

ASSESSMENT REPORT 75

**SHERWIN CREEK IRON ORE PROJECT
SHERWIN IRON PTY LTD**

May 2014

Abbreviations and Glossary	4
Units and Symbols.....	5
Executive Summary	6
List of Recommendations	7
1 Introduction.....	11
1.1 Environmental impact assessment process	11
1.2 Regulatory framework	12
1.3 Environmental impact assessment history	12
1.4 Ecologically sustainable development	14
2 The Proposal.....	15
2.1 The Proponent.....	15
2.2 Project description	15
2.3 Regional Setting	17
2.3.1 Physical	17
2.3.2 Biological	18
2.3.3 Socio-economic/cultural	19
3 Environmental Impact Assessment	22
3.1 Introduction.....	22
3.2 Issues outside the scope of the assessment.....	23
3.2.1 Beneficiated ore	23
3.2.2 Project alterations.....	23
3.3 Alternative options.....	24
3.3.1 Project alternatives.....	24
3.3.2 Ore transport and export.....	25
3.3.3 Water supply.....	25
3.4 Road transport and safety.....	26
3.5 Water Management.....	29
3.5.1 Water supply.....	29
3.5.2 Water Management Plan	30
3.6 Dust	32
3.7 Biodiversity	33
3.7.1 Flora and fauna	33
3.7.2 Matters of National Environmental Significance (MNES)	35
3.7.3 Weeds.....	41
3.8 Acid and metalliferous drainage (AMD)	42
3.9 Erosion and sediment control	43
3.9.1 Erosion and Sediment Control Plan.....	44
3.9.2 Mine site access road incident.....	45
3.10 Socio-economic impacts	46
3.11 Offsets	49
3.11.1 Offsets for Matters of National Environmental Significance	49
3.11.2 Socio-cultural offsets	51
3.12 Mine closure and rehabilitation	52

3.13 Environmental Management Plan..... 53

3.13.1 Environmental Management Plans proposed by the Proponent..... 53

3.13.2 Proponent’s commitments..... 54

4 Conclusions..... 55

4.1 References 55

Appendix A..... 58

Appendix B..... 76

Abbreviations and Glossary

AHD	Australian Height Datum
AIR	Australian Ilmenite Resources
AMD	Acid and metalliferous drainage
BoM	Bureau of Meteorology
CHMP	Cultural Heritage Management Plan
DLRM	Department of Land Resource Management (NT)
DME	Department of Mines and Energy (NT)
DO	Dissolved oxygen
DoT	Department of Transport (NT)
Draft EIS	Draft Environmental Impact Statement
DSO	Direct Shipping Ore
EA Act	<i>Environmental Assessment Act</i>
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	Environmental Management System
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESD	Ecologically Sustainable Development
ESIA	Economic and social impact assessment
Fe	Iron
IBRA	Interim Biogeographic Regionalisation for Australia
MLA	Mineral Lease Application
MMP	Mining Management Plan
MNES	Matters of National Environmental Significance
NAF	Non acid-forming
NOI	Notice of Intent
NLC	Northern Land Council
NT	Northern Territory of Australia
NT EPA	Northern Territory Environment Protection Authority
PAF	Potentially acid-forming
PCMP	Provisional Cultural Heritage Management Plan
ROM	Run-of-mine
SIMP	Social Impact Management Plan

the Australian Government Minister	The Australian Government Minister responsible for the <i>Environment Protection and Biodiversity Conservation Act 1999</i>
Environmental Impact Statement	The Environmental Impact Statement is comprised of the draft Environmental Impact Statement, the Supplement to the draft Environmental Impact Statement and, subject to a direction from the NT EPA, any further information provided by the Proponent.
the Minister	Northern Territory Minister for Lands, Planning and the Environment
the Project	Sherwin Creek Iron Ore Project
The Proponent	Sherwin Iron Pty Ltd
the/this Report	This Assessment Report 75 for the Sherwin Creek Iron Ore Project
Respondent	Person or person(s) from the public or advisory bodies who provide written comment on the Environmental Impact Statement
the Responsible Minister	Northern Territory Minister for Mines and Energy
the Supplement	The Supplement to the draft EIS

Units and Symbols

%	percent
ha	hectare
km	kilometre
km ²	square kilometre
L/s	Litre per second
m	metre
mm	millimeter
mg/L	milligram per litre
ML	megalitre
Mtpa	million tonnes per annum
t	tonne
tpa	tonnes per annum

Executive Summary

Environmental impact assessment (EIA) is the process of defining those elements of the environment that may be affected by a development proposal and analysing the risks associated with the identified potential impacts. This Assessment Report (the Report) assesses the environmental impact of the Sherwin Creek Iron Ore Project (the Project), proposed by Sherwin Iron (NT) Pty Ltd (the Proponent).

The Proponent proposes to construct and operate an open pit iron ore mine at Deposit C in the Sherwin Creek Mining Area. A total of 108 million tonnes of material is planned to be mined during the course of a six-year operation of which 13.7 million tonnes is high or medium-grade ore able to be shipped directly without processing to Darwin Port for export. Approximately 1 million tonnes of ore would be hauled annually via the Roper and Stuart Highways using quadruple road trains until such time as upgrades of the Roper Highway permit a ramp up to 3 million tonnes of ore per year.

The Northern Territory Environment Protection Authority (NT EPA) has prepared this Report as advice to the Minister for Lands, Planning and the Environment (the Minister) on the EIA of the Project. The Minister is required to give a copy of this Report to the Minister for Mines and Energy (the responsible Minister), together with any written comments made by the Minister in relation to this Report. The responsible Minister, taking into consideration this Report, will then decide whether or not to authorise the Project under the *Mining Management Act* and if so, any actions that must be taken or commitments made by the Proponent before the Project will be authorised.

Analysis by NT Government of the Notice of Intent for the Project identified a number of environmental risks. On the basis of these, it was determined that an EIS was required for the Project. Key risks that contributed to the decision were:

- the size and scale of the proposal;
- the potential impacts on biodiversity, including listed flora and fauna, from land clearing activities and weed incursion as a result of the development;
- uncertainties regarding in-pit rejects disposal and rehabilitation of the mine areas;
- the unknown potential for acid and metalliferous drainage;
- uncertainties associated with water resources; and
- the potential social, cultural and economic impacts.

Information requirements based upon identified risks were described in the final EIS Guidelines for the Project and the Proponent submitted the draft EIS to address these requirements. The Proponent prepared a Supplement to the draft EIS to address respondent's issues and concerns following public review of the draft EIS.

The NT EPA considers that the environmental issues associated with the Project have been adequately identified. Appropriate environmental management of some of these issues has been resolved through the EIA process, while the remainder would be addressed through monitoring and management actions detailed in the Proponent's Mining Management Plan (MMP) under the *Mining Management Act*. The NT EPA considers that the Project can be managed in a manner that avoids unacceptable environmental impacts provided that the commitments, safeguards and recommendations detailed in the EIS and this Report, and which must be incorporated in the MMP authorised by the Department of Mines and Energy, are implemented and subject to regular reporting and compliance auditing.

The poor quality of data collection and preparation of conceptual environmental management documentation is a concern for the NT EPA. The difference between a well-planned and well-prepared Project and the Sherwin Creek Iron Ore Project is considerable as demonstrated in the documentation submitted to the NT EPA during this EIA process. Whilst the NT EPA considers that most of the key risks of this down-scaled Project can be managed to an acceptable level, there is significant concern that the low standard of the environmental assessment undertaken by the Proponent will flow through to the larger Roper River Iron Ore Project or its individual components as or if they are developed in the future. The NT EPA strongly suggests that the Proponent carefully consider its plans for the broader project and how it approaches the Government EIA process in the future.

The authorisation of excessive bulk sampling for an action undergoing EIA, without informing the NT EPA, was inappropriate and in contravention of the principles of ESD. These decisions can create precedents with lasting effects for the quality of environmental management on mine sites when Government continues to be challenged by legacy mines requiring costly remediation. It is in the NT Government's best interests to ensure that this is not repeated in the future.

The MMP for the Project will be subject to review to the satisfaction of the Department of Mines and Energy. It is recommended that management plans be developed in consultation with key stakeholders, including the NLC. The management plans will be working documents for the life of the Project and will require periodic review in the light of operational experience and changed circumstances.

Information gaps remaining from the EIA process require the Proponent, Government and the regional community to rely on intensive, post-assessment data collection, analyses and monitoring to determine the significance of, and appropriate responses to, potential impacts. These requirements are largely captured in the commitments made by the Proponent and recommendations in this Report. The ongoing risk analysis, environmental monitoring and management required from the Proponent must demonstrate that environmental impacts from the Project are no greater than those predicted in this assessment.

List of Recommendations

Recommendation 1

The Proponent shall ensure that the Project is implemented in accordance with the environmental commitments and safeguards:

- **Identified in the Sherwin Creek Iron Ore Project Environmental Impact Statement (draft Environmental Impact Statement, Supplement to the draft Environmental Impact Statement and further information); and**
- **Recommended in this Assessment Report.**

The Northern Territory Environment Protection Authority considers that all safeguards and mitigation measures outlined in the Environmental Impact Statement are commitments made by the Proponent.

Recommendation 2

The Proponent shall advise the Northern Territory Environment Protection Authority and the responsible Minister of any changes to the proposed action, in accordance with clause 14A of the Environmental Assessment Administrative Procedures.

Recommendation 3

The condition survey of the Roper Highway must be undertaken prior to completion of the bulk sample (Phase 1) of the Project. Any required actions arising from the condition survey must be acted upon before the commencement of Phase 2.

The Roper Highway must be upgraded to an appropriate standard, preferably a dual lane, fully sealed road to at least secondary highway standard, prior to any approval of the Project by the Department of Transport to proceed beyond 1000 000tpa ore transport rate. The Proponent must contribute proportionally to this upgrade.

Any transport rate increases and concomitant upgrades required will need to be referred to the NT EPA in accordance with Recommendation 2 of this Report.

Recommendation 4

In order to ensure that critical dust issues are managed and other water requirements are met, the Proponent must identify sustainable groundwater sources of acceptable quality to the satisfaction of the Controller of Waters prior to authorisation of the Project.

The NT EPA must be notified of any water sources identified for Project use that have not been considered in the Environmental Impact Statement in accordance with Recommendation 2 of the Assessment Report.

Recommendation 5

A water management plan must be prepared to the satisfaction of the Controller of Waters. The plan must include:

- A groundwater monitoring program with contingencies for groundwater depletion and protection of groundwater dependent ecosystems;
- A surface water monitoring program to detect impacts downstream of the mine site; and

Management mechanisms to mitigate any impacts detected through monitoring.

Recommendation 6

A Dust Management Plan must be prepared and implemented to the satisfaction of the Department of Mines and Energy. The Dust Management Plan must include, at a minimum:

- An appropriately designed dust monitoring program using methods based on accepted Australian/New Zealand Standards for both particulate dust and respirable crystalline silica;
- Monitoring of dust deposition levels on vegetation adjacent to the mine site;
- Analysis of ambient dust levels against appropriate human health criteria;

- Scheduling of dust suppression activities accounting for ambient meteorological conditions to effectively mitigate dust formation; and
- Development of appropriate and effective contingency measures in reaction to unacceptable dust levels.

A cost/benefit analysis of sealing haul roads should be undertaken and the findings reported to the Department of Mines and Energy.

Recommendation 7

A management plan for potentially acid-forming waste rock must be prepared to the satisfaction of the Department of Mines and Energy to prevent or mitigate any potential impacts associated with acid and metalliferous drainage from the mine site. The management plan is to include all actions the proponent has identified in its EIS, including but not limited to:

- Implementing a strategy for the ongoing assessment of risks and management and monitoring of potentially acid-forming materials during mining including setting threshold triggers and implementing appropriate mitigation;
- Employing a site-specific sampling and analysis plan to identify and characterise potentially acid-forming materials; and
- Designing encapsulation cells to contain potentially acid-forming materials.

Recommendation 8

The Proponent must develop a final Erosion and Sediment Control Plan (ESCP) in the Mining Management Plan to the satisfaction of the Department of Mines and Energy. The updated ESCP must include additional detail as recommended by the Department of Land Resource Management and committed to by the Proponent in the EIS.

Recommendation 9

The Proponent is to undertake a full audit of the implementation of the erosion and sediment control plan for the Sherwin Creek Deposit C site prior to the onset of the 2014/2015 Wet season. The audit must be undertaken by a suitably qualified person. At its completion, an audit report must be provided to the Department of Mines and Energy and the NT EPA.

Recommendation 10

The Traffic Management Plan and Social Impact Management Plan must be prepared and implemented to ensure that they are cohesive, working together to maximise safety and community awareness with respect to ore haulage traffic on the public road network.

The Plans should include:

- A community engagement strategy to facilitate community awareness and provide a reporting mechanism for the community and road users of any road traffic issues, near-misses and incidents;
- Clear processes and chain of command for translating complaints or issues into actions and for detailing appropriate contingencies should an incident occur; and

A reporting mechanism to the NT Government Department of Transport.

Recommendation 11

The Proponent taking the proposed action is wholly responsible for implementation of all conditions of approval and mitigation measures contained in the Environmental Management Plan and must ensure all staff and contractors comply with all requirements of conditions of approval and mitigation measures contained in the Environmental Management Plan.

The Environmental Management Plan, and sub-plans, should form part of the Mining Management Plan. In preparing each plan, the Proponent will include any commitments and additional measures for environmental protection and monitoring contained in the Environmental Impact Statement and this Assessment Report.

Recommendation 12

Within two years of commencing the Project, the proponent must commission and pay the full cost of an independent environmental audit of the project. The audit should:

- Be conducted by a suitably qualified, experienced and independent team of experts;
- Assess the environmental performance of the project and review whether the Proponent has complied with all recommendations, conditions and commitments;
- Review the adequacy of the plans and procedures and recommend appropriate measures or actions to improve the environmental performance of the action, including any plans or procedures.

The results of the audit should be submitted to the Department of Mines and Energy and the Northern Territory Environment Protection Authority. The results of the audit must be made available on the Proponent's website.

1 Introduction

Sherwin Iron (NT) Pty Ltd (the Proponent) proposes to construct and operate an open pit iron ore mine at Deposit C in the Sherwin Creek Mining Area within mineral lease 29584 (MLA29584), known by the Proponent as the Sherwin Creek Iron Ore Project.

The proposed Project is located on Mt McMinn Station, 420km south-east of Darwin and approximately 150km east of Mataranka via the Stuart and Roper Highways.

The Proponent intends to mine direct shipping ore (DSO) for export to Chinese markets via the Port of Darwin. Currently, Deposit C is being mined as a bulk sampling program to test the marketability of the ore. This was authorised by the Department of Mines and Energy.

Ore from the bulk sampling operation is currently transported by quadruple road train along the Roper and Stuart Highways to the Port of Darwin. This mode of transport is proposed to continue and ramp up for the DSO mining operation.

The purpose of this Assessment Report (this Report) is to identify and evaluate the Project's risks to the environment and to recommend whether the risks are acceptable. This is achieved by identifying the potentially significant risks of an environmental impact occurring as a result of the Project components and activities, and evaluating the Proponent's corresponding safeguards or prevention measures to remove or mitigate the risks. The contents of this Report form the basis of advice to the Minister for Lands, Planning and the Environment (the Minister) on the environmental impact assessment (EIA) of the Project and the acceptability of any residual risks to the environment.

1.1 Environmental impact assessment process

The EIA process should:

- identify potential impacts on the environment (where environment is defined broadly according to the *Environmental Assessment Act* (EA Act)); and
- evaluate the risks of those impacts occurring.

Through the assessment of the environmental risks of the Project, the Proponent must demonstrate:

- that these risks can be satisfactorily managed within acceptable levels, e.g. impacts would not result in long-term or irreversible environmental detriment; and
- the effectiveness/feasibility of management measures in a precautionary/risk management framework.

That the assessment gives weighted consideration to:

- values and risks;
- estimation of the likelihood of success of preventative and remedial measures; and
- the validity and comprehensiveness of programs established to provide ongoing measures of the environmental effects of the Project.

The assessment of environmental risk can be more reliably evaluated when there is a substantial baseline of relevant information. Where this information is limited or not available, risk assessment is inevitably constrained and far less precise. In the absence of sufficient baseline information, and in keeping with the NT EPA Act's objective to promote ecologically sustainable development, the NT EPA adopts the guiding principle that where there are threats of serious or irreversible environmental

damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. If potential impacts are understood with a reasonable level of certainty, monitoring programs can be better informed to detect impacts, and management measures can be more effectively targeted to address those impacts.

This Report evaluates the adequacy of commitments and environmental safeguards proposed by the Proponent to avoid or mitigate the risks of potential impacts identified in the EIA process. The safeguards may be implemented at various levels in the planning framework of a project and include (among other approaches):

- Design and layout of components such as accommodation camp, access roads and other infrastructure, associated with the Project;
- Management of construction activities; and
- Management of processes used in operation of the mine (e.g. inputs and outputs).

A list of commitments made by the Proponent is provided at Appendix A of this Assessment Report. Additional safeguards are recommended in this Report, where appropriate.

1.2 Regulatory framework

Environmental assessment was undertaken in accordance with the requirements of the EA Act. The proposal was determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)(Cth) as it was considered likely to have significant impacts on listed threatened species and communities and listed migratory species which are Matters of National Environmental Significance (MNES). The Project has been assessed under the EA Act by the Northern Territory Environment Protection Authority (NT EPA) on behalf of the Australian Government.

The NT EPA has produced this Report as advice to the Minister on the EIA of the Project. The Minister is required to give a copy of this Report to the Minister for Mines and Energy (the responsible Minister), together with any written comments made by the Minister in relation to this Report. The responsible Minister, taking into consideration this Report, will then make a determination as to whether or not the Project should be authorised to proceed under the *Mining Management Act* and if so, any actions that must be taken or commitments made by the Proponent before the Project will be authorised.

The Australian Government Minister responsible for the EPBC Act (the Australian Government Minister) will need to consider the Project for an approval decision under the EPBC Act. This Report will inform that consideration.

The approvals and regulatory requirements for the Project are set out in Section 1.10 of the draft EIS.

1.3 Environmental impact assessment history

On 2 February 2011, the then Department of Natural Resources, Environment, the Arts and Sport (NRETAS), received a Notice of Intent (NOI) for development of the Hodgson Downs Mining Area as stage 1 of the Roper River Iron Ore Project. The then Minister for Natural Resources, Environment and Heritage decided that the Hodgson Downs component required assessment at the level of an Environmental Impact Statement (EIS). Since the original decision, the Proponent (Sherwin Iron Ltd) has altered the proposal a number of times under clause 14A of the Environmental Assessment Administrative Procedures. The alterations included:

- September 2011 - Hodgson Downs Mining Area Iron Ore Project – clarification of deposits to be mined and proposal to transport ore, including beneficiated ore, via slurry pipeline to the Darwin rail line for transport to Darwin Port;
- November 2012 – Sherwin Creek and Hodgson Downs Mining Area Iron Ore Project – Addition of the Sherwin Creek area, reduction of proposed deposits to be mined at the Hodgson Downs area, construction of haul roads from both mining areas to Darwin rail line, mining of direct shipping ore only;
- June 2013 – Sherwin Creek Iron Ore Project – withdrawal of the Hodgson Downs Mining Area and associated haul roads, withdrawal of proposed dam and airfield;
- July 2013 – Sherwin Creek Iron Ore Project – withdrawal of haul road proposed from Sherwin Creek deposit to rail line. Road transport of ore proposed to Darwin Port using Roper and Stuart Highways.

Guidelines were prepared and finalised for the Sherwin Creek and Hodgson Downs Mining Areas proposal following public consultation. The guidelines were not amended with subsequent alterations to the Project as the content remained relevant for the smaller Project at Sherwin Creek.

On 6 April 2013, a delegate for the Australian Government Minister decided that the Project was a controlled action under the EPBC Act and agreed to accredit the assessment process under the EA Act for the purposes of assessing the Project. The Project was considered likely to have significant impacts on the following MNES that are protected under Part 3 of the EPBC Act:

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

Subsequent Project variations submitted under the EPBC Act did not alter the controlled action decision.

Draft guidelines covering matters to be addressed in the EIS were subject to a public review period between 18 May and 3 June 2013. On 17 June 2013, the NT EPA directed the Proponent to prepare the EIS addressing the matters set out in the final guidelines.

The draft EIS for the Project underwent a seven week public exhibition period commencing on 14 December 2013. Fourteen submissions on the draft EIS were received from Government agencies and non-Government organisations. All submissions were forwarded individually to the Proponent. The Proponent prepared the Supplement as required under the EA Act to address the issues raised by the respondents. A summary of respondents' comments and concerns is included in Appendix B of this Report. A copy of full submissions on the draft EIS is included at Appendix A of the Supplement with the Proponent's responses in the main body of the Supplement.

On 25 March 2014, the NT EPA received and circulated the Supplement to Government advisory bodies. Further information was requested within a 21-day period. The Proponent provided further information on 22 April 2014. This Report is based on a review of the draft EIS and the Supplement (collectively referred to as the EIS), and comments from the Proponent, non-Government respondents and Government advisory bodies on the EIS. The NT EPA prepared this Report and provided it to the Minister.

The EIA chronology and EIS documentation can be viewed on the Sherwin project page of the NT EPA website at:

<http://www.ntepa.nt.gov.au/environmental-assessments/assessment/register/sherwin-creek-iron-ore>.

1.4 Ecologically sustainable development

The Australian Government affirmed its commitment to sustainable development at United Nations conferences on environment and development, notably via the Rio Declaration and Agenda 21 in 1992 and the Johannesburg Declaration at the United Nations 2002 World Summit. Australia reaffirmed its commitment at the Summit to promote the integration of the three components of sustainable development—economic development, social development and environmental protection—as interdependent and mutually reinforcing pillars.

Australia developed the National Strategy for Ecologically Sustainable Development (ESD) identifying four national principles (Table 1). The Strategy identified ways to apply the principles to a range of industry sectors and issues such as climate change, biodiversity conservation, urban development, employment, economic activity, and economic diversity and resilience.

In December 1992 the NT Government endorsed the National Strategy and agreed, along with all other States and Territories, to the Intergovernmental Agreement on the Environment.

The Strategy defines ESD as:

‘Using, conserving and enhancing the communities’ 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.

ESD is development that aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations.’

Table 1. The principles of Ecologically Sustainable Development

ESD Principle	Definition
Integration principle	Consideration needs to be given to the long and short-term economic impacts as well as other environmental, social and equitable impacts.
Precautionary principle	Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
Inter- and intra-generational equity	The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of present and future generations.
Conservation of biological diversity and ecological integrity	The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-

	making
Improved valuation, pricing and incentive mechanisms	Should be promoted to ensure that the costs of environmental externalities are internalised and that the polluter bears the costs associated with environmental pollution.

To achieve the objectives of ESD, the Project needs to continually be informed and guided by the ESD principles. Accordingly, the assessment of this proposal, its potential impacts (positive and negative) and the management measures used to enhance positive and reduce negative impacts was undertaken in the context of ESD principles.

Subsequent decision-making processes by approval bodies must be guided by ESD principles and the continued project design and development, as well as the development and implementation of management and monitoring programs by the Proponent, should all aim to meet the objective of ESD.

2 The Proposal

2.1 The Proponent

Sherwin Iron (NT) Pty Ltd is an Australian iron ore exploration and development company. The Roper River Iron Ore Project, of which the Sherwin Creek Iron Ore Project is a part, is the company's flagship project.

Sherwin Iron's interests in the region comprise of six mining areas across three Exploration Leases (EL24101, EL24102 and EL26412).

2.2 Project description

The Proponent is seeking approval to mine direct shipping ore (DSO) within the Sherwin Creek Mining Area (MLA29584) on Deposit C. Additionally, two smaller mining leases have been authorised to establish the accommodation camp and the 4.5km access road from the mine to the Roper Highway. Both the camp and access road have already been constructed for the bulk sample.

The Project is located in the Northern Territory, approximately 570km by road from Darwin (420km south-east of Darwin to Mataranka via the Stuart Highway and approximately 150km east of Mataranka via the Roper Highway). The Roper Highway is a single lane, sealed road for the majority of the route to the mine site with the final 12km to the Sherwin Creek Deposit C access intersection unsealed. The location of the Project is shown in Figure 1.

DSO is high grade ore that requires minimal processing. The total global resource of Fe (DSO and beneficiated ore) is stated as 488 million tonnes (Mt) at 42% Fe including 320Mt of resource at 40.1% Fe at Sherwin Creek (Deposits A, B, and C) and 107Mt of resource at 47.0% Fe at Hodgson Downs (Deposits X, W, and TUY). The inventory for the MLA areas currently stands at a combined Indicated DSO Resource of 40.9Mt at 57.8% Fe for Deposit C and Deposits X and W, with Deposit C potentially yielding 18.2Mt at 58.3% Fe. Mining of DSO at Deposit C is expected to result in a mine life of approximately 6 years.

The sub-grade ore that exists in the Deposit C footprint would be removed during mining and stockpiled for beneficiation in the future. A total of 108Mt of material is

planned to be mined during the course of operations of which 13.7Mt is high-grade or medium-grade ore. Sub-grade material comprises 22.8Mt, with a total waste movement of 72.3Mt.

The Proponent proposes to use the initial waste material mined from the pit to construct roads and hardstand areas with the remainder stored on the external waste dump. Some waste has already been placed in the external waste dump area as part of bulk sampling. After pit stage 1 has been completed and the external waste dump footprint has been filled to provide the sub-grade material stockpile area, the remaining waste material mined will be dumped in the pit, with the fill face advancing north in the pit following the advancing ore and waste mining face.

An area inside the pit would be used for temporary water storage. Run-off from both the external dump face and the in-pit dump face would collect in this in-pit sump during the Wet season and is expected to dry out during the Dry season. The Proponent expects that formation of AMD in waste rock and exposed pit faces is unlikely so that the water stored in the pit would be uncontaminated. Pit water would be used to supplement groundwater for dust suppression.

The area of disturbance within the resource area for the Project is estimated to be 350 hectares (ha). Approximately 34.6ha has already been disturbed for the bulk sampling operation. Key components of the Project and timeframes from the draft EIS are included in Table 2. The Project is already significantly behind schedule as bulk sampling has not yet been completed.

Table 2: Project components and timeframe (draft EIS)

Component	Details and Timeframe
Proposed Construction Commencement	Early 2014
Proposed Operation Commencement	Q1 2014
Life of Mine	6 years
Estimated Year of Decommissioning	2019
Size of Orebody	39.2 Mt, including low grade ore
Ore Type	Oolitic Hematite
Estimated Total DSO Production	13.8 million tonnes at 58% Fe
Strip Ratio	7:1
Number of Pits	1
Depth of Pits	10m to 40m
Estimated Recoverable Topsoil	100,000 m ³ , average depth of 0.1 m
Crushing Rate	Up to 3 Mtpa
Ore Grade	58.0% Fe
Estimated Total Disturbance Footprint	350 Ha
Workforce During Construction	150
Workforce During Operations	100

Infrastructure and other components proposed for the site include workshops, office, laydown areas, explosives magazine, DSO stockpile or Run-of-Mine (ROM) pad, sub-grade ore stockpile area, waste rock dump, haul road between pit and stockpiles, service roads, access road from the Roper Highway to the site and accommodation village. Some of this infrastructure has already been constructed for the bulk sampling. The current plan for the layout of the mine site and infrastructure is included in Figure 2.

The site access road established for the bulk sampling project was partially washed away during the 2013/14 Wet season due to inappropriate road construction and lack of adherence to engineering plans. A detour has since been constructed. Sherwin has indicated that this access road would be reconstructed with a culvert to ensure flows within Sherwin Creek are not impeded.

Mined DSO would be crushed and stockpiled for blending if required. Ore would then be loaded onto quadruple road trains and transported to an interim stockpile site near Mataranka and then transported via the Stuart Highway to Port of Darwin for export.

The Proponent has approval to haul up to 1000 000tpa (Mtpa) of ore along the Roper Highway. The EIS calculates that each day for 300 days in a year, approximately eight convoys each consisting of up to five quadruple road trains will make the return trip from the mine to an interim stockpile site near Mataranka. Separate road trains would then be used to transport the material from the Mataranka stockpile site to the Port of Darwin via the Stuart Highway. Following an upgrade of the highway to dual lane, the ore trucking rate will increase to 3Mtpa requiring approximately 20 convoys of 5 road trains or 200 truck movements to transport the ore.

2.3 Regional Setting

2.3.1 Physical

The Project is located in the Gulf Fall and Uplands bioregion. The Gulf Fall region is remote and undeveloped and as such has significant wilderness and environmental conservation values. The sense of remoteness and solitude people can experience when visiting the area is unique and the areas where people can gain such an experience are rapidly disappearing. Scenic values of the region include rolling hills, sandstone escarpments, pristine river systems, and billabongs.

The Roper River region has a tropical savannah climate with marked Wet and Dry seasons with over 90% of the mean average rainfall (800 – 1000mm) falling in the Wet season (November to March). The mean rainfall at Roper Bar store (20km east of the Project) is 787.7mm/year and mean evaporation 2400mm/year.

The Roper River catchment is the largest sea-flowing catchment in the Northern Territory and covers an area of approximately 82 000km². The tidal influence of the Roper River reaches the Roper Bar, a natural rock bar extending across the river and causeway that enables entry into Arnhem Land. The saltwater/freshwater interface occurs further downstream, and depends on the stream flow. The township of Ngukurr, about 30 km downstream of Roper Bar, relies on the Roper River for part of its drinking water supply.

The Limmen Bight (Port Roper) Tidal Wetlands System is situated around the mouth of the Roper River covering an area of 185 000ha and is the only wetland in the region listed in the Directory of Important Wetlands in Australia (Environment Australia, 2001).

Groundwater discharges provide an important contribution to the base flow of the Roper River. This occurs from the Tindall Limestone Aquifer providing substantial Dry season flow. Groundwater resources in the mineral lease area of the Project are typical for the catchment, comprising fractured and weathered rocks with bores yielding less than 1L/s. During the Wet season, flooding in the lower lying areas of the Roper catchment can be extensive and flooding does occur in the area of the proposed Project.

Sherwin Creek itself is an intermittent, first-order stream of the Roper River system that ceases to flow in the early to mid-Dry season when it becomes a series of disconnected pools that dry out later in the season.

The proposed Deposit C mine site sits on a ridge line approximately 125m Australian Height Datum (AHD). The mine site is 10km from the Roper River.

2.3.2 Biological

Flora

The Gulf Fall and Uplands bioregion is the second largest in the NT and stretches from the Arnhem Plateau into western Queensland. It comprises undulating terrain with scattered low, steep hills and rugged dissected plateaus. The most extensive vegetation is woodland dominated by Darwin Stringybark (*Eucalyptus tetrodonta*) and Variable barked Bloodwood (*Corymbia dichromophloia*) with spinifex understorey, and woodland dominated by Northern Box (*Eucalyptus tectifica*) with tussock grass understorey.

The flora survey recorded 230 plant species at Deposit C and in the surrounding area. No threatened species listed under the EPBC Act or the *Territory Parks and Wildlife Conservation Act* (TPWC Act) were recorded in the field surveys. Weed occurrence in the area was reported to be relatively low with only four introduced plant species recorded at Deposit C and surrounds. Eight vegetation communities occur in the Project area with the predominant vegetation community associated with the sandstone escarpment defined as mid woodland of *Eucalyptus phoenicea* +/- *Corymbia dichromophloia*, *Eucalyptus tetrodonta*, *Corymbia ferruginea* subsp. *ferruginea*. This represents approximately 88% of the vegetation type. A further 6% of vegetation was defined as low woodland of *Corymbia aspera* +/- *Acacia lamprocarpa*, *Buchanania obovata*, *Eucalyptus miniata* and *Eucalyptus tetrodonta* and found in gorges on the Project site. The EIS indicates that all of the identified vegetation communities are common and widespread in the region.

Fauna

A review of the EPBC Act and Land Resource Management (NT) databases revealed that 25 vertebrate species listed as threatened either under the EPBC Act and/or the TPWC Act could exist at the Project site. The field surveys recorded a total of 101 native, terrestrial vertebrate species at Deposit C comprising of 60 birds, 18 reptiles, 4 amphibians and 19 mammals. No threatened species were recorded and three introduced species were found. Surveys of the wider area around Deposit C recorded a total of 200 native terrestrial species with six feral species detected. Two threatened species and one species listed as migratory were recorded in the broader area. These included:

- Grey Falcon (*Falco hypoleucos*) (Vulnerable – TPWC Act);
- Mertens' Water Monitor (*Varanus mertensi*) (Vulnerable – TPWC Act); and
- Rainbow Bee-eater (*Merops ornatus*) listed under the EPBC Act as a migratory species.

The Buff-sided Robin (*Poecilodryas cerviniventris*) was found to be present on the site and was originally listed under the EPBC Act as the Derby White-browed Robin (*Poecilodryas superciliosa cerviniventris*). The Buff-sided Robin is classed as Near-Threatened in the Northern Territory but was delisted from the EPBC Act in 2013. Its habitat includes mangroves, riparian thickets and gorges across the top end, the latter being present within the Project area.

A desktop review indicated that five fish species listed as threatened either under the EPBC Act and/or the TPWC Act could exist in the region of the proposed mine. Fish surveys of two sites on Sherwin Creek were conducted with seven fish species identified, all but one considered to be common and widely distributed through the Roper River catchment. The exception was an unidentified eel-tailed catfish (*Plotosidae* sp.)

2.3.3 Socio-economic/cultural

The Project is located within the sparsely populated Roper Gulf Shire. Only 3500 people live in the shire, of which 70% are Indigenous and English is usually the second language. The largest population centres in the region and the most likely to be impacted (positively and negatively) are Ngukurr (population 1056), Mataranka (600), Urapanga (88), Minyerri (484) and Jilkminggan (280).

With respect to these communities, the EIS provided summary information, including data from the Australian Bureau of Statistics 2011 census:

- Populations are very young with the median age around 20 years and approximately 35% of the regional population being children under the age of 14.
- Census data suggests there is a high level of attendance at school; however, the quality of education is questioned as many graduates cannot read or write effectively.
- At 24%, regional unemployment is higher than the Territory average of 4%. Local government administration was the highest reported employment category with 20 – 40%, education (8 – 20%) and local retail (6 – 8%). Although there is a diverse range of employment opportunities, there are few positions available. Ngukurr offers the greater range of work opportunities due to its size.
- The economic base across the communities is currently limited though there may be opportunities for the Proponent to contribute to the development of some Indigenous Business Enterprises.

Land use in the project area includes pastoral, conservation, tourism, Aboriginal freehold and leasehold, fishing and horticulture. Pastoral activities, agriculture and fishing are currently the major industries in the region with mining making up a very small percentage of land use. The nearest operating mines also accessed via the Roper Highway include the Australian Ilmenite Resources SILL 80 project which is approximately 40km east of Sherwin Creek Deposit C and the Roper Bar Iron Ore mine operated by Western Desert Resources to the south-east.

Sherwin Iron's Project is located wholly on Mt McMinn station and is therefore subject to the requirements of Pastoral Leases as well as the *Native Title Act 1993*.

Figure 1: Location of the Sherwin Creek Iron Ore Project (Source: Chapter 1 Sherwin Creek Iron Ore Project draft EIS)

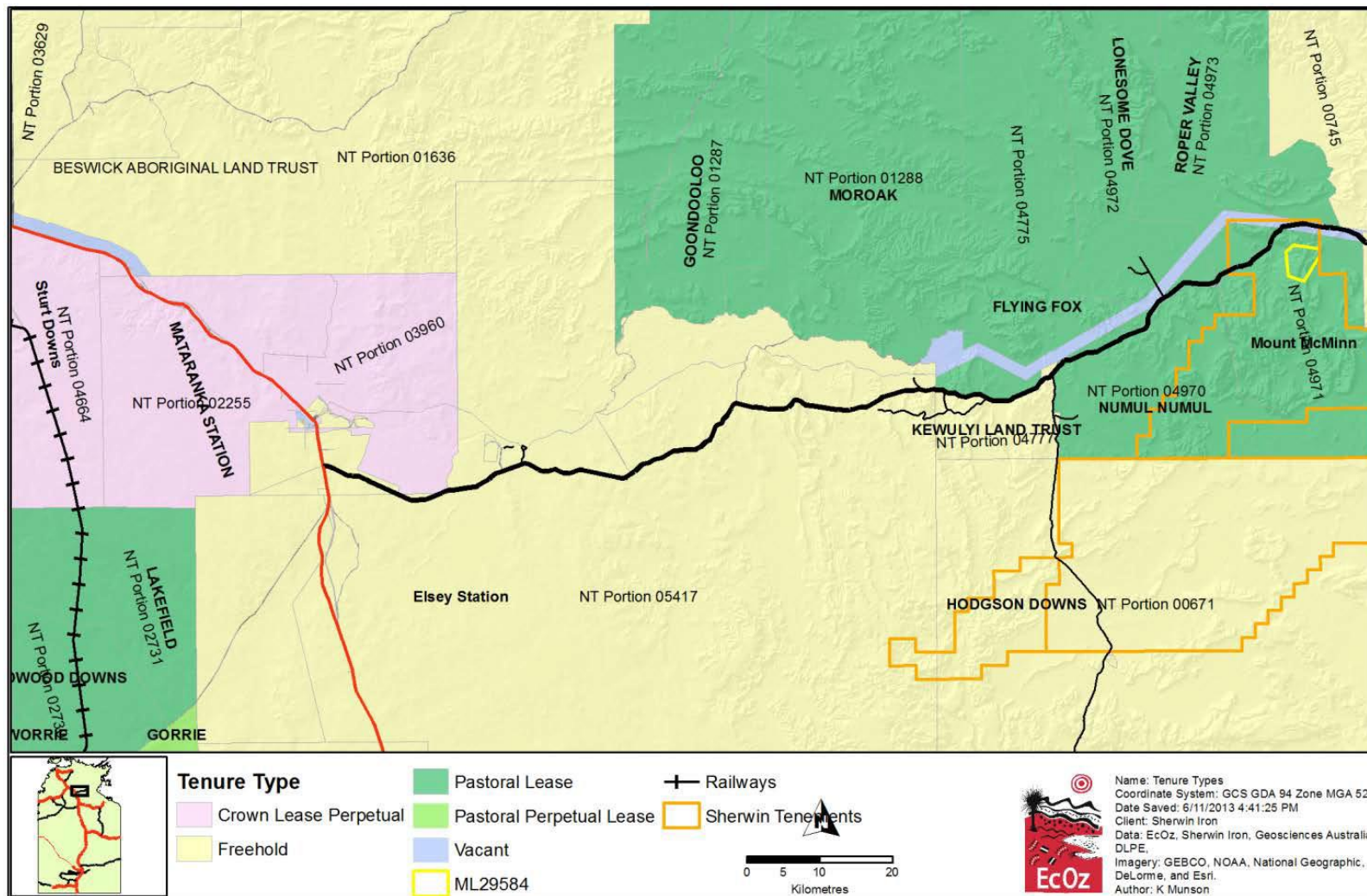
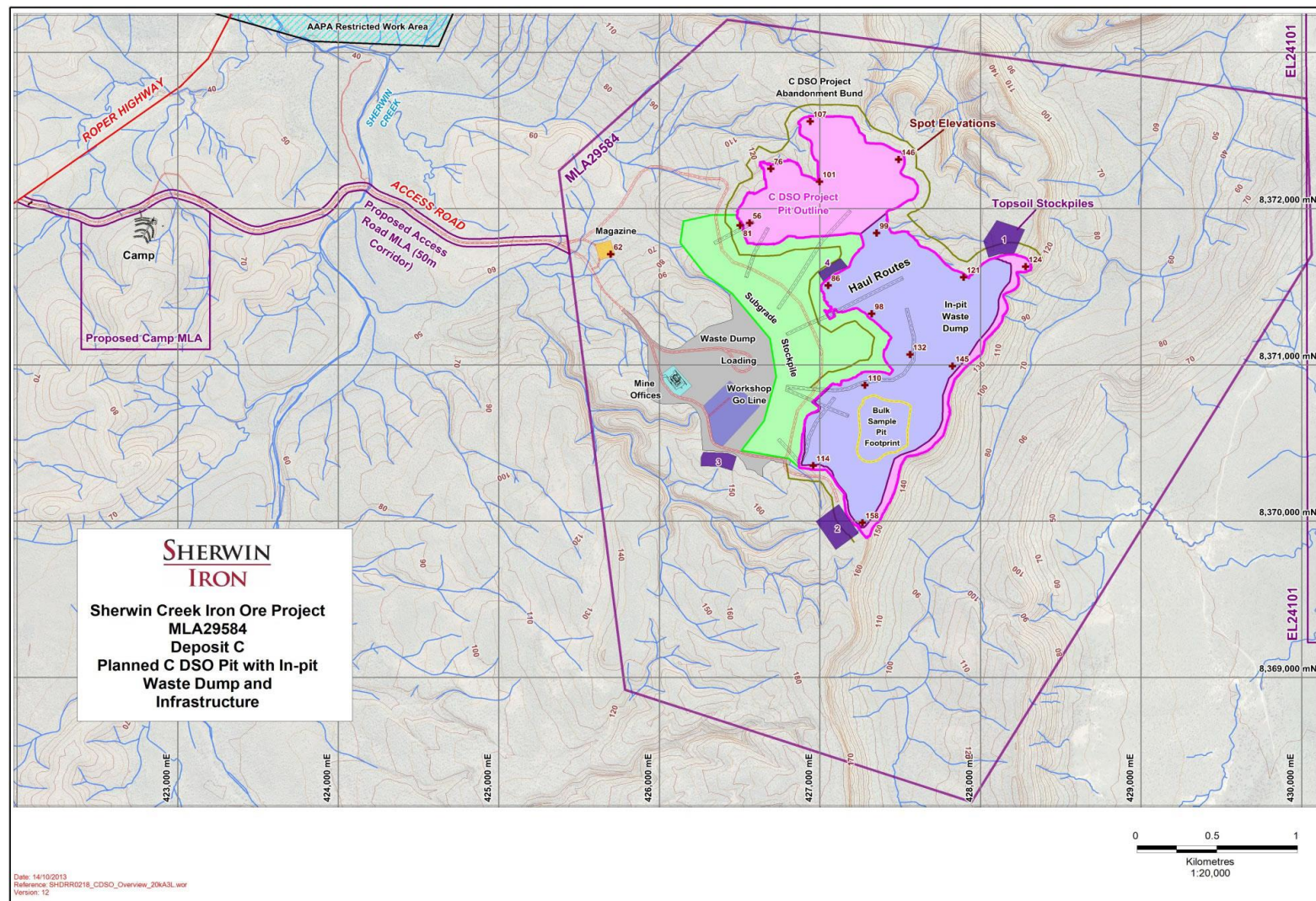


Figure 2: Location of infrastructure within the mineral lease (Source: Chapter 1 Sherwin Creek Iron Ore Project draft EIS)



3 Environmental Impact Assessment

3.1 Introduction

The purpose of this Report is to evaluate the Project and to determine whether environmental impacts arising from the proposal are considered acceptable and the Project should be allowed to proceed. This is achieved by identifying the potentially significant risks of environmental impacts occurring as a result of the Project components and activities, and evaluating the Proponent's corresponding safeguards or prevention measures to remove or mitigate those risks. Where the proposed safeguards are considered insufficient, or where a safeguard is deemed particularly important, recommendations are made to add to or emphasise commitments made by the Proponent.

The environmental acceptability of the Project is based on analysis of the following from the EIS:

- Adequacy of information outlining the proposed action (particularly which components or activities are likely to impact the environment);
- Adequacy of information on the existing environment (particularly environmental sensitivities);
- Adequacy of information on the range and extent of potential impacts and the risks of those impacts occurring within the Project context; and
- Adequacy of the proposed safeguards to avoid or mitigate potential impacts.

In this Report, the recommendations (in **bold**) are preceded by text that identifies concerns, suggestions and undertakings associated with the Project. For this reason, the recommendations should not be considered in isolation.

Minor and insubstantial changes are expected in the design and specifications of the Project following the conclusion of the EIA process. It will be necessary for approval mechanisms to accommodate subsequent changes to the environmental safeguards described in the EIS and recommendations in this Report. If the Proponent can demonstrate that changes are unlikely to significantly increase the risks of an impact on the environment, an adequate level of environmental protection may still be achieved by modifying the conditions attached to relevant statutory approvals governing the Project. Otherwise, further environmental assessment may be required.

Therefore, subject to decisions that permit the Project to proceed, the overarching recommendations of this Report are:

Recommendation 1

The Proponent shall ensure that the Project is implemented in accordance with the environmental commitments and safeguards:

- **Identified in the Sherwin Creek Iron Ore Project Environmental Impact Statement (draft Environmental Impact Statement, Supplement to the draft Environmental Impact Statement and further information); and**
- **Recommended in this Assessment Report.**

The Northern Territory Environment Protection Authority considers that all safeguards and mitigation measures outlined in the Environmental Impact Statement are commitments made by the Proponent.

Recommendation 2

The Proponent shall advise the Northern Territory Environment Protection Authority and the responsible Minister of any changes to the proposed action, in accordance with clause 14A of the Environmental Assessment Administrative Procedures.

3.2 Issues outside the scope of the assessment

A number of submissions to the draft EIS included issues associated with aspects of the proposal that had been authorised to proceed under separate approval processes or are part of a broader project proposal that is as yet undefined and will be the subject of future mining applications. This section provides some consideration of these aspects.

3.2.1 Beneficiated ore

The Proponent intends to mine only DSO during the 6-year life of the Project. DSO is defined as ore that contains approximately 57% or greater concentrations of iron (Fe) and does not require processing beyond crushing and screening prior to transport to export facilities. No tailings are produced and therefore no storage facilities for tailings are required.

Lower grade ore incidentally extracted from the Deposit C pits would be stockpiled for potential beneficiation to increase the Fe concentration and then for sale in the future. It is likely that the Proponent will eventually apply for authorisation to mine beneficiated ore. The EA Act currently limits consideration of impacts to specific projects. While consequential and cumulative impacts can be considered in this context, the Proponent is not expected to include detailed consideration of potential future projects for which details may not be known and where uncertainties are high (e.g. market conditions). However, mine planning can consider the potential for future mining activities.

3.2.2 Project alterations

As discussed in the introduction of this Report, the Sherwin Creek Iron Ore Project is part of a larger proposed mining development by the Proponent known as the Roper River Iron Ore Project. Subsequent changes to the Project have led to the substantial downscaling of the Project so that this assessment process focuses on a smaller part, Deposit C. This is not ideal with respect to assessing the broader implications of a large proposal as strategic planning is sacrificed in the region and replaced by rapid, piecemeal developments.

The Proponent has indicated that a number of components proposed for previous Project referrals are not required for the mining of Deposit C in the Sherwin Creek mining area. These include:

- Construction of a water dam for the Project as a supply source;
- Construction of private haul roads from the deposits to the Adelaide to Darwin rail line near Mataranka;
- Loading facilities at the rail line;
- Haul roads linking mining areas; and
- Airstrip.

It is likely that these components will be reintroduced in the future as the Proponent is more able to fund the studies required to plan and commence the broader project development. The Proponent will need to notify the NT EPA of any intent to develop these components in accordance with Recommendation 2 of this Report.

3.3 Alternative options

The EIS guidelines required consideration of a number of alternative options for various aspects of the Project. The relevant alternatives included:

- Not proceeding with the proposal;
- Options for ore transport and export;
- Haul road options including the use of a private haul road or upgrade of the Roper Highway corridor;
- Site selection for mine components;
- Mining methods and management of wastes;
- Rehabilitation methods;
- Alternative sources of water;
- Alternatives to discharge of waste to waterways, if relevant;
- Energy sources for power generation;
- Alternative processes, methods and lifecycle; and
- Consideration of alternative environmental management measures for key risks/impacts.

The alternatives that elicited concerns from stakeholders are discussed further in this section of the Report.

3.3.1 Project alternatives

A number of proposals have been presented by the Proponent since the first NOI was referred in 2011. These proposals were of a larger scale and included exploitation of a number of mining areas and deposits and included both DSO and beneficiated ore (BFO). As discussed previously in this Report, withdrawal of the larger Roper River Iron Ore Project and submission of alterations to the proposal significantly reduced the scope of the Project for this assessment. Whilst this allowed for a more simplified and expedient approval process and therefore a more rapid initiation of mining, it meant that consideration of the more significant components associated with the broader mining activity, including mine infrastructure, ore processing and ore transport options, will be deferred to future MMPs and EIA processes.

With respect to future site planning and development of the larger resource, the Department of Mines and Energy were concerned about sterilisation of the BFO resource due to proposed backfilling of the pit as a means of waste rock disposal. The Supplement stated that the entire shallow iron ore sequence would be mined out of Deposit C and therefore there would be no risk of sterilising future resources at this site.

A number of respondents to the draft EIS were concerned about the piecemeal approach to developing the broader Roper River Iron Ore Project in the region and the cost to the community of conducting separate approvals processes for each stage of a larger project. This is of concern to the NT EPA, particularly as relevant information relating to the current, down-sized Project was inconsistent, often contradictory and inadequate, making what could have been a relatively uncomplicated EIA process, challenging.

3.3.2 Ore transport and export

A number of options have been considered for the transport of ore to export facilities. The option currently preferred by the Proponent and one that is being used at the moment for bulk sampling is the transport of ore by public road to the Port of Darwin. The draft EIS stated that *“alternative transport arrangements are being planned and are expected to be in place by the end of the 2 year mining period with options including the construction of a haulage route parallel to the Roper Highway and then by train from the Mataranka or Katherine area or use of barge down the Roper River”*. The option to transport ore by barge along the Roper River would require an export facility in the Gulf of Carpentaria. It should be noted that the Amateur Fisherman’s Association of the NT (AFANT) is opposed to this option and has advised the Proponent of this.

Other options considered were the piping of ore slurry to the Gulf coast or to the rail line, again requiring specialised facilities. Any of these options if reconsidered by the Proponent for the Sherwin Creek Iron Ore Project or for the mining of any other deposits in the future would require notification to the NT EPA.

The Northern Land Council (NLC) in its submission considered that the option of private haul roads dedicated to the Project should have been discussed given the risks associated with using the Roper Highway. The construction of dedicated haul roads was previously proposed and then removed as part of the reduced scope of the Project. A haul road from Deposit C to the rail line would have reduced the risk of collisions and incidents with non-mine traffic to almost negligible. The EIS stated that a separate haul road was considered unviable due to environmental and social aspects including terrain, existing pastoral infrastructure and the need for intensive clearing and habitat disturbance. Whilst it is acknowledged that such disturbance was likely to have been significant, no information was provided to support these assertions.

With future development of other deposits within the Proponent’s mineral leases, such as the Hodgson Downs mining area, it is likely that private haul roads will be considered again, at least between mining areas, and the viability both socially and biophysically of constructing such roads will need to be assessed by the Proponent and Government.

The chosen option and its associated risks are discussed in Sections 3.4 and 3.10 of this Report.

3.3.3 Water supply

Water is scarce in the Sherwin Creek mining area due to the nature of the weathered and fractured sedimentary rock. Fracture zones, which contain secondary porosity with little water storage capacity for recharge, are expected to be shallow and possess little potential to host significant aquifers. Accordingly, groundwater bores in the area are low yielding.

The Proponent proposes to extract all of its water requirements from groundwater sources. This is a significant issue given the low yields of nearby bores and the potential distances from the proposed mine site of higher yielding aquifers in the area. The water requirement for the proposed operation is considerably greater than current groundwater sources can supply. These limitations are discussed further in Section 3.5 of this Report. The Proponent will require pipe infrastructure to convey water to a turkey’s nest dam. The potential impacts of reticulating water from a network of bores have not been considered in this Report.

Other alternative options include the use of treated sewage effluent and rainwater collected in the mine pit, which are also discussed in Section 3.5.

The Proponent has been accessing water for dust suppression for its bulk sampling activity from a perennial water hole upstream of Judy Crossing on the Roper River. This source was assessed previously by the Environment Protection Agency (EPA)(the precursor agency to the NT EPA) as part of the Australian Ilmenite Resources (AIR) SILL80 project (in Assessment Report 71 (EPA 2012)) and authorised for use by AIR. In Assessment Report 71, the EPA assessed the proposed extraction of up to 1649 ML/annum of water from the Roper River to supply the AIR SILL80 mine. The EPA concluded that the potential impacts of extracting water from the Roper River include:

- Decrease in volume of water flowing downstream of the extraction site leading to a decrease in water quality, impacting communities such as Ngukurr and other users;
- Reduced flows may also allow migration of the sea water interface further upstream which could impact on freshwater water quality and aquatic ecology;
- Increased occurrence of cease-to-flow events along the Roper River when full groundwater entitlements from the Mataranka Water Allocation Planning are reached, impacting further on environmental values and operational activities of other users; and
- Detrimental impacts to threatened species as a consequence of reduced flows due to water extraction.

The EPA recommended a number of conditions be imposed on AIR to ensure that the extraction was not to the significant detriment of the downstream environment and users.

Anecdotal evidence suggests that the distances required to cart the water from this pump point to Sherwin Creek Deposit C mean that turnaround times are protracted resulting in extended periods at the mine site without adequate suppression of dust for bulk sampling activities. Significant smothering of vegetation by dust generated around the bulk sampling area has been observed.

The EIS has not included pumping of water from the Roper River as an option for the Project. However, if the option was ever considered, it is likely that the water would need to be piped rather than carted to the mine site. It is unlikely that the authorised pump point for AIR would sustainably support the water requirements of more than one operating mine. Therefore, an alternative, suitable, perennial pool on the river would need to be identified. Given the significance and scale of the potential impacts identified in Assessment Report 71, the NT EPA would need to be notified of any such proposal in accordance with clause 14A of the Environmental Assessment Administrative Procedures (Recommendation 2).

3.4 Road transport and safety

One of the key concerns of many respondents to the EIS was the safety of road users with the proliferation of heavy vehicle traffic on the Roper Highway as a result of the Proponent's preferred ore transport option.

The EIS states that the approved maximum ore haulage rate is 1.5Mtpa and calculates likely traffic volumes based on that figure. A Traffic Management Report (TMR) and a Traffic Impact Statement (TIS) prepared by Opus International Consultants (Australia) Pty Ltd on behalf of the Proponent (Appendix L of the draft EIS) provided good clarity on what had been agreed with the Department of Transport (DoT) with respect to Phases 1 and 2 of the Project. However, when read in conjunction with the main draft EIS document and the Supplement, the information on proposed activities in the TMR conflicted substantially with the poorly worded and

structured transport information in Chapter 2 of the draft EIS and relevant sections of the Supplement. The inconsistency in information between the draft EIS chapters, Appendix L and the Supplement, made it very difficult to understand the transport activity proposed.

The NT EPA can confirm that the Proponent has an agreement with the Department of Transport (DoT) to utilise the Roper and Stuart Highways for transportation of up to 1000 000tpa (1Mtpa), not 1.5Mtpa as claimed in the EIS.

Although incorrectly articulated in the EIS, the volumes of road train traffic generated by the agreed haulage rate of 1Mtpa for the Project range from 25 return trips per day in Phase 1 (bulk sample) to around 40 return trips per day as the Project ramps up to its maximum approved haulage. Each road train would be towing four trailers with a payload between 90 and 100 tonnes.

The Roper Highway is the primary access for tourists and fishers to popular destinations such as Roper Bar, as well as the access between Katherine and townships such as Ngukurr. Additionally, it serves as an access for the regional pastoral industry, and for a number of mine sites that have recently been authorised including Western Desert Resources Roper Bar Iron Ore Project and the Australian Ilmenite Resources (AIR) SILL80 Project.

The Roper Highway is a single lane road for most of its length. Of the 145km to the intersection with the Sherwin Creek access road, approximately 130km is sealed. Traffic data from 2010 indicate that road use varied between an average of 70 and 120 vehicles per day. It is unclear from the data what types of vehicles predominantly made up these figures, however, mining had not commenced in the region at this time so it is likely that traffic consisted of light recreational vehicles and local residents with some infrequent cattle trucks. What is clear is that traffic is likely to increase considerably as a result of development within the region, the proportion of road trains is likely to be greater and the 2010 data are out of date.

The required design of the highway is governed by its category in the Austroads Guide to Road Designs Part 3: Geometric Design (2010). According to the Proponent's Traffic Management Report (Appendix L of the EIS), the Roper Highway is considered to be a single carriageway rural road and, if traffic remained at 2010 levels, is only required to have a single sealed traffic lane 3.7m wide. The current road largely fulfils this criterion.

However, with the addition of traffic from the Proponent's bulk sampling activity (50 truck movements) and vehicles associated with the Roper Bar Iron Ore Project, the current average daily loads for this road are likely to exceed the criterion, particularly during the higher traffic months. Traffic will increase substantially again once –AIR's SILL80 project (20 trucks per day) commences operations and with the influx of vehicular traffic moving into the region exploring for shale gas.

Both AFANT and the NLC expressed concerns at the risk of collisions between light vehicles and road trains, in lieu of the extreme risk identified in the EIS and accidents that have occurred recently. AFANT in its submission appropriately describes the risk source of collisions as follows:

- The condition of the Roper Highway including the narrow pavement, limited ability to move off the road in some areas, narrow and obscured vision areas, and road width at some culverts and bridges;
- The increased road train traffic on the Stuart Highway with limited overtaking opportunities.

The Stuart Highway was not considered in any detail in the EIS. Quadruple road trains from the Project, in addition to the existing haulage from other mines, tourists (including retirees towing caravans) and local traffic, will be passing through the main streets of Mataranka, Katherine and Adelaide River leading to cumulative impacts.

The EIS discusses the proposed road upgrades that have been undertaken on the Roper Highway to date and that are proposed before or at completion of the bulk sampling phase and prior to Phase 2. The upgrade and maintenance of the Roper Highway that has commenced, been completed or is ongoing includes:

- Regular grading and maintenance of a section of the Roper Highway that runs from the Sherwin Creek Iron Ore project for 12km towards Mataranka for the duration of the bulk sampling project;
- Sherwin has erected information signage at the Mataranka end of the Roper Highway and at the Roper Bar side of the mine site turnoff for public view, as well as Electronic Signage at both these sites;
- Shoulder restoration has taken place on the bitumen section of the highway 2km west of Moroak Station eastward over a 50km section;
- Reforming of several sections of the 12km dirt road leading to the mine site turnoff;
- On-going 24-hour dust suppression on dirt section of the Roper Highway and maintenance grading from the end of the sealed section to the mine site turnoff; and
- To improve safety, convoys have two escort vehicles, one with Electronic signage indicating number of trucks in the convoy and one with written convoy signage. All vehicles are equipped with 40 channel radios and the escorts call up oncoming traffic to warn them of the approaching convoy.

Other works that are proposed and are the subject of negotiations and possible agreement with the DoT include strengthening of road pavements and shoulders, seal and pavement widening to a two-lane sealed carriageway and improved line of sight, construction of overtaking lanes, upgrades of bridges and culverts, road safety improvements including provision of heavy vehicle rest areas and repairs and maintenance of the Roper Highway. Specifically, these works apply to approximately 13km of the Roper Highway.

Additionally, the Proponent has committed to:

- Undertaking a condition survey of the road before the bulk sampling is completed;
- Undertaking a safety audit in accordance with the Austroad publication (Road Safety Audit) 2002;
- Upgrading the Roper Highway in agreement with the DoT;
- Development of a Traffic Management Plan;
- Engaging a transport coordinator.

Many of these commitments should have been undertaken to inform the EIA process. Nevertheless, the NT EPA supports these commitments and considers that they must be implemented prior to expansion of mining beyond the bulk sample.

The NT EPA acknowledges that the Proponent is one stakeholder in the public road network and that the NT Government is the owner of the network. The DoT is considering the cumulative effects of traffic on the Roper Highway to ensure that the

road is fit for purpose and that any required contributions to upgrades or maintenance of the road by users is equitable and in proportion to users' potential impacts.

The NT EPA considers, in the absence of appropriate data or audit provided in the EIS, that the Roper Highway needs to be upgraded to a sealed, dual lane highway at least to the Sherwin Creek intersection to minimise the risk of catastrophic collisions. Whilst this is not the responsibility of the Proponent, the current proposed upgrades are not considered adequate for any further increases in mine traffic above that currently approved.

Recommendation 3

The condition survey of the Roper Highway must be undertaken prior to completion of the bulk sample (Phase 1) of the Project. Any required actions arising from the condition survey must be acted upon before the commencement of Phase 2.

The Roper Highway must be upgraded to an appropriate standard, preferably a dual lane, fully sealed road to at least secondary highway standard, prior to any approval of the Project by the Department of Transport to proceed beyond 1000 000tpa ore transport rate. The Proponent must contribute proportionally to this upgrade.

Any transport rate increases and concomitant upgrades required will need to be referred to the NT EPA in accordance with Recommendation 2 of this Report.

3.5 Water Management

3.5.1 Water supply

The Proponent will require water for dust suppression (approximately 85% of water demand) and other purposes. Current bulk sampling activities have demonstrated that dust is likely to be a critical issue in terms of worker safety and ecological health. Dust management is discussed further in Section 3.6 of this Report.

The Proponent states in its EIS, that water demand will be met from groundwater. One of the key limiting aspects of the Sherwin Creek mining area is the availability of water in the vicinity of Deposit C. Groundwater flows in the region are generally regarded as poor. The Proponent has implemented a groundwater exploration program to fully characterise the potential for aquifers to yield an adequate supply to satisfy requirements. This work is ongoing. To date, the minimum estimated annual volume of water required for the mine has been revised upwards by the Proponent to 87 million litres per annum (ML/a). This is subject to debate and the Department of Mines and Energy has calculated that considerably more would be required, in the order of 500ML/a.

Working with the Proponent's estimate, the groundwater extraction rate required to satisfy demand would be 2.8 litres per second (L/s) continuous draw. However, as this could affect the sustainability of the aquifer and due to the seasonal nature of demand, the Proponent intends to pump bores for 8 to 12 hours per day. This limitation pushes up the peak demand rate on aquifers to 12L/s.

Based on current knowledge from existing water bores, monitoring bores and exploration production bores near Deposit C, the medium to long term sustainable yields from these bores are low with the most productive yielding just 0.8 and 0.1L/s. The Proponent intends to continue with its groundwater exploration program to identify a more reliable source and has identified the Bessie Creek Sandstone

formation as the most likely to host higher yielding aquifers. Further information provided by the Proponent indicates that the conceptual target would be a single aquifer with good annual recharge, located within 25km of the operations at Deposit C. Multiple bores are likely to be required to supply a proposed pipeline to the mine site where the water would be delivered to one or more turkey's nest dams for storage. These components have not been detailed in the EIS.

The Proponent has also included alternative, potential water sources on site including sumps in the mined pits. Although these are not featured in the water supply calculations, these sources may provide some buffer to the requirement for ground water, until groundwater sources become more critical towards the end of the Dry season. A potential issue associated with the use of in-pit water is the quality. This would need to be considered carefully before this source should be considered for dust suppression.

In the meantime, the Proponent has been extracting water for its bulk sampling activity from a source in the Roper River approved for use by AIR for the nearby SILL80 project. The NT EPA was anecdotally advised that approval to use this supply had been recently withdrawn from the Proponent but that the Proponent continues to source water from the Roper River. The NT EPA has not been provided with details on this extraction including the volumes being extracted, or the biological and physical monitoring that the Proponent is implementing to ensure that such extraction is not having an impact on water users downstream. This source was not considered in the EIS, as discussed in section 3.3.3, and the NT EPA requires notification in accordance with Recommendation 2 should the Proponent identify extraction from the Roper River as a source for its water demand.

Clearly, the water limitations for the site have not been resolved; however, the Proponent is confident that suitable groundwater sources will be found to enable Phase 2 mining operations to commence. The DME has indicated that until this occurs, the MMP will not be authorised and the Proponent has acknowledged this.

The NT EPA is satisfied that if appropriate action is taken to identify appropriate, sustainable water supply sources that have been considered in the EIS, and regulatory oversight is adequate prior to authorisation, that any impacts can be managed to an acceptable level.

Recommendation 4

In order to ensure that critical dust issues are managed and other water requirements are met, the Proponent must identify sustainable groundwater sources of acceptable quality to the satisfaction of the Controller of Waters prior to authorisation of the Project.

The NT EPA must be notified of any water sources identified for Project use that have not been considered in the Environmental Impact Statement in accordance with Recommendation 2 of the Assessment Report.

3.5.2 Water Management Plan

A Water Management Plan (WMP) was included as part of the draft EIS (draft EIS Appendix F1) to address the risks associated with groundwater extraction, lack of supply and potential surface water impacts from changes to hydrology and stormwater runoff. The WMP adopts the format suggested in a template for Preparation of a Mining Management Plan by the DME at:

http://www.nt.gov.au/d/Minerals_Energy/Content/File/Forms_Guidelines/AA7-

[030%20Template%20for%20the%20Preparation%20of%20a%20Mining%20Management%20Plan.docx](#).

In following this format, the WMP contained no reference to values worth protecting, such as water quality or any beneficial uses of the downstream environment, and no measurable objectives for water management were explicitly stated. Rather, the WMP resembled a risk assessment with management aspects included.

Water supply issues are discussed in Section 3.5.1 above and are intrinsically linked to the potential for groundwater depletion based on the Proponent's intention to source its dust suppression needs from groundwater bores.

There was concern that, given the poor yields from and slow recharge of local aquifers, the Proponent had not given adequate consideration to the possibility of drawdown depleting aquifers and affecting groundwater dependent systems in the medium to long terms, given the timeframe of the Project.

The Proponent responded by reiterating its commitment to ensuring that over-exploitation of the available ground water resources would not occur. The EIS indicated that short term sustainable yields were calculated to demonstrate that the project could proceed in the short term (i.e. 6 to 12 months), whilst further investigations to secure additional groundwater resources were undertaken. The Proponent indicated that the slow rate of groundwater recovery was accounted for in setting sustainable yields to prevent depletion and/or over exploitation but that recommended modelling and operational parameter settings, contingency measures and requirements for closure could only be implemented once the resources were located.

Significant work is required by the Proponent to resolve the water supply issue and ensure that groundwater depletion does not occur as a consequence of the Project. Operational controls will need to be established and an appropriately designed monitoring program implemented with contingencies in the event that groundwater extraction is exceeding sustainable yields.

Another issue raised in responses to the draft EIS related to the surface water monitoring program. The program outlined consists of monthly sampling at seven sites, six of which are distributed on Sherwin Creek and the seventh on a control creek. Two issues were identified. Firstly, the program's monthly schedule rather than the preferred use of continuous (using loggers) or event-based monitoring, and secondly, the absence of ecological parameters to facilitate data interpretation.

The DLRM indicated that the 'baseline' water quality data for Sherwin Creek were very limited in terms of numbers of sites and the number of sampling occasions and therefore could not adequately describe pre-mining conditions. For example, two sites in Sherwin Creek, sampled on the same day, had dissolved oxygen (DO) measurements of 1.1% and 73%, and Total Nitrogen of 2.8mg/L and 0.1mg/L. Without adequate baseline, such variation could neither be attributed to mining nor natural changes and monitoring would therefore be a wasted exercise.

The DLRM recommended the establishment of locally-derived water quality trigger values using data collected from flowing waters and/or accounting for seasonal variation.

The Proponent provided an updated WMP in the Supplement (Supplement Appendix B) to include proposed, event-based sampling of field parameters such as pH, electrical conductivity, turbidity and DO. The WMP proposes at least weekly monitoring during flows in Sherwin Creek and includes an annual macroinvertebrate monitoring program on Sherwin Creek (i.e. upstream and downstream of the mine)

and on a nearby reference stream. This is proposed to enable the assessment of potential impacts of the mine on aquatic health. The Proponent intends to establish site-specific trigger values based on reference site data.

If the Proponent prepares and implements an appropriate WMP that incorporates the commitments and the monitoring advice recommended by the DLRM, in conjunction with the ESCP discussed in Section 3.9.1, the NT EPA considers that the potential impacts to water quality from the Project can be managed to an acceptable level.

Recommendation 5

A water management plan must be prepared to the satisfaction of the Controller of Waters. The plan must include:

- **A groundwater monitoring program with contingencies for groundwater depletion and protection of groundwater dependent ecosystems;**
- **A surface water monitoring program to detect impacts downstream of the mine site; and**
- **Management mechanisms to mitigate any impacts detected through monitoring.**

3.6 Dust

The Risk Assessment in the EIS identifies dust as a potential atmospheric contaminant that presents a high inherent risk to human health due to the crystalline silica (quartz) in dust from iron ore mining and its potential to cause silicosis. As well as the human health risks, there is concern that the dust generated on site could have serious impacts on surrounding vegetation through smothering and on aquatic communities due to the deposited dust contaminating surface water run-off.

Data on atmospheric dust were presented in Appendix M of the draft EIS. A number of concerns were raised by respondents regarding the sampling undertaken. These were as follows:

- Although presented as baseline data, these data were collected after commencement of bulk sampling operations. It is likely that during sampling mining activities were occurring including truck movements, construction of roads and other infrastructure, and excavation of the pit for the bulk sample. The conditions at the time of sampling should have been discussed in the draft EIS and the data interpreted to provide context;
- The ambient air quality sampling was undertaken during one month. In the monsoonal Wet/Dry tropics, dust levels vary greatly between seasons, and rainfall varies from year to year. Therefore, the data provided cannot be considered sufficient to detect changes due to mining or cumulative impacts;
- There was no information in the draft EIS on how the data collected in the study compared with acceptable levels or qualities of ambient dust for human safety.

Responses provided to these concerns in the Supplement were dismissive and in some cases did not attempt to address the concern raised. However, the Proponent provided additional commitments based on some of the concerns, which included:

- Developing a Dust Management Plan as part of the MMP;

- Applying dust mitigation polymer to high traffic areas and roads around accommodation areas;
- Applying water to haul roads into the pits;
- Designing and implementing a soil and sediment monitoring program to support the Dust Management Plan.

The Proponent has committed to 'pre-mining' air quality sampling around the mine area before and during Phase 2 although no specific detail is provided.

Given the potentially serious implications for workers' health if excessive dust is generated at the site, the potential for vegetation in the area to be smothered, which has been reported from the bulk sampling operation, and the significant water deficit in the mining area as discussed in Section 3.5 of this Report, a Dust Management Plan is required for the site. This will be a requirement of the Mining Management Plan. The Proponent should also consider sealing the major haul roads through the mine site to minimise dust generation.

Recommendation 6

A Dust Management Plan must be prepared and implemented to the satisfaction of the Department of Mines and Energy. The Dust Management Plan must include, at a minimum:

- **An appropriately designed dust monitoring program using methods based on accepted Australian/New Zealand Standards for both particulate dust and respirable crystalline silica;**
- **Monitoring of dust deposition levels on vegetation adjacent to the mine site;**
- **Analysis of ambient dust levels against appropriate human health criteria;**
- **Scheduling of dust suppression activities accounting for ambient meteorological conditions to effectively mitigate dust formation; and**
- **Development of appropriate and effective contingency measures in reaction to unacceptable dust levels.**

A cost/benefit analysis of sealing haul roads should be undertaken and the findings reported to the Department of Mines and Energy.

3.7 Biodiversity

3.7.1 Flora and fauna

The key risks to biodiversity identified in the EIS guidelines for the broader Sherwin Creek and Hodgson Downs project were:

- Clearing of native vegetation, which could result in a loss of biodiversity and ecological function if not properly managed; and
- Risk of significant impacts to threatened flora, fauna and ecological communities from the Project.

The Proponent was required to assess the risks to biodiversity to demonstrate that:

- The Proponent is fully aware of the risks to biodiversity associated with all aspects of the Project; and

- The prevention and mitigation of risks to biodiversity are adequately addressed.

The risk assessment was required to focus on threats to the conservation significance of vegetation types, identified threatened species and areas of potential significance to listed migratory species.

Following the public review and provision of the guidelines to the Proponent, a significant alteration of the Project was made such that some of the most significant components of the larger project were removed including:

- Deposits X and W within the Hodgson Downs Mining Area with a disturbance area estimated at 526ha;
- Water storage dam with 173ha disturbance area;
- Private haul roads from deposits to proposed rail siding with an estimated area of disturbance of 770ha; and
- Private haul road between deposits with an estimated area of disturbance of 290ha.

The total area to be cleared in the original proposal on which the controlled action decision by the Australian Government was made, was 2058ha. The current proposal at Deposit C in the Sherwin Creek Mining Area is reduced to an estimated 350ha of disturbance.

While this reduced the potential significance of impacts to EPBC-listed species and those protected under the TPWC Act, the Project variation did not change the decision by the Australian Government or the controlling provisions.

The draft EIS concluded that no threatened species would be affected by the Project due, in summary, to:

- Most of the vegetation to be cleared being common and widely distributed across northern Australia;
- The area to be cleared is small relative to the extent of similar vegetation types;
- No critical habitats were identified within the area to be disturbed;
- For the more distinctive habitats to be disturbed, flora and fauna surveys revealed no threatened species;
- No permanent water exists in the vicinity of the Project area.

The Proponent also concluded that ecologically significant proportions of populations of migratory species or important habitat for many of these species would not be affected by the Project.

Key stakeholders considered that the work undertaken for the draft EIS to assess the risk of the downscaled Project was not of an adequate standard. Reasons given included:

- The limited number of flora and fauna sites sampled in the design to cover the 350 hectare site;
- The restricted sampling program provided only a 'snapshot' in time that did not allow for temporal variation or detection of migratory species;
- The cursory consideration of the potential for vehicle strike on significant fauna;
- The extent and quality of suitable habitat for key species around the mine and in the context of the surrounding areas had not been fully quantified to determine the potential impacts to species from clearing.

In particular, the Australian Government Department of the Environment (DoE) was concerned that inadequate consideration had been given to listed mammal and bird species, including:

- Greater Bilby (*Macrotis lagotis*);
- Northern Brush-tailed Phascogale (*Phascogale pirate*);
- Brush-tailed Rabbit-rat (*Conilurus penicillatus*);
- Northern Quoll (*Dasyurus hallucatus*);
- Gouldian Finch (*Erythrura gouldiae*); and
- Crested Shrike-tit (northern) (*Falcunculus frontatus whitei*).

There was also concern that an assessment of impacts to the Freshwater Sawfish (*Pristis microdon*) had not been properly undertaken.

The Proponent attempted to address the concerns raised by referring back to the draft EIS (despite the inadequacy of information in the first instance) or providing cursory responses with insufficient supporting evidence and justification. No significant new analyses were undertaken or information provided.

Nevertheless, the conclusions drawn by the NT EPA's key advisory agency for matters relating to biodiversity, the DLRM, were broadly in agreement with those of the Proponent. The DLRM stated that, despite the limited data provided from Project-specific fauna surveys, other available data for the surrounding region and expert knowledge of the regional distribution of significant flora and fauna held in the Department, led the Department to conclude that the risk of significant impact to regional biodiversity values from the Project was indeed low. The specific findings of the assessment of MNES are included in Section 3.7.2 below.

With further expansion plans by the Proponent, the likelihood of more significant impacts to listed species and habitats through vegetation clearing and disturbance will increase. Any move to return to the broader Project in the future will require notification to the NT Government, including under clause 14A of the Environmental Assessment Administrative Procedures, and referral to the Australian Government under the EPBC Act.

The Proponent is strongly advised to consider protected matters more seriously in planning for future works. Appropriate studies to collect baseline data should be undertaken in the interim to help facilitate a more robust decision making process for its future development plans.

3.7.2 Matters of National Environmental Significance (MNES)

On 6 April 2013, the Australian Government decided that the Sherwin Creek and Hodgson Downs Iron Ore Mine was a controlled action under the EPBC Act and would require assessment and approval before it could proceed. The relevant controlling provisions were:

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

Advice provided to the DoE by the NT EPA on the potential significance of the proposed action included:

- The likelihood of significant impact from the proposed activity was low with respect to flora and fauna; and
- Acknowledgement that data were constrained due to a focus on mining areas and not the proposed haul road corridors.

As discussed in Section 3.7.1 above, since the Australian Government's decision in 2013, the Project has been significantly downscaled such that the proposed footprint of disturbance has been reduced by approximately 1700ha.

The NT EPA believes that this has significantly reduced the risks of unacceptable impacts to MNES from the Project. A discussion of the risks to individual species is included below.

Greater Bilby (*Macrotis lagotis*)

In the Northern Territory, the greater bilby occurs in the central and western parts of the Tanami bioregion, the southern Sturt Plateau bioregion and the northern Great Sandy Desert bioregion (Pavey, 2006). The National Recovery Plan for the bilby indicates that they are now mostly restricted to the drier and least fertile parts of their former range with the exception of populations in the north of the NT and WA. Remaining populations occupy three major vegetation types, namely: open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas (Pavey, 2006). The Plan notes that it would be reasonable to consider the Tanami bioregion (west of the Stuart Highway) and the northern Great Sandy Desert bioregion as potential critical habitat of the species (Pavey, 2006).

Vegetation surveys were conducted at Deposit C and its surrounds between 2011 and 2013 with 32 sites surveyed. The eight vegetation communities present within the Sherwin Creek Deposit C Project site are known to be common and widespread through the region. None of the vegetation communities surveyed are considered critical habitat for the greater bilby. Within the Roper River catchment and specifically adjacent to the Roper Highway, vegetation communities are not considered likely to provide suitable habitat for the bilby.

The draft EIS indicates that no records of this species exist for the Gulf Fall and Uplands bioregion and the species is unlikely to occur in the bioregion or the Deposit C site. Distribution maps in the National Recovery Plan show that the records from the NT are all further south of the Roper region. Given that critical habitat does not exist within the footprint of disturbance for the Project or surrounds, or along the Roper Highway, the NT EPA considers that these conclusions are reasonable.

Fauna surveys conducted at the Sherwin Creek site and surrounds did not locate the species and it is thought that the species is regionally extinct. The NT EPA is satisfied that the risk of significant or unacceptable impact to the greater bilby from the Project is low.

Northern Brush-tailed Phascogale (*Phascogale pirata*)

Phascogale pirata (Northern Brush-tailed Phascogale), Family Dasyuridae, is a carnivorous marsupial which is listed as vulnerable under the EPBC Act (TSSC, 2010). The species is restricted to eucalypt forests in the top end of the Northern Territory. It has been recorded from Melville Island (Tiwi group) and West Island (Sir Edward Pellew group), Cobourg Peninsula and Gove Peninsula. Almost all other records are concentrated in a restricted area bounded by Kakadu, Katherine and Litchfield National Park (Woinarski *et al.*, 2007).

Most records of the species are from tall open forests dominated by *Eucalyptus miniata* (Darwin Woollybutt) and *E. tetrodonta* (Darwin Stringybark). It is a nocturnal mammal, feeding both in trees and on the ground. It shelters in tree hollows during the day. This species occurs as a series of discontinuous populations. Population size is unknown. The most recent account of the species (Rhind *et al.*, 2008 cited in TSSC, 2010) reported fewer than 10 individuals recorded in the past decade. This

species potentially occurs within the Tiwi Cobourg, Daly Basin, Pine Creek, Darwin Coastal, Arnhem Coast, Arnhem Plateau, Victoria Bonaparte and Gulf Coastal IBRA Bioregions and the Northern Territory Natural Resource Management Region.

The vegetation in the Project site and surrounds is classified predominantly as mid to low open woodland. Much of the vegetation to be cleared is unlikely to constitute critical habitat for the species. In the regional context, the vegetation communities to be cleared are considered to be common and widely distributed and clearing of the extent proposed (approximately 330ha) is not considered regionally significant.

No records of the brush-tailed phascogale have been found in the bioregion and the Sherwin Creek mining area and Roper Highway are considered to be outside the known area of distribution of the species. The species was not detected in surveys conducted by the Proponent in the Deposit C site or surrounds, or indeed in the wider Sherwin Iron exploration leases.

Although the Proponent's proposed measures to mitigate Project impacts on this and other listed species are limited, the NT EPA considers that the likelihood of significant or unacceptable impacts to this species is low.

Brush-tailed Rabbit-rat (*Conilurus penicillatus*)

The brush-tailed rabbit rat (*Conilurus penicillatus*), Family Muridae, is a moderately large, partly-arboreal rodent listed as vulnerable under the EPBC Act (TSSC, 2008). Preferred habitat for the brush-tailed rabbit rat is mixed open forest and woodland that are not burnt annually, with an understorey of perennial grasses and a sparse-to-moderate mid storey (Kemper & Firth, 2008). The species is also found on sand dunes with *Casuarina equisetifolia* (Woinarski & Hill, 2012a).

In the NT, this species has been recorded from near-coastal areas from near the mouth of the Victoria River in the west to the Pellew Islands in the east, and including Bathurst, Melville, Inglis and Centre Islands and Groote Eylandt (DLRM Fact sheet). There are no recent records from much of this historically recorded range, and it is currently known to persist in the NT only on Cobourg Peninsula, Bathurst, Melville and Inglis Islands, and Groote Eylandt and a small area in Kakadu (Woinarski & Hill, 2012a).

No single factor is known to have caused the decline in this species, however, it is thought that either disease or exotic predators, most likely feral cats, are the key factors rather than land use factors (Woinarski & Hill, 2012a).

According to the draft EIS, there are three pre-1970 records about 50km east of Deposit C on the Roper River. The draft EIS states that this species is known to occur in the bioregion but is unlikely to occur in the Deposit C site as it is outside the current known distribution range. Fauna surveys by the Proponent did not detect the species in the Sherwin Iron exploration leases or the Deposit C site and whilst potentially-suitable habitat may occur within the Deposit C site and surrounds, detailed knowledge of the preferred habitat is not available.

Given that the broad description of habitat preference satisfies a range of common and widespread habitats in the Top End, the NT EPA considers that the clearing of habitat for the Project and the transport of ore along the Roper Highway are unlikely to have a significant or unacceptable impact on the brush-tailed rabbit rat.

Northern Quoll (*Dasyurus hallucatus*)

The northern quoll *Dasyurus hallucatus* is a distinctive carnivorous marsupial and a member of the Dasyuridae family (Hill and Ward, 2010). The species occurs across much of northern Australia, from south-eastern Queensland to the south-west Kimberley but has declined across much of its range (Woinarski and Hill, 2012b). Core populations are found in rock and/or high rainfall areas (Hill and Ward 2010).

The northern quoll is a generalist predator that consumes a wide range of invertebrates and small vertebrate prey in a wide range of habitats (Woinarski and Hill, 2012b). It was common in many eucalypt open forests but has seen significant declines since the cane toad (*Rhinella marina*) invasion (Woinarski *et al*, 2010). The draft EIS indicates that the species was recorded near Ngukurr prior to the appearance of cane toads in the area. Other post-1970 records do occur in the bioregion, more than 200km south-east of Deposit C around Borroloola.

As the northern quoll does not have specific habitat requirements, suitable habitat potentially does occur in the Deposit C site, including rocky gorge and escarpment habitat. The vegetation communities to be cleared for the Project are all common and widely distributed through the region. Therefore, removal of the proposed extent of habitat is unlikely to have regionally significant impacts.

Further, the Proponent's fauna surveys confirmed the presence of cane toads in the Project area and surrounds and no signs of the northern quoll were recorded. The draft EIS hypothesised that the area may have once supported populations of Northern Quoll, but they are now locally extinct. The DLRM also consider that the species is unlikely to now be found in the area (Simon Ward pers. comm., DLRM, May 2014).

The NT EPA considers that the clearing of habitat for the Project and the transport of ore along the Roper Highway is unlikely to have a significant or unacceptable impact on the northern quoll.

Gouldian Finch (*Erythrura gouldiae*)

The Gouldian finch (*Erythrura gouldiae*) is a seed-eating bird found in the northern savannahs of Australia and is listed as endangered under the EPBC Act (O'Malley, 2006).

Within the last one hundred years populations of the species have undergone significant decline and a contraction of their known range with reliable recordings within six NT and Western Australian bioregions (O'Malley, 2006). The largest known population is in the Yinberrie Hills (about 40km north of Katherine) (Palmer *et al*, 2012).

The species occupies two different regions of the landscape on an annual cycle (Dostine *et al*. 2001), in the Dry season in rocky hills with smooth-barked, hollow bearing tree species such as *Eucalyptus tintinnans* (Salmon gum) and *E. brevifolia*, and in the Wet season low lying drainage areas where they feed on annual grasses (O'Malley, 2006). Nesting usually occurs within two to four kilometres of small waterholes or springs that persist throughout the dry season (O'Malley, 2006).

The main causes of past declines, and the main threats to the species at present, are thought to be grazing pressure, air sac mites and inappropriate fire regimes (O'Malley, 2006).

The species has been most recently been recorded from surveys in Limmen National Park (Simon Ward pers. comm., DLRM, May 2014). The DLRM suspects that the

species breeds somewhere in the region and is likely to use a variety of the woodland vegetation communities described in the draft EIS, largely as feeding habitats. However, none of the vegetation communities in the Deposit C area and surrounds are likely to be important breeding habitats.

Fauna surveys with camera traps were conducted by the Proponent in the Sherwin Creek mining area. Cameras were set up at an isolated billabong along Sherwin Creek in the late Dry season with minimal available water present in surrounding areas. Whilst other grainivorous birds were observed using the water, no Gouldian finches were recorded.

The NT EPA is satisfied that the absence of permanent water and suitable breeding habitat in the Sherwin Creek area makes it unlikely to support breeding Gouldian finches. As suitable feeding habitat is represented in the surrounding area and the wider region, the clearing of vegetation for the Project is unlikely to have significant regional effects. Unacceptable impacts to the Gouldian finch are unlikely as a result of the Project.

Crested Shrike-tit (northern) (*Falcunculus frontatus whitei*)

The crested shrike-tit or northern shrike-tit is an arboreal bird listed as vulnerable under the EPBC Act. The bird has a scattered distribution across northern Australia from the south-west Kimberley to near Borroloola in the NT though it has not been relocated in the Borroloola area since it was first recorded there in 1913 (Woinarski and Ward, 2012).

Recent records from shrike-tits in the Katherine region come from open mixed eucalypt woodland habitat with a grassy understorey on heavy soils that are slightly inundated for much of the Wet season (Ward, 2009). The closest records for the species are in the Mataranka area (150 km to the west).

Despite a number of fauna surveys associated with mining development in the region, the species has not been recently recorded. It was not recorded in fauna surveys conducted for the Project.

This species may occur in the Project area as several vegetation communities described in Appendix H2 of the draft EIS are likely to provide potential habitat for the species – 1.3, 1.4, 2.1, 3.1, 4.1, 4.2, 10.1 (Simon Ward pers. comm., DLRM, May 2014). These vegetation communities are considered to be common and widespread in the region and the total area of woodland to be cleared for the Project is considered to be minimal in the regional context.

The DLRM considers the Crested Shrike-tit to be a low density species that has been recorded from locations spread widely over the north of the NT, down to Larrimah and the likely risk to the NT population from activities in the southern Roper district is low.

The NT EPA considers that the clearing of habitat for the Project is unlikely to have a significant or unacceptable impact on the crested shrike-tit.

White-bellied Sea Eagle (*Haliaeetus leucogaster*)

The draft EIS stated that suitable nesting habitat for the White-bellied Sea Eagle (*Haliaeetus leucogaster*) is not found at Deposit C and therefore further consideration of the species was not warranted. Justification of this statement was requested of the Proponent.

The Supplement stated that the White-bellied Sea Eagle usually nests in mature forests within 5km of the coast, estuaries or large inland lakes and that no large water

bodies occur within 5km of Deposit C. The only surface water within close proximity to the Deposit C site occurs at Sherwin Creek, an ephemeral system that ceases to flow at the end of the Dry season. Sherwin Creek is not of sufficient size to constitute foraging or nesting habitat for White-bellied Sea Eagle. Suitable nesting and foraging habitat for the species occurs along the Roper River, which is approximately 10km from Deposit C. The Supplement concluded that the species would therefore not be deleteriously impacted by the development.

The NT EPA is satisfied that the Sherwin Creek Deposit C site is unlikely to include habitat that would be favoured by the white-bellied sea eagle given the more suitable habitat of the Roper River and other parts of the Roper catchment. The NT EPA considers that the risk of significant or unacceptable impacts to the species from the Project is low.

Freshwater Sawfish (*Pristis microdon*)

The freshwater sawfish (*Pristis microdon*) occur in fresh or weakly saline waters with sandy or muddy bottoms and can be encountered from river mouths up to several hundred kilometres upstream (Thorburn *et al.*, 2003). Adults are usually found in estuaries and coastal areas, and the juveniles in fresh water.

The species has been recorded from numerous rivers throughout northern tropical Australia from the Fitzroy River in the west to the Normanby River in the east. The species is known to inhabit the Roper Catchment. Records exist from the upper reaches of the Roper River on Elsey Station, 350km upstream from the river mouth (Thorburn *et al.*, 2003). The draft EIS includes reference to an unconfirmed record from Strangways River approximately 60 km west of Deposit C.

The Proponent's Aquatic Fauna Report (Draft EIS Appendix H3), included an assessment of dry season pools at Sherwin Creek and found them to be shallow (i.e. < 1m deep) with rocky rather than fine silty or sandy substrate, and dry in the late Dry season. This is likely to be unsuitable habitat for the sawfish. If the sawfish is present in the Sherwin Creek catchment it is likely that it would only be during Wet season flooding episodes. The DLRM concluded that Sherwin Creek does not provide habitat for a diverse fish assemblage (seven fish species were identified in surveys, all common and widespread) and is very unlikely to provide habitat for significant species such as Freshwater Sawfish.

In response to concerns, the Supplement included the following with regards to site impacts on the sawfish:

- Hydrological changes - Drainage lines that may be removed/modified are located at the top of their respective catchments and therefore the risk of significant modification to downstream hydrology are considered low.
- Obstruction of flows - To minimise the potential risks of alteration to surface water flows associated with the road crossing of Sherwin Creek and other minor drainage lines, their design and construction will incorporate appropriate engineering principles and natural flows will be maintained at all times.
- Groundwater dependence - Given that there were no permanent pools observed in Sherwin Creek in the vicinity of the mine site (i.e. it dries completely), there is no evidence to suggest that there are any groundwater-dependent ecosystems.
- Groundwater contamination - There is no evidence to suggest that there is connectivity in the limited groundwater in the vicinity of the mine site and aquifers closer to the Roper River.

Whilst the NT EPA considers it unlikely that freshwater sawfish would be impacted in Sherwin Creek by mining activities, the mine could affect the waters of the Roper River if the site is not properly managed. For example, the wash out of the access road mentioned previously in this Report may have impacted on the Roper River through high sedimentation and short-term turbidity levels.

The Proponent has committed to implementing an AMD Management Plan, Water Management Plan and Erosion and Sediment Control Plan.

The NT EPA is satisfied that, if these plans are implemented in accordance with recommendations in this Report, then it is unlikely that impacts from the Project would occur beyond the mine site and into the Roper River. The NT EPA considers that significant or unacceptable impacts to the freshwater sawfish from the Project are unlikely.

3.7.3 Weeds

Degradation of habitat through the introduction of weed and pest fauna species, and increased weed spread in the Project area was identified in the EIS guidelines as another key risk to biodiversity.

The Region is relatively undisturbed and only four weed species were identified in Deposit C including *Hyptis suaveolens* (Class B declared weed - growth and spread to be controlled), *Digitaria bicomis*, *Passiflora foetida* and *Stylosanthes scabra*.

Assessment of the NT Weeds Database also revealed previous data records applicable to the region with the potential to occur or be brought into the mine site. These include the declared weeds gamba grass (*Andropogon gayanus*), parkinsonia (*Parkinsonia aculeata*), prickly acacia (*Acacia nilotica*), candlebush (*Senna alata*), sida (*Sida spp.*) chinee apple (*Ziziphus mauritiana*) and non-declared but environmental weeds annual misson grass (*Cenchrus pedicellatus*), itch grass (*Rottboellia cochinchinensis*) and rubber bush (*Calotropis procera*). The declared species except gamba grass and chinee apple are all Class B weeds (growth and spread to be controlled) under the *Weeds Management Act* (The Act). Gamba grass and chinee apple are declared Class A (to be eradicated) in this region.

The EIS largely addresses the identification and the management of risks associated with weed management through the following measures:

- Detailed mapping of weed infestations based on pre-mining weed survey;
- Training staff in weed identification, including weed spread information and hygiene processes in staff inductions;
- Limiting clearing and disturbance on site;
- Installing exclusion fencing;
- Managing stockpiles; and
- Guaranteeing plant and soil materials coming onto site are weed free.

Specific commitments made in the Supplement based on comments from respondents include:

- Installation of a wash-down facility, which will adhere to the Queensland Checklist for Clean-down Procedures and Queensland Guideline for the Construction of Vehicle and Machinery Wash-down Facilities for Vehicle Wash-downs, before the onset of mining;
- The wash-down facility will be inspected annually and as part of the annual weed survey;
- Control of weeds will occur on an annual basis (at a minimum) at the end of the Wet season;

- Weed control will be carried out across the site, which will include the wash-down area;
- Neighbouring land managers will be informed within 7 days of new weed incursions onto the site should they occur.

DLRM provided additional information and recommendations in the review of the Supplement to improve the Weed and Pest Management Plan, including:

- Weed control prior to seed set should be carried out in all areas affected by the Project.
- Any works that cause disturbance to native vegetation and soils will create conditions favourable for the growth of weed species and control should be undertaken as necessary in these areas. This will include pit areas and surrounds, along roadways to and from the extractive sites, around sediment traps and around stockpiled elements (soils/rocks etc.).
- The Proponent will need to ensure that any products/extractives leaving the property are also weed and weed seed free.
- Weed control must be maintained on stockpiles as these areas are high risk for weed establishment. The stockpiled soil and rocks will need to be weed and weed seed free, both when stockpiled and when used in rehabilitation activities as topsoil.
- The Proponent acknowledges that some weed species require several control events per year to prevent seeding and further establishment. Such weeds will need to be managed accordingly to prevent further establishment, with prioritisation of Class A weeds should they occur on the mine site.
- Controlled areas can become bare earth over years of treatment allowing erosion to occur and the establishment of new weeds. The rehabilitation program should include areas undergoing weed control to prevent the infestation of new weeds in these areas and the need for further control.
- Neem (*Azadirachta indica*) is currently under review by the Minister as a proposed declaration. If neem is found on the site, GPS coordinates should be recorded and forwarded to the Weed Management Branch of DLRM for information.

All weed management must be undertaken in accordance with an updated EMP as part of the MMP for the Project. The Proponent must take into consideration the above recommendations and comments in preparing and implementing its final management plan.

3.8 Acid and metalliferous drainage (AMD)

The EIS indicated that the nature of the mining project and characteristics of the DSO pit geology and lithology at Deposit C reduced the risk of mining potentially acid-forming (PAF) material and therefore the likelihood of generating AMD. However, amongst the inconsistent and conflicting information in the documentation, the Proponent acknowledged that an area of PAF material occurs in the pit footprint and would be scheduled to be mined in years 4 to 6.

A mine waste rock balance determined through geochemical and mineralogical characterisation indicated that in a mass balance of 212Mt, only 0.03% of waste rock (59 255t) would have the potential to generate acidity. The EIS concluded that an AMD management plan would not be required unless it was deemed necessary at the time of mining this area of the deposit.

A number of respondents to the draft EIS were concerned about this proposed strategy. The NT EPA considers that planning early for the eventuality that PAF

material could be mined would ensure that the site is prepared and the risk of AMD generation would be minimised.

The Proponent subsequently included an AMD Management Plan in the Supplement which adopts a life-cycle approach with pre-mining investigations and assessments through to rehabilitation and closure. The additional investigations, assessments and actions that the Proponent has committed to undertaking are supported. The NT EPA is satisfied that AMD issues can be managed without unacceptable impacts if the Proponent upholds its commitments in the EIS.

Recommendation 7

A management plan for potentially acid-forming waste rock must be prepared to the satisfaction of the Department of Mines and Energy to prevent or mitigate any potential impacts associated with acid and metalliferous drainage from the mine site. The management plan is to include all actions the proponent has identified in its EIS, including but not limited to:

- **Implementing a strategy for the ongoing assessment of risks and management and monitoring of potentially acid-forming materials during mining including setting threshold triggers and implementing appropriate mitigation;**
- **Employing a site-specific sampling and analysis plan to identify and characterise potentially acid-forming materials; and**
- **Designing encapsulation cells to contain potentially acid-forming materials.**

3.9 Erosion and sediment control

The Sherwin Creek Deposit C site sits on a ridgeline approximately 125mAHD and drains down to the lowest point which is on the access road at approximately 45mAHD. The site is completely within the Sherwin Creek sub-catchment.

Rainfall records from Ngukurr (approximately 40km east of the site) and Roper Bar (approximately 20km east of the site) indicate typical Wet/Dry season patterns with most rainfall concentrated in the summer months between November and March. The wettest months are January to February with mean rainfall recorded as approximately 225mm and 200mm respectively; May and October average approximately 10mm per month.

Soils are classified as primarily rudosols with some kandosols, generally sandy loam with shallow depths to rock around the proposed mine site and deeper profile with higher clays in the lower parts of the lease. Soils in the Patterson land system, which cover most of the mine site, have moderate sodicity and therefore are potentially dispersive in the deeper cuts.

According to the draft EIS (Appendix E), the erosion potential for the site is variable taking into account soil factors, rainfall characteristics, slope and management factors such as cover and compaction. The results indicate erosion potentials ranging from high and very high in the mine industrial area, internal haul roads and mine pit to low in parts of the access haul road and creek crossing area.

The low erosion potential ascribed to the access road and creek crossing was not enough to prevent an incident that occurred on 12 February 2014. This incident and its implications are described in Section 3.9.2 of this Report. General management of erosion and sedimentation are discussed in the following section (Section 3.9.1).

3.9.1 Erosion and Sediment Control Plan

The draft EIS included an Erosion and Sediment Control Plan (ESCP) (draft EIS Appendix E) prepared with the following objectives:

- To ensure adequate drainage and pollution control measures are implemented to manage runoff from disturbed areas of the site;
- To ensure that stormwater is managed to protect downstream water quality;
- To ensure sedimentation from the site is reduced such that soil particles greater than 1mm are retained; and
- Erosion is prevented.

The ESCP was developed in accordance with the International Erosion Control Association, Best Practice Erosion and Sediment Control Guidelines (IECA, 2008) and is considered by the NT EPA to be conceptual but relatively comprehensive.

The DLRM requested that further detail be provided in the ESCP including:

- Specific sediment basin types and designs for each location earmarked for basins in conceptual site drawings to provide direction for construction and to assist accurate project costing;
- A typical drawing/construction detail of the proposed sediment weir type;
- Further information and typical drawings for rock lining of drains;
- Locations of proposed diversion bunds and sediment fences for topsoil stockpiles;
- Selected method(s) for stabilisation of soil stockpiles, drain and road margins, disturbance associated with installation of ESC works, or stabilisation of drainage outlets; and
- The assessment and ESC management requirements of dispersive soils.

DLRM also provided the following recommendations in response to review of the ESCP:

- Outlets for sediment basins, culverts and level spreaders should be stabilised to ensure receiving waterways or downslope areas are not at risk from accelerated erosion, with detail described in the ESCP and displayed in appropriate typical drawings;
- Preparation of a schedule for staging of ESCP works throughout site development;
- All proposed works within the ESCP should be planned by a Certified Professional in Erosion Control (CPESC, refer www.austieca.com.au), and all hydrological design calculations should be reviewed by a suitably qualified engineer;
- Review and possible upgrade of sediment containment measures with regard to potential sediment discharge from the north-western side of the subgrade stockpile to adjacent tributaries of Sherwin Creek;
- Any area of soil disturbed during site construction (not subject to future works) should be progressively rehabilitated by revegetation, mulching or other appropriate means, to the satisfaction of the Department of Mines and Energy;
- Maintenance provisions should include regular inspections of ESC works, plus inspection following major storm events, and definition of responsibilities for personnel allocated to inspection and maintenance work, including removal of sediment or ESC works repair. Inspection and maintenance activity should also include receiving waterways downstream of outlet structure discharge; and

- An inspection template should be developed for use by allocated personnel and a copy of this template should be included as an attachment to the ESCP.

The Proponent in the Supplement committed to submitting an updated ESCP prior to construction of Phase 2 including all the information requested and recommendations provided by DLRM above. The NT EPA supports the Proponent's commitments and considers that an audit of the ESCP in accordance with Recommendation 8 of this Report will ensure that the ESCP will be appropriately implemented by the Proponent.

Recommendation 8

The Proponent must develop a final Erosion and Sediment Control Plan (ESCP) in the Mining Management Plan to the satisfaction of the Department of Mines and Energy. The updated ESCP must include additional detail as recommended by the Department of Land Resource Management and committed to by the Proponent in the EIS.

3.9.2 Mine site access road incident

Throughout January and February 2014, the Proponent reports that the Sherwin Creek site received consistent and significant rainfall. This is typical for the Wet season in the Top End. These wet conditions led to a significant amount of water being contained behind the main access road to the Bulk Sample Project until it approached the running surface of the road on 10 February 2014, creating hazardous road conditions and preventing access to the mine site.

The storm water topped the main access road on 12 February 2014 and commenced eroding its side walls and surface. The Proponent was unable to reach the area to install any form of breakwater, due to the volume of flow in the creek. A large section of the access road was washed out, sending local rock and earth used to construct the access road down the Sherwin Creek. The Proponent stated that the material caused temporary discolouration.

The NT EPA understands that the road was designed with adequate provision of stormwater piping to handle the anticipated flows in the Sherwin Creek during the Wet season. However, the piping was never installed as construction of the access road was undertaken before the culvert pipes were delivered to site. This meant that any flows in Sherwin Creek were completely impeded; the road acted as a dam without a spillway.

Not surprisingly, water sampling and analyses after the incident indicated that there was no evidence of contamination up-stream or down-stream. It is likely that sediment laden water would have moved into the Roper River by the time samples were taken. The earthen material would have moved and been deposited further downstream and into the Roper River proper, undetected by water quality sampling.

The Proponent has stated that, since the incident, significant effort has been made to ensure that all aspects of the original access road design are implemented as well as all corrective actions from the onsite investigation. In the meantime, to ensure that the bulk sampling activity could continue uninterrupted, the Proponent has pushed another road through the Sherwin Creek bed upstream of the washed out access road.

The Proponent indicated that it plans to provide a follow-up report to the NT EPA upon completion of access road reconstruction with stormwater pipes installed. No such report has been provided at this time.

The NT EPA considers that filling a first order, albeit intermittent, stream with earth and rock without appropriate culverts prior to the Wet season was an extraordinary proposition and the likelihood of an incident occurring was certain. Unfortunately, such incidents can tarnish the reputation of even the most reputable companies, although it is unlikely that such a company would experience an incident of this magnitude.

This incident is symptomatic of the Proponent's apparent continued haste to commence the Project. The NT EPA considers that a 'social licence' to operate is essential in the mining industry and seeks assurance that the Proponent intends to improve its conduct at the Deposit C site. Consequently, the NT EPA recommends that a full audit of erosion and sediment controls on the mine site be conducted prior to the onset of the Wet season in 2014. The audit would gauge the success of implemented controls of the first phase of mining and the status of further controls for the second phase, and ideally demonstrate that the Proponent takes its corporate responsibilities seriously and operates in accordance with its own Environmental Policy.

Recommendation 9

The Proponent is to undertake a full audit of the implementation of the erosion and sediment control plan for the Sherwin Creek Deposit C site prior to the onset of the 2014/2015 Wet season. The audit must be undertaken by a suitably qualified person. At its completion, an audit report must be provided to the Department of Mines and Energy and the NT EPA.

3.10 Socio-economic impacts

The Proponent undertook an assessment of social and economic impacts (both positive and negative) in the draft EIS (draft EIS Appendix K2 Economic and Social Impact Assessment) and provided a provisional plan to manage the identified impacts (draft EIS Appendix K1).

The draft EIS guidelines included a number of considerations for the Proponent in undertaking the Economic and Social Impact Assessment (ESIA). The Proponent focused on the following:

- Estimates of the quantity and value of production/exports relating to the mine, including expected reduction in revenue should the proposal not proceed;
- An estimate of the value to the local economy associated with expenditure during the construction phase and the annual expenditure on regional goods and services as it relates to the mine and associated infrastructure;
- Benefits to the local community, during and beyond the life of the mine, such as development of new skills and facilities, economic development and opportunities for local and regional business and employment opportunities;
- The risks of the mine, related infrastructure and associated workforce negatively impacting on identified social issues in the region.

The Project, should it continue, is projected to provide benefits to the NT economy (unspecified) and local communities over a 6 year period.

The local communities considered to be most affected by the Project include Jilkminggan (107km west of the Project), Ngukurr (61km east), Minyerri (Hodgson Downs - 80km south), and Urapunga (36km east) due to their proximity to the Deposit C site.

As discussed in Section 2.3.3 of this Report, these communities are predominantly Aboriginal communities characterised by low income, overcrowding, relatively young

populations and high rates of illiteracy and unemployment. Up until recently, there have been few local work opportunities available for people from these communities. It is hoped that growth in the mining industry in the region might change that.

Communities such as Mataranka and Katherine could also see some economic benefits.

The Proponent indicates that the benefits to local communities would be primarily economic with some flow-on effects, including:

- Increased employment and therefore community income;
- Increased business opportunities and long term sustainability of local businesses;
- Up-skilling of local people with improved financial management and technical skills;
- Influx of workers leading to utilisation of local business and availability of education staff and skilled workers;
- Improved health outcomes through increased availability of services;
- Improvements to community services and infrastructure through donations by the Proponent.

The key negative impacts for the region identified in the draft EIS as a result of and affecting the Project include:

- Failed relationships between communities and the Proponent leading to non-realisation of business opportunities and employment targets, and constrained access to additional ore resources in the future;
- Influx of people seeking employment stretching the capacity of local health services leading to health impacts in the community and potential problems with mine employees;
- Increased availability of potentially harmful substances such as illicit drugs and alcohol leading to increased crime and reduced employee availability;
- Supply shortages resulting from mine demands leading to decreased community benefits;
- Pressure on infrastructure, particularly traffic movements on the Roper Highway leading to safety issues and potential fatalities with impacts to the Project.

The potential impact to communities and road users from increased heavy vehicle traffic stands out as the primary concern to stakeholders and this was reflected in responses to the draft EIS. The key issues are dealt with in Section 3.4 of this Report.

The EIS guidelines required the Proponent to explicitly identify those members of the community expected to accept residual risks and their consequences, providing a better understanding of equity issues. The NLC expressed concerns that the proponents had not identified those who would be required to carry residual risks. In its submission, the NLC identified two communities entirely reliant on the Roper Highway for road access, Ngukurr and Jilkminggan, and asserted that Indigenous people would likely be most affected by the mine, and perhaps likely to carry most of the residual risks and their consequences. The NLC requested that qualitative analysis of the potential implications for the regional Indigenous population be undertaken in the context of equitable distribution of the costs and benefits of the proposal.

In response, the Supplement stated that the Proponent would reduce risks as far as possible but that a certain level of risk to local communities and casual users of the Roper Highway will remain (i.e. residual risk) once the Project commences

operations. The Supplement indicated that these risks would likely be small and could be further reduced once the Project progressed and improved solutions were identified, developed and implemented.

Similarly, the Amateur Fisherman's Association of the Northern Territory (AFANT) were concerned about the negative impact of increased safety risk and heavy vehicle traffic on recreational fishing tourism and the tourism experience of visitors generally in the Roper River region.

The Proponent responded that the EIS contained a strong focus on the management of risks related to travelling the Roper Highway between Mataranka and the entrance to the mine site, without seeking to differentiate between different groups of users.

As discussed previously in this Report, the NT EPA considers that the safety risks are not small and that the Roper Highway will require significant upgrade in the future to cope with the increasing heavy vehicle traffic and to improve the residual safety risks for road users. Population centres along the Stuart Highway will also be impacted by road traffic as the cumulative impacts of resource projects and tourism grow in the NT and these communities also need to be considered in managing the impacts.

In the Supplement, the Proponent indicates that it accepts responsibility for the bulk of the cost of finding solutions to reduce any residual environmental and cultural risks directly related to mining and transport of ore. The Proponent's Traffic Management Plan, in conjunction with the Social Impact Management Plan (SIMP), seeks to mitigate these risks. The NT EPA has significant concerns about the ability of the Proponent to manage Project-related traffic safety issues, particularly on the Roper Highway, and the Proponent's management plans to minimise these impacts will need to be carefully prepared and implemented to ensure that the risk of accidents and fatalities associated with Project traffic and interactions with users of the public road network is minimised to as low as reasonably practicable.

Recommendation 10

The Traffic Management Plan and Social Impact Management Plan must be prepared and implemented to ensure that they are cohesive, working together to maximise safety and community awareness with respect to ore haulage traffic on the public road network.

The Plans should include:

- **A community engagement strategy to facilitate community awareness and provide a reporting mechanism for the community and road users of any road traffic issues, near-misses and incidents;**
- **Clear processes and chain of command for translating complaints or issues into actions and for detailing appropriate contingencies should an incident occur; and**
- **A reporting mechanism to the NT Government Department of Transport.**

The risks associated with traffic are considered significant in the region but, as the EIS states, there are likely to be other residual social risks, which will be beyond the full control of the Proponent (such as alcohol, illicit substances, crime and an influx of money). Some of these risks may be indirectly contributed to by the Project; however, the cost associated with management of these social factors remains the responsibility of government, communities and individuals, including the Proponent. The Proponent has included a suite of actions and commitments to minimise social risk in its SIMP and the NT EPA considers this to be the most appropriate mechanism for the Proponent to manage any such issues arising directly from the mine. The Proponent has committed to seeking ways to help reduce residual social risks but

claims that it cannot be held responsible for the outcomes of personal or community choices.

3.11 Offsets

Respondents to the draft EIS were concerned that there were no environmental offsets included. The EIS guidelines specifically required the Proponent to provide information on:

- Any identified impacts or detriments that cannot be avoided, reduced or mitigated at reasonable costs and whether these impacts could be considered as 'significant' under the EPBC Act;
- Risks of failure of management actions (such as rehabilitation, weed control, etc.) and uncertainties of management efficacy should be identified; and
- Proposed offsets for residual significant impacts to listed threatened species or ecological communities and listed migratory species and an explanation as to how these proposed offsets meet the requirements of the Environmental Offsets Policy and Offsets assessment guide, where relevant.

The Proponent responded that the only unavoidable impact identified in the EIS process is the clearing of native vegetation and stated that the approximate 350ha area of primarily open eucalypt woodland to be cleared is common and widespread across the region and represents a negligible amount in the regional context. Additionally, the Proponent asserted that the small portion of gorge habitat to be removed is not considered significant under the EPBC Act as it does not support EPBC-listed species.

3.11.1 Offsets for Matters of National Environmental Significance

The Proponent argued that due to the nature of the Project, significant, long-term, negative residual environmental effects were not expected and used this argument to justify not including any offsets for Matters of National Environmental Significance in the EIS. Based on the information presented in the EIS, and advice from the DLRM, The NT EPA offers the following assessment:

Greater Bilby (Macrotis lagotis)

The potential effects of the Project on the greater bilby are discussed in Section 3.7.2 of this Report.

The NT EPA considers that the Project will not result in unacceptable impacts to greater bilby. As the species has not been recorded on-site and habitat for the species is not found in the Project area, the NT EPA believes that the Project is unlikely to have a significant residual impact on the species and therefore, consistent with the Australian Government Offset Policy (DSEWPac, 2012) offsets may not be applicable.

Northern Brush-tailed Phascogale (Phascogale pirate)

The potential effects of the Project on the northern brush-tailed phascogale are discussed in Section 3.7.2 of this Report.

The NT EPA considers that the Project will not result in unacceptable impacts to this species. As the species is unlikely to be in the area, has not been recorded on-site and habitat for the species is not found in the Project area, the NT EPA believes that the Project is unlikely to have a significant residual impact on the species and therefore, consistent with the Australian Government Offset Policy (DSEWPac, 2012) offsets may not be applicable.

Brush-tailed Rabbit-rat (Conilurus penicillatus)

The potential effects of the Project on the brush-tailed rabbit-rat are discussed in Section 3.7.2 of this Report.

The NT EPA considers that the Project will not result in unacceptable impacts to this species. As the species is unlikely to be in the area, has not been recorded on-site and the mainland population is now considered to be confined to the Cobourgh Peninsula, the NT EPA believes that the Project is unlikely to have a significant residual impact on the species and therefore, consistent with the Australian Government Offset Policy (DSEWPaC, 2012) offsets may not be applicable.

Northern Quoll (Dasyurus hallucatus)

The potential effects of the Project on the northern quoll are discussed in Section 3.7.2 of this Report.

The NT EPA considers that the Project will not result in unacceptable impacts to northern quoll. As the species is unlikely to be in the area due to cane toad impacts and has not been recorded on-site, the NT EPA believes that the Project is unlikely to have a significant residual impact on the species and therefore, consistent with the Australian Government Offset Policy (DSEWPaC, 2012) offsets may not be applicable.

Gouldian Finch (Erythrura gouldiae)

The potential effects of the Project on the Gouldian finch are discussed in Section 3.7.2 of this Report.

The NT EPA considers that the Project will not result in unacceptable impacts to this species. The species could occur in the area, however, as no suitable breeding habitat occurs in the Project area, no permanent water exists close to the site through the Dry season and it has not been recorded on-site, the NT EPA believes that the Project is unlikely to have a significant residual impact on the species and therefore, consistent with the Australian Government Offset Policy (DSEWPaC, 2012) offsets may not be applicable.

Crested Shrike-tit (northern) (Falcunculus frontatus whitei)

The potential effects of the Project on the crested shrike-tit are discussed in Section 3.7.2 of this Report.

The NT EPA considers that the Project will not result in unacceptable impacts to this species. Although the species could occur in the area, as the DLRM consider the shrike-tit to be a low density species that is widely distributed with suitable habitat that is widespread through the region, the NT EPA believes that the Project is unlikely to have a significant residual impact on the species and therefore, consistent with the Australian Government Offset Policy (DSEWPaC, 2012) offsets may not be applicable.

Freshwater Sawfish (Pristis microdon)

The potential effects of the Project on the freshwater sawfish are discussed in Section 3.7.2 of this Report.

The NT EPA considers that the Project will not result in unacceptable impacts to this species. As the sawfish is unlikely to be in Sherwin Creek due to unsuitable habitat for the species and was not recorded on-site, the NT EPA believes that the Project is unlikely to have a significant residual impact on the species and therefore, consistent

with the Australian Government Offset Policy (DSEWPaC, 2012) offsets may not be applicable.

3.11.2 Socio-cultural offsets

The Proponent has proposed a socio-cultural offsets program in the draft EIS (draft EIS Chapter 4) in recognition of the inclusion of social, cultural and spiritual elements in the environment and the impacts operations could have on these aspects as opposed to the physical environment. The offsets included a number of non-specific 'potential activities' under the categories of:

- Workforce Development;
- Business Development; and
- Community Investment.

Funding towards training opportunities for Indigenous people was suggested as the key activity with other general funding targets being community investment such as youth development, health programs, cultural maintenance programs and Indigenous Ranger Groups.

In its comments on the draft EIS, the NLC¹ were dissatisfied with the documentation in the EIS regarding the Proponent's stakeholder consultation process, from which the proposed socio-cultural offsets with traditional Aboriginal owners was initiated. Chapter 4.4 of the draft EIS stated that the Proponent, in consultation with the Northern Territory Government, would develop an offset proposal that "Delivers lasting environmental, economic and social benefits". The NLC noted that none of the proposed offsets programs identified any direct environmental benefits and that the EIS failed to demonstrate how the Proponent would implement, monitor and review an environmental offsets program. Further, the NLC indicated that the Proponent had failed to identify a single quantifiable outcome for any of its proposed offset categories included in the EIS and that no commitments had been made to any specific pathways or timeframes for implementation and no performance criteria had been included.

The Proponent responded that specific actions for the socio-cultural offsets were included in the SIMP and the Cultural Heritage Management Plan. Commitments made by the Proponent in these plans included:

- Development of training opportunities and apprenticeships;
- Achieving a target of 30% Aboriginal employment (with a preference for local people), which is significantly higher than found in the Northern Territory's wider mining industry;
- Establishment of self-sustaining Joint Ventures (JVs) and Family Trusts to act as vehicles for Aboriginal owned and run businesses;
- Supporting these business ventures until such time as the Aboriginal people operating the businesses have sufficient skills to work alone;
- Contracting future work to these JVs to maintain their sustainability;
- Upgrade of the road network as part of its Traffic Management Plans;
- Improving goods and services capacity within local communities to ensure that they can service the mine and the community; and
- Contributing to improvement of community health services.

¹ The NLC is an independent statutory authority of the Commonwealth and is the prescribed body corporate that represents the traditional Aboriginal people in the Roper Gulf Shire region under the *Aboriginal Land Rights (NT) Act* and the *Native Title Act*. The Proponent is obliged to consult with the Traditional Owners as part of a Native Title Claim over the Project area where the claimant has a 'Right to Negotiate' a mining agreement.

Additionally, the Proponent stated that direct economic contributions through contract revenues (royalties) would be provided to traditional Aboriginal owners that could be used to construct additional housing or other facilities of value to each community.

The Proponent acknowledges that ongoing and further discussions with Traditional Aboriginal Owners are required to ensure that offset activities remain relevant, culturally appropriate and of value to individuals, communities and/or the region.

The NT EPA considers many of the above commitments to be an accepted part of doing business in remote regions of the NT and part of requirements to comply with Agreements established between the Proponent, Traditional Owners and the NLC, including meeting workplace targets in the mining agreement. The NT EPA also considers that many of these actions would become part of an Industry Participation Plan required by the NT Government.

3.12 Mine closure and rehabilitation

The draft EIS included a draft Mine Closure and Rehabilitation Plan for the Project (draft EIS Appendix J). The Proponent intends to commit physical and financial resources to assist rehabilitation and closure with studies to commence from the beginning of operations. The intention is to rehabilitate progressively with methods tested and adapted as mining progresses. Post-mining land uses would be as agreed through stakeholder consultation which would be undertaken in the first year of operation.

Key closure objectives outlined in the draft Rehabilitation and Mine Closure Plan include:

- Final landform would be compatible with agreed post-mining land use;
- Closure would comply with regulatory requirements;
- Ensure the health and well-being of people and fauna;
- All unwanted infrastructure and any removable, non-mining wastes from the site would be removed;
- Create safe, stable, non-polluting and sustainable landforms;
- Achieve establishment of vegetation that is self-sustaining and demonstrates a return of ecosystem functions and is resilient to the local predicted fire regime;
- Maintain water quality and flows in waterways;
- Minimise long-term visual impact by creating acceptable landforms, compatible with the adjacent landscape; and
- Achieve mining lease relinquishment without a requirement for on-going active intervention.

Respondents to the draft EIS were primarily concerned with the potential for failure of rehabilitation due to:

- Failure to implement aspects of the rehabilitation plan;
- As a subset of the above, failure to control weeds during rehabilitation and following closure; and
- The potential for the sub-grade stockpile to produce AMD and unsuitability of the material as plant growth media.

The DLRM recommended that the revegetation trial work proposed in the draft EIS be conducted at the earliest opportunity rather than delayed for two years as proposed by the Proponent, to optimise the development and availability of site specific methodology for progressive rehabilitation. This would likely require a dedicated trial area at the outset of the Project to simulate soil, substrate and slope

conditions likely to be encountered during future rehabilitation. The Proponent has committed to beginning rehabilitation trials during 2014 to ensure that rehabilitation is successful. The EIS indicates that an experimental design for trials will be developed within three months of the commencement of mining (presumably Phase 2 of the Project) with field trials commencing during the 2014/15 Wet season. These trials would include the subgrade ore stockpile at the earliest time that sufficient ore for the trial was available.

The NLC and the DME were concerned about the potential for failure of revegetation of the subgrade stockpile due to the lack of suitability of the material as a growth medium. In response, the Proponent provided no assurances that the stockpile could be successfully rehabilitated but reiterated that field trials would be conducted at the earliest opportunity that material for the stockpile was available.

Further, concerns were expressed about subgrade ore leaching metals and AMD and recommended that these risks be assessed. The EIS stated that in the unlikely event that PAF/reactive materials were encountered in subgrade ore, it would be separated and managed in accordance with the AMD Management Plan (Supplement Appendix D) as discussed in Section 3.8 of this Report.

There is the possibility that the subgrade material could be sold if it became economic to do so during the mining period. This was not discussed in detail in the EIS.

The Proponent stated in the EIS that weed control of rehabilitated areas and following closure would be conducted in accordance with the Pest and Weed Management Plan, as discussed in Section 3.7.3 of this Report.

The Proponent also committed to developing closure criteria for the Deposit C mine site during the first year of operation (Presumably Phase 2).

With respect to mine closure, the NLC provided advice based on regular consultations with traditional Aboriginal owners stating that, generally, the final landform surface should be easily traversed by foot and not be predominantly made up of large angular rock. This would ensure that traditional Aboriginal owners can continue their hunting, gathering and other cultural pursuits post-closure. The NLC advised that traditional Aboriginal owners might in the future request some roads and tracks to remain in place and welcomed the commitment by the proponent to consult with and engage local Aboriginal personnel to conduct rehabilitation works such as seed harvesting and re-vegetation.

The NT EPA is satisfied that if the rehabilitation and closure of the mine site, including the subgrade stockpile, is managed and monitored in accordance with the Mine Rehabilitation and Closure Plan, the Pest and Weed Management Plan, the Erosion and Sediment Control Plan and the AMD Management Plan, then mine site closure is likely to be achieved without unacceptable impacts.

3.13 Environmental Management Plan

3.13.1 Environmental Management Plans proposed by the Proponent

The draft EIS included a draft Environmental Management Plan (EMP) (draft EIS Appendix D). The draft EMP sets out the project commitments to avoid or minimise potential environmental impacts as identified in the EIS and Supplement during construction and operational phases of the project.

The draft EMP is divided into sub-plans for the broad risk sources or areas of impact identified for the project. Each sub-plan contains the following information:

- Environmental management objectives, actions and performance criteria to be implemented to mitigate impacts;
- Monitoring, reporting and auditing requirements; and
- Corrective actions if monitoring indicates that performance requirements have not been met.

Provided the Proponent implements the management plans included in the EIS, the NT EPA considers that the potential risks to the environment will be adequately avoided, mitigated or managed. To ensure that the EMP continues to be effective, the NT EPA recommends that the Proponent undertakes an annual audit and review of the EMP.

3.13.2 Proponent's commitments

Appendix C of the draft EIS includes the initial commitments provided by the Proponent. A revised summary of the commitments was provided in Appendix D of the Supplement. The commitments are derived from the mitigation measures referred to in the draft EIS, the Environmental Management Plan and additional commitments made based on comments from respondents to the draft EIS. Some commitments were missed by the Proponent in the list and have been drawn out and included in the full list of commitments, which has been included as Appendix A in this Report.

The NT EPA considers that the EMP can provide the mechanism to adequately avoid, mitigate and manage the potential environmental risks of the Project. The NT EPA has recommended conditions to ensure that the Proponent implements the EMP over the life of the Project. In addition to implementing the EMP, the Proponent should establish a monitoring, auditing and reporting regime to ensure that the measures outlined in the EMP are implemented and reviewed regularly.

Recommendation 11

The Proponent taking the proposed action is wholly responsible for implementation of all conditions of approval and mitigation measures contained in the Environmental Management Plan and must ensure all staff and contractors comply with all requirements of conditions of approval and mitigation measures contained in the Environmental Management Plan.

The Environmental Management Plan, and sub-plans, should form part of the Mining Management Plan. In preparing each plan, the Proponent will include any commitments and additional measures for environmental protection and monitoring contained in the Environmental Impact Statement and this Assessment Report.

Recommendation 12

Within two years of commencing the Project, the proponent must commission and pay the full cost of an independent environmental audit of the project. The audit should:

- **Be conducted by a suitably qualified, experienced and independent team of experts;**
- **Assess the environmental performance of the project and review whether the Proponent has complied with all recommendations, conditions and commitments;**
- **Review the adequacy of the plans and procedures and recommend appropriate measures or actions to improve the environmental performance of the action, including any plans or procedures.**

The results of the audit should be submitted to the Department of Mines and Energy and the Northern Territory Environment Protection Authority. The results of the audit must be made available on the Proponent's website.

4 Conclusions

The NT EPA considers that the environmental issues associated with the Project have been adequately identified. Appropriate environmental management of some of these issues has been resolved through the EIA process, while the remainder would be addressed through monitoring and management actions detailed in the Proponent's Mining Management Plan (MMP) under the *Mining Management Act*. The NT EPA considers that the Project can be managed in a manner that avoids unacceptable environmental impacts provided that the commitments, safeguards and recommendations detailed in the EIS and this Report, and which must be incorporated in the MMP authorised by the Department of Mines and Energy, are implemented and subject to regular reporting and compliance auditing.

The poor quality of data collection and preparation of conceptual environmental management documentation is a concern for the NT EPA. The difference between a well-planned and well-prepared Project and the Sherwin Creek Iron Ore Project is considerable as demonstrated in the documentation submitted to the NT EPA during this EIA process. Whilst the NT EPA considers that most of the key risks of this down-scaled Project can be managed to an acceptable level, there is significant concern that the low standard of the environmental assessment undertaken by the Proponent will flow through to the larger Roper River Iron Ore Project or its individual components as or if they are developed in the future. The NT EPA strongly suggests that the Proponent carefully consider its plans for the broader project and how it approaches the Government EIA process in the future.

The authorisation of excessive bulk sampling for an action undergoing EIA, without informing the NT EPA, was inappropriate and in contravention of the principles of ESD. These decisions can create precedents with lasting effects for the quality of environmental management on mine sites when Government continues to be challenged by legacy mines requiring costly remediation. It is in the NT Government's best interests to ensure that this is not repeated in the future.

The MMP for the Project will be subject to review to the satisfaction of the Department of Mines and Energy. It is recommended that management plans be developed in consultation with key stakeholders, including the NLC. The management plans will be working documents for the life of the Project and will require periodic review in the light of operational experience and changed circumstances.

Information gaps remaining from the EIA process require the Proponent, Government and the regional community to rely on intensive, post-assessment data collection, analyses and monitoring to determine the significance of, and appropriate responses to, potential impacts. These requirements are largely captured in the commitments made by the Proponent and recommendations in this Report. The ongoing risk analysis, environmental monitoring and management required from the Proponent must demonstrate that environmental impacts from the Project are no greater than those predicted in this assessment.

4.1 References

Environment Australia (2001). *A directory of important wetlands in Australia*. Environment Australia, Canberra. Third Edition.

Environment Protection Agency (2012). Assessment Report 71 Environmental Assessment Report and Recommendations for the Australian Ilmenite Resources SILL80 Ilmenite Project. Available at: <http://www.ntepa.nt.gov.au/environmental-assessments/assessment/register/sill80>.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012). *Policy guiding the use of offsets under the Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) BIO244.0812. Available at: <http://www.environment.gov.au/resource/epbc-act-environmental-offsets-policy>.

Dostine, P.L., Johnson, G.C., Franklin, D.C., Zhang, Y., and Hempel, C. (2001). Seasonal use of savanna landscapes by the Gouldian finch, *Erythrura gouldiae*, in the Yinberrie Hills area, Northern Territory. *Wildlife Research* **28**, 445-458.

Hill B.M. and Ward S.J. (2010). *National Recovery Plan for the Northern Quoll Dasyurus hallucatus*. Department of Natural Resources, Environment, The Arts and Sport, Darwin.

IECA (2008). *Best Practice Erosion & Sediment Control*. International Erosion Control Association, (IECA) Australasia Chapter, Picton, NSW. ISBN: 978-0-9806146-0-2.

Kemper, C.M. and Firth, R.S.C. (2008). Brush-tailed Rabbit-rat. In *The Mammals of Australia* (Eds. S Van Dyck and R Strahan). Reed New Holland, Chatswood, Australia.

O'Malley, C. (2006). *National Recovery Plan for the Gouldian Finch (Erythrura gouldiae)*. WWF-Australia, Sydney and Parks and Wildlife NT, Department of Natural Resources, Environment and the Arts, NT Government, Palmerston.

Palmer, C., Woinarski, J.C.Z. and Ward, S. (2012). *Threatened Species of the Northern Territory – Gouldian Finch Erythrura gouldiae*. Northern Territory Department of Land Resource Management. Available at: http://www.lrm.nt.gov.au/_data/assets/pdf_file/0018/10854/Gouldian_Finch_VU_FIN_AL.pdf.

Pavey, C. (2006). *National Recovery Plan for the Greater Bilby Macrotis lagotis*. Northern Territory Department of Natural Resources, Environment and the Arts.

Rhind, S.G., Woinarski, J.C.Z., and Aplin, K. (2008). Northern Brush-tailed Phascogale. In *The Mammals of Australia*. Third edition. (eds S Van Dyck and R Strahan) pp. 103–104. Reed New Holland. Sydney.

Thorburn, D.C., Peverell, S., Stevens, J.D., Last, P.R. and Rowland, A.J. (2003). *Status of Freshwater and Estuarine Elasmobranchs in Northern Australia*. Report to the Natural Heritage Trust.

Threatened Species Scientific Committee (TSSC) (2008). Approved Conservation Advice for *Conilurus penicillatus* (Brush-tailed Rabbit-rat). Department of the Environment, Canberra. Available at: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/132-conservation-advice.pdf>.

Threatened Species Scientific Committee (TSSC) (2010). Approved Conservation Advice for *Phascogale pirata* (Northern Brush-tailed Phascogale). Department of the Environment, Canberra. Available at: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/82954-conservation-advice.pdf>.

Ward, S. (2009). *Survey Protocol for the Northern Shrike-tit Falcunculus frontatus whitei*. Northern Territory Department of Resources, Environment, the Arts and Sport. August 2009.

Woinarski, J.C.Z. (2004). National Multi-species Recovery plan for the Partridge Pigeon [eastern subspecies] *Geophaps smithii smithii*, Crested Shrike-tit [northern (sub)species] *Falcunculus (frontatus) whitei*, Masked Owl [north Australian mainland subspecies] *Tyto novaehollandiae kimberli*; and Masked Owl [Tiwi Islands subspecies] *Tyto novaehollandiae melvillensis*, 2004 - 2009. Northern Territory Department of Infrastructure Planning and Environment, Darwin.

Woinarski J, Pavey C, Kerrigan R, Cowie I, and Ward S (2007). *Lost from our landscape: threatened species of the Northern Territory*. NT Government Printer. Darwin.

Woinarski, J.C.Z., Armstrong, M., Brennan, K., Fisher, A., Griffiths, A.D., Hill, B., Milne, D.J., Palmer, C., Ward, S., Watson, M., Winderlich, S., and Young, S. (2010). Monitoring indicates rapid and severe decline of native small mammals in Kakadu National Park, northern Australia. *Wildlife Research* **37**, 116-126.

Woinarski, J.C.Z. and Hill, B. (2012a). *Threatened Species of the Northern Territory - Brush-tailed rabbit-rat Conilurus penicillatus*. Northern Territory Department of Land Resource Management. Available at:
http://www.lrm.nt.gov.au/_data/assets/pdf_file/0015/10824/brush-tailed_rabbit-rat_EN_FINAL.pdf.

Woinarski, J.C.Z. and Hill, B. (2012b). *Threatened Species of the Northern Territory – Northern Quoll Dasyurus hallucatus*. Northern Territory Department of Land Resource Management. Available at:
http://www.lrm.nt.gov.au/_data/assets/pdf_file/0014/10814/northern_quoll_CR_FINAL.pdf.

Woinarski, J.C.Z. and Ward, S. (2012). *Threatened Species of the Northern Territory – Northern Shrike-tit/Crested Shrike-tit Falcunculus (frontatus) whitei*. Northern Territory Department of Land Resource Management.

Appendix A – Table of commitments for the Sherwin Creek Iron Ore Project (Compiled from the draft EIS, Supplement to the draft EIS and Further Information)²

Subject	Description	Commitment	Section in EIS
Human health and safety	Food hygiene	Food supplied by Sherwin Iron will be transported, stored and prepared in accordance with the NT <i>Food Act</i> and national Food Safety Standards.	Draft EIS, Section 3.2
Human health and safety	Food hygiene	Sherwin Iron will gain approvals [from the Department of Health] for both the mine camp kitchen/food preparation areas and the mine camp accommodation areas.	Section 2.2.2
Human health and safety	Legislation	The <i>Public and Environmental Health Act 2011</i> will apply for the registration of accommodation, and design approval for the wastewater treatment facility, general sanitation, mosquito prevention, rat exclusion and prevention as well as prevention of any public nuisance during the construction phase and actual operation of the project.	Section 2.2.2
Human health and safety	Biological hazards	Gloves and other protective equipment will be worn by first aid personnel when treating injuries to protect against infectious diseases from bodily fluids.	Draft EIS, Section 3.2
Human health and safety	Biological hazards	Safe operating procedures will be developed for working on or near the waste water treatment facility, including the use of appropriate PPE and hygiene practices (e.g. thoroughly washing hands during and after working in these areas). Maintenance of this facility will be conducted in accordance to the manufacturer's specifications.	Draft EIS, Section 3.2
Human health and safety	Air emissions	Respirable crystalline silica monitoring will be routinely conducted to ensure exposure is within acceptable limits. Levels of crystalline silica will be measured in accordance with the methodology in the <i>Australian Standard Workplace Atmospheres – Method for Sampling and Gravimetric Determination of Respirable Dust AS2985-2004</i> .	Draft EIS, Section 3.2
Human health and safety	Air emissions	Procedures will be implemented to ensure that employees and contractors do not suffer adverse health effects in the work environment from particulates or gas/vapours, either used or generated by the mining activities. These procedures will include a dust control/monitoring program and use of respiratory protection devices where necessary.	Draft EIS, Section 3.2
Human health and safety	Air emissions	Dust from heavy machinery will be controlled by dust suppression measures such as polymer sprays and watering of roads and work areas.	Draft EIS, Section 3.2
Human health and safety	Noise	Noise in the workplace can cause permanent hearing loss. Mining operations will comply with the <i>NOHSC: 1007 National Standard for Occupational Noise</i> .	Draft EIS, Section 3.2
Human health and safety	Noise	All equipment (both fixed and mobile) will be maintained in accordance with the <i>AS1269 Occupational Noise Management Series</i> and the <i>Mining Management Act 2001</i> .	Draft EIS, Section 3.2
Human health and safety	Noise	Hearing protection will also be used when needed.	Draft EIS, Section 3.2

² Commitments from the draft EIS are in standard text; commitments from the Supplement Commitments Table are in bold and italicised; commitments not included in commitments tables in the EIS or found in further information are bold and in red font.

Subject	Description	Commitment	Section in EIS
Human health and safety	Hazardous substances	All hazardous substances will be managed and stored in accordance with relevant standards: • NOHSC: 1015 National Standard for the Storage and Handling of Workplace Dangerous Goods • NOHSC: 1005 National Model Regulation for the Control of Workplace Hazardous Substances • NOHSC: 1008 Approved Criteria for Classifying Hazardous Substances • Australian Standard 1940: 2004 The Storage and Handling of Flammable and Combustible Liquids.	Draft EIS, Section 3.2
Human health and safety	Hazardous substances	A register of all approved hazardous substances will be maintained.	Draft EIS, Section 3.2
Human health and safety	Hazardous substances	Fuels will be stored and handled in accordance with the relevant standards. Diesel is the predominant fuel to be stored on-site and presents a low risk of combustion.	Draft EIS, Section 3.2
Human health and safety	Hazardous substances	PPE (e.g. gloves, face shields or respiratory-protection devices) and first-aid equipment (e.g. emergency showers and eye-wash stations), will be maintained and available for use	Draft EIS, Section 3.2
Human health and safety	Hazardous substances	Awareness training will be provided to all personnel with regard to the correct handling and storage of hazardous substances and the procedures to follow in the event of a spill.	Draft EIS, Section 3.2
Human health and safety	Drinking water supply	Where water is required for human consumption (drinking or washing) it would receive primary treatment in the form of ultra-violet treatment and reverse osmosis filtration. Raw water will be stored at the camp area in tanks prior to treatment. All potable water will need to be tested against the Australian Drinking Water Guidelines.	Draft EIS, Section 3.2
Human health and safety	Management of potable water	<i>Sherwin will ensure that appropriate disinfection systems for potable water are installed. Separate systems will be installed at the camp and mine site. In addition, potable water at the mine site will be obtained from water bottle dispensers.</i>	Section 2.2.2
Human health and safety	Waste water treatment and recycling	<i>Sherwin will ensure that the DoH Environmental Health Branch is consulted prior to installation of waste water treatment and recycling facilities on site.</i>	Section 2.2.2
Human health and safety	Pest management and disease	Where possible any constructed earthworks that will collect water (sediment traps, garbage pits) will be designed to be free draining within five days. Where these structures will hold water for more than five days, they will be steep sided, have a sloping base to one end and kept free of vegetation. Natural drainage patterns will be maintained wherever possible.	Draft EIS, Section 3.2
Human health and safety	Pest management and disease	Artificial containers and receptacles will be managed to prevent mosquito breeding.	Draft EIS, Section 3.2
Human health and safety	Pest management and disease	Rehabilitation of the site will ensure that the area is contoured to be free draining with no surface depressions collecting pooled water.	Section 3.2
Human health and safety	Pest management and disease	Personnel will wear hats, socks, long-sleeved shirts and long pants while on the mine site. Head nets and gloves, if required, will also be worn. Where possible, personnel will avoid peak biting times, specifically at dusk. Employees, contractors and visitors will be supplied with insect repellent. The workforce will be educated on mosquito and midge health risks and mitigating measures. On-site office areas will be screened.	Section 3.2
Human health and safety	Wildlife hazards	During the staff induction process, mine personnel will be made aware of the potential wildlife hazards and the best methods to avoid negative encounters. Appropriate training for the treatment of snake bite will also be provided to all staff. First-aid facilities will be equipped to respond to incidents of this type and provide appropriate treatment.	Section 3.2

Subject	Description	Commitment	Section in EIS
Human health and safety	Wildlife hazards	To provide protection against snake and spider bite, PPE such as boots, trousers and long sleeves will be required on the mine site. Gloves will also be provided for use during relevant tasks.	Section 3.2
Human health and safety	Waste	Clearly labelled bins will be placed in appropriate locations to segregate and collect the waste materials generated on-site. Perishable waste will be removed from the mine site by staff on a daily basis. General and recyclable waste will be transported off-site by a licensed contractor for disposal at a licensed general waste facility.	Section 3.2
Human health and safety	Waste	Regulated or hazardous wastes will be stored in accordance with relevant Australian Standards. They will be collected from site and disposed of by a licensed waste management firm.	Section 3.2
Human health and safety	Waste	Clinical waste such as drug and alcohol testing kits will be disposed of in accordance with the <i>Remote Health Atlas</i> (NT Department Health and Families 2006). Clinical waste is also classified as hazardous waste under the <i>Dangerous Goods Act</i> .	Section 3.2
Human health and safety	Heat	All employees and contractors will be required to wear long-sleeve shirts, trousers and hats to help reduce sun exposure. Sunscreen will also be made available to all employees.	Section 3.2
Human health and safety	Heat	To mitigate the risk of heat stress, all personnel will be made aware during staff induction training of the signs and symptoms of overexposure to heat and its effects, including dehydration. Drinking water will be readily available to all staff.	Section 3.2
Human health and safety	Fire	Fire safety devices such as emergency exit lighting, smoke detector alarms, fire extinguishers and fire blankets etc. will be installed in all buildings and outdoor areas as is required by the Building Code of Australia and the NT Fire and Emergency regulations 2011.	Section 3.2
Human health and safety	Alcohol and drug	Secure alcohol storage area will be constructed into the "wet mess" entertainment area and managed under the direction of the camp manager. A strict Fitness For Work (FFW) policy will be implemented and enforced. Daily alcohol screening and monthly drug screening will be undertaken to ensure compliance with the FFW policy.	Section 3.2
Human health and safety	Manual handling	In order to minimise the health risks training will be provided to all personnel.	Section 3.2
Human health and safety	Vehicle collisions	All vehicles will be maintained in a roadworthy condition. All mine personnel operating vehicles on-site will be trained and appropriately licensed.	Section 3.2
Human health and safety	Vehicle collisions	Speed limits around the site will be imposed both for safety and to reduce the amount of dust generated.	Section 3.2
Human health and safety	Vehicle collisions	Dust control, in the form of polymers and road watering will be implemented to improve driver visibility.	Section 3.2
Human health and safety	Vehicle collisions	All mine vehicles will be regularly inspected and fitted with two-way radios.	Section 3.2
Human health and safety	Vehicle collisions	Pedestrian access will be limited, and all staff and site visitors will be made aware of the dangers of heavy trucks and machinery operating in their surrounding environment. It is important that machinery operators are aware of any situations where there are likely to be persons on the ground in their vicinity.	Section 3.2

Subject	Description	Commitment	Section in EIS
Human health and safety	Vehicle collisions	Risk mitigation measures employed on the Roper Highway will include: <ul style="list-style-type: none"> • Upgrading of identified sections of the highway • Installation of vehicle activated warning signs at the approaches to single-lane bridges • Limiting operations to those periods when there are no restrictions on the use of the highway (~310 days/year). 	Section 3.2
Human health and safety	Vehicle collisions	A Fatigue Management Plan will also be developed.	Section 3.2
Human health and safety	Lighting	To reduce the health and safety risks associated with poor lighting, the following will be installed: <ul style="list-style-type: none"> • Task lighting where required to complete a specific task safely e.g. in offices and in operation areas • Access and stair lighting • Emergency lighting in the Administration Building and selected staff common areas. 	Section 3.2
Human health and safety	Lighting	A minimum interior lighting level of 160 lux for general work areas and 40 lux for walkways and access areas will be installed in accordance with the AS1680 Interior Lighting. Emergency lighting will be installed in accordance with the AS2293 <i>Emergency Escape Lighting and Exit Signs for Buildings</i> .	Section 3.2
Human health and safety	Lighting	Orange, red or yellow low pressure sodium vapour lamps will be used for exterior lighting, except where safety considerations require otherwise. Where other coloured lights are used, the light spilt will be restricted with shades (to prevent sky glow) or orientation. Pathway lights will be low to the ground and shaded where possible.	Section 3.2
Human health and safety	Electrical energy	Australian Standards (i.e. AS3000 <i>Electrical Installations</i> and AS3007 <i>Electrical Installations for Surface Mines</i>) will be adhered to when designing, installing and maintaining electrical systems.	Section 3.2
Human health and safety	Working at heights and falling objects	Where ever possible, work will be performed at ground level. Where this is not possible, work shall be performed from either a fixed, temporary or elevated platform. Alternatively, a person restraint system can be used. Fall protection equipment must be worn at all times and be connected to an appropriate anchor point when undertaking a task at a height. Personnel working at heights must be trained to do so.	Section 3.2
Human health and safety	Working at heights and falling objects	Items falling from height can also present a safety risk. PPE that protects against objects falling from height include steel-capped boots and hard hats; these will be worn at all times while on-site. No personnel should be underneath another employee working at a height.	Section 3.2
Erosion and Sediment Control Plan	Control devices	The ESCP control devices such as diversion drains, diversion bunds, catch drains, level spreaders, rock filter dams, culverts, sediment weirs, sediment basins, channelization controls, sediment fences, stockpile covers will be installed as per ESCP or as per updates in the MMP.	Appendix E
Erosion and Sediment Control Plan	Preserving existing batters	Throughout the mine lease area, there are a number of existing batters with proposed works near or adjacent to steep sections of earth. During construction, the earthmoving works will be monitored closely at these areas as to not disturb the natural batter and cause rutting that would induce future scour of the natural surfaces. Constant supervision of all interface areas will be included in the daily report and monitoring programs.	Appendix E
Erosion and Sediment Control Plan	Sodic Soils	Any sodic soils encountered on site will need to be managed by the application of Gypsum. Application rates can be determined at a later stage after testing of the expected soils has been undertaken.	Appendix E
Erosion and sediment control	Erosion and sediment control design	An updated ESCP will be submitted prior to construction and will include further detail on ESC. Works will be carried out by a Certified Professional in Erosion Control and all hydrological design calculations will be reviewed by a suitably qualified engineer.	Supplement Section 2.2.1 & 2.2.3

Subject	Description	Commitment	Section in EIS
Erosion and sediment control	Infrastructure location	Topsoil and infrastructure will be located away from slopes and creeks. Detailed maps [of storage of topsoil and other infrastructure] will be included in the Mining Management Plan.	Section 2.2.9
Dust Monitoring Report	Generation of dust	Watering of unsealed roads and uncovered stockpiles to minimise the generation of dust.	Appendix M
Dust	Generation of dust	Dust mitigation polymer is to be utilised at site whenever possible.	Appendix D
Dust Monitoring Report	Stockpiles	Stockpiles will be kept to a low profile so wind is less likely to spread dust.	Appendix M
Dust Management	Generation of dust	Sherwin Iron commits to develop a Dust Management Plan. This plan will be submitted with the MMP.	Section 2.2.7 & 2.2.9
Dust Management	Generation of dust	Roads with high traffic use and roads around the accommodation areas will be sealed with a dust mitigation polymer, and the roads into the pits will be watered with a water cart. The roads closest to vegetation would therefore be covered with a polymer and reduce dust deposition onto surrounding vegetation.	Section 2.2.9
Dust Management	Soil and sediment monitoring	Sherwin Iron commit to designing and implementing a soil and sediment monitoring program to support the Dust Management Plan	Section 2.2.9
Dust Management	Sediment laden runoff	Sherwin will avoid using recycled waste water for dust suppression in areas where it could run into creeks	Section 2.2.9
Dust Management	Dust suppression using treated sewage effluent.	The waste water quality will be routinely monitored at the wastewater treatment plant and water containing faecal coliforms will not be used for dust suppression as it will indicate a malfunction in the treatment system.	Section 2.2.9
Dust Management	Dust monitoring	Further dust sampling will be undertaken around the mining area pre-mining and again once mining has commenced. Additional dust deposition monitors will be installed around the mining area to monitor levels.	Section 2.2.9
Dust Management	Worker exposure	Respirable crystalline silica monitoring will be routinely conducted to ensure exposure is within acceptable limits. Levels of crystalline silica will be measured in accordance with the methodology in the Australian Standard Workplace Atmospheres – Method for Sampling and Gravimetric Determination of Respirable Dust AS2985-2004.	Section 2.2.9
Dust Management	Blasting	No blasting will be undertaken during high wind events.	Section 2.2.9
Biting Insect Management Plan	Water pooling	Prevent the potential of increasing mosquito populations through appropriate water storage	Appendix N

Subject	Description	Commitment	Section in EIS
Biting Insect Management Plan	Contact	Reduce the potential for contact between personnel and mosquitoes	Appendix N
Biting Insect Management Plan	Outbreaks	Monitor for mosquito outbreaks and respond to severe outbreaks or incidence of disease.	Appendix N
Archaeological Assessment Report	Buffer zones	A 100m conservation buffer zone will be implemented around all rock art sites recorded in the survey as well as around the stone artefact scatter, SHER13_02.	Appendix O
Archaeological Assessment Report	Ground disturbance	Archaeological surveys will be conducted prior to any other ground disturbance works.	Appendix O
Archaeological Assessment Report	Baseline Survey	A baseline survey sampling representative landforms will be conducted across the Sherwin Iron leases, to address the lack of regional archaeological data and assist in the development of a regional predictive model for site location.	Appendix O
Archaeological Assessment Report	Consultation with TO group	The Traditional Owner group will be consulted on the mitigation of impacts on archaeological sites located in the tenement.	Appendix O
Noise and Vibration Report	Noise Management Plan	Develop and register a Noise Management Plan with the NT EPA.	Appendix P
Noise and Vibration Report	General	Quieter and silenced equipment will be used where available over louder equipment.	Appendix P
Noise and Vibration Report	General	All equipment used on site will be in good condition and good working order	Appendix P
Noise and Vibration Report	Drop heights	As far as possible, material drop heights into or out of trucks will be minimised.	Appendix P
Noise and Vibration Report	Various equipment	All combustion engine plant, such as generators, compressors and welders will be checked to ensure they produce minimal noise with particular attention to residential grade exhaust silencers.	Appendix P
Noise and Vibration Report	Engine covers	All engine covers will be kept closed while equipment is operating.	Appendix P
Noise and Vibration Report	Vehicles	Vehicles will be kept properly serviced and fitted with appropriate mufflers.	Appendix P
Noise and Vibration Report	Exhaust brakes	Use of exhaust brakes will be eliminated, where practicable.	Appendix P

Subject	Description	Commitment	Section in EIS
Noise and Vibration Report	Operating of machines	Where practical, machines will be operated at low speed or power and will be switched off when not being used rather than left idling for prolonged periods.	Appendix P
Noise and Vibration Report	Excessive noise from machines	Machines found to produce excessive noise will be removed from the site or stood down until repairs or modifications can be made.	Appendix P
Noise and Vibration Report	Roads	Roads will be kept smooth and free of potholes and bumps	Appendix P
Noise and Vibration Report	Awareness	All site workers will be made aware of the potential for noise impacts and encouraged to take practical and reasonable measures to minimise the impact during the course of their activities.	Appendix P
Noise and Vibration	Blasting	Blasting at the mine is to only take place between 7am and 7pm Monday to Saturday and 9am and 6pm on a Sunday or public holiday. Blasting activities are to be advertised at least 48 hours before the commencement of blasting	Appendix D
Transport	Unsecured Loads / Destabilised vehicle, Crushed vehicle cabin, Debris on road	Iron Ore being transported from the mine site to Darwin will be secured and located in covered trailer.	Section 3.8
Transport	Poor driving Standards / Vehicle collision, Speeding, Unauthorised drivers	Sherwin Commits to travel in convoys along the Roper Highway – with lead vehicles warning other road users.	Section 3.8
Transport	Poor driving Standards / Vehicle collision, Speeding, Unauthorised drivers	Road trains will travel in convoy during the bulk sampling project and until the road has been upgraded and is considered safe enough for trucks to travel without escort. Convoys will travel in 5 or 6 truck maximum configurations; they will travel at a safe distance between vehicles with the front escort approximately 1km in front of the end escort. These will travel in convoys of up to five trucks per convoy until the road has been upgraded.	Section 2.2.10
Transport	Poor driving standards	Sherwin commits to company branding on all ore carrying vehicles.	Section 3.8
Transport	Poor driving standards	Sherwin commits to having IVMS in all road trains	Section 3.8
Transport	No rest breaks, long working hours, inadequate rest, shift cycles, Inappropriate nutrition	Sherwin commits to developing a fatigue management plan	Section 3.8
Transport	Vehicle noise	Sherwin commit to schedule vehicles to reduce traffic volumes within the Mataranka and Katherine areas between 9pm and 7am, and will adhere to existing legal requirements with regard to engine and compressions braking	Section 3.8
Transport	Vehicle breakdown	Sherwin will ensure the haulage contractor has an action plan for dealing with vehicle breakdowns	Section 3.8

Subject	Description	Commitment	Section in EIS
Transport	Traffic Management Plan	Sherwin commit to develop a traffic management plan that will be agreed upon with the Department of Transport	Section 3.8
Transport	Fauna Strikes, Driving standards, breakdown,	Sherwin commit to induct all new drivers, including training in route familiarisation	Section 3.8
Transport	Haulage procedures	Sherwin commit to follow the standard heavy haulage operator's procedures, including the reporting of any accidents to both the police and Sherwin Iron, while notifiable incidents will also reported to NT WorkSafe.	Section 3.8
Transport	Road maintenance Poor driving standards	Sherwin commits to upgrading the existing intersection between the Roper Highway and the Mine Site to the approval of the Department of Transport	Section 3.8
Transport	Explosives	Sherwin Iron commits to ensuring that they and their contractors will transport dangerous goods in compliance with the Transport of Dangerous Goods by Road and Rail Act and Regulations.	Section 3.8
Transport	Overweight vehicles	Sherwin Iron will install a weighbridge to ensure that all vehicles are under the legal axle weight limit	Section 3.8
Transport	Road maintenance	Sherwin will start an asset management program with all stakeholders involved in the management and continued function of the Roper Highway	Section 3.8
Transport	Road maintenance	Sherwin Iron will only operate road trains during the period when the Roper Highway has non restricted opening of the road.	Section 3.8
Transport	Inadequate Sight Distance along curves, and near bridges	Sherwin commit to making road improvements and/or installing Vehicle Activated Warning signs to warn drivers of approaching traffic along the Roper Highway.	Section 3.8
Transport	Culverts close to road seal	Sherwin propose to move culvert heads along the Roper Highway to a minimum of 2.5m from the edge of the road seal, and install 4 guideposts each side of the carriageway to highlight the location of culvert headwalls	Section 3.8
Transport	Lack of overtaking opportunities	Sherwin will upgrade the Roper Highway in consultation with the Department of Transport	Section 3.8
Transport	Road safety	Sherwin will conduct a condition survey of the length of the Roper Highway, including shoulders, prior to commencement of any haulage as part of an increase in tonnage above [1.0]Mtpa.	Section 2.2.7
Transport	Road safety	The condition survey is to be undertaken before the end of the bulk sampling phase	Section 2.2.7
Transport	Road safety	Approval from all stakeholders would be sought on the exact scope and detail of the [condition] survey prior to commencement.	Section 2.2.7

Subject	Description	Commitment	Section in EIS
Transport	Road safety	<i>The MMP will contain a suite of commitments including committing Sherwin to ensure that the Transport Coordinator will implement all requirements of the highway use agreement.</i>	Section 2.2.10
Transport	Road safety	Sherwin Iron will operate road trains and carry out road maintenance recommendations in accordance with the existing Traffic Management Report (Appendix L of the Draft EIS). Sherwin will complete further traffic management planning and consultation with NTG prior to annual haulage exceeding [1.0]Mtpa.	Section 2.2.7
Transport	Road safety	If alternative transport options are not available or as yet undecided, then Sherwin Iron will continue to transport only up to [1.0]Mtpa along the Roper Highway. If Sherwin Iron wants to go above the agreed [1.0]Mtpa then they will need to renegotiate the traffic management planning or develop an alternative route	Section 2.2.7 & 2.2.10
Transport	Road safety, fauna impacts, road kills.	Vehicle speeds will be limited to a maximum of 80 km/hr and where practicable travel will be avoided during periods of peak fauna activity (e.g. sunrise/sunset, night-time). Dead animals will be removed from mine roads to reduce the likelihood of additional kills of scavenging animals	Section 2.2.10
Transport	Road safety	Sherwin will undertake a safety audit in accordance with the Austroad publication (Road Safety Audit).	Further information
Transport	Road safety	Development of a Traffic Management Plan that will be designed by a Northern Territory accredited Traffic Management Plan Designer and be in conformance with the requirements of AS 1742 – 'Manual of uniform traffic control devices Part 3: Traffic control devices for works on roads'. Opus Consultants have been engaged to do this work.	Further information
Pest and Weed	Weed survey	Carry out a pre-mine construction weed survey and produce a detailed map of weed infestations	Appendix I
Pest and Weed	Cooperation with landholders and stakeholders	Cooperation with landholders and stakeholders in assessing pest and weed risks, developing strategies and setting priorities.	Appendix I
Pest and Weed	Weed management branch	Liaison with Weed Management Branch about control methods	Appendix I
Pest and Weed	Annual surveys	Annual survey of weeds.	Appendix I
Pest and Weed	Induction/awareness	Weeds and pest issues as part of induction for all staff and raised where appropriate at daily toolbox meetings. Weed ID material produce to assist this.	Appendix I
Pest and Weed	Training	Selected staff trained in pest and weed identification and control	Appendix I
Pest and Weed	Identification	Suspect weeds collected and sent to botanist/ Weed Management Branch for identification	Appendix I

Subject	Description	Commitment	Section in EIS
Pest and Weed	Disturbance minimised	Limit clearing and ground disturbance to minimum area necessary, and boundaries of areas to be cleared are clearly marked	Appendix I
Pest and Weed	Plant and soil material arriving on site	Plant and soil material purchased from suppliers guaranteeing weed free status and inspected on arrival to site	Appendix I
Pest and Weed	Weed control	Weeds controlled within project area, and particularly around mining and rehabilitation areas	Appendix I
Pest and Weed	Weed disposal	Weeds not disposed of in landfill, but at a designated composting site	Appendix I
Pest and Weed	Fencing	Exclusion fencing erected around project area	Appendix I
Pest and Weed	Fencing	Exclusion fencing erected around and over landfill	Appendix I
Pest and Weed	Waste disposal	Putrescible wastes collected in covered bins, frequently removed to landfill and burnt as necessary	Appendix I
Pest and Weed	Rehabilitation	Rehabilitating disturbed areas as soon as practical to reduce the amount of area prone to weed establishment.	Appendix I
<i>Pest and weed</i>	<i>Communicating risk of weed or pest spread in the region</i>	<i>Sherwin commit to informing neighbours within 7 days if new pests or weeds are identified on site.</i>	<i>Section 2.2.5 & 2.2.7</i>
<i>Pest and weed</i>	<i>Spread of weeds</i>	<i>Sherwin commit to installing a wash down facility, specifically designed and located to prevent the spread of weeds, before the onset of mining.</i>	<i>Section 2.2.5</i>
<i>Pest and weed</i>	<i>Spread of weeds</i>	<i>[The wash-down facility] will adhere to the Queensland Checklist for Clean-down Procedures and Queensland Guideline for the Construction of Vehicle and Machinery Wash-down Facilities for Vehicle Wash-downs.</i>	<i>Section 2.2.7 & 2.2.5</i>
<i>Pest and weed</i>	<i>Spread of weeds</i>	<i>Vehicles will be certified weed free before entry into the project area.</i>	<i>Section 2.2.7 & 2.2.3</i>
<i>Pest and weed</i>	<i>Weed control</i>	<i>Sherwin reaffirm their commit to carrying out annual weed control and specify that this will be done at least annually at the end of the wet season.</i>	<i>Section 2.2.3, 2.2.5 & 2.2.7</i>
Rehabilitation and Mine Closure	Stakeholder involvement	Implement processes for stakeholder involvement in rehabilitation and closure planning within one year of the commencement of operations.	Appendix J

Subject	Description	Commitment	Section in EIS
Rehabilitation and Mine Closure	Detailed RMCP	Develop of a more detailed RMCP within two years of the commencement of mining. This plan will be submitted for review and approval by the consent authority.	Appendix J
Rehabilitation and Mine Closure	Updates	Within a period of not less than four years prior to the completion of mining and intended mine closure, the RMCP will be updated to incorporate previous years' rehabilitation and outcomes. This plan will be again be submitted for review and approval by the consent authority.	Appendix J
Rehabilitation and Mine Closure	Rehabilitation trials	Rehabilitation trials will commence as early as practicable and before the end of two years from the commencement of mining	Appendix J
Rehabilitation and Mine Closure	Fire	Fire will be excluded from rehabilitation areas for several years. The mine site will have fire fighting capacity to assist this.	Appendix J
Rehabilitation and Mine Closure	Conservation of topsoil	Conservation of topsoil and progressive rehabilitation of waste landforms, backfilled pits, and all other disturbed areas will be done as soon as practicable to the appropriate standard and recommended guidelines	Appendix J
Rehabilitation and Mine Closure	Progressive rehabilitation	Rehabilitation will be undertaken progressively as mining progresses. The final rehabilitation will be restricted to the areas disturbed during the last year of mining and removal of mine infrastructure (i.e. plant, ROM, workshop and camp).	Section 2.2.7
Rehabilitation and Mine Closure	Research and site trials	Research and site trials, including investigating analogue areas will be conducted to enable the rehabilitation program to be modified to reflect site-specific parameters.	Appendix J
Rehabilitation and Mine Closure	Closure task register	A Closure Task Register will be immediately developed, to incorporate the closure criteria into the final landform design and the management of key issues.	Appendix J
Rehabilitation and Mine Closure	Analysis of rehabilitation of similar sites	During the first year of operation Sherwin also commit to an analysis of previous rehabilitation of other similar sites to inform their rehabilitation strategy.	Appendix J
Rehabilitation and Mine Closure	Unexpected closure	In the event of unexpected closure, <ul style="list-style-type: none"> An environmental audit of the site will be conducted immediately and provided to DME Mine access and security and will be reviewed Storage of chemicals and hydrocarbons will be reviewed and removed if necessary A programme to address incomplete rehabilitation and revegetation works will be developed Any contaminated material will be relocated from hardstand areas to a suitable holding facility, and any PAF material will be placed within an open pit and suitably encapsulated within an appropriate landform The stability of landforms, water quality and revegetation will be monitored. 	Appendix J
Rehab and closure	Mine pit sumps	[Mine pit] sumps will be backfilled upon closure.	Section 2.2.7
Rehab and closure	Development of rehabilitation trials	Sherwin commit to beginning rehabilitation trials during 2014. An experimental design for trials will be developed within three months of the commencement of mining. Field trials will begin during the 2014/15 wet season. The trial design will simulate soil, substrate and slope conditions likely to be encountered during future rehabilitation.	Section 2.2.3, 2.2.5 & 2.2.7

Subject	Description	Commitment	Section in EIS
Rehab and closure	Subgrade rehabilitation	Sherwin commit to designing trials on rehabilitation on the subgrade stockpile within three months of commencing mining and to begin field trials during the first wet season that sufficient subgrade ore for a trial is available.	Section 2.2.9
Rehab and closure	Waste management	Waste management will be as per previous commitments. It is considered inappropriate to set exact timeframes for activities, however waste removal will be done in a timely manner as required to maintain a high standard of housekeeping.	Section 2.2.7
Rehab and closure	Weed monitoring	Sherwin reaffirm their commitment to annual monitoring of weeds and specify that the commitment to control declared weeds will be undertaken annually after the wet season. This applies to all areas of the lease including rehabilitation areas.	Section 2.2.7
Rehab and closure	Development of closure criteria	Sherwin commit to develop closure criteria during the first year of operation.	Section 2.2.7
Surface water hydrology	Impeded fish migration	Creek crossing design (culverts) will have limited influence on flows.	Section 3.3
Surface water hydrology	Alteration to natural flow paths and patterns	Natural water flows will be maintained as far as possible and where modification is necessary, resume their natural flow paths as far as possible.	Section 3.3
Surface water hydrology	Alteration to natural flow paths and patterns	To minimise the potential risks of alteration to surface water flows associated with the road crossing of Sherwin Creek and other minor drainage lines, their design and construction will incorporate appropriate engineering principles and natural flows will be maintained at all times.	Section 2.2.10
Surface water quality	Impact on downstream water quality associated with erosion	Control devices such as diversion drains, diversion bunds, catch drains, level spreaders, rock filter dams, culverts, sediment weirs, sediment basins, channelization controls, sediment fences, stockpile covers will be installed as per ESCP and WMP, or as per updates in the MMP.	Appendix E & Appendix F1
Groundwater	Groundwater monitoring frequency	Some monitoring bores will therefore be monitored at monthly frequencies whilst production bores (including nearby monitoring bores) may be monitored more frequently, pending final design of the ground water supply. Post-closure monitoring will be undertaken until it can be demonstrated that the ground water regime has returned to its pre-mining state.	Section 2.2.9
Groundwater	Groundwater dependent systems	a survey for GDE in the area within the aquifer will be occur and monitoring put in place to ensure that GDE are not affected by water extraction	Further information
Surface & ground-water quality	Monitoring	Monitoring of appropriate on site, downstream and reference (unimpacted) sites will be undertaken in accordance with the program specified in the approved WMP.	Appendix F1
Surface & ground-water quality	Monitoring	Site-specific water quality trigger values will be developed when there is sufficient data available from baseline monitoring and/or upstream reference sites.	Appendix F1
Surface & ground-water quality	Over extraction of Groundwater	To minimise water use and therefore the risk of lowering of groundwater levels, Sherwin will implement of water saving strategies, including (but not limited to) the following: <ul style="list-style-type: none"> Minimise use (e.g. education of workers in camp, use of polymers on roads to reduce requirements for dust 	Appendix F1

Subject	Description	Commitment	Section in EIS
		suppression) <ul style="list-style-type: none"> Recycling of wastewater for dust suppression (i.e. sewage treatment plant) Re-use of rainfall/run-off captured in disturbed areas of the mine site for dust suppression. 	
Surface & ground-water quality	Over extraction of Groundwater	In order to identify additional groundwater resources to meet mining operational requirements, Sherwin commits to undertake geophysical exploration, bore drilling, testing and sampling. Sherwin will assess potential impacts of extraction and sustainable yields from these additional groundwater resources (i.e. potential GDE's, other users, etc).	Appendix F1
Surface & ground-water quality	Over extraction of Groundwater	In order to minimise the operational and environmental risks (if any) associated with depletion of groundwater resources, Sherwin will ascertain/set operational controls for ground water exploitation (i.e. sustainable safe yield, allowable drawdown and distance to zero drawdown) and monitor bore yields, groundwater level behaviour and water quality, in accordance with the Water Management Plan (Appendix F1).	Appendix F1
Groundwater	Over extraction of Groundwater	Finalisation of the MMP will not occur until a suitable aquifer has been identified and modelling results showing long-term sustainable yields exceeding 12 L/sec have been demonstrated.	Further information
Groundwater	Over extraction of Groundwater	Results of ongoing engineering work aimed at reducing site water requirements, including refinements to overall site layout and design, will also be included in the MMP to allow finalisation of the site water balance.	Further information
Surface & ground-water quality	Supply & quality	The mined out pits will be used to store rain falling into the open pit, with diversions to direct water away from current work areas/faces.	Section 2.2.9
Surface & ground-water quality	Discharge	If required, mining during the wet season will retract to higher lying ground and will then continue once the lower lying areas have dried out and/or the water level receded.	Section 2.2.9
Surface & ground-water quality	Contamination of downstream surface and/or groundwaters associated with acid mine drainage.	To minimise the risk of impacts to surface and/or groundwater quality associated with AMD, Sherwin commits to the following: <ul style="list-style-type: none"> Ongoing characterisation of materials, storage and management methods. Demarcation and progressive excavation and implementation of immediate remediation measures such as burial, sealing and compaction to prevent oxidisation of PAF materials. Where PAF is exposed, sealing and compaction of the sides and base of the excavation will be undertaken before backfilling. Implementation of construction methods to prevent long-term PAF exposure to oxygen (e.g. sheetpiling) will be considered. 	Appendix G
Surface & ground-water quality	Contamination of downstream surface and/or groundwater associated with acid mine drainage.	On-going characterisation of materials and storage and management methods. Storage/disposal of any encountered potentially acid forming (PAF) in purpose-designed and built encapsulation cells.	Section 3.3, Appendix G
Surface water and groundwater quality	Management of PAF	Sherwin commits to ongoing site-specific characterisation and appropriate management of any potentially acid-forming (PAF) materials encountered during mining, in accordance with the most recent Acid Mine Drainage Management Plan. Management measures will include (but are not limited to) appropriate segregation and storage/disposal to prevent interaction with water, particularly rainfall.	Section 2.2.7
Surface water and groundwater quality	Management of PAF	In the unlikely event that very localised and limited PAF materials are encountered earlier than Year 3, these will be stored and provisionally capped in dedicated areas for later permanent disposal in the PAF Cell, to be constructed in Year 3.	Section 2.2.9

Subject	Description	Commitment	Section in EIS
Surface water and groundwater quality	Hydrocarbon monitoring	Fuels will be stored in self-bunded tanks and procedures will be in place to track fuel volumes (i.e. identify potential leaks) and manage any minor spills during refuelling activities.	Section 2.2.9
Surface water and groundwater quality	Environmental monitoring bores	Sherwin commits to determining appropriate locations for additional environmental monitoring bores as part of the Mining Management Plan approval process.	Section 2.2.7
Surface & groundwater quality	Over extraction of Groundwater	Bore testing procedures and modelling will be used to ensure that bores are allocated long term sustainable abstraction rates that will ensure that there is no detrimental impact on the resource and/or the surrounding environment.	Section 2.2.9
Surface water and groundwater	Sustainable extraction	Sherwin commits to defining adequate sustainable ground water resources that will be appropriately managed to prevent over-exploitation and/or depletion.	Section 2.2.7
Groundwater	Supply	Sherwin is committed to undertake further ground water exploration programs to meet the deficit in water supply.	Section 2.2.9
Surface water and groundwater	Sustainable extraction	The mine does not intend drawing water from the ephemeral Sherwin Creek and will rely on ground water resources to meet the project water demand.	Section 2.2.1
Environmental management	Continual review and update of relevant plans	Sherwin is committed to continual improvement through their EMS and EMP by investigating, reviewing and implementing recommended improvements for any non-compliance. The project will be further refined and defined prior to development of an MMP, during this process Sherwin will update both the EMS and the EMP and include information resulting from the EIS approvals process.	Section 2.2.7
Environmental management	Continual review and update of relevant plans	Sherwin is yet to develop an ISO 14001 compliant EMS but is committed to moving towards this best practice standard. Sherwin further commits to reviewing the Environmental Management System to ensure audit and performance results are assessed and recommendations incorporated into management, policy and procedures.	Section 2.2.7
Environmental management	Managing non-conformance	Sherwin will notify key stakeholders, including traditional Aboriginal owners and local communities, as soon as practicable with regards to environmental incidents and EMP non-conformance events.	Section 2.2.7
Environmental management	MMP compliance / Stakeholder reporting	From the OPR [Operational Performance Report] a publicly available document (Environmental Mining Report) will be developed and will be an appropriate medium for communicating with stakeholders. The OPR is to detail all risks and performance against identified performance criteria. Trigger levels, objectives and targets must be discussed to demonstrate that the management systems on site are minimising impacts to the environment. Included in the OPR is a section specifically reporting on incidents and non-conformances.	Section 2.2.7
Environmental management	Environmental Management System	To ensure compliance with Sherwin Iron and Project requirements, formal audit programs have been established to validate whether the EMS and activities employed by Sherwin Iron and subcontractors: <ul style="list-style-type: none"> • Conform to agreed/ specified requirements. • Are suitable and effective. • Meet statutory/regulatory obligations. 	Section 2.2.7

Subject	Description	Commitment	Section in EIS
		<ul style="list-style-type: none"> Require improvement. Internal compliance audits (as determined by the HSE Manager). <p>Where such audits or inspections reveal non-conformance with the contract, the EMS requirements and plans and/or deficiencies in these, the project and/or contractor shall rectify such non-conformance and/or deficiencies within the time period specified by the auditing team and advise the auditing team of all actions taken to remedy non-conformance and/or deficiencies.</p> <p>The EMS is to be reviewed at least annually and include all relevant internal and external EMS documentation including:</p> <ul style="list-style-type: none"> Company policies. Company standards. Procedures. Supporting material. Legislation, Acts, Regulations, etc. <p>Annual self-assessments are conducted on each project and office location to establish the depth of maturity of the site Environmental Management System.</p>	
Environmental management	EMS	<p>Sherwin will operate with an ISO14001:04 compliant EMS. The EMS and the EMP will be further updated to include KPI and other required information prior to operations and submitted with the Mining Management Plan.</p> <p>Sherwin is committed to continual improvement through their EMS and EMP by investigating, reviewing and implementing recommended improvements for any non-compliance. The project will be further refined and defined prior to development of an MMP, during this process Sherwin will update both the EMS and the EMP and include information such as that requested here.</p>	Section 2.2.7
Infrastructure design	Fish passage	Any upgrades to road infrastructure, bridges, crossings or flood ways are to comply with general principles in: Kapitzke 2010 Culvert Fishway Planning and Design Guidelines and Fairfull & Witheridge 2003 Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings.	Section 2.2.1
Vegetation clearing	Clearing of fauna habitat	All areas to be cleared will be delineated prior to the clearing operations. This ensures that areas to be cleared are restricted to the minimum required. All clearing will be done during the mornings and not during rain events, in order to minimise direct mortality [of fauna].	Section 2.2.10 & 2.2.6
Socio-economic	Adaptive management and consultation	Sherwin Iron commit to complying with and implementing the Provisional Social Impact Management Plan (Appendix K1 of the EIS), The Social and Economic Impact Assessment (Appendix K2 of the EIS) and The Stakeholder Consultation Report (Appendix K3 of the EIS)	Section 2.2.7
Socio-economic	Managing non-conformance	Sherwin will notify key stakeholders, including traditional Aboriginal owners and local communities, as soon as practicable with regards to environmental incidents and EMP non-conformance events.	Section 2.2.7
Socio-economic	Socio-economic / Cultural impact management.	<p>In consultation with Traditional Owners, [the Social Impact and Cultural Heritage Management Plans] and processes will undergo continuous modification and improvement as the Project progresses. Consultations will occur through mechanisms described in the Native Title Agreement agreed between Sherwin Iron, the NLC and Traditional Aboriginal Owners and summarized in the Stakeholder Engagement Plan contained within the Social Impact Management Plan.</p> <p>A significant part of ongoing consultation with Traditional Aboriginal Owners and their representatives will involve an assurance that these measures remain culturally appropriate and relevant throughout the life of the Project. The Plans are flexible and will remain subject to modification should additional offset activities</p>	Section 2.2.7

Subject	Description	Commitment	Section in EIS
		be identified or completed as the Project progresses.	
Socio-economic	SIMP / CHMP	<p>Commitments made in the [Social Impact and Cultural Heritage Management Plans] are highlighted below:</p> <p>Workforce Development: Specific actions are presented in the Social Capital Plan contained within the Social Impact Management Plan. Sherwin Iron and its contractors have been in ongoing discussion with the NLC throughout Agreement negotiations to identify suitable opportunities for placement of Aboriginal people into the Project's workforce. This includes commitments to:</p> <ul style="list-style-type: none"> • development of training opportunities and apprenticeships; and • achieving a target of 30% Aboriginal employment (with a preference for local people), which is significantly higher than found in the Northern Territory's wider mining industry. <p>Business Development: Development of businesses owned and operated by local Aboriginal groups is a key feature of Sherwin Iron's proposals to deliver lasting environmental, economic and social benefits. Specific actions and timelines are presented in the Social Capital Plan contained within the Social Impact Management Plan. This Plan contains commitments to:</p> <ul style="list-style-type: none"> • establishment of self-sustaining Joint Ventures and Family Trusts to act as vehicles for Aboriginal owned and run businesses; • supporting these business ventures until such time as the Aboriginal people operating the businesses have sufficient skills to work alone; and • contracting future work to these JVs to maintain their sustainability. <p>Community Investment: Sherwin Iron expects that it will have a net positive contribution to communities and the region through:</p> <ul style="list-style-type: none"> • upgrade of the road network as part of its Traffic Management Plans; • improving goods and services capacity within local communities to ensure that they can service the mine and the community; • contributing to improvement of community health services. <p>Sherwin iron will also be providing a significant direct economic contribution through contract revenues (royalties) that Traditional Aboriginal owners may elect to use to construct additional housing or other facilities of value to each community.</p> <p>All additional offsets will be tailored to best suit the feedback received, will be published on the Sherwin Iron website and included in updated versions of the Social Impact and Cultural Heritage Management Plans.</p> <p>As part of its commitment to continuous improvement, Sherwin Iron will further develop procedures, policies, protocols and plans relevant to each of these commitments as the Project progresses. Traditional Owners will be consulted and involved when these are being developed and implemented throughout the Project's life.</p> <p>There is also a provision within the Mining Agreement through which Sherwin Iron is committed to regular and ongoing meetings with Traditional Owners. These are scheduled to occur on a quarterly basis. Sherwin Iron is committed to regular consultation with all key stakeholders across the duration of the Project.</p>	Section 2.2.7
Socio-economic	SIMP / CHMP	<p>Stakeholder Engagement:</p> <ul style="list-style-type: none"> • A commitment to address all interests and concerns related to the project that is raised by stakeholders. • A commitment to maintaining strong, positive relationships with all impacted stakeholders 	Section 2.2.7

Subject	Description	Commitment	Section in EIS
		<ul style="list-style-type: none"> • A commitment to maximizing participation of traditional owners in mining operations. • Community cohesion and safety • A commitment to having no significant or permanent negative impact on the health of community members • A commitment to having no significant negative impact on regional or community crime rates • A commitment to operating all aspects of the mine in a safe manner, consistent with workplace legislation in the NT 	
Socio-economic	SIMP / CHMP	<p>Community Development (Social Capital)</p> <ul style="list-style-type: none"> • A commitment to maximizing the involvement of local community businesses in the Project through developing their skills base and contracting to them where possible. • A commitment to building work skills and capacity amongst local Aboriginal people so that they may be able to obtain employment at Sherwin Iron or elsewhere. • A commitment to maximising participation of traditional owners in mining operations through direct employment, contracting to community businesses and local Aboriginal Joint Ventures. 	Section 2.2.7
Socio-economic	SIMP / CHMP	<p>Community Development (Infrastructure)</p> <ul style="list-style-type: none"> • A commitment to avoiding access to Aboriginal Land Trust Areas unless authorized to so do • A commitment to minimising impacts on environmental values • A commitment to having no negative permanent impact on community and regional access through its activities • A commitment to having no negative impacts on availability of housing in local communities • A commitment to having significant negative impact on existing community health services through its activities • A commitment to having no ongoing negative impacts on supply of goods and other services to communities • A commitment to having no long-term negative impacts on regional tourism ventures 	Section 2.2.7
Socio-economic	SIMP / CHMP	<p>Cultural Heritage</p> <ul style="list-style-type: none"> • A commitment to management of all archaeological sites in accordance with the Heritage Act (NT): • A commitment to protection of Sacred Sites in accordance with the Aboriginal Sacred Sites Act (NT) • A commitment to protection of contemporary culture by developing a program to assist with protection of the area's endangered languages; • Working with traditional owners to manage their cultural heritage and encourage its ongoing transmission to future generations; • Recording and protecting proprietary traditional knowledge ;and • Not disrupting ceremonial activities. 	Section 2.2.7
Socio-economic	SIMP	[The SIMP] will be reviewed should Sherwin Iron include additional resources into its mining plans in the future.	Draft EIS Appendix K1

Subject	Description	Commitment	Section in EIS
Socio-economic	Management Plans	Sherwin Iron commit to complying with and implementing the Provisional Social Impact Management Plan (Appendix K1 of the EIS), The Social and Economic Impact Assessment (Appendix K2 of the EIS) and The Stakeholder Consultation Report (Appendix K3 of the EIS).	Section 2.2.7
Socio-economic	Risk	Sherwin Iron remains responsible to bear the bulk of the cost of finding solutions to reduce any residual environmental and cultural risks directly related to mining and transport of ore.	Section 2.2.7
Socio-economic	Cumulative impacts	Should Sherwin decide to pursue the larger Roper River Iron Ore Project, assessment of cumulative impacts will form part of that submission and be assessed based on what is known at that time.	Section 2.2.7
Greenhouse Gas Emissions	Energy	Should solar PV options be considered viable in the future then Sherwin will review energy generation at that stage.	Section 2.2.5

Appendix B – Summary of comments/issues arising from the review of the Sherwin Creek Iron Ore Project draft EIS

Public Submissions

Issue - Impacts	Raised By
Larger Project (outside scope)	
<ul style="list-style-type: none"> Potential impacts from future planned operations and options. Concern that future stages won't involve same level of assessment. Cumulative impacts of larger project on biodiversity need to be taken into account. 	AFANT ECNT NLC
Bulk Sampling	
<ul style="list-style-type: none"> Significant mining is occurring under the 'veil' of bulk sampling. Minimal environmental approval conditions for bulk sampling activity. 	ECNT
Water	
Groundwater impacts <ul style="list-style-type: none"> Groundwater contamination from in-pit sumps. Depletion of groundwater due to increased drawdown to supply project needs. Groundwater dependent ecosystems 	NLC

Issue - Impacts	Raised By
Surface Water <ul style="list-style-type: none"> • Impacts from storm water runoff from operational areas outside of mine pit. • Discharge of contaminated pit water to creeks in high rainfall. • AMD contamination of surface water. • Contamination of surface waters from spills. • Failure and overflows of water management structures. 	
Risk	
General <ul style="list-style-type: none"> • Whole-of-project risk assessment should have been undertaken. 	NLC
Safety Risk <ul style="list-style-type: none"> • Risk of collision on road extreme and may not be manageable with current proposed measures. • Residual risk of mine is likely to be carried by local indigenous people due to ore transport. 	AFANT NLC
Risk to the environment <ul style="list-style-type: none"> • Residual risk of impacts on terrestrial and aquatic habitat quality through weed incursion remains high. • Risk of rehabilitation failure. 	ECNT
Causes of Risk <ul style="list-style-type: none"> • In-pit sumps lead to risks in pit walls slumping. 	NLC
Biodiversity Impacts	

Issue - Impacts	Raised By
Terrestrial <ul style="list-style-type: none"> Gorge habitat and monsoonal rainforest removed. 	EDO NT
Socio- Economic Impacts	
Human health <ul style="list-style-type: none"> Safety of road users – fatalities from collisions. Timeline of road upgrade and transport use not aligned Dust risk to human health. 	AFANT NLC
Stakeholder Impacts <ul style="list-style-type: none"> Impacts to groundwater users. 	AFANT
Impacts on tourism and recreation <ul style="list-style-type: none"> Impacts from road trains on users of the Roper Highway. Decline in fishing tourism in the Roper region. Negative impact on tourists' attraction to the NT as a travelling destination. 	
Cumulative Impacts	
<ul style="list-style-type: none"> Concern that cumulative impacts cannot be assessed as the entire project and others in the region are not considered in this assessment. Greater demand on water resources. Significant changes to local landscape. Impacts on infrastructure such as roads. 	ECNT NLC

Issues – Information presented in the draft EIS	Raised By
<p>Generic</p> <ul style="list-style-type: none"> • Should have included information on the bulk sampling and ramp up to next phase. • Some public health legislation should be included. • Information in EIS appeared to be incomplete. • Detail on alternative options should have been provided. • Scope should have been reflected in revised guidelines or the larger scope assessed. • The commitments table is incomplete. • Commitments should be detailed, quantifiable and include timeframes for actions. • The EMP provides insufficient detail and scope as appropriate for a project of this scale. • Description of proposed construction and operation activities and development schedule, particularly with respect to mine waste management, does not provide sufficient detail for the reader to adequately assess the potential impacts. • Environmental management structure does not adequately describe the chain of reporting environmental performance and who in the executive has environmental responsibilities. • The Environmental Management System (EMS) described in the EIS appears ad-hoc and does not contain appropriately standardised management actions for non-compliances • The description of environmental monitoring tools is insufficient. 	<p>AFANT</p> <p>DoH</p> <p>NLC</p>
<p>Acid and metalliferous drainage (AMD)</p> <ul style="list-style-type: none"> • Proposal to use locally available non-acid forming (NAF) material to cap potentially acid-forming (PAF) material has not been sufficiently demonstrated to be viable. • Suitability of NAF material has not been shown. • The EIS fails to properly assess the risks of AMD mitigation options and provide justification for selection of the preferred option. 	<p>NLC</p>
<p>Water supply</p> <ul style="list-style-type: none"> • In-pit sump water use has not been clearly described or shown to be viable. • Inconsistency in information regarding the intended primary source of water for operation. • No rationale provided for estimates of water demands on site. 	<p>NLC</p>

Issues – Information presented in the draft EIS	Raised By
Groundwater <ul style="list-style-type: none"> Monitoring points not shown in relation to key landforms and project infrastructure. 	NLC
Water management <ul style="list-style-type: none"> Information on effects of Wet season on the site (bulk sampling) should have been included. Question the claim of zero waste water discharge in Wet season. 	AFANT
Biodiversity <ul style="list-style-type: none"> Flora and fauna surveys did not cover the proposed camp area. Restricted flora and fauna sampling provided only a snap shot in time. 	ECNT EDO NT
Greenhouse and climate change <ul style="list-style-type: none"> Renewable energy options should have been investigated and committed to in mining operations. Inadequate consideration of GHG emissions arising from the development. 	ECNT EDO NT
Dust <ul style="list-style-type: none"> Monitoring conducted could not be considered 'baseline' as bulk sampling activities had begun. Sampling period inadequate to allow useful analysis of change or cumulative impacts. Dust analysis requires meteorological information to support the interpretation. No information on which to compare dust results to determine whether levels are acceptable. Details on profiles of stockpiles to limit dust formation are not included in the EIS. More detail required on methods to suppress dust on haul roads. 	NLC
Alternative options <ul style="list-style-type: none"> Haul road options were not considered in detail. No discussion of alternative plans to ensure safety on public road network. 	NLC
Infrastructure <ul style="list-style-type: none"> Key information on Roper Highway condition and tangible details of maintenance program has not been included. 	NLC

Issues – Information presented in the draft EIS	Raised By
Mine closure and rehabilitation <ul style="list-style-type: none"> Water demand estimates for rehabilitation should have been presented. The control of weeds is not discussed adequately in the information pertaining to closure and rehabilitation. 	NLC
Social <ul style="list-style-type: none"> Safety measures for road/track/pedestrian crossings of Roper Highway not considered properly. No commitments were made in relation to socio-economic/cultural impact management. No consideration of stakeholder engagement in reporting environmental performance. 	NLC

Issue - Proposal	Raised By
Water management <ul style="list-style-type: none"> On site mine water must be included in broader catchment water planning and allocation. Water deficit likely on site with unreliable rainfall affecting the reliability of in-pit water storage. Continuous sampling should be used for water monitoring. 	AFANT NLC
Biodiversity <ul style="list-style-type: none"> Road upgrades must satisfy requirements for fish passage. Gorge habitat and monsoon rainforest should be protected from clearing. Economic arguments should not be used to justify clearing of vulnerable vegetation. 	AFANT EDO NT

Issue - Proposal	Raised By
Acid and metalliferous drainage (AMD) <ul style="list-style-type: none"> Commitment should be made to develop a plan to manage all PAF materials appropriately and to communicate any proposed plan amendments to key stakeholders. 	NLC
Site rehabilitation and mine closure <ul style="list-style-type: none"> Water should be allocated for rehabilitation. Commitment by the proponent to engage with Aboriginal personnel in conducting rehabilitation works is welcomed. Concerns about rehabilitation success on subgrade stockpiles. 	NLC
Infrastructure <ul style="list-style-type: none"> Proposed road upgrade for Roper Highway appears inadequate. Dual lane with multiple overtaking lanes on Roper Highway required. Stuart Highway needs more passing lanes and overtaking opportunities. 	AFANT NLC

Issue – Regulation of the Proposal	Raised By
Offsets <ul style="list-style-type: none"> Solar PV plant for mine and for local communities in the future recommended as possible offset. No mention of offsets to replace clearing of vegetation for the Buff Robin. No direct environmental offset opportunities have been identified. No implementation plans or detail presented for identified general opportunities. No transparency on offsets programs developed outside of the EIS process. Offsets information does not comply with offsets policy. 	ECNT NLC
Regulation	

Regulatory responsibility and management <ul style="list-style-type: none"> • Appropriate oversight required of vegetation clearing to protect rainforest and gorge habitat. 	EDO NT
Government contribution <ul style="list-style-type: none"> • NT and Commonwealth Governments to contribute to highway upgrades. • Communication infrastructure investment by Government in the region required. 	AFANT

NT Government Submissions

Issue - Impacts	Raised By
Biodiversity <ul style="list-style-type: none"> • Dust is an environmental hazard at the site due to the potential to substantially smother surrounding vegetation. 	DME
Health <ul style="list-style-type: none"> • Composition of dust makes it particularly harmful to humans. • Risk to tourists and other road users presented by Roper Highway condition and heavy vehicle use. • Impact on structure and condition of highways. • Flow-on effects of heavy vehicle road use to other industries in the region such as fishing and primary industries. 	DME Tourism NT DPIF DME
Issue – Information presented in draft EIS	Raised By
General <ul style="list-style-type: none"> • Location of proposed storage site for cleared vegetation is required. • Difficult to determine location of proposed topsoil storage and other infrastructure from maps provided. 	DME
Biodiversity <ul style="list-style-type: none"> • Pre-mining macroinvertebrate sampling could not be considered adequate or representative. • Adequate conclusions drawn on the likelihood that habitat is unsuitable for significant fish species. 	DLRM DME

<ul style="list-style-type: none"> Although the sampling for flora and fauna for the project is considered inadequate, external data sources and knowledge indicate that significant impacts to regional biodiversity is likely to be low. Weed management required. Query about further clearing requirements for access tracks and cleared vegetation stockpiles. 	
Health <ul style="list-style-type: none"> Key public health and radiation legislation needs to be included. Water treatment plant advice provided. Dual lane sealed Roper Highway may be required but a matter for DoT. 	DME DoH DoT
Water <ul style="list-style-type: none"> Forecast water usage needs to be reviewed as it is underestimated. Alternative water sources need to be identified that will provide sustainable supply through variable rainfall years. Limited value of current water quality monitoring design Monitoring for <i>E.Coli</i> in surface water should be undertaken if treated sewage is used for dust control. Monitoring should include Total Petroleum Hydrocarbons due to fuel storage volumes. Monitoring frequencies for groundwater suggested. 	DME DLRM
Erosion <ul style="list-style-type: none"> Erosion and sediment control plan should include specifics as recommended by DLRM. 	DLRM
AMD <ul style="list-style-type: none"> Management plan required for AMD. Details of PAF waste storage required. 	DME
Mine closure <ul style="list-style-type: none"> Rehabilitation trials should start as early as possible rather than in two years as suggested. Question about rehabilitation of subgrade ore stockpiles if material is not a suitable growth medium. Demonstration that mining activities have left no ongoing legacy issues may take longer than two years. 	DLRM DME
Issue - Proposal	

Generic <ul style="list-style-type: none"> Proposed development schedule not feasible Query about whether resource could be sterilised by in-pit waste disposal. Overview of proposed mine design will be required in MMP. 	DME
AMD <ul style="list-style-type: none"> Question about whether the risk of metals leaching from low grade ore stockpiles was considered. 	DME
Water <ul style="list-style-type: none"> Groundwater resources are inadequate to meet total operational requirements for the mine. Capacity of the area to store or yield adequate groundwater is limited. In-pit water storage will be unreliable. 	DME
Dust <ul style="list-style-type: none"> Lack of available water for dust control. Water requirements for dust suppression have been severely underestimated. Polymer product on roads is unlikely to address water deficit. Waste water from sewage treatment may be unsuitable for dust suppression near waterways. Control of dust from blasting. Dust monitoring program needs to be designed and implemented. Soil and sediment monitoring program designed and implemented to assess depositional nature of dust generated. 	DME

NT Environment Protection Authority submission

Issue – Impacts
Biodiversity <ul style="list-style-type: none"> Vehicle strike on fauna along the Roper Highway
Risk <ul style="list-style-type: none"> Risk of traffic collisions is extreme on the Roper Highway.

Issue – Information presented in the Draft EIS	
General	<ul style="list-style-type: none"> Information provided in the main draft EIS and Appendices often conflicting, inconsistent and unclear. In most cases there is inadequate justification for modification of risks following listed controls making the risk assessment more subjective.
Water	<ul style="list-style-type: none"> Clarification on how excess stormwater in pits will be handled if it impedes mining during wet periods.
Waste rock / tailings / AMD	<ul style="list-style-type: none"> Contradictory information provided on presence of PAF material and risk of AMD generation. More detailed discussion of AMD management required including contingencies to mitigate potential impacts.
Biodiversity	<ul style="list-style-type: none"> Information required on the risk of vehicle strike to fauna. Information on EPBC-listed mammal species potentially impacted by transport is required. Extent and quality of suitable habitat near the mine and surrounding area for specific fauna species needs quantification. Potential impacts and mitigation measures for specific listed species should be provided. Assess effects of AMD, changes to hydrology, groundwater drawdown on Freshwater Sawfish.
Infrastructure	<ul style="list-style-type: none"> Details of any road upgrade for the term of this project should be included in the EIS. Wording associated with timing of road upgrades is vague and non-committal.
Issue - Proposal	
Water	<ul style="list-style-type: none"> Little certainty provided that there will be adequate water supply for the project.
Infrastructure	<ul style="list-style-type: none"> Upgrade of road needs to be in the short term. Proposed mitigation measures for traffic management on the Roper Highway appear inadequate.

Social <ul style="list-style-type: none">• Implications for traffic wishing to overtake road train convoys.
Offsets <ul style="list-style-type: none">• Without detailed information on impacts to EPBC-listed species, offsets may be justified.
Cumulative impacts <ul style="list-style-type: none">• Assessment of cumulative impacts on EPBC-listed species based on the likely development of a larger project in the future should be undertaken.