

5.8 TRANSPORT

Transport is the single biggest cost in the Harts Range Project and is critical to its profitability and Olympia Resources' ability to proceed with the project.

The transport of bulk product to the Port of Darwin or Port Pirie will either be by road haulage or by a combination of road transport to a Plenty Highway siding and rail. Currently, negotiations are occurring with representatives of both road and rail haulage, the Port of Darwin and Port Pirie. A number of factors need to be considered in these discussions including port and rail infrastructure as well as the cost of material movement and social impacts of the different options.

The most viable option for transporting containerised product is to transport by road to Alice Springs and then by rail north or south.

6. EXISTING ENVIRONMENT, POTENTIAL IMPACTS AND MANAGEMENT

Studies to describe the existing environment should be of a scope and standard sufficient to serve as a benchmark against which the impacts of the project may be assessed over an extended period. Control areas not impacted by the project should be included in studies and long-term monitoring locations established.

This section of the PER should also clearly identify qualify and quantify, where appropriate, the potential environmental impacts expected to result from the project and from any feasible alternatives.

The section should also include an assessment of the level of significance of the impact, be it global, regional or local.

6.1 AIR RESOURCES MANAGEMENT

6.1.1 Baseline

6.1.1.1 Climate

The climate of the Harts Range area is arid. Dry conditions are typically experienced throughout the year, with a higher summer rainfall period relating to thunderstorms and occasional rain-bearing depressions resulting from cyclonic activity. The area generally experiences high summer and low winter temperatures. Humidity is generally low all year. Between May and September, a constant dry south-easterly wind blows across the district. The average annual rainfall for the district is 285 millimetres.

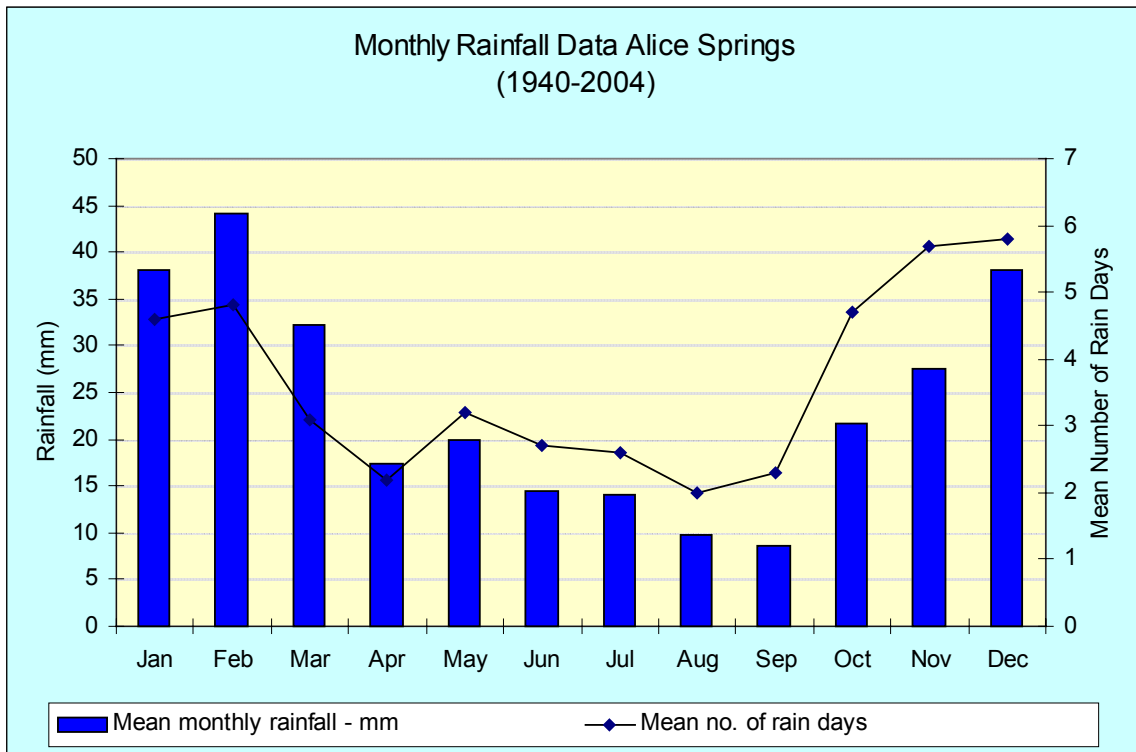
The Harts Range district experiences climatic conditions similar to Alice Springs. The temperature for Alice Springs ranges from 36.3 degrees Celsius in January to a minimum of four degrees Celsius in July. Mean annual average rainfall is 285 millimetres, 95% of which falls between October and March. The average monthly rainfall and number of rain days for Alice Springs are shown in Figure 8. Rain commonly falls as isolated storms, resulting in sporadic and unpredictable creek flow patterns. Tropical cyclonic and winter depressions may result in prolonged wet periods which are irregular and may be related to El Nino periodicity.

Average daily minimum and maximum temperatures are 14 and 19.6 degrees Celsius in July and 21.3 and 36.3 degrees Celsius in January. The average monthly temperatures for Alice Springs are shown in Figure 9.

Average annual evaporation is 3400 millimetres. Humidity in January averages 30% at 9am, dropping to 15% at 3pm. In July, the 9am humidity is 60%, and 30% at 3pm.

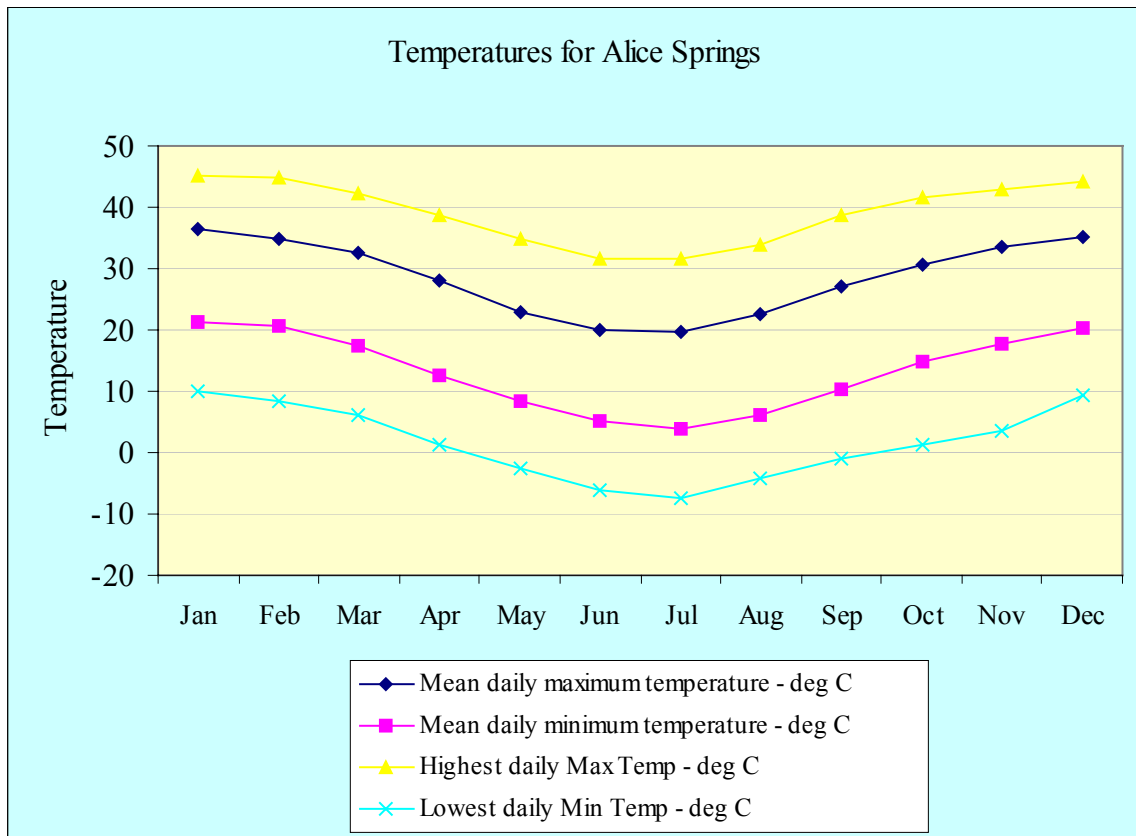
The wind in the southern Northern Territory is generally from the East south-east at around 10 to 20 kilometres. However, wind strength and direction is extremely variable according to time of day and local geography.

Figure 8: Alice Springs Monthly Rainfall Data (1940 – 2004)



Source: Bureau of Meteorology [Available: <http://www.bom.gov.au>]

Figure 9: Alice Springs Monthly Temperatures (1940 – 2004)



Source: Bureau of Meteorology [Available: <http://www.bom.gov.au>]

6.1.1.2 Air Quality

No site-specific air quality monitoring data is available for the project area. The nearest data for substance emissions in the area is the National Pollutant Inventory (NPI) data for Alice Springs, 215 kilometres south-west of the project area.

While there is no ambient air quality data available for the project area, existing air quality is expected to be generally good, given the lack of urban populations or industry. Suspended particulate levels are, however, expected to be elevated due to windblown dust and pastoral activities.

6.1.2 Potential Issues or Impacts

Potential air resource issues include:

- Mobile equipment emissions from engine and generator exhausts. This includes carbon monoxide, carbon dioxide and nitrous oxides.
- A negative impact on climate change associated with increased greenhouse gas emissions. An estimate of greenhouse gas emissions has been prepared for the project. A copy of this is contained in Appendix 4.
- Generation of dust from stripping and replacing topsoil, excavating ore and vehicle movement on unsealed roads.
- Generating dust during screening operations.
- Generating dust during transfer operations. These include loader to truck or conveyor transfer points.

6.1.3 Management and Mitigation Measures

Olympia Resources will aim to minimise air emissions likely to impact air resources. The following sections detail management and mitigation measures and will be implemented.

6.1.3.1 Point Sources

The primary point sources have been identified as:

- Quarrying front-end loader.
- Ore processing facilities.
- Chemical and fuel storage areas.
- Principal electrical generation facilities.

To minimise its point source emissions Olympia Resources will ensure:

- Emission control equipment is installed for activities that could generate emission levels of concern including, but not limited to, dust, exhaust emissions from diesel combustion engines in stationary and mobile equipment, diesel-powered electric generators and the laboratory. Control equipment includes equipment such as dust extraction systems, water sprays and conveyor covers (**Commitment 6.1.3.1a**).

- Diesel combustion engines in stationary and mobile equipment and diesel-powered electric generators will be operated and maintained to minimise emissions of combustion gases (**Commitment 6.1.3.1b**).
- Pollution control devices, such as dust extractors, conveyor covers and sprinklers installed at point sources will be maintained and operated in good working order (**Commitment 6.1.3.1c**).

6.1.3.2 Fugitive Sources

The primary fugitive sources have been identified as:

- Road construction.
- Onsite light vehicle traffic.
- Other earthwork and construction activities.
- Other large non-vegetated areas (eg. parking and material storage areas).

To minimise its fugitive emissions, Olympia Resources will implement the following:

- Minimise the amount of disturbed surfaces. Disturbed surfaces will be progressively rehabilitated to minimise the surface area available for wind erosion (**Commitment 6.1.3.2a**).
- Water trucks will be used to control fugitive dust within the pits and on internal roads whenever necessary to limit dust to acceptable levels. The volume and frequency of water applied will be modified during different climatic conditions to accommodate for road surface moisture changes (**Commitment 6.1.3.2b**).
- Where dust suppression using water is not effective, the use of chemical dust suppressants and/or wetting agents will be considered for use with water (**Commitment 6.1.3.2c**).
- Movement of mobile equipment and vehicles will be limited to clearly-marked routes or areas where dust control methods can be used (**Commitment 6.1.3.2d**).
- The speed of vehicles on roads will be controlled with appropriate signage. Vehicles travelling on unsealed or minor roads will travel at speeds that will not generate excessive dust (**Commitment 6.1.3.2e**).
- Vehicles and equipment will be regularly maintained to manufacturer's specifications to minimise exhaust emissions (**Commitment 6.1.3.2f**).
- Equipment operators will remain in enclosed, air-conditioned cabins to minimise exposure to dust emissions (**Commitment 6.1.3.2g**).
- Areas will be rehabilitated progressively to minimise areas exposed to wind erosion. Vegetation established will be compatible with the post-mining land use of the area (**Commitment 6.1.3.2h**).

6.1.4 Impact Assessment

Potential impacts from air emissions associated with the project are expected to be minimal, particularly when compared with other extractive industries. The lack of tailings storage facilities and waste rock dumps, the lack of requirement for blasting and the ability of the

operation to progressively reclaim backfilled areas will significantly reduce air emission sources. The remote location of the project and the absence of nearby residential facilities also limits adverse impacts that any air emissions are expected to have on the local or regional environment or human health.

Dust emissions that are generated will be localised. Experience with other extractive operations has demonstrated that mining activities typically generate coarse particles (i.e. greater than 10 microns). This results in a large proportion of particulates settling within a short distance of the point of generation.

Greenhouse gas emissions will result from onsite generation of power for the operation and from exhausts of vehicles and mobile equipment. The simplistic processing and quarrying operations will require limited mobile equipment and power generation requirements. The estimated annual greenhouse gas emissions are not considered significant.

6.2 NOISE AND VIBRATION MANAGEMENT

6.2.1 Baseline

There is no baseline noise or vibration data available for the project. Given the current pastoral and exploration land uses, it is anticipated that the project area has a relatively low background levels although this would tend to increase slightly closer to the Plenty Highway.

6.2.2 Potential Issues or Impacts

Potential noise and vibration issues include:

- Mobile equipment noise and vibration emissions from engines.
- Processing and generator noise and vibration emissions from exhausts.

6.2.3 Management and Mitigation Measures

To minimise noise and vibration emissions Olympia Resources will:

- Use engineered controls where justified. For example:
 - o Reducing the noise from equipment by installing soundproofing and/or noise abatement devices around/on primary sources of noise such as power generators and water pumps.
 - o Reducing equipment vibration by installing shock-absorbing devices or materials around the primary sources of vibration such as ore processing equipment and water pumps (**Commitment 6.2.3a**).
- Maintaining, to the extent practicable, the natural acoustic barriers (i.e. trees and ridges) between noise sources and neighbouring communities (**Commitment 6.2.3b**).
- Ensuring that hearing protection equipment is available and utilised in onsite areas where engineering controls are deemed inappropriate or ineffective (**Commitment 6.2.3c**).

6.2.4 Impact Assessment

As with air quality, noise and vibration emissions from the project are not anticipated to be significant. Engineered controls and barriers will further reduce impact.

6.3 SOIL AND LAND SYSTEMS

6.3.1 Baseline

Low Ecological Services were commissioned to undertake baseline studies of the project area to determine the land system and soil types and their distribution within the project area. A full copy of the report of these studies is contained in Appendix 5. Results are discussed below.

Land systems are defined as an area or group of areas throughout which there is a recurring pattern of topography, soils and vegetation within a climatic region (Perry *et al.* 1962). Three land systems are present within the project area; Simpson (land system 71), Sandover (land system 78) and Kanandra (land system 80) (Perry *et al.* 1962). Location of these land systems is shown on Figure 10. Table 4 lists the area of each land system potentially affected by the project and compares this with the total area of each land system on Mt Riddoch Station and in southern Northern Territory.

The Simpson land system is extensive in the Northern Territory and covers most of the Simpson Desert to the southeast of Mt Riddoch. On Mt Riddoch Station it is present as an isolated unit of dunes and swales with stable flanks comprised of red dune sands and red clayey sands. The patch of dunes at Mt Riddoch is surrounded by the Kanandra land system and is an outlier of the larger dune systems in the Simpson Desert. The project would affect about 11.5 square kilometres of this land system.

The Kanandra land system is widespread on Mt Riddoch and in the project area. It consists of floodplains and alluvial plains including Aturga Creek and surrounds the sand dunes of the Simpson land system. The Kanandra land system is characterised by sparsely-timbered, red sandy plains mostly situated on the north side of Harts Range. The system can contain low dunes and the dunes present in the project area are a gradation between Kanandra land system dunes and the larger Simpson land system dunes. The project would affect about 12 square kilometres of this land system.

The Sandover land system on Mt Riddoch Station is represented by a small floodplain along the Plenty River in the northern part of the project area. Soil consists of alluvial clayey sands and alluvial sandy red earths, containing coarse-grained garnets. The project would affect about 2.5 square kilometres of this land system.

Table 4: Land System Areas Present Within the Mining Lease Application (Estimation), Mt Riddoch Station and in the Alice Springs/Southern Northern Territory

Land Type	Estimated Area (km ²) on ML(A) 23868	Area (km ²) on Mt Riddoch Station	Area (km ²) in South NT (1962)	% Area of Land System on Mt Riddoch also within ML	% Area of Land System in Mt Riddoch Station/South NT
ML(A) 23868	26	-	-	0.6%	[100%]
Mt Riddoch Station	-	4,628	4,628	-	[100%]
Simpson L.S.	11.5	18	98,000	63.9%	0.01%
Sandover L.S.	2.5	91	4,400	2.7%	2.07%
Kanandra L.S.	12	1,208	3,400	1.0%	35.53%

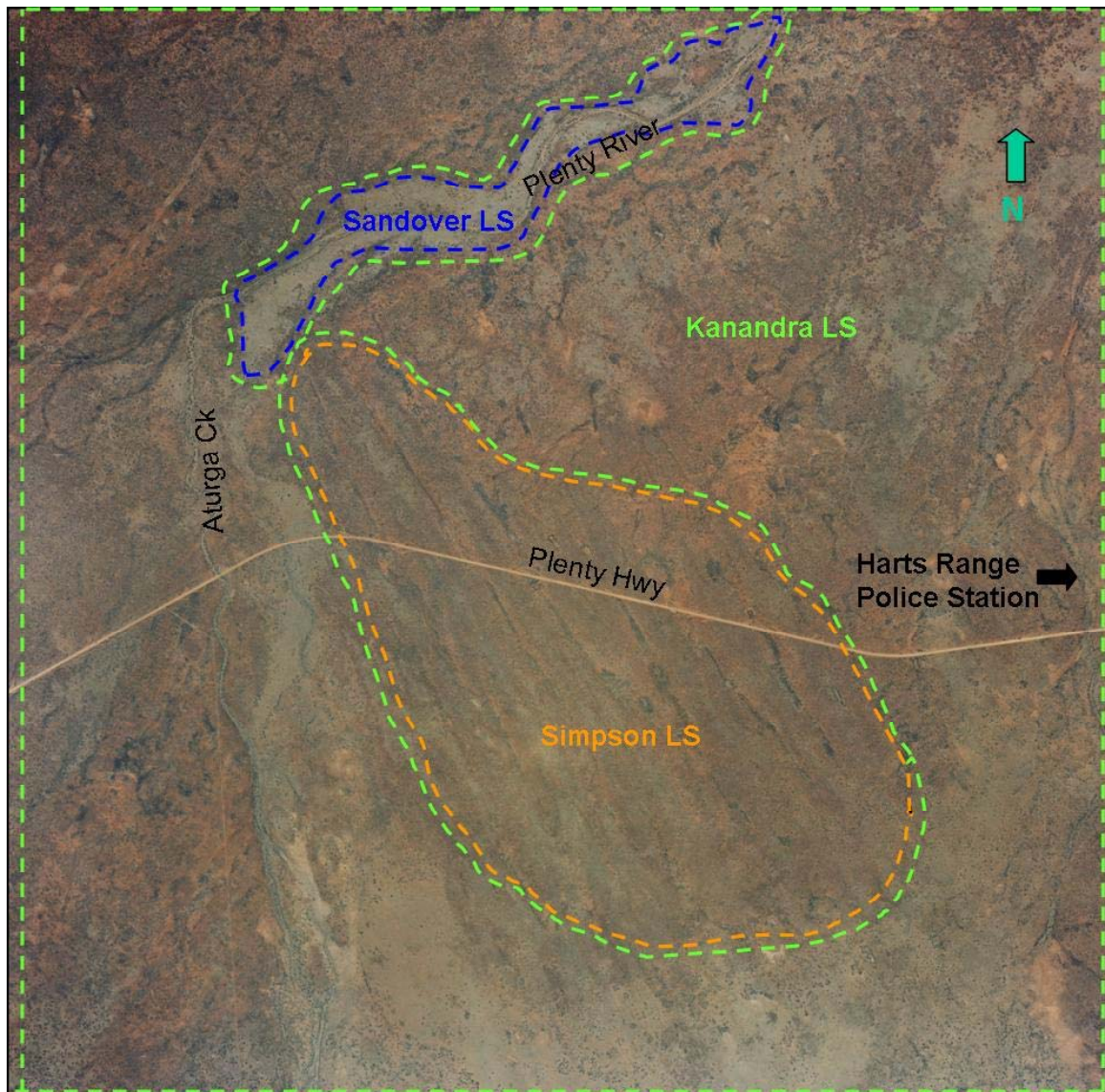
Sources: Low and Strong, 1985, Perry et al., 1962

6.3.2 Potential Issues or Impacts

The following potential issues have been identified:

- Re-establishment of a root zone suitable for plant growth for rehabilitating restored landforms and infrastructure areas.
- Compaction of soil surfaces by vehicles and equipment.
- Erosion of restored surfaces and impacts on vegetation establishment.
- Possible contamination of soils by hydrocarbons.
- Disturbance of unique land systems.
- Erosion of banks of water courses after quarrying until sufficient vegetation re-establishes to stabilise banks.

Figure 10: Land Systems Within the Project Area (Perry et al., 1962; Low & Strong, 1985)



6.3.3 Management and Mitigation Measures

The proponent will manage clearing and rehabilitation to ensure limited landform disturbance occurs. Progressive rehabilitation will be undertaken to maximise revegetation success and minimise long term environmental degradation.

Management and mitigation measures to achieve these aims include:

6.3.3.1 Sensitive Areas and Ground Disturbance

- A clearing permit system will be implemented for all ground disturbance activities (**Commitment 6.3.3.1a**).
- Unauthorised access to protected or sensitive areas (including rehabilitated areas) will be restricted (**Commitment 6.3.3.1b**).

- Vehicles and mobile equipment are to be parked only in designated parking areas. Vegetated areas will not be used for parking (**Commitment 6.3.3.1c**).

6.3.3.2 Topsoil Management

- All areas of the proposed development will be stripped of topsoil to an average depth of about 20 centimetres (**Commitment 6.3.3.2a**).
- Topsoil will be removed progressively to ensure large surface areas are not left exposed (**Commitment 6.3.3.2b**).
- Topsoil stripped from infrastructure areas will be stockpiled in windrows less than two metres to minimise loss of seed viability and soil biota (**Commitment 6.3.3.2c**).
- Excluding the first 10 hectares, all topsoil stripped for quarrying purposes will be placed directly on areas reshaped as part of the rehabilitation process wherever possible. This will ensure survival of the seed bank and microbes contained in the topsoil to assist in rapid revegetation (**Commitment 6.3.3.2d**).
- Topsoil stripping and stockpiling (where required) will be undertaken in dry and preferably still wind conditions to minimise dust generation and topsoil compaction (**Commitment 6.3.3.2e**).

6.3.3.3 Erosion

- No quarrying will occur within the creek beds and within five metres of the creek bank to ensure stability of these structures (**Commitment 6.3.3.3a**).
- Diversion bunds and drains will be installed as necessary to control local surface water runoff to minimise overland flow and consequential erosion (**Commitment 6.3.3.3b**).
- Rehabilitation areas will be ripped on the contour after placing topsoil to remove compaction and improve soil structure and infiltration capacity where necessary (**Commitment 6.3.3.3c**).
- Stripped vegetation will be placed on or within topsoil to act as a physical barrier to wind and water erosion and provide microhabitats to promote rehabilitation success (**Commitment 6.3.3.3d**).
- Rehabilitated and disturbed surfaces will be routinely inspected for erosion, particularly after significant rainfall events. If soil erosion is observed, appropriate remediation measures will be implemented (**Commitment 6.3.3.3e**).

6.3.3.4 Soil Contamination

Contamination management and mitigation measures are discussed in Section 6.8.

6.3.3.5 Rehabilitation

Rehabilitation management and mitigation measures are discussed in Section 7.0.

6.3.4 Impact Assessment

Potential issues and impacts on soil and landforms associated with the project are expected to be minimal after implementation of control measures described above.

Long-term change to the landscape will be minimal as a result of quarrying. All quarried voids will be backfilled progressively to their approximate pre-quarrying landforms and stabilised with indigenous vegetation. Rehabilitation will be integrated into the mine plan and conducted as part of the quarrying operation. Rehabilitation through re-spreading the topsoil immediately onto the backfill will result in maintaining the vegetation diversity and will preserve the integrity of the floodplain and dunes.

Local provenance species will be used to rehabilitate disturbed areas. Ideally, revegetation will occur through careful management of topsoil and its contained seed resource. Supplementary seeding or planting may occur if rehabilitation monitoring demonstrates that revegetation is not proceeding in line with expected results.

Land uses occurring before the project will be able to continue after appropriate rehabilitation protection from grazing.

All land systems within the project area are represented elsewhere on Mt Riddoch Station and in the southern part of the Northern Territory. In 1985, Low & Strong assessed whether any land systems on Mt Riddoch Station warranted reservation, on the basis of the extent they were reserved elsewhere (in National Parks), their conservation value (biodiversity, unique/threatened species) and the area they covered on the station.

The Kanandra land system, primarily located on Mt Riddoch Station, is not well represented in reservations and was deemed as “low priority for reservation” (Low & Strong, 1985). The Sandover and Simpson land systems along with several other land systems on Mt Riddoch were thought to have too limited occurrence to warrant reservation.

6.4 FLORA AND FAUNA

6.4.1 Baseline

A biological survey within the project area was conducted by Low Ecological Services in September 2004. The objectives of the survey were to:

- Identify, assess and map vegetation types present within the project area.
- Determine whether flora and fauna species of conservation significance were present within the project area.
- Identify habitats where significant flora and fauna may occur within the project area.

The report is reproduced in Appendix 5 and is discussed below.

6.4.1.1 Flora

One hundred and thirty-one plant species were recorded during the baseline survey. Non-riparian zones were dominated by Ironwood, Witchetty Bush, Cassia and Saltbush. Riparian zones were dominated by Coolibah, Red Gum and Buffel Grass.

Dominant vegetation within the Simpson land system (isolated unit of dunes and swales) include Ironwood (*Acacia estrophiolata*), with tall shrubs of Witchetty Bush (*Acacia kempeana*) and Cassia (*Senna artemisioides subsp. filifolia*) with scattered Whitewood (*Atalaya hemiglauca*). The understorey includes grasses Wiregrass (*Aristida holathera* and *A. strigosa*), Woolly Butt (*Eragrostis eriopoda*) and Buffel Grass (*Cenchrus ciliaris*). The patch of dunes at Mt Riddoch is surrounded by the Kanandra land system and is an outlier of larger dune systems in the Simpson Desert.

The widespread Kanandra land system (floodplains and alluvial plains including Aturga Creek) is characterised by scattered Ironwood trees (*Acacia estrophiolata*), tall shrubs of Witchetty Bush (*Acacia kempeana*), Cassia (*Senna artemisioides subsp. filifolia*), low shrubs such as Saltbushes (*Rhagodia* species) and grasses (*Aristida* species and *Eragrostis* species).

The Sandover land system (small floodplain along the Plenty River) consists of River Red Gum (*Eucalyptus camaldulensis*) and occasional Coolibah (*Eucalyptus coolabah subsp. arida*) trees overlying various grasses (*Aristida* species and *Eragrostis* species) and low shrubs (*Rhagodia* species). Introduced Buffel Grass now dominates the ground storey.

The *EPBC Act* (1999) listed only one species of conservation significance that could potentially be in the area, Macdonnell Ranges Cycad (*Macrozamia macdonnellii*). It is likely that, if present, this species would be restricted to the Harts Ranges south of the project area and its area of influence. No species of conservation significance were recorded during the baseline survey.

As a result of the baseline survey and discussions with regulatory officers, localised areas of vegetation were recommended for preservation due to their size and local significance. These include a stand of Gidgees 280 metres south of the Plenty Highway and 600 metres east of Aturga Creek and a stand (including four Corkwood trees) on the floodplain.

6.4.1.2 Fauna

Thirty-three bird species, five mammal and five reptile species were recorded opportunistically and at fauna sites. The Red Kangaroo was the most commonly recorded species, observed at all sites and throughout the study area. House Mice were the only mammal species and Central Bearded Dragons were the most frequently recorded reptile during the baseline survey. The Crested Bellbird, Spiny-cheeked Honeyeater, Singing Honeyeater and Willy Wagtail were the most commonly heard or observed birds during the survey.

No *EPBC Act* (1999)-listed fauna species of conservation significance were recorded within the project area. The Central Brush-tailed Possum (*Trichosurus vulpecula vulpecula*) has been found on Mt Riddoch Station in the past and until recently was considered locally extinct. However, sightings have been made in more recent years (Dick Cadzow pers. comm. 2004). Although the species is common in southern Australia, it is listed as endangered in the Northern Territory (Paltridge and McAlpin 2002). Recent tree scratchings on a River Red

Gum at the Plenty River vegetation site were observed and although they could be from a possum, they are more likely cat scratches. Possum scats, which are more definitive than scratchings (Michael Barret pers. comm.. 2004), were searched for but none were found. Several mature trees contained hollows that could be utilised by possums.

6.4.2 Potential Issues or Impacts

Potential issues and impacts include:

- Clearing vegetation from project areas. The project footprint during any one year is likely to be about 15 hectares, of which about 10 hectares will be cleared annually for new quarry areas. The balance will be existing infrastructure areas such as access roads, pipeline, treatment plant, small stockpile and a small workshop and office area. The total anticipated disturbance area for the 20-year project life is 232 hectares (Table 5).

Table 5: Land Clearing Requirements

Infrastructure	Area (hectares)
Quarry	200
Wet plant (moved once)	4.0
Offices, workshop and stores	1.0
Sand and clay containment (for first three years)	10
Camp	1.5
Haul road	0.5
Pipeline	15
Total	232

- Loss of riparian vegetation surrounding Aturga Creek and Plenty River.
- Death of vegetation as a result of groundwater drawdown in water extraction areas.
- Successful establishment of vegetation on restored landforms.
- Spreading of weeds, particularly Buffel Grass, as a result of introducing equipment to the site, quarrying operations and transport of product.
- Removal of native fauna habitats as a result of vegetation clearance.
- Trapping of animals in open trench during pipe construction activities.
- Death of animals during pipe construction activities.
- Death of animals on quarry roads and the ore product transport road.
- Attraction of feral animals to waste disposal areas and permanent water storage areas.

6.4.3 Management and Mitigation Measures

Olympia Resources aims to minimise loss of habitat and re-establish appropriate habitat through rehabilitation. The company will also endeavour to manage and control the spread of weed species as a result of its operations.

Management and mitigation measures that will be implemented to achieve these aims include:

6.4.3.1 Habitat

- Ground disturbance management and mitigation measures are discussed in Section 6.3.3.1.
- Topsoil management and mitigation measures are discussed in Section 6.3.3.2.
- Erosion management and mitigation measures are discussed in Section 6.3.3.3.
- Rehabilitation management and mitigation measures are discussed in Section 6.11.
- Employees and contractors will be required to attend an induction programme that will include environmental management. In particular, the induction will clearly explain employee and contractors' roles and responsibilities for restricting impacts on fauna and habitat (**Commitment 6.4.3.1a**).

6.4.3.2 Flora

- Earthmoving equipment brought to the project area, particularly during construction, will be cleaned to remove soil and plant seeds prior to entry (**Commitment 6.4.3.2a**).
- Weeds will be controlled through prevention, monitoring and early eradication. If spread of weeds is identified as being an issue of concern after construction starts, a weed management plan will be prepared in conjunction with the Northern Territory Government Controller of Weeds and other relevant experts (**Commitment 6.4.3.2b**).
- Disturbance of trees on the floodplain and dune systems will be minimised where practicable (**Commitment 6.4.3.2c**).
- No trees will be disturbed within the riparian zone (**Commitment 6.4.3.2d**).

6.4.3.3 Fauna

- No domestic animals or firearms will be allowed onsite (**Commitment 6.4.3.3a**).
- Speed restrictions will be implemented on internal roads to minimise fauna death on roads. Signage restricting speed on main roads will also help reduce fauna deaths (**Commitment 6.4.3.3b**).
- Waste management procedures will be implemented to minimise attraction of feral animals to the project area (**Commitment 6.4.3.3c**).
- Olympia Resources will implement feral animal control programmes in conjunction with the station owner if, during the project, feral animals are observed to have become an issue (**Commitment 6.4.3.3d**).
- The maximum length of open trench present during construction of the water pipeline will be limited to 10 kilometres (**Commitment 6.4.3.3e**).
- Daily inspections of open trench will be conducted during construction of the water pipeline. Any live trapped fauna will be removed and released to adjacent areas (**Commitment 6.4.3.3f**).

- Insulated shelter boxes will be installed every 100 metres of open trench to provide fauna with shelter from high day time temperatures during construction of the water pipeline. This will minimise fauna death due to heat stress (**Commitment 6.4.3.3g**).

6.4.4 Impact Assessment

There will be negligible impact on active channels where River Red Gum trees are well developed. Removal of some trees from the floodplain will occur during quarrying, but significant groups of trees and trees within the watercourse areas will have an appropriate buffer left around them and will not be damaged.

Quarrying will remove the ground storey vegetation, but the retained topsoil will contain seeds and be reinstated immediately on backfilled areas to allow for revegetation when appropriate rain falls.

Vegetation communities and species found in the project area are widespread regionally with no rare or threatened species recorded; therefore loss of vegetation due to the project will not impact such flora.

Local surface disturbance will remove habitat in the immediate project area. Overall, the impact will be minimal with loss of faunal habitat locally significant, but regionally minor. Re-colonisation of disturbed areas will occur as vegetation is progressively re-established and as the site is decommissioned when activities cease.

6.5 GROUNDWATER

6.5.1 Baseline

Territory Ground Water Services undertook a preliminary hydrogeological study of the area in November 2004 (Matthews, 2004) to investigate the hydrology of the area and assess the project's potential impacts on groundwater. The report noted two aquifers within the study area. A shallow unconfined aquifer is present at a depth of 20 to 30 metres, although this aquifer is not currently exploited. Its low yield (commonly about one litre per second) does not make it an option as a project water source.

A deeper, semi-confined sand aquifer has yields of five litres per second and the water quality is similar to the upper aquifer, signifying a moderate to long-term connection between the two aquifers.

A lack of test pumping data has not allowed sufficient calculations of the aquifers parameters at present. Although the calculation of aquifer throughflow, storage volumes and recharge potentials have not yet been completed, Territory Ground Water Services states the basin characteristics are comparable to the Ti Tree basin. The reduced size and additional runoff from the nearby Harts Ranges should result in increased recharge rates.

Quality testing of the deep aquifer from Bore RN 17045 highlighted an electrical conductivity of 1,510 microsiemens per centimetre, which equates to a total dissolved solid level of about 1,000 milligrams per litre. The Northern Territory Power and Water Corporation uses a total

dissolved solid guideline value of 800 milligrams per litre as the upper limit for potable water. Without treatment, the water is not suitable for human consumption and marginally suitable for irrigated agriculture. Based on experience with extraction to date for pastoral uses and knowledge of the underlying geology, the water quality is not expected to change significantly with time or extraction.

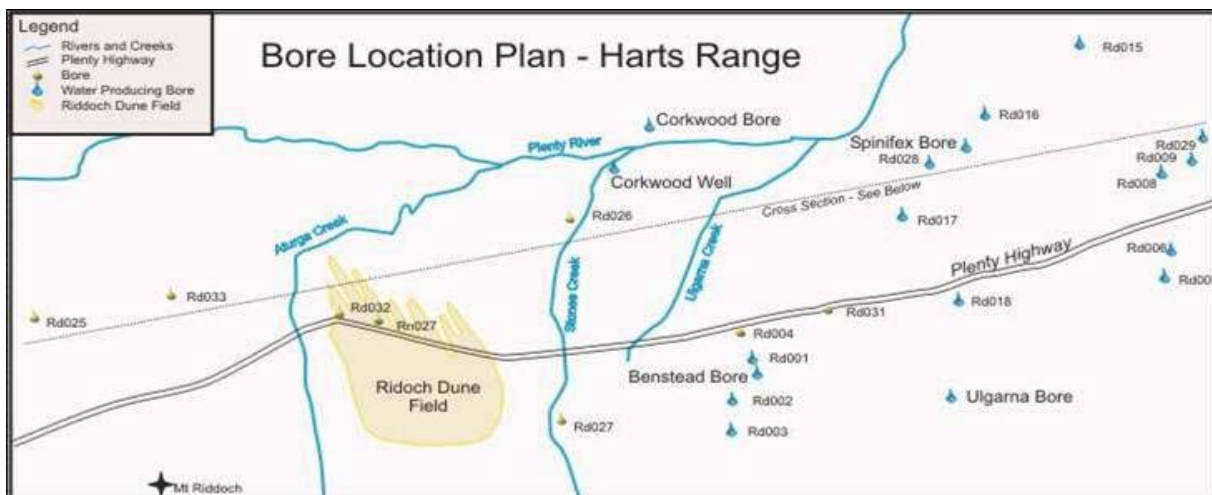
Water requirements for the total operation will be sourced from the deep, semi-confined sand aquifer located 15 kilometres east of the project area. A borefield consisting of three to five bores will be developed. Two will be operated, two rested and one placed on standby at any one time to provide the operational requirement of 1,000 kilolitres per day. To date, four of the five bores (including Spinifex bore) have been constructed. Territory Ground Water Services considers the borefield to have a capacity to produce about 2,000 kilolitres of water per day. Figure 11 shows the location of the bores in relation to the project area.

Water will be delivered to the operational area via a 15-kilometre pipeline of about 250 millimetres diameter. Water will be stored onsite in an 80-kilolitre lined pond, which is equivalent to two hours of water requirement. A basic water balance is detailed in Appendix 2.

Groundwater required for potable uses will be treated using a reverse osmosis and chlorination process prior to consumption. Raw groundwater will be used for all other site requirements.

Current beneficial users of the groundwater within the area include Mt Riddoch Station and Titjikala community.

Figure 11: Location of Borefield and Groundwater Bores



6.5.2 Potential Issues or Impacts

Potential groundwater issues or impacts include:

- Lowering of localised groundwater levels as a result of quarrying.
- Lowering of the water table in the region of the Spinifex bore and Titjikala community borefield. Lowering of water levels may adversely impact on yields from existing bores used for community and pastoral purposes.

- Temporary formation of a groundwater mound beneath the backfilled quarry areas if returned material has greater moisture content than undisturbed material.
- Deterioration of local groundwater quality as a result of seepage of contaminants from quarrying activities into the aquifer.
- Groundwater abstraction may reduce the volume of surface water flows due to the potential hydraulic connection between surface and ground waters.
- Concentration of salts on road areas where groundwater is used as a dust suppressant.
- Pipeline infrastructure impacting on pastoral activities.

6.5.3 Management and Mitigation Measures

Olympia Resources will maintain groundwater quality and contain impacts of dewatering so they do not affect any other beneficial users. Management and mitigation measures to achieve this include:

- Quarrying activities will only occur above the water table (**Commitment 6.5.3a**).
- Process water storage structures will be lined to minimise seepage (**Commitment 6.5.3b**).
- Reject sands used to backfill quarry areas will be thickened and discharged at about 45% solids to minimise free-draining water in backfilled areas. Sumps will be installed within backfilled areas to collect further water for recycling (**Commitment 6.5.3c**).
- Olympia Resources will replace Spinifex bore and provide Mt Riddoch Station with water from the project's borefield to the same volume currently abstracted (**Commitment 6.5.3d**).
- The following standard borefield management practices will be employed:
 - o Flow meters will be fitted to groundwater extraction bores to enable monitoring of extraction volumes.
 - o Quarterly level monitoring of observation bores (Bores RN's 17046 and 17047).
 - o Six-monthly water quality samples from observation and production bores.
 - o A formal aquifer review every two years using all monitoring data (**Commitment 6.5.3e**).
- The pipeline will be buried to minimise interference with pastoral activities (**Commitment 6.5.3f**).
- DIPE will be consulted on appropriate method and location for the water line to cross the Plenty Highway (**Commitment 6.5.3g**).

6.5.4 Impact Assessment

The maximum depth of all quarry areas is about seven metres. Given the depth to the shallowest aquifer is at least 20 metres, quarrying activities will not result in interception of groundwater. Consequently, dewatering of quarry areas will not be necessary and no localised lowering of the groundwater table will result.

The effect of groundwater pumping from the five bores proposed to be developed will be localised, temporary drawdown of the water table during the life of the operation. It is anticipated that a minor cone of depression will form around the production bores, however, this will dissipate after pumping stops. This localised lowering may affect Spinifex bore, however, this will be temporary and negated by proposed management practices. Olympia Resources is negotiating with Mt Riddoch Station whereby Spinifex bore will be upgraded at Olympia Resources' cost. During the time of operation of the borefield, Olympia Resources will ensure that water of similar volume to that currently extracted by the station is supplied to them. When mining ceases, additional bores developed by Olympia Resources will be handed over for the station's use.

The Titjikala Community borefield will not be affected. Currently available data shows that the borefield is sufficiently distant assuming a homogenous aquifer. Additionally, the results of drilling from bores RN 17046 and RN 17047 show an area of reduced transmissivity exists between the Spinifex bore area and the community that further reduces the likelihood of impact.

Constructing impermeable water storages, thickening reject sands prior to disposal and the permeable nature of the substrate material will not result in developing a temporary water mound beneath infrastructure and backfilled quarry areas.

Waste characterisation test work undertaken by Olympia Resources shows the sands mined are totally inert and do not contain sulphides. The lack of potentially acid-generating material, low rainfall and high evaporation results in a low potential for acid generation and related water quality problems. In addition, groundwater quality is not expected to change significantly with time or extraction (Matthews 2004). The relatively low salt levels within the water, combined with the permeable nature of the sediments, ensures that concentration of salts within quarried areas will not occur.

On average, Aturga Creek flows every two years while the Plenty River and Ongeva Creek flow annually. The itinerant nature of the water courses is due largely to the permeable fluvial channel and floodplain and low rainfall. The flows are not related to groundwater movement into channels and consequently abstraction activities will not impact on surface water regimes.

Burial of the pipeline to a depth of one metre will minimise temperature-induced pipeline movements, avoid damage by fire and avoid the pipeline becoming a traffic and mustering obstacle.

6.6 SURFACE WATER

6.6.1 Baseline

The project area is located within the headwaters of the Plenty River catchment, about 20 kilometres from the river's source. This arid-zone river runs for about 380 kilometres to the southeast before fading in the sand dunes of the Simpson Desert.

The project area also contains Aturga Creek. Both watercourses are ephemeral and flow is typically a quick rise in water level to a flood peak after heavy rain, followed by several days

or weeks of declining flows. Flash-flooding is relatively common. Floodplain inundation for periods longer than one week is uncommon.

Flow records for the Plenty River at a station 25 kilometres north-east of the Harts Range Racecourse, indicate that the river averages two or three small flows per year with a flow duration of one to five days. Large flows may last for up to three weeks.

Aturga Creek, with a smaller catchment, flows much more infrequently (average one small flow every two years). Creeks with smaller catchments or in local rain shadows may flow as little as once or twice a decade.

No surface water will be extracted for the project.

6.6.2 Potential Issues or Impacts

The proposed mining and processing operations pose the following issues:

- Temporary reduction in surface water volume to ephemeral creeks as a result of diverting runoff from operational areas.
- Contamination of surface water as a result of release of pollutants associated with earthmoving, excavation and ore processing. Potential contaminants include sediment and hydrocarbons.
- Contamination of surface waters due to release of sewage.
- Flooding of operational areas.
- Contamination of surface waters due to release of sewage.

6.6.3 Management and Mitigation Measures

Olympia Resources aims to prevent or minimise any deterioration in surface water quantity and quality. Management and mitigation measures to achieve this will include:

- Protection bunds and diversion channels will be constructed to prevent flooding of pits, process areas or other quarrying infrastructure (**Commitment 6.6.3a**).
- Out-of-pit stockpiles will be constructed so that interference with natural surface water drainage is prevented or impacts are minimised (**Commitment 6.6.3b**). Interference will be minimised by careful consideration of location of stockpiles.
- Release of sediments to watercourses will be prevented where release of sediment is identified as a potential risk by installing sediment control structures at discharge points (**Commitment 6.6.3c**).
- Construction of the stockpile areas in the process plant so that surface water runoff can be captured and re-used (**Commitment 6.6.3d**).
- Culverts and/or floodways will be installed as required where roads cross watercourses (**Commitment 6.6.3e**).
- Commercially-available sewage treatment systems at the accommodation village and processing areas. Where solids are required to be removed, these will be disposed of

offsite in accordance with Department of Health and Community Services requirements. Treated water will be dissipated through seepage (**Commitment 6.6.3f**).

- Hydrocarbon storage will be in accordance with Australian Standard *AS1940 Storage and Handling of Flammable and Combustible Liquids* (**Commitment 6.6.3g**). Further contamination management and mitigation measures are discussed in Section 6.8.
- Any water releases to the environment will meet approved water quality criteria (**Commitment 6.6.3h**).

6.6.4 Impact Assessment

Careful design of the project including consideration of surface water flows when siting infrastructure will result in minimal impacts on surface water.

Design and operation of the water storage dam will incorporate measures to minimise risk of overtopping during the wet season including high intensity rainfall events.

Implementation of the management and mitigation measures described above will ensure that potential for contamination of surface water is minimised, catchments containing potentially contaminated surface water flows are appropriately managed prior to release and disruption to natural flow regimes is minimised.

Waste products generated by the project (reject sands) will predominantly be silica sand with about 18% silt and a negligible amount of clay. Characterisation test work by Olympia Resources shows the materials are totally inert and do not contain any sulphides. Mineral compositions are given in Appendix 6.

To ensure all-year vehicle access to the wet plant and associated infrastructure facilities, the processing area and access roads to the Plenty Highway will be located on dune terrain. This well drained and slightly elevated terrain will ensure the operational area and access will not be adversely affected during significant rainfall events. Calcrete from pit floors will be used as a road base and to establish a hardstand operational surface. The high permeability of the pit floor and ability of the operation to recycle water collected in the pit means that discharge of excess water from the quarry during extreme rain events is unlikely.

6.7 CULTURAL ENVIRONMENT

6.7.1 Non-Aboriginal Baseline

The Australian Heritage Council (AHC) was appointed on 19 February 2004 and replaces the Australian Heritage Commission as the principal adviser to the Australian Government on heritage matters. The AHC is administered within DEH, and is responsible for compiling the Australian Heritage Database, which includes the Register of the National Estate, Commonwealth Heritage List, National Heritage List, and World Heritage List.

A search of the Australian Heritage Database was conducted in October 2004 to determine if any registered heritage sites occur in or adjacent to the project area. No sites were listed in the database.

The first non-Aboriginal person to pass through the Mt Riddoch area, as described by Lowe (1985), was John Ross in 1870. He was followed by Charles Winnecke (c.1877) who named Mt Riddoch for John Riddoch, member for Victoria River. The following year, H. V. Barclay passed through and named the Plenty River due to its plentiful supply of water. Gemstone prospectors converged on the Harts Range sparking the 1880s “Ruby Rush” and the first mica mine was established at Mt Palmer by the late 1880s. By 1926, intensive mining of mica deposits was being undertaken throughout the ranges.

The initial pastoral lease, which was to become part of Mt Riddoch Station, was issued in 1910. The land has been continually used and developed for cattle production since that time.

6.7.2 Aboriginal Baseline

According to Gunn (2004), the Central Australian ranges appear to have been first occupied around 30,000 years ago. It is most likely that they were occupied continuously through the late Pleistocene and Holocene period to the present; however, occupation during the glacial maximum (18,000 to 12,000 BP) is still being assessed.

Studies also reveal an increase in site usage around 1000 BP that continued up until the contact period. This is characterised by a greatly increased density of chipped stone artefacts, grindstones, charcoal, bone and other types of occupational debris (Smith 1996). On this basis and as a result of geomorphic factors, it is expected that any surface artefacts located within the project area will be from this later period. Grindstones were introduced into the region around 3500 years ago; however they become far more numerous after c. 1000 BP.

The project area is currently within the traditional estate of either the Bloomfield and/or Jenkins families (Tony Petrick, pers. com.; 2004) and is not subject to any Native Title Claim.

Olympia Resources has entered into an Indigenous Land Use Agreement with the Central Lands Council to cover exploration and mining activities on the project area and this agreement has been registered. The agreement includes the possibility of any future Native Title Claims over the project area.

6.7.2.1 Previously Recorded Sites

Prior to Olympia Resources initiating a number of surveys, no previous archaeological studies are known to have been undertaken within the project area.

Site-recording projects have been undertaken within the Harts Ranges to the east (Gunn 2001; pers. field notes), the Dulcie Ranges to the northeast (Gunn 1989, 1992, 1993, 1997; Cleary et al. 1994; Thorley 1994) and on the sand plains east of Harts Range (Gunn 2002). These have shown that archaeological and other Aboriginal site types tend to concentrate around existing water sources, with a general decrease in frequency with distance from the water reserve (Gunn 1997). It is also likely that bedrock outcrops near water reserves will contain rock art.

Strehlow’s map of Aboriginal Central Australia has no Aboriginal sites within the project area. He does, however, locate two sites just outside the area; the place name of *Areja* to the north-west, and the totemic site of *Erala Banberaka* to the south-east.

6.7.2.2 Surveys

A Sacred Site Clearance had been previously undertaken within the project area for Olympia Resources exploration permit and a single site, *Anthere*, was recorded. The site visit was made by an anthropologist and local Aboriginal group members in 2002. Another site visit was undertaken by representatives of Aboriginal Areas Protection Authority (AAPA) in October 2004 to determine whether any sites of Aboriginal significance were present within the proposed project area. In the first survey no sites of significance were identified in the planned sand pit or project area. Preliminary indications are that some sites of significance have been identified in dunes east of the planned sand pit.

An archaeological survey of Olympia Resources' proposed Mining Lease was undertaken in August 2004 by Ben Gunn with the assistance of Lindsay Cavanaugh and Riley Williams of Atitjere Community (Gunn, 2004). Results of the survey are reproduced as Appendix 7 and are discussed below.

The survey located 111 stone artefacts within the area. Excluding two, all concentrations occur along the margins of Aturga Creek and on the sandplains immediately adjacent to the creek. The two exceptions were a single artefact on the crest of the highest sand dune, two kilometres east of Aturga Creek, and a light but concentrated scatter in and around a stand of Gidgee trees within the sand dunes, 200 metres east of Aturga Creek.

Three archaeological sites and a potential habitation site were located within the project area (Figure 12). Two were distinguished on the basis of artefact concentrations, Aturga Creek 1 and 2 (AC-1 and 2 respectively). The third was a scarred tree (AC-3), located just south of the highway and one kilometre downstream (north) from AC-1. A potential habitation site was located within a stand of Gidgee trees to the east of the scarred tree. A scatter was also located at *Anthere* claypan, east of the project area. Figure 13 shows the transect and artefact locations.

6.7.2.3 Significance

The report concluded that the sites identified presented a unique snapshot of the prehistoric use of this area, however, the pattern was unlikely to be outstanding from a regional perspective. Specifically:

- ***Aboriginal significance***
 - o From our research, none of the archaeological sites along Aturga Creek have particular Aboriginal significance.
- ***Archaeological significance***
 - o *Anthere* is accorded a high archaeological significance on account of its considerable archaeological potential, both in regard to its sub-surface deposits and the nature of its surface material.
 - o Site AC-3 is accorded a high archaeological significance because few scarred trees have been recorded in the region. This significance may decrease with further archaeological surveys within the region.
 - o Site AC-1 is accorded a moderate significance pending an assessment of its sub-surface content. Further analysis of the surface material is also warranted.

- o Site AC-2 is accorded a low significance on account of the low number of artefacts it contains and doubtful sub-surface potential.
- o The areas of background scatter are not of particular academic significance because they reflect the stone types located within the greater concentrations mentioned above.
- ***Heritage significance***
The archaeological sites do not have Heritage significance nor do they have potential for educational purposes.

6.7.3 Potential Issues or Impacts

Potential Aboriginal cultural impacts include:

- Unauthorised destruction or damage to identified sites.
- Identification of additional Aboriginal sites during the quarrying process.

Figure 12: Archaeological Site Locations

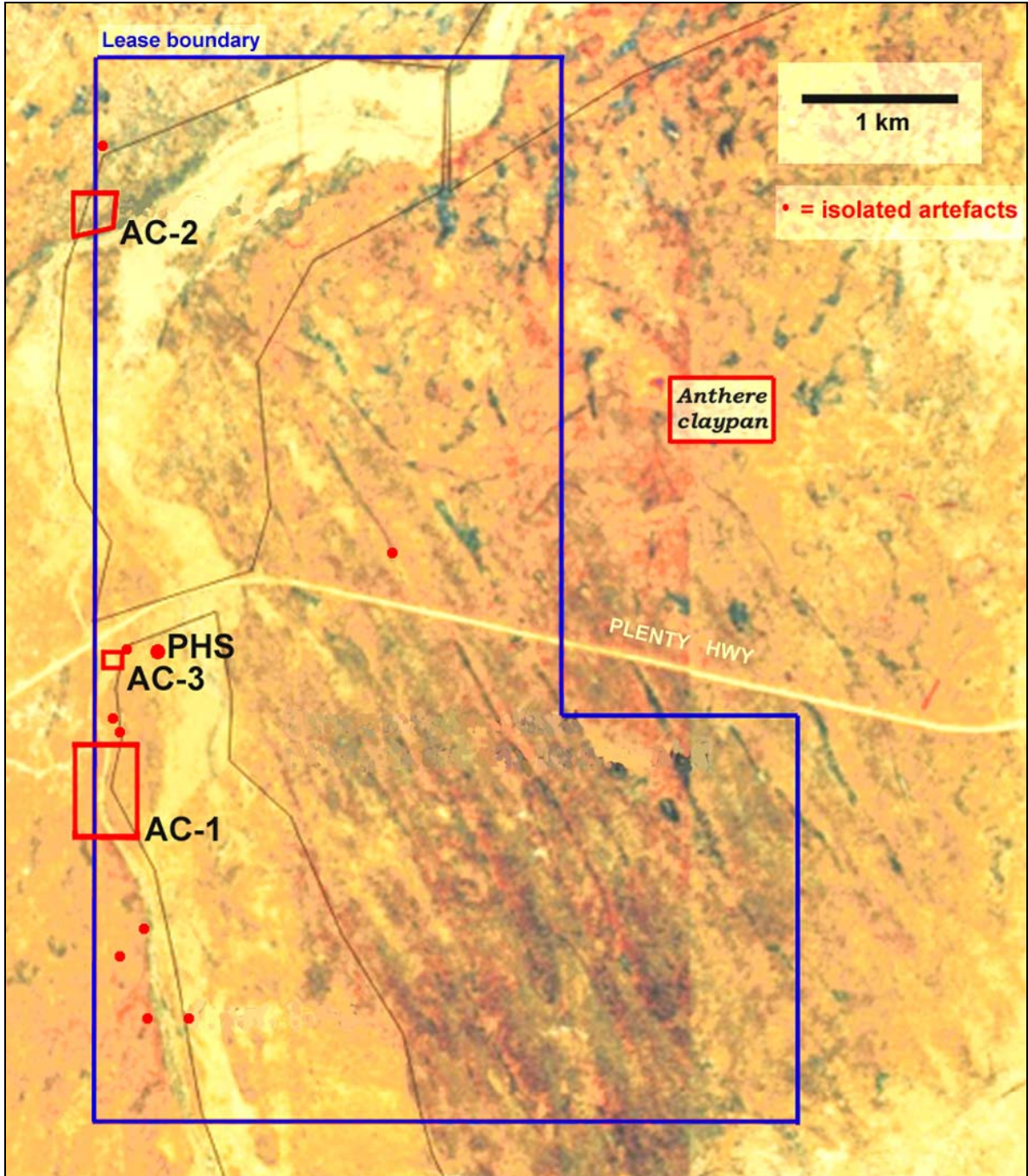
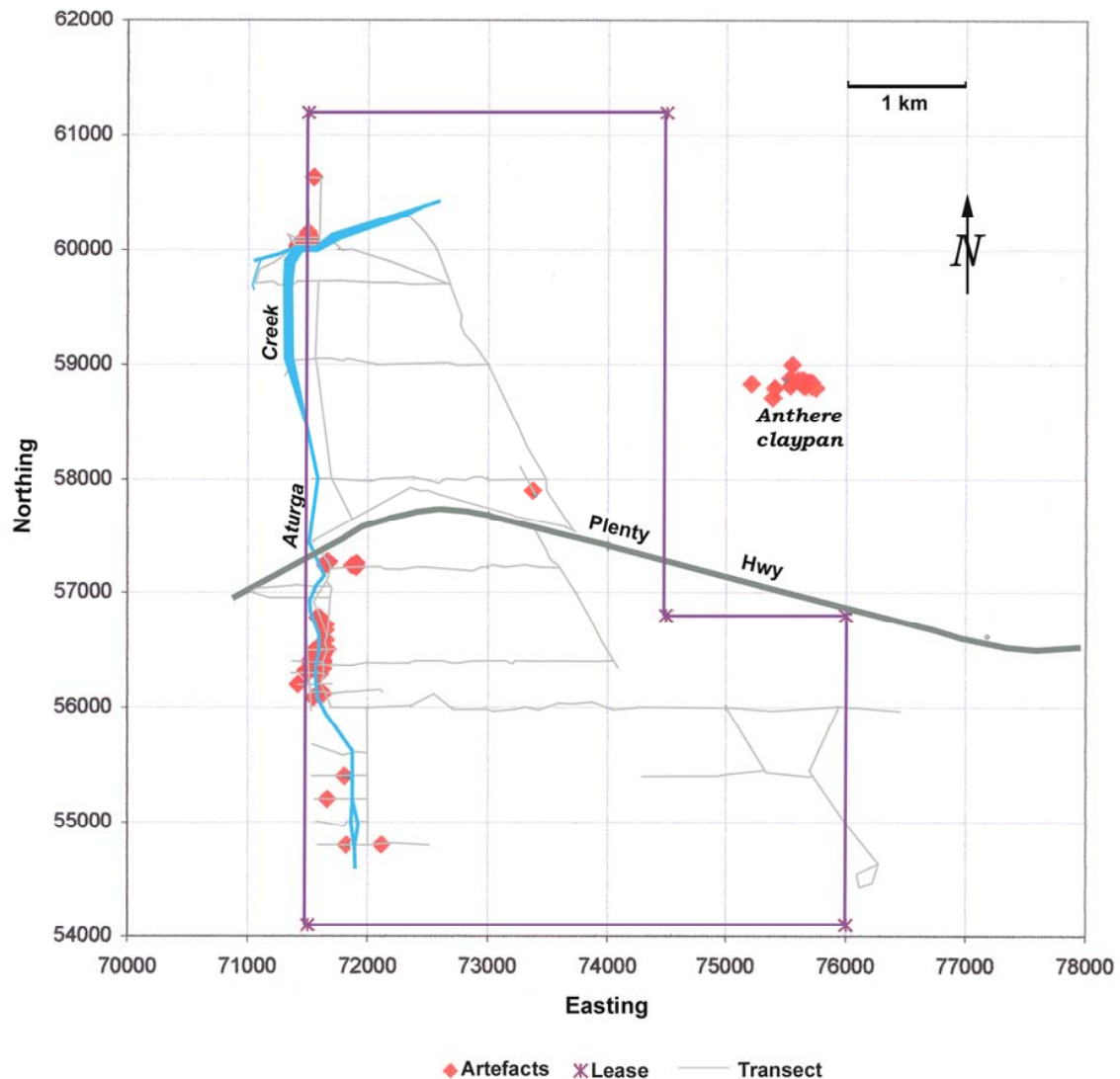


Figure 13: Transect and Artefact Locations
Survey transect and artefact locations



6.7.4 Management and Mitigation Measures

Management and mitigation measures to address potential issues or impacts will include:

- The coordinates of artefact and archaeological site locations shall be stored in a suitable database by Olympia Resources and be made accessible to project design, construction and operations personnel (**Commitment 6.7.4a**).
- Construction or quarrying activities will not occur until appropriate checks against artefact and archaeological site locations have been made (**Commitment 6.7.4b**).
- All employees and contractors will be required to participate in a general site induction before starting work. The induction will include:
 - o Information on the importance of the cultural environment and protecting the artefact and archaeological site.

- o Information on the correct procedure if items of potential Aboriginal or heritage significance (including bones) are discovered during quarrying (**Commitment 6.7.4c**).
- The Aboriginal Areas Protection Authority and Central Land Council will be contacted immediately if items of potential Aboriginal significance are discovered (**Commitment 6.7.4d**).
- Olympia Resources will employ Aboriginal monitors to scout areas for artefacts or sites before topsoil stripping to improve the chances of discovering items of Aboriginal significance (**Commitment 6.7.4e**).
- No archaeological site will be disturbed unless clearances have been obtained from AAPA and/or Central Land Council. No isolated artefacts will be disturbed without approval from Olympia Resources Operations Manager.

The following management measures will be implemented if disturbance is required and has been approved:

- o For AC-1 and 2, a complete and systematic recovery of all surface material will be undertaken and a series of at least four test pits be excavated across the site to ascertain the depth and integrity of its deposit and to attempt to recover and date any charcoal that might reflect the period of the site's occupation.
- o The deposits of the potential occupation site (at the Gidgee stand east of AC-3) will be test-excavated to assess its potential at an appropriate time (**Commitment 6.7.4f**).
- Site AC-3 (scarred tree) will be preserved with no sand quarrying occurring under the tree canopy and not to within 50 metres of the tree trunk (**Commitment 6.7.4g**).
- An area of 500 metres radius around *Anthere* claypan will be designated as restricted for the life of the quarrying project. This will prohibit any quarrying, access tracks, thoroughfare or other associated works within the designated area (**Commitment 6.7.4h**).

6.7.4.1 Impact Assessment

Implementing the management and mitigation measures will result in a low risk of the project impacting the cultural environment.

6.8 WASTE AND HAZARDOUS MATERIALS

6.8.1 Baseline

Bulk hazardous substances to be used within the operation will be limited to hydrocarbon products such as diesel and lubricants. No explosives and process reagents are required for the project. About 10 tonnes per annum of an acrylamide-based flocculant will need to be used in the thickener. This is similar to flocculants routinely used in water treatment plants and is not considered to be a hazardous substance. Storage requirements are detailed in Table 6.

Table 6: Hazardous Materials Storage Requirements

Substance	Area of Use	Storage Type	Storage Amount
Diesel	Mobile equipment and power generation	2 x 55,000 litre tanks	110,000 litres
Diesel	Power generation borefield	2 x 10,000 litre tanks	20,000 litres
Lubricants	Equipment maintenance	200 litre drums	2000 litres

The main diesel tanks will be filled directly from tanker truck importing diesel to the site. Minor storages on borefields will be filled using a service truck.

A putrescible landfill will be required to dispose of inert and putrescible wastes.

6.8.2 Potential Issues and Impacts

Potential issues and impacts include:

- Spillage of hydrocarbons to the environment.
- Disposal of hazardous wastes generated during construction and operations including tyres, waste oil and grease.
- Disposal of putrescible wastes in an onsite landfill.

6.8.3 Management and Mitigation Measures

Olympia Resources will aim to effectively manage hazardous materials to minimise and control potential discharges to the environment.

Management and mitigation measures to achieve this aim will include:

6.8.3.1 Materials

- Material Safety Data Sheets will be available and accessible at all work places where hazardous materials are used (**Commitment 6.8.3.1a**).
- Design of chemical and hydrocarbon product storage tanks and secondary containment will be in accordance with *AS1940 Storage and Handling of Flammable and Combustible Liquids*. The design should also address appropriate corrosion protection and leak detection systems (**Commitment 6.8.3.1b**).
- An inventory of hydrocarbon use will be maintained to help determine whether storage containers are leaking (**Commitment 6.8.3.1c**).
- Chemical and hydrocarbon product storage tanks and related piping, including distribution piping, will be above ground (**Commitment 6.8.3.1d**).
- Runoff from hydrocarbon product storage areas will be routed through oil water separators (**Commitment 6.8.3.1e**).
- Trained personnel will refill hydrocarbon product storage tanks (**Commitment 6.8.3.1f**).

- Hazardous materials will be transported in bulk packaging wherever possible. This will minimise the number of containers and reduce spillage risk (**Commitment 6.8.3.1g**).
- All mobile equipment and light vehicle servicing activities including wash down will be done on impermeable surfaces (**Commitment 6.8.3.1h**).
- The heavy vehicle workshop will contain a purpose-built wash down facility incorporating an appropriate sediment and oil/grease removal system (**Commitment 6.8.3.1i**).
- Absorbent materials will be kept on hand for containment of hydrocarbon spillages. Bioremediating agents will be used in situ to treat localised spillages (**Commitment 6.8.3.1j**).

6.8.3.2 Landfill

- A solid waste landfill will be established onsite to only receive solid wastes classified as non-hazardous (inert and putrescible) (**Commitment 6.8.3.2a**).
- Design, construction, operation and closure of the onsite landfill will conform to all applicable regulations (**Commitment 6.8.3.2b**).
- Domestic waste from accommodation camps and offices will be properly handled, shipped to and disposed of in the onsite landfill (**Commitment 6.8.3.2c**).
- The reuse and recycling of waste packaging and construction materials and used equipment/parts, tyres and metal to maximise resources conservation and value recovery and minimise disposal in the onsite landfill (**Commitment 6.8.3.2d**).
- Return reusable pressurised containers and vessels to suppliers. Pressurised containers and vessels that are not reusable will be punctured using suitable equipment and disposed of in the onsite landfill (**Commitment 6.8.3.2e**).

6.8.3.3 Offsite Disposal

- Hazardous waste generated by the operation will be transported offsite to licensed waste disposal facilities. This is likely to include waste oil, grease and heavy equipment fuel filters (**Commitment 6.8.3.3a**).
- Solutions drained from punctured pressurised containers and vessels will be managed as hazardous wastes and appropriately disposed of offsite (**Commitment 6.8.3.3b**).
- All hazardous wastes will be temporarily stored in designated containers and contents properly labelled at all times. Storage will conform to *AS1940 Storage and Handling of Flammable and Combustible Liquids* (**Commitment 6.8.3.3c**).
- Develop and maintain a register of all hazardous materials imported to the site or generated as a result of site activities. This will document the hazardous material name, location, approximate volume, storage method and where applicable, disposal method for the substance and containers (**Commitment 6.8.3.3d**).

6.8.4 Impact Assessment

No chemicals are required for the processing requirements. Hydrocarbons are the primary type of hazardous material anticipated to be required onsite. Correct management through

implementation of the above measures will ensure that adverse impacts are prevented or minimised.

Emergency Response Plans will be developed to ensure appropriate response can be made to incidents involving hazardous materials.

6.9 VISUAL AMENITY

6.9.1 Baseline

The project is in a sparsely-populated area used primarily for pastoral activities. The area is used at low intensities by tourists with interests in fossicking for gem stone.

The landform within the project area is gently undulating to flat. Dominant individual elements include Aturga Creek, Plenty River and north-west to south-east orientated sand dunes of the Simpson Land System. The topographic variation ranges from about 540 metres northeast of the Harts Range Police Station to 600 metres above sea level on a high dune located about three kilometres from Aturga Creek.

Most land is used for rangeland grazing of beef cattle. Native vegetation dominates the project area with some introduced grass species also present.

Clearing topsoil and quarrying sands will have a low to moderate visual effect in the pastoral environment. Topsoil and quarried sands will be similar in colour to the existing soils of the region and stabilisation with vegetation will blend the initial topsoil stockpile and restored quarry areas into the character of the surrounding landscape.

The wet plant, camp and water storage dam will be the most visible elements of the project. The access road, dry processing plant, offices, camp and water storage dam will be visible from some locations. In height, the wet plant will be similar to a two-storey shed (about 12 metres high). It will initially be located about 100 metres south of the Plenty Highway on the floodplain of Aturga Creek. The plant is likely to be moved north of the Plenty Highway after quarrying of resources on the southern side of the highway has been completed. Earthmoving equipment will typically only be visible when quarrying approaches the Plenty Highway. The plant will be lit at night to provide safe working conditions for employees.

The project is located in a region of predominantly low visual sensitivity due to the pastoral use of the land. One public road crosses the project area (Plenty Highway). The highway divides the project area approximately in half. Quarrying activities are planned to start in the southern sections of the project area. As quarrying proceeds north towards the highway, visibility of the operations from the highway will increase.

6.9.2 Potential Issues and Impacts

The only potential issues are:

- Visibility of operations from Plenty Highway.
- Visibility of permanent features after closure of operations.

- Distraction of highway users by lights.

6.9.3 Management and Mitigation Measures

Despite the low potential for impact on public visual amenity, Olympia Resources aims to implement the following measures:

- Access to the project site will be limited to employees and authorised visitors. All accesses will be well signposted to control traffic movement in and out of the project area (**Commitment 6.9.3a**).
- Vegetation will not be cleared unless absolutely necessary (**Commitment 6.9.3b**).
- Topsoil will be directly replaced to remove the need to form stockpiles (**Commitment 6.9.3c**).
- Access roads will be constructed from local materials (**Commitment 6.9.3d**).
- Restored surfaces will be progressively revegetated to establish a panorama compatible with the surrounding landscape (**Commitment 6.9.3e**).
- Permanent features that will remain after closure of the operation (i.e. backfilled quarries) will be contoured so they blend with the natural topography (**Commitment 6.9.3f**).
- A buffer strip of at least 10 metres from the Plenty Highway will be retained to provide visual screening for the project (**Commitment 6.9.3g**).
- Lighting within the wet plant, dry processing plant and camp will be carefully sited and directed to minimise annoyance to travellers and nearby communities (**Commitment 6.9.3h**).
- Colours for external walls of the processing plants, offices and camp will be selected to blend in with the local landscape (**Commitment 6.9.3i**).

6.9.4 Impact Assessment

Due to the remote location of the project, the low number of users of the Plenty Highway and the management measures proposed by Olympia Resources, the project will have low adverse impacts on highway users or local residents.

6.10 SOCIO-ECONOMIC ENVIRONMENT

6.10.1 Baseline

6.10.1.1 Harts Range

The Harts Range district is about 130,000 square kilometres and includes 25 cattle stations, six major Aboriginal communities (including Utopia and Alcoota), two major highways (Plenty and Sandover) and the Arltunga National Park. The district population is about 3,000. The majority of Aboriginal people within the district are Eastern Arrente.

The closest community to the project area is Atitjere Aboriginal Community, located two kilometres west of the mining lease application area and 215 kilometres north-east of Alice Springs along the Plenty Highway. The last 50 kilometres to the community is dirt road.

The Atitjere Aboriginal Community consists of:

- A police station with two staff.
- A school with primary and limited secondary year 10 facilities. School of the Air via Alice Springs is also an option.
- A health clinic with a permanent sister as well as a doctor from Alice Springs who visits once a month.
- A 24-hour power station two kilometres east of the police station.
- An all-weather gravel airstrip allowing regular mail deliveries.

The major industries in the district are beef and cattle, mining and tourism. The closest shops are in Alice Springs.

The Gem Tree Caravan Park is 70 kilometres east of the Stuart Highway along the Plenty Highway. The caravan park services tourists who fossick for gems in the area and is a useful stop when travelling east to Mount Isa.

6.10.1.2 Alice Springs

Alice Springs is 215 kilometres south of the project area along the Stuart Highway. It is 1,305 kilometres south of Darwin and 1,316 kilometres north of Adelaide.

Alice Springs has a population of 25,040 (Australian Bureau Statistics, 2001) representing 13.8% of the Northern Territory population. Alice Springs services surrounding mining and Indigenous communities, the Joint Defence Facility at Pine Gap and thousands of tourists who come to visit the region's natural attractions such as Uluru (Ayers Rock) and Kings Canyon.

Mparntwe (Alice Springs) is within the homelands of the Arrernte people.

A review of 1996 and 2001 census figures show that:

- Over 12.8% of the population of Alice Springs is Aboriginal or Torres Strait Islander.
- The Alice Springs population demographics are representative of the Northern Territory averages as seen in Table 7.

Table 7: Percent Distribution by Age Groups in Urban Areas

Age Group (years)	Alice Springs (%)	Total Northern Territory (%)
0 - 4	9.3	9.8
5 - 19	23.9	24.8
20 - 64	63.3	62.1
65 and over	3.5	3.2
Total	100	100

- Projected urban growth in Alice Springs is 4%.
- About 33.1% of the population over the age of 15 has post-school qualifications.
- The median weekly household income for Alice Springs is \$819, which is lower than the median weekly income of households in Darwin, but on par with other regional centres in the Northern Territory.
- About 12.3% of households in Alice Springs have no motor vehicle.

The people of Alice Springs enjoy a range of quality facilities comparable to any town of similar size in Australia.

6.10.2 Potential Issues or Impacts

Potential social and economic impacts include:

- Increased local employment in Harts Range and Alice Springs.
- Potential increased use of Stuart and Plenty highways.
- Increased use of Darwin and Adelaide ports.
- Increased traffic movements as material is imported and exported from the project area.
- Increased contribution to the Northern Territory and federal economies as a result of royalties and payroll taxes.
- Increased pressure on Harts Range accommodation and medical services.
- Temporary change of land use from pastoral to mining.
- Increased business opportunities for local business, particularly Indigenous businesses.
- Negative impact on tourism within the area.

6.10.3 Management and Mitigation Measures

Management and mitigation measures that will be implemented to address the potential issues and enhance positive or mitigate negative impacts will include:

- Where possible, the project will obtain goods and services from the local economy. Preference will be given to employing local people (**Commitment 6.10.3a**).
- On completion of mining activities, infrastructure will be removed and the site rehabilitated to allow the pre-mining land use to recommence. Infrastructure will not be decommissioned where agreement has been reached for post-mining land users to take responsibility for infrastructure (i.e. bores) of value to them (**Commitment 6.10.3b**).
- Compensation agreements will be reached with landowners for loss of use of land due to mining or associated infrastructure (**Commitment 6.10.3c**).
- Employment opportunities will be advised in Harts Range and Alice Springs and preference will be given to local candidates (**Commitment 6.10.3d**).
- Provision of goods and services will be advised to Harts Range and Alice Springs and preference will be given to local businesses (**Commitment 6.10.3e**).

- Accommodation for construction and permanent employees will be provided onsite (**Commitment 6.10.3f**).
- First Aid facilities will be established onsite for the duration of the project. These facilities will be operated by appropriately-qualified employees (**Commitment 6.10.3g**).
- A relationship will be established between onsite Emergency Response and First Aid personnel and providers of equivalent services in Harts Range and Alice Springs (**Commitment 6.10.3h**).
- Olympia Resources will maintain all internal roads within its lease area between the quarry and processing facility. Maintenance of Plenty and Stuart highways is DIPE's responsibility (**Commitment 6.10.3i**).
- Access to the project site will be limited to employees and authorised visitors. All access routes will be signposted to control traffic movement. Appropriate signs will also alert motorists to increased traffic, road crossings and road trains (**Commitment 6.10.3j**).

6.10.4 Impact Assessment

Implementing the management and mitigation measures will result in a low risk of the project negatively impacting the socio-economic environment.

Employment from Harts Range and Alice Springs will provide a beneficial impact on the local communities, especially that of Harts Range.

The increased traffic on the Plenty and Stuart highways by about three light vehicles, five road trains and one supply truck travelling to and from the site each day will be offset by a reduction in traffic as a result of railway commissioning.

Use of port facilities in Darwin are not expected to result in any significant impact as management of the product will be subject to management and mitigation strategies detailed within the Port Authorities' environmental management systems.

Increased contribution to the Northern Territory and federal economies as a result of royalties and payroll taxes will result in a net benefit.

Pressure on Harts Range accommodation and medical services will be alleviated by accommodation for the construction workforce at the project site and establishing a First Aid facility at the project site.

Local land use will change during the life of the project from pastoral (stock grazing) to active quarrying. It will revert to pastoral when extraction is complete with land alienation of up to 500 hectares for the life of the project.

The project will provide an economic boost to the local area and Northern Territory economy through increased business opportunities for local, particularly Indigenous businesses. The project will not impact on recreational or tourist uses of surrounding areas.

Adequate signage will warn tourists about increased traffic hazards associated with the project.

7. REHABILITATION AND CLOSURE

7.1 OBJECTIVES

The primary objectives of Olympia Resources rehabilitation strategies are to:

- Ensure the physical and geochemical stabilisation of all project components in the short and long-term.
- Undertake progressive rehabilitation of disturbed areas and habitat using local, native species.
- Protect the public, domestic animals and wildlife from injuries.
- Allow the pre-mining land use (pastoral) to be restored once full decommissioning has been completed.

To ensure the objectives are met, Olympia Resources will prepare and implement a Rehabilitation Plan as part of the Mining Management Plan.

7.2 REHABILITATION METHODOLOGY

Details of the rehabilitation process have previously been described in Section 3.7.

Rehabilitation of the depleted quarries will involve:

- Progressive placement of reject sands (**Commitment 7.2a**).
- Control slope gradients to minimise erosion and soil loss (**Commitment 7.2b**). Slopes will be constructed so that maximum angles do not exceed 15 degrees.
- Spread topsoil and cleared vegetation on re-shaped surfaces (**Commitment 7.2c**).
- Contour ripping to assist water infiltration and surface water control if required (**Commitment 7.2d**).
- Apply seed to ripped surfaces if rehabilitation monitoring shows natural revegetation has not occurred satisfactorily within two years of rehabilitation (**Commitment 7.2e**).
- Construct a fence to prevent grazing of establishing areas for more than five years (**Commitment 7.2f**).
- Dune ends will be stabilised during the rehabilitation process to ensure long-term stability of the post quarrying landform (**Commitment 7.2g**).

Land surfaces disturbed by burying of the water pipeline will be rehabilitated progressively as part of the construction process. Rehabilitation will involve:

- Placement of subsoil over the pipe to completely fill the trench.
- Compaction of sub soil material to prevent future subsidence along the trench area.
- Respreading of stockpiled topsoil over disturbed areas.
- Ripping of disturbed areas across the contour. This will promote water infiltration into the soil and provide microhabitats for seed germination.

- Installation of cross drains where required to direct surface runoff into adjacent areas (**Commitment 7.2h**).

Infrastructure will be removed from the site as it becomes redundant. This will include the accommodation village, administrative offices, workshops, fuel storage tanks, generators, water diversion structures, power lines and water pipes (**Commitment 7.2i**).

Disturbed surfaces will be rehabilitated after removal of infrastructure. This will involve:

- Treating localised contamination (i.e. hydrocarbon spillages). Depending on the contaminant type and concentration, contaminated material may be removed or treated onsite.
- Spreading topsoil on deep ripped and reshaped surfaces.
- Contour ripping to assist water infiltration and surface water control if required.
- Apply seed to ripped surfaces if rehabilitation monitoring shows natural revegetation has not occurred satisfactorily within two years of rehabilitation (**Commitment 7.2j**).

Monitoring will be conducted on an annual basis to establish the effectiveness of rehabilitation. Monitoring will include consideration of physical stability, erosion minimisation, vegetation establishment (species diversity, density, cover) and weed presence (**Commitment 7.2k**).

7.3 CLOSURE

Olympia Resources will prepare a Closure Plan, to be reviewed every three years, as part of its Mining Management Plan. Closure Plan implementation will be based on results derived from progressive rehabilitation activities. This will involve identifying post-closure impacts, develop and implement inspection and monitoring programmes to verify acceptable performance, and develop and implement corrective actions plans (**Commitment 7.3a**).

On final decommissioning, plant and infrastructure will be dismantled, made safe and removed from the site. Infrastructure such as bores and roads will not be decommissioned if post-mining land users request retention (**Commitment 7.3b**).

8. ENVIRONMENTAL MANAGEMENT DOCUMENTS

A draft Environmental Management Plan (EMP) should be provided in a form suitable for inclusion in a Mining Management Plan as required under the Mining Management Act. The draft EMP should be strategic, describing a framework for environmental management. Where possible, specific management policies, practices and procedures should be included in the draft EMP. A final EMP would be prepared at the conclusion of the assessment, taking into consideration comments on the PER and on the supplement and incorporating the Assessment Report's recommendations.

8.1 ENVIRONMENTAL MANAGEMENT SYSTEM

Olympia Resources will develop and implement an Environmental Management System (EMS). The EMS will support an Environmental Management Plan (EMP) and provide a formal description of the methodical framework for managing environmental issues. The EMS will ensure the operation maintains high levels of environmental performance and does not cause environmental harm. The EMS aims to describe procedures, practices and review processes to implement environmental considerations into all aspects of operations. An important component of the EMS is a platform for ongoing review and reporting of environmental performance of operations in a quantifiable and consistent manner.

The EMS will be a dynamic document that will change to meet the needs of stakeholders, evolving performance requirements and customer and community expectations.

The EMS will consist of the following 11 elements:

i. Environmental Policy and Objectives

The Corporate Environmental Policy:

- Provides objectives for conduct of all operations, employees and contractors.
- Details Olympia Resources' commitment to continuous improvement in environmental performance, pollution prevention and compliance with environmental legislation, regulations and standards.

ii. Legal Obligations and Other Requirements

Statutory requirements set the standard for minimum compliance. Olympia Resources, its employees, contractors, suppliers and other third parties are bound by:

- Company standards.
- Company-authorized procedures, directives and instructions applicable to the workplace.
- Federal and Territory legislation and regulations.

A Compliance Register detailing applicable legal requirements and voluntary commitments by Olympia Resources will be developed.

iii. Management Commitment

Company directors recognise the importance of leading by example and demonstrating management commitment to EMS objectives. Senior management is committed to active involvement in implementing this system.

Olympia Resources senior management will review the EMS at least annually to ensure it remains adequate, effective and appropriate. The review will take into account:

- Relevant results of environmental audits.
- Extent to which objectives and targets have been met.
- Continuing suitability of the EMS.
- Concerns of all interested parties.

iv. Key Responsibilities and Reporting Structure

Environmental management has direct-line accountability, with individual employees and contractors responsible for conducting activities in an environmentally-acceptable manner.

Successful implementation of the EMS will depend on a commitment from all employees and contractors, detailed job and responsibility descriptions, developing key performance indicators, induction and training. Individual responsibilities and authorities will be defined, documented and communicated to facilitate effective environmental management.

v. Education and Training

It is recognised that employees and contractors who do work that may have significant environmental impacts will require appropriate training, education and/or experience. Training and competency needs will be identified and competencies assessed.

Olympia Resources will ensure appropriate training is provided for all employees and contractors to meet its EMS requirements. All employees, including site-based contractors, will be required to attend an induction when they start work; this will include environmental awareness and responsibilities and the function and implementation of the EMP.

vi. Communication

Olympia Resources will communicate and consult with internal and external stakeholders. Effective communication with staff, contractors, regulatory authorities and the community will be inherent in all activities.

Procedures are being developed for establishing and maintaining a document control system and for receiving, documenting and responding to relevant information and requests from external parties.

vii. Environmental Issues and Risks

Environmental issues and risks associated with Olympia Resources' activities, discharges, consumables and products will be identified, evaluated and managed. EMPs and associated procedures will document requirements to manage and minimise environmental risks during construction, normal operations, closure and emergency situations as far as practicable. Risk assessments will be conducted for all new projects

before issue of contracts or modification to existing processes. A Hazard Register will centralise risk assessment information.

viii. Operational Control

Olympia Resources recognises that the adoption, use and continuous improvement of consistent standards, procedures and guidelines will result in sound environmental management.

Olympia Resources will ensure that procedures, work permits and risk assessment outcomes are effectively implemented to achieve environmental objectives associated with all aspects of its operations, including managing change and emergency situations.

Environmental monitoring will provide ongoing information about impacts of individual tasks or projects and effectiveness of control strategies that are implemented to minimise these impacts.

ix. Contractor Management

Olympia Resources will establish standards to ensure that risks to the environment resulting from the contracting of equipment, materials or services are reduced to as low as reasonably practicable.

Olympia Resources will establish a systematic approach to selecting and managing contractors to ensure company environmental standards are maintained. An inspection programme will ensure performance of contractors is consistent with EMS requirements.

x. Environmental Performance

Monitoring systems and procedures and collecting data will form the basis of measuring key performance indicators and Olympia Resources' performance against yearly environmental objectives and targets, compliance with regulatory requirements, voluntary commitments and the EMS.

Systems will be established for internal and external reporting of environmental hazards, incidents, non-compliances and communication of environmental monitoring results.

xi. Environmental Audits and Inspections

Audits, inspections and reviews will allow individual operations and projects to identify areas for improvement and will help continually improve environmental performance. Inspections will focus on practical implementation of procedures, identification and management of hazards and achievements of key performance indicators.

Audits will ensure both the EMS and specific components of the system are complied with. Reviews will ensure EMS requirements are desirable, practicable and help the operation meet its regulatory and voluntary environmental commitments and key performance indicators.

8.2 ENVIRONMENTAL MANAGEMENT PLAN

An EMP will be developed in consultation with DIPE and DBIRD, prior to start of construction. The following sections detail the proposed content and structure of the EMP.

8.2.1 Objectives

The objective of an EMP is to clearly describe key environmental strategies to be adopted by Olympia Resources to manage the project in accordance with the company's Environmental Policy and statutory environmental requirements.

Development of an EMP is an integral component of the Mining Management Plan under Section 40 of the *Mining Management Act*.

8.2.2 Structure and Scope

The management plans and strategies outlined within the EMP document will apply to all components of the project during construction, operation and closure phases. The EMP will be binding on all Olympia Resources' employees and contractors. The EMP will be developed in accordance with the *Draft Environmental Management Plan (EMP) Guidelines* prepared by DIPE (undated); the EMP requirements outlined in the draft PER Guidelines; DBIRD's Mining Management Plan Advisory Note (DBIRD February 2002); and DBIRD's *Small Mining Operations Mining Management Plan Advisory Note (DBIRD November 2002)*.

The EMP structure will be split into two key sections. The first section will describe administrative details necessary to effectively guide and implement the EMP. These are:

- The Olympia Resources Environmental Policy.
- Environmental performance objectives for core areas.
- Appropriate resources necessary to fulfil EMP requirements.
- Environmental responsibilities necessary to implement the EMP.

The second section will detail individual management strategies that the project will adopt to meet the objective of the EMP document. Management strategies will be developed for the following core areas:

- Emergency Preparedness and Response.
- Environmental Training.
- Soil and Land Management.
- Vegetation Management.
- Fauna Management.
- Air Quality Management.
- Noise and Vibration Management.
- Groundwater Management.
- Surface Water Management.
- Waste and Hazardous Materials Management.
- Ethnographic and Archaeological Management.
- Socio-Economic Management.
- Aesthetic and Visual Management.

- Rehabilitation.
- Closure Management.

Each environmental aspect will be presented in a format that concisely details:

- The potential environmental issues or impacts as a result of the project.
- Olympia Resources objectives and targets for managing potential environmental issues or impacts.
- Management strategies necessary for Olympia Resources to meet environmental objectives and targets. These strategies are subdivided into the construction and operations phase of the project.
- A risk comparison of potential environmental issues before and after implementation of management strategies.
- Monitoring and reporting requirements associated with management strategies.
- Contingency planning if required. A large component of contingency planning is detailed within the section on, Emergency Response and Preparedness.
- Persons responsible for managing the environmental aspects.

8.2.3 EMP Review

This EMP will be reviewed within the first year of operations to incorporate the environmental plans developed during construction. During operations, the EMP will be reviewed every four years in consultation with DIPE and DBIRD. The review will ensure the key environmental strategies to be adopted by Olympia Resources are still adequate to achieve objectives of the company's Environmental Policy and statutory environmental requirements.

9. PUBLIC INVOLVEMENT AND CONSULTATION

Public involvement and the role of government organisations should be clearly identified. The outcomes of surveys, public meetings and liaison with interested groups should be discussed, and any resulting changes made to the proposal clearly identified. Details of any ongoing liaison should also be discussed including any negotiations with native title claimants.

Negotiations and discussions with local and community government, the Territory Government and the Commonwealth Government should be detailed, and any outcomes referenced. Details of any ongoing negotiations and discussion should also be presented.

Olympia Resources initiated the stakeholder consultation process for the project before it submitted the Notice of Intent in July 2003. Olympia Resources prepared a consultation strategy to facilitate effective communication with regulators, local and wider community and other stakeholders. This allowed issues raised during the consultation process to be taken into consideration in the project's design, development, operation and closure.

Significant stakeholders were identified through discussions with DBIRD, DIPE, the Central Lands Council and the Arltapilta Community. Olympia Resources has continued to consult stakeholders on a regular basis. Consultation has included public presentations, government presentations and one-on-one discussions with pastoral leaseholders, environmental groups, community groups, local members of parliament, government departments, members of local Aboriginal communities and Native Title claimants. The consultation strategy includes, but is not limited to, community updates, mail-outs, newsletters, website information, display materials, letters, personal visits, newspaper articles, radio advertising, site tours, presentations and community meetings. The consultation strategy has been included in the project scheduling and will continue throughout the life of the project.

A list of consultation activities undertaken is detailed in Table 8. A summary of issues raised and Olympia Resources' response are presented in Table 9.

Table 8: Summary of Consultation Undertaken to Date

Consultation	Date
Presentations at conferences in Alice Springs organised by DBIRD.	August 2004
Information sessions with station owners each time the site is visited.	Ongoing?
Discussions with Arltapilta community whenever activity is arranged onsite.	Latest October 2004
Discussions with Centralian College with respect to assistance in providing pre-work training for project operators.	June 2003
Communication with editors of Alice Springs newspapers as one way to keep the community informed.	August 2004
Periodic interviews with Alice Springs ABC Radio as a vehicle for notifying the community of the ongoing activity of Olympia Resources' project.	July 2004
Development of a website that regularly updates company and project activity.	January 2004

Consultation	Date
Project updates and discussions with the Cadzow family on Mt Riddoch Station.	October 2004
Project updates and discussions with the Arltapilta Community via Community Clerk, Donna Cole.	October 2004
Project updates and discussions with DBIRD (Steve Tatzenko, Tony McGill, Gerry Whitfield and others).	October 2004
Project updates and discussions with Office of Territory Development, David Malone and Brian O’Gallagher.	October 2004
Meeting with Minster for Minerals and Energy Kon Vatskalis.	July 2004
Regular updates and a meeting with Member for Alice Springs Lorraine Braham.	October 2004
Discussions with Perkins Shipping - This company has been providing logistics support and continues to be the lead logistics provider to the project.	Continuing
Project updates and discussions with Gem Tree caravan park owner Graeme Short.	October 2004
Project updates and discussions with the Alcoota Station manager Chistopher Nott.	October 2004
Discussions with a group of traditional owners (led by Anthony Petrick).	October 2004
Project updates and discussions with Darwin Port Authority (Barry Berwick and Gary Scanlan) concerning export of bulk products from the project.	October 2004
Project updates and discussions with DIPE – Environment and Heritage representatives including Lynne Allan, Juanita Croft, Peter Banister, Suzanne Davis Hall, Robyn Gregory, John Childs and Robin Jeffery in Darwin and Alice Springs.	Latest October 2004
Project updates and discussions with Jeff McLeod, Store Manager Arltapilta, Unit Officer, Harts Range Emergency Services.	October 2004
Project updates and discussions with Aboriginal Areas Protection Authority representatives Geoffery Stead, Andrew Allen and Erika Blockley.	October 2004
Project updates and discussions with Central Lands Council representative Michael Prowse and others.	October 2004
Project updates and discussions with Freightlink concerning transportation.	October 2004
Project updates and discussions with Northern Territory Freight Services concerning transportation of road freight to Darwin or Port Pirie at economical rates.	September 2004

Table 9: Summary of Issues Raised and Olympia Resources’ Responses

Stakeholder	Issue Raised	Olympia Resources Management Strategies and Impact Assessments
<p>The Cadzow family on Mt Riddoch Station.</p>	<p>The Cadzow family is generally in support of the project. Their main concerns relate to the proximity of the project site to the homestead. In particular:</p> <ul style="list-style-type: none"> • Hazards associated with traffic entry onto the Plenty Highway from the project area. • Noise from the machinery in the quarry and from the plant. • The final land use and vegetation cover of rehabilitated areas. • Potential impact on the Spinifex bore water supply by the borefield for the plant. • Interference of water pipeline from borefield to plant with mustering. 	<p>Access to the project site will be limited to employees and authorised visitors and all accesses will be well signposted to control traffic movement of in and out of the project area. Appropriate signs will also alert motorists to increased traffic, road crossings and road trains. Discussions held with DIPE regarding construction of a turning lane at Plenty Highway entry point.</p> <p>Noise is not expected to be an issue, however, Olympia Resources will implement engineering controls where justified. These may include reducing the noise from equipment with soundproofing and/or noise abatement devices on primary sources of noise such as power generators and water pumps.</p> <p>Vegetation types existing prior to disturbance will be re-established.</p> <p>In the event that Spinifex bore is affected by local drawdown, Olympia Resources will replace Spinifex bore or provide Mt Riddoch Station with the same amount of water from the project’s borefield.</p> <p>The pipeline will be buried below a depth of one metre to minimise temperature-induced pipeline movements, avoid damage by fire and avoid the pipeline becoming a traffic and mustering obstacle.</p>
<p>Arltapilta Community (via Community Clerk, Donna Cole)</p>	<p>The Arltapilta Community is anxious that the project has taken so long to reach finalisation. The community highlights the economic advantages of the project to the community and in the regional development of the district. They hope to have 4-5 people employed at the project once it starts.</p>	<p>Where possible, the project will obtain goods and services from the local economy where appropriate services or skills exist. Preference will be given to employing local people.</p>

Stakeholder	Issue Raised	Olympia Resources Management Strategies and Impact Assessments
DIPE	DIPE's main concerns relate to the water supply and use of Plenty Highway.	<p>The project reinforces the importance of the Plenty Highway to industry. The highway is used by AVI Industries at Mud Tank, Olympia Resources at Aturga and Tennant Creek Gold at Molyhill. Continuous upgrade of the highway is difficult because base course material is scarce. This may be alleviated with the supply of some calcrete from the Olympia Resources quarry.</p> <p>The effect of groundwater pumping will be a temporary drawdown of the water table during the life of the operation. It is anticipated that a minor cone of depression will form around production bores, however, this will dissipate after pumping stops. The Titjikala Community borefield will not be affected given the distance involved and the area of reduced transmissivity between the Spinifex bore area and the community. In the event that Spinifex bore is affected by local drawdown, Olympia Resources will replace Spinifex bore or provide Mt Riddoch Station with water from the project's borefield to the same amount.</p>
Gem Tree caravan park owner, Graeme Short	Graeme Short is concerned about the current state of the Plenty Highway and would support adequate signage to ensure tourists are aware of increased traffic use, road trains and vehicle crossings.	Access to the project site will be limited to employees and authorised visitors and all accesses will be well signposted to control traffic movement in and out of the project area. Appropriate signs will also alert motorists of increased traffic, road crossings and road trains.
Alcoota Station Manger, Christopher Nott	Christopher Nott considers the project will have economic benefit to the community.	The project will provide an economic boost to the local area and Northern Territory economy through increased business opportunities for local, particularly Indigenous, businesses. The project will not impact on recreational or tourist uses of surrounding areas.
A group of traditional owners led by Anthony Petrick	The group were involved with protecting sacred sites within the project area. While they have identified some sites of significance, they do not believe this should be a limiting factor on project development.	<p>Implementing the management and mitigation measures will result in a low risk of the project impacting the cultural environment. Some of these strategies include:</p> <ul style="list-style-type: none"> • Construction or quarrying activities will not occur until appropriate checks against artefact and archaeological site locations have been made. • All employees and contractors will be required to participate in

Stakeholder	Issue Raised	Olympia Resources Management Strategies and Impact Assessments
		<p>a general site induction incorporating cultural information.</p> <ul style="list-style-type: none"> Olympia Resources will employ Aboriginal monitors to scout areas for artefacts or sites before topsoil stripping to improve the chances of discovering items of Aboriginal significance.
Jeff McLeod, Store Manager and Arltapilta, Unit Officer Harts Range Emergency Services	Jeff McLeod sees advantages in project with respect to regional and local employment. He does, however, express concerns about the Plenty Highway and encourages the use of signs.	<p>The project will provide an economic boost to the local area and Northern Territory economy through increased business opportunities for local, particularly Indigenous, businesses. The project will not impact on recreational or tourist uses of surrounding areas.</p> <p>Access to the project site will be limited to employees and authorised visitors and all accesses will be well signposted to control traffic movement in and out of the project area. Appropriate signs will also alert motorists of increased traffic, road crossings and road trains.</p>
Aboriginal Areas Protection Authority (Geoffrey Stead, Andrew Allen and Erika Blockley)	Project updates and discussions have provided valuable insights to sacred site issues in the area surrounding the project and have identified some areas that require protection from development that will be identified in the AAPA Certificate.	<p>Implementation of the management and mitigation measures will result in a low risk of the project impacting the cultural environment. Some of these strategies include:</p> <ul style="list-style-type: none"> Construction or quarrying activities will not occur until appropriate checks against artefact and archaeological site locations have been made. All employees and contractors will participate in a general site induction incorporating cultural information. <p>Olympia Resources will employ Aboriginal monitors to scout areas for artefacts or sites before topsoil stripping to improve the chances of discovering items of Aboriginal significance.</p>
Central Lands Council (Michael Prowse and others)	The CLC have supported the ILUA with an endeavour to see the project go forward.	<p>The project will provide an economic boost to the local area and Northern Territory economy through increased business opportunities for local, particularly Indigenous, businesses. The project will not impact on recreational or tourist uses of surrounding areas.</p>

10. GLOSSARY

A glossary should be provided, defining the meaning of technical terms, abbreviations and colloquialisms. Throughout the PER, technical terms and jargon should be minimised.

AAPA	Aboriginal Areas Protection Authority
AHC	Australian Heritage Council
AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
AMH	Alumino-magnesio-hornblende
BP	Before Present
CLC	Central Lands Council
DBIRD	Department of Business, Industry and Resource Development
DEH	Department of Environment and Heritage
DIPE	Department of Infrastructure, Planning and Environment
EMP	Environmental Management Plan
EMS	Environmental Management System
MMP	Mining Management Plan
PER	Public Environmental Report

11. REFERENCES

Any source of information such as studies, research, maps and personal communications used in the preparation of the PER should be clearly identified, cited in the text and referenced in the bibliography.

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APPENDICES

APPENDIX 1

DIPE Draft Guidelines for the Preparation of a Public Environmental Report Harts Range Garnet Project - August 2004