

## 5. Existing Social and Economic Environment

### 5.1 Communities

A desktop socio-economic assessment of Spinifex Ridge was undertaken on a local and regional scale. The subsections below provide a summary of the existing community profiles.

#### 5.1.1 Pilbara Region

The Pilbara region is located in northern Western Australia and covers more than 500,000 km<sup>2</sup> accounting for 20% of the State's total area (PDC, 2001). In 2001, the region supported a population of approximately 42,000 people (ABS, 2001). The region comprises four local government areas including:

- Shire of Ashburton;
- Shire of East Pilbara (within which the project is located);
- Shire of Roebourne; and
- Town of Port Hedland.

Although the region is classified as 'very remote' due to the large distances between population centres, it is supported by a modern and efficient infrastructure network with energy, water, transport and communications services. The major population centres for the region are the towns of Port Hedland and Karratha. The majority of the population represents large temporary workforces that support industry and infrastructure development in the region. The population is considered young with a median age of 29 when compared to the State median age of 35.

A smaller proportion of the population supports pastoralism in the region. Almost 58% of the area is occupied by pastoral leases (DoA, 2004).

The Pilbara economy makes significant contributions to the State through the development of natural resources and provides three of the largest export revenue earners: iron ore, liquefied natural gas, and oil (DLGRD, 2004). Key industries in the Pilbara and their annual estimated production values as measured in 2003 were:

- oil and gas - \$14.5 billion;
- mining - \$8 billion;
- salt - \$179.5 million;
- tourism - \$160 million;
- agriculture - \$53.3 million; and
- fishing and aquaculture - \$42.4 million.

### 5.1.2 Shire of East Pilbara

The Shire of East Pilbara (**Figure 5-1**) covers an area of approximately 380,000 km<sup>2</sup> and is the largest municipality in Australia supporting a population of approximately 6,790 people with a median age of 32 years. Approximately 16% of Pilbara residents reside in the Shire of East Pilbara, of which a significant proportion forms a temporary population. The largest towns within the shire include Newman, Nullagine and Marble Bar (Shire of East Pilbara, 2006).

The majority of the area is utilised for pastoralism, however the economy is supported by significant contributions made by iron ore, gold and base metal mining estimated to have an export value of \$7.5 billion in 2005 (DoIR, 2005).

### 5.1.3 Marble Bar

Marble Bar is the nearest commercial and residential centre to the project area. The town provides various support services and facilities to the community (refer to **Section 5.1.4**) and surrounding pastoralism and mining activities. The town is renowned and promoted by the tourism industry as 'the hottest town in Australia'; a fact which is still recorded by the Guinness Book of Records.

#### 5.1.3.1 Demographics

Marble Bar was declared a town in 1893 following the discovery of gold in the region. At the peak of the mining boom during this period the population of Marble Bar reached approximately 5,000 people. The population has declined over the years and is currently about 380 people. The population profile of Marble Bar as determined in 2001 from Census data indicates that the population was largely comprised (about 64%) of younger people under the age of 40 years, with few children. This profile is typical of many small remote and rural populations with few children as secondary and tertiary education facilities are not easily accessible therefore requiring children to receive education in other areas such as Karratha, Port Hedland or Perth. Key demographic characteristics of the Marble Bar community include:

- most age groups show a significantly larger proportion of males to females;
- large proportion of the population between the ages of 0 to 4 (11.1%) and 30 to 39 (19.8%);
- small population over the age of 65 (7.4%);
- high proportion of indigenous people within the Shire of East Pilbara (21%) with a relatively low proportion in Marble Bar; and
- high proportion of Australasian-born residents (82%); well above the State average (70%).

#### 5.1.3.2 Workforce and Employment

In 2001, a high proportion of people were employed within the 'construction' industry (17.6%), 'personal and other services' industry (16%) and 'accommodation and cafes' industry (12%). Only a small proportion of the people were employed directly by the 'mining' industry (4.8%). Other employment industries include manufacturing, retail trade, transport and storage, property and business services, government administration and defence, education, and health and community services.

**Figure 5-1  
Shire of  
East Pilbara**



Map Projection: Longitude / Latitude (Australia GDAG4)

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**Location Diagram :**



**Map Legend :**

-  Spinifex Ridge Mineral Tenements
-  Major Road
-  Minor Road
-  Telfer - Port Hedland Gas Pipeline
-  Local Government Authority boundary



The occupations employing the largest proportion of the working population in Marble Bar (125 people) were professionals or associate professionals (38%), tradespersons (14%) and labourers (13%).

Indigenous employment within the Shire of East Pilbara indicates that almost 33% of employed indigenous people in the Shire were employed in ‘government administration and the defence’ industry.

### **5.1.3.3 Housing and Accommodation**

ABS Census data indicates that there were 81 dwellings in Marble Bar in 2001, of which about 60% were separate houses. A high proportion of other dwelling types were recorded including caravans, cabins, tents or flats attached to a shop or office.

In 2001, the residential mobility in Marble Bar was high, with 49% of the population living elsewhere in the five years prior to 2001. Residential mobility is often used as an indicator of trends such as a development boom or migration from rural areas to urban areas, however, in remote towns such as Marble Bar, the data is often reflective of employee turnover in key industries of the town.

### **5.1.4 Local Services and Support**

Marble Bar has a small number of available community facilities and services. These include:

- police;
- medical (Royal Flying Doctor Service and Nursing Post);
- fuel supplies;
- hotel;
- discount store;
- caravan park;
- swimming pool;
- postal services;
- school;
- gym;
- library;
- community centre; and
- church (services held subject to notice).

### **5.1.5 Public Safety**

The project area is currently accessed via Bamboo Creek Road (**Figure 3-5**). Existing public safety issues within the project area are related to mineral exploration activities, vehicle interaction on existing tracks either by pastoralists or tourists and recreational activities in Kitty’s Gap, Coppin Gap and the Talga Range. No other activities are undertaken within the project area that may affect public safety.

The project area is signposted in several locations and the small exploration camp is manned at all times to ensure adequate safety and security is maintained across the site. All corporate visitors to the project site are currently required to comply with Moly Mines Health, Safety and Environment (HSE) requirements and must report to the exploration camp. The general public are able to visit Coppin Gap and Kitty's Gap via various tracks that traverse the project area and signposting alerts the public that exploration activities occur nearby.

During the construction and operation of the mine, public safety issues relating to access, security, traffic, blasting and emergency response will be identified and managed. An assessment of public safety issues is provided in **Section 10.5**.

## **5.2 Land Use**

### **5.2.1 Pastoral Activities**

Pastoralism is the dominant land use within the Pilbara region and is comprised of cattle (approximately 85%), sheep (meat) approximately 9% and sheep (wool) approximately 6%. Spinifex Ridge is located entirely within the Yarrie pastoral station lease. The Yarrie Station homestead is the nearest residential premises, located approximately 25 km from the project area.

### **5.2.2 Mining**

No previous mining activities have occurred within the project area, however the area has been subject to mineral exploration by various parties for over 30 years. The nearest operational mine is Bamboo Creek Gold Mine, located 15 km to the east of the project area.

### **5.2.3 Tourism and Recreation**

Tourism is a valuable contributor to the Pilbara's economy. The Pilbara has a variety of major attractions including the spectacular gorges and waterfalls of the Karijini National Park and the Milstream-Chichester National Park. Older towns such as Marble Bar and Cossack have a range of historical features and the Dampier Archipelago offers a variety of aquatic activities. Of these attractions Karijini National Park and the Dampier Archipelago are the two major draw cards for the Pilbara region. Both locations are situated within close proximity and are easily accessible from the major mining hubs of the region including Port Hedland, Newman and Karratha.

In 2004/2005, 339,000 domestic and international visitors stayed overnight in the Pilbara region. Overall, 53% of the domestic visitors travelled to the Pilbara Region for business purposes, with a further 39% for holidays and/or visiting friends. Based on a four-year rolling average, domestic visitors were most likely to travel to the region between July-September while international visitors preferred to come later in the year between October to December. It is generally acknowledged that tourism offers opportunities for growth in the Pilbara. However, if measured in economic terms alone it currently makes a very small contribution to the wealth of the region, which is dominated by the resources sector (**Table 5-1**).

■ **Table 5-1 Indicators of Regional Development in Western Australia.**

(Department of Local Government and Regional Development, 2004)

Industry	Total	Percentage of region GDP
Fishing (2001/02)	\$ 13m	0.1%
Tourism (2001)*	\$ 207m	1.3%
Retail turnover (2001/02)	\$ 301m	1.9%
Mining (2001/02)	\$14,865m	95.6%
Manufacturing (1999/00)	\$ 134m	0.9%
Agriculture	\$ 27m	0.2%

The Western Australian Tourism Commission (WATC) estimates that of the 7.4 million visitors to Western Australia in 2002 only 287,400 (3.9%) visited the Pilbara. Approximately 262,000 of these were domestic visitors who stayed for an average of four and a half nights, adding \$142m to the local economy. Whilst the number of international visitors to the Pilbara was less than 10% of the total (25,400), the WATC claims these visitors are much more valuable to the region, each person spending four times more than their domestic counterparts. The tourism multiplier of 1.93 inflates this figure for both domestic and international visitors. For every \$100 spent by visitors a further \$93 is circulated throughout the community and local businesses. A summary of data tables pertaining to international and domestic visitor activity can be found on the WATC website.

The Pilbara region has historically attracted visitors based on its widespread scenic attractions and national parks. Many of Marble Bar's current tourist attractions are based around past mining activities, which are now creating an economic benefit for the community. For example, in recent years "industrial tourism" has developed within the Marble Bar area, with the former Comet Gold mine becoming a tourist attraction providing a museum and tourist centre. The town of Marble Bar has also developed heritage trails and is renowned as Australia's hottest town.

Within the immediate vicinity of the Spinifex Ridge Project, Coppin Gap and to a lesser extent Kitty's Gap, attract some visitors during the cooler months of the year for picnics and sightseeing. The area is used by both day-trippers from Port Hedland and Marble Bar as well as longer term holidaymakers passing through the region. There are no visitor facilities at Coppin Gap and the area is used infrequently. It is estimated that between 60 and 100 vehicles visit Coppin Gap every year. Other local reserves that serve as similar tourism locations include the Doolena Gorge, Marble Bar Pool and the nearby Chinaman's Pool. All areas are suitable for swimming and picnicking and are frequented by day-trippers from surrounding towns.

Aside from low level tourism and visitors to Coppin Gap and Kitty's Gap, no other recreational activities occur within the project area.

### 5.2.3.1 Landscape Values and Aesthetics

The Pilbara region is highly regarded for its landscape and aesthetic values with spectacular scenery including steep gorges and ranges separated by extensive plains.

The Talga Range forms part of a formation that extends for more than 75 km east–west and is breached by more than eight creeks and rivers, in places forming spectacular pools and gorges. The major rivers flowing through the range are the Talga and Coongan Rivers, approximately 30 km west of the project area. The formation is called the Gorge Range, west of the Coongan River.

The immediate project area encompasses various landforms including undulating hills in the southern portion, vegetated drainage lines, a significantly elevated ridgeline dissected by major drainage lines to form ‘gaps’ and extensive plains to the north. The most prominent feature of the area is the Talga Range that is elevated approximately 130 m above the surrounding plains and the ‘gaps’ that have been formed by Coppin Creek and Kookenyia Creek dissecting through the range. Coppin Gap is considered to contain significant landscape and aesthetic values at a local scale. It is protected as a Shire controlled nature reserve with the vesting purpose of “Protection of Natural Formations”.

Although the project area is only seen by the public visiting Coppin Gap and Kitty’s Gap, the area is rarely visited for any other purpose. Public view points of the project area will be from the Coppin Gap area, Muccan – Shay Gap Road, Warrawagine Road and Bamboo Creek Road. The height of the Talga Range screens and separates the northern and southern portion of the project area. An assessment of the project footprint and its impact on visual amenity of the landscape is presented in **Section 10.7**. A discussion of geoheritage values is provided in **Section 4.4**.

Consultation with stakeholders, including the Marble Bar community, has identified that the aesthetic and tourism values of Coppin Gap, and to a lesser extent Kitty’s Gap, are highly valued and should be preserved.

### **5.3 Indigenous Heritage**

There is a single undetermined registered Native Title claim over the project area (WC99/008 Njamal). Moly Mines has successfully negotiated a Native Title Agreement with the Njamal People, which establishes terms for access, compensation and management of specific heritage, cultural and environmental issues. The agreement also addresses employment and training opportunities for the Njamal people. This Agreement covers the entire Project Area and all ancillary titles that may be required to service the Project.

A search of the Department of Indigenous Affairs “Register of Aboriginal Sites” (1 June 2007) did not show any registered sites within the Project Area.

Consultation to date with indigenous representative has been extensive and has included formal and informal meetings, several site visits and heritage surveys. A summary of indigenous stakeholder consultation undertaken to date has been provided in **Table 5-2**. The issues and outcomes are described in **Section 6**.

■ **Table 5-2 Indigenous Stakeholder Consultation**

<b>Stakeholder</b>	<b>Date</b>	<b>Method of Consultation</b>	<b>Participants</b>
Pilbara Native Title Service/ Njamal People	4 April 05	Meeting	Njamal elders
	11 May 05	Meeting	Working party
	5 September 05	Meeting	Working party
	2 November 05	Meeting	Working party
	7 November 05	Survey	Numerous
	2 December 05	Meeting	Working party
	14-15 December 05	Survey	Numerous
	19 January 06	Meeting	PNTS on behalf of Njamal People
	1 March 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	23 March 06	Survey	Numerous
	1 March 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	29 March 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	17 May 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	8-9 June 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	27 June 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	10 July 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	17-18 July 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	31 July-1 August 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	8 August 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	14 September 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
	7 November 06	Meeting	Working party
	10 November 06	Meeting	Community Meeting
	13 December 06	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People
9 January 07	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People	
1 February 07	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People	
12 February 07	Mediation Meeting	NNTT, Moly Mines and PNTS on behalf of Njamal People	
13 April 07	Inaugural MALC Meeting	Inaugural MALC Committee	

### 5.3.1 Archaeology

Indigenous archaeological surveys within the project area have been carried out with particular focus on the proposed areas of impact. These surveys have identified a number of items of archaeological interest (Eureka, in prep).

Within the disturbance footprint a number of artefact scatters have been identified. These artefact scatters are considered not to be of major archaeological significance. Discussions with the Njamal people and with DIA will determine the appropriate management of these artefact scatters.

Outside the disturbance footprint, some engravings have been located during the archaeological surveys. Management practices will ensure that these engravings are not impacted by any activities associated with the operation. The management of these engraving sites will be determined and finalised following discussion with DIA and the Njamal people.

### 5.3.2 Ethnography

Three ethnographic surveys have been undertaken in the project area. These were carried out in November 2005, December 2005 and March 2006 and involved professional anthropologists and Njamal representatives. Four ethnographic sites have been located and recorded during the surveys

The November 2005 survey focused on an area south of Spinifex Ridge that corresponds to the pit and western waste landform areas. The field survey did not identify any ethnographic sites within the specific area of this survey (Yamatji Marlpa Barna Baba Maaja Aboriginal Corporation, 2006).

The December 2005 and March 2006 surveys have been jointly reported (Anthropos Australis, 2006). These surveys identified four ethnographic sites within the project area. These sites are:

- Coppin Gap – a mythological site; camp site and water source;
- Site within Kitty's Gap – a mythological site exists on the western side of Kitty's Gap;
- Coppin Creek – a camp site and water source along the creek downstream of Coppin Gap; and
- Warrawagine Road – an historic camp site was identified adjacent to Warrawagine Road near the Kookenyia Creek crossing.

Management of the identified sites will be primarily through exclusion of these areas from the operational footprint as detailed in **Section 10.3**.

## 5.4 Non-Indigenous Heritage

A search of the Register of the National Estate, State Register of Heritage Places, National Trust's List of Classified Places and the Local Government's Municipal Inventory was undertaken and did not identify any sites of European heritage significance within or in close proximity to the project area. The search however did identify 85 sites within the Shire of East Pilbara. The two closest sites are Bamboo Creek – Mining Relics and Yarrie Homestead, which are located some 15km and 25km from the project area respectively (HCWA, 2006).

## 6. Stakeholder and Community Consultation

### 6.1 Consultation Programme

Moly Mines commenced formal stakeholder consultation in April 2005, some 16 months before the Project was formally referred to the EPA.

The key stakeholders for the Project are presented below.

#### Federal Government Departments

- Department of Environment and Water Resources

#### State Government Departments

- Department of Environment and Conservation
- Main Roads Western Australia
- Office of Development Approvals Co-ordination
- Department of Planning and Infrastructure
- Department of Industry and Resources
- Department of Health
- Department of Indigenous Affairs
- Department of Water

#### Local Government Authorities

- Shire of East Pilbara
- Town of Port Hedland

#### Non-Government Organisations

- Care for Hedland Environmental Association
- Conservation Council of Western Australia
- Wildflower Society

#### Indigenous Stakeholders

- Pilbara Native Title Service
- Njamal People

#### Other Stakeholders

- Pilbara Development Commission
- Yarrrie/ Muccan Station
- Oakover Gold
- Dampier Port Authority
- Warrawagine Station
- Port Hedland Port Authority
- Marble Bar Police
- Marble Bar Community
- Muccan Minerals

Moly Mines has developed a stakeholder consultation plan for the Spinifex Ridge Project that identifies the key stakeholders and triggers for both scheduled and routine consultation, including quarterly community meetings in the town of Marble Bar. Consultations to date have included meetings, telephone and electronic mail communications, letter (mail-out) correspondence, site visits and on-ground surveys.

Moly Mines is committed to continuing consultation throughout the life of the project and into post closure. Stakeholders will be inherently important, providing valuable input to develop and implement acceptable completion criteria for mine closure

## 6.2 Overview of Issues and Responses

Throughout the consultation process, Moly Mines has noted the concerns and comments raised by its stakeholders. These issues are broadly categorised in **Table 6.1** with reference to relevant sections in the PER provided. A summary of Moly Mines' response to these issues is provided below.

### ■ Table 6-1 Key Issues Raised During Consultation

Issue	Section in PER
Fauna species of conservation significance	4.8, 8.6
Coppin Gap	8.2.2; 8.3; 8.4; 8.5.3; 8.6.2.2; 8.6.2.3; 8.6.3;.8.7
Site closure	9
Road use	3.5; 3.6.4, 10.5
Tourism and restricted access	3.9, 5.2.3, 10.5
Waste landform design and location	8.12.1
Tailings	8.12.2
Water use efficiency	3.6.3
Location of the workforce	3.7, 10.1
Pit location	3.2
Acid mine drainage	8.12.1
Employment opportunities	3.7, 10.1

### 6.2.1 Fauna Species of Conservation Significance

#### Issue

Several species of conservation significance were identified from the fauna surveys undertaken. Concerns were raised about potential adverse impacts on the species and their critical habitats.

#### Response

The species identified are all widespread and well represented in the Pilbara. The Talga Range and Coppin Gap are the two most critical habitats for many of the species and neither will be significantly affected. Coppin Gap will not be impacted by the Project and the Talga Range will have negligible impact, limited to a section of the pit, the conveyance tunnel, an access track to the top of the range and associated communications tower. **Section 8.6** addresses management of fauna.

### 6.2.2 Coppin Gap

#### Issue

Coppin Gap is considered locally unique and warranting protection for its aesthetic values, contribution to local biodiversity, Aboriginal Heritage values and as a tourist attraction. Concerns were raised about any potential impacts on Coppin Gap, either directly or indirectly. Potential indirect

impacts come from the creek diversion, pit dewatering, blasting and restricted access for the general public.

### **Response**

The Project will have no direct impact on Coppin Gap as it sits outside the disturbance footprint and is protected by an A-class Reserve for the Preservation of Natural Formations.

Appropriate landform design and the establishment of a buffer zone along Coppin Creek will limit any impacts on visual amenity for visitors to Coppin Gap.

Sound engineering design of the creek diversion channel and the small pit dewatering volumes all suggest that there will be negligible change to the natural variations in water level that already exist in Coppin Gap. Hydrological modelling (surface and groundwater) support this finding. **Sections 8.3 and 8.4** discuss management of potential hydrological impacts on Coppin Gap.

### **6.2.3 Site Closure**

#### **Issue**

It is well established that closure planning should commence during the mine planning stage to maximise the potential for successful site closure at the completion of the mine life. Concerns raised include:

- leaving a mining void at the end of mining and the potential issues relating to water quality over the long term;
- Acid Rock Drainage from waste rock landforms;
- issues associated with seepage from the TSF; and
- re-establishment of access between Coppin Gap and Kitty Gap for tourists.

#### **Response**

Mine closure planning has commenced and will be continually refined throughout the life of the Project to ensure all of the associated issues and concerns are addressed. Landform construction includes consideration of final landform design as outlined in **Section 8.12**. Management of issues associated with final pit water quality; acid rock drainage; TSF seepage; and re-established access are also addressed in **Section 8.12**. Key stakeholders will be involved in the closure planning process and development of completion criteria.

### **6.2.4 Location of the Tailings Storage Facility**

#### **Issue**

The location of the TSF in relation to Coppin Creek (on the northern side of the Talga Range) was raised because of concerns it may impact on the Coppin Creek floodway and in the event of a catastrophic failure, cause contamination of the De Grey River.

## **Response**

The TSF was moved several hundred metres to the west of its original location (away from the creek) and is now located out of the 100 year average recurrence interval floodplain. The tailings will be thickened, and is of a coarse grind size. The larger particles will beach readily around the perimeter of the TSF, consolidating quickly. Catastrophic failure of the outer embankment of the TSF is considered almost impossible given the TSF design. Further, studies suggest that the tailings (solid and liquid) have a low toxicity and any potential impacts associated with the tailings are likely to be physical rather than chemical. Potential impacts of the TSF on creeks and the De Grey River are discussed in **Section 8.12.2**.

### **6.2.5 Road Use**

#### **Issue**

The Marble Bar Road has got a significant volume of heavy vehicle traffic on it, due largely to the mining and minerals industry boom. Any additional traffic has the potential to increase the risk associated with vehicle related incidents.

#### **Response**

During the construction phase it is estimated that there will be 10 – 20 truck movements per day, for a period of up to 12 months. During the commissioning and operational phases there will be two - five truck movements per day. This is not significant when compared to the estimated 163 vehicle movements per day currently on the road, of which approximately 90 of those are triple road trains (MRWA, pers comm).

### **6.2.6 Tourism and Restricted Access**

#### **Issue**

The significance of Coppin Gap as a local tourist attraction was routinely raised by stakeholders. Any impacts to this feature are seen as unacceptable.

#### **Response**

Mining activities have been set back from Coppin Gap to avoid any direct impact. Access to Coppin Gap will be maintained throughout the operation. Tourism and recreation have been discussed in more detail in **Section 5.2.3**. Indirect impacts associated with groundwater levels and visual amenity are addressed in **Sections 8.3 and 8.12**.

### **6.2.7 Waste Landform Design and Location**

#### **Issue**

Concerns raised about the waste landforms include:

- changes to the aesthetics of the area;
- ensuring PAF material is appropriately managed; and
- keeping the landforms out of the major drainage lines to minimise downstream impacts.

## **Response**

Waste landform design has incorporated features designed to ensure that they blend in with surrounding landforms; ensure encapsulation of PAF material; and locating these landforms away from major drainage lines. Criteria for waste landform design are discussed in **Section 8.12.1**.

### **6.2.8 Tailings**

#### **Issue**

Concerns raised about the tailings include:

- the ingestion of tailings liquor by birds and other fauna and potential toxicity impacts; and
- seepage and potential downstream impacts.

#### **Response**

Tailings and TSF seepage has been characterised to allow assessment of potential toxicity or downstream impacts. The tailings are essentially crushed rock with geochemical composition reflecting the mineralisation of the mined ore. Tailings seepage does have some elevated molybdenum, as does the natural water in Coppin Gap pool. These elevated levels are not considered to pose a significant environmental concern. **Section 8.12.2** includes discussion of potential impacts from tailings solids and seepage.

### **6.2.9 Water Use Efficiency**

#### **Issue**

Water is a scarce resource in many parts of the Pilbara. Stakeholders wanted to ensure that opportunities for water recycling and efficient use of water was implemented.

#### **Response**

There are sound environmental and economic reasons to reduce water usage as much as practicable. Water efficiency and reuse has been included in the preliminary design phase of the project. Most water used on site is required for the processing plant. As much of this as practical is recovered through the tailings thickener prior to tailings being pumped to the TSF. Water from the TSF is also recovered after the tailings beach out, and this provides a significant water source supplement to the plant. Water management is discussed in **Section 3**.

### **6.2.10 Location of the Workforce**

#### **Issue**

It was asked why the workforce couldn't be based in Marble Bar, therefore providing direct economic benefits to the town.

#### **Response**

The primary reason that Marble Bar is not used for accommodation is the problems with access to site for significant periods of the year when rivers and creeks in the area are impassable. Other considerations include safety concerns for lengthy travel of a large workforce, cost and time for travel and issues associated with attracting a large number of high quality employees to the project.

Nevertheless, it is anticipated that a number of employees on site will choose to operate as drive-in-drive-out employees with Marble Bar a possible location for these people.

### **6.2.11 Pit Location**

#### **Issue**

Locating the pit between Coppin Gap and Kitty's Gap was considered to adversely impact on the aesthetics of the area.

#### **Response**

There are no alternatives to the location of the pit; it must be at the location of the orebody. **Section 2.2** describes consideration of alternatives for the mining process. Nevertheless the mining activities have been designed to minimise impacts on aesthetic values of the area.

### **6.2.12 Acid Mine Drainage**

#### **Issue**

The generation of low pH leachate from waste landforms is a significant issue at some mines. Potential impacts to Coppin Gap and the De Grey River was the issue of most concern.

#### **Response**

Waste rock characterisation has identified that the amount of PAF waste rock is sufficiently low to allow for best practice environmental management by encapsulation of this material in NAF waste rock. **Section 8.12.1** details issues associated with acid mine drainage.

### **6.2.13 Employment Opportunities**

#### **Issue**

Local stakeholders wanted to ensure that there would be adequate opportunities for training and employment.

#### **Response**

There are significant advantages in employing local people on site, with a higher likelihood for longer term employment. Local stakeholders will be encouraged to apply for positions at Spinifex Ridge. A significant number of positions will be available for personnel without relevant experience and these people will be trained in the requirements of their role.

## 7. Environmental Principles, Sustainability and Management

### 7.1 Principles of Environmental Protection

General guidelines for environmental protection are set out in numerous EPA guidance statements. In 2003, the EP Act was amended to include a core set of principles that are to be applied in formal assessments. This section describes these principles and demonstrates the ways in which the Spinifex Ridge Project satisfies each principle.

In its assessment of environmental impacts associated with the project, Moly Mines has considered the principles of environmental protection in the EP Act (**Table 7-1**). These principles address environmental, social and economic considerations, the precautionary principle, inter-generational equity, conservation of biological diversity and ecological integrity, product stewardship and the waste hierarchy (EPA, 2004b). If these principles are effectively implemented regulatory bodies are encouraged to recognise Moly Mines' ability to:

- support activities that promote awareness of environmental protection;
- provide information and educate stakeholders which enables them to further support environmental protection;
- to foster an environmental ethic within the project and surrounding community;
- establish means by which stakeholders may address local environmental protection issues;
- establish and implement policies and environmental management plans that support environmental protection and are consistent with regulatory requirements, state policies and protection measures;
- promote protection of the environment at a regional level by encouraging the implementation of best practice standards and guidelines at a local scale;
- encourage strong partnerships for environmental protection between government, industry and community; and
- apply the waste hierarchy to activities and processes that generate waste.

Outcomes resulting from these actions will lead to a significant level of environmental protection and will provide an effective framework for life-of-mine operation.

### 7.2 Sustainability

The definition for sustainability that is most widely accepted is:

“Development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987).

The three aspects of sustainability are closely interrelated and have the ability to influence another. These aspects are social sustainability, economic sustainability and environmental sustainability.

Variations of ‘sustainability’ do exist and an example of this is the focus on ecological processes as represented by the term ‘Ecological Sustainable Development’.

Australia’s National Strategy for Ecologically Sustainable Development (NSES D) defines ecologically sustainable development as:

“Using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased”.

The objectives of the NSES D are to:

- enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- provide for equity within and between generations; and
- protect biological diversity and maintain essential ecological processes and life support systems.

The key messages that form these objectives are adopted by the EPA as ‘*Principles of Environmental Protection*’ and are reflected in the EP Act. The manner in which the Spinifex Ridge Project satisfies these objectives is demonstrated in **Section 7.1**.

In addition to the National Strategy, the Western Australian Government also released a State Sustainability Strategy “*Hope for the Future*” in 2003 that outlines six broad goals for sustainability:

- ensure the way we govern is driving the transition to a sustainable future;
- play our part in solving the global challenges of sustainability;
- value and protect our environment and ensure the sustainable management and use of natural resources;
- plan and provide settlements that reduce the ecological footprint and enhance our quality of life;
- support communities to fully participate in achieving a sustainable future; and
- assist business to benefit from and contribute to sustainability.

Specific to the mining industry, the State Strategy sets out a vision that includes the following key actions:

- work towards assessment of projects using sustainability criteria;
- foster local community involvement (particularly Aboriginal communities, pastoralists and local shires);
- establish a transparent process to enable community awareness of the day-to-day regulatory system for the resources industry; and
- implement strategies that support the use of local employment in mining ventures, particularly using regional centres as employment hubs and encourage mining companies to maximise their purchasing of goods and services within regions.

■ **Table 7-1 Principles of Environmental Protection**

<b>Principles of Environmental Protection</b>	<b>Relevant (Yes/No)</b>	<b>If yes, consideration given in project</b>	<b>Addressed (Yes/No)</b>	<b>Section(s) in PER</b>
<p>1. The precautionary principle.</p> <p>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by:</p> <ul style="list-style-type: none"> <li>▪ careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</li> <li>▪ an assessment of the risk-weighted consequences of various options.</li> </ul>	Yes	<p>Management actions will be implemented that are designed to prevent environmental degradation even though there is considered little likelihood of any significant serious or irreversible environmental damage.</p> <p>Detailed evaluation of proposed activities has been undertaken to avoid damage to the environment. Specialist environmental, heritage and socio-economic studies (e.g. flora, fauna, heritage and groundwater) have been carried out over all proposed impact areas to assess the natural and socio-economic environments and determine potential impacts. Management actions have been outlined that address these potential impacts.</p>	Yes	4.0 8.0 8.13
<p>2. Inter-generational equity.</p> <p>The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.</p>	Yes	<p>Sustainable development can be considered as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (refer to <b>Section 7.2</b>).</p> <p>Moly Mines recognises that sustainable development requires collaborative effort from industry, governments, inter-governmental agencies and the general public. To ensure that the health, diversity and productivity of the environment is maintained or enhanced, several baseline studies have been completed for the project area. The project will operate in accordance with an environmental management system that is designed to foster continual improvement through the life of the mine, closure and rehabilitation planning will be undertaken progressively and a consultation programme has been developed, implemented and will be maintained.</p>	Yes	7.2
<p>3. Conservation of biological diversity and ecological integrity.</p> <p>Conservation of biological diversity and ecological integrity should be fundamental consideration.</p>	Yes	<p>The conservation of biological diversity and ecological integrity has formed an important component of the project due to the environmental attributes present within the project area. Baseline studies have been undertaken over all proposed impact areas to: (i) assess environmental values; (ii) identify the need to minimise impacts; (iii) optimise the project footprint to protect or minimise impacts on significant areas; and (iv) identify areas requiring management plans. The</p>	Yes	4.11 4.12 8.6 8.7

Principles of Environmental Protection	Relevant (Yes/No)	If yes, consideration given in project	Addressed (Yes/No)	Section(s) in PER
		project has particularly considered potential impacts on the riparian, aquatic and hydrological aspects of Coppin Creek and Coppin Gap.		
<p>4. Improved valuation, pricing and incentive mechanisms.</p> <ul style="list-style-type: none"> <li>▪ Environmental factors should be included in the valuation of assets and services;</li> <li>▪ The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement;</li> <li>▪ The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes; and</li> <li>▪ Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.</li> </ul>	Yes	<p>Environmental factors have been assessed and evaluated in the relevant design studies and have formed a key component on evaluating project alternatives.</p> <p>Moly Mines acknowledges the polluter pays principle. Where practicable process efficiencies have been adopted to minimise waste production.</p> <p>The procurement of goods and services will consider the full life cycle costs of providing such goods and services.</p> <p>The complete life cycle of the project from construction to closure and rehabilitation, have been determined and costed to an acceptable level of accuracy for this stage of the project, inclusive of actions required to meet the project's environmental goals. This includes pollution control, waste minimisation and management, rehabilitation and revegetation. Moly Mines will implement its environmental goals in the most cost effective manner.</p>	Yes	8.0 9.0 10.0
<p>5. Waste Hierarchy.</p> <p>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</p>	Yes	All reasonable and practicable measures will be taken to minimise the generation of waste and its discharge into the environment. The management options that will be adopted in order of preference are to avoid, reduce, reuse, recycle and recover waste. Waste management will be addressed in relevant management plans.	Yes	8.14

Moly Mines acknowledges the need to consider the three components of sustainability (economic, environmental and social), for the life of the project. Environmental and socio-economic assessments have been conducted for the project to determine potential impacts, local and regional benefits and the need for management strategies (refer to **Sections 8** and **10**). In parallel with these assessments, a stakeholder consultation programme has been implemented. This programme commenced in 2005 and will be maintained for the life of the project. Further detail on stakeholder consultation carried out by Moly Mines is provided in **Section 6**.

### **7.3 Environmental Policy**

The environmental policy is an integral component of the Environmental Management System (EMS) being developed by Moly Mines (**Section 7.4**). Moly Mines is committed to minimising the environmental impact of its operations and to continually improve its environmental performance. To accomplish this, Moly Mines will:

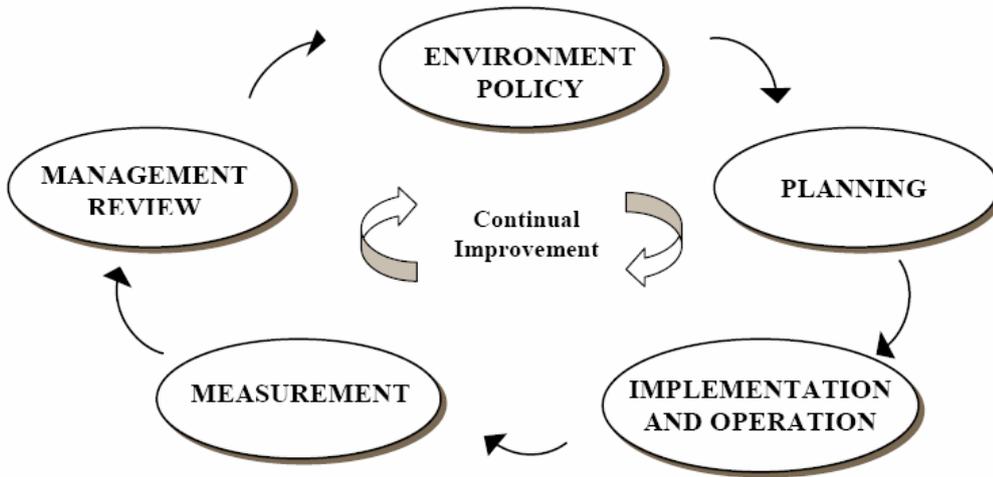
- Ensure compliance with all environmental laws, regulations and other requirements as the minimum standard for its management practices.
- Identify activities with the potential to have an environmental impact and to implement management measures to address associated risks.
- Establish annual environmental objectives and targets designed to facilitate continual improvement of the operations.
- Pursue positive co-operative relationships with government agencies that regulate its business.
- Operate in accordance with management systems that include procedures, processes and standards designed to protect the environment.
- Train employees and contractors to a standard where they are capable of meeting their individual responsibilities and those of the company.
- Implement an audit and monitoring program to measure environmental performance, and where necessary make improvements to practices and performance.
- Consult with stakeholders, particularly the local community.
- Promote the efficient use of resources, including the reuse and recycling of goods.
- Promote the concept that sound environmental management is a shared responsibility between the employer and employee.

### **7.4 Environmental Management System**

Moly Mines is finalising the initial development and implementation of a management system that will assist the company in proactively managing environmental issues and promoting environmental excellence and continual improvement. The management system will be developed to be consistent with the intent of AS/NZS ISO 14001:2004 '*Environmental management systems - Requirements with guidance for use*'.

The management system represents a structured framework in which Moly Mines will be able to implement its environmental policy, establish and assess its commitments; objectives; plans and procedures; compliance to legal and other requirements; and improve performance. A critical component of the management system is the requirement for senior management to take an active role in the implementation and ongoing management of the system.

The ISO14001 standard is based on a continuous cycle of improvement containing the five main principles of policy, planning, implementation, measurements and review (**Figure 7-1**).



■ **Figure 7-1 Environmental Management System Principles**

There are several benefits for developing and implementing an EMS and these include but are not limited to the following:

- improved environmental performance;
- reduced liability;
- documented evidence of ‘due diligence’;
- improved compliance;
- prevention of incidents;
- improved public image;
- reduced costs; and
- improved market acceptability.

Successful implementation of the management system will result in effective management of the site, ensuring that environmental considerations are incorporated along with safety requirements and production issues in how the site operates.

**7.5 Environmental Management Programme**

The Environmental Management Programme (EMP) is a management tool that provides a summary of the environmental aspects of the project and includes the environmental management plans necessary

to manage potential environmental impacts. The management plans detail objectives; issues and management actions to effectively. The EMP forms an additional, higher level of operational control over the requirements that originate from the management system.

### **7.5.1 Framework**

The EMP will be presented in the following format:

- Project Background.
- Corporate Policies.
- Structure of Programme and linkage to management system.
- Responsibilities.
- Implementation and Auditing of Programme.
- Management Plans:
  - Flora and Vegetation Management Plan;
  - Fauna Management Plan;
  - Groundwater Management Plan;
  - Surface Water and Site Drainage Management Plan;
  - Coppin Gap Management Plan;
  - Conceptual Closure Management Plan; and
  - Other management plans, as appropriate.

The management plans that address key environmental aspects are presented in **Appendix F**. The remainder of the management plans will be developed in consultation with relevant stakeholders prior to any ground disturbing activities taking place.