

ASSESSMENT REPORT 46

**ABRASIVE SANDS QUARRYING PROJECT
HARTS RANGE**

**ENVIRONMENTAL ASSESSMENT REPORT
AND
RECOMMENDATIONS**

**by the
OFFICE OF ENVIRONMENT AND HERITAGE
NORTHERN TERRITORY GOVERNMENT**

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Northern Territory Government

Office of Environment and Heritage

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ABBREVIATIONS

AAPA	Aboriginal Areas Protection Authority
AHC	Australian Heritage Council
CLC	Central Land Council
DBIRD	Northern Territory Department of Business, Industry and Resource Development (formerly DPIF, DME)
DEH	Department of the Environment and Heritage (Commonwealth Department)
DHCS	Northern Territory Department of Health and Community Services (formerly THS)
DIPE	Northern Territory Department of Infrastructure, Planning and Environment (formerly Department of Lands, Planning and Environment; Department of Transport and Works; and Parks and Wildlife Commission)
PER	Public Environmental Report
EMP	Environmental Management Plan
EPBC	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth Act)
km	Kilometres
m	Metres
ISO	International Standards Organisation
MMP	Mining Management Plan
NEPM	National Environment Protection Measure
NOI	Notice of Intent
NT	Northern Territory
OEH	Office of Environment and Heritage

EXECUTIVE SUMMARY

This report assesses the environmental impacts of the proposal by Olympia Resources Limited (the proponent), to establish an abrasive sands quarrying operation within the Harts Range region 215 km northeast of Alice Springs. The project will involve the quarrying of approximately 10 hectares per annum of sand-sized garnet from fluvial and dune sediments on the floodplain of Aturga Creek in the Harts Range area. Sand extracted from the quarry will be separated into garnet and a mixture of garnet and alumino-magnesio-hornblende. These products will be transported from site by road and/or rail to consumers in Australia and overseas. The physical separation process does not utilize chemicals.

The Assessment Report reviews the Public Environmental Report, public comments and information, comments and advice provided by Northern Territory Government Agencies.

Environmental assessment is the process of defining those elements of the environment which may be affected by a development proposal and of determining the significance, risk and consequences of the potential impacts of the proposal. Recommendations arising from the assessment address methods to mitigate these impacts.

Conclusions

The Office of Environment and Heritage is reasonably confident that mining at the site can be managed in an environmentally appropriate manner. However there is an outstanding issue relating to the impact of the project on the water supply to the Atitjere Aboriginal community which is situated some 20km from the project area. The proponent has not yet provided evidence that the borefield from which it intends to draw water for the project is separate from the aquifer serving Atitjere, and cannot therefore demonstrate that the project will not have an adverse impact on the community's water supply. The additional information provided by MBS Environmental on 22 December 2004 at the request of the Minister for the Environment and Heritage did not satisfy the stated requirements.

Accordingly, prior to the issue of any authorisation under the *Mining Management Act* for the development or operations of the proposal, the Office of Environment and Heritage requires additional information to be provided with respect to water supply issues as outlined in Section 3. Upon receipt of this information, the Office of Environment and Heritage and the Department of Business, Industry and Resource Development can complete their assessment of the proposal in order to issue an authorisation for the project under the *Mining Management Act*.

The Office of Environment and Heritage considers that the remaining environmental issues associated with the proposed project have been adequately identified. Appropriate environmental management of these issues will be addressed through monitoring and management actions detailed in the Construction and Operation Environmental Management Plans to be included as part of the Mining Management Plan.

LIST OF REQUIREMENTS AND RECOMMENDATIONS

REQUIREMENTS (information to be provided before approval is issued)

Requirement 1

Prior to project approval, the proponent must undertake the hydrogeological investigations necessary to:

- demonstrate that the aquifer has the capability to meet the water requirements of the project;
- Enable monitoring bore sites to be selected; and
- Understand the potential impact that extraction of ground water may have on the Atitjere Community water supply.

Results of these investigations must be provided to the Office of Environment and Heritage.

Requirement 2

In the event that these additional investigations indicate a likely adverse impact on the supply of water to the Atitjere Community, then prior to project approval, the proponent must prepare an adaptive management plan for managing potential impacts on surrounding users of the water resource. This plan must be developed in consultation with the Department of Infrastructure, Planning and Environment, the Department of Business, Industry, Resources and Development, Power and Water Corporation and the current users of the water resource. The final plan must be submitted to the Office of Environment and Heritage for approval and be included in the Mining Management Plan.

RECOMMENDATIONS

Recommendation 1

Olympia Resources Pty Ltd shall ensure that the proposal is implemented in accordance with the environmental commitments and safeguards:

- identified in the Abrasive Sands Quarrying Project, Harts Range Public Environmental Report; and
- recommended in this Assessment Report (No. 46).

All safeguards and mitigation measures outlined in the Public Environmental Report are considered to be commitments by Olympia Resources Pty Ltd and are included in Appendix 1 of this report.

Recommendation 2

In accordance with clause 14A of the Administrative Procedures of the *Environmental Assessment Act 1982* the proponent shall advise the Minister of any changes to the proposal for determination of whether or not further environmental impact assessment is required.

Recommendation 3

If the option to truck containers of bagged product to Alice Springs is utilised, a noise management plan must be developed in consultation with the Office of Environment and Heritage for the transport of product though Alice Springs to Brewers Estate. The noise management plan must be submitted to the Office of Environment and Heritage for approval prior to commencement of operations and be included in the Mining Management Plan.

Recommendation 4

The proponent is to undertake an assessment of greenhouse gas emissions from the project. This assessment should outline, as a minimum, the following:

- Energy requirements for the project;
- Fuel sources for the project;
- Estimated greenhouse gas emissions as a CO₂ equivalent total;
- A comparison with the Northern Territory and national levels of greenhouse gas emissions;
- Investigations into offsetting emissions from the operation; and
- Benefits of this project to the abatement of greenhouse gas emissions on a national or global scale.

Details are to be provided on the project's commitment to:

- Providing a greenhouse gas emissions inventory and undertaking benchmarking;
- Measures to minimise greenhouse gas emissions; and
- Implementing an offset project to be approved by the Office of Environment and Heritage. This approval should be sought prior to the commencement of operations.

These commitments must be included in the Mining Management Plan.

Recommendation 5

An Erosion and Sediment Control Plan is to be included in the Mining Management Plan. It must be developed in consultation with the Office of Environment and Heritage and other relevant government agencies and be submitted to the Department of Infrastructure, Planning and Environment for approval prior to the commencement of any works.

Recommendation 6

A vegetative buffer zone of 25 metres (minimum) must be maintained along all creek beds.

Recommendation 7

A Fire Management Plan is to be included in the Mining Management Plan. It must be developed in consultation with the land holder, Emergency Services, and other relevant agencies

and be submitted to the Department of Infrastructure, Planning and Environment for approval prior to the commencement of any works.

Recommendation 8

Prior to commencement of construction, field fauna surveys are to be conducted to provide baseline data on which to base monitoring protocols and a target for rehabilitation and regeneration works. The surveys should also include the identification of any suitable threatened species habitat to inform their appropriate management (for inclusion in the Construction and Operational Environmental Management Plans). Survey methodology is to be developed in conjunction with the Department of Infrastructure, Planning and Environment's Biodiversity Unit.

The surveys are to include the areas where the proposed haul roads and water pipeline are to be constructed.

Recommendation 9

A Weed Management Plan is to be included in the Mining Management Plan and submitted to the Department of Infrastructure, Planning and Environment for approval prior to the commencement of any works

Recommendation 10

Prior to any discharge of water, a Waste Discharge Licence must be obtained under the *Water Act 1992*.

Recommendation 11

In order to avoid development of mosquito breeding sites, the finished surface level of the buried pipeline must match the level of the surrounding ground to prevent ponding of water in depressions. Rehabilitated areas must contain no depressions capable of ponding water for more than 5 days. Drains, culverts or other infrastructure must be constructed so as to prevent the impoundment of water.

The Environmental Management Plans must include measures that limit the time water is allowed to pool to less than 5 consecutive days and a monitoring program for any water impoundments.

Rehabilitation plans should be prepared in conjunction with advice from the Department of Health and Community Services to ensure that no new mosquito breeding sites remain after closure of the mine site.

Recommendation 12

In accordance with the *Heritage Conservation Act* the Office of Environment and Heritage must be notified of any intention to disturb or destroy an archaeological site and approval sought from the Minister for the Environment and Heritage to disturb a site regardless of whether or not sites have previously been identified and reported. This includes sites that have been determined to have low archaeological significance such as background scatters. A pre mining timeframe for the assessment of aboriginal artefacts should be established prior to the commencement of operations to ensure adequate time is allowed to assess and remove or reschedule operations if sites are discovered.

Recommendation 13

The oil and grease removal system for the heavy vehicle workshop must comply with Power and Water Corporation's Guidelines for On-Site Pre-treatment. Industrial wastes must not be discharged to the septic system.

Recommendation 14

Sewage and other waste water treatment systems used during the construction and operational phases will require approval from the Department of Health and Community Services. Effluent re-use or disposal must be in accordance with the Department of Health and Community Services guidelines.

Recommendation 15

The waste disposal site must conform to relevant legislation and be located in an area approved by the Department of Health and Community Services and the Office of Environment and Heritage. Measures must be undertaken to ensure that the site does not attract feral animals.

Recommendation 16

A local employment and procurement strategy should be developed in consultation with local agencies including the Central Land Council, giving particular consideration to the employment of local aboriginal people and aboriginal businesses.

Recommendation 17

The Closure Plan must be developed in conjunction with the Department of Infrastructure Planning and Environment and the Department of Business, Industry, Resources and Development.

Recommendation 18

A rehabilitation plan is to be developed in consultation with the Department of Infrastructure, Planning and Environment and the Department of Business, Industry and Resource Development, which includes rehabilitation objectives and constraints, and detailed methodology for the progressive rehabilitation of all elements of the operation. The plan should also include a rehabilitation outlook outlining the likely success of the plan and justify using examples of rehabilitation in similar terrain and climate. The plan should also include a contingency in the event that the proposed methodology is not successful, for example, rehabilitation offset. The plan must be included as part of the Mining Management Plan.

Recommendation 19

The progressive rehabilitation of the quarry should include contingency options if the swell factor is significantly different to that predicted. The contingency plan should include options for sourcing additional capping materials if swell of reject sands is less and options for additional storage if the swell of reject sands is more. This information must be included as part of the Operational Environmental Management Plan.

Recommendation 20

Environmental Management Plans covering construction and operation are required to be prepared and submitted to the Office of Environment and Heritage and the Department of Business, Industry and Resource Development for approval prior to commencement of construction and operation respectively. The Environmental Management Plans are to be included in the Mining Management Plan as an appendix.

In preparing each Environmental Management Plan, the proponent is to include any additional measures for environmental protection and monitoring contained in this Assessment Report and recommendations made by the NT Government with respect to the proposal. Each Environmental Management Plan is to be referred to relevant NT Government agencies for review prior to finalisation, after which it shall become a public document. The Environmental Management Plans shall form the basis for approvals and licences issued under relevant NT legislation.

1 INTRODUCTION AND BACKGROUND

This report assesses the environmental impact of a proposal by Olympia Resources Limited to commence abrasive sand quarrying at Harts Range. The proposed development involves the quarrying of approximately 10 hectares per year of sand sized garnet from fluvial and dune sediments for approximately 20 years. The finished product will be used to supply the loose abrasive market as a non-toxic alternative to copper slag and a harder alternative to crushed glass.

This Environmental Assessment Report is based on a review of the Public Environmental Report (PER), the additional information provided by Olympia Resources and comments from the public and Northern Territory Government agencies.

1.1 The Proposal

Olympia Resources' Harts Range exploration and mining tenements are located on Alcoota, Mt Riddock, Huckitta and Jervois pastoral leases. The project area is located wholly on Mt Riddock Pastoral Lease. This includes all the floodplains and dunes required for quarrying, separation and infrastructure.

The location of the Harts Range Abrasives Project is on either side of the Plenty Highway and is (figure 1):

215 km northeast of Alice Springs.

20 km west of the Atitjere Aboriginal Community.

100 km east of the Stuart Highway.

The proposed development will involve extracting sand from fluvial and dune sediments through relatively shallow quarrying, the construction of a processing plant and small camp area, five water bores and associated infrastructure.

Extraction

Sands are to be extracted through excavation. Quarrying will be by conventional earthmoving machinery using a combination of front-end loaders and trucks and/ or scrapers. No blasting will be required. Identified alluvial, plain and dune deposits will be quarried. These deposits, particularly plain and dune deposits, overlay a calcrete-lithified base and tertiary green clay. All sand accumulated above the accrete base will be excavated. Excavation deposits will vary between two meters within the alluvial beds and four to seven metres for plain and dune deposits.

Under normal operations all non-valuable sand, clay and oversize material from the quarrying and processing operations are returned to the depleted pit as backfill. There is no requirement for a separate tailings compound or dam. While establishing the pit over the first six to 12 months, up to 10 hectares will be set aside for a clay/ sand containment dam to hold backfill sand and clay. All backfill material will be returned to the pit over the following two to three years and the topsoil returned to recover the dam area. The pit will then be continually backfilled and rehabilitated while quarrying proceeds.

Processing

A screening and wet concentration plant will separate the garnet and aluminomagnesian-hornblende (AMH) sand (product) from the waste consisting of quartz sand and oversize rock and clay (reject sands). Further separation of the combined garnet/ AMH sand concentrate into saleable products will be carried out in a dry separation plant. The dry separation plant will be a conventional mineral separation plant that uses magnets and screens to produce the products which are either bagged onsite or left as bulk product. All reject sand will be returned as fill to the quarry to produce a post-quarry landform similar to that prior to disturbance.

Primary processing will be undertaken in a wet plant where sands are wet screened to separate the >2mm fraction and the <180µm fraction. Product obtained by this process is then treated through spirals, jigs and tables to produce fine (180-250µm) and coarse (>250µm) concentrate. No chemical reagents are required during the process.

Production is anticipated to start at a rate of 100 000 tonnes (about 50 000 cubic metres) of abrasive sands per year. Subject to favourable demand, yearly production is likely to increase over three to five years to 300 000 tonnes. Production of 100 000 tonnes of abrasive sand requires quarrying of about 500 000 tonnes or 300 000 cubic metres of sands. On assumption that this is quarried from an average depth of five metres, this equates to an area of about 100 000 square metres or 10 hectares per year.

The project footprint during any one year is likely to be about 15 hectares, of which about 10 hectares will consist of quarried areas. The balance will be infrastructure areas such as access roads, pipeline, treatment plant, small stockpile and small workshop and office area.

Infrastructure and Ancillary Activities (figure 2)

Transport – Transport options are currently under consideration by Olympia Resources and are:-

- Trucking product between the quarry stockpile area and a shed in or near the Port of Darwin. Trucking would involve transporting product from the quarry site 100 km west along the Plenty Highway, then 1305 km north along the Stuart Highway to the Port of Darwin. Initially this will involve two triple road trains per day increasing to six when production reaches 300 000 tonnes per year.
- Trucking product in sea containers to a storage yard in Brewers Estate in Alice Springs before railing to either a shed in or near the Port of Darwin or Port Pirie. It is planned to transport only bagged product in sea containers, initially at the rate of 40 000 tonnes per year and increasing to a maximum of 120 000 tonnes per year. Transport between Harts Range and Brewers Estate would be on public roads. Initially two triple road trains per day would be required, increasing to six at the maximum planned production.
- Railing product between the project area and the Port of Darwin with the construction of a rail siding near the intersection of the Plenty Highway and the Alice Springs-Darwin Railway Line.

Water Requirement and Management – Water requirements for the total operation will be sourced from groundwater. A borefield of three to five bores will be developed 15 km north-east of the Harts Range Atitjere Aboriginal Community. Between one and five bores will operate at any one time on a rotational basis. The processing of product will require 1000 kilolitres of water per day. About 90% of this water will be made up of recycled water (from the process thickener overflow and quarry backfill dewatering), the remainder being supplied

from the borefield. Water will be delivered to the operational area via a 15 km pipeline. Water will be stored onsite in a lined 80 kilolitre water dam. Wastewater in the form of sewage and grey water from accommodation and office areas will be treated in septic tanks and leach drains. This represents the only water discharged from the project.

Workforce – During construction/ establishment of the site, the construction workforce will vary from an initial five workers (associated with construction of borefield and pipeline) to approximately 25 people. Workers will be accommodated in a camp with overflow being directed to Gem Tree Caravan Park, 40 km west of the Harts Range site. It is expected that the total onsite workforce once the quarry is in operation will be approximately 30 workers. Some employees will be required to reside in an onsite camp while others are expected to commute daily from nearby stations and the Harts Range community.

1.2 Issues Not Included in this Environmental Impact Assessment

1.2.1 Darwin Port

Impact associated with any use of port facilities is not considered in this Assessment Report and would be subject to a separate application.

1.2.2 Native Title Negotiations

The Central Land Council (CLC) undertakes the negotiation of Indigenous Land Use Agreements on behalf of Local Aboriginal Groups under the *Native Title Act (1993)*. Olympia Resources Limited has not yet reached an agreement with local Aboriginal groups and the CLC regarding the development of a mine at Harts Range.

Consultation with local Aboriginal groups is currently underway and is not included in this assessment report.

1.2.3 Construction of Rail Siding

If transportation of product via rail is undertaken, a rail siding would be constructed on land owned jointly by Freightlink and the Northern Territory Government. The construction of a rail siding is not included in the PER or this assessment report.

1.3 Environmental Impact Assessment History

The proponent lodged a Notice of Intent (NOI) with the Department of Business, Industry and Resource Development in July 2003, proposing the development of a garnet sand quarrying project. The development proposal was formally referred to the Office of Environment and Heritage in July 2004. The Minister for the Environment and Heritage determined that the environmental issues associated with the proposal were sufficiently significant to warrant assessment under the Northern Territory *Environmental Assessment Act 1982* at the level of a PER.

Accordingly on 9 August 2004 the Minister directed that a PER be prepared for the proposal. Draft guidelines covering issues to be addressed in the PER were subject to public review from 24 August 2004 to 7 September 2004. Final guidelines were prepared, taking into account the comments received from the public and Government agencies. The Minister issued the final guidelines and a direction to the proponent to prepare the PER on 7 October 2004.

The proposal was referred to the Australian Government for a determination on whether it is a controlled action under the *Environment Protection and Biodiversity Conservation Act*. The Australian Government determined that the proposal was not a controlled action and as such does not require further assessment under their legislation.

The PER was submitted on 17 November 2004 and placed on public review for four weeks from 17 November 2004 to 15 December 2004.

At the request of the Minister for Environment and Heritage, additional information was supplied by MBS Environmental Pty Ltd on behalf of Olympia Resources on the 22 December 2004 in the form of:

- A letter from MBS Environmental.
- A letter from URS.
- Diagrams of water resources.

Sections 3, 4 and 5 of this Assessment Report deal with issues raised in the submissions to the PER and the proponent's commitments to environmental management provided within the PER.

2 ENVIRONMENTAL IMPACT ASSESSMENT

2.1 Introduction

The main purpose of this Environmental Assessment Report is to determine if the proposed project can proceed without unacceptable environmental impacts. It does this by identifying all relevant potential environmental impacts and evaluating the feasibility and likely effectiveness of environmental safeguards put forth by the proponent. Where the proposed safeguards were considered incomplete, inadequate or insufficiently clear, or for safeguards that are particularly crucial, this Assessment Report makes recommendations to complete or emphasise the safeguards and commitments made by the proponent.

The environmental acceptability of the project is based on consideration of the following from the PER:

- adequacy of information outlining the proposal (particularly which structures or activities are likely to impact the environment);
- adequacy of information on the existing environment (particularly environmental sensitivities);
- adequacy of information on the range and extent of potential impacts; and
- adequacy of the proposed safeguards to avoid or mitigate potential impacts.

The Office of Environment and Heritage is reasonably confident that mining at the site can be managed in an environmentally appropriate manner. However there is an outstanding issue relating to the impact of the project on the water supply to the Atitjere Aboriginal community which is situated some 20km from the project area. The proponent has not yet provided evidence that the borefield from which it intends to draw water for the project is separate from the aquifer serving Atitjere, and cannot therefore demonstrate that the project will not have an adverse impact on the community's water supply.

Accordingly, prior to the issue of any authorisation under the *Mining Management Act* for the development or operations of the proposal, additional information is required to be provided with respect to water supply issues as outlined in Section 3. Upon receipt of this information, the Office of Environment and Heritage and the Department of Business, Industry and Resource Development can complete their assessment of the proposal in order to issue an authorisation for the project under the *Mining Management Act*.

The Office of Environment and Heritage considers that the remaining environmental issues associated with the proposed project have been adequately identified. Appropriate environmental management of these issues will be addressed through monitoring and management actions detailed in comprehensive Construction and Operational Environmental Management Plans (EMPs) to be included as part of the Mining Management Plan (MMP).

Section 4 contains recommendations (in **bold**), each of which are preceded by text that identifies concerns, suggestions and undertakings associated with the project. For this reason, recommendations should **not** be considered in isolation.

3 REQUIREMENTS PRIOR TO APPROVAL AND FOR FURTHER ASSESSMENT

3.1 Groundwater supply

The proponent proposes to source the water requirements for the total operation of the quarry from groundwater (including water supply for the workforce accommodation). The PER states that a borefield of three to five bores will be developed approximately 4.5km north of the Harts Range Atitjere Aboriginal Community borefield supplying an operational requirement of 1000 kilolitres per day. In response to the information provided in the PER the Minister for the Environment and Heritage requested that additional information was required to demonstrate:-

- The sustainability of the groundwater resource; and
- The potential impacts of groundwater abstraction on existing users.

Additional information was provided by the Olympia Resources on 22 December 2004.

The proponent has not yet been able to demonstrate that the groundwater supply is adequate to supply their operations while not impacting on supply for other users. The proponent has carried out very limited hydrogeological investigations (considering the uncertainties around the sustainability of the resource and the potential impacts) and the extent and capability of the aquifer is unknown. There is still insufficient evidence to conclude that the Atitjere aquifer is not continuous with the borefield aquifer. The extraction of water from this aquifer may have significant impacts on water supply to Atitjere Aboriginal Community, Mt Riddock Station and with the ongoing operations of the project.

The proponent recognises the potential to adversely impact on the community water supply and is proposing that measures are taken in the event of a problem occurring. These include:

- providing an alternative water supply for Spinifex Bore, should the supply of that bore be adversely affected by the proposed borefield;
- In the event of the Atitjere Borefield being significantly affected, installing an additional production bore, or providing a supplementary supply; and
- considering the development of a computer model to predict the long-term effects of pumping.

Provided that appropriate monitoring bores are installed by Olympia Resources to enable the impacts of their borefield development on the Atitjere Borefield and Spinifex Bore to be assessed, then these commitments may address the concerns previously raised. However, the current knowledge of the groundwater resource does not enable sites for such monitoring bores to be selected. The Office of Environment and Heritage believes that the issue of maintaining water supply to the Atitjere community is of sufficient importance to require the proponent to clarify the matter early rather than negotiating a solution in the event of a problem occurring.

Requirement 1

Prior to project approval, the proponent must undertake the hydrogeological investigations necessary to:

- Demonstrate that the aquifer has the capability to meet the water requirements of the project;
- Enable monitoring bore sites to be selected; and
- Understand the potential impact that extraction of ground water may have on the Atitjere Community water supply.

Results of these investigations must be provided to the Office of Environment and Heritage.

Requirement 2

In the event that these additional investigations indicate a likely adverse impact on the supply of water to the Atitjere Community, then prior to project approval, the proponent must prepare an adaptive management plan for managing potential impacts on surrounding users of the water resource, particularly the Atitjere Community. This plan must be developed in consultation with the Department of Infrastructure, Planning and Environment, the Department of Business, Industry, Resources and Development, Power and Water Corporation and the current users of the water resource. The final plan must be submitted to the Office of Environment and Heritage for approval and be included in the Mining Management Plan.

4 RECOMMENDATIONS

Recommendations for actions to be included in approvals for this project are:

Recommendation 1

Olympia Resources Pty Ltd shall ensure that the proposal is implemented in accordance with the environmental commitments and safeguards:

- **identified in the Abrasive Sands Quarrying Project, Harts Range Public Environmental Report; and**
- **recommended in this Assessment Report (No. 46).**

All safeguards and mitigation measures outlined in the Public Environmental Report are considered to be commitments by Olympia Resources Pty Ltd and are included in Appendix 1 of this report.

Recommendation 2

In accordance with clause 14A of the Administrative Procedures of the *Environmental Assessment Act 1982* the proponent shall advise the Minister of any changes to the proposal for determination of whether or not further environmental impact assessment is required.

4.1 Transport

Three options for transportation of product offsite are discussed in the PER: trucking of product to the Port of Darwin; trucking containers of bagged product to Alice Springs then by rail to the Port of Darwin or Port Pirie; or rail transport between the project area and the Port of Darwin. Trucking of bagged product to Alice Springs requires the movement of 2 to 6 triple road trains per day through residential areas. Traffic noise associated with this movement may be significant.

Recommendation 3

If the option to truck containers of bagged product to Alice Springs is utilised, a noise management plan must be developed in consultation with the Office of Environment and Heritage for the transport of product though Alice Springs to Brewers Estate. The noise management plan must be submitted to the Office of Environment and Heritage for approval prior to commencement of operations and be included in the Mining Management Plan.

4.2 Quarrying

Quarrying will involve the use of conventional earthmoving machinery. No blasting will be undertaken. Where necessary, vegetation will be stripped and placed directly on backfilled quarry areas. Topsoil will be removed and initially stockpiled, but eventually be progressively replaced onto backfilled quarry areas. Processed sand will be initially stockpiled and eventually progressively backfilled to quarry areas. Environmental issues relating to the quarrying process, such as vegetation removal, stockpiling, dust and noise have been addressed in the PER and will be managed through the Operational Environmental Management Plan.

4.3 Processing

Processing will involve pumping the sand slurry from the pit screening operation to the wet concentration plant where the abrasive sands will be separated from other quarry product content via hydrocyclones, hydrosizers and spirals. Reject clay fines will be pumped to a thickener to recover water before being mixed with reject quartz sand and pumped back into the mined area of the pit as backfill. Water coming out of the deposited backfill will be pumped back into the process stream. Abrasive sands will be loaded via a front end loader to the dry separation plant where it will be placed in a drying kiln. Magnets and screens will separate the final product. Environmental issues relating to the processing method, such as dust, noise and water management have been addressed in the PER and will be managed through the Operational Environmental Management Plan.

4.4 Water Pipeline

A water pipeline will be constructed from the borefield to the operations area. The proposed route is outlined in figure 3. Prior to commencement of construction of the pipeline route, surveys will be undertaken to ensure that the proposed route does not impact on any areas of anthropological, archaeological or environmental significance. Construction of the pipeline will occur during conditions of dry weather. Approximately 20 ha of vegetation will be cleared which will include a clearway of 10m to allow construction of the pipe. The pipeline will be approximately 15kms long. The pipeline will be buried to a minimum of 600mm of material. Excavation will be undertaken to a depth of 0.95m and a width of 900mm. Topsoil will be stripped and stockpiled for later reuse. Sections of open trench will be limited to two kilometers and daily inspections will be undertaken to remove and release any trapped fauna. Insulated shelter boxes will be installed every 100m to provide shelter for fauna. Topsoil will be returned and regularly sprayed with water to encourage revegetation and seeding undertaken where natural regeneration is not sufficient. Weeds and erosion and sediment management will be undertaken as part of the Construction and Operational EMPs.

4.5 Air Resources

Ambient air quality data is not available for the project area but existing air quality is expected to be generally good given the lack of urban population or industry. Dust associated with the quarrying and processing of product will be managed through the Operational EMP. Management measures were adequately outlined in the PER (refer Commitments Table, Appendix 1).

The PER describes likely greenhouse gas emissions as 'not considered significant'. The PER does not provide an estimate of greenhouse gas emissions from electricity generation, or satisfactorily address the possibility of emissions offsets.

Recommendation 4

The proponent is to undertake an assessment of greenhouse gas emissions from the project. This assessment should outline, as a minimum, the following:

- **Energy requirements for the project;**
- **Fuel sources for the project;**
- **Estimated greenhouse gas emissions as a CO₂ equivalent total;**

- **A comparison with the Northern Territory and national levels of greenhouse gas emissions;**
- **Investigations into offsetting emissions from the operation; and**
- **Benefits of this project to the abatement of greenhouse gas emissions on a national or global scale.**

Details are to be provided on the project's commitment to:

- **Providing a greenhouse gas emissions inventory and undertaking benchmarking;**
- **Measures to minimise greenhouse gas emissions; and**
- **Implementing an offset project to be approved by the Office of Environment and Heritage. This approval should be sought prior to the commencement of operations.**

These commitments must be included in the Mining Management Plan.

4.6 Soil and Land Systems

Baseline studies undertaken by Low Ecological Surveys (2004) indicate that the three land systems the Simpson, Kanandra and Sandover consist primarily of sands. Sandy soils in arid climates make land cleared for mining operations, pipelines and other structures susceptible to wind and water erosion. Although average rainfall is low, erosion risk is high due to intense periods of rainfall and flash flooding. The potential for erosion is increased post-extraction as soil will be destabilised for an extended period of time once mature vegetation has been removed.

Recommendation 5

An Erosion and Sediment Control Plan is to be included in the Mining Management Plan. It must be developed in consultation with the Office of Environment and Heritage and other relevant government agencies and be submitted to the Department of Infrastructure, Planning and Environment for approval prior to the commencement of any works.

The PER states that a vegetative buffer zone of 10 metres will be maintained along creek beds. The erodible nature of the soils and likelihood of flash flooding make creek systems particularly vulnerable to erosion. Current best practice in the mining and extractive industries requires a minimum buffer zone along water courses of 25 metres to ensure the integrity of banks and riparian vegetation.

Recommendation 6

A vegetative buffer zone of 25 metres (minimum) must be maintained along all creek beds.

4.7 Fire

The objectives of fire management have not been addressed in the PER. A fire management plan is important to ensure that the mine and surrounding countryside is not impacted upon, or placed in danger, either through uncontrolled or unplanned burning, or through the build up of fuel.

Recommendation 7

A Fire Management Plan is to be included in the Mining Management Plan. It must be developed in consultation with the land holder, Emergency Services, and other relevant agencies and be submitted to the Department of Infrastructure, Planning and Environment for approval prior to the commencement of any works.

4.8 Flora and Fauna

The PER addresses potential impacts on flora and fauna, and gives commitment to mitigation measures, however it does not supply enough information on the faunal species present.

The project area is relatively large and included several distinct habitats spread between three land systems, including an isolated and potentially important outlier of the Simpson Desert dune fields. Fauna lists were compiled from a four day field survey and listed only 33 birds, 5 mammal and 5 reptile species. For a large area containing several habitats, such as the project area, there are likely to be more species of terrestrial vertebrates present than have been listed in the PER.

The PER suggests that additional information and assessment of fauna could be gained during the mining operation, however, this suggestion is not acceptable without a much greater initial input into determining actual species diversity of the site, particularly in those areas marked for early development

Recommendation 8

Prior to commencement of construction, field fauna surveys are to be conducted to provide baseline data on which to base monitoring protocols and a target for rehabilitation and regeneration works. The surveys should also include the identification of any suitable threatened species habitat to inform their appropriate management (for inclusion in the Construction and Operational Environmental Management Plans). Survey methodology is to be developed in conjunction with the Department of Infrastructure, Planning and Environment's Biodiversity Unit.

The surveys are to include the areas where the proposed haul roads and water pipeline are to be constructed.

Commitment 6.4.3.2b states that "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."

Weed species are adept at colonising disturbed ground and being transported by equipment to new locations. Weed management is an essential part of land management and the introduction and spread of weeds must be avoided. Weed management must be planned prior to any works starting.

Recommendation 9

A Weed Management Plan is to be included in the Mining Management Plan and submitted to the Department of Infrastructure, Planning and Environment for approval prior to the commencement of any works

4.9 Surface Water

Surface water is scarce in the project area with watercourses flowing infrequently. The project will extract no water from surface water sources. Olympia Resources will protect surface water quality by preventing release of waters or possible contaminants (including sediment) to water courses, utilising construction techniques that minimise interference with natural surface water drainage and capture and reuse of runoff from work areas.

Commitment 6.6.3h states that “Any water releases to the environment will meet approved water quality criteria.” Any releases of water offsite require a waste discharge licence under the *Water Act 1992*.

Recommendation 10

Prior to any discharge of water, a Waste Discharge Licence must be obtained under the *Water Act 1992*.

4.10 Biting Insects

Due to the low average annual rainfall, the current biting insect breeding season in the project area is likely to be short. This season may be extended by the presence of permanent water bodies. Potential mosquito breeding can have negative impacts on public health due to pest and potential disease problems associated with mosquitoes such as Ross River Virus, Barmah Forest virus, Kunjin virus and Murray Valley Encephalitis virus. Water pooling in any areas for longer than 6 consecutive days is conducive to mosquito breeding.

Recommendation 11

In order to avoid development of mosquito breeding sites, the finished surface level of the buried pipeline must match the level of the surrounding ground to prevent ponding of water in depressions. Rehabilitated areas must contain no depressions capable of ponding water for more than 5 days. Drains, culverts or other infrastructure must be constructed so as to prevent the impoundment of water.

The Environmental Management Plans must include measures that limit the time water is allowed to pool to less than 5 consecutive days and a monitoring program for any water impoundments.

Rehabilitation plans should be prepared in conjunction with advice from the Department of Health and Community Services to ensure that no new mosquito breeding sites remain after closure of the mine site.

4.11 Cultural Environment

The project proposed by Olympia Resources has the potential to impact upon archaeological places and objects resulting from past Aboriginal occupation. The proponent should note that all prescribed archaeological places and objects are protected under the *Heritage Conservation Act 1991*, regardless of whether or not sites have been previously identified and reported.

Recommendation 12

In accordance with the *Heritage Conservation Act* the Office of Environment and Heritage must be notified of any intention to disturb or destroy an archaeological site

and approval sought from the Minister for the Environment and Heritage to disturb a site regardless of whether or not sites have previously been identified and reported. This includes sites that have been determined to have low archaeological significance such as background scatters. A pre mining timeframe for the assessment of Aboriginal artefacts should be established prior to the commencement of operations to ensure adequate time is allowed to assess and remove or reschedule operations if sites are discovered.

4.12 Waste and Hazardous Material

Hazardous substances onsite are limited to hydrocarbon products such as diesel and lubricants. The heavy vehicle workshop will contain a purpose built washdown facility with a sediment and oil and grease removal system. Release of hydrocarbon contaminated water can have negative impacts on the surrounding environment.

Recommendation 13

The oil and grease removal system for the heavy vehicle workshop must comply with Power and Water Corporation's Guidelines for On-Site Pre-treatment. Industrial wastes must not be discharged to the septic system.

Recommendation 14

Sewage and other waste water treatment systems used during the construction and operational phases will require approval from the Department of Health and Community Services. Effluent re-use or disposal must be in accordance with Department of Health and Community Services guidelines.

A putrescible landfill will be constructed by Olympia Resources at the project site to dispose of inert and putrescible wastes. Putrescible wastes often attract feral animals and can be a health hazard.

Recommendation 15

The waste disposal site must conform to relevant legislation and be located in an area approved by the Department of Health and Community Services and the Office of Environment and Heritage. Measures must be in place to ensure that the site does not attract feral animals.

4.13 Visual Amenity

The project is located in a sparsely populated area utilised primarily for pastoral activities. The wet plant and earthmoving will occasionally be visible from the Plenty Highway when quarrying is in that region. The Plant will be lit at night. Infrastructure will be painted to blend with the local landscape and vegetation clearing will be minimised and a buffer strip of 10 meters maintained along the Plenty Highway. Disturbed areas will be progressively rehabilitated and contoured to match the surrounding landscape. Lighting plants will be located to minimise annoyance to travellers and nearby communities. Issues relating to visual amenity have been addressed adequately in the PER.

4.14 Socio-Economic Environment

The Harts Range District is sparsely populated with a high proportion of Aboriginal people. Atitjere Aboriginal Community is located 20 kilometres from the project area. The project is

likely to provide opportunities for employment. The PER states that employment preference will be given to local people and that preference will be given to local businesses for procurement.

Recommendation 16

A local employment and procurement strategy should be developed in consultation with local agencies including the Central Land Council, giving particular consideration to the employment of local Aboriginal people and Aboriginal businesses.

4.15 Rehabilitation and Closure

The PER states that a Closure Plan, to be reviewed every 3 years will be included as part of the Mining Management Plan.

Recommendation 17

The Closure Plan must be developed in conjunction with the Department of Infrastructure Planning and Environment and the Department of Business, Industry, Resources and Development.

Rehabilitation objectives and methodology have been described adequately in the PER. Rehabilitation will be undertaken progressively. Topsoil will be stockpiled and quarried areas backfilled and contoured to match the natural landscape. Revegetation will be undertaken through recolonisation of natural vegetation, or seeding of native species. Dune ends will be stabilised. The water pipeline will be rehabilitated progressively by placing subsoil over the pipe to fill trench, covering with topsoil and revegetating with native species. Cross drains and contouring will be utilised to control erosion. Infrastructure will be removed from the site as it becomes redundant and any areas of localised contamination treated (resulting from minor spills etc). Disturbed surfaces will be covered with topsoil, contour ripped where required and revegetated through natural processes or seeding.

Recommendation 18

A rehabilitation plan is to be developed in consultation with the Department of Infrastructure, Planning and Environment and the Department of Business, Industry and Resource Development, which includes rehabilitation objectives and constraints, and detailed methodology for the progressive rehabilitation of all elements of the operation. The plan should also include a rehabilitation outlook outlining the likely success of the plan and justify using examples of rehabilitation in similar terrain and climate. The plan should also provide a contingency in the event that the proposed methodology is not successful, for example, rehabilitation offset. The plan must be included as part of the Mining Management Plan.

The PER states that reject sands will be returned to the quarried area and that this area will be contoured to fit in with the natural landscape. Reject sand from the wet plant and thickened clay from the thickener will be pumped to fill the quarried pit behind the quarrying operation. It is estimated that the removal of the abrasive sands from quarried sand will be approximately balanced by the 'swell factor' of the sand due to excavation. The PER states that the result is that restored land surfaces should approximate pre-quarrying levels and landforms. The PER has not addressed the need for contingency in the event that actual swell factor of processed material is significantly different from expectations.

Recommendation 19

The progressive rehabilitation of the quarry should include contingency options if the swell factor is significantly different to that predicted. The contingency plan should include options for sourcing additional capping materials if swell of reject sands is less and options for additional storage if the swell of reject sands is more. This information must be included as part of the Operational Environmental Management Plan.

4.16 Public Involvement and Consultation

Olympia Resources has undertaken consultation with a range of stakeholder groups including pastoral leaseholders, government bodies, Aboriginal and community groups. Negotiations are still outstanding with the Central Land Council and Native Title Claimants. Olympia Resources is in the process of finalising these arrangements. These negotiations are outside the scope of this report (see 1.2.2).

5 MONITORING AND ENVIRONMENTAL MANAGEMENT

An environmental monitoring program needs to be developed as part of the Mining Management Plan. The monitoring program must have clear objectives and be implemented in such a way as to demonstrate the effectiveness of the company's environmental management system and their effectiveness in achieving the stated objectives.

The proponent is required to report monitoring data on a regular basis, to undertake an annual review of monitoring data and to submit an annual report to the Department of Business, Industry and Resource Development on the interpretation of the monitoring data and the company's performance against stated environmental objectives or targets. Interpretation of monitoring data also requires analysis of developing trends so that potential issues can be identified and addressed well before they reach trigger values and become environmental issues.

5.1 Environmental Management Documents

The PER discusses the principles of an environmental management system to be developed by Olympia Resources for the project. The objectives, structure and scope of an environmental management plan (for both construction and operation of the project) have also been outlined. The PER also states that the Operational 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.

Recommendation 20

Environmental Management Plans covering construction and operation are required to be prepared and submitted to the Office of Environment and Heritage and the Department of Business, Industry and Resource Development for approval prior to commencement of construction and operation respectively. The Environmental Management Plans are to be included in the Mining Management Plan as an appendix.

In preparing each Environmental Management Plan, the proponent is to include any additional measures for environmental protection and monitoring contained in this Assessment Report and recommendations made by the NT Government with respect to

the proposal. Each Environmental Management Plan is to be referred to relevant NT Government agencies for review prior to finalisation, after which it shall become a public document. The Environmental Management Plans shall form the basis for approvals and licences issued under relevant NT legislation.

6 REFERENCES

MBS Environmental, 2004, *“Public Environment Report Abrasive Sands Quarrying Project Harts Range, Northern Territory”*, Prepared for Olympia Resources Limited.

URS, 16 December 2004, Letter Report – Groundwater Supply, Harts Range Garnet Project for Olympia Resources Ltd.

MBS Environmental, 17 December 2004, Letter – Olympia Resources Limited: Harts Range Project Request for Additional Information.

APPENDIX 1

Summary of environmental commitments made by Olympia Resources.

PER ref	Commitment and Key Performance Indicators Where Applicable
Air Quality	
6.1.3.1a	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.
6.1.3.1b	Diesel combustion engines in stationary and mobile equipment and diesel-powered electric generators will be operated and maintained to minimise emissions of combustion gases.
6.1.3.1c	Pollution control devices such as dust extractors, conveyor covers and sprinklers installed at point sources will be maintained and operated in good working order.
6.1.3.2a	Minimise the amount of disturbed surfaces. Disturbed surfaces will be progressively rehabilitated to minimise the surface area available for wind erosion.
6.1.3.2b	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.
6.1.3.2c	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.
6.1.3.2d	Movement of mobile equipment and vehicles will be limited to clearly-marked routes or areas where dust control methods can be used.
6.1.3.2e	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.
6.1.3.2f	Vehicles and equipment will be regularly maintained to manufacturer's specifications to minimise exhaust emissions.
6.1.3.2g	Equipment operators will remain in enclosed, air-conditioned cabins to minimise exposure to dust emissions.
6.1.3.2h	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.
Noise and Vibration	
6.2.3a	Use engineered controls where justified. For example: - 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. - Reducing equipment vibration by installing shock-absorbing devices or materials around the primary sources of vibration such as ore processing equipment and water pumps.
6.2.3b	Maintaining, to the extent practicable, the natural acoustic barriers (i.e. trees and

PER ref	Commitment and Key Performance Indicators Where Applicable
	ridges) between noise sources and neighbouring communities.
6.2.3c	Ensure that hearing protection equipment is available and utilised in onsite areas where engineering controls are deemed inappropriate or ineffective.
Soil and Landforms	
6.3.3.1a	A clearing permit system will be implemented for all ground disturbance activities.
6.3.3.1b	Unauthorised access to protected or sensitive areas (including rehabilitated areas) will be restricted.
6.3.3.1c	Vehicles and mobile equipment are to be parked only in designated parking areas. Vegetated areas will not be used for parking.
6.3.3.2a	All areas of proposed development will be stripped of topsoil to an average depth of about 20 centimetres.
6.3.3.2b	Topsoil will be removed progressively to ensure large surface areas are not left exposed.
6.3.3.2c	Topsoil stripped from infrastructure areas will be stockpiled in windrows less than two metres to minimise loss of seed viability and soil biota.
6.3.3.2d	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.
6.3.3.2e	Topsoil stripping and stockpiling (where required) will be undertaken in dry and preferably still wind conditions to minimise dust generation and topsoil compaction.
6.3.3.3a	No quarrying will occur within the creek beds and within five metres of the creek bank to ensure stability of these structures.
6.3.3.3b	Diversion bunds and drains will be installed as necessary to control local surface water runoff to minimise overland flow and consequential erosion.
6.3.3.3c	Rehabilitation areas will be ripped on the contour after placing topsoil to remove compaction and improve soil structure and infiltration capacity where necessary.
6.3.3.3d	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.
6.3.3.3e	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.
Flora and Fauna	
6.4.3.1	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.
6.4.3.2a	Earthmoving equipment brought to the project area, particularly during construction will be cleaned to remove soil and plant seeds prior to entry.
6.4.3.2b	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,

PER ref	Commitment and Key Performance Indicators Where Applicable
	a weed management plan will be prepared in conjunction with the Northern Territory Government Controller of Weeds and other relevant experts.
6.4.3.2c	Disturbance of trees on the floodplain and dune systems will be minimised where practicable
6.4.3.2d	No trees will be disturbed within the riparian zone.
6.4.3.3a	No domestic animals or firearms will be allowed onsite.
6.4.3.3b	Haulage routes will have speed restrictions to minimise fauna death on roads. Signage restricting speed on main roads will also help reduce fauna deaths.
6.4.3.3c	Waste management procedures will be implemented to minimise the attraction of feral animals to the project area.
6.4.3.3d	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.
6.4.6.3e	The maximum length of open trench present during construction of the water pipeline will be limited to 10 kilometres.
6.4.3.3f	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.
6.4.3.3g	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.
Groundwater	
6.5.3a	Quarrying activities will only occur above the water table.
6.5.3b	Process water storage structures will be lined to minimise seepage.
6.5.3c	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.
6.5.3d	Olympia Resources will replace Spinifex bore and provide Mt Riddock Station with water from the project's borefield to the same volume currently abstracted.
6.5.3e	The following standard borefield management practices will be employed: - Flow meters will be fitted to groundwater extraction bores to enable monitoring of extraction volumes. - Quarterly level monitoring of observation bores (Bores RN's 17046 and 17047). - Six-monthly water quality sampling from observation and production bores. - A formal aquifer review every two years using all monitoring data.
6.5.3f	The pipeline will be buried to minimise interference with pastoral activities.
6.5.3g	DIPE will be consulted on the appropriate method and location for the water pipe to cross the Plenty Highway.
Surface Water	
6.6.3a	Protection bunds and diversion channels will be constructed to prevent flooding of pits, process areas or other quarrying infrastructure.

PER ref	Commitment and Key Performance Indicators Where Applicable
6.6.3b	Out-of-pit stockpiles will be constructed so that interference with natural surface water drainage is prevented or impacts are minimised.
6.6.3c	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.
6.6.3d	Construction of the stockpile areas in the process plant so that surface water runoff can be captured and re-used.
6.6.3e	Culverts and/or floodways will be installed as required where roads cross watercourses.
6.6.3f	Commercially-available sewage treatment systems will be installed 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.
6.6.3g	Hydrocarbon storage will be in accordance with Australian Standard <i>AS1940 Storage and Handling of Flammable and Combustible Liquids</i> .
6.6.3h	Any water releases to the environment will meet approved water quality criteria.
Archaeology and Heritage	
6.7.4a	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.
6.7.4b	Construction or quarrying activities will not occur until appropriate checks against artefact and archaeological site locations have been made.
6.7.4c	All employees and contractors will be required to participate in a general site induction before starting work. The induction will include: - Information on the importance of the cultural environment and protecting the artefact and archaeological site. - Information on the correct procedure if items of potential Aboriginal or heritage significance (including bones) are discovered during quarrying.
6.7.4d	The Aboriginal Areas Protection Authority and Central Land Council will be contacted immediately if items of potential Aboriginal significance are discovered.
6.7.4e	Olympia Resources will employ Aboriginal monitors to scout areas for artefacts or sites prior to topsoil stripping to improve the chances of discovering items of Aboriginal significance.
6.7.4f	No archaeological site will be disturbed unless clearances have been obtained from the Aboriginal Area Protection Authority 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: 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 sites

PER ref	Commitment and Key Performance Indicators Where Applicable
	occupation. 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.
6.7.4g	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.
6.7.4h	An area of 500 metre radius around <i>Anthere</i> 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.
Hazardous Materials	
6.8.3.1a	Material Safety Data Sheets will be available and accessible at all work places where hazardous materials are used.
6.8.3.1b	Design of chemical and hydrocarbon product storage tanks and secondary containment will be in accordance with <i>AS1940 Storage and Handling of Flammable and Combustible Liquids</i> . The design should also address appropriate corrosion protection and leak detection systems.
6.8.3.1c	An inventory of hydrocarbon use will be maintained to help determine whether storage containers are leaking.
6.8.3.1d	Chemical and hydrocarbon product storage tanks and related piping, including distribution piping, will be above ground.
6.8.3.1e	Runoff from hydrocarbon product storage areas will be routed through oil water separators.
6.8.3.1f	Trained personnel will refill hydrocarbon product storage tanks.
6.8.3.1g	Hazardous materials will be transported in bulk packaging wherever possible. This will minimise the number of containers and reduce spillage risk.
6.8.3.1h	All mobile equipment and light vehicle servicing activities including wash down will be done on impermeable surfaces.
6.8.3.1i	The heavy vehicle workshop facility will contain a purpose-built wash down facility incorporating an appropriate sediment and oil/grease removal system.
6.8.3.1j	Absorbent materials will be kept on hand for containment of hydrocarbon spillages. Bioremediating agents will be used in situ to treat localised spillages.
6.8.3.2a	A solid waste landfill will be established onsite to only receive solid wastes classified as non-hazardous (inert and putrescible).
6.8.3.2b	Design, construction, operation and closure of the onsite landfill will conform to all applicable regulations.
6.8.3.2c	Domestic waste from accommodation camps and offices will be properly handled, shipped to and disposed of in the onsite landfill.
6.8.3.2d	The reuse and recycling of waste packaging and construction materials and used equipment/parts, tyres and metal will be promoted to maximise resources conservation and value recovery and minimise disposal in the onsite landfill.
6.8.3.2e	Reusable pressurised containers and vessels will be returned to suppliers. Pressurised containers and vessels that are not reusable will be punctured using suitable equipment and disposed of in the onsite landfill.
6.8.3.3a	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

PER ref	Commitment and Key Performance Indicators Where Applicable
	equipment fuel filters.
6.8.3.3b	Solutions drained from punctured pressurised containers and vessels will be managed as hazardous wastes and appropriately disposed of offsite.
6.8.3.3c	All hazardous wastes will be temporarily stored in designated containers and contents properly labelled at all times. Storage will conform to <i>AS1940 Storage and Handling of Flammable and Combustible Liquids</i> .
6.8.3.3d	Develop and maintain a register of all hazardous materials imported to the site or generated as a result of site activities will be developed and maintained. This will document the hazardous material name, location, approximate volume, storage method and where applicable, disposal method for the substance and containers.
Visual and Aesthetics	
6.9.3a	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.
6.9.3b	Vegetation will not be cleared unless absolutely necessary.
6.9.3c	Topsoil will be directly replaced to remove the need to form stockpiles.
6.9.3d	Access roads will be constructed from local materials.
6.9.3e	Restored surfaces will be progressively revegetated to establish a panorama compatible with the surrounding landscape.
6.9.3f	Permanent features that will remain after closure of the operation (i.e. backfilled quarries) will be contoured so they blend in with natural topography.
6.9.3g	A buffer strip of at least 10 metres from the Plenty Highway will be retained to provide visual screening for the project.
6.9.3h	Lighting within the wet plant, dry processing plant and camp will be carefully sited and directed to minimise annoyance to travellers and nearby communities.
6.9.3i	Colours for external walls of the processing plants, offices and camp will be selected to blend in with the local landscape.
Socio Economics	
6.10.3a	Where possible, the project will obtain goods and services from the local economy. Preference will be given to employing local people.
6.10.3b	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.
6.10.3c	Compensation agreements will be reached with landowners for loss of use of land due to mining or associated infrastructure.
6.10.3d	Employment opportunities will be advised in Harts Range and Alice Springs and preference will be given to local candidates.
6.10.3e	Provision of goods and services will be advised to Harts Range and Alice Springs and preference will be given to local businesses.
6.10.3f	Accommodation for construction and permanent employees will be provided onsite.
6.10.3g	First Aid facilities will be established onsite for the duration of the project. These

PER ref	Commitment and Key Performance Indicators Where Applicable
	facilities will be operated by appropriately-qualified employees.
6.10.3h	A relationship will be established between onsite Emergency Response and First Aid personnel and providers of equivalent services in Harts Range and Alice Springs.
6.10.3i	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.
6.10.3j	Access to the project site will be limited to employees and authorised visitors. All access routes will be well signposted to control traffic movement. Appropriate signs will also alert motorists to increased traffic, road crossings and road trains.
Rehabilitation and Closure	
7.2a	Progressive placement of reject sands.
7.2b	Control slope gradients will be controlled to minimise erosion and soil loss.
7.2c	Spread topsoil and cleared vegetation on re-shaped surfaces.
7.2d	Contour ripping to assist water infiltration and surface water control if required.
7.2e	Apply seed to ripped surfaces if rehabilitation monitoring shows natural revegetation has not occurred satisfactorily within two years of rehabilitation.
7.2f	Construct a fence to prevent grazing of establishing areas for more than five years.
7.2g	Dune ends will be stabilised during the rehabilitation process to ensure long-term stability of the post quarrying landform
7.2h	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.
7.2i	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.
7.2j	Disturbed surfaces will be rehabilitated after infrastructure is removed. 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

PER ref	Commitment and Key Performance Indicators Where Applicable
	required. • Apply seed to ripped surfaces if rehabilitation monitoring shows natural revegetation has not occurred satisfactorily within two years of rehabilitation.
7.2k	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.
7.3a	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,.
7.3b	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.

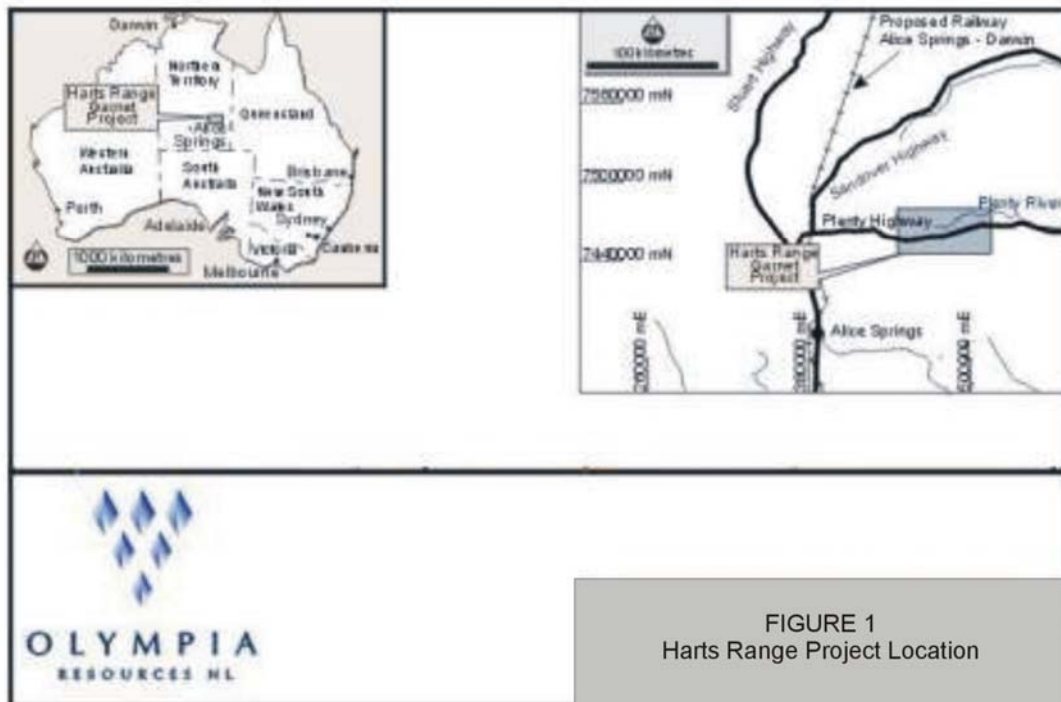


Figure 1 – Quarry Location

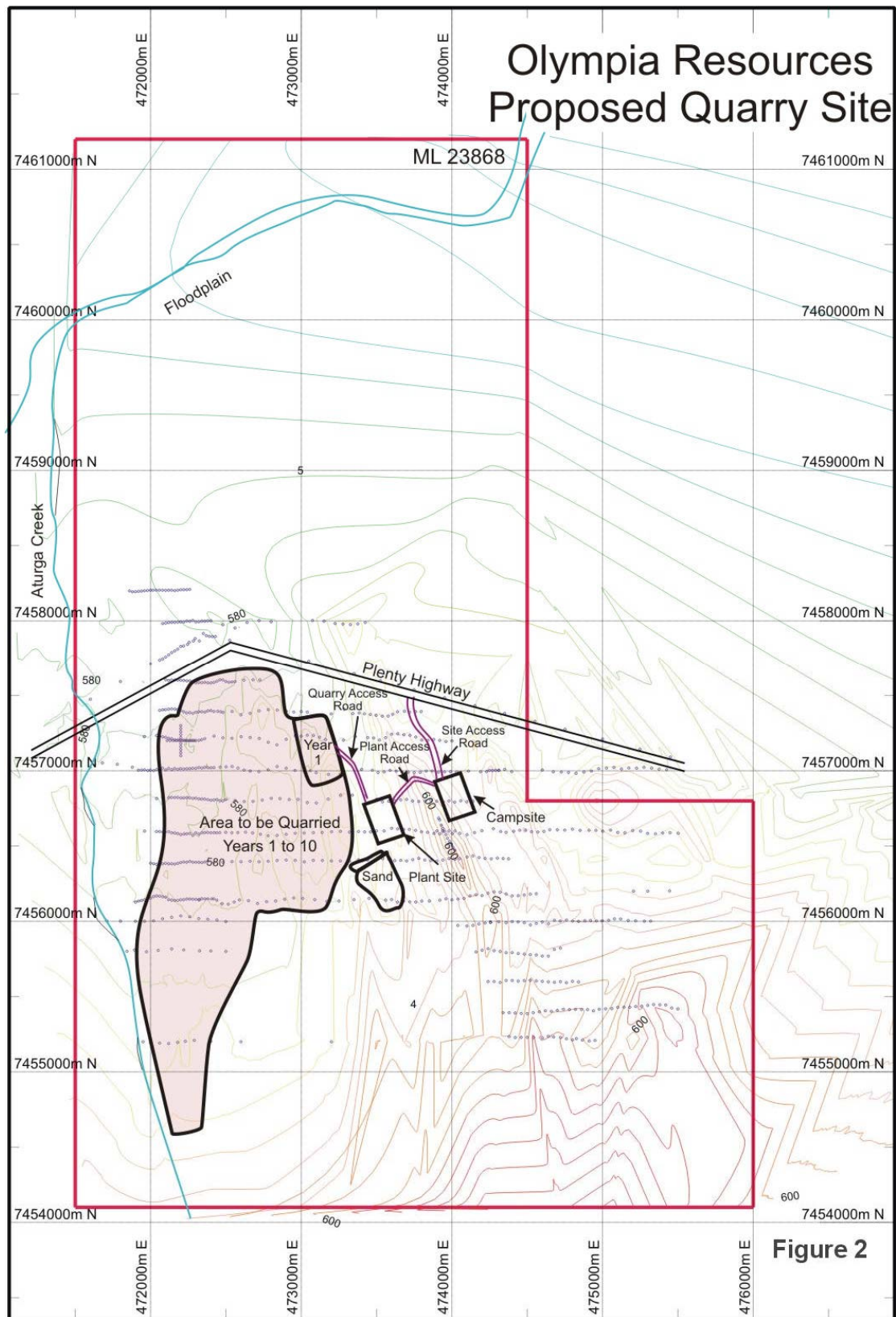


Figure 2 – Infrastructure and Quarry Site

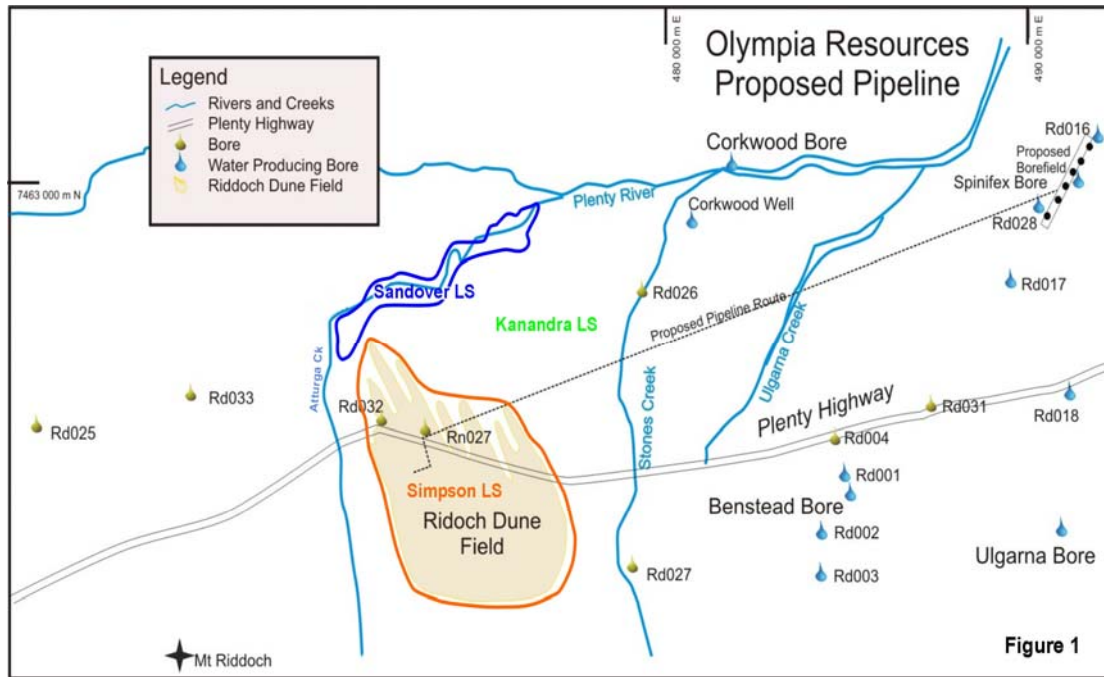


Figure 3 – Proposed Pipeline Route