC Act	VM Act	Bio-diversity	
10.7.7	*Melaleuca* spp. and / or *Acacia leptostachya* shrubland on ferricrete (eastern)	-	LC	NOC	No
10.10.1	*Acacia shirleyi* woodland or *A. catenulata* low open woodland on sandstone ranges	-	LC	NOC	No
10.10.3	*Eucalyptus* sp. (Caldervale D. Jermyn AQ 582304) open woodland on sandstone ranges	-	OC	OC	No
10.10.4	*Eucalyptus exilipes* and / or *Corymbia leichhardtii* open woodland on sandstone ranges	-	LC	NOC	No
10.10.5	*Corymbia trachyphloia* and / or *C. lamprophylla* or *Eucalyptus mediocris* open woodland on sandstone ranges	-	LC	NOC	No
10.10.7	*Eucalyptus cloeziana* open woodland on sandstone ranges	-	OC	OC	No
11.5.5	*Eucalyptus melanophloia, Callitris glaucophylla* woodland on Cainozoic sand plains / remnant surfaces. Deep red sands	-	LC	NOC	Yes

E = Endangered; OC = Of Concern; LC = Least Concern under the VM Act; NOC = No Concern at Present under Biodiversity status classification.

The field survey found the DEHP RE mapping to be generally accurate.

Nine REs occur within the mine surface clearance footprint. These are all Least Concern under the VM Act (although two are classified as Endangered and three as Of Concern under the DEHP biodiversity status). These Least Concern REs are not well represented in Queensland's conservation estate and are at risk from clearing, and grazing impacts including Buffel Grass invasion which in turn contributes to frequent and hot fires.

While no REs mapped by DEHP were listed under the EPBC Act, the EPBC Act Protected Matters Search Tool identified three Threatened Ecological Communities potentially occurring within the broader study area. These are:

- Brigalow (*Acacia harpophylla* dominant and co-dominant);
- Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin; and
- Weeping Myall Woodlands.

The field survey confirmed that no EPBC Act listed Threatened Ecological Communities occur within the study area. Minor occurrences of Brigalow dominant and co-dominant REs were found to be present (i.e. RE 10.3.3 and RE 10.4.3) but these REs are not included within the EPBC Act definition of the Threatened Ecological Community "Brigalow (*Acacia harpophylla* dominant and co-dominant)".

The majority of the watercourses within the study area and mine surface clearance footprint are designated under the VM Act. However, the mine surface clearance footprint does not contain any areas mapped as high-value regrowth under the VM Act.

5.3.3 Threatened and Near Threatened Flora Species

Database searches identified three flora species listed as Threatened or Near Threatened under the NC Act that are known to have ranges that overlap the study area. These species and their habitat preference are outlined in **Table 4**.

Table 4. Threatened and Near Threatened Flora Species Recorded as Occurring Within or Having Ranges That Overlap the Study Area.

Common Name	Scientific Name	Status		Preferred Habitat	Source
		NC Act[1]	EPBC Act		
Western Rosewood	*Acacia spania*	NT	-	Shallow sandstone-derived soils in open eucalypt woodlands or *Acacia* shrub-lands. Known within study area but no preferred habitat within mine surface clearance footprint.	1,2
Large-podded Tick-trefoil	*Desmodium macrocarpum*	NT	-	Open forests and woodlands and semi-evergreen vine thickets in red earths, rarely sandy clay soils throughout the coastal ranges of eastern QLD as far west as Longreach and at altitudes to 884 m (DNR 1999). Known within study area and mine surface clearance footprint.	1,2,3
Round-leaved Myrtle	*Micromyrtus rotundifolia*	V	-	Acacia shrub lands and in eucalypt-acacia woodlands on breakaways associated with the Great Dividing Range in shallow and sandy red soils in Central West QLD. Known north east of the study area but no preferred habitat within mine surface clearance footprint.	1,2

Status: [1]: Commonwealth (EPBC) listed: **E** = Endangered; **V** = Vulnerable

[2]: State (NC Act) listed: **E** = Endangered; **V** = Vulnerable; **NT** = Near Threatened

Source: 1 = QEPA WildNet record; **2** = Herbrecs; **3** = Bimblebox Rapid Assessment WorleyParsons Field Survey May 2009

The Queensland EHA mapping also identified one essential habitat area for Large-podded Tick-trefoil occurring within the study area .

Western Rosewood (*Acacia spania*) is a Near Threatened species which HERBRECS indicates is growing at the Cavendish Homestead "on a small lense of red sand amongst cleared Silver-leaf Ironbark" (-23.4313, 146.2877 GDA decimal degrees). The location of this record is approximately 7 km west of the mine surface clearance footprint . The Queensland Herbarium also has a record of the species 21.5 km southeast of Jericho.

[1] Note that Western Rosewood and Large-podded Tick-trefoil were listed as Rare under the NC Act until early 2010. However, the Rare category has been phased out and replaced by the category Near Threatened (DEHP 2010). All previously listed Rare species are being progressively reviewed by DEHP. In the meantime the transfer of Rare species to the Near Threatened category does not change the management requirements for these species (DEHP 2010).

The WorleyParsons (2009) survey of the Bimblebox Nature Refuge recorded Large-podded Tick-trefoil plants at five locations, one of which had been previously recorded by the Queensland Herbarium (in 2003). Further surveys in 2009 and April 2010 surveys were unable to confirm the potential extent of Large-podded Tick-trefoil beyond these five locations. Conditions for detection of Large-podded Tick-trefoil individuals and groups were problematic during both these periods. Indeed, in October 2009 weather conditions were very dry (specimens were desiccated, see **Plate 5**) and in April 2010 the ground layer had become dominated by tall dense grasses (particularly Buffel Grass). Due to the challenges of surveying for this species it is considered likely that additional individuals and groups occur within the study area.

The WorleyParsons (2009) survey identified 50-60 individual Large-podded Tick-trefoil plants. The majority of these occur at two sites while the other three sites recorded less than five individuals at each site. The numbers of individuals recorded at each site are represented in the following table.

Table 5. Numbers of Large-podded Tick-trefoil Individuals Previously Recorded

Site	Coordinates (GDA decimal degrees)	Numbers of individuals
1	- 23.46154962540 - 146.34912210200	< 5
2	-23.41767020590 - 146.42038691800	1
3	-23.41713550330 - 146.40076463900	20-30
4	-23.44261624300 - 146.39600947200	2
5	-23.44231098760 - 146.34495789600	10-15

(Source: WorleyParsons 2009)

Based on the WorleyParsons (2009) survey results, between 50 and 60 individuals Large-podded Tick-trefoil occur within the study area. At least 21 individuals occur within the mine surface clearance footprint, which equates to approximately 40% of populations within the study area.

Large-podded Tick-trefoil is a herbaceous perennial scrambler to 0.5 m that is known to be self-pollinating (Hacker 1990 as cited in DNR 1999). It normally occurs in open Eucalypt woodlands and open Eucalypt forest communities predominantly on red earths (rarely on sandy clay soils) and has been recorded to 884 m elevation (Queensland Herbarium 1996 as cited in DNR 1999). Populations have been recorded from north of Townsville to near Mundubbera and as far west as Longreach. The closest known populations occur 50 km and 70 km northwest and 120 km east of the study area.

Round-leaved Myrtle (*Micromyrtus rotundifolia*) has been recorded by the Queensland Herbarium in association with hilly terrain to the northwest of the study area. The mine surface clearance footprint does not contain suitable habitat for this species.

No other NC Act Threatened or Near Threatened flora species were identified during the assessment and no flora species listed under the EPBC Act were identified by either the desktop review or the field surveys.

Although it is not possible to rule out the potential occurrence of any EPBC Act listed flora species (or any NC Act Threatened or Near Threatened flora species in addition to the species detailed above), the likelihood of occurrence of such species within the mine surface clearance footprint is considered to be low.

5.3.4 Regionally Significant Flora Species

Three Regionally Significant flora species were identified by database searches from the wider study area. These include Sandstone Wattle (*Acacia gnidium*) and Broad-leaved Sandstone Myrtle (*Homoranthus thomasii*) listed as significant species within ROTAP (Briggs and Leigh 1995) and Desert Heather (*Calytrix microcoma*) listed as endemic to the Desert Uplands bioregion (EPA 2005). The preferred habitat for each of these species

is sandstone scarps. There is potential for these species to occur in the northwestern corner of the study area but not within or adjacent to the mine surface clearance footprint. No other Regionally Significant species were observed within the Study area during the field survey.

Plate 5. Desiccated Large-podded Tick-trefoil (*Desmodium macrocarpum*) specimen observed in the Bimblebox Nature Refuge

5.3.5 Least Concern Flora Species

A total of 85 Least Concern native flora species were recorded during the field surveys.

5.3.6 Significant Weed Species

The study area is generally dominated by blade ploughed and pulled paddocks that contain a high density (> 95%) of pasture grass (primarily Buffel Grass). This environmental weed is also present in open woodland areas but in lower densities (generally less than 5% cover).

In total eight non-native flora species (see **Table 6**) were identified within the study area including three declared weed species:

- Rubber Vine (*Cryptostegia grandiflora*) is a WONS species and a Class 2 declared weed species previously observed near the centre of the Bimblebox Nature Refuge (WorleyParsons 2009). The species is not widespread or common in the study area.
- Velvet Tree Pear (*Opuntia tomentosa*) is a Class 2 declared weed that occurs as scattered individuals across the study area (and in the majority of the sites surveyed).
- Arsenic Weed (*Senna obtusifolia*) is a Class 2 declared weed that occurs in isolated small patches across the study area.

Table 6. List of Non-native Flora Species Recorded During Field Surveys

Scientific name	Common name
Cryptostegia grandiflora^*	Rubber Vine
*Opuntia tomentosa**	Velvet Tree Pear
*Senna obtusifolia**	Arsenic Weed
Pennisetum ciliare[#]	Buffel Grass
Melinis repens	Natal Grass
Dactyloctenium australe	Durban Grass
Stylosanthes scabra	Shrubby Scabra
Hymenachne amplexicaulis	Olive Hymenachne

* Declared

^ WONS

[#]Pasture grass

5.4 Bush Fire History

Fires have occurred in the Project area both from natural events (i.e. lightning strike) and by anthropogenic events (i.e. hazard reduction burning and as part of land clearing activities). Typically, most natural fires occur from lightning strike during dry electrical storms.

Dangerous bush fire 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 summer;
- Persistent south-west to north-west winds;
- Prolific amounts of fuel that have accumulated over previous heavy and vigorous growing seasons; and
- Spring/summer thunderstorm activity in dry years.

No records of extreme fires exist for the immediate Project area.

5.5 Ignition Sources

Removal of ignition sources is an important component of bushfire management. This is particularly important when subject to severe weather conditions.

External to the site, sources of ignition typically include hazard reduction burning and lightning strikes.

On-site sources include the hot exhausts of vehicles and spark or flame sources such as grinders or welders.

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Other sources of ignition include lightning, the arcing of power lines, and the escape of fire from legal hazard reduction burning. Spontaneous combustion of coal and waste stockpiles is also a risk.

6. BUSH FIRE RISK ASSESSMENT AND MANAGEMENT PROCESS

Bushfires and grassfires are common throughout Australia. Grassfires are fast moving, passing in five to ten seconds and smoldering for minutes. They have a low to medium intensity and primarily damage crops, livestock and farming infrastructure, such as fences. Bushfires are generally slower moving, but have a higher heat output. This means they pass in two to five minutes, but they can smolder for days. Fire in the crown of the tree canopy can move rapidly.

Bushfires are an intrinsic part of Australia's environment. Natural ecosystems have evolved with fire, and the landscape, along with its biological diversity, has been shaped by both historic and recent fires. Many of Australia's native plants are fire prone and very combustible while numerous species depend on fire to regenerate.

Indigenous Australians have long used fire as a land management tool and it continues to be used to clear land for agricultural purposes and to protect properties from intense, uncontrolled fires.

6.1 Factors Affecting Bush Fire Risk and Fire Behaviour

The basic factors which determine whether a bushfire will occur include the presence of fuel, oxygen and an ignition source. More specifically, fire intensity and the speed at which a bushfire spreads will depend on ambient temperature, fuel load, fuel moisture, and wind speed and slope angle.

Typically, the greater the fuel load the hotter and more intense the fire. Fuel that is concentrated with adequate spacing will burn faster than heavily compacted or scattered fuel sources. Smaller pieces of fuel such as twigs, litter and branches burn quickly, particularly when they are dry and loosely arranged. Some types of grasses burn very rapidly, while larger fuels, such as tree trunks, do not burn as easily. The natural oil within Eucalypt trees promotes the combustion of fuel.

Dry fuel will burn quickly, but damp or wet fuel may not burn at all. As a consequence, the time since rainfall and the amount of rain received is an important consideration in assessing bushfire danger. Often a measure of the drought factor, or moisture deficit, will be used as an indicator of extreme bushfire weather conditions.

Wind acts to drive a fire by blowing the flames into fresh fuel, bringing it to ignition point and providing a continuous supply of oxygen. Wind also promotes the rapid spread of fire by spotting, which is the ignition of new fires by burning embers lofted into the air by wind. Spotting can occur up to 30km downwind from the fire front. There is a threshold wind speed of around 12 to 15km/h which makes a significant difference in the behaviour of bushfires in the open. When wind speeds are below this threshold, fires with heavy fuel loads burn slowly. However, even a slight increase in wind speed above this threshold results in a significant increase in fire behaviour and advancement. The width of a fire front also has an influence on the rate of spread and a wind shift can immediately widen the forward edge of a fire.

The higher the temperature the more likely it is that a fire will start or continue to burn. This is because the fuel is closer to its ignition point at high temperatures and pre-heated fuel loads burn faster.

Dry air promotes a greater intensity fire than moist air. Plants become more flammable at a low humidity because they release their moisture more easily.

Fires pre-heat their fuel source through radiation and convection. As a consequence of these heat transfer effects, fires accelerate when travelling uphill and decelerate travelling downhill. The steepness of the slope plays an important role in the rate of fire spread. The speed of a fire front advancing will double with every 10 degree increase in slope so that on a 20 degree slope, its speed of advance is four times greater than on flat ground.

6.2 Bush Fire Risk

Bush fire risk is defined as the chance of a bush fire igniting, spreading and causing damage to assets of value. The three main factors that contribute to bush fire risk are:

- The potential severity of the fire (or bush fire hazard). The bush fire hazard is influenced by the vegetation, slope, and fuel load and weather conditions.
- How close the bush fire hazard is to an asset (or bush fire threat). The further an asset is located from a bush fire hazard, the less likely it is to be damaged or destroyed by the bush fire.
- The capacity of an asset to cope with, and recover from the expected bush fire (or vulnerability).

Different types of assets have different abilities to cope with fire.

The approach for the assessment and management of bush fire risk at the Galilee Coal Project mine site will include:

- The assessment and maintenance of bush fire risk based on site surface factors, such as vegetation condition, sealed areas;
- The assessment and management of materials, machinery and performed tasks on site to prevent ignition sources or the enhancement of a bush fire;
- The reduction of hazards;
- Fire training of company personnel; and
- The reduction of vulnerability to bush fire through the maintenance of Asset Protection Zones.

Bush fire risk assessment will take place via inspections organised by the Environmental Superintendent and where relevant members of the Rural Fire Service. Assessment surveys will be undertaken on a regular basis, or six weeks prior to the bush fire season, and ongoing as required throughout the bush fire season.

Risk assessments will be undertaken in accordance with the BMP and any EA or approval conditions,

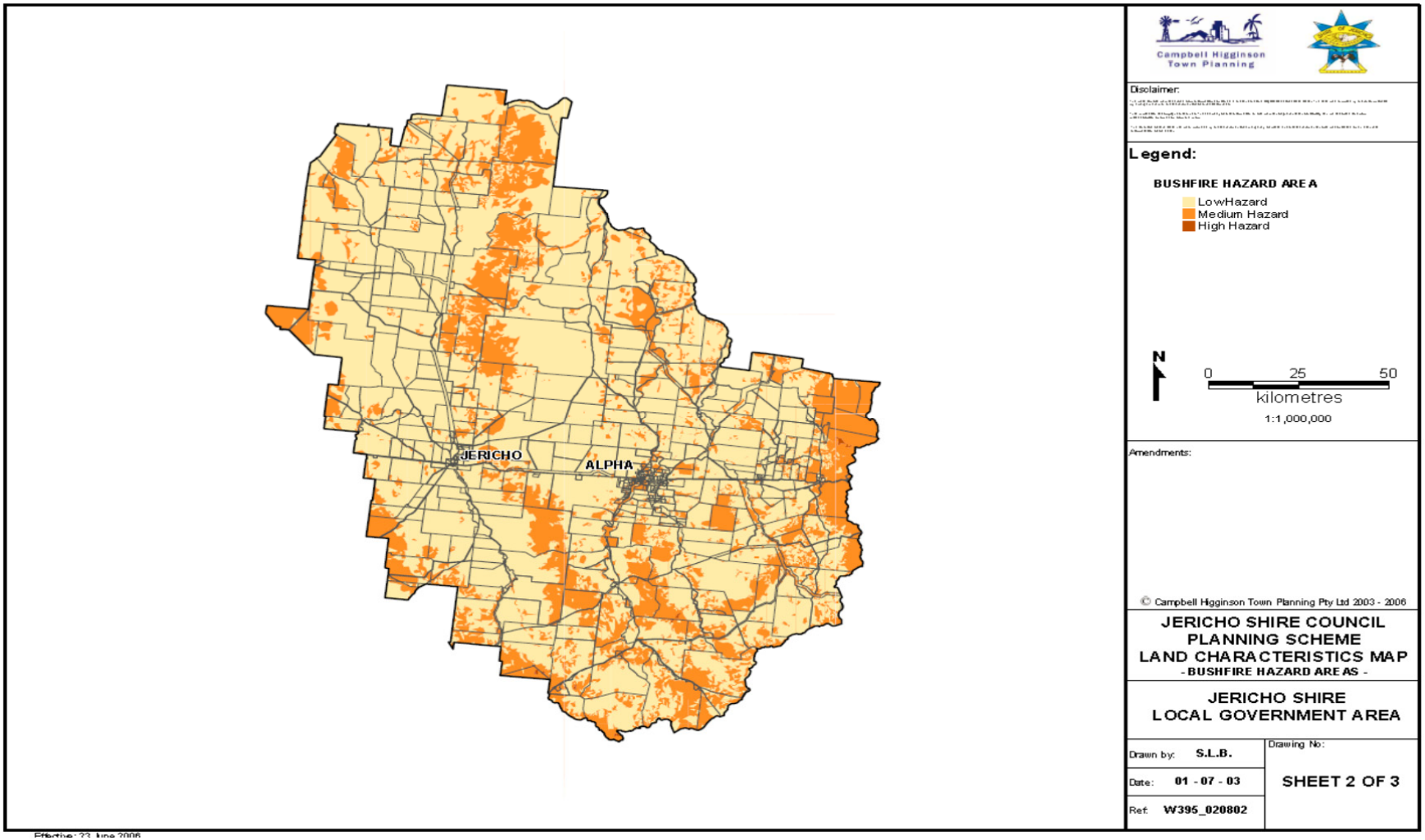
6.3 Preliminary Bushfire Hazard Assessment

The preliminary bushfire hazard severity has been calculated in accordance with Appendix 3 of the State Planning Policy 1/03 (SPP1/03). The methodology involves quantitative and qualitative assessments.

The quantitative element requires an assessment of three key characteristics of land that have been found to be the main determinants of the severity of bushfire hazard. These factors are vegetation communities, slope and aspect and are all discussed in detail below.

The Jericho Shire Council (now Barcaldine Regional Council) Planning Scheme Land Characteristics Map – Bushfire Hazard Areas Overlay (Map Sheet 2 of 3) shows that the mine site has been mapped as being within a low to medium bushfire hazard area (see **Figure 14**).

Figure 14. Jericho Shire Council Planning Scheme Land Characteristics Map – Bushfire Hazard Areas Overlay (Map Sheet 2 of 3)



6.4 Vegetation Communities

The different types of vegetation communities determine the rate at which dry fuel accumulates. Some vegetation communities protect fuel from drying out in all but extreme bushfire seasons and can then be susceptible to very destructive bushfires. Vegetation communities may expose fuels to drying and therefore be frequently available for burning. The characteristics of different vegetation communities are reflected in **Table 7.**

Table 7. Hazard scores and associated fire behaviours for various vegetation communities

Vegetation communities	Fire behavior	Hazard Score
Wet sclerophyll forest, tall eucalypts (>30m), with grass and mixed shrub understory.	Infrequent fires under severe conditions, flame lengths may exceed 40m, floating embers attack structures for one hour, radiant heat and direct flame are destructive for 30 minutes.	10
Paperbark heath and swamps, eucalypt forest with dry-shrub ladder fuels.	Fire intensity depends on fuel accumulation, but can be severe, with flame lengths to 20m, spot fires frequent across firebreaks, radiant heat and direct flame for 15 minutes.	8
Grassy eucalypt and acacia forest, exotic pine plantations, cypress pine forests, wallum heath	Fire intensity may be severe with flame lengths to 20m, but less attack from embers.	6
Native grasslands (ungrazed), open woodlands, canefields	Fast moving fires, available to fire annually to four years. Usually no ember attack, radiant heat for >10m, with a duration of <2 minutes.	5
Intact acacia forests, with light grass to leaf litter, disturbed rainforest.	Fires infrequent, usually burn only under severe conditions, relatively slow fires, usually little ember attack.	4
Orchards, farmlands, kikuyu pastures	Fires very infrequent, slow moving, may be difficult to extinguish, frequent fire breaks.	2
Grazed grasslands, slashed grass	Grazing reduces intensity and rate of spread of fire, with a duration <2 minutes.	2
Desert lands (sparse fuels), mowed grass	Gaps in fuel, usually slow fire spread.	1
Rainforest	Virtually fireproof	0

The extent and distribution of REs on site are generally analogous with current mapping, with inaccuracies limited to refinement of the scale of mapping. Ground-truthed REs and the relevant DEHP Fire Management Guidelines are shown at **Figure 15** and summarised in **Table 8**

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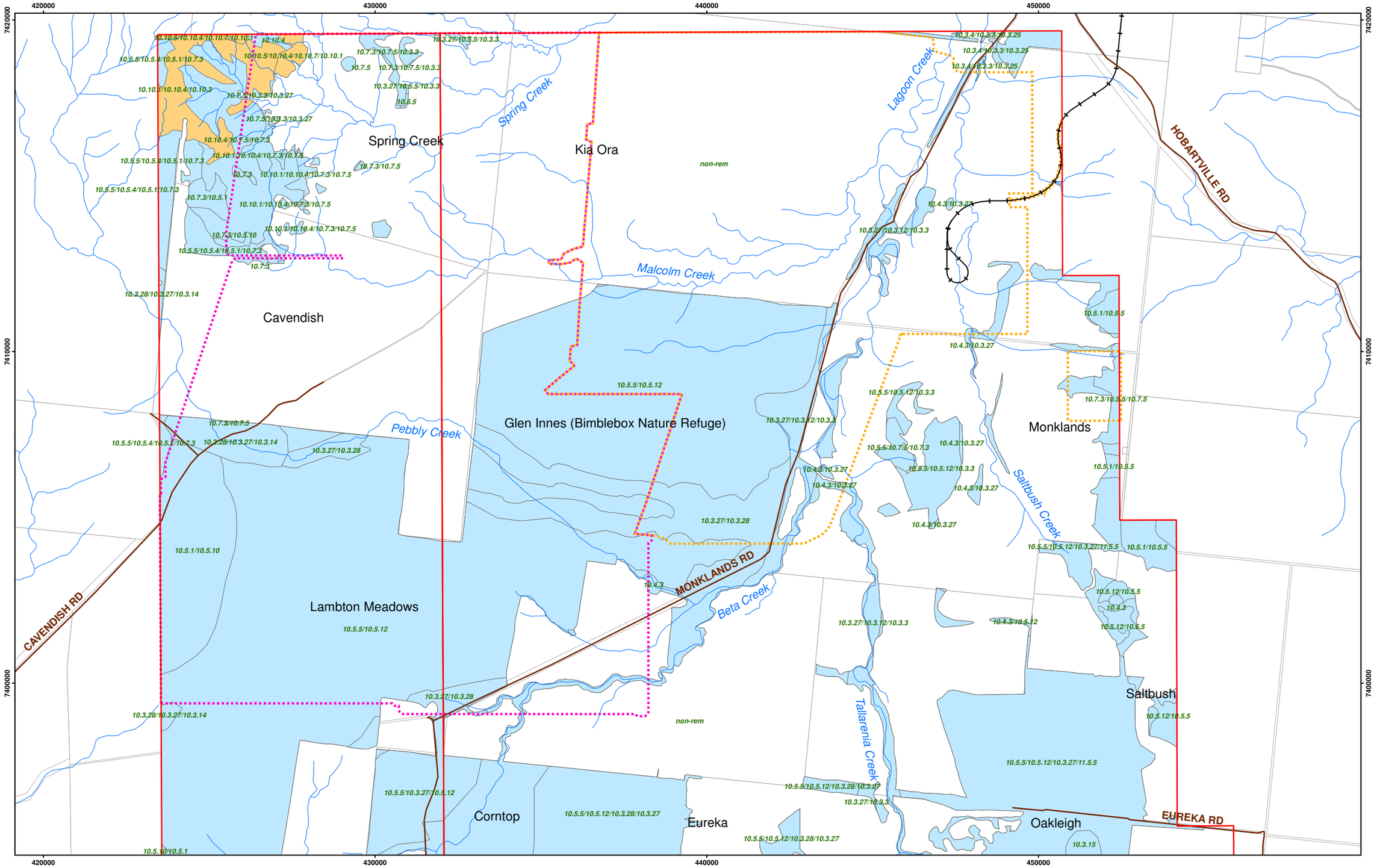

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Source:	Cadastral Boundaries: DERM 2012 Mine Detail, Proposed Railway Line: Waratah Coal Pty. Ltd. 2012 Ownership: Waratah Coal 2012 EPC: State of Queensland (Department of Natural Resources and Mines) 2012 Roads: Geoscience Australia 2012 Watercourses: Vegetation Management Act Queensland Regrowth Other Watercourses Version 2.1 (DERM 2012) VMA Regional Ecosystems v6.1: State of Queensland (Department of Environment and Resource Management) 2011
Disclaimer:	This plan is based on or contains data provided by others. Waratah Coal Pty. Ltd. gives no warranty in relation to the data (including accuracy, reliability, completness, currency or suiability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to and use of the data. Data must not be used for direct marketing or be used in breach of privacy laws.
File:	WAR20-26-SEIS0045a-FIG01a-REM-VEG-BUSHFIRE-120810 Date: 10/08/2012

FIGURE 15:
REGIONAL ECOSYSTEMS (VMA STATUS)

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Table 8. Ground-truthed Regional Ecosystems and the relevant DEHP Fire Management Guidelines

RE code	Community description	SPP1/03	DEHP Fire Management Guideline
10.3.3	*Acacia harpophylla* and / or *Eucalyptus cambageana* low open woodland to open woodland on alluvial plains	6	STRATEGY: Manage surrounding country. ISSUES: This community does not need fire. Hollow trees are critical habitat. Intense and extensive fires will degrade vegetation structure and destroy animal habitats. Restrict extent and intensity of fires. There is typically insufficient fuel where macropods and goats are abundant.
10.3.4	*Acacia cambagei* low open woodland to low woodland on alluvial plains	6	STRATEGY: Protection relies on broad-scale management of surrounding country with numerous small fires throughout the year so that wildfires will be very limited in extent. Protection from fire is necessary. ISSUES: Gidgee is readily killed by fire. Buffel Grass invasion may increase risk from fire. High intensity fires will typically kill the overstorey. Grazing may be an option for reducing fuel loads where exotic grass such as Buffel have invaded.
10.3.12	*Corymbia dallachiana* and *C. plena* or *C. terminalis* open woodland on sandy alluvial terraces (eastern)	6	SEASON: Early dry season when there is good soil moisture, with some later fires in the early storm season or after good spring rains. INTENSITY: Primarily low to moderate, with occasional high intensity fires. INTERVAL: Typically 2 - 7 years, with some areas longer unburnt. STRATEGY: A predominance of early dry season fires is recommended, although there is value in occasional late dry season fires, or storm burns, over small areas. Burning should begin very soon after the wet season, to secure boundaries and adjacent fire-sensitive vegetation. Subsequent repeat ignitions can be used within the same section of land weeks or months after the boundaries have been secured by early burning, to produce a mixture of burnt areas with multiple ignition dates. Use topographical features to ignite areas as soon as they dry out. This will create a mosaic of areas that were burnt at different dates and unburnt sections within the same area of woodland. Burn away from riparian communities, which can be critical habitat for some species. Approximately 25% of the grassy woodlands within a landscape should receive patchy fires in most years. ISSUES: These woodlands have a diverse native grass and herb layer that is maintained and promoted by regular fire. Burning that starts immediately after the wet season, with follow up small fires ignited progressively over multiple dates can increase the availability of grass and herb seed, which is a critical food source for many birds and small mammals.

RE code	Community description	SPP1/03	DEHP Fire Management Guideline
			Recently burnt grass clumps tend to produce more seed than unburnt clumps and the earlier burnt grass usually seeds earlier than later burnt grass. Maintaining a fire mosaic will help ensure protection of habitat and mitigate against wildfires. Low to moderate intensity burns with good soil moisture minimise the risk of losing hollow trees. An occasional late season burn will promote grasses and legumes. Ensure a diverse grass layer; maintain hollow-bearing trees and vegetation structure.
10.3.14	*Eucalyptus camaldulensis* and / or *E. coolabah* open woodland along channels and on floodplains	6	SEASON: Various (wet season or winter). INTENSITY: Low. INTERVAL: Interval will depend on (a) need for burning, (b) seasonal conditions and (c) grazing pressure. Not to be targeted for burning unless in need of protection. STRATEGY: Aim to exclude fire by fuel reduction in adjacent vegetation communities where possible. Undertake partial burns when necessary to reduce fuel loads and protect against severe wildfire. Burn with high soil moisture (i.e., after rain/storms) or in winter when fire is more easily controlled. ISSUES: Rarely burns due to low fuel loads.
10.3.25	*Eremophila mitchellii* low open woodland on alluvial plains	6	SEASON: Primarily early dry season mild conditions. Some storm or late burns can be beneficial for Rubbervine control. INTENSITY: Low to moderate. INTERVAL: 5-10 years. STRATEGY: A predominance of early dry season fires is recommended, although there is value in occasional late dry season fires, or storm burns, over small areas for Rubbervine control. ISSUES: These *Eremophila mitchellii* dominated woodlands with scattered eucalypts are fairly tolerant of low to moderate intensity fires. Rubbervine infestations are common within 11.3.13, with repeated fires valuable for its control.
10.3.27	*Eucalyptus populnea* open woodland on alluvial plains	6	SEASON: Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains. INTENSITY: Moderate. INTERVAL: 3-5 years. STRATEGY: Burn less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. ISSUES: Young Cypress are killed by fire. Planned burns have traditionally been carried out in the winter dry season; further research required.

RE code	Community description	SPP1/03	DEHP Fire Management Guideline
10.3.28	*Eucalyptus melanophloia* or *E. crebra* open woodland on sandy alluvial fans	6	SEASON: Summer to late-autumn. INTENSITY: Low. INTERVAL: 3-6 years. STRATEGY: Aim to burn 40-60% of any given area. Spot ignition in cooler or moister periods encourages mosaics. ISSUES: Control of weeds is a major focus of planned burning in most areas. Maintain ground litter and fallen timber habitats by burning only with sufficient soil moisture. Burning should aim to produce fine scale mosaics of unburnt areas.
10.4.3	*Acacia harpophylla* and / or *Eucalyptus cambageana* open woodland on Cainozoic lake beds	6	STRATEGY: Maintain fire management of surrounding country so that wildfires will be very limited in extent. Frequent fire at the edge of this RE keeps fuel loads low. Protection from fire is necessary. ISSUES: *Casuarina cristata* is fire sensitive, although germination can be good in bare areas. Brigalow is soft-seeded, so germination is not promoted by fire. Buffel Grass invasion will increase risk from fire. High intensity fires will cause damage to overstorey. Grazing may be an option for reducing fuel loads where exotic grass such as Buffel have invaded.
10.5.1	*Eucalyptus similis* and / or *Corymbia brachycarpa* and / or *Corymbia setosa* low open woodland to open woodland on sand plains	6	SEASON: Dry season. INTENSITY: Various. INTERVAL: 1-5 years. STRATEGY: Burn less than 30% in any year. Begin burning early in the fire season, followed by progressive patch fires burnt through the year. ISSUES: Management of this inherently stable, and fire tolerant vegetation type should be based on maintaining animal habitats and preventing extensive wildfire. Maintaining a fire mosaic will ensure protection of animal habitats and mitigate against wildfires.
10.5.5	*Eucalyptus melanophloia* open woodland on sand plains	6	SEASON: Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains. INTENSITY: Low to moderate. INTERVAL: 6-10 years. STRATEGY: Restrict to less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. Sometimes a small amount of wind may move the fire front quickly so that burn intensity is not too severe to destroy habitat trees. ISSUES: Burn interval for conservation purposes will differ from that for grazing purposes; the latter being much shorter. Management of this vegetation type should be based on maintaining vegetation composition, structural diversity, fauna habitats (in particular hollow-bearing trees and logs) and preventing extensive

RE code	Community description	SPP1/03	DEHP Fire Management Guideline
			wildfire. Maintaining a fire mosaic will help ensure protection of habitat and mitigate against wildfires. Fire can control shrub invasives (e.g., *Eremophila* spp. and *A. stenophylla* in the red soil country in particular). Fire will also control Cypress. Low to moderate intensity burns with good soil moisture are necessary to minimise loss of hollow trees. Avoid burning riparian communities as these can be critical habitat for some species. Culturally significant (scar) trees may need protection, such as rake removal of ground fuels. Planned burns have traditionally been carried out in the winter dry season; further research required.
10.5.10	*Corymbia leichhardtii* open woodland on sand plains	6	Nil guidance available
10.5.12	*Eucalyptus populnea* open woodland on sand plains	6	SEASON: Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains. INTENSITY: Moderate. INTERVAL: 3-5 years. STRATEGY: Burn less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. ISSUES: Young Cypress are killed by fire. Planned burns have traditionally been carried out in the winter dry season; further research required.
10.7.3	*Acacia shirleyi* woodland or *A. catenulata* low woodland at margins of plateaus	6	'SEASON: Wet season - early dry season. INTENSITY: Various. INTERVAL: Not more than once every 30 years. ISSUES: Sensitive to high frequency intense fires.
10.7.5	*Eucalyptus thozetiana* open woodland on scarps and on pediments below scarps	6	SEASON: Various (storm season / wet season or winter). INTENSITY: Low - moderate. INTERVAL: Interval will depend on (a) need for burning, (b) seasonal conditions and (c) grazing pressure. Not to be targeted for burning unless in need of protection. STRATEGY: Aim to exclude fire by fuel reduction in adjacent vegetation communities where possible. Undertake partial burns when necessary to reduce Spinifex (and other) fuel loads and protect against severe wildfire. Burn with high soil moisture (i.e., after rain/storms) or in winter to reduce *Triodia* spp. dominance where necessary. ISSUES: To manage the spread of the highly flammable *Triodia* spp., winter and/or wet/storm season fire can be used. Note some Acacias can be fire sensitive (e.g., *A. shirleyi*, *A. aneura*) and may be killed by high intensity fires. NB: Winter burns may

RE code	Community description	SPP1/03	DEHP Fire Management Guideline
			favour shrubs over *Triodia* spp. and thus change the ground layer composition over time. Due to the sparse nature of the Spinifex in these ecosystems, there is rarely enough fuel load to burn.
10.7.7	*Melaleuca* spp. and / or *Acacia leptostachya* shrubland on ferricrete (eastern)	6	SEASON: Various. INTENSITY: Moderate to high. INTERVAL: 8-15 years. STRATEGY: Burn in association with surrounding vegetation. Burn less than 30% in any year. ISSUES: *Acacia leptostachya*, and others, has germination promoted by fires, but seedlings require > 5 years to mature. These Acacias begin to senesce after approximately 10 to 15 years, and associated grasses disappear after around 5 to 10 years. Therefore burning intervals of 8 to 15 years can maintain the species composition and structure of this community. Ensure mature woodland structure persists for many years in between fire events; maintain a diverse grass layer in sections of this ecosystem.
10.10.1	*Acacia shirleyi* woodland or *A. catenulata* low open woodland on sandstone ranges	6	'SEASON: Wet season - early dry season. INTENSITY: Various. INTERVAL: Not more than once every 30 years. ISSUES: Sensitive to high frequency intense fires.
10.10.3	*Eucalyptus* sp. (Caldervale D. Jermyn AQ 582304) open woodland on sandstone ranges	6	Nil guidance available
10.10.4	*Eucalyptus exilipes* and / or *Corymbia leichhardtii* open woodland on sandstone ranges	6	Nil guidance available
10.10.5	*Corymbia trachyphloia* and / or *C. lamprophylla* or *Eucalyptus mediocris* open woodland on sandstone ranges	6	'SEASON: Summer to winter. INTENSITY: Low to moderate. INTERVAL: 4-25 years. STRATEGY: Aim for 40-60% mosaic burn. Burn with soil moisture and with a spot ignition strategy so that a patchwork of burnt/unburnt country is achieved. ISSUES: The very diverse understorey of this RE requires ground truthing or local knowledge before applying the fire guideline. The fire regime should maintain a mosaic of grassy and shrubby understoreys. Control of weeds is a major focus of planned burning in most areas. Careful thought should be given to maintaining ground litter and fallen timber habitats by burning only with sufficient soil moisture. Burning should aim to produce fine scale mosaics of unburnt areas. Variability in season and fire intensity is important,

RE code	Community description	SPP1/03	DEHP Fire Management Guideline
			as well as spot ignition in cooler or moister periods to encourage mosaics.
10.10.7	*Eucalyptus cloeziana* open woodland on sandstone ranges	6	'SEASON: Summer to winter. INTENSITY: Plan for low to moderate. Unplanned occasional high intensity wildfire will occur. INTERVAL: 4-8 years maintains a healthy grassy system. 8-20 years for shrubby elements of understorey. STRATEGY: Aim for 40-60% mosaic burn. Needs disturbance to maintain RE structure (eucalypt overstorey with open understorey of predominantly non-rainforest species). ISSUES: Frequent fire is needed to maintain understorey integrity, keeping more mesic species low in the profile of the understorey so that other species can compete. It is essential that wildfires are not the sole source of fire in this ecosystem. High intensity fires occur periodically through time, however frequent low to moderate intensity fires will create the disturbance required to keep the understorey diverse. A follow-up burn soon after a high intensity wildfire can be considered to reduce germinating mesic species. This 'endangered' RE may contain a high number of rare and threatened plant species which require appropriate fire management.
11.5.5	*Eucalyptus melanophloia, Callitris glaucophylla* woodland on Cainozoic sand plains / remnant surfaces. Deep red sands	6	'SEASON: Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains. INTENSITY: Moderate. b: Low to moderate. INTERVAL: 3-5 years. b: 6-10 years. STRATEGY: Burn less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. b: Burn less than 10-30% in any year to achieve a mosaic. Burn under conditions of good soil moisture and when plants are actively growing. Protection relies on broad-scale management of surrounding country with numerous small fires throughout the year so that wildfires will be very limited in extent. ISSUES: Young Cypress are killed by fire. Planned burns have traditionally been carried out in the winter dry season; further research required. b: Cypress is killed by fire and regenerates from canopy stored seed (obligate seeder). It reaches reproductive age at about 6 years. Fire frequency less than 6-8 years will reduce cypress, but long fire interval will lead to cypress dominance and eucalypt suppression. Fuel reduction burns will help restrict incursions by high intensity wildfires that kill cypress. Fire after good spring rain has the potential to burn severely if there is no follow-up rain and re-lights

RE code	Community description	SPP1/03	DEHP Fire Management Guideline
			occur.

Note: No Fire Management Guidelines have been prepared for the Dessert Uplands Bioregion (i.e. RE 10.). For all RE 10 codes the DEHP Fire Management Guideline database was reviewed and where possible an appropriate surrogate Guideline was included in the above Table. These Guidelines are included as a preliminary guide and further detail assessment will be undertaken as part of preparing the final BMP.

6.5 Slope

Studies have shown that fires burn more quickly and with greater intensity up slopes, generally doubling every 10 degrees of slope. Also, the steeper the slope the more difficult it is to construct ring roads, firebreaks and provide access for emergency crews. Trees situated downhill from structures will have their crowns close to the structures. This presents bushfire hazards particularly for exposed structures such as timber decks. The SPP1/03 hazard scores for different categories of slope are shown in **Table 9**.

Table 9. SPP hazard scores for slope

Slope	Hazard Score
Gorges and mountains (>30%)	5
Steep Hills (>20% to 30%)	4
Rolling Hills (>10% to 20%)	3
Undulating (>5% to 10%)	2
Plain (0% to 5%)	1

For site-specific assessment of bushfire hazard, if the site is downhill from the hazard, the slope effect may be taken as zero as the fire intensity will be less. However, burning heavy fuels may roll downhill and trees may fall down, so recommended setbacks from the hazard still need to be observed.

The topographic assessment conducted for the Environmental Impact Statement indicated that the study area is comprised of level to undulating with the majority of the fire hazards area to the west and southwest of the site consists of rolling (>10% to 20%) to undulating (>5% to 10%) hills.

The Galilee Coal Project mine and rail loading infrastructure has been sited in the north east corner of the Project area. This area consists largely of plains and undulating hills and as such the hazard score for the area and infrastructure is very low. The location in the north east corner also provides a significant buffer for the infrastructure should a fire occur to the west where the landscape is a combination of undulating to rolling hills. Moreover the cleared area in the north east mitigates the risks associated with the dry westerly winds usually associated with extreme fire weather in the project area.

6.6 Aspect

Aspect affects bushfire hazard due to the effects that exposure to direct sunlight has on different vegetation communities, including the drying rates of fuels. Aspect also correlates closely with exposure to low humidity winds that increase bushfire intensity. In extremely broken country where there is a variety of aspects, the predominant aspect should be used.

As aspect has only a minor influence on flatter land, aspect is not considered to be significant on land with a slope less than 5%. **Table 10** shows the hazard score for aspect.

Table 10. SPP hazard scores for aspect

Aspect	Hazard score
North to North-West	3.5
North-West to West	3
West to south	2
North to East	1
East to south	0

The construction of the Galilee Coal Project mine will be on level to undulating land which will have, for the purposes of this report, no aspect. No infrastructure is proposed in the area of greatest slope in the far western sections of the Project area.

6.7 Interim Hazard Rating

Combining scores to identify the severity of bushfire hazard the scores for the individual factors determined for vegetation communities, slope and aspect are added together to give a total for each sub-unit. Total hazard score = vegetation community hazard score + slope hazard score + aspect hazard score. The total hazard score determines the severity of bushfire hazard for each sub-unit as set out in **Table 11**.

Table 11. Total Hazard Score

Total hazard score	Bushfire hazard
13 or greater	High
6 - 12.5	Medium
1 – 5.5	Low

The bushfire hazard for the Galilee Coal Project area were vertical fuels are located has been assessed as 'medium' when applying the process outlined in the SPP1/03 guideline. However, the greater proportion of the area where infrastructure will be located has already been cleared of vertical fuels and therefore the bushfire should be considered as 'low'. The hazard score varies from 'low' in the areas already cleared of vertical fuels to 'medium' on the eucalypt dominated undulating sections of the site. No areas were identified as having a 'high' bushfire ranking.

The SPP1/03 guideline states that any land within 50 m of an area identified as having a 'medium' bushfire severity classification will be included in the 'medium' bushfire hazard area.

6.8 Site Specific Factors

Site specific factors have a significant influence on the bushfire risk potential and no two properties can be treated the same. The following site specific factors will need to be considered when conducting a bushfire hazard assessment:

- Hazardous materials manufactured or stored in bulk increase the potential for detrimental impacts of bushfire on public safety and the environment. Activities within the mine area will involve hazardous materials. The SPP1/03 defines "hazardous materials stored in bulk" as materials defined in the *Dangerous Goods Safety Management Act 2001* (except that radioactive

substances and infectious substances are excluded for the purposes of this SPP) in quantities that:

- Would be equivalent to or exceed the minimum quantities set out to determine a Large Dangerous Goods Location in the Dangerous Goods Safety Management Regulation; or
- Would require a licence for a magazine for the storage of an explosive under the Explosives Regulation 1955.

- It is likely that if a severe bushfire event was to threaten the coal mine the fire front would come from a west to southwesterly direction:
  - The mine infrastructure is located in the north eastern section of the Project area on land that has already been extensively cleared, or will be cleared during the construction of the mine therefore it is unlikely for a bushfire to approach the north to north east.

7. Mitigation and Management

No single risk management option is likely to provide sufficient protection from bush fires. This is particularly true for extreme conditions or areas of major risk. However, the following options can be used in combination to manage bush fire potential:

- Avoid the risk – by deciding not to proceed with the activity likely to generate the bush fire risk;
- Reduce the hazard – reduce the level of fuel available to burn in a bush fire;
- Reduce ignitions – reduce the number of deliberate and accidental ignitions;
- Reduce vulnerability – increase the resilience of community and environmental assets to bush fires; and
- Residual risk – manage with fire response strategies such as fire suppression operations, early fire detection and evacuation.

The following sections discuss indicative risk reduction measures that will be further developed as part of preparing the BMP for the site.

7.1 Fire Breaks

It is recommended in SPP1/03 that firebreaks be provided by a perimeter road that separates Lots from areas of bushfire hazard and that the road has:

- A minimum cleared width of 20 m; and
- A constructed road width and weather standard complying with local government standards.

Due to the nature of the mine and the bulk hazardous materials on-site it is proposed that a firebreak be provided. The firebreak will:

- be monitored during regular inspections, with remedial and maintenance work carried out when required;
- Fire trails will be locked when not in use to prevent unauthorised entry. Fire Trails will be maintained to a standard for Category 1 Fire Tanker access where possible;
- Separate the mine infrastructure area and vital infrastructure from areas of bushfire hazard to the north, west and south by a minimum 50 m clearing width;
- Contain no vegetation other than maintained / slashed grasses;
- Contain a perimeter road / fire maintenance trail so that fire patrols can be conducted and the road can be utilised for firefighting and allow burning of sections and access for bushfire response. The road will:
    - Be constructed to road width and weather standard complying with local government standards;
    - Have a maximum gradient of 12.5%;
    - Have a formed width and gradient and erosion control devices that comply with local government standards;

- Have vehicular turnarounds at each end; and
- Have vehicular access at each end or where vehicular access is not practicable an appropriate evacuation procedure and mustering points at the north-eastern and southeastern edges of the firebreak.

7.2 Building Construction

The Australian Standard for Construction of Buildings in a Bushfire Prone Area is AS3959-2009. Accommodation buildings within the mine area will likely be built in accordance with recommendations for buildings in high severity bushfire hazard areas and constructed to Level 1 requirements of the standard. Where practical all temporary and construction buildings will be constructed to this standard as well.

7.3 Firefighting Equipment

In addition to the firefighting equipment requirements for the buildings on site, the state planning policy requires that, for uses involving new or existing buildings with a gross floor area greater than 50m^2, it is a requirement that each Lot has:

- A reliable reticulated water supply that has sufficient flow and pressure characteristics for firefighting purposes at all times (minimum pressure and flow is 10 L a second at 200 kPa); and
- An on-site water storage of not less than 5,000 L (e.g. accessible dam or tank with fire brigade tank fittings).

Various clean and dirty water dams will be developed during construction activities. The water stored in this pond will be utilised for on-site water storage when needed for a severe bushfire event.

7.4 Fire Detection and Warning

Portable fire extinguishers will be used as protection during 'hot work' such as welding, grinding, cutting, heating or other heat or spark producing operations throughout the site. As construction progresses and systems are commissioned within specific buildings, personnel will be informed of the different alarm sounds.

Office accommodation will be protected by the use of hard-wired smoke detection devices with battery backup. A means of raising the alarm in the event of a fire or other emergency at the site will be established at the commencement of construction activities. The alarm system will be appropriate to ensure all personnel can be notified immediately of any emergency situation and evacuation, or other actions required. The alarm system will be tested on a regular basis.

Australian standards that may be relevant to the project include:

- AS1670-2004 - Fire detection, warning, control and intercom systems – System design, installation and commissioning. This Standard sets out requirements for the design, installation and commissioning of fire detection and alarm systems comprising components complying with the requirements of the appropriate product Standards; and
- AS4428 -1997 – Fire detection, warning, control and intercom systems – Control and indicating equipment. This Standard specifies the common requirements and the performance criteria for control and indicating equipment (CIE) used in fire detection, warning, control and intercom systems.

7.5 Evacuation

A detailed evacuation plan will be developed as part of the China First Project HSEC system prior to the commencement of construction. The Mine Manager or delegate will be responsible for the implementation of this plan. Once construction is complete an operation evacuation plan will be established and the evacuation of the facility will be part of the site induction to be completed by all personnel prior to visiting the site. The evacuation plan will include an evacuation procedure and the construction requirements. Recommendations for the site evacuation include:

- Adequate provision of escape routes to be maintained from all permanent facilities at all times;
- Escape routes and muster areas shall be clearly displayed in all site facilities;
- Doors maintained as fire exits shall be marked as such and will open outwards; and
- All escape routes will be clearly marked and signposted and inspected weekly to ensure these are clear from any obstructions.

7.6 Fire Drills

Waratah Coal will appoint a Fire Safety Co-ordinator who will be responsible for ensuring that drills are carried-out each month and ensuring that all personnel are familiar with the evacuation procedure and the respective muster points.

Simulated fires shall be carried out to ensure the readiness and competency of the Fire Safety Coordinator and emergency officers to fight a major fire. During the drill, equipment shall be tested. In the event any equipment failure it will be immediately repaired or replaced.

Review of fire safety Co-ordinator/brigade competency shall be determined during the drills. Site based brigade members shall be retrained if any evidence of incompetency exists.

8. Management System

8.1 Reporting

The provisions described in this BMP will be audited regularly as part of the China First EMS.

The BMP will be reviewed at regular intervals in accordance with the audit results and updated as required to take into account new information, guidelines and the requirements of external agencies and internal company requirements.

Bushfire management activities undertaken will be reported in the annual Environmental Management Report likely to be required as part of Environmental Authority and / or Coordinator-General conditions.

Bushfire management activities undertaken will if required be reported in the Rural Fire Service hazard management system.

8.2 Record Keeping

Reports containing information relating to monitoring, inspections and observations, correspondence, notification and approvals, records of communication with statutory authorities and other bodies, audit reports and reviews shall be maintained for a period as prescribed in the Project conditions. If no timeframe is specified records shall be retained for a minimum of five years.

8.3 Document Control

The BMP will be controlled in accordance with the Mine's Document management System.

Modifications to the BMP may occur as a result of the auditing and review process, the assessment and implementation of a corrective action or as a result of system improvements or modifications.

8.4 Related Management Documents

The following management documents will be prepared as part operation of the mine and are related documents to the BMP:

- Fire and Explosion Major Hazard Management Plan - identifies the fire hazards, resources, procedures, equipment and inspections, required to maintain a system for fire prevention and fire fighting capability;
- Emergency Fire Provisions - describes the facilities in place at the mine to allow for adequate fire fighting ability;
- Emergency Management System - defines a standard set of procedures and responses to ensure the effective management of any incident, threat, injury or emergency arising

from any source at the mine where the relevant Management Plan has been ineffective in controlling the fundamental hazard;

- Emergency Response Plan - defines the actions that are to be taken in response to a fire or other emergency by persons at the mine;
- Smoke Underground During Bushfires - defines gas monitoring and evacuation procedures to be established in the event of smoke from bushfires entering the underground workings;
- Evacuation in Event of Fire - covers the emergency evacuation of personnel from the underground areas of the mine in the event of an outbreak of fire;
- Surface Evacuation - provides a procedure for evacuation of the surface area of the mine in an emergency;
- Loss of Pressure or Quantity of Water to the Fire Fighting Supply System – ensures the safety of the persons who are underground when the water supply to underground is interrupted, or becomes ineffective; and
- In the event of an emergency at the site, the Emergency Contacts should be used, but contacting 000 in the first instance in the case of a fire emergency is imperative.

9. Conclusion

The Bushfire Risk Assessment was conducted for the China First coal mine project. This assessment was completed following the methodology set out in State Planning Policy 1/03, Mitigating the Adverse Impacts of Flood, Bushfire and Landslide. The assessment included traversing the subject property as well as reviewing available information sources such as planning scheme maps, topographic maps and aerial photography. .

A review of the Jericho Shire Council (now Barcaldine Regional Council) Planning Scheme Land Characteristics Map – Bushfire Hazard Areas Overlay (Map Sheet 2 of 3) shows that the China First Project area has been mapped as a 'low' to 'medium' bushfire hazard area. This was generally confirmed by detailed field assessment at the site.

The overall hazard for the China First site and surrounding areas is predominately ranked as 'low' to 'medium'.

The mine infrastructure is generally located on lands already cleared for cattle grazing operations in the north eastern section of the project area and it is therefore unlikely for a bushfire to significantly threaten the mine infrastructure and workers. The site rages between plains to undulating hill and therefore has a low slope hazard. Similarly the site has a easterly aspect and thereby a low hazard ranking.

The results of this preliminary bushfire hazard assessment and the indicative management framework will be incorporated into the final BMP that will be developed during the final detailed design stage and prior to the commencement of construction activities.

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