

# Bushfire Management Plan



## Appendix 4

# Draft Bushfire Management Plan

For



**Tellus Holdings Ltd**

Chandler Project

**Prepared by: Low Ecological Service**

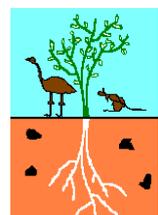
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Low Ecological Services P/L

PO Box 3130, Alice Springs, NT 0871

Ph: (08) 89 555 222 Fax: (08) 89 555 722

Email: [lowecol@lowecol.com.au](mailto:lowecol@lowecol.com.au)



**Frontispiece:** Top: rocky hill overlooking the sandplain at the Chandler Facility Site, Bottom (left to right): *Crotalaria eremaea* (bluebush pea), *Varanus gouldii* (sand goanna) and *Solanum ellipticum* (bush tomato).

## DISCLAIMER

This document has been prepared by Low Ecological Services Pty Ltd. (LES) for Tellus Holdings Pty. Ltd. in accordance with an agreement with Tellus Holdings Pty. Ltd. LES has prepared this document using the skill and care expected from professional scientists to provide factual and technical information and reasonable solutions to identified risks. It does not constitute legal advice.

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<b>Authors:</b>	Jeremy Snowdon-James and Katie Degnian
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## DOCUMENT CONTROL

Approvals	Name	Signature	Date
Originator:	Low Ecological Services		
Reviewer:	Tellus Holdings Ltd	×	
Administrator:	Tellus Holdings Ltd	×	
Approver:	Dep't of Mines and Energy	×	
Custodian:	Tellus Holdings Ltd	×	

## PREFACE

This preliminary document will remain a working document until it is finalised as an operational document and can be used as such by operators in the field.

The final version will incorporate any comments or recommendations resulting from any government approval processes; it is not anticipated that any major changes to the document will be required.

All information on proposed operations contained in this document has been supplied by Tellus.

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## EXECUTIVE SUMMARY

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This draft Bushfire Management Plan (BFMP) has been developed to identify potential bushfire hazards and risks at the Proposal and provide mitigation measures and implementation strategies to reduce these risks. For determination of high bushfire risk areas at the Proposal the following environmental factors have been considered:

- Climate:
  - Rainfall;
  - Wind;
  - Humidity; and
  - Temperature.
- Topography
- Vegetation type and density.

From desktop GIS mapping analysis and on-ground truthing a bushfire risk map was created. This map rates the environmental risk for bushfires into three risk categories:

1. Low – Moderate;
2. Low; and
3. Very Low.

The vegetation and land systems present at the Proposal area have a low overall fire risk. Only following periods of productive growing conditions (rainfall and warm weather) will grass and shrub density increase the fire risk above these levels. In most cases a hot windy fire will be needed to create a bushfire of significant spread and intensity to cause potential damage to human life, infrastructure or the environment.

Fire scar mapping from the North Australian Fire Information website (North Australia Fire Information, 2016) indicated records of one fire affecting the Proposal area in the last 16 years. This fire occurred in the late dry season of 2011, which followed two years of above average rainfall (Australian Government, 2016). This gives an approximate fire frequency at the Proposal area of 1 in 15 years, and emphasises that the highest risk of bushfires will be following prolonged favourable vegetation growing conditions.

The one Low – Moderate fire risk area is in the Finke land system, this is due to the presence of buffel grass along the Finke River system. It is important to note that most the Finke River will have a Low fire risk, with only patches dominated by buffel grass having a Low - Moderate fire risk.

This bushfire risk map will be updated annually and reflect:

- Any incidents or bushfires in the year previous;
- Results of bushfire fuel load assessments;
- Infrastructure changes or new locations of potential ignition sources;
- Indication of any new fire breaks; and
- Any back or patch burning activities conducted.

This map will be used to effectively apply the mitigation measures proposed to reduce the identified bushfire risks for the Proposal. The key mitigation measures proposed by this draft BFMP are:

- Implement and update a bushfire risk map annually;
- Conduct annual bushfire fuel load assessments following the method prescribed in this BFMP;
- Consult with surrounding pastoralist, land managers, traditional owners and the Central Land Council to plan back and/or patch burning activities;
- Conduct back and/or patch burning based on stakeholder consultation and results of bushfire fuel load assessment;
- Develop and maintain fire breaks of at least 4 m width (*Bushfires Act*) around all infrastructure and facilities; and
- Keep up to date with the latest fire ban, climatic conditions or bushfires warnings from internet and government sources as provided in this BFMP.

Bushfire risk areas are determined in relation to the Proposal based on vegetation type and land systems. This draft bushfire management plan provides mitigation measures and control actions applicable across the whole of the Proposal site. Due to the changing environment and climatic conditions this draft BFMP will continually be reviewed and updated based on the most up to date and current survey information and bushfire risk assessment data.

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## 1. INTRODUCTION

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### 1.1. Overview

Tellus Holdings Limited (Tellus) has requested Low Ecological Services (LES) to prepare this Bushfire Management Plan (BFMP) as a standalone document to accompany the Environmental Impact Statement (EIS) for the proposed Chandler Facility (the Proposal).

The Proposal is located approximately 120 km south of Alice Springs in the Northern Territory (NT). The Proposal involves the construction and operation of the following:

- A private access road from the Stuart Highway (Henbury Access Road) to the proposed Apirnta Facility;
- Private rail siding and temporary storage and transfer facility named the Apirnta Facility, adjacent to the Central Australian Railway;
- Private haul road (Chandler Haul Road) from the Apirnta Facility to the Chandler Facility; and
- A salt mine and dual business storage and isolation facility named the Chandler Facility.

This BFMP for the Proposal has been developed using best practise guidelines and knowledge from arid land ecology specialists with extensive experience in the Proposal area, and surveys with Aboriginal Traditional Owners (TOs), pastoralists, land managers and the Central Land Council (CLC).

The BFMP consists of:

- A description of the local environment and climatic conditions;
- A bushfire risk assessment within the Proposal area;
- Mitigation and preventative measures to reduce bushfire risks;
- Delegation of roles and responsibilities;
- Key activities in response to bushfires;
- A plan for the continual monitoring and assessment of bushfire fuel load;
- Necessary distances for strategic fire breaks;
- Maintenance procedures for peripheral and strategic fire breaks;
- A plan for strategic fuel reduction burns in collaboration with TOs, pastoralists, land managers and the CLC; and
- A commitment for the continual review and improvement of this BFMP.

### 1.2. Objective

The objective of the BFMP is to manage and minimise key bushfire risks to (in order of importance):

- Protect human life;
- Protect assets to maintain capability before, during and after the passage of destructive bushfires;
- Minimise the environmental impact of bushfires, particularly impacts on biodiversity and species listed as threatened under the *Environmental Protection and Biodiversity Conservation* (EPBC) Act and *Territory Parks and Wildlife Conservation* (TPWC) Act;

- Provide for bushfire prevention and mitigation that is environmentally sustainable and cost effective, including co-operating with surrounding pastoral property management, TOs and the CLC; and
- Manage bushfire control and patch/back burning preventative programs as appropriate and necessary for the Proposal.

### 1.3. Scope

The scope of this draft BFMP is limited to bushfires associated with and/or impacting on the construction, operation, decommissioning and rehabilitation activities at the Proposal, including but not limited to the following facilities:

- The proposed Henbury Access Road from the Stuart Highway to the Apirnta Facility (approximately 60 km);
- The proposed Apirnta Facility;
- The proposed Chandler Haul Road from the Apirnta Facility to the proposed Chandler Facility (approximately 30 km); and
- The Chandler Facility:
  - Key underground infrastructure including: underground rock salt mine (with complementary storage business); mine access decline; and ventilation shafts. Products that would be stored include equipment, archives and waste materials (including hazardous and intractable waste).
  - Key aboveground infrastructure including: salt processing facilities; waste unloading area; waste storage warehouse; surface hydraulic backfill plant and underground reticulation; salt and overburden stockpiles; maintenance buildings; administration buildings; worker accommodation; solar/diesel hybrid power plant; clean and raw water dams; water and sewage treatment; fuel storage facility; utility reticulation; and possible technology recovery park.

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## 2. LEGISLATION AND OTHER REGULATORY REQUIREMENTS

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The key legislation and regulatory requirements applicable to the draft BFMP are:

- *Bushfires Act* 2014;
- Bushfire Regulations 2014;
- *Fire and Emergency Act* 2015; and
- Fire and Emergency Regulations 2011.

The *Bushfires Act* defines the legal responsibilities and requirements in relation to bushfires in the NT. The essential requirement of the *Act* is that bushfire control is the responsibility of the landholder.

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## 3. FIRE INFORMATION AND ENVIRONMENTAL FACTORS

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### 3.1. Fire Triangle

Fires require three elements to exist – fuel, oxygen and heat. Control or extinguishing fires is achieved by controlling or removing one or more of these elements.

#### 3.1.1. Fuel

Fuel is classified as any combustible material; it is characterised by its:

- Type - Some sources are more flammable than others;
- Moisture content - Higher moisture content is less likely to burn;
- Size – Larger fuel particles, i.e. large logs, take longer to burn than smaller fuel particles, i.e. grasses;
- Quantity – Large quantities can produce more heat leading to higher intensity fires; and
- Arrangement – The distribution of fuel loads impacts the spread and intensity of fires, closely packed can limit oxygen but widely spaced may reduce connectivity.

#### 3.1.2. Oxygen

Fire generally requires 16% oxygen to burn with air typically containing approximately 21% oxygen. Oxygen is required to support the chemical process of combustion which in turn produces heat, gasses and by-products like ash and smoke. An increase in oxygen will increase the intensity of the burn and aid in complete combustion.

#### 3.1.3. Heat

Heat is defined as the initial energy source required to start a fire. Heat energy will initially remove the moisture content or other volatile components of the fuel source; this is why higher moisture content can reduce the available bushfire fuel load. Heat is required to maintain a fire and effectively transmit it to the next source. Once a fire is burning it can effectively heat the next fuel source through three main transfer pathways:

- Convection – Transfer of heat through air displacement, hot air rising carries heat away with cooler oxygen replaced at the base of the fire. This can lead to spot fires, as embers can be transported up and away by wind.
- Conduction – Transfer of heat through physical objects from areas of higher temperature to lower temperature.
- Radiation – Transfer of heat outside of any physical interaction, e.g. heat from the sun. It works by transferring heat through thermal radiation of particles; it requires no mass transfer or medium.

### 3.2. Fire Danger Ratings

The Fire Danger Rating is a standardised scale of fire danger likely to be experienced; it is derived from information provided to the fire authorities by the Bureau of Meteorology (BOM). The level is calculated by combining variables that will have an impact on the danger of a fire should it occur and the difficulty in putting it out. Table 3-1 explains each rating and the actions to be taken.

**Table 3-1: Fire danger ratings from the Northern Territory fire and rescue service**

Fire Danger Rating	Fire Danger Index	Fire Behaviour and Impact potential	Recommended Action
Catastrophic	100+	<p>Fire will threaten without warning. It will be difficult to see, hear and breathe.</p> <p>Fires may be uncontrollable and fast moving. A significant amount of burning embers will be blown around and spot fires will start, often many kilometres ahead of the main fire.</p> <p>There is a strong likelihood that people unprepared may suffer serious, if not life threatening injury. Property in the path of the fire is likely to be destroyed. Even well prepared homes may not survive as house building standards do not require a dwelling to be constructed to withstand fire in excess of a fire danger index of 100, and many will be ignited by spot fires caused by burning embers.</p> <p>Expect wide scale power, telephone and water supply failure.</p> <p><b>Do not expect a fire truck or firefighters to attend.</b></p>	<p><b>Ensure that your survival is the first priority in implementing your Bushfire Survival Plan in these conditions.</b></p> <p>For maximum probability of survival, leaving early in the day of catastrophic conditions is the best option.</p> <p>It will not be safe to stay and defend even the best prepared property.</p> <p>Stay well informed of the current fire situation throughout a day of catastrophic fire danger by remaining tuned to local media on a battery powered radio.</p>

Fire Danger Rating	Fire Danger Index	Fire Behaviour and Impact potential	Recommended Action
Extreme	75-99	<p>Fire will threaten suddenly and it will be hot, windy and difficult to see, hear and breathe.</p> <p>Fires will be very difficult to control and fast moving. Burning embers will be blown around and start spot fires.</p> <p>There is a potential for property in the path of the fire, or impacted by ember attack to be lost, and people may suffer serious if not life threatening injury.</p> <p>Only very well prepared homes will be likely to offer any degree of safety.</p> <p>Expect power, telephone and water supply failure.</p> <p><b>Do not expect a fire truck or firefighters to attend.</b></p>	<p><b>Ensure that your survival is the first priority in implementing your Bushfire Survival Plan in these conditions.</b></p> <p>For maximum probability of survival, leaving early on a day of Extreme fire danger is the best option.</p> <p>If your Bushfire Survival Plan includes the decision to stay and defend, only do so if your home is prepared to the highest level and constructed to withstand bushfire, and you are physically able to do so.</p> <p>Stay well informed of the current fire situation throughout a day of catastrophic fire danger by remaining tuned to local media on a battery powered radio.</p>
Severe	50-74	<p>Fires can be difficult to control and will burn unpredictably. Embers will be blown around and it will be uncomfortable and dangerous to be out in the open.</p> <p>There is a potential for property in the path of the fire, or impacted by ember attack to be lost, and people may suffer serious if not life threatening injury.</p> <p>Only very well prepared homes and substantial, solid construction buildings will be likely to offer any degree of safety.</p> <p>Expect localised power, telephone and water supply failure.</p> <p><b>Do not expect a fire truck or firefighters to attend.</b></p>	<p>Ensure that your survival is the first priority in implementing your Bushfire Survival Plan in these conditions.</p> <p>For maximum probability of survival, leaving early is the best option.</p> <p>If your Bushfire Survival Plan includes the decision to stay and defend, only do so if your home is well prepared and constructed to withstand bushfire and you are physically able to do so.</p> <p>Stay well informed of the current fire situation throughout a day of Extreme fire danger by remaining tuned to local media on a battery powered radio.</p>
Very High	25-49	<p>Fires can be difficult to control. Embers may be blown around.</p> <p>Loss of property and injury is less likely, but significant damage could occur.</p> <p>Well prepared homes and substantial buildings can offer safe shelter.</p> <p>Some local infrastructure may be temporarily</p>	<p>Implement your Bushfire Survival Plan. Leaving early is the best option.</p> <p>If your Bushfire Survival Plan includes the decision to stay and defend, only do so if your home is well prepared and</p>

Fire Danger Rating	Fire Danger Index	Fire Behaviour and Impact potential	Recommended Action
		unavailable.	constructed to withstand bushfire and you are physically able to do so. Stay well informed of the current fire situation Very High fire danger by remaining tuned to local media on a battery powered radio.
High	12-24	Fire can be controlled. Loss of property is unlikely but damage may occur. Well prepared homes and substantial buildings can offer safe shelter.	Stay well informed of the current fire situation throughout a day of High fire danger by remaining tuned to local media. Know how to get further information if required.
Low - Mod	0-11	Fire can be easily controlled. Little risk to life and property.	Stay well informed of the current fire situation throughout a day of Low-Moderate fire danger by remaining tuned to local media. Know how to get further information if required.

### 3.3. Fire Forecast and Updates

Fire tracking is an important part of the BFMP and effective risk mitigation. There are several internet based systems that provide details on tracking, forecasts, information on emergency notices and current weather conditions. Table 3-2 shows several internet-based sites that will be used to monitor bushfires for the Proposal.

**Table 3-2: Fire tracking and warning internet sites**

System	Website	Information	Monitoring
Bureau of Meteorology – Fire Forecast Map	<a href="http://www.bom.gov.au/nt/forecasts/fire-map.shtml">http://www.bom.gov.au/nt/forecasts/fire-map.shtml</a>	Fire forecast for the region on a daily basis.	As required
Bushfires NT – Alerts and Warnings Central Australia	<a href="https://nt.gov.au/emergency/cyclones/current-bushfire-alerts-and-warnings">https://nt.gov.au/emergency/cyclones/current-bushfire-alerts-and-warnings</a>	Department of Environment and Natural Resources NT summary of bushfire alerts and warnings.	
ABC Website – Summary of Alerts and Warnings	<a href="http://www.abc.net.au/news/emergency/state/nt/">http://www.abc.net.au/news/emergency/state/nt/</a>	Official warnings will be issued through the ABC as and when released.	
North Australia Fire Information –	<a href="http://www.firenorth.org.au/nafi3/">http://www.firenorth.org.au/nafi3/</a>	Mapping of hotspots and fire scars in the area.	

System	Website	Information	Monitoring
Bushfire Map			
Secure NT – Bushfire Map	<a href="http://www.securent.nt.gov.au/">http://www.securent.nt.gov.au/</a>	Bushfire tracking map.	

### 3.4. Climatic Contributions

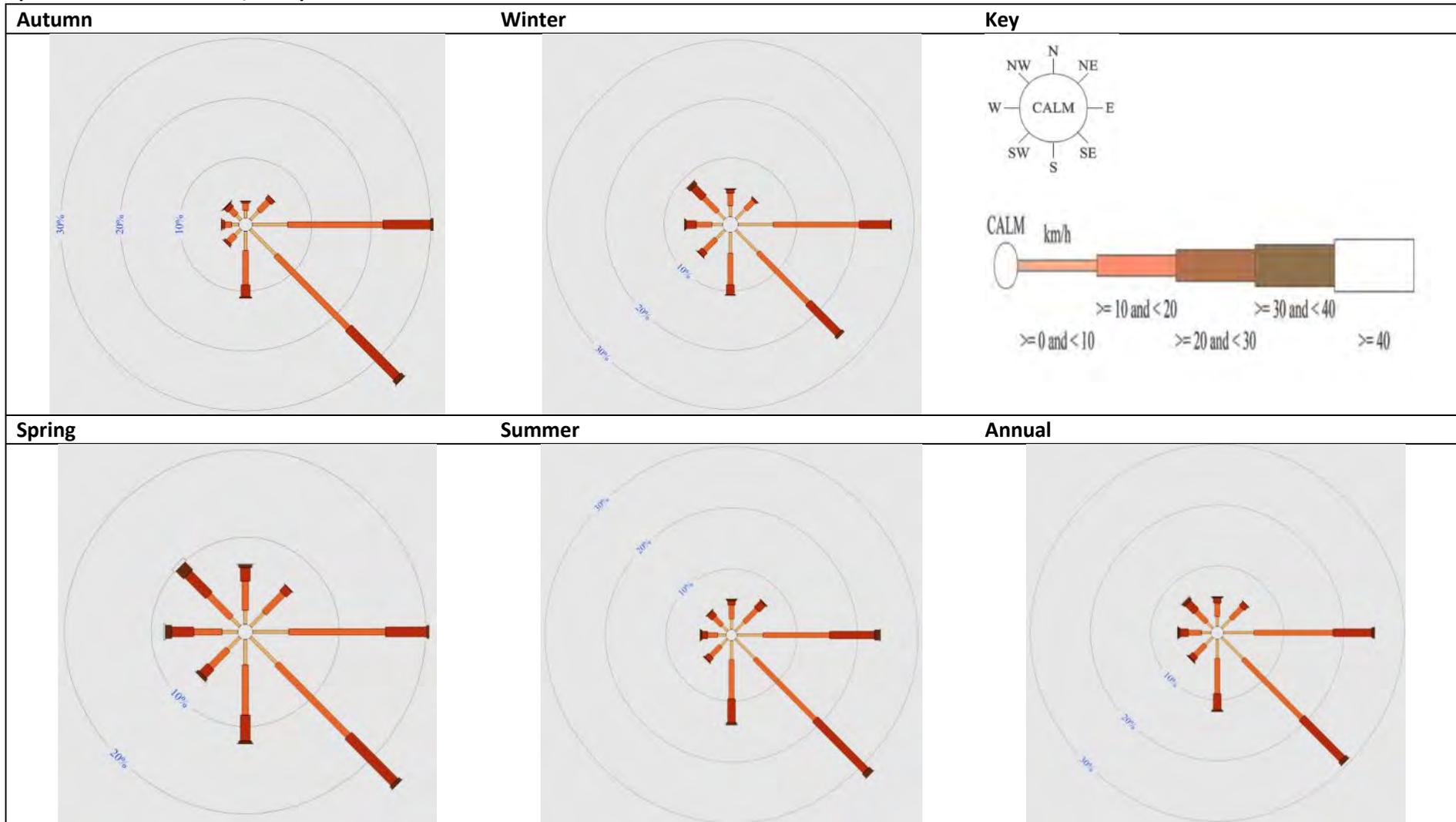
#### 3.4.1. Wind

Wind influences the direction and speed of a bushfire. Wind supplies oxygen and can remove soot and ash from the flame; increasing its ability to burn. Wind can slant a bushfire front, carry embers causing spot fires and dictate the direction of the bushfire front. Unpredictable wind changes can occur during a bushfire which alter the direction of the bushfire front.

The dominant wind direction at the Proposal area is from the south east and is generally the strongest in autumn and summer with average wind speeds of 16 km/h, up to a maximum of 40 km/h (Australian Government, 2016). Wind rose diagrams for the Proposal area for each season are shown in Table 3-3. Wind rose diagrams have been taken from the Alice Springs Airport which is the closest reliable weather station of a comparable environment; it is located approximately 115 km to the north.

It is important to be aware that wind patterns follow a counter clockwise progression (varying around a week long periodicity), but are normally from high pressure systems that result in south west and east dominance of wind direction. However, during the spring and autumn equinoxes and during the unpredictable summer wet season, storms more commonly come from the west and north-west.

**Table 3-3: Wind rose diagrams from Alice Springs Airport (BOM, 2016) used as reference for wind speed, direction and frequency for the Proposal area (Australian Government, 2016)**



### 3.4.2. Lightning

BOM information for Alice Springs lightning strikes shows a high rate of lightning strikes during summer storms. Lightning caused fires are relatively common throughout the region and is a risk at the Proposal area.

### 3.4.3. Temperature and Humidity

The Proposal area experiences hot, dry and arid conditions most the year; with cool humid winters. Daily mean maximum temperatures in summer are above 35°C, with mean minimum temperature of 18°C. Winter mean maximums are below 23°C, with minimums not above 10°C (Australian Government, 2016). Information on temperatures is taken from the Alice Springs Airport which is the closest reliable weather station with temperature records of a comparable environment; it is located approximately 115 km to the north.

On average there is a 10-15% difference in humidity from 9am to 3pm throughout the year. The highest humidity is during winter where it can reach 64% (June) with the lowest 9am humidity at 30% (October to December) (Australian Government, 2016).

The highest risk time for bushfires is during periods of low humidity and high temperature. This is generally from October through to February within the Proposal area.

### 3.4.4. Rainfall and Evaporation

There are two weather stations with records of rainfall within proximity of the Proposal area; Maryvale, 20 km to the north east and Idracowra, 25 km to the south east (Table 3-4 and Table 3-5). The average rainfall for these two sites is 521 mm and 577 mm, respectively. Both sites receive the dominant proportion of the annual rainfall over the summer months, from December through to March (Australian Government, 2016).

This period also coincides with the highest evaporation. The Proposal area is within a region receiving on average 3,000 mm of evaporation per annum; with approximately 1,150 mm during the summer months (Australian Government, 2016).

Periods of high rainfall followed by hot dry conditions provide the ideal conditions for bushfires in this area.

**Table 3-4: Maryvale weather records of monthly rainfall statistics (Australian Government, 2016)**

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	25.9	24.3	21.6	12.1	17.5	13.1	12.5	8.3	8.0	17.0	18.0	27.0	197.4
Lowest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.3
Highest	198.1	191.9	132.6	101.3	86.0	78.4	50.8	59.2	57.1	89.9	105.6	226.3	521.8

**Table 3-5: Idracowra weather records of monthly rainfall statistics (Australian Government, 2016)**

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	25.4	26.1	20.6	13.9	16.7	12.8	12.0	7.9	7.6	15.8	19.4	25.4	196.1
Lowest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.3
Highest	214.3	281.5	153.8	101.0	174.9	74.2	201.0	71.0	54.8	119.5	158.0	159.7	577.3

Rainfall is important for determining if bushfires will occur, as when there is no rainfall there is limited vegetation growth. The summary of climate statistics from the Alice Springs Airport and fire risk based on this information is provided in Table 3-6.

**Table 3-6: Climatic statistics for Alice Springs Airport (1954-2014) used as a basis for assessment of the bushfire risk for the Proposal area (Australian Government, 2016).**

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Temperature</b>												
Mean maximum temperature (°C)	36.3	35.1	32.7	28.3	23.1	19.8	19.7	22.7	27.3	31.1	33.7	35.4
Mean minimum temperature (°C)	21.4	20.7	17.5	12.6	8.3	5.0	4.0	6.0	10.3	14.8	17.9	20.2
<b>Rainfall</b>												
Mean rainfall (mm)	40.7	43.0	31.2	17.2	18.9	13.3	15.3	8.8	8.1	20.5	28.4	37.9
<b>9 am conditions</b>												
Mean 9am relative humidity (%)	34	39	39	44	56	64	59	46	35	30	30	30
<b>3 pm conditions</b>												
Mean 3pm wind speed (km/h)	16.1	16.5	16.0	14.4	13.3	12.9	13.6	14.8	15.6	16.0	15.5	14.8
<b>Bushfire Risk<sup>1</sup></b>												
-	High	High	High	Med	Med	Low	Low	Low	Med	High	High	High

<sup>1</sup>Bushfire risk rating is based on rainfall and humidity; low humidity coupled with high rainfall increases the bushfire risk.

### 3.4.5. Vegetation Types and Quantity

The Proposal area is dominated by undulating sand plains with tall shrublands of *Acacia aneura* (mulga) or *Acacia kempeana* (witchetty bush) with scattered *Allocasuarina decaisneana* (desert oak) over an understorey of short grasses, predominantly *Aristida* and *Enneapogon* species, but also *Triodia pungens* and *Triodia basedowii* (soft and hard Spinifex). Disturbance is limited to livestock grazing, past bushfires and *Cenchrus ciliaris* (buffel grass) invasion in disturbed sites and along creek lines. Vegetation is generally sparse and only after significant rainfall events does density increase.

### **3.5. Topographic Factors**

#### **3.5.1. General**

Topographic features affecting the rate, spread, intensity and movement of bushfires:

1. Wind – Ridge lines or the top of hills can experience higher wind speeds than downslope sections;
2. Aspect – Northern and western facing slopes will generally burn faster due to lower moisture content of vegetation as these two slopes receive higher solar intensity annually; and
3. Slope – Fires will travel faster uphill than downhill.

#### **3.5.2. Specific to the Proposal**

All facilities constructed at the Proposal will be on flat to gently undulating topography, therefore the impact of topographic features on the bushfire impacts at the Proposal will be minimal to non-existent for infrastructure. It is important to understand these characteristics of bushfire in the case of an emergency.

All slopes and hillsides in the area generally have a low bushfire risk due to vegetation type and sparse density. They are generally dominated by saltbushes that have a low fire carrying capacity.

### **3.6. Past Bushfire History**

Mapping obtained from the North Australia Fire Information website (North Australia Fire Information, 2016) shows fire scarring in the Proposal area in 2011 from late dry season fires. A site visit by LES in October 2012 noted signs of past fire at most survey sites; however only two out of the seven sites surveyed appeared to have been burnt within the last two years. Similar results were found on all subsequent surveys at the Proposal.

Figure 4-1 and 4-2 show areas that have been burnt since 2000 overlaid with the land systems. Figure 4-1 suggests that the Rumbalara land system, with higher topography, acts as a fire break for the area for the proposed Chandler Facility. It is believed that this, along with the proposed Chandler Haul Road (which will double as a fire break) will reduce the risk of bushfire coming from the south east, which due to wind direction is a higher risk area.

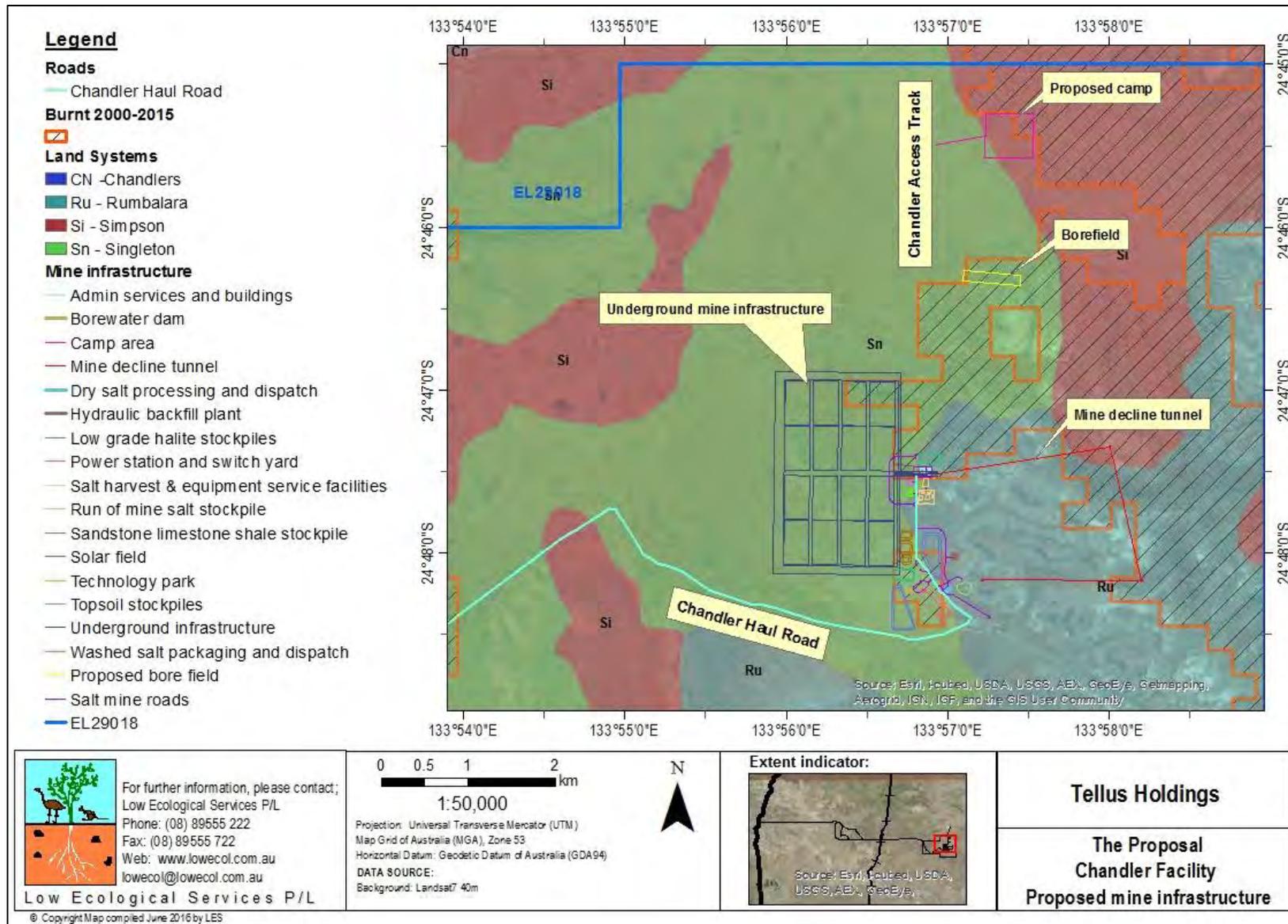


Figure 3-1 Map of the Chandler Facility with land units and fire history

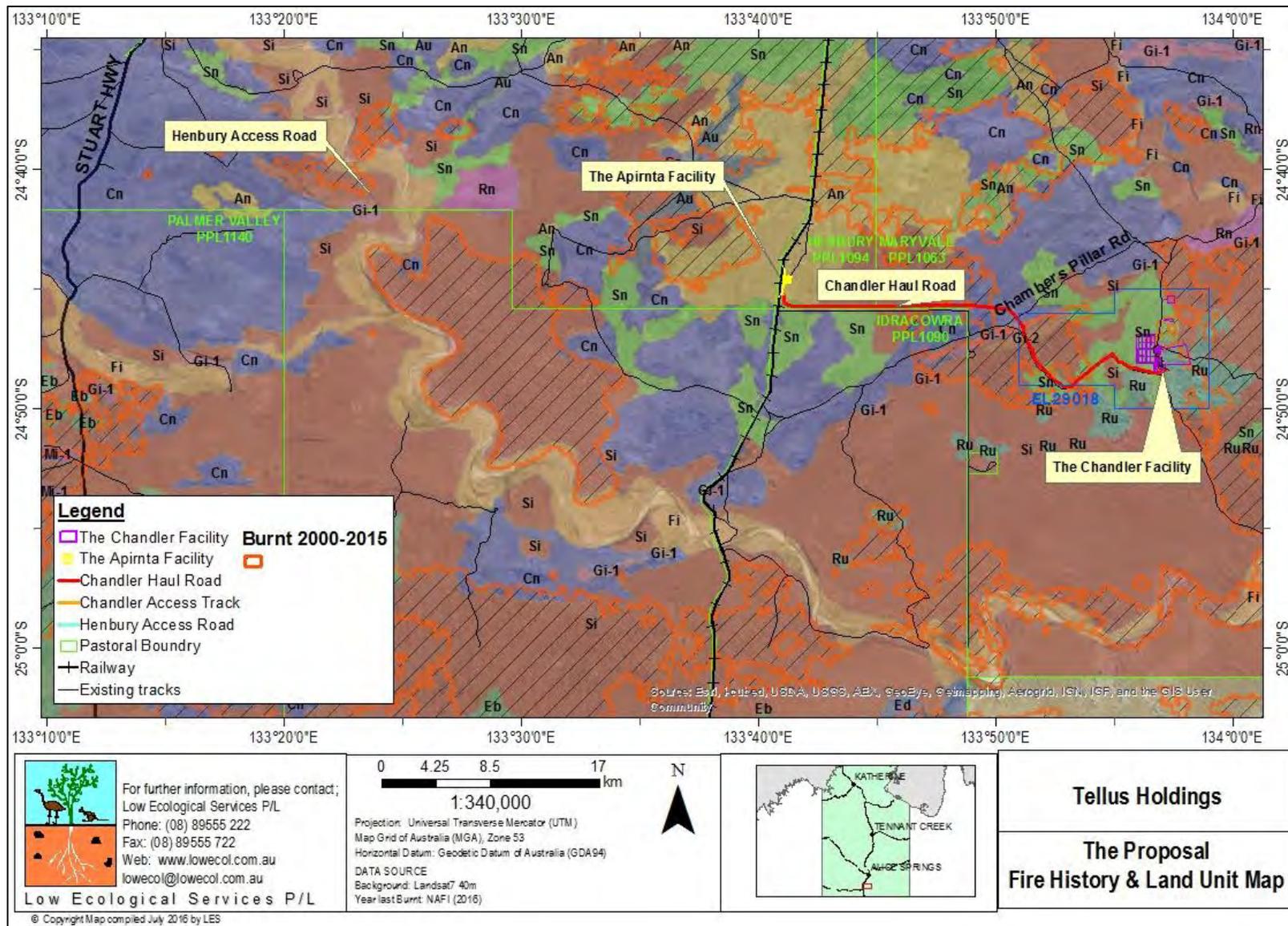


Figure 3-2 Map of the Proposal area with land systems and fire history

## 4. BUSHFIRE RISK ASSESSMENT

### 4.1. Key Definitions

Key definitions relating to bushfire risk management are provided in Table 4-1.

**Table 4-1: Key definitions relating to bushfire risk management**

Key Definitions	
Incident Event	An event capable of causing critical, major, moderate, minor or negligible damage.
Hazard	A physical situation with the potential to start a bushfire impacting human health, damage to property, environmental assets or some combination of these.
Risk	The likelihood of a specified undesired event occurring within a specified period or in specified circumstances. It may be either a frequency (the number of specified events occurring in a time unit) or a probability (the probability of specified event following a prior event), depending upon circumstances.

### 4.2. Risk Assessment Methodology

This section describes the risk assessment for potential events that may impact the probability of a bushfire during construction and operational activities.

The purpose of this risk assessment is to identify potential bushfire hazards and develop risk-reducing measures to prevent and mitigate impacts from construction and operational activities. This assessment also outlines recommended management actions that help to reduce the risk to as low as reasonably possible (ALARP).

Risk assessment consists of five basic steps:

1. Hazard identification;
2. Risk analysis;
3. Risk evaluation;
4. Risk management; and
5. Residual risk analysis.

These steps are described briefly below.

#### 4.2.1. Hazard Identification

Hazard identification involves identifying the sources of risk i.e. those activities or incidents that could result in a bushfire impact. Hazards are categorised into those arising from routine construction and operations, and those arising from incidents. Other hazards involve natural environmental aspects that may influence the occurrence and spread of a bushfire, including rainfall, humidity, topography, wind and vegetation density.

#### 4.2.2. Risk Analysis

Risk analysis determines the likelihood of an activity or event occurring, and the consequences of that activity or event on bushfires. The risk ranking matrix, given in Appendix was used to assess the

consequence and likelihood of all identified events. The matrix is based on six classifications of severity and six for the likelihood of a hazard.

#### **4.2.3. Risk Evaluation**

Risk evaluation prioritises the risks, that is, determining if the risk of an activity or incident is ALARP, or if management actions are required to reduce the risk to ALARP. The risk evaluation presented in Table 5-2 represent the residual risk with existing or planned safeguards in place.

#### **4.2.4. Risk Management**

Table 4-2 presents the detailed assessment of risks, impacts and their management for the Proposal. Sections 6 focus on the management measures and implementation plan Tellus will employ to minimise the environmental risks identified to ALARP.

#### **4.2.5. Residual Risk Analysis**

Residual risk is the risk rating once additional management measures have been implemented. This rating will be ALARP.

### **4.3. Bushfire Risk Assessment Table**

The bushfire risk assessment for the Proposal is presented in Table 4-2 it considers the risk to areas based on current environmental consideration at site (vegetation type and density, wind direction and speeds, climate, rainfall and topographic features) and location of facilities at the Proposal This risk assessment will be utilised in the development of bushfire mitigation measures to be developed and implemented for the Proposal as outlined in Section 5 of this draft BFMP. It is also used in the development of the bushfire risk map which outlines areas of bushfire risk. This map is updated at least annually or more frequently if climatic conditions dictate, to represent current bushfire risk areas.

**Table 4-2: Bushfire risk assessment for the Proposal**

Hazard Identification			Risk Analysis			Prevention and Mitigation	Residual Risk Analysis		
Hazard	Impacts and Receptors	Causes	S <sup>1</sup>	L <sup>2</sup>	Risk Rating	ALARP	S <sup>1</sup>	L <sup>2</sup>	Risk Rating
<b>Construction</b>	People Assets Environment	<ul style="list-style-type: none"> <li>Hot works</li> <li>Increased vehicles</li> <li>Clearing and stockpiling vegetation</li> <li>Increased ignition sources</li> </ul>	6	3	18	<ul style="list-style-type: none"> <li>All hot works to have a permit and safety assessment in line with the appropriate Tellus policy.</li> <li>Only diesel vehicles used onsite</li> <li>No open flames unless permit approved</li> <li>Vegetation stockpile in low mounds to reduce large fuel source</li> <li>Vehicles checked and cleaned daily for build-up of grasses or vegetation around engine and undercarriage</li> <li>All vehicles to be fitted with firefighting equipment</li> <li>All vehicles fitted with spark arrestors</li> <li>A permit obtained and the Minister informed not less than 48 hours before any planned back and/or patch burning activities performed</li> </ul>	3	2	6
<b>Operation</b>	People Assets Environment	<ul style="list-style-type: none"> <li>Ignition sources</li> <li>Use of flammable materials</li> <li>Hot works</li> <li>Increased vehicles</li> <li>Increased use of Proposal area</li> </ul>	6	3	18	<ul style="list-style-type: none"> <li>At least a 4 m fire break around all working areas</li> <li>All hot works to have a permit and safety assessment in line with the appropriate Tellus policy.</li> <li>No open flames outside of designated areas</li> <li>Designated smoking area</li> </ul>	3	2	6

Hazard Identification			Risk Analysis			Prevention and Mitigation	Residual Risk Analysis		
Hazard	Impacts and Receptors	Causes	S <sup>1</sup>	L <sup>2</sup>	Risk Rating	ALARP	S <sup>1</sup>	L <sup>2</sup>	Risk Rating
						<ul style="list-style-type: none"> <li>No wastes burnt onsite</li> <li>Weather and bushfire conditions assessed daily from internet sites listed in Table 3-2</li> <li>All vehicles fitted with spark arrestors</li> <li>A permit obtained and the Minister informed not less than 48 hours before any planned back and/or patch burning activities performed</li> </ul>			
<b>Open Flames</b>	People Assets Environment	<ul style="list-style-type: none"> <li>Smoking</li> <li>Cooking</li> <li>Hot works</li> </ul>	4	4	16	<ul style="list-style-type: none"> <li>Smoking only permitted in a designated smoking area.</li> <li>All hot works to have a permit and safety assessment in line with the appropriate Tellus policy.</li> <li>No hot works to be carried out next to flammable material or dense vegetation</li> <li>Firefighting equipment to be readily available during hot works</li> <li>Cooking with open flames to be conducted within designated area with sufficient firefighting equipment</li> <li>Any gas stored onsite is to be clearly labelled and stored as per supplier's requirements</li> </ul>	2	2	4
<b>Hazardous Materials,</b>	People Assets	<ul style="list-style-type: none"> <li>Flammable hazardous material stores</li> </ul>	5	3	15	<ul style="list-style-type: none"> <li>Ensure all flammable material is stored within a bunded area away from any flame</li> </ul>	3	2	6

Hazard Identification			Risk Analysis			Prevention and Mitigation	Residual Risk Analysis		
Hazard	Impacts and Receptors	Causes	S <sup>1</sup>	L <sup>2</sup>	Risk Rating	ALARP	S <sup>1</sup>	L <sup>2</sup>	Risk Rating
<b>Chemicals and Fuels</b>	Environment	<ul style="list-style-type: none"> <li>Flammable chemicals</li> <li>Flammable and volatile fuels</li> </ul>				source <ul style="list-style-type: none"> <li>Appropriate fire extinguishers and fighting equipment to be located next to flammable material</li> <li>All staff trained in the use and location of appropriate firefighting equipment</li> <li>If volatile fuels are required onsite they will have an individual risk assessment undertaken and stored in separate area with appropriate controls.</li> </ul>			
<b>Bushfire</b>	People Assets Environment	<ul style="list-style-type: none"> <li>Natural event</li> <li>Back and/or patch burning on adjacent properties</li> <li>Deliberate fire lighting outside of the Proposal area</li> </ul>	5	4	20	<ul style="list-style-type: none"> <li>Develop fire breaks at least 4 m wide and in sufficient locations around the Proposal to allow for access during bushfire control activities</li> <li>Obtain a permit and engage with TOs, pastoralists, land managers and the CLC in routine back and/or patch burning to reduce fuel loads surrounding the Proposal; Minister to be informed not less than 48hours before burning to commence</li> <li>All staff to be inducted into this BFMP</li> <li>A dedicated bushfire response team of 3-5 staff members during construction and 2-3 during operations to be present on site at any one time. Teams to have rural bushfire management training</li> <li>Strict no open flame policy within the Proposal area</li> </ul>	2	3	6

Hazard Identification			Risk Analysis			Prevention and Mitigation	Residual Risk Analysis		
Hazard	Impacts and Receptors	Causes	S <sup>1</sup>	L <sup>2</sup>	Risk Rating	ALARP	S <sup>1</sup>	L <sup>2</sup>	Risk Rating
						<ul style="list-style-type: none"> <li>Designated smoking area</li> <li>Liaise with local TOs, CLC, land managers and pastoralists in back and/or patch burning planning</li> <li>Use of fire tracking websites to monitor and inform bushfire management actions</li> <li>If the bushfire is beyond control, then a bushfire warden or control officer will be notified and all surrounding land owners and managers of the area which the fire is likely to spread will be notified.</li> </ul>			
<b>Third Party Access</b>	People Assets Environment	<ul style="list-style-type: none"> <li>Increase in ignition sources</li> <li>Open flames outside of designated areas</li> <li>Unapproved back and/or patch burning</li> </ul>	4	4	16	<ul style="list-style-type: none"> <li>Liaise with local TOs, CLC, land managers and pastoralists in back and/or patch burning operation planning</li> <li>Inform local TOs, CLC, land managers and pastoralists on the boundaries of the Proposal area and no open flame policy</li> <li>All visitors must sign in and undergo visitor site induction</li> <li>All visitors must be accompanied by a site representative</li> <li>Visitors must not deviate from formal access routes.</li> </ul>	2	2	4

<sup>1</sup> – Severity

<sup>2</sup> – Likelihood

<sup>3</sup> – *Bushfires Act*

Risk assessment conducted by Low Ecological Services in conjunction with Tellus Holdings Pty Ltd.

## **4.4. Bushfire Risk Specific to Facility**

### **4.4.1. Chandler Facility**

The Chandler Facility is surrounded by Low to Very Low bushfire risk vegetation and land system types as shown in Figure 4-1. Only under several years of good growing conditions (sufficient rainfall and appropriate temperatures) will the vegetation pose a significant risk to cause a bushfire with potential to impact on his facility. The facility is blocked from the dominate wind direction by a very Low bushfire risk area, which further reduces its susceptibility to bushfires.

### **4.4.2. Apirnta Facility**

The Apirnta facility is surrounded by a Low bushfire risk environment (Figure 4-1). There is potential for this area to be upgraded to a Low - Moderate bushfire risk area following good vegetation growth and favourable bushfire conditions, i.e. high wind and low humidity. Patch burning will be the most effective mitigation and preventative measure for this area.

### **4.4.3. Chandler Haul Road**

The Chandler Haul Road crosses sections of Low to Very Low bushfire risk areas (Figure 4-1). The road itself will act as an effective fire break for low intensity fires with light winds. If mitigation measures prescribed in the BFMP are followed, the long-term risk of bushfires affecting the Chandler Haul Road is Low.

### **4.4.4. Maryvale Access Road**

The Maryvale Access Road crosses the only area identified as having a Low – Moderate bushfire risk (Figure 4-1). This is along the Finke River and is due to the presence of buffel grass along several sections of the River. If buffel grass management and other mitigation measures prescribed in Section 6 of the BFMP are followed then the risk of bushfire to the Maryvale access road will be Low.

### **4.4.5. Chandler Access Road**

The Chandler Access Road crosses sections of Low to Very Low bushfire risk areas (Figure 4-1). The road itself will act as an effective fire break to low intensity fires with light winds. If mitigation measures prescribed in the BFMP are followed, the long-term risk of bushfires affecting the Chandler Access Road is Low.

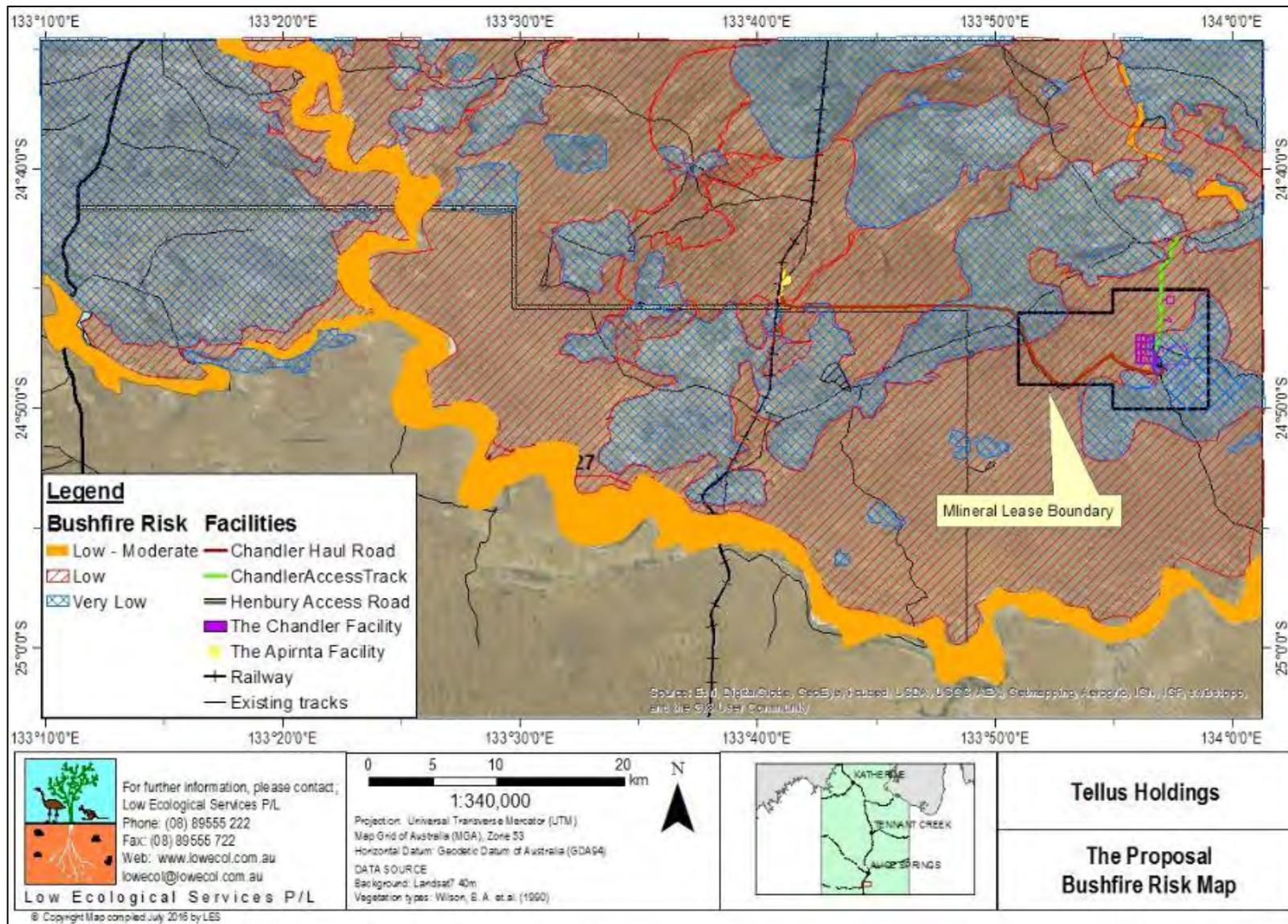


Figure 4-1: Bushfire risk map showing bushfire risk areas based on vegetation types and land systems for the Proposal area.

## 5. BUSHFIRE CONTROL ACTIONS

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Rural bushfire management is broken into four distinct facets:

- Prevention – Measures taken to reduce the possibility of bushfires occurring;
- Mitigation – Measures taken to minimise the impacts of bushfires;
- Suppression – Response measures to contain and ultimately extinguish bushfires; and
- Habitat management – Maintain biodiversity, surface cover and aesthetic values.

The following methods for bushfire control have been adapted from the Bushfire NT Firefighting course and the Basic Wildfire Awareness Guidance, ACT Fire and Rescue Community Fire Units Learners Guide (2011).

### 5.1. Prevention

As a part of this BFMP it is recommended that bushfire fuel load assessments (see Appendix and Appendix) are conducted annually to assess bushfire potential and need for pro-active controls, e.g. back and/or patch burning. The timing of this is recommended in August or September. *C. ciliaris* and other grasses including spinifex are a concern for the spread and intensity of bushfires and, as such, are key species in bushfire fuel load assessment. Spinifex will require 3-4 years after being burnt to be of concern for bushfire risk again. Saltbushes have a low bushfire carrying capacity and are dominant over a large proportion of the site

All survey lines/areas, vegetation densities and high bushfire fuel load areas will be identified and recorded with global positioning system (GPS) coordinates. Additional locations of interest (such as flora and fauna of conservation significance and habitat) will be determined by associated flora and fauna surveys and additional important sites will also be recorded and identified. This information will be mapped using GIS mapping and form a key part of the BFMP.

The assessment method for bushfire fuel loads is based on The Overall Fuel Hazard Guide for South Australia (2012). This is to be implemented at designated observation points across the Proposal area. This assessment technique is based on the visual assessment of *C. ciliaris*, native grasses and forbs, woody shrubs and trees. It is a risk rating based assessment and is described in Table 5-1. Additional assessment of bushfire fuel loads will be recorded opportunistically on a data sheet like that in Appendix.

The result from annual and opportunistic bushfire fuel load assessments will be used to develop bush fire management strategies and update this draft BFMP and the bushfire risk map. The annual survey results will be available in the site manager's office for emergency referral.

**Table 5-1: Criteria for visual inspection of bushfire fuel load risk assessment (Department of the Environment and Natural Resources, 2011)**

Overall Fire Risk	Criteria
1	Virtually no risk of fire spread. Little Buffel grass and forbs with sparse shrubs.
2	Slight risk of a fire spreading, but only under extreme conditions. Existing fuel is patchy and discontinuous.
3	Risk of fire spreading under extreme conditions. Small but continuous Buffel tussocks.
4	Area able to support the spread of a low or medium intensity fire under favourable conditions. Continuous fuel load with consisting of shrubs and/or Buffel.
5	Area will burn readily under most conditions

Grasses and Forbs	Criteria
1	Sparse. Not sufficient to carry fire
2	Scattered. Sufficient to carry a fire in high wind.
3	Dense. Sufficient to carry a fire between Buffel tussocks or shrubs.

Buffel Grass	Criteria
1	Sparse. Not sufficient to carry fire
2	Scattered. Sufficient to carry a fire in high wind.
3	Dense. Sufficient to sustain a fire under most conditions.

Trees and woody shrubs	Criteria
1	Not present
2	Sparse to scattered. Not sufficient to support a fire.
3	Dense. Sufficient to sustain a fire under most conditions.

## 5.2. Mitigation

Table 5-2 details mitigation and management measures to control the spread, development and severity of bushfires within the Proposal area. This BFMP should be read in conjunction with the Biodiversity Management Plan, Waste Management Plan, Water Management Plan and Hazardous Material Management Plan.

**Table 5-2: Mitigation, implementation, responsibility, reporting and auditable criteria and measures for bushfire control within the Proposal area during construction and operation**

Mitigation Measure	Effectiveness	Responsible	Reporting	Audit
Bushfire risk map – highlighting risk areas for bushfires and potential direction of approach. This map is to be updated annually or following significant rainfall periods with results of	High	Site Manager	At least annually or more frequently if required	Map showing latest update of bushfire risk and reference to bushfire fuel load assessment

Mitigation Measure	Effectiveness	Responsible	Reporting	Audit
bushfire fuel load assessment surveys				
All staff inducted into this BFMP, the Emergency Response Plan (ERP) and other management plans associated with bushfire management	Moderate	Site Manager	Annual Report	Annual report showing details of all completed inductions
Firebreaks developed around all assets and strategically to most effectively stop or slow incoming bushfires	High	Construction Manager	End of construction	All firebreaks are at least 4 m ( <i>Bushfire Act</i> ) wide, surrounding all assets, locations.
Firebreaks maintained and cleared of vegetation to at least 10 cm in height	High	Construction and Site Manager	End of construction report, then annually	Records of work completed and all fire breaks with vegetation below 10 cm
Appropriate signage and Safety Data sheets (SDS) near hazardous and flammable material stores around site	Moderate	Construction Manager	Annual Report	Signage at all hazardous and flammable material stores
Firefighting equipment and fire extinguisher onsite	High	Construction Manager	Annual Report	Location map and fire extinguishers present on site
Fire extinguishers maintained and inspected every 6 months	High	Site Manager	6 months	Records show inspection every 6 months
ERP clearly displayed	Moderate	Emergency Response Officer	Annual Report	Annually audit to inspect plans and muster points
A dedicated bushfire response team of 3-5 staff members during construction and 2-3 during operations to be present on site at any one time trained in bushfire fighting by NT or state/territory equivalent	Moderate	Site and Construction Manager	Annual Report	Records show 100% satisfactory completion by all staff
Fire drills conducted	Moderate	Site Manager	Annual Report	Annual report shows fire drills conducted regularly
Open flames or ignition sources prohibited within 20 m of flammable material	High	Site Manager	Annual Report	Signage marking no open flame zones
Designated smoking area	Moderate	Construction Manager	Annual Report	Designated smoking zones clearly signed and designated no smoking zones clearly signed
Back and/or patch burning conducted as required in co-ordination with key stakeholders and following provision of permits: CLC; TO's;	High	Site Manager	Annual Report	Evidence of stakeholder engagement; records of back and/or patch burning work conducted and permits granted

Mitigation Measure	Effectiveness	Responsible	Reporting	Audit
Minister; and Surrounding pastoralists and land managers				
Vehicles inspected daily for build-up of vegetative matter in undercarriage and engine bay	Moderate	Site Manager	Daily	Records show daily checks and clean out of vehicles, as required
Monitor bushfires and climatic conditions through websites in Table 3-2	Moderate	Site Manager	Daily	Records show daily updates from bushfire advice websites and use during fire season
Any hot work requires a permit and a bushfire spotter if in areas next to flammable material	High	Site Manager	As required	Annual report shows indication of hot works permits approved
Enforce no open flames or hot works during designated fire bans	Moderate	Site Manager	As required	Records show evidence of enforcing fire bans
Incident report lodged for any fire	Low	Site Manager	As required	Annual report shows records of any fire incident reports
Annual BFMP compliance and performance review	Moderate	Site Manager	Annual Report	Audit of BFMP criteria and management measure
All vehicles to carry fire extinguisher and UHF radio	Moderate	Site Manager	During new vehicles fit out	Records of compliance with all vehicles or visual inspection

### 5.3. Suppression

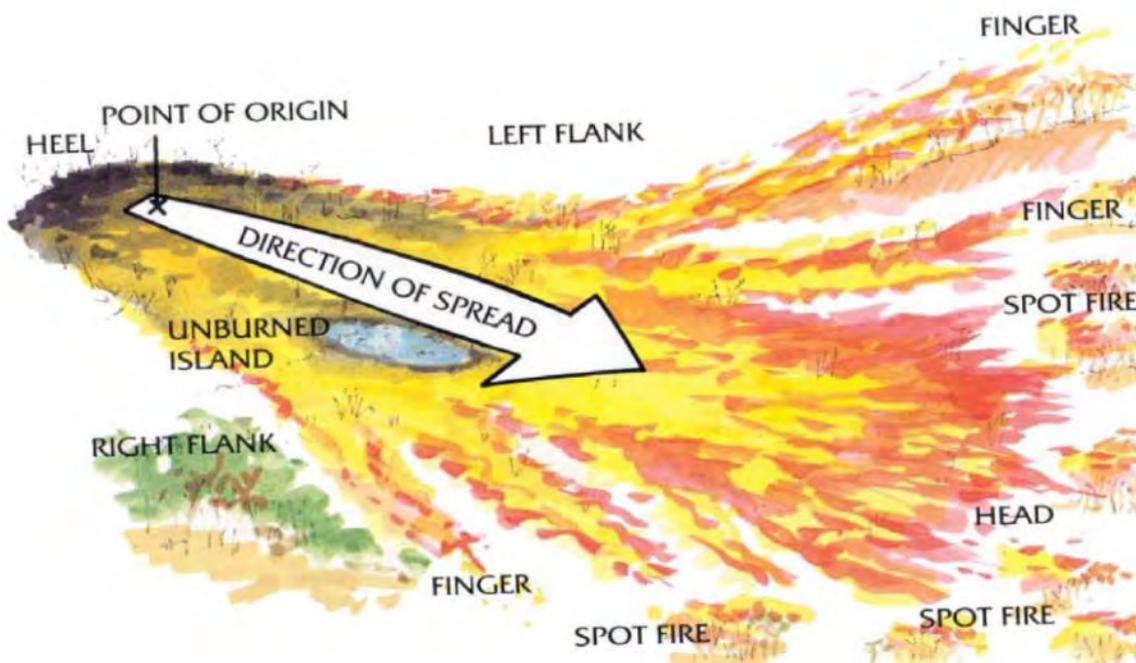
If a bushfire is deemed to potentially impact the Proposal area, then bushfire suppression techniques will be activated. During construction, there will be a dedicated team of 3-5 staff at any one time present on site that will be adequately trained in the methods of bushfire management. During operation, the workforce on site will be reduced and the number of potential ignition sources also reduced, so the number personnel in the dedicated team can be reduced to 2-3 staff members.

#### 5.3.1. Components of a Bushfire

A bushfire can be broken down into components to aid in on-ground co-ordination of control methods; these are described in Table 5-3 and displayed in Figure 5-1.

**Table 5-3: Parts of a bushfire**

Component	Description
Head	Is the part of the fire making the most progress, it will have the most intense and hottest fires and can also be called the fire front.
Flank	These are the sides of the fire between the front and the heel (rear). They are generally of lower intensity than the head and often described in direction, eastern flank, or location, left flank.
Fingers	Long slender sections of fire that extend beyond the head or flanks. Usual caused by variations in wind and fuel loads.
Heel	This is the rear of the fire, which is the lowest intensity part of the fire with the least spread. It is generally upwind or downslope of the head.
Spot Fire	Fires caused by wind transported embers, outside of the area of the main fire; usually in front of the head of the fire.



**Figure 5-1: Graphic representation of components of a bushfire**

### 5.3.2. Bushfire Control Approaches

The two main approaches to bushfire management are direct and indirect as detailed in Table 5-4.

**Table 5-4: Bushfire management techniques as adapted for the Proposal area from the ACT Fire and Rescue, 2011 & Bushfires NT, 2016 references**

Control Method	Details	
<b>Direct Attack</b>		
Head	Attacking the head of the fire either by developing a control line (clearing a line in front of the fire) or using fire retardants or water to extinguish the head of the flame. Only recommended for low intensity fires.	
Flank	Like head attack but work is done on the flanks of the bushfire, generally moving from the rear to the head to try and pinch the fire out. Useful if the fire is too intense to attack from the Head	
Parallel	Develop a control line a short distance ahead of the fire, useful when the fire is too intense to attack at close range. The attack line should be placed as close as possible to the main fire and if possible a second unit can burn out the fuel between the main fire and the control line	
Equipment	Advantages	Disadvantages
<ul style="list-style-type: none"> <li>Mechanical, e.g. bulldozers</li> <li>Hand tools, e.g. shovels</li> <li>Fire retardants, e.g. foam, chemicals, water</li> <li>Source of fire, e.g. drip torches</li> </ul>	<ul style="list-style-type: none"> <li>Less area burnt</li> <li>Quickly contain the fire</li> <li>Edges where fire extinguished can be turned into the control line</li> </ul>	<ul style="list-style-type: none"> <li>Obstacles (e.g. fences) can impede on the control line</li> <li>Limited to low intensity fires</li> <li>Places firefighters in direct path or contact with the fire</li> <li>Needs constant patrol of fire line</li> <li>Irregular fire line constructed quickly</li> </ul>
<b>Indirect Attack</b>		
Back and/or patch burning	A control line is established some distance from the head or flanks of the fire and the fuel in between is burnt out. This can be advantageous when the intensity is too great or the terrain makes it difficult to attack the fire at close range	
Equipment	Advantages	Disadvantages
<ul style="list-style-type: none"> <li>Mechanical, e.g. bulldozer</li> <li>Hand tools, e.g. shovels</li> <li>Source of fire, e.g. drip torch</li> <li>Fire retardants, e.g. foam, chemicals, water</li> </ul>	<ul style="list-style-type: none"> <li>Removes firefighters from direct contact with fires</li> <li>Allows for strategic placement of control line</li> <li>Allows more time and consideration in control of the fire</li> <li>Choice of location for control line</li> </ul>	<ul style="list-style-type: none"> <li>Increases size of fire</li> <li>Allows for more intense fires to develop</li> <li>Larger area to control</li> <li>Back and/or patch burning may result in intense fires at intersection, potentially causing spotting outside of control lines</li> <li>Need to monitor and patrol large line</li> </ul>

### 5.3.3. Fire Control Equipment

A summary of the location and type of firefighting equipment available on the Proposal site is provided in Table 5-5.

**Table 5-5: Summary of firefighting equipment on the Proposal site**

Type	Location	Capacity
<i>To be updated prior to commencement of activities at the Proposal, but to include as a minimum:</i>		
<ul style="list-style-type: none"><li>• A dedicated bush fire trailer or utility with a 5,000L water tank and motorised water pump and hose;</li><li>• Fire extinguishers appropriate to potential fire type – chemical, electrical etc.; and</li><li>• Fire hoses around facilities</li></ul>		

A map of the location of firefighting equipment is shown in Figure 5-2.

*To be provided after Proposal is constructed*

**Figure 5-2: Location map of firefighting equipment**

## 5.4. Habitat Management

Through effective fire preventative and mitigation measures the biodiversity and potential habitat for species of conservation significance will be maintained. Several species of conservation significance identified as having moderate to high likelihood of occurrence in the Proposal area with high risk of fire impact include:

- Slater's Skink *Liopholis slateri slateri*
- Crest-tailed Mulgara *Dasyercus cristicauda*
- Great Desert Skink *Liopholis kintorei*
- Brush-tailed Mulgara *Dasyercus blythi*
- Thick-billed grasswren *Amytornis modestus indulkana*

All other species of conservation significance are also indirectly affected by bushfires through habitat and food loss. Of concern to increased fire severity and occurrence is the invasive species *C. ciliaris* (buffel grass). This species readily colonises disturbed areas after fires. It outcompetes native grasses and substantially increases the bushfire fuel load of the environment; resulting in hotter more intense fires. *C. ciliaris* has been identified during on-ground surveys within the Proposal area, although at present it is restricted to several localised populations.

Adequate fire management and mitigation measures as outlined in this BFMP and Weed Management Plan will ensure that the spread and introduction of *C. ciliaris* into new areas does not occur.

## 6. IMPLEMENTATION STRATEGY

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### 6.1. Roles and Responsibilities

#### 6.1.1. Construction Manager

It is the responsibility of the Construction Manager to ensure the following occurs during the construction phase of the Proposal:

- All staff are inducted and trained in this BFMP and ERP;
- Adequate firefighting equipment and staff trained in use on site;
- A dedicated team of 3-5 staff member during construction to be present on site at any one time accredited with bushfire management from the NT or state/territory equivalent;
- Placement of appropriate signage and firefighting equipment around flammable material stores;
- Issuing of hot work permits;
- Development of designated smoking area;
- Development and maintenance of fire breaks;
- Ensure fire extinguishers are maintained and tested every 6 months;
- Ensure vehicles are checked and cleaned daily of any vegetative build up;
- Ensure all vehicles are maintained in accordance with the manufacturers requirements;
- Check for regular updates with internet-based fire and climatic condition websites;
- Report any incident to Emergency Response Officer for further action;

- Ensure bushfire fuel load assessments conducted annually or more frequently if required;
- Consultation with TOs, pastoralists, land managers and the CLC to plan back and/or patch burning operations;
- Application and granting of a permit to conduct back and/or patch burning; and
- Notification to the Minister not less than 48 hours before any planned back and/or patch burning occurs.

#### 6.1.2. **Site Manager (or equivalent)**

- All staff are inducted and trained in this BFMP and ERP;
- Maintenance and provision of firefighting equipment and staff trained in its use on site. This will include a dedicated bushfire trailer or utility with a 5,000L water tank and motorised water pump and hose;
- A dedicated team of 2-3 staff during operations to be present on site at any one time accredited with bushfire management from the NT or state/territory equivalent;
- Placement of appropriate signage and firefighting equipment around flammable material stores;
- Issuing of hot work permits;
- Development of designated smoking area;
- Maintenance of fire breaks;
- Ensure fire extinguishers are maintained and tested every 6 months;
- Ensure vehicles are checked and cleaned daily of any vegetative build up;
- Ensure all vehicles are maintained in accordance with the manufacturers requirements;
- Check for regular updates with internet-based bushfire and climatic condition websites;
- Ensure bushfire fuel load assessments conducted annually or more frequently if required;
- Consultation with TOs, pastoralists, land managers and the CLC to plan back and/or patch burning operations;
- Application and granting of a permit to conduct back and/or patch burning;
- Notification to the Minister not less than 48 hours before any planned back and/or patch burning occurs;
- Annual report;
- Incident reports;
- Stakeholder engagement;
- Annual BFMP compliance and performance audit;
- Vehicles fitted with fire extinguisher and UHF radio; and
- Report any incident to Emergency Response Officer for further action

#### 6.1.3. **Emergency Response Officer**

- Develop emergency response plan;
- Designate emergency muster points;
- Responsible for co-ordinating emergency response;
- Audit and review emergency response plan;
- Update emergency response plan;

- Ensure emergency response drills are conducted regularly;
- Develop emergency response induction;
- Ensure adequate emergency evacuation maps and signage is adequately displayed;
- Co-ordinate with relevant government, Northern Territory Fire and Rescue Service (NTFRS), Country Fire Service (CFS) and other stakeholders in response to a bushfire or large fire event;
- Determine level of threat and appropriate action required; and
- Co-ordinate with Site or Construction Manager for staff response.

#### 6.1.4. Staff

- Meet requirements of this BFMP;
- Have appropriate training for use of basic firefighting equipment;
- Aware of locations of all firefighting equipment and emergency procedures;
- Daily check of vehicles;
- Report any fire incident to Site Manager;
- Apply for hot work permits;
- Maintain fire breaks as directed by site or construction manager;
- Follow bushfire advice as given by Site Manager, Construction Manager or Emergency Response Officer;
- Smoking in designated smoking areas only; and
- No open flames outside of designated areas during high fire risk periods.

## 6.2. Training and Competency

A dedicated team of 3-5 staff member during construction and 2-3 during operations to be present on site at any one time will be appropriately trained in the management and control of bushfires by the NT bushfire unit or equivalent qualification from another state/territory. All staff will be familiar with and inducted into this BFMP. As part of the induction all staff will be made aware of the potential fire sources, bushfire risk map and location of control equipment available relevant to the Proposal.

Staff will be given cultural competency training to work effectively with TOs and CLC in bushfire management and mitigation measures.

## 7. REPORTING

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### 7.1.1. Routine Reporting

An annual Bushfire Management Report will be compiled containing the following information:

- Any fire incidents or near misses;
- Any bushfire mitigation work conducted – back and/or patch burning, development of fire breaks or other;
- An assessment of bushfire fuel loads in the surrounding area, including GPS locations;
- Update of the bushfire risk map;

- Records of all staff inductions into this BFMP;
- Records of required staff in bushfire training with satisfactory completion;
- Fire equipment maintenance;
- Fire and emergency response drills;
- Fire break maintenance;
- Stakeholder engagement – CLC, pastoralists, land managers, TOs and other;
- Results of audits; and
- Review and update of the BFMP.

### 7.1.2. Incident Reporting

An incident report will be generated and submitted to the site manager who will then distribute the results to Bushfires NT, the ABC (broadcast updates), the Department of Environment and Natural Resources (DENR), the Department of Primary Industry and Resources (DPIR) and other affected stakeholders as soon as possible.

Bushfires NT, DENR and the DPIR will be notified immediately if there is a serious fire on site.

An incident report will typically include the following:

- Location of fire;
- Date and time fire noticed;
- Updated bushfire map including all past bushfire or fires at the Proposal;
- Cause or source of fire (if known);
- Mitigation and management response;
- Damages – personal, assets or environment;
- Recommendations for future fire management;
- Rehabilitation work; and
- Stakeholder engagement.

## 7.2. Stakeholder Engagement

Tellus will engage the following stakeholders to determine concerns and attain information and advice relating to bushfire risk and management in the Proposal area:

- Tellus representative responsible for fire safety;
- CFS and NTFRS representative/s;
- Adjacent landholders;
- TOs;
- CLC;
- Appropriate consultant with relevant experience; and
- Bushfires NT.

Tellus will engage with TOs, CLC, land managers and pastoralists in the planning of bushfire fuel load assessment surveys and controlled burn planning at the site. There will be ongoing management of firebreaks, ground fuel surveys and consultation on frequency and timing of controlled burning.

TOs, surrounding pastoralists and land managers, and when required, an appropriately experienced consultant, will be used to provide specialist advice and notified of any planned fire activities at the Proposal.

Concerns, information and advice resulting from stakeholder consultation and engagement will be incorporated in the annual review and audit of the BFMP.

There will be direct engagement of Aboriginal Rangers wherever possible in the ongoing development of the BFMP, particularly through participation in field surveys.

## 8. BUSHFIRE RESPONSE

Table 8-1 details the bushfire action response plan delegating responsibilities and required actions based on bushfire threat and occurrence. This plan will be annually reviewed and updated to improve the safety of all staff, assets and environmental values within the Proposal area. The information is derived with reference to the ACT Fire and Rescue (2011) community fire training manual and the national bushfire warning system alert levels.

**Table 8-1: Bushfire action response plan for the Proposal**

Responsibility	Situation			
	<b>No fire:</b> Carry out maintenance and scheduled inspection requirements of this BFMP	<b>Advice:</b> Either inspection identifies specific local bushfire risk or advice is issued of potential bushfire risk in the area	<b>Watch and Act:</b> A bushfire is approaching. Action should be taken to protect life and assets	<b>Emergency Warning:</b> Unplanned fire or bushfire imminent. Immediate action required; prioritise human life.
General Staff	<ul style="list-style-type: none"> <li>Maintain strict adherence to this BFMP</li> <li>Maintain fire breaks</li> <li>Assist with pre-bushfire season back and/or patch burning, as required</li> </ul>	<ul style="list-style-type: none"> <li>Notify Site Manager of potential risk</li> <li>Mitigate risk by all available methods without placing staff at risk</li> </ul>	<ul style="list-style-type: none"> <li>Maintain safe distance from bushfire</li> <li>Report to Emergency Response Officer and Construction Manager/Site Manager</li> <li>Review location of bushfire fighting equipment, evacuation procedures and muster points</li> </ul>	<ul style="list-style-type: none"> <li>If small fire, use available firefighting equipment and control fire</li> <li>Report to Emergency Response Officer or Construction Manager/Site Manager;</li> <li>If large fire, follow emergency response and evacuation plan</li> <li>Follow instructions from Emergency Response Officer or</li> </ul>

				Construction Manager/Site Manager
Construction/ Site Manager	<ul style="list-style-type: none"> <li>Organise maintenance of fire breaks, fire extinguishers, waters sources, firefighting equipment and staff training</li> <li>Run emergency drills regularly</li> <li>Co-ordinate back and /or patch burning</li> <li>Inspection of site for bushfire fuel loads and fire risk</li> <li>Co-ordinate bushfire fuel load assessments</li> </ul>	<ul style="list-style-type: none"> <li>Follow advice on internet sources</li> <li>Prepare for mitigation response</li> <li>Respond to site specific hazard</li> <li>Report on incident</li> <li>Review ERP</li> </ul>	<ul style="list-style-type: none"> <li>Follow bushfire on internet sources</li> <li>Determine level of bushfire and potential risk to on site personnel through on-ground assessments</li> <li>Prepare bushfire response team;</li> <li>Review ERP and evacuation procedures</li> <li>Actions need to be implemented to protect life and assets</li> </ul>	<ul style="list-style-type: none"> <li>Assess bushfire on-ground and internet</li> <li>Implement fire control techniques, if appropriate</li> <li>Alert Bushfire NT, DENR, DPIR and appropriate stakeholders</li> <li>Follow instructions from Emergency Response Officer</li> </ul>
Emergency Response Officer	<ul style="list-style-type: none"> <li>Provide advice to site/construction manager as required;</li> <li>Ensure emergency response plan in place</li> <li>Liaise with site/construction manager to ensure emergency response drills conducted regularly</li> <li>Ensure appropriate emergency muster points signage clearly displayed and intact.</li> </ul>	<ul style="list-style-type: none"> <li>Provide advice to site/construction manager as required;</li> <li>Review emergency response plan and</li> <li>Ensure bushfire response team and equipment is on standby</li> </ul>	<ul style="list-style-type: none"> <li>Provide advice to site/construction manager as required;</li> <li>Engage emergency response plan;</li> <li>Engage bushfire response team and equipment;</li> <li>Assess and develop bushfire mitigation plan in consultation with internet sources and site/construction manager</li> </ul>	<ul style="list-style-type: none"> <li>Assess bushfire on-ground and internet</li> <li>Inform site/construction manager of appropriate emergency response plan;</li> <li>Organise and manage dedicated bushfire response team</li> </ul>

## **9. REVIEW AND AUDIT**

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There will be an annual review and audit of this BFMP. This information will be used to improve the BFMP for subsequent years and update the bushfire risk map. This BFMP is a constantly improving plan.

## 10. REFERENCES

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## 11. APPENDICES

### Appendix 1: Risk matrix

		Low Risk	Moderate Risk	High Risk	Likelihood – Probability of Harm / Loss					
					1	2	3	4	5	6
					Unlikely/Unknown; Not expected to occur	Remote Potential; May occur only on exceptional circumstances	Possible; Could occur at some time	Probable; Expected to occur at some time	Frequent; Likely to occur regularly	Highly Likely/Ever present; occurs in most circumstances
		Environmental Impact								
SEVERITY – Consequence of Harm / Loss	1	Alteration/disturbance within the limits of natural variability; effects not transmitted or accumulating; resources not impaired. Minimal pollution effect, contained locally.			1	2	3	4	5	6
	2	Temporary alteration/disturbance beyond natural variability; effects confined to site and not accumulating; resources temporarily affected. Minor pollution, slight or negligible impact, negligible remedial or recovery work. Short term, localised and insignificant impacts to habitat or populations. Rapid recovery – measured in hours.			2	4	6	8	10	12
	3	Alteration/disturbance of a component of an ecosystem; effects not transmitted or accumulating. Pollution with some onsite impact and recovery work; possible outside assistance to contain. Incidental changes to abundance/biomass of biota in affected area; insignificant changes to overall ecological function. Recovery period measured in days – months.			3	6	9	12	15	18
	4	Alterations to one or more ecosystems or component levels, but which are recoverable; effects can be transmitted/accumulating. Significant pollution with offsite impact and recovery work. Impact that will cause a detectable effect in local ecosystem factors. Recovery period measured in months.			4	8	12	16	20	24
	5	Irreversible alteration to one or more ecosystems or several component levels; effects can be transmitted, accumulating; lost sustainability of most resources. Massive site impact and recovery work. Detrimental effect that will cause a significant effect on local ecosystem factors. Recovery period measured in years.			5	10	15	20	25	30
	6	Irreversible alteration to one or more ecosystems or several component levels; effects can be transmitted, accumulating; lost sustainability of most resources. Massive pollution with significant recovery work. Large scale detrimental effect that is likely to cause a highly significant effect on local ecosystem factors such as water quality, nutrient flow, community structure and food webs, biodiversity, habitat availability and population structure. Long term recovery period measured in decades.			6	12	18	24	30	36



**b) Bushfire fuel assessment sites located in the south-western region of The Proposal.**

Property Region	Assessment Site	Overall Fuel Hazard Rating 2017 <sup>1</sup>	Overall Fuel Hazard Rating 2018 <sup>1</sup>	Overall Fuel Hazard Rating 2019 <sup>1</sup>
<i>South-western</i>				
<sup>1</sup> L = Low, M = Moderate, H = High, VH = Very High, E = Extreme				

**c) Bushfire fuel assessment sites located in the south-eastern region of The Proposal.**

Property Region	Assessment Site	Overall Fuel Hazard Rating 2017 <sup>1</sup>	Overall Fuel Hazard Rating 2018 <sup>1</sup>	Overall Fuel Hazard Rating 2019 <sup>1</sup>
<i>South-eastern</i>				
<sup>1</sup> L = Low, M = Moderate, H = High, VH = Very High, E = Extreme				

**d) Bushfire fuel assessment sites located in the north-eastern region of The Proposal.**

Property Region	Assessment Site	Overall Fuel Hazard Rating 2017 <sup>1</sup>	Overall Fuel Hazard Rating 2018 <sup>1</sup>	Overall Fuel Hazard Rating 2019 <sup>1</sup>
<i>North-eastern</i>				
<sup>1</sup> L = Low, M = Moderate, H = High, VH = Very High, E = Extreme				

**e) Bushfire fuel assessment sites located in the central region of The Proposal**

Property Region	Assessment Site	Overall Fuel Hazard Rating 2017 <sup>1</sup>	Overall Fuel Hazard Rating 2018 <sup>1</sup>	Overall Fuel Hazard Rating 2019 <sup>1</sup>
<i>Central</i>				
<sup>1</sup> L = Low, M = Moderate, H = High, VH = Very High, E = Extreme				

**f) Bushfire fuel assessment sites located in the north-western region of The Proposal.**

Property Region	Assessment Site	Overall Fuel Hazard Rating 2016 <sup>1</sup>	Overall Fuel Hazard Rating 2017 <sup>1</sup>	Overall Fuel Hazard Rating 2018 <sup>1</sup>
<i>North-western</i>				
<sup>1</sup> L = Low, M = Moderate, H = High, VH = Very High, E = Extreme				

**Appendix 3: Bushfire fuel hazard assessment guide**

a) This table will be used to perform the bushfire fuel load assessments at the Proposal. This table has been taken from the *Overall Fuel Hazard Guide for South Australia, 2011*.

Assessing Surface Fuel Hazard					
Surface Fuel Hazard Rating	Low	Moderate	High	Very High	Extreme
Litter depth (mm)	<15	15 - <25	25 - <35	25 - <50	>50
Litter load (t/ha)	<4	4 - 8	8 - 12	12 - 20	>20
Litter cover (%)	<60	60 - 80	80 - 90	90 - 95	>95

Assessing Near-surface Fuel Hazard						
Near-surface Fuel Hazard Rating	Low	Moderate	High	Very High	Extreme	
Tussock Grasses (eg. Buffel)	Near surface fuel absent or virtually absent.	10-20% cover Little or no suspended bark and leaves	20-40% cover >20% dead May have suspended bark and leaf material	30-60% cover >30% dead grass or leaf and bark litter	>60% cover >50% dead grass or leaf and bark litter	
Hummock Grasses (eg. Spinifex)		10-20% cover	20-35% cover	40-60% cover	>60% cover	
Low sedges/rushes		10-20% cover	20-40% cover >20% dead	30-60% cover >30% dead grass or leaf and bark litter	>60% cover >50% dead grass or leaf and bark litter	
Low shrubs		10-20% cover Little or no suspended bark, leaves or twigs	20-40% cover May have suspended bark, leaves or twigs	40-60% cover	>60% cover	
Cover	<10% ground cover	Very large gaps between fuel patches. <20% dead material.	Gaps between fuel patches > fuel patches.	Fuel patches > gaps between fuel patches	Very small gaps between fuel patches	
		2%	10%	20%	50%	80%

Adjusted Surface Fuel Hazard						
Surface Hazard Rating	Near Surface Hazard Rating					Adjusted Surface Fuel Hazard
	L	M	H	VH	E	
L	L	L	M	H	VH	
M	M	M	H	VH	E	
H	H	VH	VH	VH	E	
VH	VH	VH	E	E	E	
E	E	E	E	E	E	

Assessing Elevated Fuel Hazard					
Elevated Hazard Rating	Low	Moderate	High	Very High	Extreme
Description	Easy to walk through in any direction	Easy to walk through, but vegetation brushes against legs occasionally	Moderately easy to walk through, but brush against or step over vegetation most of the time	Difficult to walk through. Need to carefully select path and step high	Very difficult to see where you're going. Need to use arms to push through vegetation
% dead material	Virtually absent	<20%	<20%	20-30%	>30%
% fuel cover	<20%	20-30%	30-50%	50-80%	>80%

Assessing Bark Fuel Hazard					
Bark Hazard Rating	Low	Moderate	High	Very High	Extreme
Stringybarks	None present	None present	Few pieces of bark loosely held	Significant amounts of bark loosely held	Outer bark loosely attached, bark easily dislodged
Platy and subfibrous barks	None present	Very tight bark	Tight bark, long unburnt	Loose bark	Does not occur
Smooth (gum) barks	Entirely smooth bark	No long ribbons present	Long ribbons of bark, but smooth trunk	Long ribbons of bark to ground level	Does not occur

**b) Criteria for assessing bushfire fuel hazard ratings and equivalent fuel loads in tonnes per hectare (t/ha); adapted from the *Overall Fuel Hazard Guide for South Australia, 2011***

Overall Fuel Hazard

Bark hazard: L/M					
Elevated Hazard Rating	Adjusted Surface Hazard Rating				
	L	M	H	VH	E
L	L	M	M	H	H
M	L	M	M	H	H
H	L	M	H	VH	VH
VH	VH	VH	VH	VH	VH
E	E	E	E	E	E

Overall Fuel Hazard

Bark hazard: H					
Elevated Hazard Rating	Adjusted Surface Hazard Rating				
	L	M	H	VH	E
L	L	M	H	H	H
M	L	M	H	H	H
H	L	H	H	VH	VH
VH	VH	VH	VH	VH	E
E	E	E	E	E	E

Overall Fuel Hazard

Bark hazard: VH/E					
Elevated Hazard Rating	Adjusted Surface Hazard Rating				
	L	M	H	VH	E
L	L	VH	VH	VH	E
M	M	VH	VH	VH	E
H	M	VH	E	E	E
VH	E	E	E	E	E
E	E	E	E	E	E

Overall Fuel Hazard

Equivalent Fuel Loads (t/ha) <sup>1</sup> for Given Hazard Rating					
Fuel	Low	Moderate	High	Very High	Extreme
Bark	0	0	2	5	7
Surface <sup>2</sup>	2	5	10	16	20
Elevated	0	0	2	6	10

<sup>1</sup>Fuel Load = Bark + Surface + Elevated

<sup>2</sup>Adjusted for Near-surface fuel

