

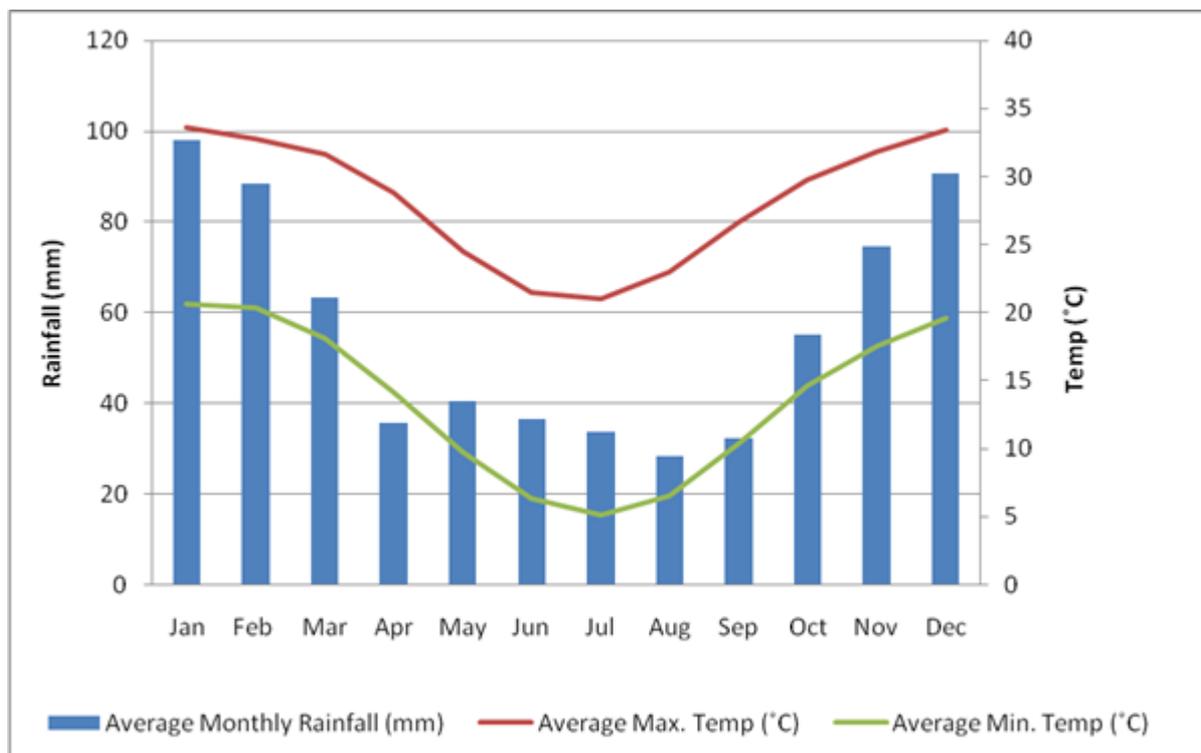
## 4.0 ENVIRONMENTAL VALUES AND MANAGEMENT OF IMPACTS

### 4.1 CLIMATE

#### 4.1.1 Regional Climate

Information from the Bureau of Meteorology ([www.bom.gov.au](http://www.bom.gov.au)) indicates that the average annual rainfall for the region (based on data for the Taroom Post Office weather station) is approximately 676 millimetres (mm). Rainfall is typically seasonal, with the dry season occurring predominantly from April to September (with an average of 34.9 mm per month) and the wet season peaking between November and February (with an average of 87.9 mm per month).

The coldest period of the year occurs in July, with an average minimum temperature of 5.1 degrees Celsius (°C), and an average maximum of 21 °C. The warmest month of the year is January, with an average minimum temperature of 20.6 °C, and an average maximum of 33.6 °C. Light to moderate winds between 6.1 to 11.2 kilometres per hour (km/hr) from the west and south are predominant in the region. Mean annual rainfall and temperature ranges are shown in Figure 4.1.

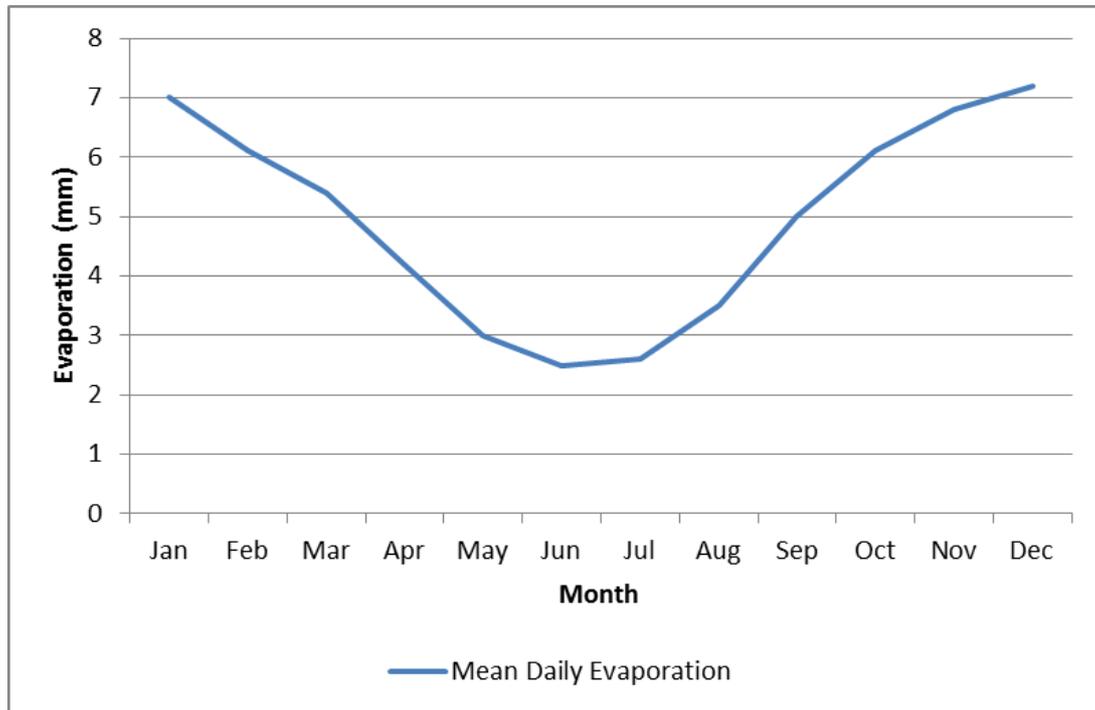


**Figure 4.1 Climograph for Taroom Post Office Weather Station (1978 – 2011)**

As there is no available data for evaporation statistics from the immediate Project site area, data from the Narayen Research Station weather station, approximately 110 km away, has been used as an approximation of evaporation at the Project site.

The annual average annual evaporation at Narayen Research Station weather station is 1807 mm, approximately 2.7 times the average annual rainfall at the Project site. Evaporation varies seasonally,

with the highest evaporation rates occurring in the November to January period, when daily evaporation averages over 6.5 mm. This is more than double the rates occurring in the period May to July. Figure 4.2 displays the mean daily evaporation rates for all months of the year.

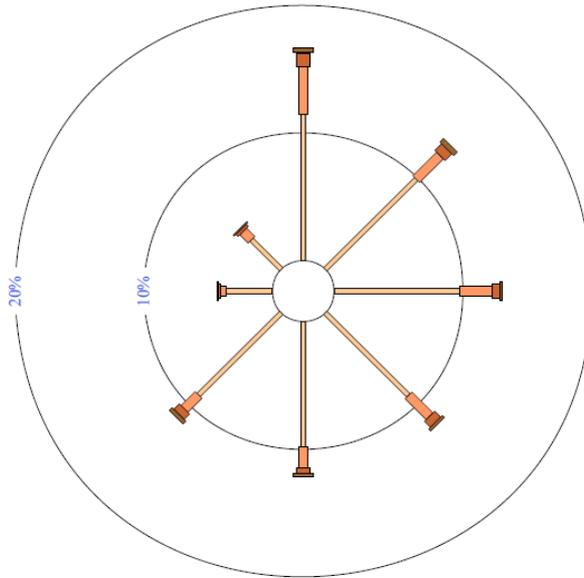


**Figure 4.2 Mean Monthly Evaporation – Narayen Research Station Weather Station**

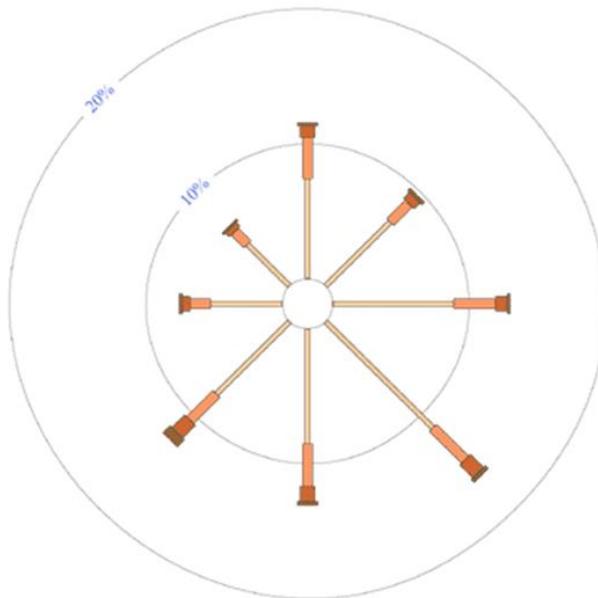
Mean wind speeds measured at the Taroom Post Office weather station at 9 a.m. indicate that wind speeds are highest in September, October and November, all averaging above 10 km/hr. Wind speeds at 9 a.m. are lowest from April to July, averaging below 7 km/hr.

Although wind speeds at 3 p.m. do not exhibit as much variation throughout the year, April and May still show the lowest speeds, averaging under 9 km/hr and September and October experience the highest speeds, averaging above 11 km/hr.

The wind roses in Figure 4.3 show that during measurements at 9 a.m. the wind direction is predominantly from the north; however wind is experienced from eastern and southern directions also. At 3 p.m., wind is predominantly from the southeast direction.



9:00 a.m. Taroom – calm 12%



3:00 p.m. Taroom – calm 9%

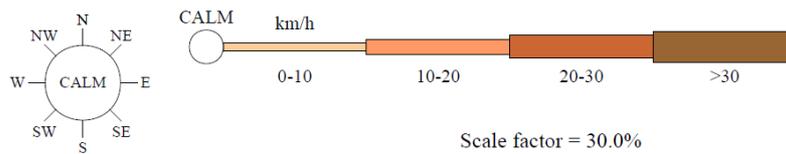


Figure 4.3 Wind Roses for the Taroom Post Office Weather Station

## 4.1.2 Climatic Extremes

Central Queensland is described as having a subtropical continental climate (BOM Australia - Köppen Australian climate classification scheme shown in Figure 4.4). Subtropical continental climates can be highly variable from season to season and year to year with various climatic extremes including floods, frosts, droughts and heatwaves not being uncommon. Thunderstorms and rainfall during the wet season may often be attributed to low pressure systems associated with cyclones.

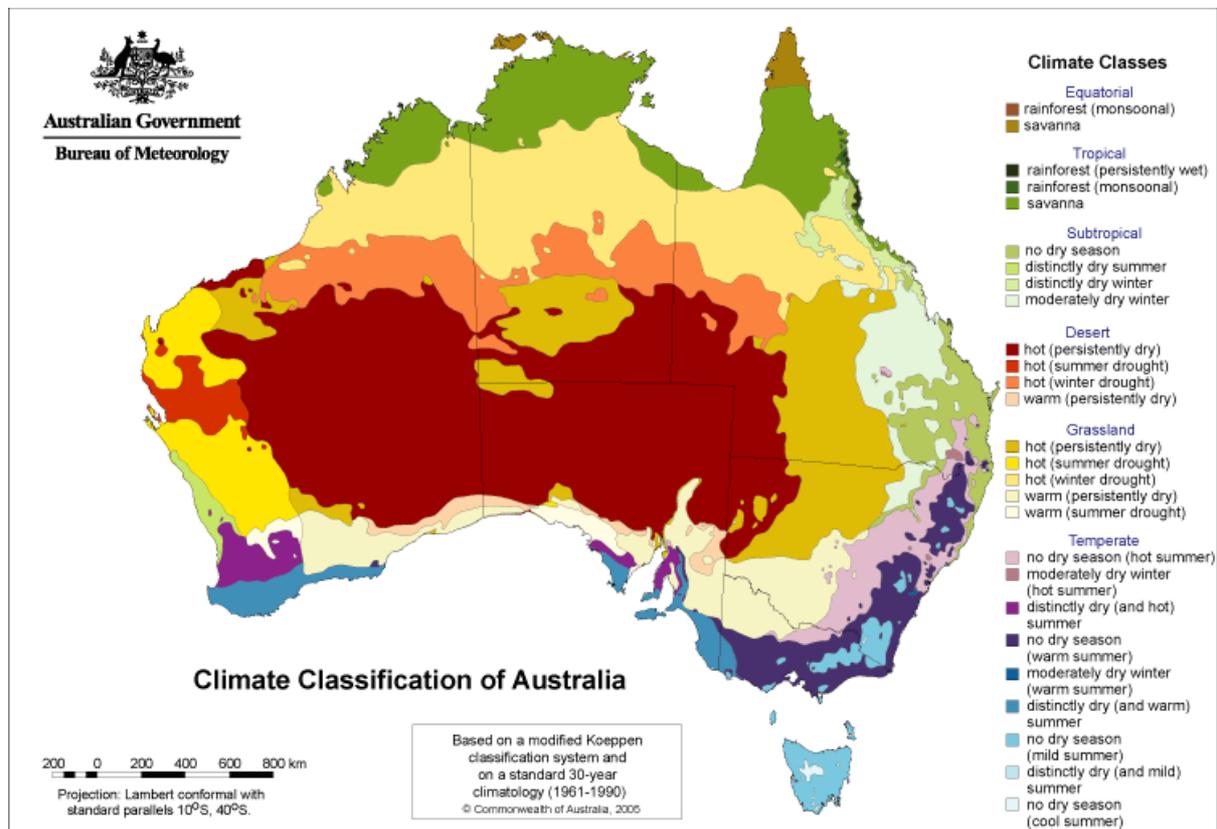


Figure 4.4 Köppen Australian Climate Classification Scheme (BOM 2012)

### 4.1.2.1 Droughts

Failure of the wet season to occur can cause severe strain on the pastures and available surface water supplies. The onset of drought is greatly enhanced by the high evaporation rates during the summer months. Evaporation losses during the dry season are less due to the lower temperatures.

Due to the long term nature of the Project and the variability of the Australian climate, the effects of drought have been considered by Taroom Coal Pty Ltd. The Project's external water supply will be secured by a connection to the water distribution pipeline network owned by a third party provider as described in Section 3.5.3. This water supply will ensure that the Project will not be reliant on the collection of rainfall.

Additional water management strategies that will assist in drought mitigation at the proposed Elimatta Project will be discussed further in Section 4.5.

#### 4.1.2.2 Flooding

The proposed Elimatta Project is located within the Fitzroy River catchment area. The catchment area can be susceptible to severe flood events following heavy rainfall episodes due to its immense size and fan-like shape.

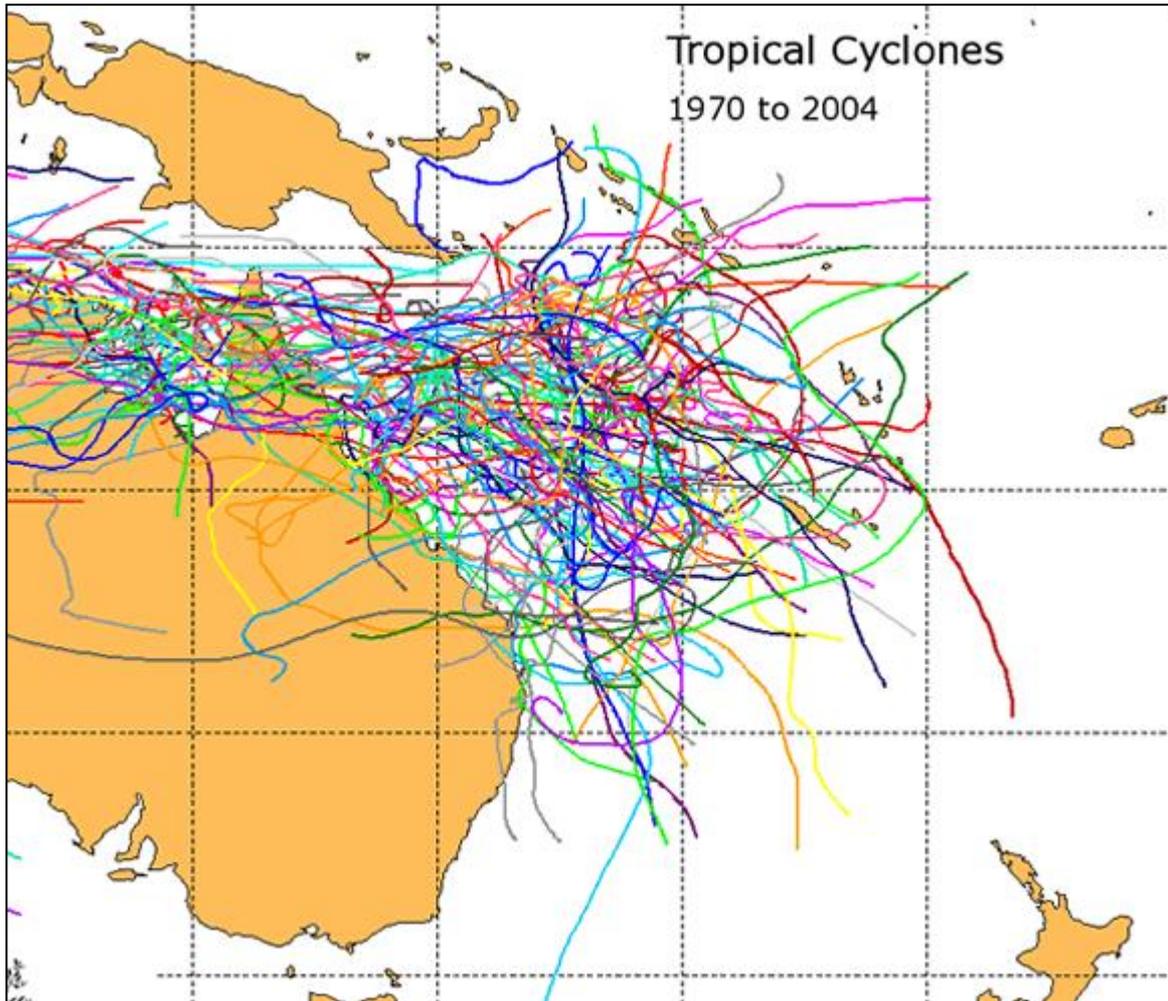
The Elimatta Project site is cut by Horse Creek, which flows in a northerly direction through the site. Horse Creek is a tributary of Juandah Creek which flows towards the township of Taroom where it flows into the Dawson River. The Dawson River flows north east from Taroom to join the Fitzroy River.

Historically, there have been a number of significant flood events on the Dawson River at Taroom indicating the susceptibility of the region to flooding. Specifically, at the Taroom gauge on the Dawson River 4.5 metre (m) is considered a minor flood and 7 m a major flood. Significant historical flood events have recorded gauge heights of 6.71 m (1918), 8.15 m (1954), 4.08 m (1978), 7.46 m (1983), 6.24 m (1991), 6.07 m (2008), 7.26 m (2010) and 10.43 m (2010-2011).

There is no existing flood data for the waterways that traverse the Project site, however, flood studies undertaken for the site and aforementioned historical events indicate that the site will be susceptible to flood events. Specific details of the flood studies undertaken are discussed in detail within Section 4.5.

#### 4.1.2.3 Cyclones

The impact from cyclonic winds at the Project site will be minimal. Cyclonic winds normally prevail in close proximity to the coast. Figure 4.5 shows the tracking patterns of cyclones that have occurred off the Queensland coast between 1970 and 2004, illustrating the small percentage that track significantly inland. Given that the Project is located approximately 300 km from the coastline the impacts from cyclones are likely to be limited to thunderstorms and heavy rainfall, the impacts and mitigation strategies of which are discussed in detail in Section 4.5.



**Figure 4.5 Cyclone Tracking 1970 – 2004 (BOM 2012)**

#### **4.1.2.4 Bushfires**

The peak fire season for the Project area occurs in spring and summer (Figure 4.6) when the vegetation is at its driest and the probability of rainfall is low. Serious fires may follow long dry periods accompanied by El Nino - Southern Oscillation events.

Bushfire risk maps obtained by the Queensland Rural Fire Service indicate that the Project lies within an area that has a low – medium bushfire risk.

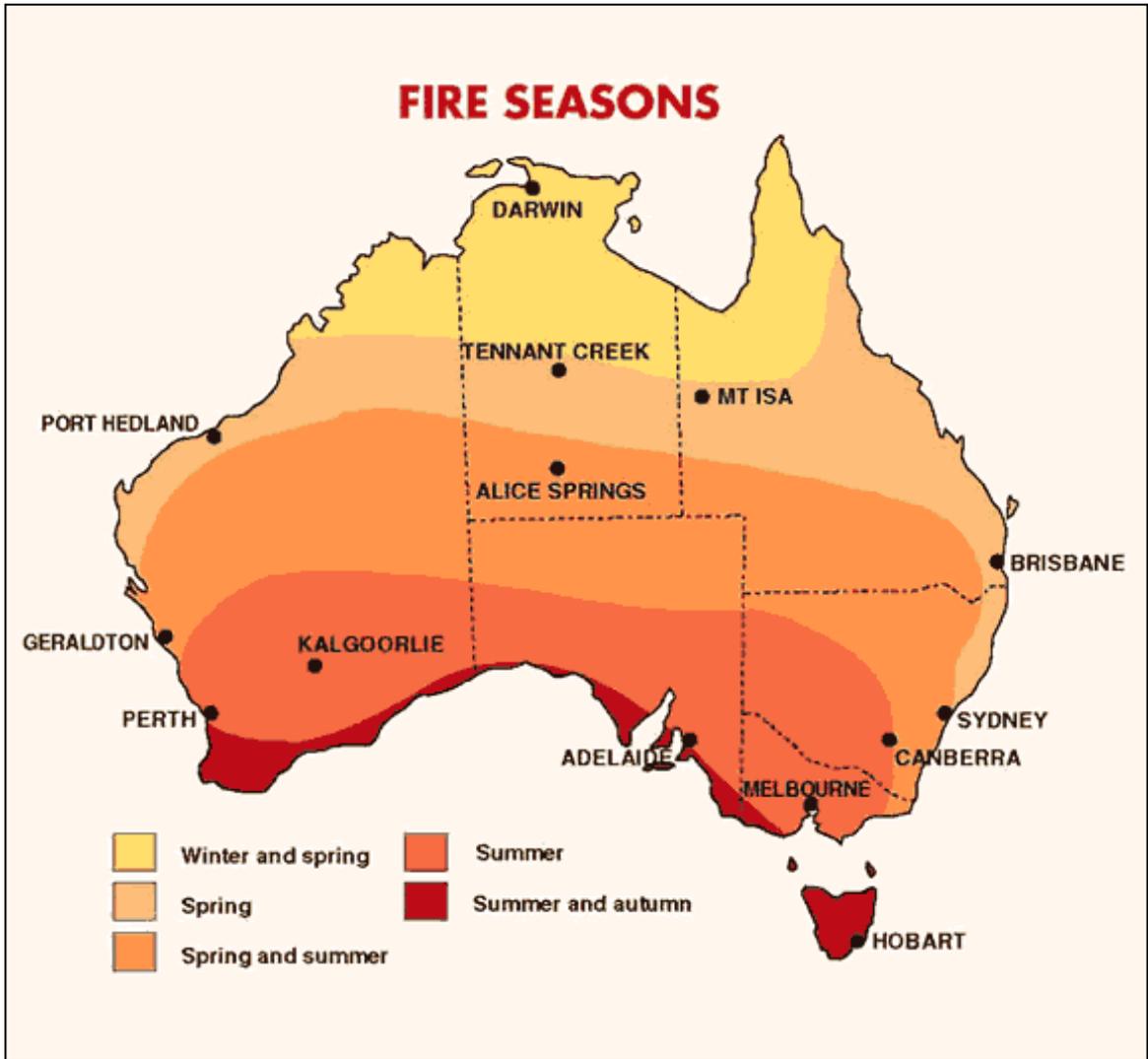


Figure 4.6 Typical Fire Seasons in Australia (BOM, 2012)