Millennium Expansion Project

Environmental Impact Statement

CHAPTER 6:

CLIMATE

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6.0 CLIMATE

6.1 INTRODUCTION

According to the Bureau of Meteorology (BOM), the Millennium Expansion Project (MEP) area is classified as 'Subtropical' based on the Koppen classification system. Subtropical refers to areas that have humid, wet summers and cool, dry winters.

The BOM has a weather station located at the Water Treatment Plant (Station #034038) in Moranbah that has collected climatic records from 1972 through to 2010. This is the closest long-term weather station to the MEP area and is located 24 km east of the MEP. A summary of the average climatic data recorded at Station #034038, providing indicative climate and weather for the MEP area, is presented in **Table 6-1**.

Table 6-1 Climate Averages–Moranbah Weather Station

Month	Temperature (ºC)		Relative Humidity (%)		Wind Speed (km/h)		Rainfall (mm)		
	Mean max	Mean min	9 am	3 pm	9 am	3 pm	Mean Monthly	Highest Daily	Highest Monthly
Jan	33.9	21.9	70	42	7.5	8.8	102.1	120.4	315
Feb	33.2	21.8	74	47	7.7	9.7	98.3	150.8	347.4
Mar	32.3	20.2	70	41	8.1	9.5	47.3	164.8	268
Apr	29.6	17.6	72	43	7.6	8.8	37.4	143.8	271
May	26.6	14.4	73	44	6.2	6.8	36.8	58.0	196.6
Jun	23.7	11.2	73	44	5.5	6.5	23.0	43.4	170.3
Jul	23.6	9.8	69	39	5.3	6.9	19.0	60.0	103.6
Aug	25.3	10.9	66	35	6.6	7.6	23.1	150.8	247.3
Sep	29.2	14.1	59	30	7.7	8.3	8.1	20.4	39.4
Oct	32.4	17.7	59	30	8.4	8.4	37.1	73.8	146.6
Nov	33.2	19.5	61	34	8.4	8.9	68.4	86.0	220.3
Dec	34.0	21.1	64	39	8.6	8.8	97.3	116	318.2
Annual Average	**29.7**	**16.7**	**67**	**39**	**7.3**	**8.2**	**49.8**	**-**	**-**

Source: http://www.bom.gov.au/climate/averages/tables/cw_034038.shtml
http://www.bom.gov.au/clim_data/cdio/tables/text/IDCJCM0036_034038.csv

Moranbah has a warm climate with mean maximum temperatures ranging from 23.6°C in July to 34.0°C in December. Mean minimum temperatures range from 9.8°C in July to 21.9°C in January. Heat wave conditions can be expected between October and March and frosts between May and August.

The region tends to have winds of low velocity (less than 10 km/hr) with the prevailing wind direction predominantly from the north and northeast during spring and summer and from the southeast during autumn and winter. Wind records for Moranbah for January-April show an easterly predominance of moderate strength (1-20 km/h), with easterlies dominating during May-July with some south-easterly influence. Easterly winds predominate for August-

December which tend north to north-easterly from October-December. Further information on wind direction and speed, in reference to air quality, is provided in **Chapter 11-Air**.

The average annual rainfall at the Moranbah Water Treatment Plant is 592.4 mm, of which the majority falls in the warmer months of the year (November to February). Historically, the highest monthly rainfalls occur in December.

Monthly averages for rainfall and temperature for Moranbah were sourced from the BOM and are shown in **Figure 6-1**.

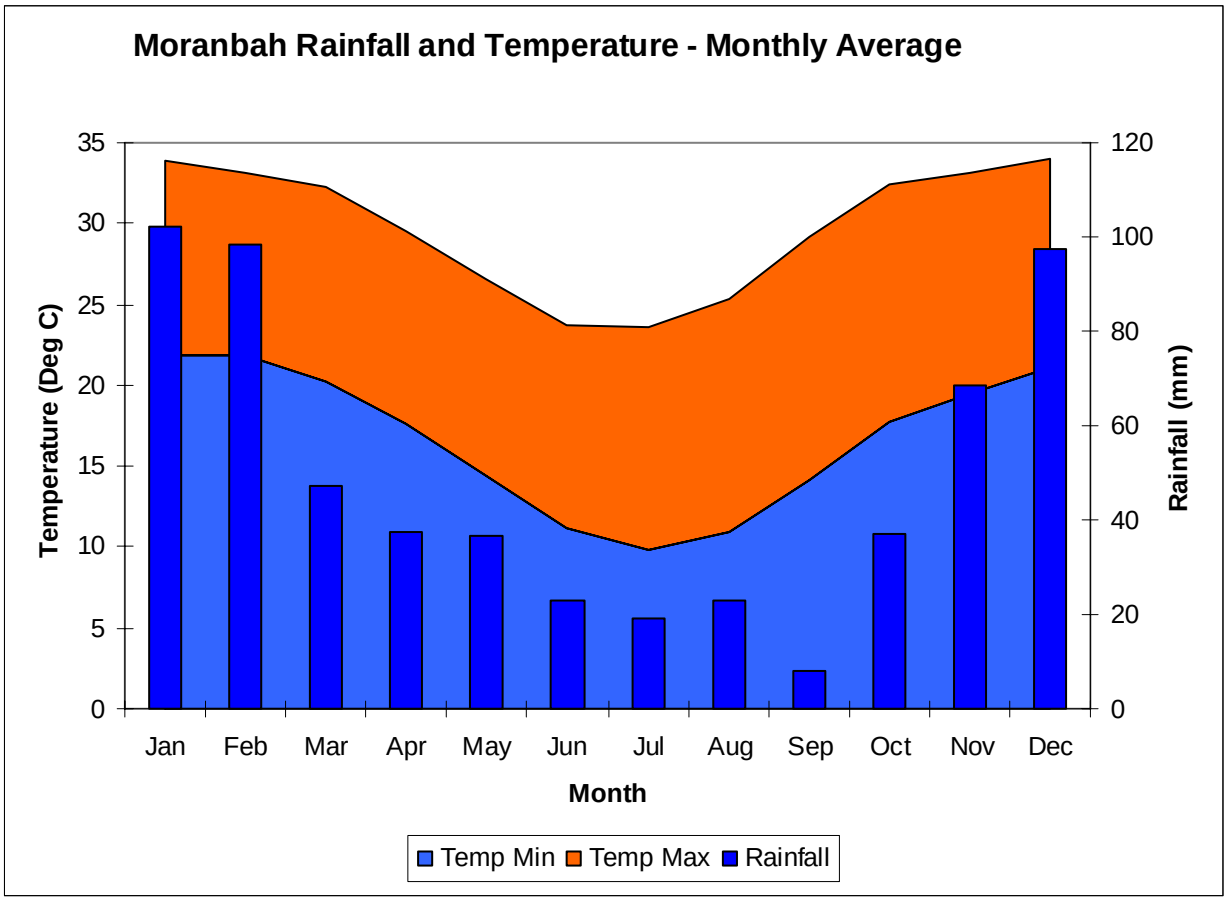

Figure 6-1 Average Monthly Rainfall and Temperature (1972-2010)

The evaporation rate is highest in the summer months, with a mean daily rate of 8.2 mm in January, and lowest in the cooler months, with a mean daily rate of 3.6 mm in June. The mean monthly rate of evaporation is 78 mm. The annual average rate of evaporation is 2,372.5 mm, which greatly exceeds the annual rainfall, a characteristic of semi-arid environments.

Rainfall records from July 2007-May 2009 were available from the weather station located on the adjacent BHP Mitsui Coal Poitrel Mine (Poitrel), located less than 5 km from the MEP (Poitrel Mine Environment Department, 2010). A comparison of the rainfall records from the BOM and the Poitrel weather station can be seen in **Table 6-2**, which shows that rainfall correlation is similar but slightly higher in the MEP area over the two years being compared. When compared against the long-term annual average rainfall figures from Moranbah, rainfall in the MEP area for the last two years exceeded the annual long term average by 67%. This was due to significantly wetter than average years for the entire region in the last two years.

Table 6-2 Rainfall Records

Month	Moranbah Station 034038		Poitrel Mine
	Long-term Average Rainfall (mm)	Recorded Rainfall (mm)	Recorded Rainfall (mm)
July 2007	19.0	0.0	0.0
Aug 2007	23.1	12.8	13.0
Sept 2007	8.1	13.0	19.0
Oct 2007	37.1	32.1	48.0
Nov 2007	68.4	78.6	142.5
Dec 2007	97.3	162.3	141.5
Jan 2008	102.1	272.2	303.0
Feb 2008	98.3	347.4	304.0
March 2008	47.3	9.3	53.0
April 2008	37.4	1.0	0.5
May 2008	36.8	0.3	10.0
June 2008	23.0	7.4	5.5
July 2008	19.0	94.0	93.0
Aug 2008	23.1	0.0	0.0
Sept 2008	8.1	6.2	7.0
Oct 2008	37.1	9.7	3.5
Nov 2008	68.4	52.5	62.0
Dec 2008	97.3	32.5	83.5
Jan 2009	102.1	167.8	134.0
Feb 2009	98.3	238.4	279.5
March 2009	47.3	2.2	2.5
April 2009	37.4	34.3	38.5
May 2009	36.8	1.6	0.0
Jun 2009	23.0	10.6	0.0
Jul 2009	19.0	0.0	0.0
Aug 2009	23.1	0.1	0.0
Sept 2009	8.1	0.0	0.0
Oct 2009	37.1	2.6	2.0
Nov 2009	68.4	20.5	15.0
Dec 2009	97.3	0.2	28.5
Jan 2010	102.1	99.6	179.5
Feb 2010	98.3	185.3	152.5
Total	**1,172.8**	**1,577.3**	**1,743.5**

Source: BOM and Poitrel rainfall records.

6.2 EXTREME EVENTS

The following discussion of potential extreme events identifies the likely frequency and magnitude of flooding, bushfires, landslides and earthquakes. These are considered in reference to the *State Planning Policy 1/03 - Mitigating the adverse impacts of flood, bushfire and landslide* (*SPP 1/03*).

6.2.1 Cyclones/Flooding

The BOM Queensland Flood Summaries indicate there have been relatively few cyclones in the past 120 years in the MEP area. The most intense cyclone, a Category 2 event, occurred in January 1918 in Mackay and caused severe flooding. High floods were also experienced in all tributaries of the Fitzroy and Burdekin Rivers, especially the Dawson, Mackenzie, Comet and Nogoa Rivers.

Meteorological monitoring commenced at the Moranbah Water Treatment Plant in 1972. Since 1972, the highest 24 hour rainfall event recorded at the Moranbah BOM station was 164.8 mm.

Potential impacts from flooding and heavy rainfall events have been assessed for the MEP. Appropriate flood mitigation and management procedures, and associated infrastructure, has been designed and will be incorporated as detailed in **Chapter 10 – Water Resources**.

There is a risk of flooding and impact from strong winds on the MEP area, with the subsequent potential for release of contaminants and sediments from site. This may occasionally, but infrequently, necessitate halting of mining activities if this will alleviate the release of contaminants during extreme meteorological conditions. The likelihood of flooding and chemical or wastewater spills to waterways occurring at the MEP is very low, refer to **Chapter 10 – Water Resources** and **Chapter 18 – Hazard and Risk**.

Peabody will manage the impacts of flooding in accordance with the recommendations of *SPP 1/03*. Flood levees will be constructed progressively throughout the MEP site as required to minimise impacts of flooding on mining activities and any potential for release of contaminants to the environment.

6.2.2 Bushfires

Bushfires and grassfires are an intrinsic component 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.

The risk associated with fire varies depending on the type of fire. Grassfires are fast moving and smoulder briefly. 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 and can smoulder for days. Fire in the crown of the tree canopy can move rapidly.

Bushfire risk mapping, as modelled by the Rural Fire Service and Queensland Fire and Rescue Service, has been reviewed for the MEP area. The area surrounding Moranbah is primarily classified as having a medium to low bushfire risk, although there are a number of locations within the Isaac Regional Council area that are classified as having a higher risk.

Under *SPP 1/03*, watercourses are classified in the low risk category. This is due to the fact that many of the creeks are predominantly dry throughout the year containing only tree roots, logs and cobbles. Creeks will only flow during, and immediately after, a significant rainfall event before drying into a series of pools of water, and eventually evaporating completely.

As a bushfire mitigation measure, areas surrounding infrastructure associated with the MEP will be managed to ensure they meet the requirements of SPP 1/03. As mining construction and operations progress, fire breaks will be maintained to minimise the risk of bush fire. This is detailed in the existing Millennium Mine Safety and Health Management Plan. In the event of a fire threatening human safety and/or mining infrastructure, the Moranbah Fire Brigade response time is estimated to be 45 minutes.

The MEP will follow the Queensland Mines Rescue Service regulations and procedures.

6.2.3 Landslides

Landslides can be caused by earthquakes, volcanoes, soil saturation from rainfall or seepage or by human activity (e.g. vegetation removal, construction on steep terrain). Landslides usually involve the movement of large amounts of earth, rock, sand or mud, or any combination of these.

Based on the topography of the MEP site it is unlikely that there will be any landslides resulting from natural causes, although erosion of mesa structures can result in rock falls and the movement of soil.

Disturbance to waterways has the potential to create land slippages and mining activities also have the potential to create localised slippages within the mine ramps, pits and overburden dumps. Despite this low risk, should a land slide/slippage occur that meets the definition in *SPP 1/03*, Peabody will manage the impacts in accordance with *SPP 1/03* and in consultation with the Queensland Government State Disaster Management Group. The site Principal Hazard Management Plan will also be followed.

6.2.4 Earthquakes

The majority of the world's earthquakes generally occur at plate boundaries (i.e. interplate seismicity). Although Australia is located within a tectonic plate, it exhibits intraplate seismicity with a comparatively low level of activity. Earthquakes have been assessed as a low hazard for the MEP based on the Mackay region earthquake map (Middelmann and Granger, 2000). Earthquake activity occurs in a general zone along the coast from the border of New South Wales to north of Cairns and extends off the coast and further inland from the MEP.

In the unlikely event of an earthquake, the MEP will follow the site Emergency Response Plan.

6.3 REFERENCES

Middelmann, M. and Granger, K. 2000, Community Risk in Mackay: A Multi Hazard Risk Assessment, Australian Geological Survey Organisation, Canberra.

Poitrel Mine Environment Department 2010, Recorded Rainfall Figures for Poitrel Mine, Provided by the Poitrel Mine Environment Department.