

CHAPTER 5 EXISTING ENVIRONMENT

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5 *EXISTING ENVIRONMENT*

This chapter describes elements of the existing environment within and surrounding the Rasp Mine and summarises climate data.

5.1 *TOPOGRAPHY AND DRAINAGE*

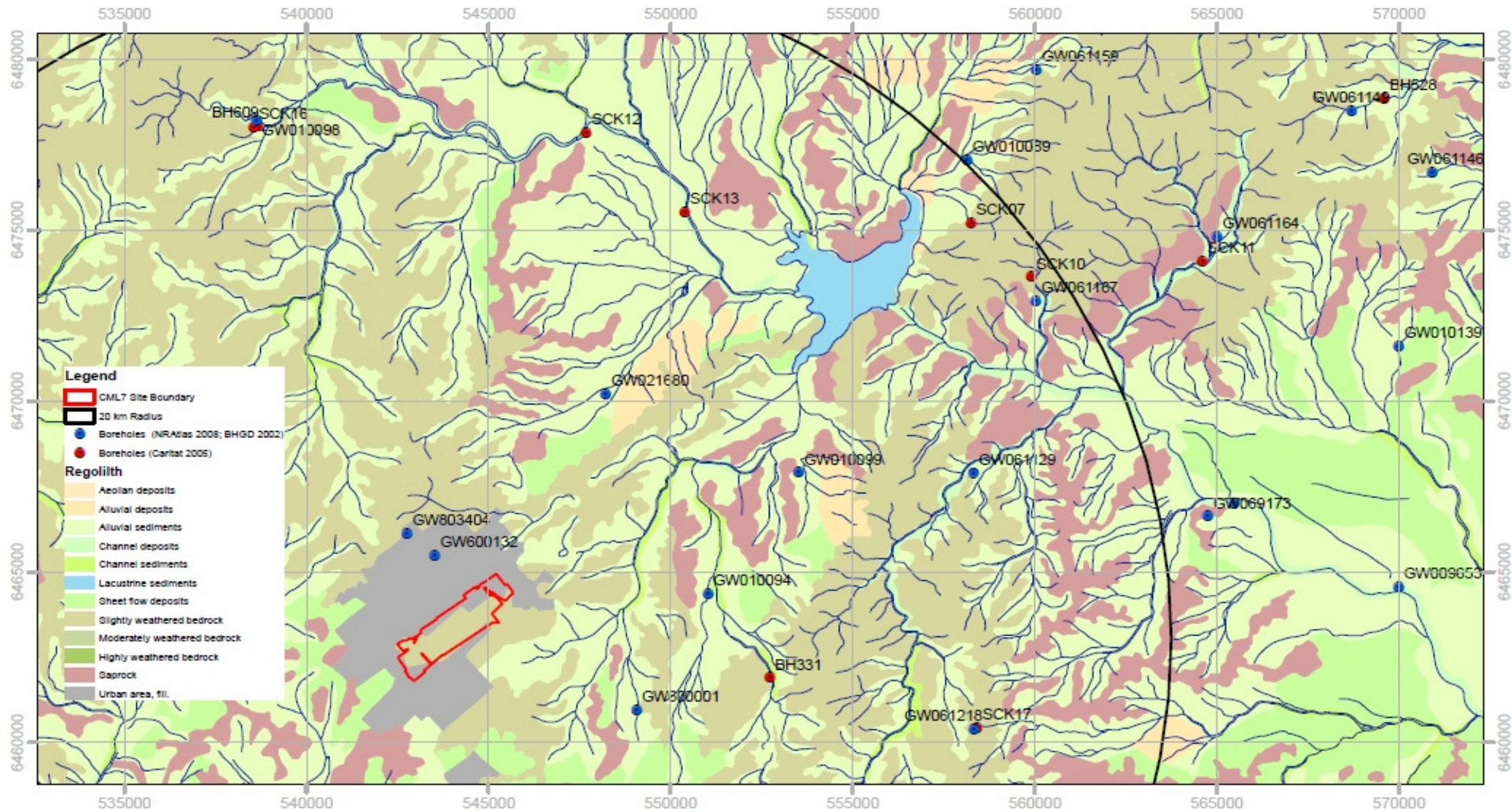
The far west region of NSW is characterised by rolling downs and lowlands. The Barrier Range lies to the north, west and south-west of Broken Hill. Elevations generally range from approximately 180 m AHD 30 km west of Broken Hill to 300 m AHD within Broken Hill to 472 m AHD at Mount Robe, 33 km north-west of Broken Hill (Broken Hill City Council, 2000).

CML7 lies centrally within the Line of Lode which divides the City and its surrounds into North and South Broken Hill. To the north of the City, the land consists generally of steep, rugged hills and hill slopes. The remaining area consists of low hills, foot slopes and low calcareous rises (Broken Hill City Council, 2000).

The Rasp Mine and the City of Broken Hill are located within the catchment of the Stephens Creek Reservoir. West of Broken Hill, all runoff drains to Lake Frome, in South Australia *Figure 5-1*. Three main creeks run within 30 km of the City; Umberumberka Creek to the northwest, Stephens Creek to the east and southeast and Yancowinna Creek to the northeast. The closest major water course is the Darling River approximately 100 km to the south east. The Rasp Mine is not subject to flooding from external water courses.

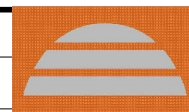
The surface drainage patterns of the Rasp Mine have been substantially altered by previous mining and rehabilitation works. A major part of the rehabilitation works has been the construction of a number of water storage areas and diversion drains to contain site runoff. The final discharge point for the initial areas of potential impact is the Horwood Dam.

Figure 5-1 Broken Hill water courses



Broken Hill Operations Pty Ltd

Source: Golder Associates



5.2 CLIMATE

Long term climate data is available from a Bureau of Meteorology (BoM) weather station located in Patton Street Broken Hill, approximately 250 m south of the Rasp Mine.

Table 5-1 Climate data for Broken Hill (Patton Street) Station (1889 - 2007)

	Daily maximum temperature (°C)	Daily minimum temperature (°C)	9 am		3 pm	
			Mean (°C)	Humidity (%)	Mean (°C)	Humidity (%)
Jan	32.7	18.4	23.5	44	31.1	28
Feb	32.2	18.2	22.8	48	30.5	30
Mar	29.0	15.5	20.2	51	27.7	32
Apr	23.9	11.8	16.4	58	22.9	39
May	19.1	8.5	12.5	69	18.1	48
Jun	15.6	6.2	9.4	77	14.9	54
Jul	15.1	5.3	8.7	74	14.5	50
Aug	17.3	6.3	10.5	64	16.5	41
Sep	21.0	8.8	14.1	55	20.2	34
Oct	24.9	11.7	17.4	47	23.5	30
Nov	28.6	14.7	20.2	44	26.8	27
Dec	31.4	17.1	22.6	42	29.7	27

The climate is typical of the arid areas of far western NSW, with the aridity largely related to the remoteness from moderating ocean influences and their associated moisture-bearing air masses, and the absence of rainfall associated with high mountains (R. W. Corkery BHCC Statement of the Environment 2004).

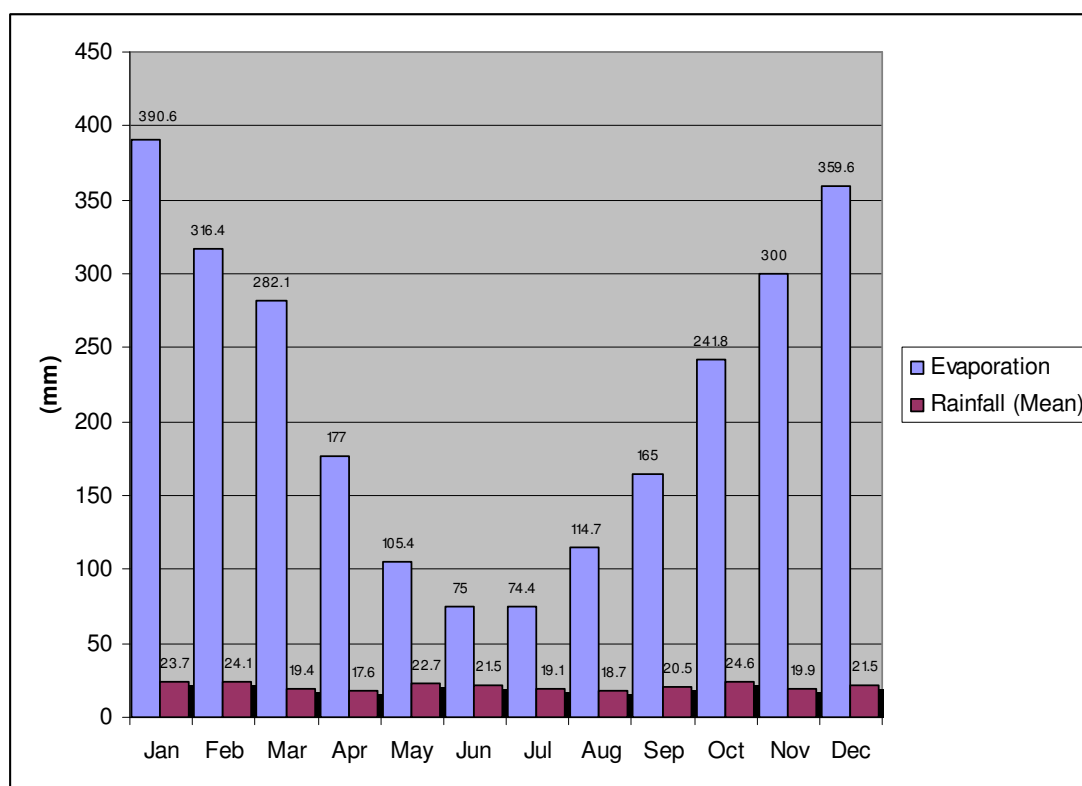
5.2.1 Temperature

On average, January is the warmest month in Broken Hill with a mean daily maximum of 32.7°C. The coolest month is July with a mean daily minimum temperature of 5.3°C.

5.2.2 Rainfall and Evaporation

The mean annual rainfall at Broken Hill is 247.5 mm, *Figure 5.2*. The mean number of rain days annually over this period is 34 days. However, this is low probably due to recent drought conditions as the long term rainfall data indicates an average of 48.4 days per year. On average, October is the wettest month with a mean monthly rainfall of 24.6 mm, while April is the driest month with an average of 17.5 mm, *Table 5-2*. The average evaporation in the vicinity of the Rasp Mine is 2,614.

The greatest evaporation rates occur during October through to March with monthly average evaporation rates being in the range of 241 mm to 391 mm. The annual average evaporation exceeds annual precipitation by 2356 mm.

Figure 5-2 Average monthly rainfall & evaporation - Broken Hill**Table 5-2 Average number of raindays per month - Broken Hill**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.5	2.5	2.1	2.0	3.1	3.4	3.5	3.3	3.1	3.5	2.6	2.4

5.2.3 Wind

Wind speed and direction information is available from long term average data collected at the BoM Broken Hill Airport AWS, located approximately 3.5 km south of the site.

On an annual basis, winds are predominantly from the south, with smaller contributions from the southwest. On average, October is the month of highest wind flow and May is the month of lowest wind flow. Calm conditions are evident approximately 1% of the time. A review of windrose information concludes:

- during summer and autumn, predominant winds are from the south, with smaller contributions from the south east,
- during winter, predominant winds are from the north and west, with smaller contributions from the south, and
- during spring, predominant winds are from the south, with smaller contributions from the south west.

5.3 SURROUNDING LAND USE

A single zone in the Broken Hill Local Environment Plan (BHLEP) encompasses the metropolitan area of Broken Hill, which is referred to as the "2(c) City Zone" (Broken Hill City Council, 1996). Imposing a single zone for the metropolitan area reflects the low-lying, consistent landscape and the generic urban form of Broken Hill. The City is made up primarily of large residential areas with dispersed commercial and industrial land uses.

Surrounding the metropolitan area of Broken Hill is a mixture of rural land and land identified for environmental protection. The regeneration reserves adjoin the outer limits of the urban areas of north and south Broken Hill. A significant portion of the non-urban areas of Broken Hill (approximately 9,340 ha) is reserved as the Willyama Common (Broken Hill City Council, 1996). The Common was originally created in the 1890's to provide local Commoners with land to graze and mature stock. Over time, various parcels of land have been excised from the Common to provide for community purposes, such as the Living Desert Reserve.

The "Living Desert" is an area of 2400 ha situated on the northern limits of Broken Hill. The "Living Desert" contains an area of 174 ha, the Living Desert Wildlife Sanctuary, which is to be developed into a tourism and education facility focusing on environmental aspects of Broken Hill (Terra Consulting, 2000).

Before mining and settlement began in Broken Hill, the area supported pastures of Saltbush, Bluebush, Mulga and Belah trees on the hills and ridges, with River Gums occurring along the non-perennial watercourses. However, the widespread destruction of much of this vegetation led to extensive wind and water erosion and frequent dust storms and sand drifts affecting private residences, mining machinery and infrastructure.

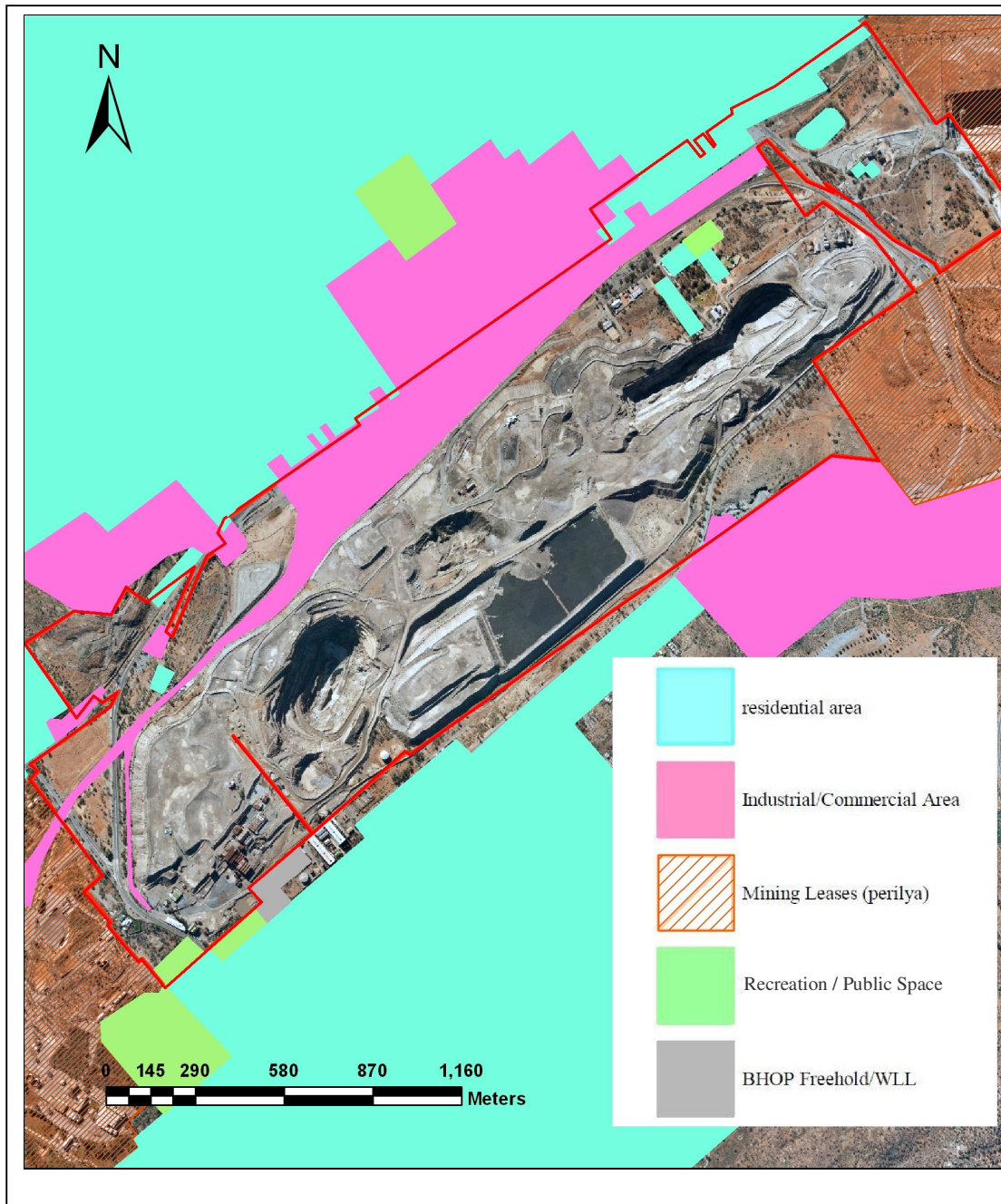
In 1936 in response to this the then major mining company in the town, the Zinc Corporation, fenced 0.2 km² (20 ha) of land and planted the area with Saltbush and 2,500 trees. BHCC and future mining companies further fenced an area of 1 km wide around the City to exclude grazing and this later became the Regeneration Reserves.

These Regeneration Reserves were established to protect the urban area of Broken Hill from sandstorms, loss of topsoil and inundation of houses by sand drifts, and now encircle the City. Today, the Regeneration Reserves comprise 17.15 km² (1,715 ha) immediately adjoining the outer limits of the urban areas of north and south Broken Hill. Public access within the reserves is restricted and Council by-laws protect them from unauthorized access and grazing.

Today the Common continues to support mining and grazing activities as well as a wide range of recreational activities such as horse riding and trail bike riding. An archery range, horse trotting track, four wheel drive tracks and a model aircraft area are also located on the Common (R. W. Corkery BHCC Statement of the Environment 2004).

The various land use categories surrounding the CML7 site are presented within *Figure 5-3*.

Figure 5-3 Land Use Surrounding CML7 - Broken Hill



5.4 SOILS

Soils within the Broken Hill LGA can be typically related to six broad landform categories, namely low hilltop, hilltop, upper slopes, footslope, lower slope of low rise and broad drainage flat. Shallow, sandy skeletal soils are found on the hills and rocky outcrops. On the upper slopes and foot slopes, deeper duplex and gradational soils (desert loams, red earths and solonised brown soils) occur. These soils are generally very alkaline and show variable salinity. Soils on the broad drainage flats are solonised brown soils and are generally much deeper and may extend to depths of approximately 3 m.

Most soils within the LGA have high erosion potential when stripped of vegetation cover and many are dispersable. Saline soils are evident on the lower slopes and drainage flats in a range of locations (R. W. Corkery BHCC Statement of the Environment 2004).

Due to the long history of mining and disturbance on the site, the original soils have been removed and all that remains are shaped overburden piles. As the proposal to undertake further mining of CML7 involves underground operations, and as the surface has previously been rehabilitated, the disturbance of surface soil and impacts in terms of sedimentation and erosion is likely to be minimal.

5.5 ECOLOGY

The Rasp Mine is highly disturbed and modified with little habitat value. Almost all native vegetation had been removed by previous mining activities over the last century. A number of ecological impact assessments have been conducted at the site by ERM. The following provides a summary of these studies.

A review of past ecological assessments undertaken for trial mining at CML7 (ERM 2001), exploration decline development at CML7 (ERM 2006) and temporary mining of remnant ore in the base of Kintore Pit (ERM 2007) was conducted. This approach is justified as no notable alterations to habitat at the site have occurred, and previous assessments were within a similar footprint to the Project and were undertaken as recently as 2006.

As part of the assessment conducted by ERM (ERM 2001), ecologists undertook a field investigation over two days and two nights. The assessment included vegetation mapping, assessment of fauna habitat value and flora and fauna surveys targeting threatened species having potential to occur within the Project Area. Derelict mine shafts were investigated by a specialist bat consultant to determine whether any bats were present and the suitability of mine shafts as bat roosts was assessed. A database search of the DECC Wildlife Atlas and a review of the Broken Hill LGA Baseline State of Environment Report 2000 (Terra Consulting, 2000) was undertaken to ascertain the likelihood of any threatened species occurring within 10 km of the site (the 'locality').

ERM (ERM 2006) conducted an additional search of the DECC wildlife atlas, a Department of the Environment and Water Resources online search for Matters of National Environmental Significance (EPBC Act, 1999) and reviewed the Corkery (2004) *Broken Hill LGA State of the Environment Report 2004*. To determine whether any additional threatened species had been listed on the schedules of the TSC Act and EPBC Act since the 2001 study.

5.5.1 Flora

The Rasp Mine area is highly disturbed as a result of past mining activities. Most of the area is occupied by rubble, mine waste rock and tailings. It is vegetated with sparsely scattered introduced weed species. There are some individual trees, including introduced species such as figs (*Ficus* sp.) oleander, wild tobacco and pepper trees, adjacent to buildings and infrastructure and on waste dumps.

Native vegetation is restricted to small isolated patches of woodland, saltbush and rocky grassland at the site perimeters and along roadside verges, *Figure 5-4*. Vegetation along roadside verges also comprise planted Western Australian eucalyptus. These communities are outside the development footprint.

The woodland communities occur at the south-western (west of the railway line) and north-eastern extents of the Rasp Mine (*Figure 5-4*). These communities are sparsely vegetated with canopy vegetation of Eucalypts (*Eucalyptus* spp.) and a shrub and groundcover layer of Mulga (*Acacia aneura*), Old Man Saltbush (*Atriplex nummularia*), Bluebush (*Maireana* spp.), Copperburr (*Bassia* spp.) and Wiregrass (*Aristida* spp.).

Saltbush communities within the Rasp Mine are almost mono-specific stands of Old Man Saltbush and Bluebush species to the north of South Road, in the north-western corner of the mine lease.

Several areas on rocky foot-slopes contain grasses such as wiregrass and Barley Grass (*Hordeum leporinum*), with scattered mulga and old man saltbush. This community occurs south of Holten Drive, and outside of the Project Area.

These communities will not be removed or disturbed during the proposed mining activities. Progressive rehabilitation with the establishment of an olive grove has been undertaken over an area previously used as a water storage dam. This is located adjacent to South Road and one of the old man saltbush communities. The Broken Hill Gourmet Products Co-Operative Limited has undertaken the establishment, harvesting and maintenance of the olive grove.

5.5.2 Fauna

The Rasp Mine is surrounded by urban commercial and industrial areas and there is little native vegetation cover. No tree hollows have been identified on-site and groundcover (e.g. fallen branches) is generally sparse. The small isolated woodland patches have little value as fauna habitat. Previous ecological studies identified that there was very little foraging, nesting or roosting habitat for fauna at the site, though the existing mine buildings provide some potential roosting habitat for bats. The mine shafts are considered to be unsuitable roosting habitat for bats as their steel capped roofs provide limited or no access and updraught of airflow containing highly sulphurous fumes was noted at some shafts (Greg Richards and Associates Pty Ltd, 2001). For these reasons, the area of the Rasp Mine is considered to be of low habitat value for native flora and fauna.

No threatened or migratory species or endangered ecological communities listed under the *Threatened Species Conservation Act 1995* (TSC Act) or *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were recorded at the site during past investigations and their likely occurrence is considered to be low due to a lack of suitable habitat.

Figure 5-4 Vegetation in and surrounding Rasp Mine

