

4. ENVIRONMENTAL AND SOCIO-ECONOMIC SETTING

This chapter provides an overview of the physical and socio-economic environment in which the project is set. The physical setting of the project can be characterised as semi-arid, relatively flat, open grasslands/open woodland which are common across the Barkly Tableland; while the socio-economic setting of the region can be characterised as being sparsely populated, remote and heavily dependant on Tennant Creek and Mount Isa for services and employment. Within the project area there are no residents or existing infrastructure, apart from an exploration camp.

Further details about this setting are provided below.

4.1 Landscape

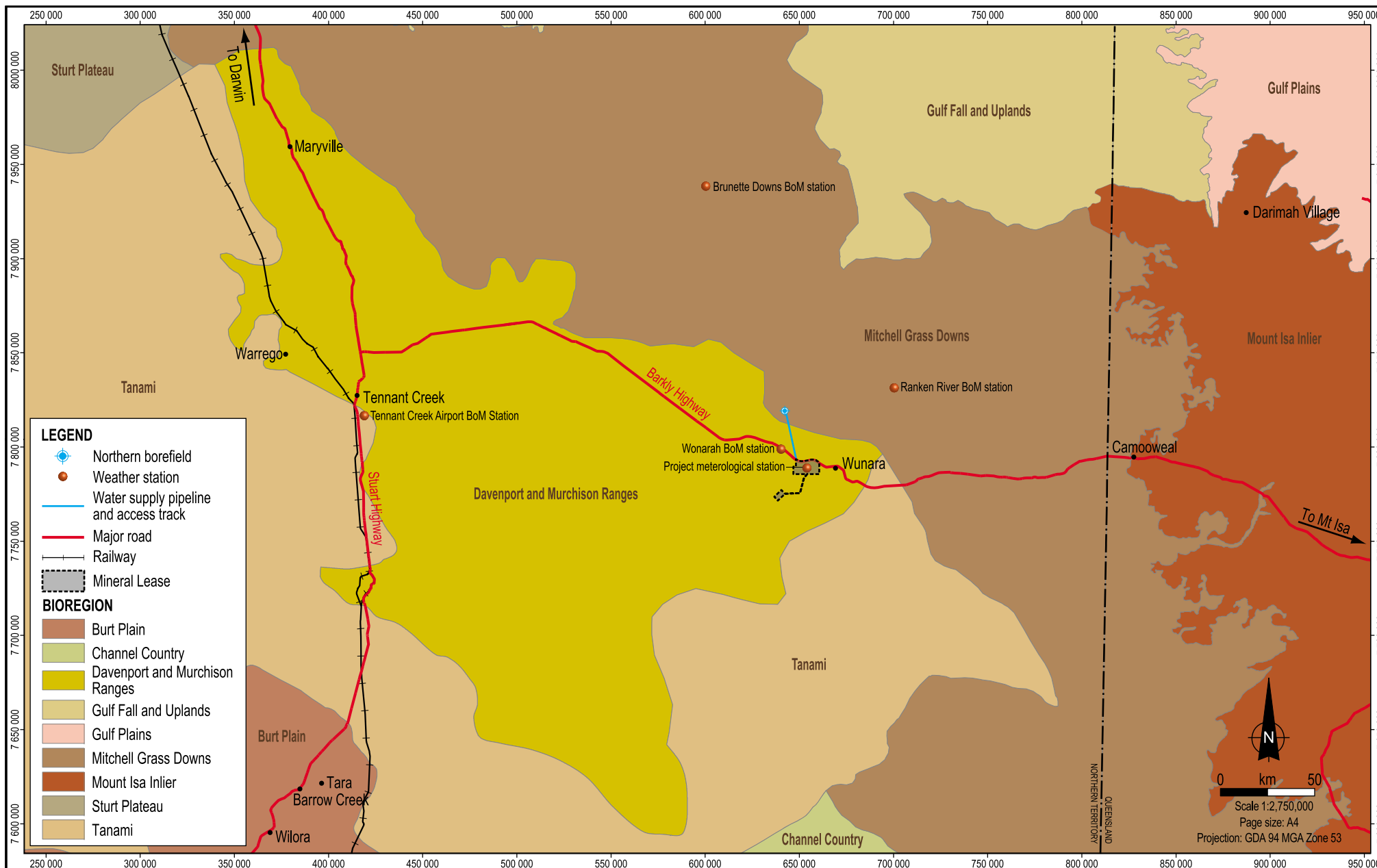
The Wonarah Phosphate Project is located on the undulating plains of the Barkly Tableland within the Davenport and Murchison Ranges Bioregion (Figure 4.1). Across the Barkly Tableland there is generally only a very gentle relief that varies less than 50 m in elevation from the highest to lowest point (Edgoose, 2003). The landscape of the project area has a general low relief, although small rocky outcrops are locally common (Plate 4.1). There are few natural features of note in the project area, other than the rocky outcrops and some termite mounds.

4.2 Climate

The regional climate is semi-arid with well-defined wet and dry seasons: hot, wet and relatively humid weather generally persists from November until March (with mean maximum of 38°C and minimum of 25°C) before becoming mild to cool between April and September (mean maximum 25°C and minimum 12°C). The annual rainfall is in the range of 300 to 400 mm with the majority of this falling during January and February. Droughts and floods can occur in the region within a few years of each other and while tropical cyclones have passed through the region, they are infrequent and erratic in nature. On average, one cyclone will pass within 200 km of the project area every six or seven years, with these cyclones known to bring heavy falls of rain of up to 200 mm in one day.

Climatic data for the project area has been obtained from a meteorological station that was installed at the project area in May 2008 and Bureau of Meteorology (BoM) stations, including: 'Wonarah', located 10 km east of the project area which ceased operation in 1974; 'Brunette Downs', located 145 km north of the project area; and 'Ranken River' rainfall station, located 68 km northeast of the project area (see Figure 4.1). Brunette Downs and historical data from Wonarah show similar seasonal trends in temperatures (Figure 4.2).

Brunette Downs records a higher mean annual rainfall (414 mm) than that of the historic Wonarah record (317 mm, ranging from 100 to 570 mm). Ranken River receives a mean annual rainfall of 361 mm, ranging from 100 to 828 mm. Rainfall patterns for the project area are expected to be similar to Ranken River. The total rainfall recorded at the project area during May 2008 to July 2009 was 280 mm, with over half of this (180 mm) falling during a single event in January 2009. Evaporation for the region, as measured at Brunette Downs exceeds rainfall during all months of the year except January and February, the two months of the highest rainfall.



Source:
Place names and roads from GEODATA 250k (optimum scale 1:250,000).
Bioregions from DEWHA.
Mineral Lease from DMETIS.

coffey
natural systems

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27.10.2009
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File Name:
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Minemakers Australia Pty Ltd

Wonarah Phosphate Project

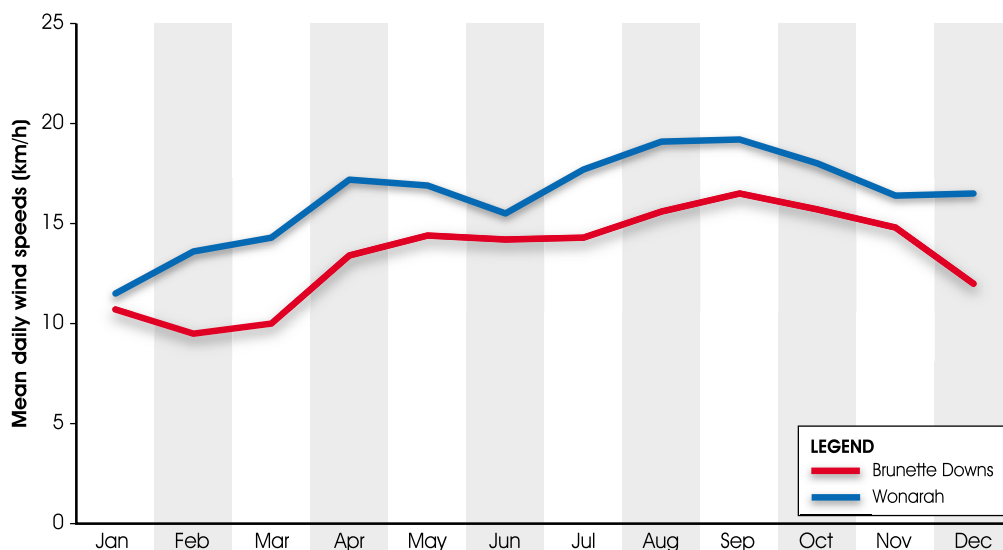
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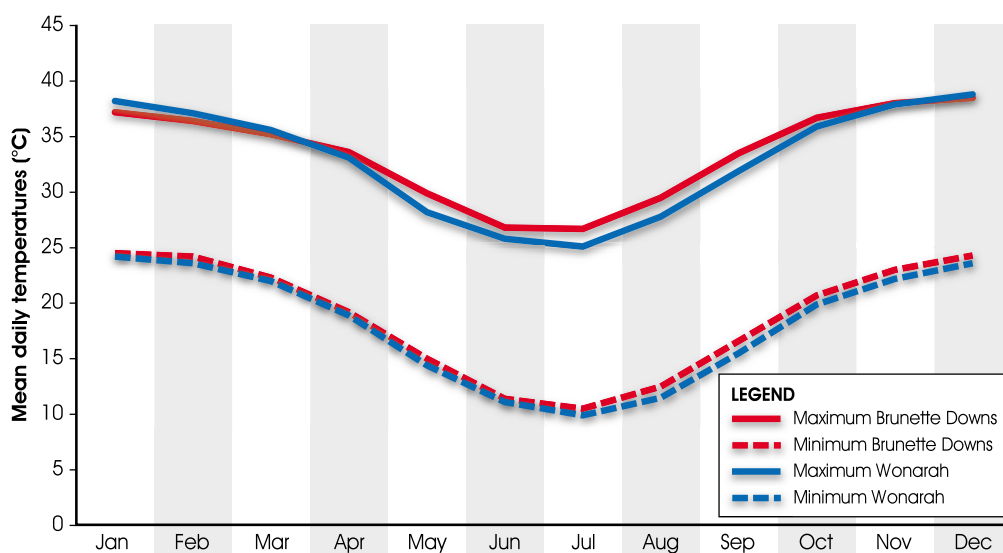
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4.1

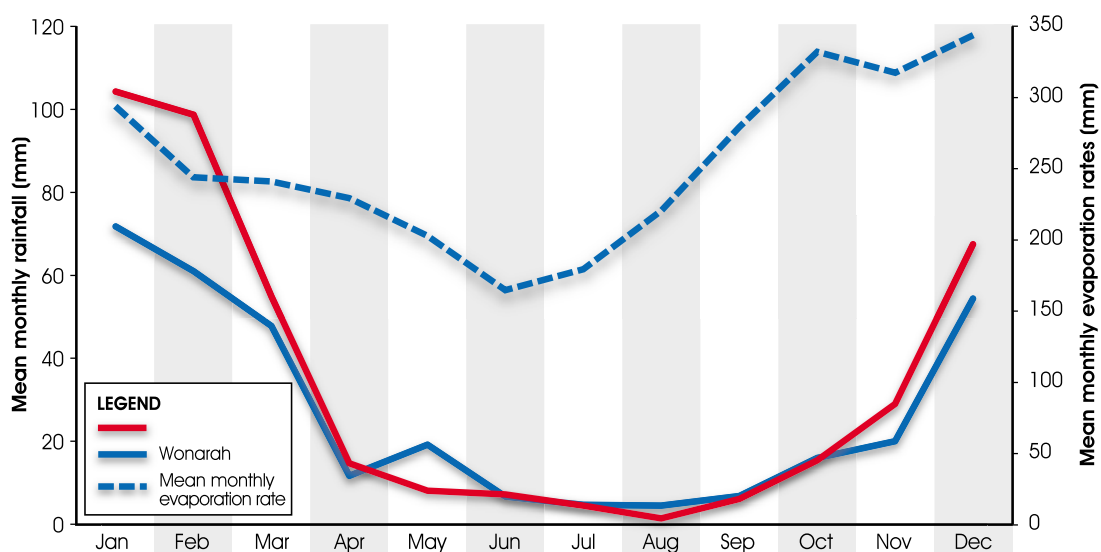
a)
Mean daily
wind speed
for Wonarah
and Brunette
Downs



b)
Mean daily
temperatures
for Wonarah
and Brunette
Downs



c)
Mean monthly
rainfall and
evaporation
rates for
Wonarah and
Brunette Downs



Source: BoM, 2009.

The relative humidity for the Wonarah and Brunette Downs BoM stations show similar trends. The mean annual relative humidity for mornings is 48% and afternoons is 27%, with mean humidity ranging from a high of 60% during the wet season and dropping to a low 20% during the dry season.

4.3 Surface Water

The project area is situated at the eastern margin of the internally draining Barkly Surface Water Management Area, which covers an area of 124,000 km². Watercourses that drain the Barkly Tableland are ephemeral and only flow after major rains (generally during the late wet) to several large shallow lakes, very few of which are permanent. However, some lakes are known to retain water for extended periods after rain. No significant watercourses traverse the project area, there are only minor ephemeral drainage lines (Plate 4.2). The closest significant watercourse is the ephemeral Ranken River about 50 km to the east of the project area.

Water quality for ephemeral watercourses in semi-arid environments generally varies greatly, due largely to the intermittent, seasonal nature of the flow. It is common for heavy rains to result in highly turbid flows and sediment-bound materials to be transported large distances (Smith, 2003). Ephemeral watercourses that dry out under high temperatures also tend to have variable salinity due to the concentration of salts from evaporation.

There is no major water storage, diversion or supply infrastructure within the Barkly Surface Water Management Area and the volume of surface water used is less than 0.1% of the mean annual runoff, with any water use being for stock watering.

4.4 Groundwater

Groundwater across the Barkly Tableland has been, and continues to be, used for domestic and stock water for nearly a century. Groundwater quality over the Barkly Tableland is generally fresh to brackish, ranging from 500 to 4,000 mg/L total dissolved solids (TDS), which is suitable drinking water for beef cattle.

Groundwater levels in the region are extremely variable, ranging from about 25 to more than 100 m below ground level. While the regional groundwater flow regime is poorly understood, it is thought that there may be a north-south groundwater divide, with groundwater north of the divide flowing northwards and discharging to the Gregory River and groundwater south of the divide flowing southeast. In the area north of the Mineral Lease the groundwater levels are reasonably consistent, lying between 49 to 51 m below ground level (bgl). This indicates the presence of a well connected aquifer system within the cavernous and weathered dolomite. Groundwater levels at the Mineral Lease are more variable, varying from 3 to 103 m bgl. This variability in groundwater level suggests a heterogeneous or fragmented groundwater system, with poor hydraulic connections between aquifers.

Test pumping carried out show a modest aquifer transmissivity at the Arruwurra zone of about 15 m²/d. Results of test pumping at the northern borefield site demonstrated high to very high aquifer transmissivity ranging from 350 to 500 m²/d and 700 to 900 m²/d, consistent with a short-term duty rate of between 15 and 20 L/s.

4.5 Land Use

Broadscale land use mapping identifies the project area as having grazing, natural vegetation and traditional Indigenous use, i.e., hunting and gathering and access to and use of sacred sites. Surrounding pastoral properties are grazed with beef cattle; however, no pastoral activity occurs in the project area. Beside traditional Indigenous use, the other main land use that the area has been used for is mineral exploration. The Wonarah phosphate deposit was identified in 1967, and exploration for phosphate resources has been carried out intermittently at Wonarah over the past 40 years.

4.6 Flora and Fauna

At a broad scale, the project area is dominated by the Yelverloft land system. The Yelverloft land system is characterised by skeletal soils and gravelly lateritic earth with *Eucalyptus brevifolia* or *E. dichromophlora* woodlands.

At a finer scale, vegetation is dominated by *Acacia*, *Eucalyptus*, *Grevillea*, *Hakea* and *Melaleuca* tree and shrub species over *Aristida* and *Triodia* grass species, with the composition of vegetation varying depending on the soil substrate (which is in turn largely a function of topography). In total, 144 flora species were recorded in the project area during wet and dry season baseline surveys. Of these, none were flora species of national conservation significance, i.e., listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and no such species are considered likely to be present. However, thirteen species listed under the Northern Territory *Territory Parks and Wildlife Conservation Act* (TPWC Act) have been recorded in the region, with four species recorded in the project area.

Forty-four species of Indigenous significance are present. There is also two environmental weed species present within the project area, these species are relatively common in the Barkly Tableland. Fire plays a large role in the condition of vegetation in the project area and surrounds (Plates 4.3 and 4.4); at a broad scale the project area has a fire frequency history of one to two fires every ten years, with some patch burning practiced by Traditional Owners.

The fauna of the project area is generally common and widespread in the region. A total of 33 bird, 14 reptile and 15 mammal (10 native and 5 introduced) species were recorded during wet and dry season baseline surveys. Of these, none are listed under the EPBC Act and one, the northern nail-tailed wallaby, is listed under the TPWC Act. Four species of conservation significance have been previously recorded in the region surrounding the project area. Of these, two species, the mulgara and bilby, are listed as vulnerable under the EPBC Act, while the spectacled hair wallaby and long-haired rat are listed as near-threatened under the TPWC Act. Suitable habitat for each of these species is present within the project area but this habitat is not considered critical for the survival of any significant populations of any of the species. Migratory bird species may visit wetland habitat in and around the project area during suitable conditions. Introduced fauna present in and around the project area are the donkey, camel, cow, feral cat and fox.

4.7 Cultural Heritage

The cultural heritage field survey located six sites of Aboriginal archaeological significance (one site of moderate, and five sites of low, scientific significance) (see Section 6.12). Four of these sites are located within the Mineral Lease and two, including the site of moderate significance, lie outside of the Mineral Lease. These archaeological sites were associated with silcrete outcrops and contained artefacts that indicated that the use of the area was related to groups moving through the area and not related to permanent occupation of the area.

Eight Aboriginal sacred sites have been identified close to, but outside, the Mineral Lease these been incorporated into cultural exclusion zones. Two sites have been identified to the north of the Barkly Highway; however, these sites occur to the west of the northern borefield.

No sites of non-Indigenous cultural heritage significance are present within the project area.

4.8 Air Quality and Noise

The project area is remote from significant air pollution sources such as industry, other than that from passing freight and tourist traffic on the Barkly Highway. The existing air quality in the vicinity of the project area is typical of semi-arid, rural environment with wind blown dust from existing exposed surfaces and ash from bushfires the main pollutant. Dust monitoring results show background dust fall is on average in the range of 1.9 to 3.4 g/m²/month, which is typical of arid regions.

No significant, permanent man-made noise sources are located at or near the project area, other than that from passing traffic on the Barkly Highway. The background noise levels from natural sources are likely to be less than 30 dB(A) during the night and in non-windy periods during the day.

4.9 Socio-economic Environment

The Northern Territory is the most sparsely populated state or territory in Australia and includes many small Aboriginal communities. The Barkly Tableland region covers an area of 283,648 km² in the central eastern area of the Territory. Tennant Creek (population 2,920) is the major service centre for the region and is located approximately 260 km from the project. As the regional service centre, there are a range of social, commercial and professional services. The project falls within the administrative boundaries of the Barkly Shire Council.

Tennant Creek has a local and regional population of approximately 8,310. The Aboriginal and Torres Strait Islander people comprise 49% of the total population of Tennant Creek. The Traditional Owners of Tennant Creek are the Warumungu people. Within the Barkly Tableland region, Traditional Owners include the Kaiditch, Alyawarr and Arruwurra people. There is a long history of occupation by Indigenous persons and many maintain a strong association with the land and water in the region.

The major source of income for the local communities in the region is generated from agricultural production. Pastoral production the Barkly Tableland, which covers an area of 283,648km², accounts for 39% of the Northern Territory cattle industry. Other sources of income in the Tennant Creek area include mining and tourism. The agricultural production and mining industries have a

long-standing history in Tennant Creek and the surrounding region and the local community are hoping to capitalise from the presence of a large-scale development in the area.

Employment in Tennant Creek is dominated by public administration (approximately 23%), with only 8% employment in both the retail trade and accommodation and service industries. Mining accounts for 2% of employment in Tennant Creek. The unemployment rate in Tennant Creek (7%) is higher than in Darwin and there is an absence of semi-skilled and skilled persons within the available workforce. The Northern Territory government initiatives to improve employment in the region is demonstrated by the development of the Regional Job Hub located at Tennant Creek (opened July 2009) which aims to coordinate and facilitate access to resources so that job opportunities can be realised in the area.

The tourism industry in Tennant Creek is significant component of the local economy. There are five hotels within Tennant Creek, with approximately 200 rooms available in total, 3 caravan parks, and another 66 rooms available in the form of cabins. Short-term accommodation is also available along the ore transport route at the Three Ways and Barkly Roadhouses and five roadside campsites along the Barkly Highway.

Tennant Creek is generally well equipped with essential and non-essential services. Services include a hospital, emergency services (police, fire, ambulance, Royal Flying Doctor Service), child care centre and education facilities for pre-school through to secondary and vocational education and training.

The Barkly Highway, which links Tennant Creek to Mount Isa, passes immediately to the north of the project area; the project is approximately equidistant between these two major towns. The Barkly Highway (Plate 4.5) is used as the main road freight route between Queensland and the Northern Territory, as well as being a popular tourist route.

Wunara Community

There is little development in the project area, with the closest residents located in the Wunara Community, approximately 10 km east of the Mineral Lease boundary. Wunara is an Aboriginal settlement (Plate 4.6) adjacent to the Barkly Highway and comprises four houses and some associated buildings. The population fluctuates from 2 to 30 people according to the season. The community also has recreational and community infrastructure including a public telephone, bore and water storage infrastructure.

The Wunara community does not have medical facilities within the community and community members must travel to Tennant Creek or Mount Isa in Queensland to access available services. There is also no school in the community with school aged students either undertaking school of the air while living in the community, with the alternative option to leave the community to larger towns and cities.

Employment opportunities in Wunara are limited; however, two of the Traditional Owners living in the Wunara community have been employed by Minemakers to assist during the exploration phase of the project and six Traditional Owners are currently employed in the mining of a bulk sample.

Plate 4.1
Rocky outcrops common
in the project area



Plate 4.2
Typical ephemeral drainage line
in the project area



Plate 4.3
The project area after fire showing
Spinifex regrowth



Plate 4.4
Vegetation in the project area
after good wet season rains



Plate 4.5
Barkly Highway



Plate 4.6
Wunara community



