

Public Environmental Report Abrasive Sands Quarrying Project Harts Range, Northern Territory

Prepared for:
Olympia Resources Limited

November 2004

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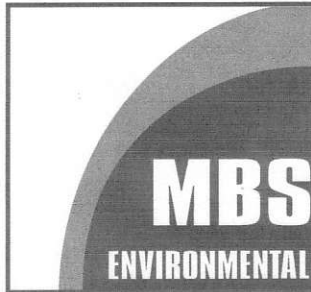
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ABN 60 102 614 479



environmental and water resource consultants

PUBLIC ENVIRONMENTAL REPORT
ABRASIVE SANDS QUARRYING PROJECT
HARTS RANGE, NORTHERN TERRITORY

PREPARED FOR

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TABLE OF CONTENTS

1.	EXECUTIVE SUMMARY.....	1
1.1	INTRODUCTION	1
1.2	COMMITMENTS	6
2.	INTRODUCTION	14
2.1	NAME AND ADDRESS OF PROPONENT, INCLUDING CONTACT OFFICER	14
2.2	OUTLINE OF PROPOSAL	15
2.3	HISTORY OF THE PROJECT.....	15
2.4	EXPLANATION OF THE OBJECTIVES, BENEFITS AND JUSTIFICATIONS	15
2.5	TENEMENT STATUS FOR PROJECT AREA	16
2.6	LEGISLATIVE FRAMEWORK AND APPROVAL PROCESS.....	16
2.6.1	<i>Northern Territory</i>	16
2.6.1.1	Environmental Impact Assessment	16
2.6.1.2	Mining Management.....	17
2.6.2	<i>Commonwealth</i>	18
2.7	PUBLIC ENVIRONMENTAL REPORT OBJECTIVES.....	19
2.8	PER SCOPE AND STRUCTURE	19
2.9	ADMINISTRATIVE REQUIREMENTS	20
3.	DESCRIPTION OF PROPOSED DEVELOPMENT.....	21
3.1	PROJECT LOCATION	21
3.2	EXISTING LAND USE	21
3.3	GEOLOGY	23
3.3.1	<i>Background</i>	23
3.3.2	<i>Resource</i>	24
3.4	OVERALL PROCESS DESCRIPTION.....	25
3.5	QUARRYING	26
3.5.1	<i>Alluvial Deposits</i>	26
3.5.2	<i>Plain and Dune Deposits</i>	26
3.5.3	<i>Extraction Plan</i>	27
3.6	PROCESSING	27
3.7	PROGRESSIVE REHABILITATION	32
3.8	TRANSPORT	33
3.8.1	<i>Trucking to Port of Darwin</i>	33
3.8.2	<i>Trucking Containers of Bagged Products to Alice Springs and then by Rail to Port of Darwin or Port Pirie</i>	33
3.8.3	<i>Rail Transport between Project Area and Port of Darwin</i>	34
3.9	WATER REQUIREMENT AND MANAGEMENT.....	34
3.9.1	<i>Groundwater</i>	34
3.10	INFRASTRUCTURE	35
3.11	WORKFORCE	35
3.11.1	<i>Construction Phase</i>	35
3.11.2	<i>Operation Phase</i>	36
3.11.3	<i>Decommissioning</i>	36
3.11.4	<i>Recruitment and Training Policy</i>	37
3.11.5	<i>Transportation of Employees</i>	37
3.12	PROJECT SCHEDULE	37

3.12.1	Construction.....	37
4.	OBJECTIVES AND BENEFITS OF PROJECT	39
4.1	SOCIO-ECONOMIC OBJECTIVES AND BENEFITS.....	39
4.2	COMMERCIAL OBJECTIVES	39
4.3	LOCAL, REGIONAL AND GLOBAL ENVIRONMENTAL OBJECTIVES	39
5.	PROJECT ALTERNATIVES.....	41
5.1	NOT PROCEEDING WITH THE PROJECT	41
5.2	INFRASTRUCTURE LOCATION	41
5.3	RAW MATERIALS	41
5.4	EXTRACTION AND PROCESSING TECHNOLOGIES	42
5.5	ENVIRONMENTAL MANAGEMENT TECHNOLOGIES.....	42
5.6	WORKFORCE ACCOMMODATION	42
5.7	POWER SUPPLY OPTIONS	42
5.8	TRANSPORT	43
6.	EXISTING ENVIRONMENT, POTENTIAL IMPACTS AND MANAGEMENT	44
6.1	AIR RESOURCES MANAGEMENT	44
6.1.1	<i>Baseline.....</i>	<i>44</i>
6.1.1.1	Climate.....	44
6.1.1.2	Air Quality	46
6.1.2	<i>Potential Issues or Impacts.....</i>	<i>46</i>
6.1.3	<i>Management and Mitigation Measures</i>	<i>46</i>
6.1.3.1	Point Sources	46
6.1.3.2	Fugitive Sources	47
6.1.4	<i>Impact Assessment</i>	<i>47</i>
6.2	NOISE AND VIBRATION MANAGEMENT	48
6.2.1	<i>Baseline.....</i>	<i>48</i>
6.2.2	<i>Potential Issues or Impacts.....</i>	<i>48</i>
6.2.3	<i>Management and Mitigation Measures</i>	<i>48</i>
6.2.4	<i>Impact Assessment</i>	<i>49</i>
6.3	SOIL AND LAND SYSTEMS.....	49
6.3.1	<i>Baseline.....</i>	<i>49</i>
6.3.2	<i>Potential Issues or Impacts.....</i>	<i>50</i>
6.3.3	<i>Management and Mitigation Measures</i>	<i>51</i>
6.3.3.1	Sensitive Areas and Ground Disturbance	51
6.3.3.2	Topsoil Management	52
6.3.3.3	Erosion.....	52
6.3.3.4	Soil Contamination	52
6.3.3.5	Rehabilitation.....	52
6.3.4	<i>Impact Assessment</i>	<i>53</i>
6.4	FLORA AND FAUNA	53
6.4.1	<i>Baseline.....</i>	<i>53</i>
6.4.1.1	Flora	54
6.4.1.2	Fauna.....	54
6.4.2	<i>Potential Issues or Impacts.....</i>	<i>55</i>
6.4.3	<i>Management and Mitigation Measures</i>	<i>55</i>
6.4.3.1	Habitat.....	56
6.4.3.2	Flora.....	56
6.4.3.3	Fauna.....	56
6.4.4	<i>Impact Assessment</i>	<i>57</i>

6.5	GROUNDWATER	57
6.5.1	<i>Baseline</i>	57
6.5.2	<i>Potential Issues or Impacts</i>	58
6.5.3	<i>Management and Mitigation Measures</i>	59
6.5.4	<i>Impact Assessment</i>	59
6.6	SURFACE WATER	60
6.6.1	<i>Baseline</i>	60
6.6.2	<i>Potential Issues or Impacts</i>	61
6.6.3	<i>Management and Mitigation Measures</i>	61
6.6.4	<i>Impact Assessment</i>	62
6.7	CULTURAL ENVIRONMENT	62
6.7.1	<i>Non-Aboriginal Baseline</i>	62
6.7.2	<i>Aboriginal Baseline</i>	63
6.7.2.1	Previously Recorded Sites	63
6.7.2.2	Surveys.....	64
6.7.2.3	Significance	64
6.7.3	<i>Potential Issues or Impacts</i>	65
6.7.4	<i>Management and Mitigation Measures</i>	67
6.7.4.1	Impact Assessment	68
6.8	WASTE AND HAZARDOUS MATERIALS	68
6.8.1	<i>Baseline</i>	68
6.8.2	<i>Potential Issues and Impacts</i>	69
6.8.3	<i>Management and Mitigation Measures</i>	69
6.8.3.1	Materials	69
6.8.3.2	Landfill.....	70
6.8.3.3	Offsite Disposal	70
6.8.4	<i>Impact Assessment</i>	70
6.9	VISUAL AMENITY.....	71
6.9.1	<i>Baseline</i>	71
6.9.2	<i>Potential Issues and Impacts</i>	71
6.9.3	<i>Management and Mitigation Measures</i>	72
6.9.4	<i>Impact Assessment</i>	72
6.10	SOCIO-ECONOMIC ENVIRONMENT	72
6.10.1	<i>Baseline</i>	72
6.10.1.1	Harts Range.....	72
6.10.1.2	Alice Springs.....	73
6.10.2	<i>Potential Issues or Impacts</i>	74
6.10.3	<i>Management and Mitigation Measures</i>	74
6.10.4	<i>Impact Assessment</i>	75
7.	REHABILITATION AND CLOSURE.....	76
7.1	OBJECTIVES.....	76
7.2	REHABILITATION METHODOLOGY	76
7.3	CLOSURE	77
8.	ENVIRONMENTAL MANAGEMENT DOCUMENTS.....	78
8.1	ENVIRONMENTAL MANAGEMENT SYSTEM.....	78
8.2	ENVIRONMENTAL MANAGEMENT PLAN	80
8.2.1	<i>Objectives</i>	81
8.2.2	<i>Structure and Scope</i>	81
8.2.3	<i>EMP Review</i>	82

9. PUBLIC INVOLVEMENT AND CONSULTATION..... 83

10. GLOSSARY..... 88

11. REFERENCES..... 89



FIGURES

- Figure 1: Location Plan
- Figure 2: Tenement Plan Detailing all Tenements held in the Vicinity of Riddoch Station
- Figure 3: Cross-section of Aturga Floodplain
- Figure 4: Cross-section of Dunes
- Figure 5: 10-Year Extraction Plan
- Figure 6: Cross-section of Quarrying Process
- Figure 7: Process Plant Flow Sheet
- Figure 8: Alice Springs Monthly Rainfall Data (1940 – 2004)
- Figure 9: Alice Springs Monthly Temperatures (1940 – 2004)
- Figure 10: Land Systems Within the Project Area (Perry et al., 1962; Low & Strong, 1985)
- Figure 11: Location of Borefield and Groundwater Bores
- Figure 12: Archaeological Site Locations
- Figure 13: Transect and Artefact Locations

TABLES

- Table 1: Reserve Statement Summary - Proven
- Table 2: Reserve Statement Summary - Probable
- Table 3: Planned Construction Schedule
- Table 4: Land System Areas Present within the Mining Lease Application (Estimation), Mt Riddoch Station and in the Alice Springs/Southern Northern Territory Areas
- Table 5: Land Clearing Requirements
- Table 6: Hazardous Materials Storage Requirements
- Table 7: Percentage Distribution by Age Groups in Urban Areas
- Table 8: Summary of Consultation Undertaken to Date
- Table 9: Summary of Issues Raised and Olympia Resources' Responses

APPENDICES

- Appendix 1: DIPE Draft Guidelines for the Preparation of a Public Environmental Report
Harts Range Garnet Project - August 2004
- Appendix 2: Basic Water Balance
- Appendix 3: Olympia Resources Environmental Policy, Indigenous People, Quality, and
Occupational Health and Safety Policies
- Appendix 4: Greenhouse Gas Emissions Estimate
- Appendix 5: Low Ecological Services Baseline Studies
- Appendix 6: Mineral Compositions
- Appendix 7: Aturga Creek Archaeological Survey - September 2004

1. EXECUTIVE SUMMARY

The Executive Summary should provide a brief outline of the project and each chapter of the Public Environmental Report (PER), allowing the reader to obtain a clear understanding of the proposed project, its environmental implications and management objectives. The Executive Summary should be written as a stand-alone document, able to be reproduced on request for interested parties who may not wish to read or purchase the PER in its entirety.

1.1 INTRODUCTION

Olympia Resources Limited proposes to establish an abrasives project located about 167 kilometres north-east of Alice Springs on either side of the Plenty Highway. The project will involve quarrying of about 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 (AMH). These products will be transported from the site by road and/or rail to consumers in Australia and overseas. Excluding the use of inert flocculants, the physical separation process does not require chemical usage.

Reject sands consisting of light minerals and fine-grained sands will be returned to the pit. The reinstated surface will be re-contoured and covered with topsoil and vegetation debris as part of the rehabilitation process.

Production is anticipated to start at a rate of 100,000 tonnes of abrasive sands per year and is likely to increase over three to five years to 300,000 tonnes. For the purpose of planning, a project life of 20 years is nominated, in the knowledge that it may be extended. 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.

The relatively common nature of the quarrying and processing technologies proposed for Harts Range allows the use of proven industry environmental technologies. Olympia Resources' Environmental Policy requires industry best management practices.

The transport of bulk product to Darwin or Adelaide will either be by road haulage or by a combination of road transport to a Plenty Highway siding and then by rail. Negotiations are occurring with representatives of both road and rail haulage and the Port of Darwin and Port Pirie.

Infrastructure necessary for the project will include:

- A diesel-fuelled, two-megawatt power generation plant located near the processing plant area.
- A bulk diesel storage tank to supply the generator and mobile equipment located near the workshop.
- Five borefield pumps, generator and associated water supply line.
- An accommodation village for about 25 people.

- A heavy vehicle workshop to service mobile equipment used for quarrying and light vehicles.
- Office buildings including an area for stores and a laboratory.
- A 150-tonne per hour wet concentrating plant.
- A 50-tonne per hour dry processing and bagging plant.
- Satellite and radio communication infrastructure.

This PER does not consider impacts associated with use of port facilities or a railway siding. Port facilities where used, will be on a commercial basis whereby Olympia Resources will be a customer of the port corporation. Similarly, if a rail siding is required, Olympia Resources will work with freight link to develop an appropriate facility.

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, a small stockpile and a small workshop and office area.

Environmental Issues and Management

Air Resources Management

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. Suspended particulate levels are, however, expected to be elevated due to windblown dust, pastoral activities and bushfires.

Potential impacts from air emissions associated with the project are expected to be minimal, particularly when compared with other extractive industries. Air emission sources will be significantly reduced by the lack of tailings storage facilities and waste rock dumps, the lack of requirements for blasting and the ability of the operation to progressively reclaim backfilled areas. The remote location of the project and the absence of nearby residential facilities also limits adverse impacts that air emissions are expected to have on the local or regional environment and/or human health. Dust emissions that are generated will be localised.

Noise and Vibration Management

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

Soil and Land Systems

A biophysical survey of the project area was conducted in September 2004. All land systems identified within the project area are represented elsewhere on Mt Riddoch Station and in southern parts of the Northern Territory.

All quarried voids will be backfilled progressively to their approximate pre-quarrying landforms and stabilised with indigenous vegetation. Rehabilitation will be integrated into the quarrying plan and will be undertaken as part of the quarrying operation. Rehabilitation through re-spreading of 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 prior to the project will be able to continue after appropriate rehabilitation protection from grazing.

Flora and Fauna

One hundred and thirty-one plant species were identified during baseline surveys. Non-riparian zones are dominated by Ironwood, Witchetty Bush, Senna and Saltbush. Riparian zones are dominated by Coolibah, Red Gum and Buffel Grass.

Only one species of conservation significance (Macdonnell Ranges Cycad) was listed under the *Environmental Protection and Biodiversity Act 1999 (EPBC Act)* as potentially occurring in the area. This is likely to be restricted to the Harts Ranges, south of the project area.

Thirty-three bird species, five mammal and five reptile species were recorded in the project area during baseline surveys. 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. 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*-listed fauna species of conservation significance were recorded.

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.

Groundwater

A preliminary hydro geological study of the area was undertaken in November 2004. Water requirements for the total operation will be sourced from a deep semi-confined sand aquifer located 15 kilometres east of the project area. A borefield of three to five bores will be developed. Two will operate, two will rest and one will be on standby at any one time to provide the operational requirement of 1,000 kilolitres per day.

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

The effect of groundwater pumping from the five bores proposed to be developed will be localised; 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 the production bores but this will dissipate after pumping stops. This localised lowering may affect Spinifex bore, but 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 the current volume of water extracted by the station is supplied to them. When mining ceases, additional bores developed by Olympia Resources will be handed to the station for their use.

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

Surface water flows are not related to groundwater movement and consequently the abstraction activities will not impact on surface water regimes.

Surface Water

The project area contains Aturga Creek and the Plenty River. Both watercourses are ephemeral and quickly flood 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.

No surface water will be extracted for the project.

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

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 that significant rainfall events will not adversely affect the operational area and access. Calcrete from pit floors will be used as road base and to establish a hardstand operational surface. Consideration of the water balance for the operation indicates that discharge of excess quarry water during extreme rainfall will not be required due to high infiltration rates within the pit and the ability to reuse the water within the process.

Cultural Environment

An archaeological survey was undertaken in August 2004. Three archaeological sites and a potential habitation site were located within the project area. Two sites were distinguished on the basis of artefact concentrations, Aturga Creek 1 and 2. The third was a scarred tree, located just south of the highway and one kilometre downstream from Aturga Creek 1. A potential habitation site was located within a stand of Gidgee trees east of the scarred tree. A scatter was also located at *Anthere* claypan, east of the project area.

Implementing the management and mitigation measures of the project will have a low-risk impact on the cultural environment. Some of these strategies include checking proposed construction or quarrying locations against artefact and archaeological site locations. The use

of Aboriginal monitors and a general site induction incorporating cultural information will also be performed.

Waste and Hazardous Materials

Bulk hazardous substances to be used within the operation will be limited to hydrocarbon products such as diesel and lubricants. No explosives or process reagents are required. Management practices relating to the storage, transport and disposal of hydrocarbon products will prevent or minimise adverse impacts.

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

Visual Amenity

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 gemstone. 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 and local residents.

Socio-Economic Environment

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.

Local land use will change during the life of the project from pastoral (stock grazing) to active quarrying. It will revert to pastoral use 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 the local community, particularly Indigenous businesses. The project will not impact on recreational or tourist uses of the surrounding areas.

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

Rehabilitation and Closure

Developing a comprehensive Rehabilitation Plan will minimise impacts associated with closure. Regular review of this dynamic document will ensure it remains relevant to the activities undertaken and that objectives are achieved.

Environmental Management Documents

An Environmental Management Plan (EMP) will be developed in consultation with Department of Infrastructure, Planning and Environment (DIPE) and Department of Business, Industry and Resource Development (DBIRD), before construction starts. The document will clearly describe the 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.

Olympia Resources will develop and implement an Environmental Management System (EMS). The EMS will support the EMP and provide a formal description of the methodical framework for managing environmental issues of the project. It will ensure the operation maintains high levels of environmental performance and does not cause environmental harm. An important component of the EMS is a platform for ongoing review and reporting environmental performance in a quantifiable and consistent manner.

On an annual basis during operation, Olympia Resources will engage an appropriately-qualified third party to conduct a compliance audit and systems audit.

Public Involvement and Consultation

Olympia Resources initiated a stakeholder consultation process for the project in July 2003. Olympia Resources prepared a consultation strategy to facilitate effective communication with the regulators, the local and wider community, and other stakeholders. This was done to allow issues raised during the consultation process to be taken into consideration in the design, development, operation and closure of the project.

Significant stakeholders in the community and government were identified by discussions with DBIRD, DIPE, the Central Lands Council and Arltapilta Community. Olympia Resources has continued to consult with stakeholders on a regular basis. This 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 as required.

1.2 COMMITMENTS

Commitments with respect to the design and management are made thorough the PER. For convenience, commitments and key performance indicators where applicable are summarised below. Commitment numbers refer to PER sections in which the commitments were made.

Commitment Number	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

Commitment Number	Commitment and Key Performance Indicators Where Applicable
	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 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

Commitment Number	Commitment and Key Performance Indicators Where Applicable
	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, 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.

Commitment Number	Commitment and Key Performance Indicators Where Applicable
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 Riddoch 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.
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

Commitment Number	Commitment and Key Performance Indicators Where Applicable
	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 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.

Commitment Number	Commitment and Key Performance Indicators Where Applicable
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 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

Commitment Number	Commitment and Key Performance Indicators Where Applicable
	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 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

Commitment Number	Commitment and Key Performance Indicators Where Applicable
	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 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.

2. INTRODUCTION

A brief introduction of the proponent and the proposal, including, but not limited to, the following:

- *name and address of proponent, including contact officers;*
- *outline of proposal;*
- *history of the project;*
- *explanation of the objectives, benefits and justifications;*
- *tenement status for project area; and*
- *summaries of the scope, purpose and structure of the PER.*

2.1 NAME AND ADDRESS OF PROPONENT, INCLUDING CONTACT OFFICER

Olympia Resources Limited (Olympia Resources) proposes to develop and operate the Harts Range Abrasive Sands Quarrying Project.

Olympia Resources is a public listed company based in Perth, Western Australia. Olympia Resources can be contacted at:

Head Office address: Level 4, 25 Walters Drive
Herdsman WA 6151

Mailing address: PO Box 589
Scarborough WA 6922

Telephone: (08) 9244 1411

Facsimile: (08) 9244 1511

Email: admin@olympiaresources.com

Contact: Mr Peter Gazzard, General Manager

Queries regarding environmental matters contained within the PER should be addressed to MBS Environmental at:

Mailing address: 4 Cook Street
West Perth WA 6005

Telephone: (08) 9226 3166

Facsimile: (08) 9226 3177

Email: ksell@martinick.com.au

Contact: Ms Kristy Sell, Director Environmental Science

2.2 OUTLINE OF PROPOSAL

Olympia Resources proposes to establish an abrasives project near Mt Riddoch Station, adjacent to the Plenty Highway. The project will involve quarrying (approximately 10 hectares per annum) sand-sized garnet from fluvial and dune sediments on Aturga Creek floodplain in the Harts Range area. Sand extracted from the quarry will be processed to separate heavy minerals (>3.0 specific gravity) from light minerals. Excluding the use of inert flocculants, the physical separation process does not require chemical usage.

Heavy minerals will be separated into garnet and a mixture of garnet and aluminomagnesian hornblende (AMH). These products will be transported from site by road and/or rail to consumers in Australia and overseas.

Reject sands of light minerals and fine-grained sands (<250 micrometres) will be returned to the pit. The reinstated surface will be re-contoured and covered with topsoil and vegetation debris as part of the rehabilitation process.

2.3 HISTORY OF THE PROJECT

Garnet sands have been identified in creek beds in Harts Range since the 1960s. Before involvement of Olympia Resources, Chambigne and GMA Garnet Pty Ltd investigated the garnet resources and concluded that the resource was sub-economic to produce garnet using dry processes.

Olympia Resources discovered the mineralisation along the banks of Aturga Creek while exploring E10150. In 2000, Olympia Resources identified the world's largest detrital garnet deposit in a dune field on either side of the Plenty Highway, however, studies indicated the material was too fine-grained to be marketed successfully.

Further exploration by Olympia Resources in 2001 and 2002 (E9191, 9190, 10150, 10331 and 10372) identified coarser grained garnet and AMH within dunes on either side of the Plenty Highway and within the paleochannels adjacent Aturga Creek.

2.4 EXPLANATION OF THE OBJECTIVES, BENEFITS AND JUSTIFICATIONS

The project as described within this document is a result of careful consideration of the interaction between the design of the operation components and the key financial, environmental, safety and social aspects.

A feasibility study undertaken for the project demonstrated that it was financially viable and the decision to mine prompted the submission of a Notice of Intent (NOI) to the Department of Business Industry and Resource Development (DBIRD) in July 2003 (Olympia Resources Limited, July 2003). Since submission of the NOI, the volume of product to be produced per annum has been refined as a result of the review of market demand, ongoing discussions with potential customers and the review of achievable quarrying schedules.

Anticipated benefits resulting from the project include:

- Olympia Resources will provide direct employment for about 15 people during construction and 30 people during operation. Indirect employment is likely to be provided for an additional 30 people as a result of supplying goods and services to the project.
- Olympia Resources has entered an agreement with the Central Land Council whereby the council will manage the project's register of employment and service opportunities. Preference for employment and training opportunities will be extended to people living in the Harts Range region
- Preference will be extended to local businesses for supply of goods and services.
- Olympia Resources, through payment of company tax, payroll tax and royalties, will be contributing directly to the economies of the Federal and Territory governments.

2.5 TENEMENT STATUS FOR PROJECT AREA

The Harts Range abrasive project includes granted Exploration Licence (120150 and 9190) and a Mineral Lease Application (MLA23868). It is expected that the Mineral Lease will be granted shortly after the completion of lease boundary survey formalities in November 2004.

The project area is located about 167 kilometres north-east of Alice Springs either side of the Plenty Highway and on the Plenty River and its tributary Aturga Creek.

Figures 1 and 2 show the project and tenement locations.

Olympia Resources has entered into an Indigenous Land Use Agreement with the Central Land Council for exploration and mining of the deposit. Access to the deposit is guaranteed by these agreements and applications.

2.6 LEGISLATIVE FRAMEWORK AND APPROVAL PROCESS

2.6.1 Northern Territory

2.6.1.1 Environmental Impact Assessment

The Environmental Assessment Act 1982 and Environmental Assessment Administrative Procedures 1984, which accompanies the *Act*, form the basis for the environmental impact assessment process in the Northern Territory. The Minister for Environment and Heritage is responsible for administering the *Act*, determines which proposals should be subject to assessment under the *Act* and decides on the appropriate level of assessment in each case. DIPE helps implement the assessment procedures on behalf of the Minister.

Where a proposal is considered to have a significant environmental impact, the Minister for Environment and Heritage directs the proponent to prepare and submit a Public Environmental Report (PER) or an Environmental Impact Statement (EIS) and advises the Minister for Mines and Energy of this requirement.

In August 2004, the Minister for Environment and Heritage determined that under the *Environmental Assessment Act 1982* the Harts Range Project was to be assessed by means of the PER process. The level of assessment was set at the PER level because it was considered that the potential environmental impacts of the project were significant, but limited in extent. Draft PER guidelines were published in August 2004 and open for public comment for a 14-day period (Appendix 1).

Upon lodgement of the PER, it will be exhibited for public review and comment for four weeks. During this period, the PER will be circulated to advisory bodies for comment in relation to their areas of expertise and responsibility.

For a PER, the Office of Environment and Heritage prepares an assessment report and makes recommendations to the Minister for Environment and Heritage regarding approval of the project. The report takes into account issues raised by the advisory bodies, the public and the proponent's response to the issues. The Minister for Environment and Heritage considers this report and makes recommendation to the Minister for Mines and Energy regarding approval of the project. The Minister or Mines and Energy may choose to incorporate recommendations from the environmental assessment process in lease or license conditions, and relevant management procedures.

Key Northern Territory environmental legislation applicable to the project includes:

- *Mining Management Act 2001.*
- *Mining Act 1982.*
- *Bushfires Act 1980.*
- *Environmental Assessment Act 1982.*
- *Waste Management and Pollution Control Act 2003.*
- *Environmental Offences and Penalties Act 1996.*
- *Heritage Conservation Act 1991.*
- *Aboriginal Sacred Sites Act 1989 (Sacred Sites Act).*
- *Weeds Management Act 2001.*
- *Ozone Protection Act 1996.*
- *Water Act 1992.*
- *Soil Conservation and Land Utilization Act 1978.*
- *Territory Parks and Wildlife Conservation Act 2001.*

2.6.1.2 Mining Management

Northern Territory mining operations are regulated by the *Mining Management Act 2001*, administered by DBIRD. The *Act* amalgamates all operational provisions for mining into a single statute leaving the *Mining Act 1982* to regulate titles. The *Mining Act* contains limited

provisions governing environmental performance, although the Minister can attach specific environmental conditions as part of the grant of tenement.

Before mining starts, the operator of the mining site must apply for an authorisation to carry out mining activities. The application must be accompanied by a Mining Management Plan (MMP) relating to the mining activities. Substantial disturbance relating to exploration work also requires an authorisation, and an application along with an MMP. The MMP is attached to the authorisation and is the principal administrative document for the mine. Section 40 of the *Mining Management Act* stipulates that the MMP is to include:

- Description of the mining activities.
- Safety, health and environmental issues relevant to the mining activities and the management system to be implemented at the mining site.
- Closure plan detailing costs.

The MMP is reviewed at specified intervals as set out in the authorisation and, if changes occur, the MMP must be amended and submitted to the Minister for acceptance.

An authorisation is granted subject to the condition that the operator complies with a current MMP (submitted with the application for authorisation), and any additional conditions specified in the authorisation that the Minister considers appropriate.

2.6.2 Commonwealth

Within Australia's federal system of government, both the regulation of mining operations and the protection of the environment are principally State or Territory responsibilities. Commonwealth approval is required if matters of national significance, as defined in the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999*, are triggered. The Department of the Environment and Heritage (DEH) is responsible for administering the *Act*. The matters of national significance include presence of migratory birds, federally-listed rare flora or fauna, Commonwealth land, nuclear actions and marine areas.

The powers of the Commonwealth to regulate mining and other activities concerning the environment are primarily contained in Section 51 of the Commonwealth *Constitution*. Of particular importance are the trade and commerce power; taxation power; quarantine power; the corporations power; external affairs power; power over Commonwealth instrumentalities and public service; power over customs, excise and bounties; financial assistance power; and territories power. Importantly, where any law of a state or territory is inconsistent with a Commonwealth law, the Commonwealth law prevails. The Commonwealth therefore has the ability to override Territory laws should it choose to do so in areas within its legislative competence.

Where there is a possibility that a project will trigger matters of national significance under the *Act*, the project is referred to the DEH. Unless there are exceptional circumstances, the DEH will delegate the approval process and day-to-day administration of the mines to state and territory governments. This approach minimises unnecessary duplication in administrative processes. Searches of the *EPBC Act* database indicate that this project does not trigger matters of national significance.

2.7 PUBLIC ENVIRONMENTAL REPORT OBJECTIVES

The objectives of the PER are to:

- Provide all interested stakeholders, including government, with concise and comprehensive information regarding the design, construction and operation of the proposed quarrying and separation operation.
- Provide sufficient information to enable understanding and assessment of the scope and environmental implication of the proposal.
- Assess the environment of the project area and surrounding region.
- Identify all potential environmental impacts of the project.
- Incorporate stakeholder concerns and suggestions into project design and management.
- Outline a management strategy to avoid or minimise potentially adverse impacts.
- Secure environmental approval for the project from the Northern Territory Government in accordance with the *Environmental Assessment Act 1982*.

2.8 PER SCOPE AND STRUCTURE

The information outlined within the PER document applies to the design, construction and operation of the Harts Range Abrasive Project.

The geographical extent of the PER is limited to areas potentially influenced by the project.

The PER is structured into 10 sections to conform with the Draft Guidelines for the Preparation of a Public Environmental Report (DIPE 2004). Key requirements from the guidelines have been placed in a highlighted box at the beginning of each section to allow cross-checking of PER contents against guideline requirements. The draft guidelines in their entirety have been attached as Appendix 1.

- Section 1 Provides a brief outline of the project and each chapter of the PER.
- Section 2 Provides a brief introduction to the proponent and the project.
- Section 3 Provides a detailed description of the project.
- Section 4 Details the objectives and benefits of the project.
- Section 5 Details the alternative proposals and the reasons for the selection and rejection of particular options.
- Section 6 Describes the existing physical, biological, and socio-economic environment of the Harts Range area.
- Section 7 Describes the rehabilitation objectives, methodology and closure details.
- Section 8 Outlines and introduces the concept of the EMP required under the *Mining Management Act*. An EMP details specific management policies, practices and procedures.

- Section 9 Outlines the public involvement and consultation as well as the role of government organisations in developing the project.
- Section 10 Contains a glossary of acronyms used within this report.
- Section 11 Contains full details of items referenced throughout the report.

Appendices which contain information and data related to the PER, but which are unsuitable for inclusion in the main body of the statement, are attached to the report.

Maps, overlays, tables and figures are included in the PER to clarify text where appropriate.

2.9 ADMINISTRATIVE REQUIREMENTS

Olympia Resources will attend to the following procedural requirements as advised in the guidelines for this PER:

- Prior to the PER being distributed for comment, a preliminary draft of the PER will be lodged with DIPE for review and comment.
- Once the PER is ready for comment, 40 copies will be lodged with DIPE for distribution to Northern Territory Government advisory bodies.
- Copies of the PER will be made available for public review in Alice Springs Public Library, DIPE offices in Alice Springs and Darwin, DBIRD offices in Alice Springs and Darwin, Northern Territory Library, and Parliament House in Darwin.
- Place the PER on a CD ROM for placement on DIPE's internet site. The CD ROM copies will be in ADOBE pdf format for placement on the internet.
- Place the PER on Olympia Resources' website for public viewing.

It is noted that the DIPE action officer for this project is Ms Cymbaline, telephone (08) 8924 4216 and facsimile (08) 8924 4053.

3. DESCRIPTION OF PROPOSED DEVELOPMENT

This section should describe in detail the infrastructure design and engineering, and all stages of construction and operation of the project. This will allow a detailed understanding of all stages of the proposal and help determine impacts from the proposal.

3.1 PROJECT LOCATION

The location of the Harts Range Abrasives Project, as displayed in Figure 1, is on either side of the Plenty Highway and is:

- 1,305 kilometres south of Darwin.
- 1,316 kilometres north of Adelaide.
- 215 kilometres northeast of Alice Springs.
- 20 kilometres west of the Atitjere Aboriginal Community.
- 100 kilometres east of the Stuart Highway.
- On Mt Riddoch pastoral lease.

3.2 EXISTING LAND USE

Olympia Resources' Harts Range exploration and mining tenements are located on Alcoota, Mt Riddoch, Huckitta and Jervois pastoral leases. Project areas affected by this PER are all located on Mt Riddoch Pastoral Lease, currently held by Harts Range Pty Ltd. This includes all the floodplains and dunes required for quarrying, separation and infrastructure. Under this lease, the land is used mainly for rangeland cattle production, although sheep and horse grazing is also a land use.

Mineral exploration, prospecting, quarrying and mining are also accepted land uses. The nearby AVI vermiculite deposit is being mined and proposals are underway to develop a Molyhill tungsten-molybdenite deposit.

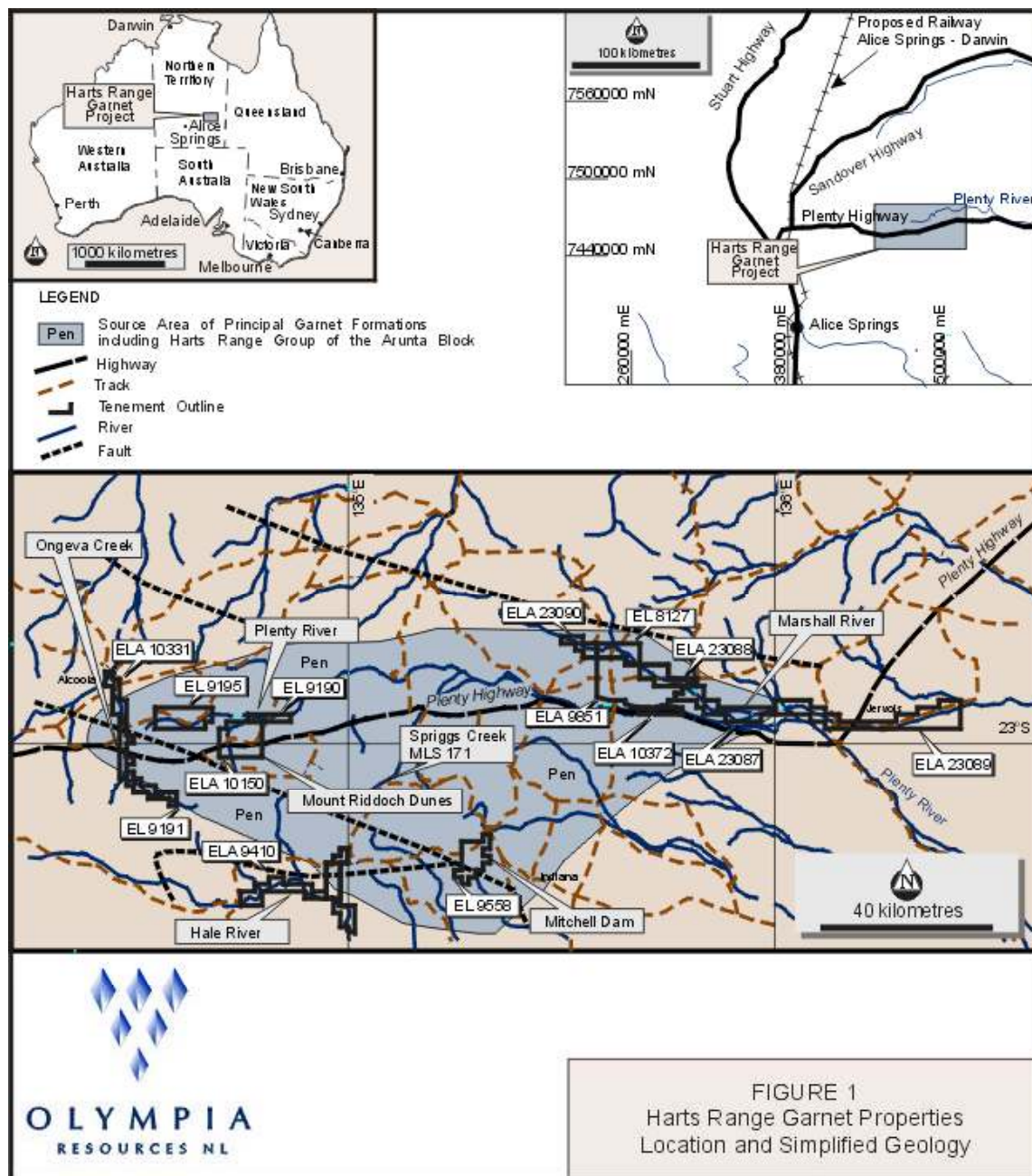
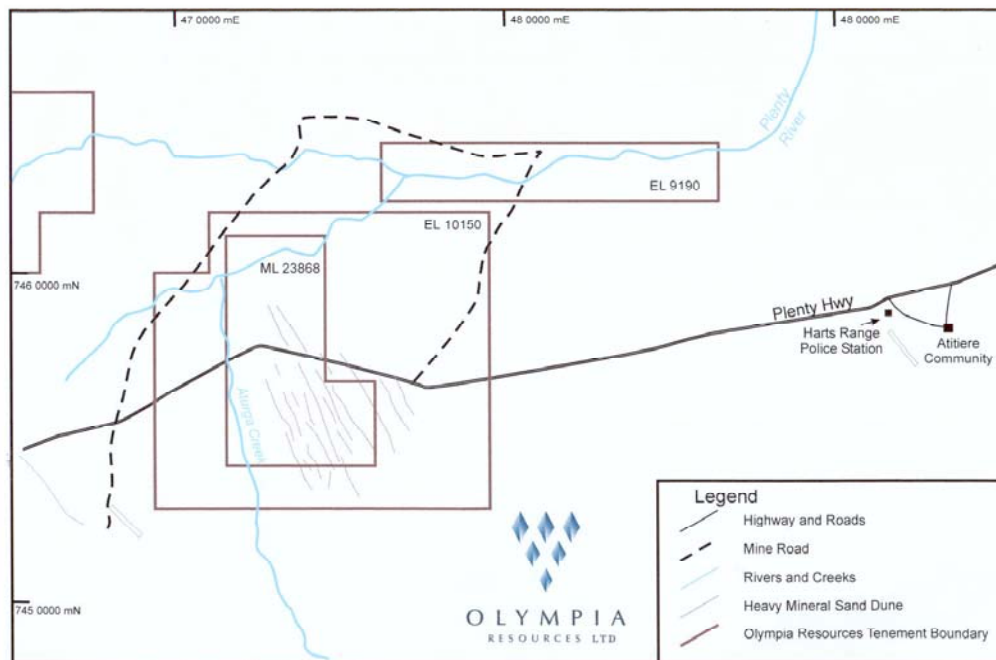
Figure 1: Location Plan

Figure 2: Tenement Plan Detailing all Tenements Held in the Vicinity of Riddoch Station



3.3 GEOLOGY

3.3.1 Background

The project area is covered by superficial alluvial and desert dune deposits. Tertiary claystone, possibly from the Waite Formation Rocks, underlie the superficial creek and dunes sand deposits. The basement material is part of the Harts Range Group.

Detailed mapping of the geological units was completed by Olympia Resources during the project's exploration programme and has been submitted to the Geological Survey of Northern Territory. The dunes and stream deposits contain heavy mineral (garnet and AMH) and will be mined during the operation. Typical geological cross-sections of the alluvial and dune deposits are presented as Figures 3 and 4.

Figure 3: Cross-section of Aturga Floodplain

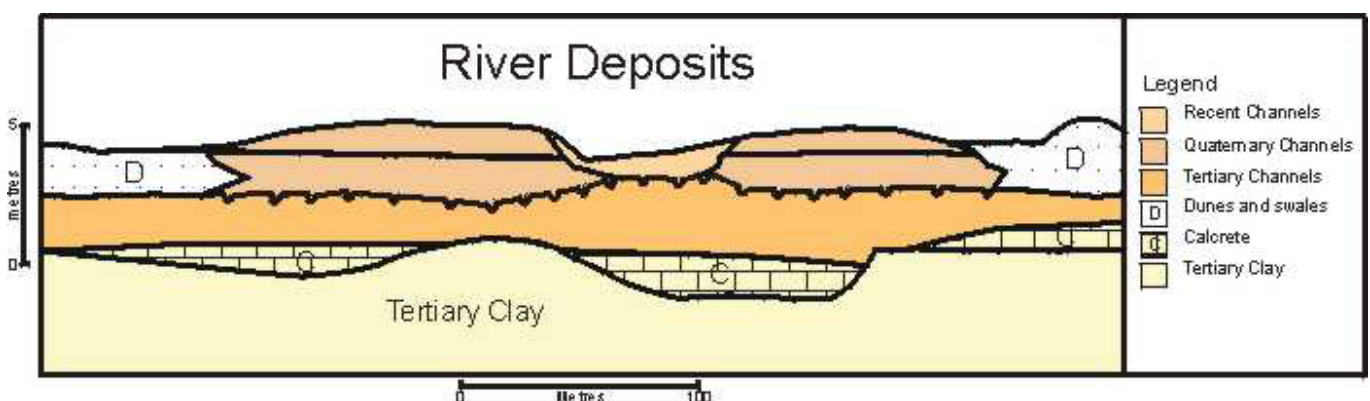
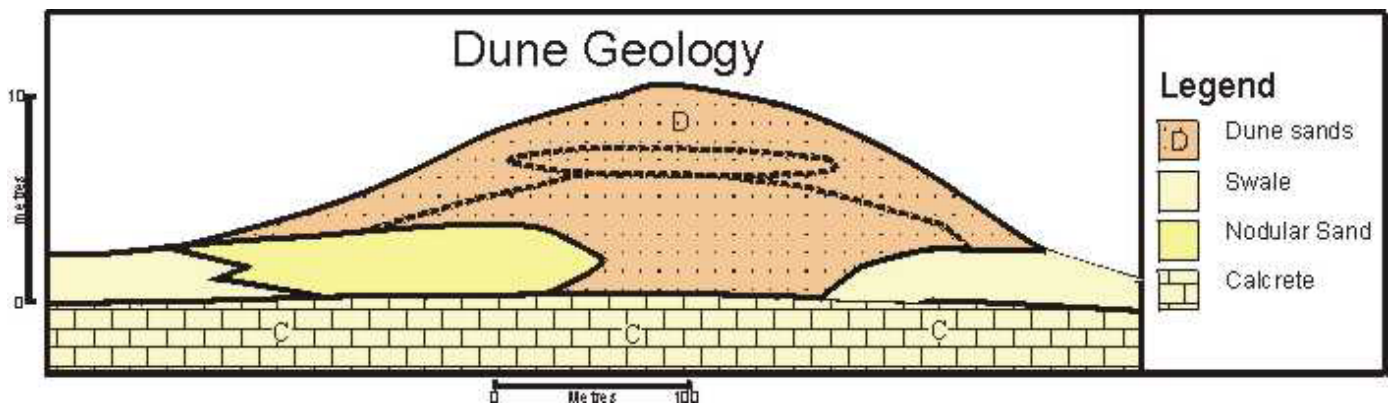


Figure 4: Cross-section of Dunes

3.3.2 Resource

The initial Mining Lease has been estimated to contain approximately six million tonnes of garnet and AMH in economic concentrations (two to +5 metres).

Heavy mineral grades between 35 and 40% are common throughout the deposit. The majority of the heavy mineral fraction (~80%) is AMH, garnet is about 18% and ilmenite and magnetite comprise the remainder. In the reserve calculation it has been assumed that the less than 250 micrometre material is not economic at present. Recovery and dilution discounts have been applied to grade calculations and further discounts have been applied for conservatism.

It is anticipated that 1,250,000 tonnes of sand will be processed per year, and about 1,000,000 tonnes will be returned to backfill quarry areas.

The total estimated reserves of recoverable garnet (2.7 megatonnes) and AMH (6.2 megatonnes) are sufficient to support production of 100,000 tonnes of garnet and 200,000 tonnes of AMH per year for 20 years (Tables 1 and 2).

Table 1: Reserve Statement Summary – Proven

Ore Type	Ore (tonnes)	Garnet in Sand (tonnes)	Garnet Recovered (tonnes)	AMH in Sand (tonnes)	AMH Recoverable (tonnes)
Dune	25,000,000	1,600,000	736,000	6,900,000	2,070,000
Floodplain	3,400,000	220,000	165,000	960,000	340,800
Paleochannel	6,000,000	390,000	292,500	1,400,000	560,000
Swale	1,600,000	98,000	51,900	370,000	122,100
Total Proven	36,000,000	2,308,000	1,245,400	9,600,000	3,092,900

Table 2: Reserve Statement Summary - Probable

Ore Type	Ore (tonnes)	Garnet in Sand (tonnes)	Garnet Recovered (tonnes)	AMH in Sand (tonnes)	AMH Recoverable (tonnes)
Creek Channel	440,000	49,000	36,800	110,000	44,000
Floodplain and Paleochannel	16,000,000	1,200,000	900,000	4,200,000	1,680,000
Dune	18,000,000	1,100,000	506,000	4,800,000	1,440,000
Total Probable	35,000,000	2,300,000	1,440,000	9,100,000	3,160,000

3.4 OVERALL PROCESS DESCRIPTION

The Harts Range garnet and AMH sand deposit is very extensive and has the potential to result in a very long operational life. For the purpose of planning, a project life of 20 years is nominated in the knowledge that it may be extended.

Sand will be quarried from extensive fluvial and very low and gently sloping dune sediments on the floodplain of Aturga Creek on both sides of Plenty Highway. The operation will be within Mineral Lease Application 23868 that is located within Exploration Licence 10150.

A screening and wet concentration plant will separate the garnet and 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.

For the initial 10 years, quarrying is likely to be undertaken on the south side of Plenty Highway, with the wet plant being located about 500 metres south of the highway. Thereafter, quarrying is expected to be mainly north of the highway.

Garnet and AMH sand will be separated wet from reject sand on the basis of differences in size and specific gravity. Further separation will involve drying, magnets and screening to remove all silica sand and produce products ranging in particle diameter from 250 microns up to two millimetres. Excluding the use of inert flocculants, the physical separation process does not require chemical usage.

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 the 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 a small workshop and office area.

Additional construction, operation (including mining and processing) and decommissioning details are provided within the following sections.

3.5 QUARRYING

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 calcrete base will be excavated.

Excavation depths vary between two metres within the alluvial beds and four to seven metres for plain and dune deposits. Distribution of abrasive sands is relatively uniform throughout the sand within the three types of deposits. In some instances, the calcrete-lithified base located below plain deposits will be excavated for use in construction of operational surfaces, tracks and the access road to Plenty Highway. Other than calcrete, sources of suitable road base material are not readily available in the region.

3.5.1 Alluvial Deposits

There are extensive alluvial deposits located on the floodplains of Aturga Creek and the Plenty River that can be excavated utilising the following methods:

- Sand within the identified alluvial deposits will be excavated using conventional front-end loaders and fed directly into onsite screens to produce a sand concentrate of less than two millimetres in diameter.
- Screen undersize material (less than two millimetres in diameter) will be trucked directly to the wet plant for processing.
- Screen reject material (greater than two millimetres in diameter) will be placed directly into excavated areas and levelled to resemble pre-quarrying surfaces. Material will be placed preferentially within excavations closest to vegetated areas.

3.5.2 Plain and Dune Deposits

The process of quarrying plain and dune deposits is detailed below:

1. **Vegetation Removal:** Where feasible, any vegetation that needs to be cleared for the purposes of quarrying will be stripped and directly placed on backfilled quarry areas covered by topsoil. Clearing will be kept to the minimum required to conduct mining. For the initial pit of about two hectares, vegetation will have to be stockpiled until backfill and topsoil areas have been established to allow direct return of vegetation onto the replaced topsoil.

2. **Topsoil Removal:** The top 20 centimetres will be removed as topsoil using scrapers or other efficient earthmoving machinery. The initial topsoil removed from the first 10 hectares will be stockpiled but thereafter topsoil will be placed directly onto backfilled quarry areas.
3. **Excavate Sand:** Sand within the identified plain and dune deposits will be excavated using conventional front-end loaders and screened near the quarrying face to remove material greater than 200 millimetres in diameter such as occasional stones and roots. This oversize material will be left on the floor of the quarry for burial underneath reject sand from the wet plant during landform restoration.
4. **Screening:** Screened sand will be transported by a short conveyor onto a wet two-millimetre screen where oversize material will be removed and left on the pit floor. Minus two millimetres sand will then be pumped in a slurry to the wet concentration plant. Screen oversize material which has been left on the pit floor will later be covered by wet concentrator reject sand during restoration.

3.5.3 Extraction Plan

Figure 5 shows the proposed extraction plan for the first 10 years of operation. Quarrying will continue in a similar manner north of Plenty Highway on completion of quarrying of the southern resources.

In the first year, up to 10 hectares will be set aside for a clay/sand containment dam to hold backfill sand and clay while the quarry pit and backfill area is being established. This will be sited between two low sand ridges by constructing a bund composed of low grade ore. Topsoil will be removed from the dam area and stored in stockpiles of less than two metres high. All backfill material will be returned to pit over the following two to three years and the topsoil returned to recover the dam area. After Year 1, all processed sand including quartz sand, lithic fragments, fine-grained clay and silt and heavy minerals less than 250 micrometres in diameter will be returned to the pit in the manner of co-disposal causing mixing of the components. The pit will then be continually backfilled and rehabilitated while quarrying proceeds. A typical cross section of the project highlighting operational areas and relative elevations is presented as Figure 6.

3.6 PROCESSING

The sand slurry from the pit screening operation will be pumped to the wet concentration plant. The wet concentration plant separates the heavy mineral fraction (abrasive sands) from the reject clay and quartz sand using hydrocyclones, hydrosizers and spirals. These are widely used in the mineral sands industry to separate heavy minerals from quartz sand and clay fines on the basis of differences in specific gravity and particle size.

The reject clay fines will be pumped as a dilute slurry to a thickener to recover water from the slurry back into the process stream and to produce a thickened clay underflow of about 30% density by weight. This thickener underflow will be pumped to a mixing hopper where it is mixed with reject quartz sand and the combined mixture will be pumped back into the mined area of the pit as backfill. Water coming out of the deposited backfill will be directed via in-pit drainage to a sump where it will be pumped back into the process stream.

The valuable heavy mineral abrasive sand from the wet concentration plant will be pumped onto drainage stockpiles. Water will be recovered from the stockpiles and pumped back into the process stream.

Water is used as the medium to transport sand through the wet concentrator process. Water will be used efficiently and recycled wherever feasible.

The abrasive sands from the stockpiles will be loaded via a front-end loader into the feed hopper of the dry separation plant. From the dry-plant feed hopper the sand will be conveyed into the drying kiln. After being dried, the abrasive sand is separated into products for sale using magnets and screens. A summary process flowchart is presented at Figure 7.

It is planned to produce the following products:

- Greater than 600 microns garnet (containing >90% garnet, <5% AMH and <1% quartz).
- Greater than 600 microns garnet blende (containing 10% to 15% garnet and <1% quartz).
- 250 to 600 microns garnet (containing >80% garnet, <20% AMH and <1% quartz).
- 250 to 600 microns garnet blende (containing 15% to 20% garnet and <1% quartz).

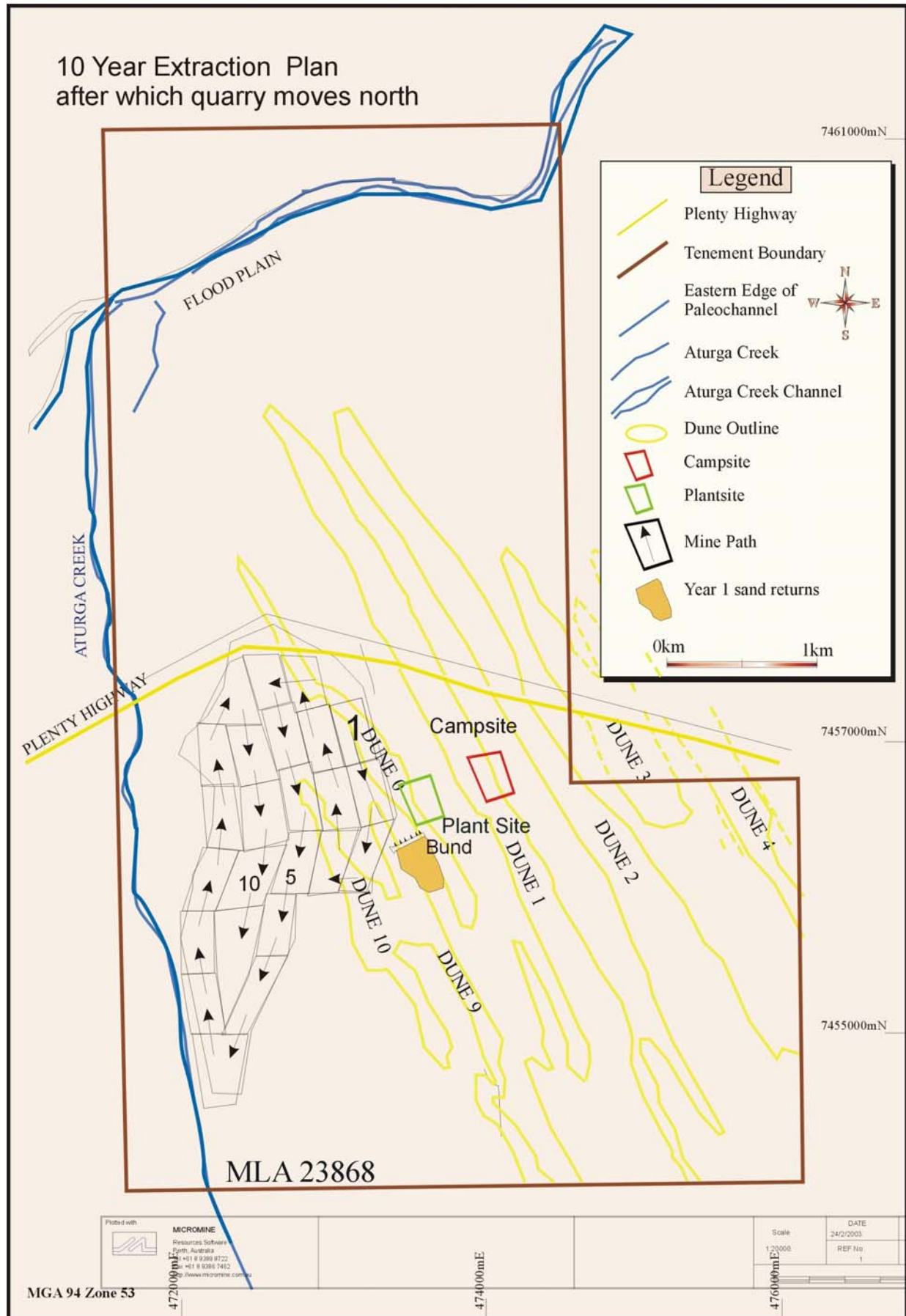
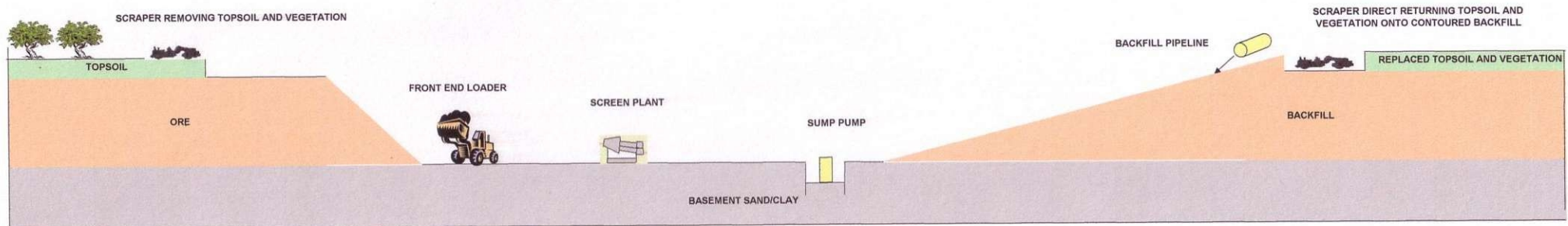
Figure 5: 10-Year Extraction Plan

Figure 6: Cross-section of Quarrying Process

Olympia Resources predicts that recoveries of garnet and AMH greater than 250 microns, as a percentage of the total amounts of garnet and AMH, are likely to be:

- Floodplain, paleochannel and river channel: Garnet 75%; AMH 40%.
- Swale: Garnet 53%; AMH 33%.
- Dune: Garnet 46%; AMH 30%.

The lower recoveries in the swale and dune ore is due to these ores being finer in grain size and having a higher proportion of minus 250 micron garnet and AMH. For both garnet and AMH, the grain size distribution is coarser in the paleochannel, river channel and floodplain ore than in the swale and dune ore.

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, there will be a need to place quartz sand and clay fines in a temporary out-of-pit containment structure. Material in this structure will be returned progressively to the mined-out pit over the second and third years of the quarrying operations.

No chemicals other than flocculants in the thickener are used in the process resulting in no potential for chemical spillages or pollution. Flocculants are typically used in water treatment plants and are not considered to be hazardous.

3.7 PROGRESSIVE REHABILITATION

This type of quarrying readily lends itself to progressive rehabilitation.

The wet plant will remove all clay fines, quartz sand and all particles greater than two millimetres and smaller than 250 microns in diameter. Apart from the initial six to twelve month period of opening up the quarry pit, all reject sand will be directly returned to backfill the quarry areas.

Once the operation has commenced and advanced about five hectares, sufficient area will be available to start backfill into the depleted pit. The following system of quarrying and rehabilitation will be followed:

1. Stockpile screen oversize material on the pit floor to be later covered by backfill.
2. Pump reject sand from the wet plant and thickened clay from the thickener to fill the quarried pit behind the quarrying operation. Bulldozers will contour the fill to the required landform. It is estimated that removal of abrasive sands from quarried sand will be approximately balanced by the 'swell factor' of the sand due to excavation. The result is that restored land surfaces should approximate pre-quarrying levels and landforms.
3. Directly place topsoil and vegetation removed from the advancing quarry face onto the surface of the backfilled quarry. Topsoil stockpiling will be minimised, which will avoid double handling and greatly enhance the success of re-establishing local provenance vegetation on restored landforms. Reduction of seed viability and soil microbial activity associated with topsoil storage is avoided through this process.

4. Rip topsoil areas to reduce any compaction resulting from the backfilling process to facilitate water infiltration and revegetation.
5. Place cleared vegetation on the surface of the topsoil or mix it within it to reduce wind and water erosion of the topsoil and provide microhabitats to promote re-establishment of vegetation.

3.8 TRANSPORT

Transport options currently under consideration by Olympia Resources are detailed in the following sections:

3.8.1 Trucking to Port of Darwin

The option of trucking product between the quarry stockpile area and a shed in or near the Port of Darwin is being evaluated. Product from the shed will likely be shipped in bulk loads of about 10,000 tonnes. Loading facilities within the Port of Darwin are yet to be finalised. This option would require a storage shed to be constructed at the Port of Darwin.

Trucking would involve transporting product from the quarry site 100 kilometres west along Plenty Highway, then 1305 kilometres 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.

All environmental impacts at the Port of Darwin would be managed according to the Environment Management System of the Port of Darwin.

3.8.2 Trucking Containers of Bagged Products to Alice Springs and then by Rail to Port of Darwin or Port Pirie

The option of 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 is being evaluated. This option would require the following infrastructure to be constructed:

- Storage yard at the Port of Darwin and/or Port Pirie.
- Storage yard at Brewers Estate, Alice Springs.

Trucking would involve transporting containers from the mine site to Brewers Estate at Alice Springs. From there, the product would be transported by rail to Darwin and/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. The containers would be transported on rail along with general container transport.

3.8.3 Rail Transport between Project Area and Port of Darwin

The option of railing product between the project area and the Port of Darwin is being evaluated and would involve the construction of the following infrastructure:

- A rail siding near the intersection of Plenty Highway and the Alice Springs-Darwin Railway Line (about 59 kilometres along Plenty Highway, west of the extractive area).
- A small bulk storage shed at the siding.
- A train loading facility.
- Storage shed at the Port of Darwin.

A train-unloading and ship-loading facility at the Port of Darwin will be constructed by the Port of Darwin and it is likely that such facilities will be constructed before being required by the project.

Trains will be unloaded at the Darwin port using a purpose-built, bottom-dump unloading facility owned by Darwin Port Corporation. Product will be loaded into a shed on land owned either by the Port Corporation or Land Corporation and leased to Olympia Resources. This option is not available at this stage, but it is conceivable that it may eventuate before the project starts.

This option would involve one or two trains each week and about five triple road train trips between the rail siding and the project area each day. The rail siding would be constructed on land jointly owned by Freightlink and the Northern Territory Government.

Excluding construction of the rail siding, all options are discussed as assessed within this PER. Land tenure and construction approvals associated with the rail siding will be assessed separately by Olympia Resources at a later date.

3.9 WATER REQUIREMENT AND MANAGEMENT

3.9.1 Groundwater

Water requirements for the total operation will be sourced from groundwater. A borefield of three to five bores will be developed 15 kilometres north-east of the Harts Range Atitjere Aboriginal Community. Between one and five bores will operate at any one time on a rotational basis to provide the operational requirement of 1,000 kilolitres per day. The borefield will have a capacity to produce about 2,000 kilolitres of water per day.

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

The pipeline will be buried to minimise temperature-induced pipeline movements, avoid damage by fire and avoid the pipeline becoming a traffic and mustering obstacle.

About 96% of water will be recycled within the process plant using the thickener, hydrocyclones and the backfill drainage sump. 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.

No surface water will be used to supply the project for any purpose. No wastewater will be discharged into any surface water for any purpose.

3.10 INFRASTRUCTURE

Infrastructure necessary for operation of the project will include:

- A diesel-fuelled, two-megawatt power generation plant. This will be located near the processing plant area.
- A bulk diesel storage tank to supply the generator and mobile equipment. This will be located near the workshop.
- Five borefield pumps, a generator and associated water supply line.
- An accommodation village for about 25 people.
- A heavy vehicle workshop. This will be used to service both mobile equipment used for quarrying and light vehicles.
- Office buildings including an area for stores and a laboratory.
- A 150-tonne per hour wet concentrating plant.
- A 50-tonne per hour dry processing and bagging plant.
- Satellite and radio communication infrastructure.

Key infrastructure locations are displayed on Figure 5.

This PER does not consider impacts associated with use of port facilities or a railway siding. Port facilities where used, will be on a commercial basis whereby Olympia Resources will be a customer of the port corporation. Similarly, if a rail siding is required, Olympia Resources will work with freight link to develop an appropriate facility.

3.11 WORKFORCE

3.11.1 Construction Phase

The first stage of construction will be the borefield and water pipeline to the Harts Range site. This work will be undertaken by experienced contractors. The number of contract employees on this work will be about five. It is anticipated that the bore and pipeline contractors will be accommodated in Gem Tree Caravan Park, 40 kilometres west of the Harts Range site.

Construction onsite at Harts Range will start with establishment of a camp to house about 25 people. During its establishment, the workforce of about eight will be accommodated in Gem Tree Caravan Park.

Once the camp has been established, the construction workforce will be accommodated onsite with overflow being directed to Gem Tree Caravan Park.

During construction, the size of the contract workforce will vary greatly. It is expected to reach its maximum of about 15 when the wet plant is constructed.

All contractors will be required to make their own arrangements for transporting members of their workforce to and from the operational area. Olympia Resources' employees will be provided with appropriate vehicles.

3.11.2 Operation Phase

It is envisaged that the operation will operate all year on a 24-hour, three-shift basis, seven days per week. About 10 people will be employed in quarrying operations and 12 people in the wet and dry plant and for product bagging. A further eight people will be required onsite for services, maintenance, wet plant supervision and accommodation. The total onsite workforce is estimated to be 30.

It is planned to use an experienced mining contractor for mining rather than use Olympia Resources personnel. Therefore, 10 of the workforce will be mining contract personnel and 20 Olympia Resources employees. In addition, a further 10 people are anticipated to be employed fulltime by the trucking and/or rail contractors.

All employees, including Olympia Resources employees and contractors will be under direction of the onsite Operations Manager.

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.

The Operations Manager is responsible for general administration and management and is expected to reside in Alice Springs. The Operations Manager will be an experienced quarry manager and will receive technical support from the earthworks supervisor, maintenance supervisor and site metallurgist. Other technical support in areas such as geology and engineering will be provided on a regular basis from offsite consultants. The Perth-based head office will generally attend to corporate administrative services, accounts and liaison with Northern Territory Government departments.

Onsite accommodation will probably consist of conventional two-person ATCO style units with a self-contained kitchen and ablution facilities. A kitchen, recreation hall/wet mess and an above-ground relocatable swimming pool are also proposed for the camp.

3.11.3 Decommissioning

During decommissioning it is likely that a workforce of about 12 will be required to remove and salvage buildings and other infrastructure. As rehabilitation will be undertaken progressively, landform restoration and vegetation establishment tasks at the end of the project will be minimal.

3.11.4 Recruitment and Training Policy

Employment opportunities will be advised in Harts Range and Alice Springs and preference will be given to local candidates. Employees will be provided appropriate training and development to ensure position requirements are fulfilled.

3.11.5 Transportation of Employees

All non-mining contractors will be responsible for their own transport requirements.

Olympia Resources' employees and mining contractors based in Alice Springs will be transported in a company car or bus to and from Alice Springs at the beginning and end of each rotation. Employees from Harts Range community may also be transported to and from work in a company vehicle although it is conceivable that they will be required to provide their own transport. The option of a local business providing a transport service will be evaluated as project planning progresses.

3.12 PROJECT SCHEDULE

3.12.1 Construction

Subject to all approvals and appropriate sales contracts signed, construction will start with the borefield and pipeline. This will be followed by construction of the camp. Construction of quarry screen plant and processing plants will then be carried out. Mobile earthmoving equipment is planned to be mobilised during May 2005. Clearing and topsoil removal of two hectares will be undertaken before quarrying starts. Quarrying and ore processing is planned to start in June 2005. Table 3 details the planned construction schedule for the project.

It is anticipated that the project will have a minimum life of 20 years. Given the recognised potential of Olympia Resources' exploration tenements, it is anticipated that future exploration will confirm that the project life will extend considerably beyond the initial projection.

Table 3: Planned Construction Schedule

Key Tasks	Completion Date												
	Sep 04	Oct 04	Nov 04	Dec 04	Jan 05	Feb 05	Mar 05	Apr 05	May 05	Jun 05	Jul 05	Aug 05	Sep 05
Definitive feasibility study			◆										
Sales agreements				◆									
PER			◆										
Complete transport study				◆									
Agreement with Port of Darwin				◆									
Processing plant design				◆									
Environmental approval				◆									
Water supply					◆	◆							
Camp construction					◆								
Processing plant construction					◆	◆	◆	◆	◆				
Site layout								◆	◆				
Commence production										◆			
Export product												◆	

4. OBJECTIVES AND BENEFITS OF PROJECT

Discuss the social, environmental and financial objectives and benefits of the project. This should include:

- *Socio-economic objectives and benefits, including reference to local and global markets, other economic activities in the affected area (eg. tourism, pastoral etc), foreign trade objectives, occupational health and safety objectives, and benefit to the local workforce, land users and Indigenous people.*
- *Commercial objectives (eg. predicted volume of product and proportion of market demand to be met by output).*
- *Local, regional and global environmental objectives.*

4.1 SOCIO-ECONOMIC OBJECTIVES AND BENEFITS

A mixture of garnet and AMH will be produced at Harts Range and will represent 75% of the project's production. The remaining 25% will be garnet products. Garnetblende will supply the loose abrasive market as a non-toxic alternative to copper slag and a harder alternative to crushed glass. The regional market for loose abrasives is in excess of 800,000 tonnes per annum and most of the material currently used is slag. Australia and Malaysia have effectively banned the use of slag and as a consequence there is a need to find an environmentally-acceptable replacement.

Other socio-economic benefits have been previously discussed in Section 2.4.

4.2 COMMERCIAL OBJECTIVES

The objectives of the project are to:

- Produce 200,000 tonnes of garnet and Garnetblende for the market in Australia and South-East Asia.
- Produce garnet and Garnetblende product at a low cost while maintaining high levels of performance of quality, safety and environmental production.
- Ensure benefits of the project are shared with members of local communities and the Northern Territory as a whole.

4.3 LOCAL, REGIONAL AND GLOBAL ENVIRONMENTAL OBJECTIVES

Olympia Resources has implemented an Environmental Policy (Appendix 3) to guide its Australian operations. Olympia Resources views environmental management as essential to its own future and that of the mineral exploration and mining industry in general. The company considers that sound environmental management benefits all stakeholders including shareholders, employees, nearby residents and the broader community.

Olympia Resources' directors recognise that environmental management is an integral part of all activities, from exploration and mining to processing and exporting. Consequently, for all its operations, the company is committed to developing, implementing and maintaining an Environmental Management System consistent with international best practice.

Specifically, the Environmental Policy Statement commits the company to:

- Comply with all environmental legislation, licences and regulations.
- Recognise conservation and heritage values.
- Identify, manage and monitor potential environmental impacts, striving to comply with international best practice.
- Rehabilitate disturbed land surfaces.
- Review and evaluate environmental performance.
- Seek continuous improvement in exploration, quarrying, waste management and the use of resources.
- Promote cross-cultural awareness, and wherever possible, protect sites of cultural significance.
- Have timely and effective communications with landowners, relevant Indigenous people and others who may be directly affected by company operations.
- Communicate regularly with employees, suppliers, contractors and customers about the aims of the Corporate Environmental Policy and the responsibilities implied.
- Provide information to the community, shareholders and government authorities about the company's environmental performance.

In addition to an Environmental Policy, Olympia Resources has also developed and implemented policies for Indigenous People, Quality and Occupational Health and Safety. All these policies are reproduced in Appendix 3.

Olympia Resources is not a signatory company to any Northern Territory, Commonwealth or international environmental codes or initiatives.

5. PROJECT ALTERNATIVES

Alternative proposals, which may still allow the objectives of the project to be met, should be discussed, detailing reasons for the selection and rejection of particular options. The selection criteria should be discussed and the advantages and disadvantages of preferred options and alternatives detailed. The potential impacts of the alternatives should be described.

Alternatives considered during project planning included:

- Not proceeding with the project.
- Locations, including process plant.
- Sources of raw materials for the project, including water supply.
- Extraction and processing technologies considered.
- Environmental management technologies considered, such as treatment and disposal of waste products.
- Workforce accommodation.
- Power supply options and service corridors.
- Transport options, including the haul road location.

These are discussed in more detail below.

5.1 NOT PROCEEDING WITH THE PROJECT

The “no project” option would result in a loss of opportunity to add value to Australia’s raw materials and loss of employment opportunities and economic benefit, particularly within local regional communities. The increasing global demand for inert abrasive media would then be met by developing projects elsewhere, including overseas, with a loss of associated benefits to the Northern Territory.

5.2 INFRASTRUCTURE LOCATION

The chosen location and design of the project has taken into consideration the existing environment and potential environmental impacts. The location of administrative infrastructure and site access road took into account the proximity of surface water drainages and topography.

5.3 RAW MATERIALS

The simple extraction and separation process results in raw materials being largely limited to water, diesel fuel and mineral resources. Sourcing mineral resources from other identified

locations within the area is not economically feasible. An economic alternative to diesel fuel to provide electricity and to run equipment has not been identified.

The closest groundwater supply of sufficient quality and quantity to meet the designed capacity requirements of the project is located about 15 kilometres to the east. Olympia Resources intends to further explore for water in this region with the aim of identifying several aquifers that will allow continuous use over a long period with appropriate management.

5.4 EXTRACTION AND PROCESSING TECHNOLOGIES

Garnet quarrying is relatively simple in terms of quarrying and processing requirements. The project as described uses common, well-tested quarrying and processing techniques. The nature of the ore bodies does not lend itself to using anything other than progressive quarrying techniques.

5.5 ENVIRONMENTAL MANAGEMENT TECHNOLOGIES

The relatively common nature of the quarrying and processing technologies proposed for Harts Range allows use of proven industry environmental technologies. Olympia Resources' Environmental Policy requires implementation of industry best management practices. These are detailed in Sections 6 and 7.

5.6 WORKFORCE ACCOMMODATION

Establishing a permanent township at the project was considered. The economic and environmental costs of establishing a township outweighed any social benefits that may have arisen from establishing this township, particularly when the proximity to the township of Harts Range Community and Alice Springs was considered. A workforce camp was considered more appropriate. It is planned to use a relatively short-cycle shift roster for the shift employees (eg. three shifts on/three shifts off). This roster would allow shift employees not based near Harts Range to spend two nights out of six sleeping at the camp and four nights at home.

5.7 POWER SUPPLY OPTIONS

An economic alternative to diesel fuel generators to provide electricity for the project has not been identified.