



EcOz  
Environmental  
Services

**WesternDesert**  
RESOURCES

# Chapter 1 Introduction

Western Desert Resources Limited  
Roper Bar Iron Ore Project



2012



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# 1 Introduction

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## 1.1 The Proponent

Western Desert Resources Limited (WDRL) is a diversified resources business with a portfolio of quality assets in the Northern Territory (NT), including gold, copper and other base metal prospects.

The company's flagship project is the rich iron ore deposits at Roper Bar, near the Gulf of Carpentaria.

### Company Vision Statement

*To be the leading low-cost iron ore producer in Northern Australia while generating wealth and prosperity for the people of the Roper District and other regions where we operate.*

### Company Mission Statement

*Western Desert Resources Limited will operate in an environmentally and socially responsible way in order to minimise our footprint and maximise benefits for our staff, shareholders and stakeholders well beyond the life of our mines.*

### 1.1.1 Environmental Policy

Since floating as a public company in 2007, WDRL has explored prospects throughout the Northern Territory (NT), including iron ore, gold, copper and other prospects. Over \$35m has been invested in the exploration potential of Australia, involving surveys and drilling on over 10,000 square kilometres of tenement.

The records show that WDRL has built up an impeccable record of environmental responsibility. The company is proud of its record of compliance with statutory requirements, in particular the Mining Management Plans, which incorporate full disclosure of environmental stewardship and rehabilitation responsibilities.

WDRL Ltd listed on the ASX in July, 2007. Respecting the importance of this matter the company stated its environmental policy just six weeks later in September, 2007.

Environmental policy is an obligation of management and it is expected that individual's will follow WDRL's Environmental Policy and assume personal responsibility in respect to impact on the environment. WDRL recognises their responsibility to meet community expectations as a minimum, and are committed to excellence in respect to their environmental performance.

In order to achieve this WDRL will:

- Implement and maintain environmental standards across the company;
- Ensure all employees, contractors and consultants are properly trained in WDRL's Environmental Policy to fulfil their individual responsibilities;
- Comply with all legal and other requirements;
- Set environmental targets and objectives, with supporting programs to achieve them;
- Implement reporting processes to identify hazards in order to minimise environmental risks, and to ensure that any non-conformance is brought to the attention of management immediately;
- Ensure that resources are in place to achieve environmental commitments;
- Implement processes to minimise ground disturbance, and ensure that cultural heritage issues are properly addressed;
- Promote a culture of efficient use of natural resources and recycling; and

- Formally review the environmental performance of employees, contractors, consultants and suppliers.

In addition WDRL will also:

- Continually improve environmental performance, prevent pollution and responsibly minimise and control wastes as far as practicable;
- Plan, construct and operate all operating locations to comply with applicable regulations and to act with due diligence for environmental protection and improvement;
- Regularly review and upgrade environmental management systems to ensure a best practice approach to environmental protection and sustainability;
- Consider favourably, suppliers who pursue good environmental management practices; and
- Communicate openly and constructively with responsible environmental interests, government authorities and the community generally.

## 1.2 The Project

### 1.2.1 Project Location

Western Desert Resources Limited (WDRL) is seeking approval to mine within Mineral Lease Application (MLA) 28264 and MLA 28963 in the Roper Bar Region of the Northern Territory. The larger potential future project area includes Roper Bar and Mountain Creek project areas consisting of seven granted Exploration Licences (EL) EL25672, EL26759, EL24307, EL24944, EL24665, EL27143 and EL26992. The location of the project is shown in Figure 1-1, and the Exploration leases are shown in Figure 1-2.

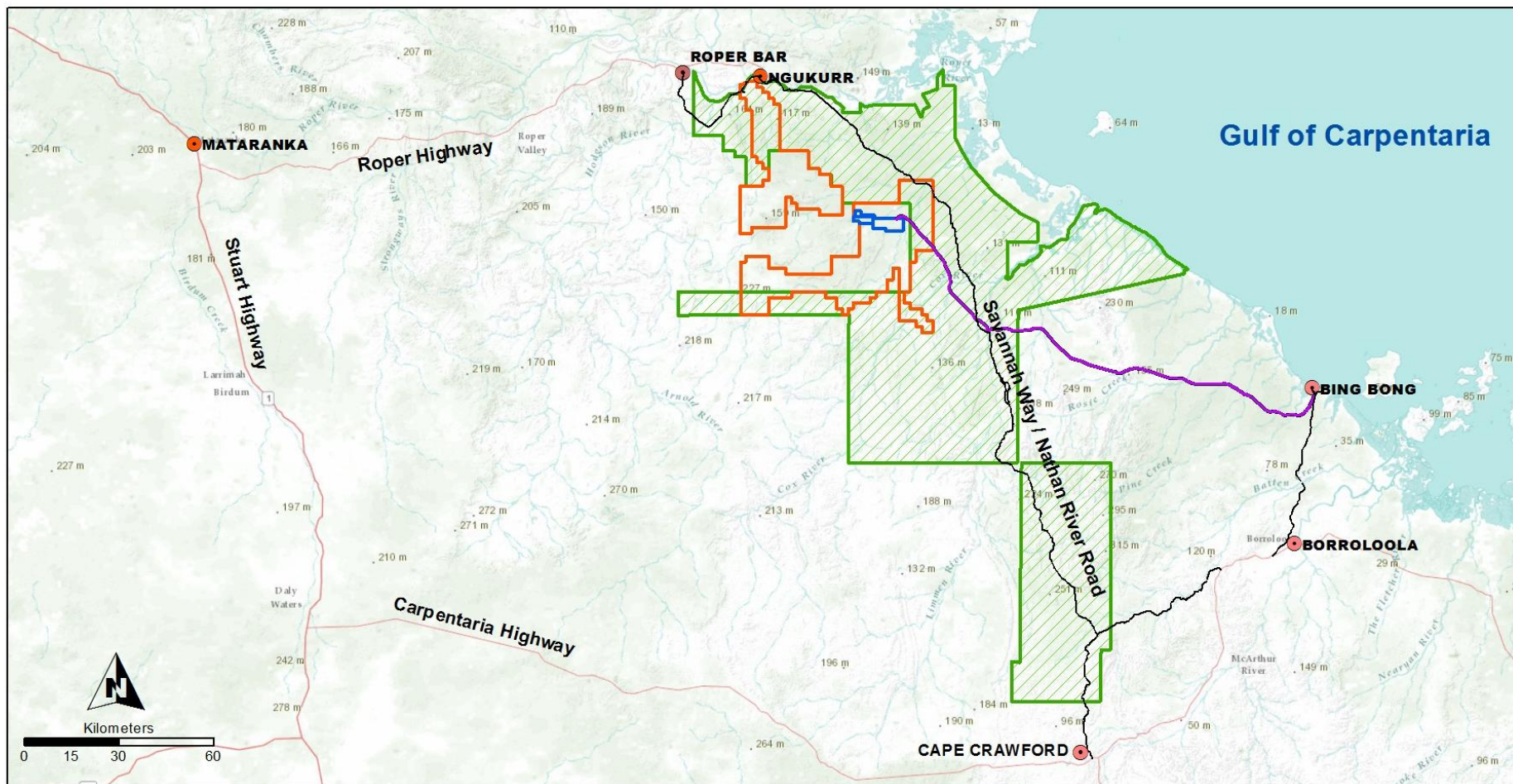
WDRL has submitted five MLA's as required under the Northern Territory *Mineral Titles Act*:

- MLA 28264 – for Mining purposes;
- MLA 28266 – Infrastructure (airstrip);
- MLA 28267 – Infrastructure (facilities);
- MLA 28962 – Camp; and
- MLA 28963 – for Mining purposes.

The location of the MLAs is shown in Figure 1-3 and the coordinates are presented in Table 1-1.

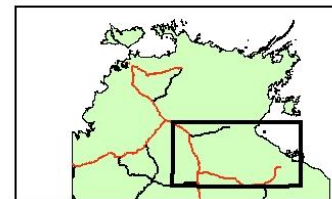
The WDRL proposal is located within NT Portion 819 which is the former St Vidgeon Pastoral Lease. St Vidgeon Station was abandoned due to its inability to support a sustainable pastoral enterprise and as a result, the Limmen National Park proposal was gazetted by the Northern Territory Government in 1991 for consideration to allocate the area to multiple use "Park or Reserve" status.

The WDRL proposal originally fell within the boundaries of the proposed Limmen National Park, which is intended to be declared as a park pursuant to the *Territory Parks and Wildlife Conservation Act (NT) (TPWCA)*. At the time of writing the Park announcement was subject to a community consultation period. It should be noted that the WDRL proposal is no longer located within the boundary of the proposed park (see Figure 1-1).



-  Proposed Haul Road
-  WDRL Proposed Mining Lease
-  WDRL Exploration Licences
-  Limmen National Park

### Western Desert Resources Limited Project Location



**WesternDesert**  
**RESOURCES**

Name: WDRL Project Location  
 Coordinate System: GCS GDA 1994  
 Date Saved: 17/06/2012 2:13:04 PM  
 Client: Western Desert Resources Limited  
 Data: EcOz, WDRL, NRETAS, Geosciences Australia  
 Imagery: ESRI Basemaps, Geosciences Australia  
 Author: K. Munson


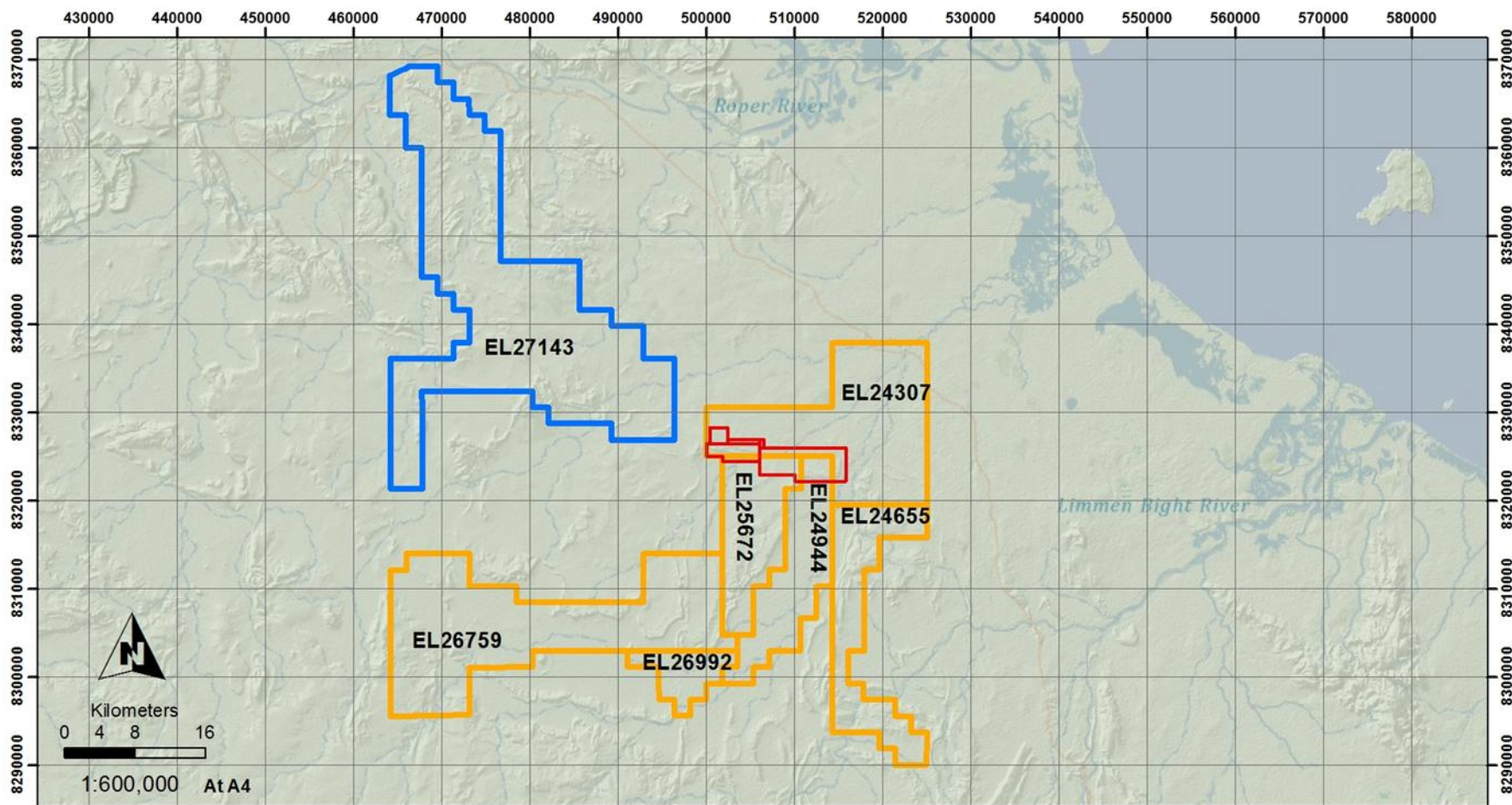


Figure 1-1: Project Location



- Exploration Leases**
- Mountain Creek Project
  - Roper Bar Project
  - WDRL MLAs



## Western Desert Resources Limited Exploration Leases

**WesternDesert**  
RESOURCES

Client: Western Desert Resources Limited  
Name: WDRL Roper Bar Exploration Leases  
Date Saved: 18/06/2012  
Coordinate System: GCS GDA 1994 MGA Zone 53  
Author: KMunson  
Imagery: Esri Basemaps, Microsoft Bing  
Data: WDRL




Figure 1-2 WDRL Exploration Leases

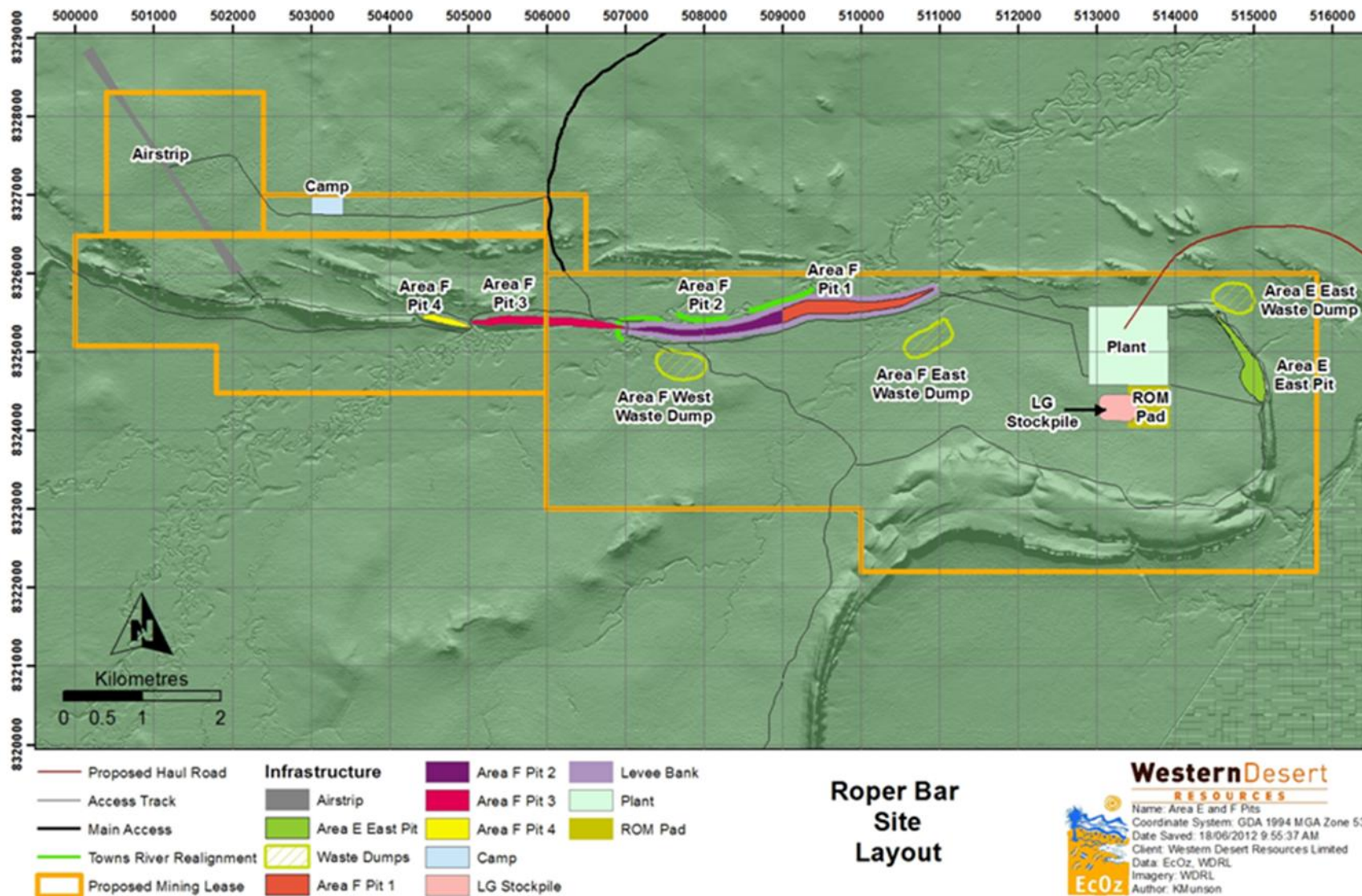
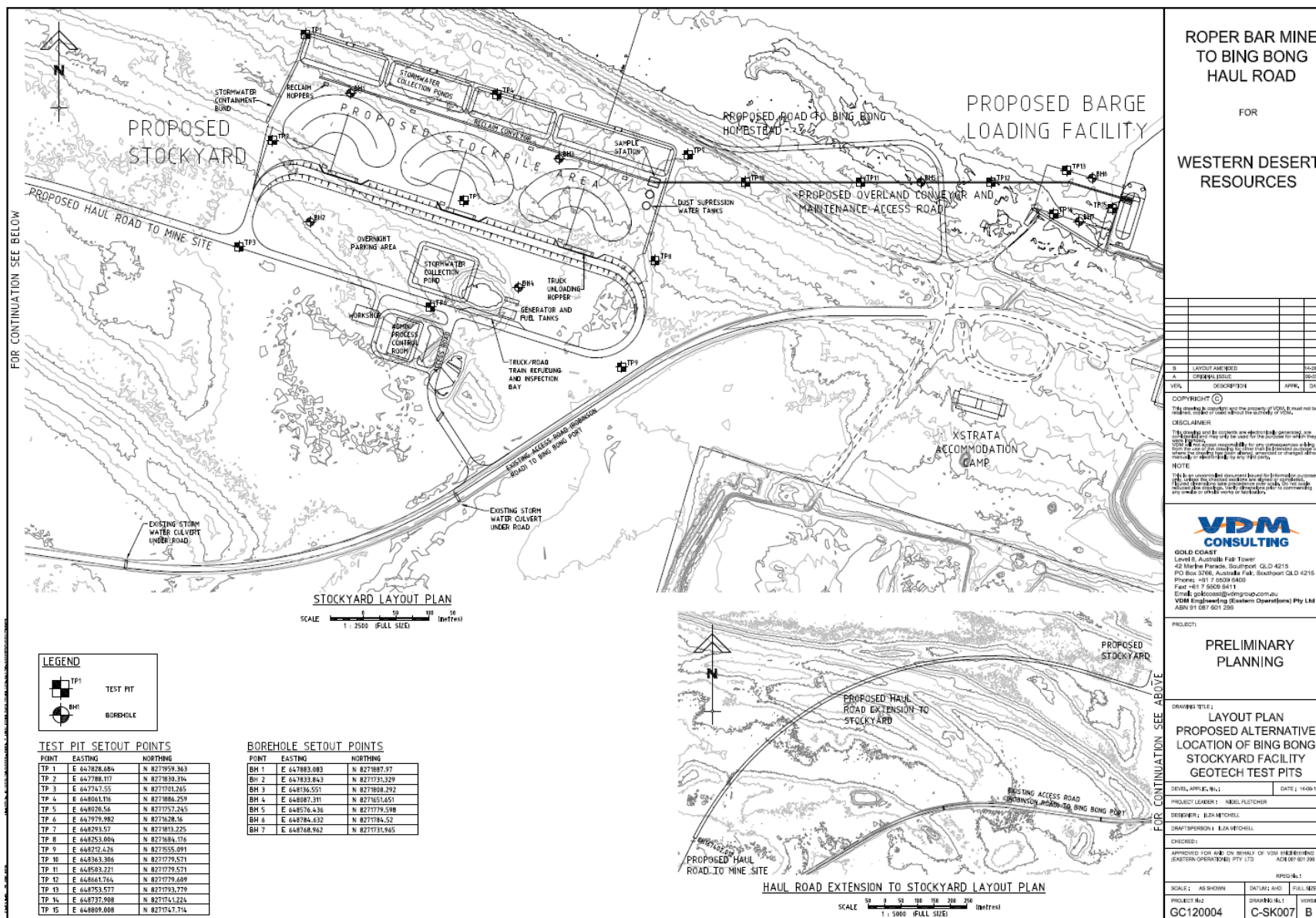


Figure 1-3 WDRL Mining Lease Applications





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SCALE: AS SHOWN DATE: 14-08-12 DRAWN BY: IJSA WITHELL  
PROJECT NO: GC120004 DRAWING NO: C-SK007 B

Figure 1-4 Stockyard and barge loading facility

**Table 1-1: MLA Coordinates**

Location	Latitude			Longitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
MLA 28266	-15	7	15.3	135	0	13.5
	-15	8	14	135	0	13.5
	-15	8	14	135	1	20.5
	-15	7	15.3	135	1	20.5
MLA 28267	-15	7	57.6	135	1	20.5
	-15	8	14	135	1	20.5
	-15	8	14	135	3	21.1
	-15	7	57.6	135	3	21.1
MLA 28264	-15	8	30.2	135	3	21.1
	-15	10	8	135	3	21.1
	-15	10	8	135	5	35.5
	-15	10	33.8	135	5	35.5
	-15	10	33.8	135	8	50
	-15	8	30.4	135	8	50
MLA 28962	-15	7	57.6	135	3	21.1
	-15	8	30.2	135	3	21.1
	-15	8	30.2	135	3	37.8
	-15	7	57.6	135	3	37.8
MLA 28963	-15	8	14.7	135	3	21
	-15	8	14.7	135	0	0
	-15	9	0	135	0	0
	-15	9	0	135	1	0
	-15	9	19.8	135	1	0
	-15	9	19.8	135	3	21.1

Current road access to the mine and ancillary infrastructure site is via the Roper Highway, which departs the Stuart Highway 10km South of Mataranka (Figure 1-1). This road is largely a single lane sealed road towards Roper Bar. Approximately 5km west of the Roper Bar Store, the Nathan River Road heads south from the Roper Highway and ultimately intersects the Carpentaria Highway near Cape Crawford 340km away. This section of road is unsealed and is where the project area is located, approximately 140km from Roper Bar. The Roper Highway and the Nathan River Road form part of the Savannah Way, a tourist route that avoids major roads, where possible, from Broome to Cairns.

The WDRL exploration tenements total approximately 1,850km<sup>2</sup>. WDRL has Mineral Lease Applications for approximately 5000 Hectares (50km<sup>2</sup>) within this area. The haul road will be 165km long with a cleared width of up to 50m, with borrow pits and temporary camps, total clearing is expected to be in the region of 850 hectares. Much of Port of Bing Bong is cleared for the existing operations; however an area will require clearing for the Stockyard Facility, Conveyor, access tracks and Barge Loading Facility, totalling approximately 50ha. Clearing within the mining tenements will total approximately 450 hectares.

The land tenures of the area traversed by the 165km Haul Road between the mine site and Bing Bong is presented in Table 1-2.

**Table 1-2: Properties intersected by the proposed haul road**

Name	Tenure Type	NT Portion	Length of haul road within this property (approx. km)
St Vidgeon Pastoral Lease*	Crown Lease Perpetual	819	30
Nathan River*	Pastoral Lease	1334	30
Lorella Springs	Pastoral Lease	1333	75
Wurrunburru Association Incorporated	Crown Lease Perpetual	2432	20
Macarthur River Station	Pastoral Lease	4319	10

\* Part of the proposed Limmen National Park

### 1.2.2 Project Overview

In 1957, BHP (now BHP-Billiton) commenced exploration on hematite sandstones immediately west of Roper Bar, or about 100 kilometres northwest of the WDRL Roper Bar Project Area. BHP defined many individual prospects. Drilling, costeaning and considerable metallurgical test work was completed, but the project was abandoned in the early sixties in favour of investigation of the massive deposits in the Pilbara Region of Western Australia.

In 1996 Geoff Fanning pegged EL9041, which generally coincided with the current EL25672. Geoff Orridge, a consulting Geologist, completed reconnaissance exploration of the area and took 16 samples. Only three samples assayed above 50% Fe; maximum 56.6%. These results were not of commercial interest at the time, and the EL was relinquished. As the demand and price for iron ore has increased, the potential of such deposits with lower transport to market costs have increased in viability and the investment into this potential project has paid dividends with the discovery of significant volumes of high grade iron ore.

WDRL initially secured exploration licences within the area in 2008. In September 2010 applications were lodged for three Mineral Leases, and a further two Mineral Lease Applications were lodged in August 2011. It is WDRL's intention to both manage and operate the proposed mineral leases.

The project consists of six granted exploration licences (EL24307, EL24655, EL24944, EL25672, EL26759 and EL26992) which are located about 240km east of Mataranka and 60kms south of Ngukurr in the Gulf Country of the Northern Territory, herein known as the Roper Bar Iron Ore Project. JORC-standard (Joint Ore Reserves Committee) resources have been estimated from about one-third of the outcropping haematitic iron formations within the Sherwin Ironstone Formation. WDRL is currently seeking approvals to mine a small proportion of the total known resource, focussing on high grade direct shipping ore (DSO). WDRL has identified a number of deposits within the MLAs and hope to commence mining these resources once approvals are granted.

A wide range of options have been considered during the assessment of the feasibility of this project. The identification of the most appropriate method of developing and operating the project is often the catalyst to the project reaching the stage where a decision to proceed is made.

The ore grade of the host ironstone has influenced project development plans. Initial discoveries and testing identified a high grade ore (~60% Iron [Fe]) that could be defined as DSO. DSO is a material that is basically 'quarried' in that it is mined, crushed and shipped to market. The next stages of investigative drilling identified a very large volume of material that was of a lower grade and would require beneficiation, prior to sale. This material, referred to as Beneficiated Ore or BFO (30 - 50% grade), would require crushing, grinding and then beneficiation, which involves the liberation of non-ferrous minerals from the ore so as to increase the iron percentage of the remaining material. Further exploration drilling during 2011 resulted in a further discovery of a significant quantity of DSO. The different methods also offer different transport options as the DSO product is a lump and gravel sized (5mm – 30mm) material and the BFO is a very fine product that suites transport via a slurry pipeline.

The result of this sequence of discoveries has dramatically impacted the project's development stages and the position that has been reached as to how the project should now proceed. Initially the known resource of DSO was determined as uneconomic to support the development of specific transport infrastructure, so the project development focus turned to a large scale BFO project. The results of the 2011 drilling program and the discovery of a substantial quantity of DSO have since returned the focus of the initial stages of the project to that of a DSO project as there is now considered to be significant quantities to warrant stand-alone transport infrastructure.

This decision is based on many factors but mostly:

- A DSO project is a simple quarrying operation;
- A DSO project requires approximately one fifth of the capital required to develop a BFO project;
- A DSO project, due to its simplicity, is expected to gain regulatory and environmental approvals sooner;
- A DSO project, due to its simplicity and reduced capital outlay can reach production sooner;
- A DSO project can fund and allow time for the further definition of a BFO resource, the BFO process and most appropriate transport option for the BFO material;
- A DSO project can invest in, and allow time for, further environmental assessment, consultation and regulatory approvals of a BFO project;
- A DSO project will allow WDRL to perform ongoing Social Impact Studies to inform their future plans based on actual community outcomes and feedback, rather than pre project expectations and suppositions.

This environmental assessment is seeking approvals for the initial mining phase which is proposed to be from MLA 28264 and 28963 which contain a number of deposits including the high grade Area E East and Area F (Pits 1, 2, 3 and 4). The inventory for the Mineral Lease Application area currently stands at a JORC Inferred and Indicated Mineral Resource estimate of approximately 65Mt @ 42% Fe with 20Mt of DSO grade material included. The expectation is for a 24Mt DSO operation as there is expected to be a resource upgrade from Area E Pit 1 which will procure the full estimated amount of DSO resulting in an expected mine life for these ML's of approximately 8 - 10 years.

The ore body is shallow, mostly surface outcropping and often linear, resulting in a mining pit design that will evolve as the mining activities progress along the deposit. The deposit is expected to be mined in sections so that where the ore has been mined out, the waste can be returned to the pits.

This proposal is similar in operation to a quarry, where material is mined, crushed to a consistent, manageable and easily transportable size (<30mm) and transported off site. There is no processing or tailings for the purely DSO material. The DSO project is identified as Phase 1. Wastes produced are either overburden or material surrounding the orebody that required moving so as to access the ore.

The extensive known resources of lower grade Sherwin Ironstone suggest that approvals for potential future phases of this project will be sought.

### **Product Transport**

Iron ore will be transported to the existing Bing Bong Loadout Facility via a proposed sealed private Haul Road, where it will be deposited and stockpiled inland from the facility. The ore will then be transported to the port facility via covered conveyor where it will be loaded onto barges to be conveyed to Ocean Going Vessels (OGV) located approximately 30kms offshore on existing moorings.

### **Associated Infrastructure**

Facilities associated with the project and proposed to be located within the MLAs include an airstrip, camp facilities, including dry and wet mess, sleeping quarters, laundry facilities, ablution blocks and

showers, and mine offices (see chapter 2). FIFO staff will be flown to site from Darwin and Ngukurr and other local communities if required.

The Project infrastructure and development comprises:

- Open pit mining of Iron Ore reserves with a return to pit of wastes;
- Water storage infrastructure and a stream realignment;
- Some Waste storage facilities and/or Overburden rock stockpiles;
- Internal haul roads and Light Vehicle (LV) access roads;
- Run Of Mine (ROM) pad;
- Crushing;
- Ancillary Infrastructure (workshop , administration office);
- Erosion and sedimentation management structures including sediment ponds;
- Camp Facility;
- Airstrip;
- Infrastructure and the overland transport of the ore (165km haul road) to the Bing Bong transshipment facility;
- A 'stockyard' or bulk materials storage and handling facility near Bing Bong;
- A covered conveyor to the Barge Loading Facility within the existing harbour of Bing Bong;
- Barges to tranship Iron Ore to Panamax style vessels moored at existing mooring sites 20-30kms out into the Gulf of Carpentaria; and
- Cranes to unload barges onto OGV's.

### 1.2.3 Project Objectives

- ✓ To develop the project in a timely manner so as to capitalise on market opportunities;
- ✓ To provide employment and ongoing benefits to this impoverished region;
- ✓ To develop a safe workplace and operate in a safe manner;
- ✓ Develop and operate according to Ecologically Sustainable Development principles;
- ✓ Provide benefits to the regions via increased infrastructure, employment and economic opportunities; and
- ✓ Operate at a profit and pay dividends to all stakeholders, including shareholders.

### 1.2.1 Project Justification

#### Market Requirements

The consensus is that demand for iron ore globally will double between now and 2030. This demand comes primarily from China, India, Japan, Korea and developing Countries like Vietnam. The quality of iron ore currently being mined is diminishing, as the available high-grade material has been depleted over the past four decades.

In furnaces required for steel making, a critical element in the production process is ensuring the phosphorous content does not reach a level exceeding 0.1%. A phosphorous content above this is detrimental to a Steel Furnace, produces sub-standard iron and has increased environmental implications. Most of the iron ore being mined globally today has a phosphorus content of nearly double that of which it contained two decades ago, and this is an increasing trend. Indeed, a substantial amount of iron ore today is approaching the upper tolerance levels of phosphorus. Analysis of the Roper Bar iron ore shows that it is one of the rare deposits globally that has nil or negligible phosphorus and as such the

iron ore from Roper Bar will become increasingly in demand, and therefore valuable, as it will be necessary to blend ores to reduce phosphorus levels in the decades ahead.

The Company places emphasis on economic sustainability as the cornerstone of being able to deliver on all sustainability measures and therefore one method of assisting this shall be to adopt a policy of hedging the exchange rate fluctuations to minimize margin deterioration during the term of the Project. In addition to this, rolling forward sale contracts for up to half of anticipated production shall be entered into in order to hedge the revenue and pricing of all product so that modeled revenue assumptions are where possible hedged throughout.

Approximately one third of the NT gross domestic product is derived directly or indirectly from mining. World class mines are essential for the ongoing payment of royalties for the benefit of all Territorians. The jobs and other economic benefits are detailed in the Social Impact Assessment (SIA) contained in the EIS (Appendix G). WDRL intends to monitor these benefits well beyond commencement of mining so that the true accurate impacts are known.

The development of the Project presents the wider community with a variety of sustained opportunities associated with the construction and operation of the mine in this region. This project and associated activities are offering opportunities to remote and regional Territorians in a development marketplace that has been very Darwin focussed and often requiring a high level of technical expertise.

### **Social and Environmental Factors**

Without denigrating the value of the proposed Limmen National Park, it has been assigned potential National Park status due to the fact that it has not been able to support pastoral or other potential economic activities to date. This is not uncommon, especially in the Northern Territory where many conservation estates and Indigenous Lands have gained their current status due to them not being wanted by pastoralists or other potential land users. This explanation helps support the understanding of the lack of economic development opportunities in this impoverished region. The declaration of the National Park may attract more visitors to the region and offer some economic development activities and jobs, but such outcomes are expected to be minor and comparisons to other high profile, including joint managed and traditionally owned, National Parks in the NT can be used to validate this statement.

The development of the Roper Bar Iron Ore Project represents the single largest economic opportunity for the region in its history. It is unlikely that any other economic opportunities of any size and value exist in the region. For over a century the Pastoral Industry has endeavoured to sustain itself within the region but has failed successively due to the unsuitability of the environment to sustain a pastoral industry. Three of the four townships near the project (Ngukurr, Minyeri and Numbulwar) have few if any current economic activities and for a variety of reasons there are few and limited development opportunities available to them. This project offers significant short term employment and business opportunities. In addition to this it will provide a royalty injection, that if well managed can provide ongoing sustainable social and economic development opportunities that cannot be offered or funded to this scale by any other potential economic activity, Government or other program in the region.

The project that is being presented has been revised so as to remove and reduce potential concerns about impact on cultural sites. Sacred and significant site clearance has been given for the mine site and is underway for the haul road. The requesting of a 4km wide study corridor for the haul road allows for the rerouting within that study corridor to avoid sites identified by Traditional Owners. Areas that were identified as being of high risk in this regard were avoided during the selection of the 4km wide corridor.

Environmental aspects of the proposal have been studied and appropriate avoidance or management actions suggested. All development activities have an impact but the assessment of that impact against the potential impacted factors has reduced most of these to low. No environmental or potential environmental risks are identified as a cause for not proceeding with this project.

**Table 1-3: Estimated Project Time Frame and Aspects**

<b>Component</b>	<b>Details and timeframe</b>
Proposed Construction Commencement	Late 2012
Proposed Operation Commencement	Mid 2013
Life of Mine	8-10 years
Estimated Year of Decommissioning	2021
Size of Orebody (phase 1)	At least 20MT DSO
Ore Type	Direct Shipping Iron Ore
Ore Mining Rate (pa)	3 MT pa
Overburden Mining Rate (pa)	Approximately 4 MT pa
Estimated Total Ore Production	24 million tonnes
Number of Pits	At least 2
Depth of Pits	Maximum 100 metres
Estimated Recoverable Topsoil	Minimal
Crushing Rate	3 MT pa
Ore Grade	DSO Greater than 56%
Estimated Total Disturbance Footprint	Mine area 450 hectares, Road 850 hectares and Stockyard and conveyor 50 hectares
Workforce	150

### **Related Proposals**

WDRL and Sherwin Iron Limited are both currently in the process of developing Iron Ore projects in the Roper River Region. The Western Desert Iron Ore project is situated approximately 80km south east of Roper Bar with iron ore exports predicted for mid-2013.

Sherwin Iron Limited has targeted production for their Hodgson Downs Iron Ore Project, 100kms to the west of WDRL's Roper Bar prospects for 2014. The potential development of additional transport options, although possibly beneficial to this project, is beyond the scope of this report and therefore has not been explored in detail.

### **1.3 Potential Future Increases**

Production output will commence at 1.5M tonnes per annum and ramp up to 3M tonnes per annum of DSO by the third year of operation. It is then anticipated that approvals will be sought for a much larger project focussing on the crushing, screening and processing via beneficiation of low grade or beneficiated ore (BFO).

#### **DSO and High Grade Ore Conversion**

High grade ore suitable for direct shipping (DSO) has been located in the resource areas F and E East. Unlike the low density hematite typical of the horizontal deposits of areas to the south of the Project, this outcropping ore has a typical specific gravity (SG) of around 4.2, a result of Fe enrichment and structure densification. Associated with these deposits is also ore grading at +50% Fe, which is of slightly lower grade due to the presence of silica rich sedimentary zones.

For potential future activities, tests on gravity separation of the +50% Fe ore types is underway with the objective of achieving sufficient upgrading to provide a blending grade with crushed and possibly jigged DSO material. This approach to the production of a single product of -10 mm fines will extend the available DSO resource.

### Beneficiation

Beneficiation tests on Roper Bar oolitic ore began with the investigation of gravity methods, the lowest cost and most direct approach to mineral separation. Results of HLS tests (Heavy Liquid Separation) indicated that very good mineral liberation was achieved at a particle size of 80% passing 150µm. The efficiency of separation using jigs and tables was then tested at various particle size ranges.

In regards to gravity separation testing, tabling of low %LOI ores at typically 42-45% Fe resulted in concentrate production grading at 60% Fe, 7.8% SiO<sub>2</sub> at a yield of 23% of the +38µm fraction. Yield increased to 35% of the +38µm fraction where a concentrate grading at 58% Fe, 10.5% SiO<sub>2</sub> was taken. The -38µm slimes fraction tended to grade in excess of 52% Fe due to the primary constituent, earthy hematite.

The modest response to gravity separation has been attributed to the presence of micro porosity in the hematite, resulting in a density within the range 3.2 to 3.6 g/cc. This density range applies to the shallow dipping, near surface deposits of ore destined for concentrate production. Recent testing of this ore type has focussed on reverse flotation and magnetic separation.

Extensive testwork has been carried out on Roper Bar ore using reverse flotation and magnetic separation. In August 2011 both techniques produced a product of target grade 58% with recoveries in the range of 50%. Use of SLon magnetic separators instead of conventional WHIMS was a contributing factor.

This is a major breakthrough for the project, as it confirmed a beneficiation path for an ore type that hitherto had been considered outside the boundaries of commercially viable recovery. Further work with both methods is continuing to confirm the viability of the process on ores from various deposits, as well as fine-tuning the process.

It is expected that a future approval for the beneficiation project will be sought.

### The Beneficiated Product

The export product is envisaged to be 58% Fe in the form of a filter cake. An assay of beneficiated ore is shown in Table 1-4 below.

**Table 1-4: Assay of Beneficiated Ore**

PRODUCT	ASSAY %	PRODUCT	ASSAY %	PRODUCT	ASSAY %
Al <sub>2</sub> O <sub>3</sub> (%)	0.97	K <sub>2</sub> O(%)	0.022	Sn(%)	<0.002
As(%)	0.006	MgO(%)	0.24	Sr(%)	<0.002
Ba(%)	0.01	MnO(%)	0.66	TiO <sub>2</sub> (%)	0.032
CaO(%)	0.07	Na <sub>2</sub> O(%)	0.071	V(%)	0.008
Cl(%)	0.048	Ni(%)	0.028	Zn(%)	0.005
Co(%)	0.007	P(%)	0.007	Zr(%)	0.006
Cr(%)	0.045	Pb(%)	<0.002	LOI 1000(%)	4.67
Cu(%)	0.014	S(%)	0.028	LOI 371(%)	4.05
Fe(%)	<b>59.6</b>	SiO <sub>2</sub> (%)	<b>7.81</b>	LOI 650(%)	4.49



## 1.4 Current Status of Proposal

WDRL's proposed Roper Bar Iron Ore Project is currently awaiting relevant environmental approvals before mine development can progress. A brief outline of the process to date is listed below:

### 1.4.1 Project Approvals

The Roper Bar Iron Ore Project (the project) was referred in 2011 under the NT *Environmental Assessment Act 1982* (EA Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The project was determined by the NT Minister for Natural Resources, Environment and Heritage to require formal environmental assessment under the NT EA Act at the level of Environmental Impact Statement (EIS). The Australian Government Minister for Sustainability, Environment, Water, Population and Communities, declared that the project is a Controlled Action under the EPBC Act. NRETAS and DSEWPaC have agreed that the Environmental Assessment of the project would be assessed under the bilateral agreement between NT and the Australian Government's.

### 1.4.2 The EIS process

This EIS provides the framework for considering the environmental, social, cultural and economic impacts of the proposed mine in the context of legislative and policy requirements and forms the basis of advice to the responsible Minister. The public will have the opportunity to review and provide comment on the proposal during the assessment period. This EIS addresses the assessment Guidelines as proposed by the Northern Territory Government (refer to Appendix A)

This Environmental Impact Statement (EIS) presents the results of a series of environmental, social and cultural assessments undertaken to generate baseline data and scope the impacts (positive and negative) and management implications for the proposed mine.

This Chapter (Chapter 1) provides an introduction to the project and the project proponent, (Western Desert Resources Limited), the assessment process under both the Australian and Northern Territory Governments, and the process of preparing the EIS and the public review process for this EIS.

This report is the primary source of information for the government and the public to use to assess this project. The public will have the opportunity to review and provide comment to the Government during their assessment period. This EIS addresses the assessment Guidelines as proposed by the Australian and Northern Territory Governments (refer to Appendix A).

The National Strategy for Ecologically Sustainable Development (NSED) (December 1992) defines ecologically sustainable development (ESD) as; *Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased.* The Northern Territory *Environmental Assessment Act 1982* does not specifically incorporate ESD however the above definition was endorsed by the Council of Australian Government in 1992.

The principles of ESD have assisted in determining the best way to develop this project. This has included employment of the precautionary principle, especially in regard to any aspects of the project where any level of uncertainty may exist.

WDRL aim to ensure ongoing best practice environmental management, which has required a whole-of-project approach to risk assessment and ensured that ESD was considered in the engineering designs, the management practices and the ongoing management, rehabilitation and monitoring plans.

The principals of ESD can be identified as five key concepts:

1. Long and short term economic, environmental, social and equitable considerations;
2. The precautionary principle;
3. Inter-generational equity;
4. Conservation of biological diversity and ecological integrity; and
5. Improved valuation, pricing and incentive mechanisms.

Several of these key concepts associated with points 1, 3 and 5 are difficult to manage for a resource extraction activity that has a finite timeframe so WDRL has identified a social benefits offsets package that aims to provide this remote and impoverished region with social and economic benefits far beyond the lifespan of the mining operation.

The accepted method for determining if the principles of ESD can be adopted is via the identification and understanding of risks. The risk assessment presented in Chapter 9 has been based on international best practice and undertaken using standardised methodologies. The risk assessment process diagram provided in the EIS Guidelines (Appendix A) as Figure 1, describes an iterative process of continual improvement, such that controls implemented may include alteration of Project components, design or operation.

### **1.4.3 EIS Scope and Structure**

Information outlined in the EIS document applies to the design, construction and operation of the Iron Ore Mine including haul roads and ore loading facility. The geographical extent of the EIS is limited to areas potentially influenced by the project. An Executive Summary of the EIS has been issued as a stand-alone document for interested parties who may not wish to read the EIS in its entirety.

The main body of the EIS (this document, Volume 1) is structured into sections to conform with the Department of Natural Resources, Environment, The Arts and Sport (NRETAS) Guidelines for the Preparation of an Environmental Impact Statement. The guidelines have been attached as Appendix A. The Document Cross-reference (Appendix B) identifies where in the EIS document the relevant risks, requirements, assessment and management actions can be found.

Technical appendices providing detailed information on many aspects of the project are attached to the EIS as separate documents in Volume 2.

## **1.5 Guidelines & Level of Assessment**

The project has been determined to require an EIS by the Environment and Heritage Division of NRETAS and the Environment Minister of the NT. The Commonwealth Government Department of SEWPaC and the Commonwealth Environment Minister declared the project a Controlled Action under the EPBC Act. The relevant agencies have agreed to conduct the Assessment under the Bi-Lateral Agreement between the NT and the Commonwealth. Specific details regarding the agreement and its administration can be found on the relevant department's websites.

## **1.6 Public Consultation and Review Process**

This EIS has been released for public comment. This process was facilitated by the advertising of the public consultation process in the NT News, Katherine Times and the Australian Newspapers. Dates for submissions are included on the advertisements and available on the NRETAS website.

Copies of the document are available on the NRETAS website, and a list of where hard copies are available is included in the EIS Guidelines at Appendix A.

## 1.7 Studies Conducted for the EIS

Various studies have been undertaken to support the development of the EIS and there are plans for ongoing work throughout continued planning and then construction and operations.

Specific work undertaken includes:

- Vegetation surveys and mapping, including fine scale vegetation mapping (1:25,000 scale), habitat characterisation and local assessment for the presence of weed species. Assessment of the vegetation and notable habitat along the Haul Road Corridor was conducted by mapping and targeted on-ground survey. All on ground vegetation surveys coincided with the timing for fauna assessments which were carried out during the build-up rains (Oct – Nov) or the early (Dec- Feb) to late wet season (March - April). Vegetation surveys were conducted by EcOz Ecologists. Detail is provided within Appendix D;
- Terrestrial Fauna Surveys - A series of fauna surveys were conducted for all three potential zones of impact (Mining Lease Area, Haul Road route and Coastal Port) in order to characterise habitat types and species present within the study areas. Four standard fauna surveys were conducted within the MLA, which included two surveys in the build-up period (October 2010) and two surveys in the early dry season (June 2011). This aimed to capture the main temporal differences to species assemblages at this location. Five standard fauna surveys were conducted along the proposed haul road alignment in locations that were considered to support typical habitat for the area (i.e. open woodland) and habitat regarded to potentially support higher biodiversity values (i.e. the rocky ridges and gullies). A total of 21 sites were established during these surveys, which occurred between November 2011 and February 2012. One standard fauna survey was conducted for the proposed stockpile facility and conveyor belt alignment. Seven sites were surveyed to include the main vegetation types present in areas proposed to be cleared and disturbed. The survey was conducted in late February 2012. All surveys were carried out by EcOz Ecologists and further information is available in Appendix D;
- Aquatic fauna surveys were conducted at five sites in October 2011 by David Wilson (Aquagreen-aquatic specialist), with three on the Towns River, and one each on Magaranyi River and Yumanji Creek – the two major tributaries downstream of the Towns River. No surveys were conducted along the haul road route and port facility as those developments are not expected to result in significant long term disturbance of wetland or riparian zones. Results from these surveys is presented in Appendix D – Terrestrial and Aquatic Biodiversity;
- Freshwater macroinvertebrate surveys were conducted at eleven sites in April 2012 by EcOz Environmental Services, including paired upstream (i.e. control/reference) and downstream (i.e. potential impact) sites on the Towns and Magaranyi Rivers (mine site) and four major streams along the proposed haul road route. Results from these surveys are presented in Appendix S.
- Surface Water - Mine site surface water hydrology by Golders (report as EIS appendix N), Haul road surface water hydrology completed by VDM and surface water quality by EcOz;
- Groundwater - Hydrogeology and groundwater report by Pendragon Environmental Solutions (report as EIS appendix E), Groundwater modelling report by RPS (appendix to Appendix E);
- A detailed risk assessment has been undertaken (Chapter 9) and has resulted in the identification of two additional risks above what was identified with the NRETAS Draft EIS Guidelines. Acid Mine Drainage (AMD) has been found present within the ore bodies and is likely to become an issue during mining and re-alignment of a section of the Towns River is also likely and therefore poses a risk. These and other risks are presented in Chapter 9 of the EIS;
- Acid Mine Drainage - Analysis of 204 samples from drill holes on site, using acid base accounting methods – AMD Management Plan by Pendragon Environmental Services (report as EIS appendix K);

- Assessment of erosion and sediment control requirements, resulting in three Erosion and Sediment Control Plans – one each for the mine site, haul road and stockyard area (VDM Consulting Services); these are found in Appendix L;
- A 12 month baseline adult mosquito monitoring program was initiated in February 2012 by EcOz Environmental Services, in collaboration with NT Medical Entomology, background information and management is outlined in Appendix O – Biting Insect Management Plan;
- Community consultation and social impact assessments have been carried out. Appendix G – Social Impact Assessment details the assessment carried out by Social Compass, and Appendix H – Consultation Reports, supplies information on consultations undertaken with local communities and stakeholders by Rowland;
- Two archaeological surveys (haul road and mine site) have been completed by Dr. Silvano Jung, archaeological consultant (Ellengowan Enterprises) and are presented within Appendix I and J; and
- A Draft Haul Road Traffic Management Plan (VDM Consulting Services) which details design and management of the Haul Road including the Savannah Way/Nathan Road intersection.

A full list of supporting appendices is presented in Table 1-5 below.

**Table 1-5: Appendices List**

<b>Report</b>	<b>Appendix</b>
EIS Guidelines	A
Document Cross Reference	B
Environmental Management Plans	C
Terrestrial and Aquatic Biodiversity	D
Hydrogeology Report	E
Weed and Pest Management Plan	F
Social Impact Assessment	G
Consultation Reports	H
Archaeological Report Haul Rd	I
Archaeological Report Mine Site	J
Acid Mine Drainage Management	K
Erosion and Sediment Control Plans	L
Noise Technical Report	M
Surface Water Hydrology Report	N
Biting Insect Management Plan	O
Rehabilitation and Closure Plan	P
Commitments Table	Q
Water Management Plan	R
Macroinvertebrate Sampling Report	S
Draft Haul Road Traffic Management Plan	T

## 1.8 Relevant Legislation and Policy

### Legislative Background

This section identifies the legislation relevant to this development and introduces the aims and intent of the legislation and how these intents have been addressed in this development.

#### 1.8.1 Commonwealth Legislation

##### Environment Protection and Biodiversity Conservation Act 1999

Assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is required for actions that are likely to have a significant impact on a Matter of National Environmental Significance (NES), or on the environment in general by Commonwealth agencies, or on Commonwealth land.

The matters of national environmental significance are:

- World Heritage properties;
- National Heritage places;
- Wetlands of international importance (Ramsar wetlands);
- Threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas;
- The Great Barrier Reef Marine Park; and
- Nuclear actions (including uranium mines).

The Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) administers the Act and has established a formal referral and assessment process. If SEWPaC determines a project will likely significantly impact a matter of national significance it is declared a “controlled action” and is required to undergo assessment and approval under the EPBC Act. In the Northern Territory this will be through the bilateral agreement between the Northern Territory and Australian governments. If the project is not a controlled action, assessment will proceed under the Northern Territory legislative approvals process.

Environments affected or potentially affected by the Project include those within the mining and processing plant area, the immediate areas surrounding these operations, along the road used by mine vehicles and trucks to access the mine, the 165km haul road, the stockyard and barge loading facility at Bing Bong and the marine environment where transit and transfer of ore is conducted.

An EPBC Act Protected Matters Report generated on these locations and area surrounding them indicates that none of the areas is within or near a site mentioned in the matters of National Environmental Significance (namely World Heritage; National Heritage; The Great Barrier Reef; Commonwealth marine areas) mentioned above.

In regards to nuclear actions, the project does not involve uranium mining or mining of any radioactive elements.

The project is in the vicinity of recorded habitats for nationally listed threatened species and nationally listed migratory and marine species. Potential impacts on the overall status of these species are considered minimal, and the terrestrial and aquatic ecology investigations have supported this.

##### Native Title Act 1993

The *Native Title Act 1993* provides legal recognition of the rights and interests of the Aboriginal people over land and water possessed under their traditional laws and customs. The Act sets out basic

principles regarding native title in Australia and establishes a regulating and governing body, the National Native Title Tribunal.

The Act also sets out processes by which native title rights are established, protected and compensation determined. Another important function of the Act is through facilitating Indigenous Land Use Agreements between native title parties and other interest holders.

The entire project is on some form of leasehold land where either Native Title has been granted or has been sought. All activities associated with the proposal are proceeding under the assumption that Native Title exists.

WDRL has instigated a community consultation strategy based on open sharing of information with all stakeholders and communities including the NLC and Northern Territory Government. WDRL has developed a stakeholder matrix and consultations with key stakeholders such as Australian and Northern Territory Government departments, land councils, land managers, land owners and traditional owners has been open and ongoing since exploration began in the area.

WDRL collaborates with Indigenous communities by identifying and protecting areas of cultural significance while it consults with traditional owners and land councils about the company's current and planned activities. This ensures that respect and trust occurs both ways with WDRL respecting the connections of Aboriginal people with their land and sites of significance and the Aboriginal people and their Councils respecting the staff and the work carried out by WDRL (more detail is available in Appendices G and H).

### **Aboriginal Land Rights (Northern Territory) Act 1976**

The *Aboriginal Land Rights (Northern Territory) Act 1976* provides for the granting of inalienable freehold title to traditional Aboriginal owners of land in the Northern Territory, the establishment of Land Councils, and the establishment and management of Land Trusts to hold the Aboriginal land for the benefit of traditional owners of the land. The Act also regulates exploration and mining on Aboriginal land and sets out the processes to be followed when negotiating with Traditional Owners for access to and leases over Aboriginal land. An exploration license cannot be granted in relation to Aboriginal land without the consent of the relevant Land Council (for the traditional owners) and the Minister. A mineral lease cannot be granted unless an agreement has been entered into under the act.

### **Revised National Weeds Strategy 1999**

The Revised National Weeds Strategy (RNWS) was produced by the Commonwealth Government in 1999 to reduce the impact of weeds on the sustainability of Australia's productive capacity and natural ecosystems by adopting a more coordinated and integrated approach to weed management.

A central component of the RNWS is the identification of Weeds of National Significance (WONS) which have been determined based on the invasive tendencies, impacts, potential for spread and socioeconomic and environmental values. A total of 20 species have been given WONS status as a result of this process. The RNWS takes a strategic approach to weed management issues of national significance through a critical assessment of existing weed management measures and lists the roles and responsibilities of government, community, landowners and land users.

Two of the principles upon which this strategy is based relate to the roles and responsibilities of weed managers. These principles are -

1. Successful weed management requires a coordinated national approach which involves all levels of government in establishing appropriate legislative, educational and coordination frameworks in partnership with industry, landholders and the community; and
2. The primary responsibility for weed management rests with landholders/land managers but collective action is necessary where the problem transcends the capacity of the individual landholder/land manager to address it adequately.

## **Quarantine Act 1908**

The *Quarantine Act 1908* regulates international border protection, including the import and export of invasive species that have the potential to cause significant damage to people, economic activities, plants, animals and the natural environment. This act is administered by the Australian Government Department of Agriculture, Fisheries and Forestry and enables the Australian Quarantine and Inspection Service to physically prevent the introduction of invasive plants and animals through the inspection of vessels, luggage, mail, animals and plants and their products.

On 1 July 2001, Australian Government introduced mandatory *Ballast Water Management Requirements* under the Quarantine Act to reduce the risk of introducing harmful aquatic organisms into Australia's marine environment through the discharging of ballast water from international vessels. These requirements strictly prohibit the discharge of high risk ballast water in Australian ports or waters, and require all international vessels intending to discharge ballast water anywhere inside the Australian territorial sea to manage their ballast water in accordance with Australia's *Ballast Water Management Requirements*.

## **Agricultural and Veterinary Chemicals Code Act 1994**

All pesticides (herbicides, insecticides and fungicides) used, supplied or distributed in Australia must be registered under the *Agricultural and Veterinary Chemicals Code Act 1994* by the Australian Pesticides and Veterinary Medicines Authority (APVMA). All APVMA approved chemicals (or products) have affixed product labels, which contain specific usage requirements and application rates. Label breaches can result in prosecutions under this Act. Permits for the use of herbicides in a manner not specified on the label are issued by the APVMA.

### **1.8.2 Northern Territory Legislation**

Environmental permitting of mining activities is regulated in the Northern Territory by both the Mining Management Act and the Environmental Assessment Act.

A decision on the appropriate permitting route for new mining proposals in the Northern Territory is initiated by the proponent's submission of a NOI to the Northern Territory Government through the Minerals and Energy Referral Assessment branch of the Department of Resources (DoR). If assessment under the Environmental Assessment Act is thought to be required, the NOI is referred to the Minister for Natural Resources, Environment and Heritage through NRETAS for determination of the appropriate level of assessment. This project has been determined as requiring an EIS. The Environment and Heritage Division (E&H) prepares Draft Guidelines for a project which is required to be assessed under the *Environmental Assessment Act* in consultation with relevant advisory bodies. The Draft Guidelines provide advice to the proponent regarding the issues that will need to be addressed in the EIS.

Draft guidelines are made available to the public for comment and review for a period. At the close of this period, E&H takes into consideration any public comments and advice from relevant advisory bodies and finalises the Guidelines for approval by the Minister for Natural Resources, Environment and Heritage. Once approved, the Minister forwards the final Guidelines to the proponent to prepare the EIS. Reports are available to the public as a hard copy at the E&H Division.

Once the proponent receives a copy of the final Guidelines and a direction from the Minister for Natural Resources, Environment and Heritage to prepare an EIS, the proponent prepares the EIS. There is no statutory timeframe in which the proponent is to prepare the EIS unless specified by the Minister.

Once the EIS has been submitted it undergoes a minimum public review period of 28 days (42 in this case). During this time, the EIS is also circulated to various government advisory bodies for comment in their area of expertise. Invitation for public comment is advertised by the proponent in various media, and copies of the EIS are placed on display at NT libraries and other suitable locations as well as the Northern Territory Government website. The proponent also makes copies available for sale.

At the close of the public review period, the Minister has 28 days in which to make a determination about the proposal. This decision is based upon the contents of the EIS, issues raised in any comments received and advice from the various advisory bodies. The Minister's determination is included in the Assessment Report which also includes any suggestions or recommendations concerning conditions which should apply to the proposal in order to minimise potential environmental impacts and to protect the environment. The Assessment Report is forwarded to the approving Minister for consideration (that is, the Minister responsible for approving the proposal).

The Assessment Report is publicly available through the web site. All Assessment Reports are available to the public as a hard copy at the E&H Division.

Following completion of the assessment and approval process under the Environmental Assessment Act the DoR proceeds with the approval process under the *Mineral Titles Act 2010* and *Mining Management Act*.

### **Mineral Titles Act 2010 and Mining Management Act 2011**

The *Mineral Titles Act 2010* and the *Mining Management Act* are the principal legislation for the regulation of mining proposals in the Northern Territory, both of which are administered by the DoR.

The *Mineral Titles Act 2010* establishes the framework within which activities to explore for and mine mineral resources can occur. The Act sets out the administrative processes for authorising these activities through the granting of a title.

Prior to any activities taking place on a granted Mineral Lease, an authorisation to carry out mining activities under the *Mining Management Act* must be obtained. The objectives of the *Mining Management Act* are to ensure that the development of mineral resources is in accordance with the best practice health, safety and environmental standards and to protect the environment and health and safety of all persons on mining sites.

Under the *Mining Management Act*, an application for an authorisation to carry out mining activities must be accompanied by a Mining Management Plan (MMP). An MMP includes information relating to the description of mining activities, the management system to be implemented for the management of health, safety and environmental aspects, costing of closure activities and particulars of organisational structure. Plans of any existing or proposed mine workings and infrastructure must also be included. The MMP is required to be reviewed at intervals specified in the authorisation to carry out mining activities.

### **Environmental Assessment Act 1994**

The *Environmental Assessment Act* and the *Environmental Assessment Administrative Procedures* establish the framework for the assessment of potential or anticipated environmental impacts of development, and provide for protection of the environment. The Northern Territory Minister for Natural Resources, Environment and Heritage is responsible for administering the Act. The Minister also determines the appropriate level of assessment for new developments or material changes to existing operations, based on the sensitivity of the local environment, the scale of the proposal and its potential impact upon the environment.

This EIS reports to the administrators of the *Environmental Assessment Act* and members of the public the potential impacts of the project and demonstrates that the risks have been appropriately addressed.

### **Water Act 2011**

The *Water Act* is administered by the Water Resources Branch of the NRETAS and provides for the investigation, allocation, use, control, protection and management of surface water and groundwater resources, as well as the administrative process for licensing these activities. The Act allows the enforceable allocation of water to various declared beneficial uses including; agriculture, aquaculture, public water supply, riparian and industry, while ensuring that adequate provisions are made to maintain cultural and environmental requirements.



Water Control Districts are declared in areas where it is recognised that increasing development and demand for water have the potential to cause degradation to water quality and reduce flows required to maintain water dependent ecosystems in the region. Water extraction licences are required for extraction greater than 5ML/year within a Water Control District however mining activities are exempt from this requirement as well as water extraction for domestic or stock watering purposes.

In regards to waste disposal licensing, this project is not planning to discharge any waste off the Mineral Lease, if off-lease discharge is required a waste discharge licence will be sought. Waste is defined in the Water Act as any solids, liquids or gas, which, if added to the water, may pollute the water.

### **Territory Parks and Wildlife Conservation Act 2011**

This Act applies statutory obligations in relation to the protection of flora and fauna. This Act allows the listing of threatened species with special conservation status, and requires a permit to be obtained prior to interference with these species.

### **Pastoral Land Act (NT) 1992**

The *Pastoral Land Act 1992 (NT)* makes provision for the conversion and granting of title to pastoral land as well as the administration, management and conservation of pastoral lands. The objects of the Act are, amongst other things, to provide a form of tenure of Crown land that facilitates the sustainable use of land for pastoral purposes, recognise the right of Aboriginal people to follow traditional pursuits on pastoral land, and provide a procedure to establish Aboriginal Community Living areas on pastoral land.

Pursuant to the terms of the Act a pastoral lease is subject to a reservation in favour of the Aboriginal inhabitants of the NT and of the leased land. It allows for the Aboriginal inhabitants to take and use the water, flora and fauna on the leased land subject to certain restrictions and conditions.

The Act allows for a pastoral lessee, with the consent of the Minister, to sublet part of the leased land for Aboriginal community living purposes to an incorporated body set up for the management of the Aboriginal community. The Act also provides for Aboriginal people to apply to the Minister for an area of land comprised in a pastoral lease to be removed from the pastoral lease and granted to the applicant as freehold land for the purpose of a community living area (this provision is similar to provision repealed in the Crown Lands Act).

### **Northern Territory Aboriginal Sacred Sites Act 1989**

The *Northern Territory Aboriginal Sacred Sites Act 1989* recognises the need to preserve and enhance Aboriginal cultural tradition in relation to certain land in the NT and Aboriginal self-determination. The Act provides for the protection and registration of sacred sites by the traditional owners of the sacred sites or the custodians who have the responsibility for protecting a sacred site in accordance with Aboriginal tradition.

The Aboriginal Areas Protection Authority (AAPA) is responsible for administering the Act and records and maintains a sacred sites register. Custodians may apply to the AAPA to have a sacred site included in the Register and may also include, amongst other things, restrictions on activities that may be carried out on or in the vicinity of the sacred site.

Unauthorised entry on to a sacred site is an offence under the Act and penalties are prescribed accordingly. A person or entity may apply to the Authority to issue an Authority Certificate to allow a person or entity to undertake work on or in the vicinity of a sacred site. Again, unauthorised entry to undertake work on or in the vicinity of a sacred site is an offence under the Act and penalties are prescribed.

The Minister may issue a Minister's Certificate for work to be undertaken on or near a sacred site when an Authority Certificate has not been issued. Whilst a Minister's Certificate has the same effect as an Authority Certificate, in the event of variance the Authority Certificate will have no force or effect.

The Act provides for the preservation of proprietary rights of owners of land comprised in a sacred site. Proprietary owners may enter and remain on that land and do anything on that land for the normal enjoyment of that owner's proprietary interest in the land.

WDRL have a granted AAPA Certificate for their mining lease application areas and have made application to AAPA for an authority certificate to perform works in relation to the haul road and stockyard facility.

### **Weeds Management Act 2001**

The *Weeds Management Act* was enacted on 1 July 2001, replacing the former *Noxious Weeds Ordinance 1962*. The new Act has been written to reflect contemporary thinking with respect to community weed management; to reflect greater responsibility for all land managers, and to ensure that landholders are responsible for carrying out weed control on their associated lands. This Act is linked to the *Northern Territory Weeds Management Strategy 1996-2005* that has the objective 'to protect the Northern Territory economy, community, industries, and environment from adverse impacts of weeds'.

The Northern Territory Government uses the 'NT Weed Risk Management System' to identify and prioritise plants to be considered for declaration as weeds in accordance with the *Weed Management Act* and to determine the appropriate management response for those plants.

Declared species are assessed on the severity of impacts and likelihood of its control using a number of parameters including:

- Invasiveness: mode of reproduction, and potential to disperse;
- Impacts: capacity to modify the environmental, social or economic values;
- Distribution: current distribution and potential distribution based on favoured habitat.

As well as:

- Costs and ease of control: ease of detection, accessibility of the site, cost of control methods and effectiveness, time to reproduction from a new plant, reproductive capacity (e.g. duration the weed may reproduce and the amount of reproductive parts) and factors contributing to the spread or establishment of the weed; and
- Persistence: how long propagules may remain viable in the environment and the probability of re-invasion.

NT Weeds Management Act 2001 states that the owner and occupier of land must:

- a) Take all reasonable measures to prevent the land being infested with a declared weed;
- b) Take all reasonable measures to prevent a declared weed or potential weed on the land spreading to other land; and
- c) Within 14 days after first becoming aware of a declared weed that has not previously been, known to be present on the land, notify an officer of the weeds location.

### **Other Relevant Legislation**

Other Northern Territory legislation relevant to the project includes the following acts and their associated amendments and regulations:

*Bushfires Act 2009.*

*Control of Roads Act 2011.*

*Dangerous Goods Act 2011.*

*Dangerous Goods (Road and Rail Transport) Act 2010.*

*Environmental Offences and Penalties Act 2011.*

*Heritage Conservation Act 2008.*

*Miscellaneous Acts Amendment (Aboriginal Community Living Areas) Act 2000.*

*Planning Act 2009.*

*Soil Conservation and Land Utilisation Act 2009.*

*Traffic Act 2011.*

*Waste Management and Pollution Control Act 2011.*

*Workplace Health and Safety Act 2011.*

## **1.9 Project Alternatives**

As with each project, a wide range of options are considered during the assessment of the feasibility of the project. The identification of the most appropriate method of developing and operating the project is often the catalyst to the project reaching the stage where a decision to proceed with the project is made.

One complicating factor that is required to be accounted for during project development stages is that environmental and regulatory approvals are generally lengthy processes, requiring in excess of a year to collect relevant baseline information and complete the appropriate studies. This factor results in the economic determination of some companies to begin the environmental and regulatory approvals process prior to the final decisions as to how the project should proceed and prior to the most appropriate method of developing and operating the project having been determined. The ability to seek approvals during the project development stage can dramatically impact the feasibility of the project as the operation of a Company to maintain and investigate a mining prospect may cost in the order of several millions of dollars a month, and without an income from the project this expenditure is unsustainable.

As discussed previously (Chapter 1.2.2) the ore grade of the Sherwin Ironstone had an impact on the project development plans, with a movement from a DSO project, to beneficiated iron ore, and back to DSO again. The result of this phase of discoveries dramatically impacted the project's development stages and the position that has been reached as to how the project should now proceed, with the focus now being to develop a DSO project of significant enough quantities to warrant stand-alone transport infrastructure.

Once the DSO project was determined as the way forward a number of alternatives were considered for the various Project components. WDRL conducted a systematic evaluation of those alternatives during the scoping and feasibility studies based on a number of criteria including economics, technical feasibility and environmental and social acceptability.

Project alternatives and options considered during the planning process included:

- Not proceeding with the proposal;
- A range of mining methodologies, including improvements in energy consumption and efficiencies;
- Open pit optimisation and mining schedules, to enable sustainable production in a controlled manner;
- Open pit location and size;
- Re-alignment of the Towns River;
- Location of associated facilities;
- Run-of-mine (ROM) ore handling, preparation and processing;

- Ore handling and transportation;
- Overburden and waste management for long-term, stable landforms;
- Disposal of general waste after all recycling options have been exhausted;
- Disposal of sewage;
- Raw water supplies for construction and operations;
- Improved water storages to capture and reuse mine affected water;
- Power supply during construction and operations;
- Distribution of site power;
- Energy use and efficiencies;
- Accommodation options;
- Methods to transport the construction and operations workforce; and
- Rehabilitation methods and environmental management techniques.

The selection of the proposed development options for each Project component has been achieved after consideration of environmental and regulatory approvals requirements, economic aspects associated with capital requirements and operational costs, social and community concerns and industry standard practices for construction and operation.

This section of the EIS presents the alternatives that were investigated to demonstrate that WDRL have explored a range of project alternatives and to allow the reader to understand why the current project proposal is the most appropriate.

### **1.9.1 Not Proceeding with the Proposal**

The development of the Roper Bar Iron Ore Project represents the single largest economic opportunity for the region in its history. It is unlikely that any other economic opportunities of any size and value exist in the region. For over a century the Pastoral Industry has endeavoured to sustain itself within the region but has failed successively due to the unsuitability of the environment to sustain a pastoral industry. Three of the four townships nearby the project (Ngukurr, Minyerri and Numbulwar) have few if any current economic activities and for a variety of reasons there are few and limited development opportunities available to them. This project offers a significant short term employment opportunities and investment of funds into these communities to assist with the long term economic sustainability of the region.

The development of the Project presents the wider community with a variety of sustained opportunities associated with the construction and operation of the mine in this region. This project and associated activities are offering opportunities to remote and regional Territorians in a development marketplace that has been very Darwin focussed and often requiring a high level of technical expertise.

A further consequence of not proceeding with the Project would be that a significant iron ore resource would remain undeveloped and associated socio-economic benefits unrealised. Mining is a profitable activity for the Northern Territory and Australian economies and should the Project not proceed, this significant resource would remain unutilised. Local, regional, Territory and Australian economies would not benefit from the employment, trade and export of goods associated with the Project and potential mineral royalties.

### **1.9.2 Alternatives to Selected Sites**

The location of the mining areas has been determined by the presence of the ore body and the initial mining areas have been determined by the grade of the ore. This aspect is relatively fixed and the only

alternatives assessed were regarding whether there were any cultural, environmental or other constraints associated with the selected mining areas.

The location of the Towns River near deposit F makes mining of this deposit impossible without altering the location of the water flow. The only alternative option identified associated with this issue was whether the deposit would be mined or not. If deposit F is removed from the potential ore reserves the viability of the project is dramatically impacted to the point where it would no longer be a viable project.

In the design of the realignment of this section of river it was determined that the construction and maintenance of a permanent channel would provide a more sustainable option than a temporary channel that may facilitate returning the flows to the original alignment. A risk assessment of this activity identified that the risks associated with a temporary alignment followed by a return to something like the original alignment were too great. The fact that the original alignment is to be an open pit for an undetermined amount of time, after which, if infilled will contain materials that are expected to take considerable time to compact and consolidate to a point where it would be possible to re-construct a channel through this material.

The site for the ROM pad, crusher, and associated infrastructure was selected based on a variety of criteria including proximity to currently proposed and future potential mining areas and proximity to transport. These sites were then assessed against geotechnical, environmental and cultural aspects to ensure that the chosen site was acceptable to all stakeholders.

Internal roads within the mining lease have been determined based on the need to transport large volumes of ore and waste around the site. Such infrastructure has been designed so as to take account for potential future aspects of the project to ensure the minimisation of the overall footprint. These factors were then assessed in relation to topography, drainage, ecology and other environmental factors as well as cultural sites, to determine a best fit scenario.

The site selection process for the mining camp and associated infrastructure met all of the relevant criteria based on the first attempt at siting. This process was aided by the local knowledge gained by on site staff during the exploration stages of the project. The camp is required to be sufficiently distant from noise generating activities associated with the mining operation and also within easy and economically viable commuting distance. The selected camp location is approximately 2.5kms from the project airstrip and approximately 8kms from the mine infrastructure areas. The design of the camp is based on best available knowledge associated with the construction and operation of remote mine site camps elsewhere in the Territory and Australia.

### **1.9.3 Alternative Transport Options**

Various alternate transport routes have been considered. As mentioned previously the type of ore that is mined and whether or how it is processed has a substantial impact on the decisions regarding the range of transport options available.

Initial discussions regarding transport options were taking place with a potential joint venture partner with similar mining interests in the region. These discussions ended as, amongst other things, the project development timeline of these companies varied to the point where development of shared infrastructure would not be possible at this stage.

These initial discussions focused on the option of a rail corridor transporting ore towards the west to meet the Adelaide to Darwin Railway to transport the ore to the Port of Darwin for export. The size of the Direct Shipping Ore resource remains insufficient to support the capital outlay associated with a railway. The option of road to the Adelaide to Darwin Railway and then railway transport to Darwin was also investigated. This would require a major upgrade of the Roper Highway and additional passing loops on the railway and would again be prohibitively expensive as well as potentially socially irresponsible due to the generation of a large volume of heavy haulage traffic onto a public road.

Additionally, the Port of Darwin doesn't have sufficient capacity to handle the proposed output of WDRL. About 3 million tonnes per year of ore is currently exported from the Port of Darwin and the port is at capacity for bulk minerals handling. WDRL plan to export up to 3 million tonnes of ore a year alone which would require doubling of the existing port capacity. The potential impact on the port and associated infrastructure and vessel traffic in Darwin harbour were not investigated but likely to produce a noteworthy impact.

As the development of the project suggested that it would become a Beneficiated Ore project, the need to change the transport options arose. The development of a BFO project would be a significantly larger project than that now proposed and would require several times more capital outlay. This results in the need to guarantee appropriate volumes of product to support such outlay. The BFO product is a very fine (sub mm) product as the ore must be crushed and ground to enable the liberation of silica. Such a fine product is most efficiently and effectively transported as a slurry via a pipeline.

A Slurry Pipeline almost directly (40kms) to the coast was investigated. Some investigations into the development of a port on the coast were undertaken but soon discounted due to the fragile nature of the coastline, the potential environmental impacts and the excessive distance of very shallow water immediately off shore. The obvious next step was to extend the pipeline proposal to an offshore location and hence Maria Island was selected as a potentially suitable location to end the pipeline, construct a slurry dewatering plant, ore stockpile and barge or ship loading facilities.

Although a pipeline is a low impact operational activity through its corridor of delivery, the investigation of the route that a possible pipeline would take via the Marra Land Trust to Maria Island was discounted because:

- a) Some of the Owners of the Marra Land Trust opposed it traversing their lands;
- b) Sensitive Wetland Coastal areas would be potentially disturbed in the construction phase;
- c) The trenching of the Pipeline between the Coast and Maria Island on the sea bed may disturb the environment and habitat of listed species;
- d) The proposed footprint of activities on Maria Island was not acceptable to some stakeholders; and
- e) Traditional Owners of Maria Island were not supportive of the Islands use.

As a result of these investigations and the fact that the project plans reverted to that of a DSO project, the potential to use Bing Bong Loadout Facility arose.

Although the Capital and Operational Costs associated with the use of Bing Bong are likely to be greater, the environmental and social effects created by the duplication of such a facility as opposed to the utilisation of existing resources at Bing Bong were seriously considered and have been deemed to be the best triple bottom line option.

The use of public roads between the mine site and the Port of Bing Bong was not considered due to the poor state of the road, public safety, the indirect length of the Savannah way and the likely level of disturbance to the wider community. Therefore a separate private haul road was suggested.

The proposed location of the Haul Road from the Mine site, 165kms to the Port of Bing Bong has been determined as being the option which will have the minimum impact on the stakeholders of lands through which it passes. Further, its location has been determined after significant consultation with Traditional Owners and native title holders, including a targeted route survey attended by the NLC to ensure sacred site and cultural issues have been properly identified and recorded.

Specific considerations of the environmental impacts were accounted for so that the chosen route was of minimum affect. Further, the engineering requirements, especially with respect to river crossings and water flows, were fully accounted for in the roads placement and design. An initial study corridor of 10km is constantly reduced as aspects and impacts are narrowed to allow determination of the best route.

#### **1.9.4 Alternative facilities and activities at Bing Bong**

The location of the ore storage and handling area or 'stockyard' at Bing Bong has been chosen to avoid impacts on the existing Xstrata operation, avoid impact on other land uses and users and to minimise environmental impacts. The siting of the conveyor has also taken environmental and other potential constraints into consideration. The choice to completely enclose the conveyor was made to reduce the environmental impact, in particular the potential for dust to be generated from this activity. The positioning of the barge loading point also underwent review against a variety of considerations and the position chosen is based on minimising the footprint on sensitive areas.

The location of the barge docking locations has been determined by the availability of space within the existing harbour. This location was accommodated so that minimal alterations to the harbour are required. The footprint of the harbour is to remain the same, with some stabilisation works proposed and some minor dredging to deepen an area for berthing. The channel and remainder of the harbour is to be utilised as is.

A variety of barges were considered and the selection of self-propelled barges best fits with the current operations and therefore is the least likely to result in unexpected impacts to the harbour or route.

The option to house operational staff within a slightly upgraded but existing accommodation facility at Bing Bong will have the smallest possible environmental impact of the options available.

The development stages of the stockyard are designed around capacity requirements and economic considerations. There are standard and well established procedures for the storage and handling of bulk commodities, including iron ore, and all have similar environmental management considerations.

#### **1.9.5 Alternative sources of Water**

In order to secure a reliable Project water supply, a number of options were investigated. Detailed groundwater and surface water studies have been completed and associated whole of site water balance developed.

The groundwater quality and quantity varies across the site and the use of water from the mine pit dewatering system will be the preferred source of water for mining related water use. Pit dewatering is an essential component of mining so the use of this water removes the need to dispose of that water and reduces the impacts on other potential water sources.

This water will be augmented with stormwater where necessary or required. The stormwater will be stored in sediment control and storage dams around the site.

A number of options were considered in relation to water storages to capture and use mine related and affected water. The Project's water management system is centred on a balance of minimising construction costs and minimising environmental impacts in the forms of project footprint, impact on surface water flows and potential impacts on the downstream environment.

The water for the mine camp will be sourced from an existing groundwater supply bore, which supplies the exploration camp. This bore is separate to the mining impact area and has suitable quality and quantity. The existing water supply from this bore is treated through a reverse osmosis system and this is expected to continue.

Water will be required at the stockyard facility at Bing Bong. Potable water will be supplied via the existing potable water facilities operated by Xstrata. The stockyard area will capture all of the rainfall runoff from the site and store this water for use in the dust suppression systems. It is expected that groundwater will be required to supplement this supply and a bore location, inland from the facility, will be selected in consultation with Xstrata and NRETAS Water Resources Branch.

### 1.9.6 Alternative Energy Sources

The options available to remote mining operations to utilise alternative sources of energy for transport and mining operations are limited. The mining fleet and the transport fleet will be diesel powered. The processing operations will also be diesel powered and as the DSO project only requires crushing and potentially some minor other processes, the energy consumption does not warrant the extra capital expenditure required to provide alternative fuel sources.

When the project was progressing down the BFO path, the energy requirements were considered significant enough so as to warrant investigating alternatives. Alternatives included:

- A gas pipeline from the MacArthur River Mine gas pipeline;
- A gas pipeline from the Amadeus Gas Pipeline (Alice Springs to Darwin); and
- A gas pipeline to a PowerStation that could transmit power to the mine site as well as Ngukurr and other communities and mining operations in the region.

None of these options are currently feasible.

WDRM have granted geothermal energy exploration tenements within the region and intend to investigate the potential of these tenements in the near future.

### 1.9.7 Alternative Environmental Management Measures for Key Risks

Project waste and ore consists of a mixture of potentially acid-forming (PAF) and non-acid forming (NAF) materials. PAF material is one which when exposed to oxygen and water during the mining process, can result in the leaching of sulphuric acid resulting in acidic runoff. It is important that the PAF material be protected from oxidation to minimise the potential for acid leachate to be generated which could harm the surrounding environment. With the presence of PAF material in and around the ore body, a number of methods of management, and therefore reduction of potential environmental risk, were investigated. It is crucial to obtain a detailed and thorough understanding of the presence and nature of the PAF material. The key options determined as being suitable for management of PAF are the construction of appropriate encapsulation structures and the potential placement of such materials back into mined out pits.

Traditional PAF material storage incorporates layers of PAF material incorporated between low permeability NAF material to minimise oxygen and rainfall reacting with the PAF material. The placement of PAF material back into pits either requires similar encapsulation techniques or flooding so as to prevent oxygen ingress.

The precautionary practice of avoiding areas of high likelihood and/or known high concentrations of PAF material, until trial management activities on areas and material of lower risk can take place, have been instigated.

### 1.9.8 Alternative Rehabilitation Methods

Progressive rehabilitation will be implemented where possible throughout the mine life. Progressive rehabilitation provides an opportunity for testing rehabilitation practices, and for the gradual development and improvement of rehabilitation methods. In addition, the visual amenity and stability of the site will also be improved.

The vegetation established on rehabilitated land will be similar to the vegetation type/s and structure that were present before mining commenced. Species selection has a significant impact on the success of a rehabilitation program. Key species that play a dominant role in the function of the ecosystem may be under-represented, resulting in a successional path that differs from the original community. Establishment of vegetation communities consistent with those present prior to mining should ensure that most fauna species will recolonise disturbed areas in time.



Establishing a diverse vegetation community often requires a combination of methods. These can include the use of direct topsoil return, seeding, planting of seedlings and natural recolonisation. Some refinement of the techniques used may be necessary through adaptive management during rehabilitation operations.

### 1.9.9 A comparative description of the impacts of each alternative on the matters of NES

The proposed action has the potential to have a significant impact on the following matters of National Environmental Significance (NES) that are protected under Part 3 of the *EPBC Act*:

- Listed threatened species and communities (section 18 and 18A); and
- Listed migratory species (sections 20 and 20A).

The listed threatened species are:

- Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus*);
- Gouldian Finch (*Erythrura gouldiae*);
- Northern Quoll (*Dasyurus hallucatus*);
- Gulf Snapping Turtle (*Elseya lavarackorum*);
- Green Sawfish (*Pristis zijsron*);
- Freshwater Sawfish (*Pristis microdon*);
- Dwarf Sawfish (*Pristis clavata*);
- Green Turtle (*Chelonia mydas*);
- Flatback Turtle (*Natator depressus*);
- Water Mouse (*Xeromys myoides*);
- Olive Ridley Turtle (*Lepidochelys olivacea*);
- Crested Shrike tit (*Falcunculus frontatus whitei*);
- Red Goshawk (*Erythrotriorchis radiatus*);
- Masked Owl (*Tyto novaehollandiae kimberli*);
- Australian Painted Snipe (*Rostratula australis*);
- Brush-tailed Rabbit-rat (*Conilurus penicillatus*); and
- Australian Bittern – *Botaurus poiciloptilus*.

There is a large list of terrestrial and marine migratory species. Details can be found in Chapter 4.

A comparative description of the impacts of each alternative on the matters of NES is presented below based on the currently proposed alternative on mining DSO and hauling this material to Bing Bong for export versus the previous proposal of a BFO project with a slurry pipeline to Maria Island for dewatering and export.

Details of potential impacts associated with the project are presented in the risk chapter (chapter 9).

The alternatives associated with activities on the mine site are minimal in regard to matters of NES. The greatest identified potential risk was identified as the possible presence of the Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus*). This was identified as a high risk due to its critically endangered status and the confirmed record of one within 100kms of the site. As a result of this, targeted surveys were performed by a bat expert in an attempt to determine if the species was likely to

be present in the area. This species was not identified during these surveys (see Appendix D for details).

The DSO project is of a smaller scale than the originally proposed BFO project. It is likely that approvals will be sought for the BFO project in the future; however there remains no or little differences to the potential impacts on the matters of NES.

The activities associated with the transport options offer significant differences in the potential impacts on the matters of NES. The chosen haul road option removes any direct impacts to the Limmen site of Conservation Significance and the associated migratory bird habitat on and adjacent to the coastline, removes the potential impact from pipeline construction activities from the terrestrial and marine environment and associated species of significance, and removes impacts from Maria Island which had the potential to impact matters of NES.

The haul road itself is unlikely to impact matters of NES. It is within the catchment of sites of significance which are likely to also be suitable habitat for certain protected and migratory species, however a risk assessment of potential impacts from road construction and operations, including unforeseen circumstances, identifies this as very low risk, and only related to potential increased sedimentation as a result of erosion.

The stockyard area has been chosen to avoid valuable habitat and is sited on heavily disturbed land from the operation of the cattle station on which it lies. The use of the existing Bing Bong facility requires minor amendments to the facilities and a small amount of construction related dredging of the existing footprint. This activity dramatically reduces the potential impact on coastal and marine areas that may have occurred if a pipeline and new port were constructed.

The increased vessel traffic associated with the use of the Bing Bong facility is one variable that has increased with the selection of the haul road transport option. Post construction the pipeline option would not require barge traffic from the coast and through the sea grass and shallow water habitat. There have been no indications of potential impacts on species that use these habitats and there has been no indication of impacts on these habitats post construction as a result of the existing activities at Bing Bong. The increased barge traffic has the potential to impact on species and habitats that are associated with matters of NES. The use of the same trafficable route and similar types and sizes of barge is aimed at ensuring that the planned operations offer no potential impacts above and beyond the simple fact that the level of traffic is greater.