Yilgarn Operations

Deception Deposit

Environmental Protection Act 1986 (WA)
Environmental Impact Assessment
(Assessment on Proponent Information)

August 2011

Document History

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Acknowledgement

This Environmental Impact Assessment has been prepared for Cliffs Asia Pacific Iron Ore Pty Ltd by Globe Environments Australia Pty Ltd. The assistance and contributions of staff from Cliffs Asia Pacific Iron Ore Pty Ltd is acknowledged and appreciated.

This report also includes contributions provided by a range of supporting consultants including (in alphabetical order) Biota Environmental Sciences, CAD Resources, Rockwater, Soil Water Consultants and Western Botanical. The assistance and contributions of these supporting consultants and their staff is acknowledged and appreciated.

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EXECUTIVE SUMMARY

Yilgarn Operations - Deception Deposit

Cliffs Asia Pacific Iron Ore Pty Ltd's (Cliffs) Yilgarn Operations include the mining of iron ore deposits at the Koolyanobbing Range, Mt Jackson Range and the Windarling Range, processing of ore at Koolyanobbing, and road and rail transport between these operations and the Port of Esperance where the processed ore is exported to international customers.

Cliffs proposes to expand its Yilgarn Operations to include an additional mining operation at the Deception Deposit, within the Shire of Menzies and the Shire of Yilgarn, located approximately 150km north of the town of Southern Cross. The Deception Deposit has taken its name from the landmark referred to as Deception Hill, located approximately 5km to the east of the proposed mining area.

The Deception Deposit contains an estimated 9.2 million tonnes of iron ore having an estimated gross economic value of A$1.44billion. Development and operation of the Deception Deposit proposal has been scheduled to commence from 2012, with an expected productive mining-life of approximately 8 years from 2013. The Deception Deposit proposal includes the development, operation, decommissioning and rehabilitation of a mine pit, waste rock landform, or stockpiles, support infrastructure and a haul road. The key characteristics of the Deception Deposit proposal are identified in Table E-1.

Implementation of the Deception Deposit proposal will occur in accordance with Cliffs' Environmental Policy (Cliffs Natural Resources 2008; Appendix 1) and Cliffs' ISO 14001:2004-certified Environmental Management System (EMS) (NCSI 2011; Appendix 2). Cliffs' EMS contains a series of Environmental Management Plans (EMPs) used for the management of environmental aspects of mine operations.

Summary of Environmental Impact Assessment

This document has been prepared in accordance with the requirements of the Environmental Protection Authority Scoping Guideline (EPA 2011a) for the purposes of an Environmental Impact Assessment (EIA) of the Deception Deposit proposal at the level of Assessment on Proponent Information (API) under s40(2)(b) of the *Environmental Protection Act 1986* (WA) and in accordance with the *Environmental Impact Assessment Administrative Procedures 2010* (EPA 2010a). The key environmental factors relevant to the Deception Deposit proposal have been identified by EPA (2011a) as:

- Flora;
- Fauna; and
- Mine Closure.

This EIA-API document identifies that the Deception Deposit proposal is not expected to result in a significant impact to the values of the key environmental factors. Cliffs has also proposed a number of management actions to minimise the potential environmental impacts of the Deception Deposit proposal to the values of the key environmental factors. A summary of the assessment and management of the key environmental factors is provided in Table E-2.

ELEMENT	DESCRIPTION
GENERAL	
Location	Tenements M77/1257, M77/1258, M77/1259 and L77/232 in the Shire of Menzies and the Shire of Yilgarn, Western Australia.
Mining Life	8 years (approximately)
Mining Method	Open Cut
Area	547.6ha (as per the components listed below)
COMPONENTS	
Mine Pit	
Location	Tenements M77/1257, M77/1258 and M77/1259
Area	117.4ha
Depth	254mAHD
Waste Rock Landform	
Location	Tenements M77/1257, M77/1258 and M77/1259
Area	257.4ha
Elevation	550mAHD
Ore Stockpiles	
Location	Tenement M77/1259
Area	52.1ha
Support Infrastructure	
Location	Tenement M77/1259
Area	31.8ha
Haul Road	
Location	Tenements L77/232 and M77/1259
Area	88.9ha
Length	22.3km
Width	40m (approximately)

Abbreviations:
ha = hectares
km = kilometres
mAHD = metres in Australian Height Datum

All values stated are maximum values, unless otherwise specified.

Table E-1 Key Characteristics of the Deception Deposit Proposal.

Table E-2 Summary of Key Environmental Factors, EPA Objectives and Guidance, Natural and Human Environment, Potential Impact, Management Proposed and Predicted Outcome for the Deception Deposit Proposal.

FACTOR	EPA OBJECTIVE and EPA GUIDANCE	NATURAL & HUMAN ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOME
Key Environmental Factors					
Flora	EPA Objective: Flora: To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge (EPA 2010b). EPA Guidance: • EPA Guidance Statement #51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004a). • EPA Guidance Statement #55: Implementing Best Practice in proposals submitted to the Environmental Impact Assessment Process (EPA 2003a).	The flora values in the vicinity of the Deception Deposit proposal include: • 7 DEC-classified 'Priority' flora species; • 33 vegetation units; and • 11 weed species. The area of the Deception Deposit proposal does not contain any Rare Flora species declared under the *Wildlife Conservation Act 1950* (WA), Threatened Species (flora) or Threatened Ecological Communities protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), or DEC-classified 'priority' ecological communities.	The Deception Deposit proposal is expected to impact: • 6 DEC-classified 'priority' flora species; • 28 vegetation; and • 547.6ha of native vegetation. Impacts to the above flora values are not expected to be significant. The Deception Deposit proposal will not impact any Rare Flora species declared under the *Wildlife Conservation Act 1950* (WA), Threatened Species (flora) or Threatened Ecological Communities protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), or DEC-classified 'priority' ecological communities.	The potential impacts of the Deception Deposit proposal on flora have been minimised through mine planning and design, resulting in the locating of infrastructure to avoid and/or minimise potential impacts. Cliffs will manage the potential impacts to flora for the Deception Deposit proposal by implementation of: • Land Clearing Management Plan (Cliffs 2011b; Appendix 3); • Weed Management Plan (Cliffs 2011c; Appendix 4); • Fire Management Plan (Cliffs 2011d; Appendix 5); and • Dust Management Plan (Cliffs 2011e; Appendix 6). Implementation of the above management actions is expected to ensure the potential impact of the Deception Deposit proposal to flora values is managed to an acceptable standard.	The Deception Deposit proposal is not expected to result in a significant impact to flora at species or ecosystem levels. Implementation of the proposed management actions is expected to ensure the potential impact of the Deception Deposit proposal to flora values is managed to an acceptable standard. Accordingly, the potential impact of the Deception Deposit proposal to flora at species or ecosystem levels can be managed to meet EPA's objective.
Fauna	EPA Objective: Fauna: To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge (EPA 2010b). EPA Guidance: • EPA Guidance Statement #20:	The fauna values in the vicinity of the Deception Deposit proposal include: • 4 fauna species protected under one or a combination of the *Wildlife Conservation Act 1950* (WA) and the *Environment Protection and Biodiversity Conservation Act 1999* (C'th); • An array of other terrestrial	The Deception Deposit proposal is expected to impact: • Nil fauna species protected under one or a combination of the *Wildlife Conservation Act 1950* (WA) and the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) • An array of other terrestrial vertebrate fauna; and	The potential impacts of the Deception Deposit proposal on fauna have been minimised through mine planning and design, resulting in the locating of infrastructure to avoid and/or minimise potential impacts. Cliffs will manage the potential impacts to fauna for the Deception Deposit proposal by implementation of:	The Deception Deposit proposal is not expected to result in significant impact to fauna at species or ecosystem levels. Implementation of the proposed management actions is expected to ensure the potential impact of the Deception Deposit proposal to fauna values is managed to an

FACTOR	EPA OBJECTIVE and EPA GUIDANCE	NATURAL & HUMAN ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOME
	Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia (EPA 2009). • EPA Guidance Statement #54: Sampling of Subterranean Fauna in Groundwater and Caves (EPA 2003b). • EPA Guidance Statement #54a: Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia (EPA 2007a). • EPA Guidance Statement #55: Implementing Best Practice in proposals submitted to the Environmental Impact Assessment Process (EPA 2003a). • EPA Guidance Statement #56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004b). • Technical Guide: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA & DEC 2010)	vertebrate fauna species; • A number of potential short-range endemic invertebrate fauna; and • A number of feral fauna species.	• A number of potential short-range endemic invertebrate fauna. Impacts to the above fauna values are not expected to be significant. The Deception Deposit proposal is not expected to impact significant or unique fauna habitat.	• Fauna Management Plan (Cliffs 2011f; Appendix 7); and • Land Clearing Management Plan (Cliffs 2011b; Appendix 3); Implementation of the above management actions is expected to ensure the potential impact of the Deception Deposit proposal to fauna values is managed to an acceptable standard	acceptable standard. Accordingly, the potential impact of the Deception Deposit proposal to fauna at species or ecosystem levels can be managed to meet EPA's objective.
Mine Closure	EPA Objectives: Decommissioning: To ensure, as far as practicable, that rehabilitation achieves a stable and functioning landform which is consistent with the surrounding landscape and other environmental values (EPA 2010b). EPA Guidance: • EPA Guidance Statement #6: Rehabilitation of Terrestrial Ecosystems (EPA 2006b). • Guidelines for Preparing Mine Closure Plans (DMP & EPA 2011).	The Deception Deposit proposal area is currently has minimal land disturbance from mineral exploration and pastoral activities, with the land area being covered by native vegetation. Geochemical characterisation of the Deception Deposit has identified the majority of waste rock is non-PAF and non-saline, and with a low risk of metaliferous drainage.	Mine closure of the Deception Deposit proposal will result in: • All mine infrastructure removed; • Mine areas being rehabilitated with native vegetation; and • An open mine void containing permanent surface water (saline).	Cliffs will undertake mine closure for the Deception Deposit proposal by implementation of: • Mine Closure Plan (Cliffs 2011g; Appendix 8). Implementation of the above management actions is expected to result in acceptable mine closure of the Deception Deposit proposal.	Implementation of the proposed mine closure actions will result in acceptable mine closure of the Deception Deposit proposal. Accordingly, mine closure of the Deception Deposit proposal can be managed to meet EPA's objective.

Contents

Figures

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Symbols and Acronyms

%	percent
^{o}	degree
>	greater than
≥	greater than or equal to
<	less than
≤	less than or equal to
^{o}C	temperature in degrees Celsius
A$	Australian Dollars
AHD	Australian Height Datum
API	Assessment on Proponent Information
CRG	Community Reference Group
C'th	Commonwealth of Australia
DEC	Department of Environment and Conservation (WA)
DIA	Department of Indigenous Affairs (WA)
DMP	Department of Mines and Petroleum (WA)
DoW	Department of Water (WA)
DoSEWPC	Department of Sustainability, Environment, Water, Population and Communities (C'th)
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environmental Protection Authority (WA)
Fe	iron (chemical symbol)
GL	gigalitre
GL/y	gigalitres per year
ha	hectare
ISO	International Standards Organisation
kL/day	kilolitres per day
km	kilometre
km^2	square kilometre
km/h	kilometres per hour
L77/232	Miscellaneous Licence (example alpha-numeric code)
m	metre
m^3	cubic metre
M	million
mm	millimetre
Mt	million tonnes
M77/1257	Mining Lease (example alpha-numeric code)
pers. com.	personal communication
sp.	species
ssp.	subspecies
WA	Western Australia

Terms

The terms used in this document have the following meanings:

Abandonment Bund means an earthen embankment placed around the crest of a mine pit for the purpose of preventing inadvertent human access to an abandoned mine pit and which is placed at a distance not being potentially susceptible to mine pit wall collapse.

Acid and Metaliferous Drainage (AMD) means a mobilised sulphuric acid leachate (a liquid) generated from the oxidation of sulphur present within waste rock material, which in turn, can cause the release of metals into the leachate.

Annual Recurrence Interval (ARI) means the average or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration (as defined in BoM 2011a). A rainfall event of 1:10 ARI has a 9.5% chance of being equalled or exceeded within any one year (percentage expressed as an Annual Exceedance Probability (AEP)).

Assessment on Proponent Information means a level of environmental impact assessment as defined by the Environmental Protection Authority's Administrative Procedures 2010 (EPA 2010a).

Berm means a constructed earthen embankment.

Conservation Significance means, in relation to flora or fauna, a species or a community listed and protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), *Wildlife Conservation Act 1950* (WA), Japan - Australia Migratory Birds Agreement 1981 (JAMBA), China - Australia Migratory Birds Agreement 1988 (CAMBA), Republic of Korea – Australia Migratory Birds Agreement 2007 (ROKAMBA) or the Convention on the Conservation of Migratory Species of Wild Animals 1978 (Bonn Convention). Conservation significance may also relate to species considered to be under threat or otherwise in need of protection as indicated by published literature, scientific/expert opinion or other guidance.

Contaminated, in relation to land, water or a site, means having a substance present in or on that land, water or site at above background concentrations that presents, or has the potential to present, a risk of harm to human health, the environment or any environmental value (as defined by the *Contaminated Sites Act 2003* (WA)).

Deception Deposit means the iron ore deposit of the Deception Deposit proposal.

Deception Deposit Haul Road means area of the haul road connecting the Deception Deposit mine area to the existing Yilgarn Operations at the Windarling Range mine operations.

Deception Deposit Mine Area means area of the Deception Deposit mine operations within part tenements M77/1257, M77/1258 and M77/1259.

Deception Deposit Mine Pit means the ground excavation to access the ore of the Deception Deposit within part tenements M77/1257, M77/1258 and M77/1259.

Deception Deposit Proposal means the proposal to undertake mining of the Deception Deposit and includes the mine infrastructure (mine pits, waste rock landform, mine operational areas and haul road), but does not include (a) the pre-existing components of Cliffs' Yilgarn Operations, (b) surveys and/or investigations of a geological or geotechnical or environmental or hydrological or planning or heritage nature (including any potential impacts associated with such surveys and/or investigations), (c) changes in asset ownership or land tenure, or (d) approval or consent or agreement associated with the existing components of Cliffs' Yilgarn Operations or surveys or investigations or ownership or tenure.

Deception Deposit Waste Rock Landform means the designed, engineered and constructed structure made of waste rock within part tenements M77/1257, M77/1258 and M77/1259.

Dewatering means the process of extracting groundwater to the surface that is undertaken to result in a temporary reduction in the elevation of the groundwater table.

Edge Effect means the impact of one land use on a separate land use that shares a common boundary.

Endemic means, in relation to flora or fauna, a species that occurs exclusively within a defined area. Generally, the defined area is specified to be either a regional area or state area.

Environmental Impact Assessment means the process of environmental assessment as defined under Part IV of the *Environmental Protection Act 1986* (WA).

Environmental Offset means an environmentally beneficial activity or activities undertaken to counterbalance an adverse environmental impact, aspiring to achieve 'no net environmental loss' or a 'net environmental benefit' outcome (as defined in EPA 2006a). Environmental offsets are considered after efforts to avoid or minimise impacts have been made and significant residual impacts still remain (as identified in EPA 2006a).

Fauna means animals, both indigenous and introduced.

Flora means plants, both indigenous and introduced.

Impact Area means the area of impact (vegetation clearing and operations) for the Deception Deposit proposal.

Inert means not readily chemically reactive with other substances.

Mine Closure means the processes by which mine infrastructure is removed, actions are undertaken to ensure safety, contaminated areas are remediated and impacted areas are rehabilitated to restore their environmental values.

Mine Pit means the open ground excavation for accessing the ore resource of the Deception Deposit.

Mine Pit bench means the relatively flat (near horizontal) surface for mining. A mine pit bench also provides access for vehicles in and out of a mine pit.

Mine Pit Wall means the steeply sloping (near vertical) portion of a stepped mine pit which forms the wall of a mine pit.

Migratory Species means fauna declared by the Commonwealth Minister for Environment and protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) as a matter of national environmental significance for being a migratory species listed under the Convention on the Conservation of Migratory Species of Wild Animals 1979 (Bonn Convention), Japan-Australia Migratory Bird Agreement 1974, China-Australia Migratory Bird Agreement 1986 or the Republic of Korea-Australia Migratory Bird Agreement 2007. *Migratory Species* also means fauna declared by the Western Australian Minister for Environment as Specially Protected Fauna under the *Wildlife Conservation Act 1950* (WA) due to it being a migratory species.

Native Title means the recognition by Australian law that some Indigenous people have rights and interests to land that arise from their traditional laws and customs. Native Title rights may be exclusive (occupy to the exclusion of others) or non-exclusive.

Precautionary Principle means where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by (a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment,

and (b) an assessment of the risk-weighted consequences of various options (as defined by s4A of the *Environmental Protection Act 1986* (WA)). Measures to prevent environmental degradation should also be *cost effective* (as defined by Principle 15 of the 1992 Rio Declaration).

Priority Ecological Community (PEC) means a naturally occurring vegetation assemblage that occurs in a particular type of habitat that is known from a few to many occurrences and which may or may not be managed for conservation and which may or may not be under threat. Classifications are made by DEC and categorised into five priority categories, with 'Priority 1' being of the highest conservation significance. PECs have no specific legal protection under the *Wildlife Conservation Act 1950* (WA) or the *Environmental Protection Act 1986* (WA), other than the general protection afforded to all native vegetation under such legislation.

Priority Fauna means fauna which are known from one, a few or several populations which may or may not be under threat, or may otherwise be rare. Classifications are made by DEC and categorised into 5 priority categories, with Priority 1 being of the highest conservation significance. Priority fauna have no specific legal protection under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), *Wildlife Conservation Act 1950* (WA) or the *Environmental Protection Act 1986* (WA).

Priority Flora means flora which are known from one, a few or several populations which may or may not be under threat, or may otherwise be rare. Classifications are made by DEC and categorised into four priority categories, with 'Priority 1' being of the highest conservation significance. Priority flora have no specific legal protection under the *Wildlife Conservation Act 1950* (WA) or the *Environmental Protection Act 1986* (WA), other than the general protection afforded to all native vegetation under such legislation.

Proponent means Cliffs Asia Pacific Iron Ore Pty Ltd (ACN 001 892 995) as the proponent for the Deception Deposit proposal.

Proposal means a project, plan, program, policy, operation, undertaking or development or change in land use as defined under the *Environmental Protection Act 1986* (WA). Development of the Deception Deposit is a proposal.

Putrescible Waste means a waste substance that is readily able to undergo decomposition when in contact with air or moisture (e.g. food).

Rare Flora means flora that is declared by the Western Australian Minister for Environmental as protected under the *Wildlife Conservation Act 1950* (WA) due to it being considered likely to become extinct or rare and therefore in need of special protection, or flora that is presumed to be extinct in the wild and therefore in need of special protection.

Short-Range Endemic Invertebrate Fauna means invertebrate fauna that are geographically restricted in range due to life characteristics that may include (one or a combination of) poor powers of dispersal, confinement to discontinuous habitats, low levels of fecundity, and/or have seasonal activity (active during cool and wet periods).

Significant means having, or likely to have, a major effect or impact of consequence. Antonym: Non-significant.

Specially Protected Fauna means fauna that is declared by the Western Australian Minister for Environment as protected under the *Wildlife Conservation Act 1950* (WA) due to it being rare or likely to become extinct, presumed to be extinct, subject to an international agreement on migratory birds, or are otherwise in need of special protection.

Species means the fundamental category of biological classification for flora and fauna, composed of genetically related individuals that share common characteristics and are capable of inbreeding.

Subterranean Fauna means fauna that have adapted to live underground. Subterranean fauna includes stygobitic fauna (aquatic subterranean fauna) and troglobitic fauna (non-aquatic subterranean fauna).

Threatened Species means a species of flora or fauna declared by the Commonwealth Minister for Environment and protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) as a matter of national environmental significance for being extinct, facing a risk of extinction, or in need of a conservation program to prevent the species from a risk of extinction. Threatened species are allocated a category of extinct, extinct in the wild, critically endangered, endangered, vulnerable or conservation dependent.

Threatened Ecological Community means a naturally occurring vegetation assemblage that occurs in a particular type of habitat that is facing a high, very high or extremely high risk of extinction in the wild in the medium-term, near or immediate future. TECs are declared and protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), with subsequent protection also afforded under the *Environmental Protection Act 1986* (WA).

Vegetation means an assemblage of flora species.

Waste Rock means the rock and soil material excavated from a mine pit that does not contain a concentration of iron at an economic grade (which may change subject to market specifications and available technologies).

Waste Rock Landform means a designed, engineered and constructed structure made of waste rock.

Yilgarn Operations means the iron ore mining operations at the Koolyanobbing Range (Deposits A to K), Mt Jackson Range (Deposits J1 to J3), Windarling Range (Deposits W1 to W5), ore processing facility at Koolyanobbing, and road and rail facilities connecting the mines and ore processing facility to the Port of Esperance where the ore is exported to international customers.

1 The Proposal

1.1 The Proponent

The Proponent for the Deception Deposit proposal is:

Cliffs Asia Pacific Iron Ore Pty Ltd (ACN 001 892 995)

Level 12, The Quadrant
1 William Street
PERTH WA 6000

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PERTH WA 6846

Telephone: (08) 9426 3333
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Website: www.CliffsNR.com

Cliffs Asia Pacific Iron Ore Pty Ltd's (Cliffs) contacts for the Deception Deposit proposal are:

Corporate Enquiries -

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Technical Enquiries -

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Email: Stuart.Hawkins@GlobeEnvironments.com.au

Cliffs is a supplier of Western Australian iron ore, with mine operations in the Yilgarn region and at Cockatoo Island. Approximately 80% of the mined ore is exported to China, with the remaining 20% exported to Japan.

Mine operations are undertaken in accordance with Cliffs' Environmental Policy (Cliffs Natural Resources 2008; Appendix 1). The Environmental Policy outlines Cliffs' overarching objectives of environmental protection and continual improvement in environmental performance. The Environmental Policy is implemented through Cliffs' Environmental Management System (EMS), which includes Environmental Management Plans (EMPs) for key environmental matters related to the mine operations. Cliffs' EMS for its Yilgarn Operations is certified and maintained to Australian and New Zealand Standard ISO 14001:2004 (NCSI 2011; Appendix 2).

1.2 Deception Deposit Proposal

Cliffs proposes to develop a new iron ore mine at the Deception Deposit, located approximately 150km north of Southern Cross, Western Australia. The Deception Deposit has taken its name from the landmark referred to as Deception Hill, located approximately 5km to the east of the proposed mining area.

The Deception Deposit proposal includes one mine pit, one waste rock landform, support infrastructure and a haul road to connect to Cliffs' existing haul road network. The Deception Deposit contains an estimated 9.2 million tonnes of iron ore having a gross economic value of approximately A$1.44billion. Mine development is scheduled to commence from 2012. Productive mining is scheduled to commence from 2013, with an estimated mining-life of approximately 8 years.

The Deception Deposit proposal will be integrated into Cliffs' existing Yilgarn Operations. The Yilgarn Operations include the mining of iron ore deposits on the Koolyanobbing Range, Mt Jackson Range and the Windarling Range, processing of ore at Koolyanobbing, and road and rail transport between these operations and the Port of Esperance where the processed ore is exported to international customers.

The location of Cliffs' Yilgarn Operations is depicted in Figure 1-1.

Figure 1-1 Location of the Yilgarn Operations. The Deception Deposit proposal will be a northern extension of the existing Yilgarn Operations. The Yilgarn Operations currently includes the mining of iron ore deposits on the Mt Jackson Range, Windarling Range and the Koolyanobbing Range, processing of ore at the Koolyanobbing Mine, and road and rail transport (via Kalgoorlie and Norseman) between these operations and the Port of Esperance where the processed ore is exported to international customers.

1.3 Proposal Characteristics

The key characteristics of the Deception Deposit proposal are identified in Table 1-1. Maps identifying the location of the Deception Deposit proposal are shown in Figures 1-2, 1-3 and 1-4. Indicative cross-sections of the mine pit, waste rock landform and haul road are shown in Figures 1-5 to 1-7.

ELEMENT	DESCRIPTION
GENERAL	
Location	Tenements M77/1257, M77/1258, M77/1259 and L77/232 in the Shire of Menzies and the Shire of Yilgarn, Western Australia.
Mining Life	8 years (approximately)
Mining Method	Open Cut
Area	547.6ha (as per the components listed below)
COMPONENTS	
Mine Pit	
Location	Tenements M77/1257, M77/1258 and M77/1259
Area	117.4ha
Depth	254mAHD
Waste Rock Landform	
Location	Tenements M77/1257, M77/1258 and M77/1259
Area	257.4ha
Elevation	550mAHD
Ore Stockpiles	
Location	Tenement M77/1259
Area	52.1ha
Support Infrastructure	
Location	Tenement M77/1259
Area	31.8ha
Haul Road	
Location	Tenements L77/232 and M77/1259
Area	88.9ha
Length	22.3km
Width	40m (approximately)

Abbreviations:
ha = hectares
km = kilometres
mAHD = metres in Australian Height Datum

All values stated are maximum values, unless otherwise specified.

Table 1-1 Key Characteristics of the Deception Deposit Proposal. The key characteristics of the Deception Deposit proposal are identified. Maps identifying the location of the Deception Deposit proposal are shown in Figures 1-2, 1-3 and 1-4.

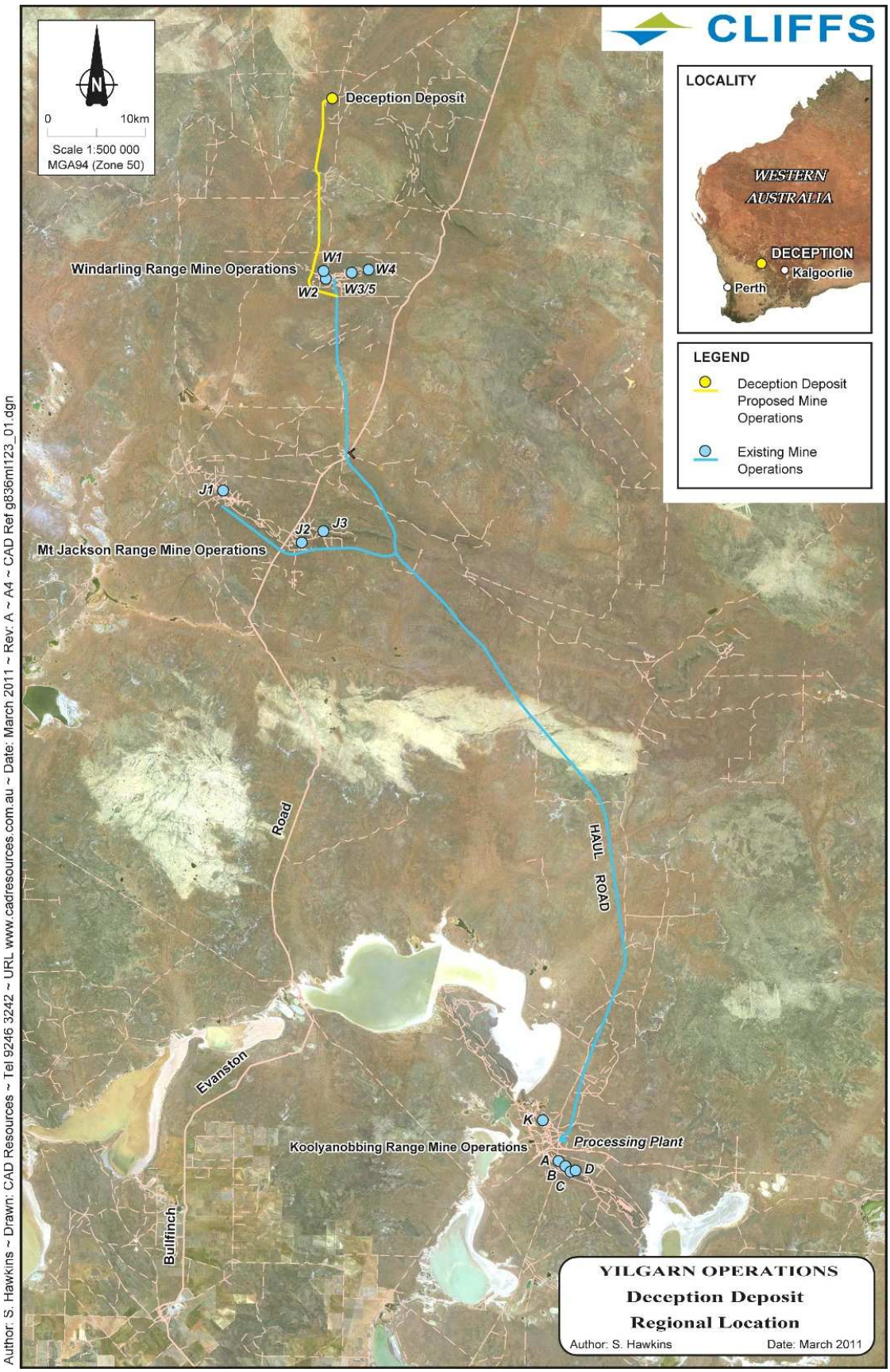

Figure 1-2 Location of Cliffs' Yilgarn Operations. Cliffs' existing mine operations at the Koolyanobbing Range, Mt Jackson Range, Windarling Range and the haul road network are identified in blue. The Deception Deposit proposal is an extension of the existing Yilgarn Operations and is identified in yellow.

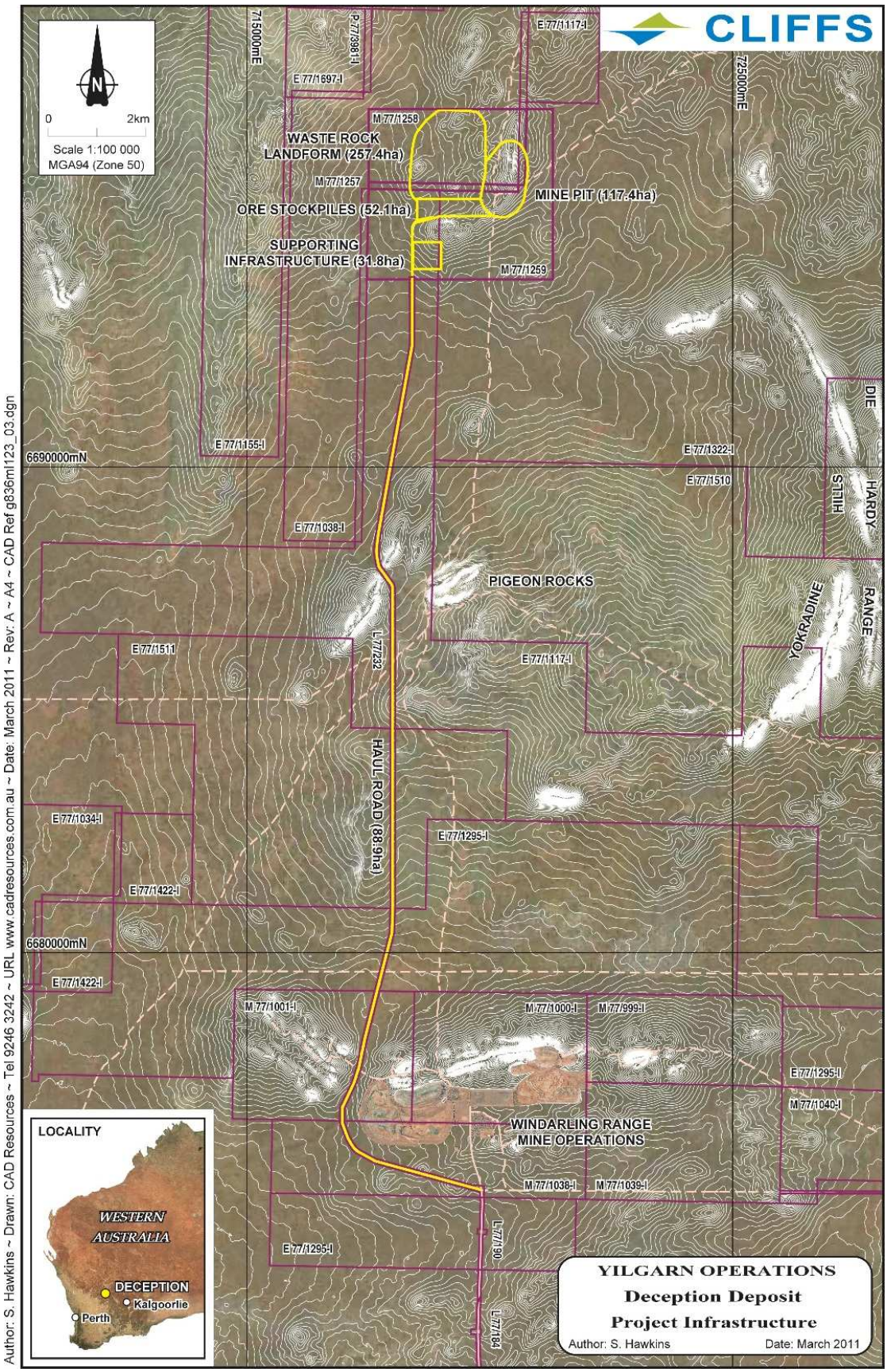

Figure 1-3 Deception Deposit Proposal Infrastructure. The Deception Deposit is located approximately 20km north of Cliffs' existing Windarling Range mine operations. The Deception Deposit haul road will extend from the Deception Deposit southwards to connect to Cliffs' existing haul road network at the Windarling Range.

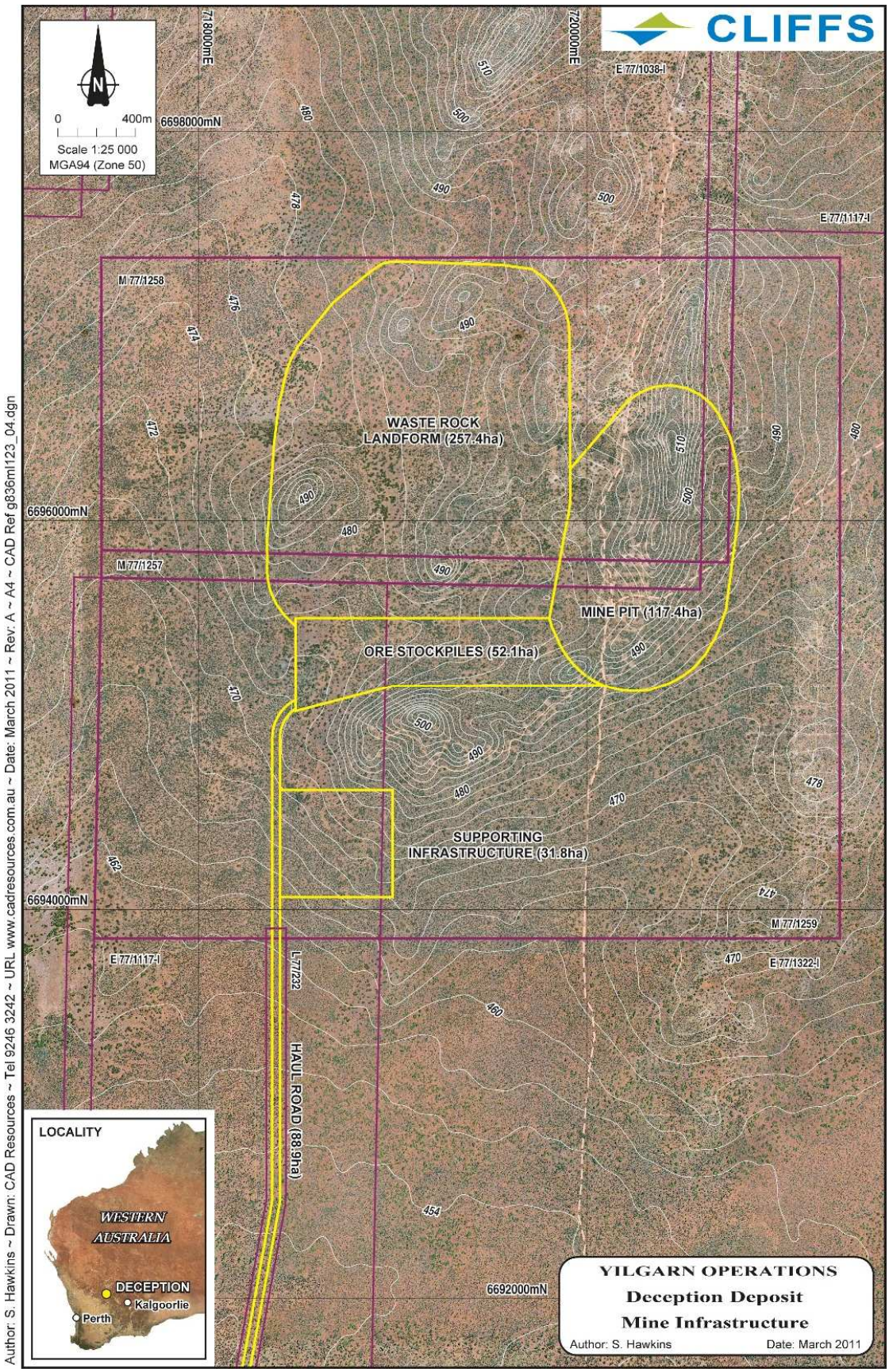

Figure 1-4 Deception Deposit Proposal Mine Area Infrastructure. The locations of the mine pit, waste rock landform, ore stockpiles and supporting infrastructure are identified.

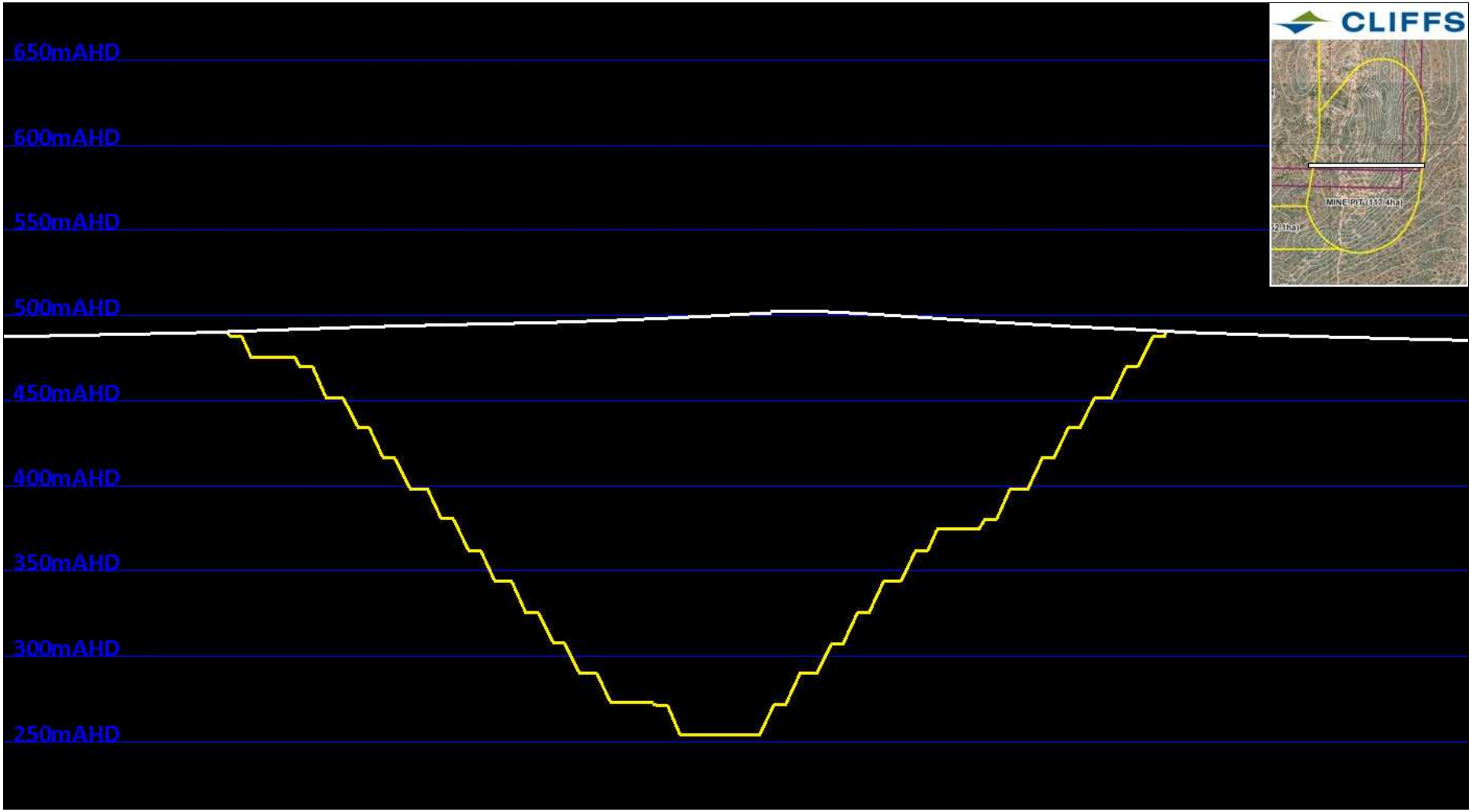

Figure 1-5 Deception Deposit Proposal Mine Pit Cross-section. The current land topography is depicted in white. The proposed mine pit is depicted in yellow.

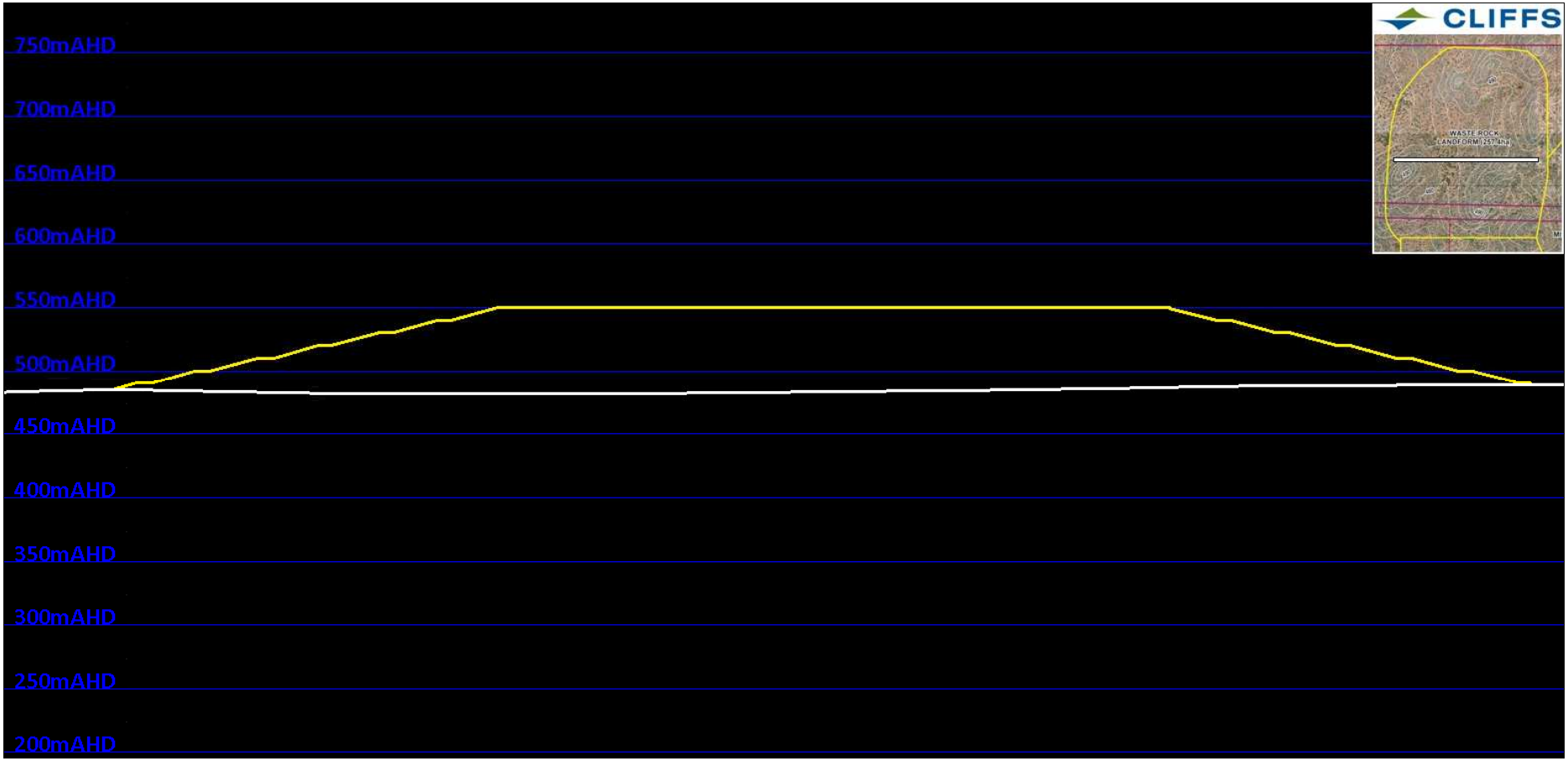

Figure 1-6 Deception Deposit Waste Rock Landform Cross-section. The current land topography is depicted in white. The proposed waste rock landform is depicted in yellow.

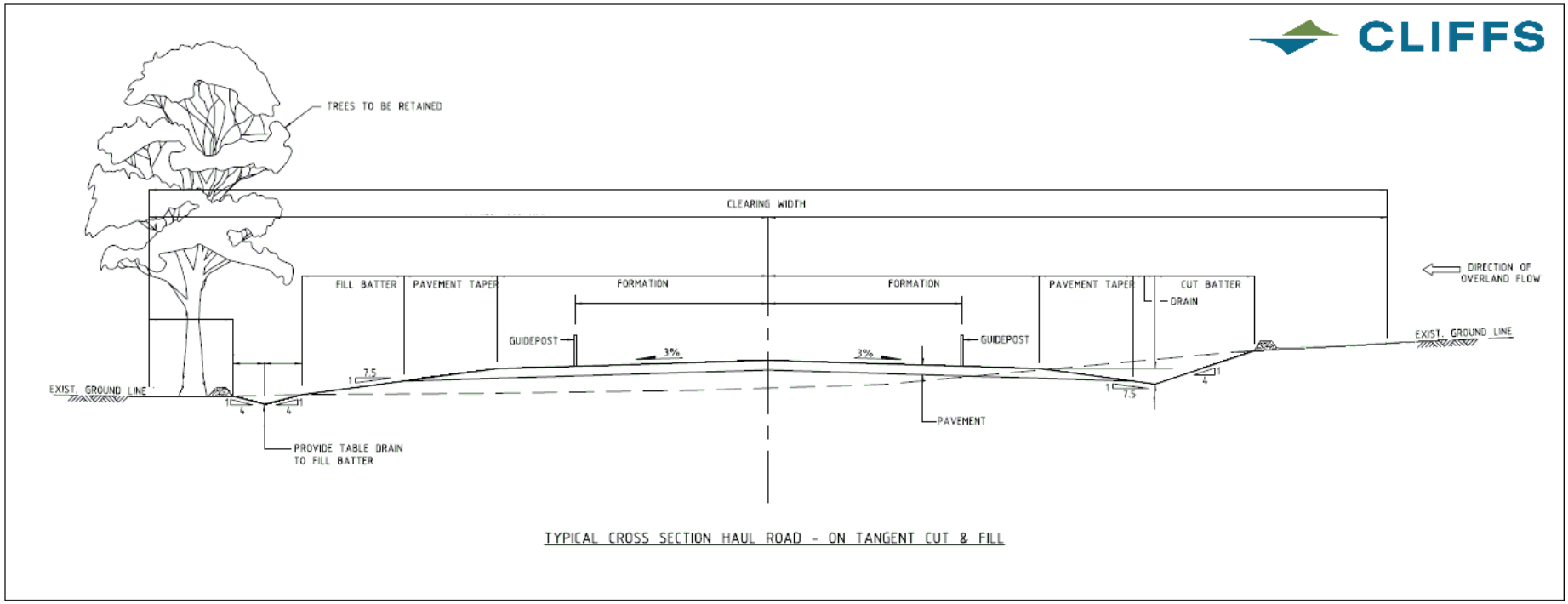

Figure 1-7 Deception Deposit Haul Road Cross-section. The cross-section depicts a typical haul road design used by Cliffs at its mine operations. Source: RoadsWest Engineering Group WA Pty Ltd (2010 unpublished).

1.4 Proposal Description

A description of the key components of the Deception Deposit proposal is provided below:

1.4.1 Mine Pit

The Deception Deposit mine pit will yield an estimated 9.2Mt of iron ore of a 61.9% Fe average grade. Mining will be undertaken by the standard open-cut mining methods of blasting and excavation to an elevation of approximately 254mAHD, creating a mine pit approximately 230m below the surrounding ground surface, and being approximately 170m below the 425mAHD natural groundwater elevation. The Deception Deposit ore resource occurs both above and below the 425mAHD natural groundwater elevation, with more than 60% of the ore resource located below 425mAHD.

The Deception Deposit mine pit will require an area of 117.4ha. The mine pit area incorporates the area required for the temporary stockpiling of cleared vegetation and topsoil and subsoil from the mine pit area prior to its use in post-mining land rehabilitation. The mine pit area also incorporates the areas required for internal mine roads to connect the mine pit to the waste rock landform and ore stockpile areas. The mine pit area incorporates the area required for a post-mining abandonment bund installation in accordance with the requirements of the Department of Mines and Petroleum (DMP 1997).

Dewatering of the Deception Deposit mine pit will be required to lower the groundwater elevation to enable dry-floor mining. As identified by Rockwater (2011; Appendix 10), modelling of the groundwater dewatering required for the Deception Deposit mine pit identifies that an estimated 22L/s (0.7GL/y) of groundwater dewatering will be required during mining. The estimated cone of depression >5m will be approximately 1500ha; predominantly contained to within Cliffs tenements. As identified by Rockwater (2011), the impacts of groundwater dewatering are expected to be temporary, with the groundwater elevation recovering following the cessation of dewatering to fill the lower portion of the Deception Deposit mine pit to an elevation of approximately 300mAHD (45m water depth) within 3 years, stabilising to an elevation of approximately 340mAHD (65m water depth) within approximately 12 years. The Deception Deposit mine pit will act as a groundwater sink after dewatering has ceased, with groundwater moving towards the mine pit (i.e. not out of the mine pit to the surrounding groundwater); resulting in no impact to regional groundwater quality (Rockwater 2011). The groundwater dewatering rate, groundwater dewatering cone of depression and groundwater recovery are comparable to the modelled groundwater dewatering rate, groundwater dewatering cone of depression and groundwater recovery undertaken for Cliffs' Windarling Range W2 Deposit mine operations (located approximately 20km south) (Rockwater 2007a) and the Mt Jackson J1 Deposit mine operations (located approximately 40km south-south west) (Rockwater 2007b).

1.4.2 Waste Rock Landform

Waste rock from the mine pit will be disposed of by construction of a waste rock landform. The waste rock landform will be constructed within a 257.4ha area and to an elevation of nominally 550mAHD. The size and elevation of the waste rock landform is based on 10m lifts having a 15^{o} batter, a 10m berm with a 5^{o} backslope between lifts, and having an overall angle of 10.5^{o}, which will accommodate an estimated 57 million bank cubic metres of waste rock.

The waste rock landform area incorporates the area required for the temporary stockpiling of vegetation and topsoil and subsoil cleared from the waste rock landform area prior to its use in land

rehabilitation. The waste rock landform area also incorporates the areas required for internal mine roads to connect the waste rock landform to the mine pit and ore stockpile areas.

The waste rock landform has been designed to conceptually meet a 1:100 year Annual Recurrence Interval (ARI) for rainfall, noting that placement of suitable face rock material and revegetation during mine operations will be necessary to achieve this. Drainage will be managed using a combination of table drains, sumps and earthen bunding (as required) to control stormwater and allow it to infiltrate and/or evaporate.

Based on geochemical characterisation of waste rock (SWC 2011a; Appendix 11), the majority of waste rock is classified as non-PAF and non-saline, and as such the waste rock does not require specific management actions for disposal.

The outer capping of the waste rock landform will have stockpiled topsoil and subsoil returned to provide growth media for rehabilitation works. Based on soil characterisation (SWC 2011b; Appendix 12), sufficient material will be available for an outer cover of approximately 0.6m of subsoil and approximately 0.5m of topsoil, overlying the waste rock.

Consistent with Cliffs' existing mine operations, the waste rock landform will also be used for the controlled disposal of inert waste, putrescible waste and contaminated waste (e.g. hydrocarbon contaminated soil). The volume of waste generated is expected to be proportionally similar to Cliffs' existing mine operations. The landfill will be subject to Registration through the Department of Environment and Conservation (DEC) in accordance with the *Environmental Protection Regulations 1987* (WA).

1.4.3 Ore Stockpiles

An ore stockpiles area, commonly referred to as a 'run-of-mine pad', will require an area totalling 52.1ha. The ore stockpile area incorporates the area required for the temporary stockpiling of cleared vegetation and topsoil and subsoil prior to its use in post-mining land rehabilitation. The ore stockpile area also incorporates the area required for internal mine roads to connect the ore stockpiles to the mine pit and waste rock landform.

The ore stockpiles area incorporates the area required for water storage dams for containment of abstracted groundwater from the mine pit prior to use in dust suppression. The dams will have a stock-fencing perimeter to minimise fauna access and contain fauna egress matting to assist with fauna escape in the event of fauna entry.

Drainage will be managed using a combination of table drains, sumps and earthen bunding (as required) to control stormwater and allow it to infiltrate and/or evaporate.

1.4.4 Support Infrastructure

Support infrastructure will require an area totalling 31.8ha. The support infrastructure will include the following components:

Mine Administration Facilities -
Mine administration facilities will include mine offices (with kitchen and toilet facilities) and a small number of temporary (non-residential) overnight accommodation facilities (for periodic use for matters including injured personnel, emergencies and security).

Workshops and Maintenance Facilities -
Workshop and maintenance facilities will be required for mechanical and engineering use and storage purposes. Workshops and maintenance facilities will be on concrete hardstands with sumps for the collection and containment of contaminants. Sumps will be lined with a polymer, clay or non-permeable equivalent.

Equipment Storage Facilities -
Multiple locations will be required for storage of mining equipment, including vehicles and spare parts.

Hydrocarbon, Chemical and Explosives Storage Facilities -
Storage facilities for hydrocarbons (including vehicle fuels), chemicals and explosives will be required. The products will be stored and segregated in accordance with the *Dangerous Goods Safety Act 2004* (WA), *Dangerous Goods Safety (Storage and Handling of Non-Explosives) Regulations 2007* (WA) and the *Dangerous Goods Safety (Explosives) Regulations 2007* (WA).

Water Treatment Facility -
A water treatment plant (approximately 10kL/day) will be constructed to provide potable (drinking) water from abstracted groundwater to service mine personnel and mine office facilities (kitchens and toilets). The water treatment plant will be designed to produce potable water which meets drinking water quality targets (as per NHMRC & NRMMC 2004). Due to the low water requirement, the volume of liquid waste (brine) produced from the water treatment process will be managed by transfer to the water storage dams prior to its use in dust suppression.

Water Storage Dams -
Water storage dams will be constructed to supply groundwater for dust suppression purposes to the support infrastructure area and haul road. The dams will have a stock-fencing perimeter to minimise fauna access and contain fauna egress matting to assist with fauna escape in the event of fauna entry.

Wastewater Treatment Facility -
A wastewater treatment facility (approximately 10kL/day) will be constructed to treat wastewater influent from the mine offices (kitchens and toilets). The wastewater treatment technology will be designed and constructed to the requirements of the Shire of Menzies and in accordance with the *Health Act 1911* (WA) and the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974* (WA). Due to the low volume (due to the absence of a mine camp), high evaporation rates (approximately 10 times average annual rainfall) and the depth to groundwater (>50m, as identified in Rockwater 2011), the potential environmental impact from the wastewater treatment facility is expected to be negligible.

Power Generation Facilities -
Diesel generators will be used for power supply to support infrastructure.

The area for the support infrastructure incorporates areas required for the stockpiling of topsoil and subsoil cleared from the area of the support infrastructure prior to its use in post-mining land rehabilitation. The area of the support infrastructure also incorporates areas required for internal mine roads between the supporting infrastructure components.

Drainage will be managed using a combination of table drains, sumps and earthen bunding (as required) to control stormwater and allow it to infiltrate and/or evaporate.

1.4.5 Haul Road

A 22.3km unsealed haul road of up to 88.9ha in area will be constructed to connect the Deception Deposit mine area to Cliffs' existing haul road network at the Windarling Range mine operations. The haul road location has been determined based on a combination of engineering, land planning and environmental factors (e.g. land topography, land access, minimum distance, minimum vegetation clearing).

The haul road will be subject to an engineering design catering for a 1:10 year ARI for rainfall, which is consistent with the engineering design of Cliffs' existing haul road network. Drainage will be managed using a combination of table drains, sumps and earthen bunding (as required) to control stormwater and allow it to infiltrate and/or evaporate.

1.5 Environmental Management

Cliffs' existing mine operations are undertaken in accordance with an EMS. Cliffs' EMS is certified and maintained to Australian and New Zealand Standard ISO:14001 (NCSI 2011; Appendix 2). Cliffs' EMS contains a series of EMPs that have previously been subject to review of the Commonwealth Department of Sustainability Environment Water Population and Communities (DoSEWPC), Environmental Protection Authority (EPA), DEC and DMP for the management of key environmental matters related to mine operations.

The EMS and the series of EMPs are an integral management component of Cliffs' existing mine operations. Compliance with the EMS and EMPs is regularly audited both internally and by external consultants in order to ensure compliance and identify any changes necessary to achieve improved environmental outcomes. The regular auditing of the EMS and EMPs is consistent with Cliffs' Environmental Policy (Cliffs Natural Resources 2008) for evaluation of performance against its environmental targets.

To ensure consistency in mine operations and environmental protection, Cliffs proposes that the EMPs from Cliffs' EMS are also used for the Deception Deposit proposal. Accordingly, the following EMPs have been included and referred to in this Environmental Impact Assessment (EIA) Assessment on Proponent Information (API) document for the Deception Deposit proposal:

- Land Clearing Management Plan (Cliffs 2011b; Appendix 3);
- Weed Management Plan (Cliffs 2011c; Appendix 4);
- Fire Management Plan (Cliffs 2011d; Appendix 5);
- Dust Management Plan (Cliffs 2011e; Appendix 6); and
- Fauna Management Plan (Cliffs 2011f; Appendix 7).

These EMPs are considered to be appropriate for application to the Deception Deposit proposal due to the environmental and operational similarities to Cliffs' existing mine operations.

In addition to the above, Cliffs has also prepared the following EMP for the decommissioning and rehabilitation of the Deception Deposit proposal:

- Mine Closure Plan (Cliffs 2011g; Appendix 8).

The Mine Closure Plan has been prepared consistent with the DMP and EPA (2011) guideline for mine closure plans.

The EMPs contained in Appendices 3 to 8 form part of the impact assessment for the Deception Deposit proposal as they prescribe how the key environmental factors will be managed during mine development, mine operation and mine closure. Accordingly, consideration of the Deception Deposit proposal should include consideration of the management and procedural actions proposed in these EMPs.

As part of this impact assessment document, Cliffs makes a number of environmental commitments to implement the above EMPs for the management of key environmental factors relevant to the Deception Deposit proposal. Cliffs intends that these commitments to implement these EMPs will become legally binding in an approval from the WA Minister for Environment for the Deception Deposit proposal under s45(5) the *Environmental Protection Act 1986* (WA).

To provide additional context to environmental management at Cliffs' mine operations, Cliffs' Groundwater Management Plan (Cliffs 2011h) is also provided at Appendix 9. The Groundwater Management Plan is regulated by the Department of Water (DoW) under the provisions of the *Rights in Water and Irrigation Act 1914* (WA). Cliffs intends that the Groundwater Management Plan will continue to be regulated by DoW under the provisions of the *Rights in Water and Irrigation Act 1914* (WA), without duplication under the *Environmental Protection Act 1986* (WA).

1.6 Government Assessment and Approval Processes

1.6.1 *Environmental Protection Act 1986* (WA)

The *Environmental Protection Act 1986* (WA) identifies that any proposal that is likely to have a significant impact on the environment may be referred to EPA for assessment. If EPA elects to assess a referred proposal, the Proponent for the proposal is to prepare an EIA document for consideration by EPA, who will report on the proposal to the Minister for Environment. The Minister for Environment subsequently determines if the proposal may be implemented and imposes any environmental conditions or procedures considered necessary.

Cliffs referred the Deception Deposit proposal to EPA on 7th April 2011 in accordance with s38(1) of the *Environmental Protection Act 1986* (Cliffs 2011a). The EPA subsequently determined on 11th May 2011 that the proposal should be subject to an EIA at an Assessment on Proponent Information (API) level (EPA 2011b) in accordance with EPA's administrative procedures (EPA 2010a).

This EIA-API document has been prepared in accordance with the requirements of the Environmental Protection Authority Scoping Guideline (EPA 2011a) and in accordance with the *Environmental Impact Assessment Administrative Procedures 2010* (EPA 2010a). This EIA-API document was submitted to EPA on 15th August 2011 for assessment.

The outline of the EIA-API process is depicted in Figure 1-7.

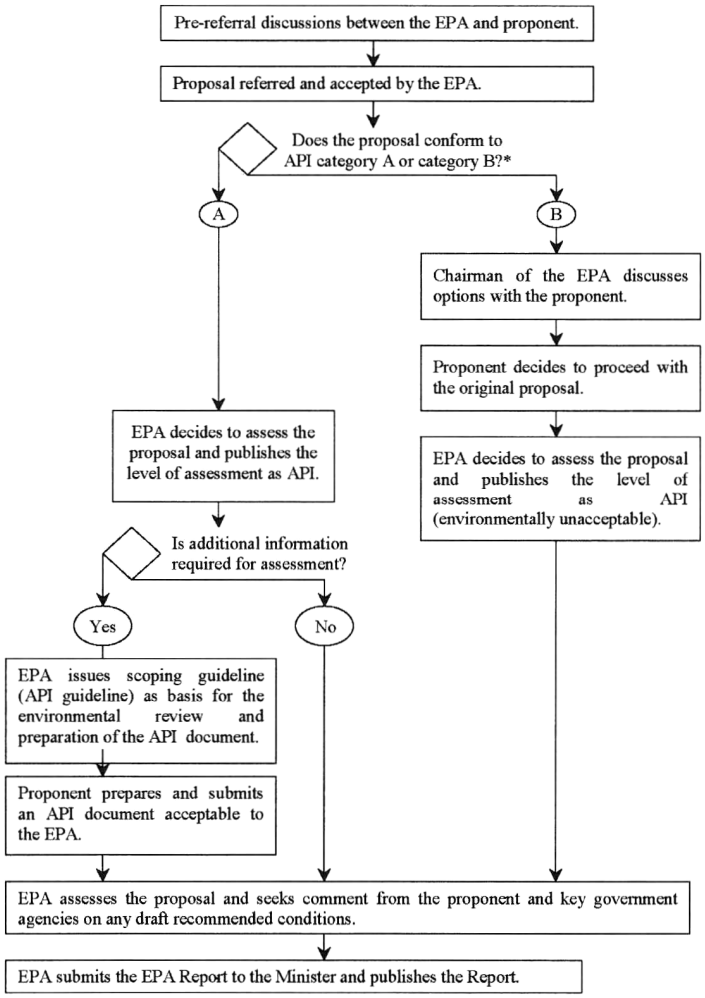

Figure 1-8 Environmental Impact Assessment (Assessment on Proponent Information) process under the *Environmental Protection Act 1986* (WA). This document has been prepared for the purposes of preparing an EIA-API document for submission to EPA. Source: EPA (2010a).

1.6.2 *Mining Act 1978* (WA)

The *Mining Act 1978* (WA) is the principal mining legislation in Western Australia and is regulated by DMP. The purpose of the *Mining Act 1978* (WA) is to control all mining land tenure (tenements), mineral exploration and mine operations. Prior to undertaking mining operations on mining land tenure, a Proponent is required to prepare a Mining Proposal in accordance with relevant guidelines for consideration by DMP, with the DMP to subsequently determine on behalf of the Minister for Mines and Petroleum whether to approve the proposed mining operations.

Cliffs has previously applied to DMP for Tenements M77/1257, M77/1258, M77/1259 and L77/232 under the *Mining Act 1978* (WA) for the Deception Deposit proposal.

Cliffs will prepare and submit a Mining Proposal to DMP for the Deception Deposit proposal in accordance with the *Mining Act 1978* (WA) to allow for mining and installation of mine infrastructure. This process is expected to commence during 2011.

The assessment process under the *Mining Act 1978* (WA) will be undertaken in parallel with the EPA assessment and approvals process under the *Environmental Protection Act 1986* (WA).

1.6.3 *Rights in Water and Irrigation Act 1914* (WA)

The *Rights in Water and Irrigation Act 1914* (WA) is the principal legislation regarding surface water and groundwater use in Western Australia and is regulated by DoW. The installation of groundwater wells and the abstraction of groundwater require assessment and approval of DoW under the *Rights in Water and Irrigation Act 1914* (WA). As identified in Section 1.4.1, the Deception Deposit mine pit will require the abstraction of groundwater.

Cliffs will prepare and submit application to DoW for the installation of groundwater wells to enable groundwater abstraction for the Deception Deposit proposal in accordance with the *Rights in Water and Irrigation Act 1914* (WA). Cliffs will also prepare and submit application to DoW to amend its existing Groundwater Licence GWL154459 (DoW 2011) granted by DoW for Cliffs' Yilgarn Operations in order to authorise groundwater abstraction through the groundwater wells. These processes are expected to commence during 2011.

The assessment processes under the *Rights in Water and Irrigation Act 1914* (WA) will be undertaken in parallel with the EPA assessment and approvals process under the *Environmental Protection Act 1986* (WA).

1.6.4 *Planning and Development Act 2005* (WA)

The *Planning and Development Act 2005* (WA) is the principal legislation regarding land developments in Western Australia, and for the area of the Deception Deposit proposal is regulated by the Shire of Menzies and the Shire of Yilgarn.

An approval under the *Planning and Development Act 2005* (WA) from the Shire of Menzies will be required as the Shire of Menzies Town Planning Scheme No. 1 (Shire of Menzies 2003) stipulates that an extractive industry (mining) within the combined Rural/Mining Zone requires the approval of the Shire of Menzies. This process is expected to commence during 2011.

An approval under the *Planning and Development Act 2005* (WA) from the Shire of Yilgarn is not required due to extractive industry (mining) being a permitted use for the combined Rural/Mining Zone under the Shire of Yilgarn Town Planning Scheme No. 2 (Shire of Yilgarn 2003).

1.6.5 *Environmental Protection Regulations 1987* (WA)

As identified in Section 1.4.2, the Deception Deposit waste rock landform will be used for the disposal of solid putrescible and inert wastes. This is consistent with the disposal of solid putrescible and inert wastes at Cliffs' existing mine operations. This disposal will be subject to a under Category 89 of the *Environmental Protection Regulations 1997* (WA) to be issued by DEC. This process is expected to commence during 2013.

1.7 Related Environmental Approvals

The Deception Deposit proposal will be integrated into Cliffs' existing Yilgarn Operations. There are a number of related environmental approvals that are relevant for consideration.

1.7.1 Implementation Statement 627 under Part IV of the *Environmental Protection Act 1986* (WA)

Implementation Statement 627 was issued to Cliffs by the WA Minister for Environment in June 2003 (WA Minister for Environment 2003) for expansion of Cliffs' Yilgarn Operations, including development and operation of a haul road to connect the Windarling Range mine operations to the pre-existing Koolyanobbing Range mine operations.

Implementation Statement 627 is a related environmental approval as the Deception Deposit haul road will connect to Cliffs' existing haul road network at the Windarling Range mine operations, and with the ore of the Deception deposit subsequently being transported on part of the previously approved haul road.

No change to the infrastructure developed in accordance with Implementation Statement 627 is required for the Deception Deposit proposal. The infrastructure developed in accordance with Implementation Statement 627 does not form part of the Deception Deposit proposal.

1.7.2 Licence 5850 under Part V of the *Environmental Protection Act 1986* (WA)

Licence 5850 was issued to Cliffs by DEC for prescribed activities occurring at Cliffs' Koolyanobbing Range Mine Operations, including operation of the Koolyanobbing Ore Handling Plant as a 'prescribed premises' under Category 12 of the *Environmental Protection Act 1986* (WA) (DEC 2010).

Licence 5850 is a related environmental approval as ore from the Deception Deposit will be processed within the Koolyanobbing Ore Handling Plant.

No change to the infrastructure operated in accordance with Licence 5850 is required for the Deception Deposit proposal. The infrastructure operated in accordance with Licence 5850 does not form part of the Deception Deposit proposal.

1.7.3 Groundwater Licence GWL154459 under the *Rights in Water and Irrigation Act 1914* (WA)

Groundwater abstraction for Cliffs' Yilgarn Operations are undertaken in accordance with Groundwater Licence GWL154459 issued by DoW under the *Rights in Water and Irrigation Act 1914* (WA) (DoW 2011).

Groundwater Licence GWL154459 is a related environmental approval it includes approval for groundwater abstraction and groundwater use within the area of the Deception Deposit proposal.

No change to the current groundwater allocation volume of Groundwater Licence GWL154459 is required to implement the Deception Deposit proposal.

1.8 Impacts, Management and Predicted Outcomes

1.8.1 Factors Assessed

This document has been prepared to meet the requirements of EPA for the purposes of an EIA-API under Part IV of the *Environmental Protection Act 1986* (WA). The key environmental factors relevant to the Deception Deposit proposal have been identified by EPA (2011a) as being:

- Flora;
- Fauna; and
- Mine Closure.

A summary of the impact assessment for key factors, potential impact, management and predicted outcomes for the Deception Deposit proposal is identified in Table 1-2.

The assessment of each key environmental factor is based on published literature and field surveys. The information from these sources is summarised in context with the Deception Deposit proposal. Further detail from this published literature and the field surveys can be obtained directly from those sources.

For each key environmental factor assessed, consideration has been given to the relevant legislative frameworks, guidance documentation and the proposed management plans through which the potential impacts of the Deception Deposit proposal can be managed. Where appropriate, Cliffs has made commitments to undertake actions to minimise or mitigate the potential impacts of the Deception Deposit proposal.

Environmental Management Plans have been included in Appendices 3 to 8 of this document to provide the details as to how Cliffs will manage the potential impacts of the Deception Deposit proposal. These management plans form an integral part of the environmental impact assessment of the Deception Deposit proposal. Cliffs requests that consideration be given to the content of these EMPs during assessment of the Deception Deposit proposal.

1.8.2 Factors Not Assessed

Matters not considered by EPA (2011a) to be key environmental factors for the Deception Deposit proposal are not assessed in this EIA-API document. Table 1-3 identifies these factors, a summary of the potential impact for these factors, and identification of how these factors are proposed to be managed.

Table 1-2 Summary of Key Environmental Factors, EPA Objectives and Guidance, Natural and Human Environment, Potential Impact, Management Proposed and Predicted Outcome for the Deception Deposit Proposal (in accordance with EPA 2010a and EPA 2011a). Detailed assessment of the key environmental factors is provided in Sections 3.1 to 3.3.

FACTOR	EPA OBJECTIVE and EPA GUIDANCE	NATURAL & HUMAN ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOME
Key Environmental Factors					
Flora	EPA Objective: Flora: To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge (EPA 2010b). EPA Guidance: • EPA Guidance Statement #51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004a). • EPA Guidance Statement #55: Implementing Best Practice in proposals submitted to the Environmental Impact Assessment Process (EPA 2003a).	The flora values in the vicinity of the Deception Deposit proposal include: • 7 DEC-classified 'Priority' flora species; • 33 vegetation units; and • 11 weed species. The area of the Deception Deposit proposal does not contain any Rare Flora species declared under the *Wildlife Conservation Act 1950* (WA), Threatened Species (flora) or Threatened Ecological Communities protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), or DEC-classified 'priority' ecological communities.	The Deception Deposit proposal is expected to impact: • 6 DEC-classified 'priority' flora species; • 28 vegetation; and • 547.6ha of native vegetation. Impacts to the above flora values are not expected to be significant. The Deception Deposit proposal will not impact any Rare Flora species declared under the *Wildlife Conservation Act 1950* (WA), Threatened Species (flora) or Threatened Ecological Communities protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), or DEC-classified 'priority' ecological communities.	The potential impacts of the Deception Deposit proposal on flora have been minimised through mine planning and design, resulting in the locating of infrastructure to avoid and/or minimise potential impacts. Cliffs will manage the potential impacts to flora for the Deception Deposit proposal by implementation of: • Land Clearing Management Plan (Cliffs 2011b; Appendix 3); • Weed Management Plan (Cliffs 2011c; Appendix 4); • Fire Management Plan (Cliffs 2011d; Appendix 5); and • Dust Management Plan (Cliffs 2011e; Appendix 6). Implementation of the above management actions is expected to ensure the potential impact of the Deception Deposit proposal to flora values is managed to an acceptable standard.	The Deception Deposit proposal is not expected to result in a significant impact to flora at species or ecosystem levels. Implementation of the proposed management actions is expected to ensure the potential impact of the Deception Deposit proposal to flora values is managed to an acceptable standard. Accordingly, the potential impact of the Deception Deposit proposal to flora at species or ecosystem levels can be managed to meet EPA's objective.
Fauna	EPA Objective: Fauna: To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge (EPA 2010b). EPA Guidance: • EPA Guidance Statement #20: Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia (EPA 2009).	The fauna values in the vicinity of the Deception Deposit proposal include: • 4 fauna species protected under one or a combination of the *Wildlife Conservation Act 1950* (WA) and the *Environment Protection and Biodiversity Conservation Act 1999* (C'th); • An array of other terrestrial vertebrate fauna species; • A number of potential short-range endemic invertebrate fauna; and	The Deception Deposit proposal is expected to impact: • Nil fauna species protected under one or a combination of the *Wildlife Conservation Act 1950* (WA) and the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) • An array of other terrestrial vertebrate fauna; and • A number of potential short-range endemic invertebrate fauna. Impacts to the above fauna values	The potential impacts of the Deception Deposit proposal on fauna have been minimised through mine planning and design, resulting in the locating of infrastructure to avoid and/or minimise potential impacts. Cliffs will manage the potential impacts to fauna for the Deception Deposit proposal by implementation of: • Fauna Management Plan (Cliffs 2011f; Appendix 7); and • Land Clearing Management Plan (Cliffs 2011b; Appendix 3);	The Deception Deposit proposal is not expected to result in significant impact to fauna at species or ecosystem levels. Implementation of the proposed management actions is expected to ensure the potential impact of the Deception Deposit proposal to fauna values is managed to an acceptable standard. Accordingly, the potential impact of the Deception Deposit proposal to fauna at species or ecosystem levels can be

FACTOR	EPA OBJECTIVE and EPA GUIDANCE	NATURAL & HUMAN ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOME
	• EPA Guidance Statement #54: Sampling of Subterranean Fauna in Groundwater and Caves (EPA 2003b). • EPA Guidance Statement #54a: Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia (EPA 2007a). • EPA Guidance Statement #55: Implementing Best Practice in proposals submitted to the Environmental Impact Assessment Process (EPA 2003a). • EPA Guidance Statement #56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004b). • Technical Guide: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA & DEC 2010).	• A number of feral fauna species.	are not expected to be significant. The Deception Deposit proposal is not expected to impact significant or unique fauna habitat.	Implementation of the above management actions is expected to ensure the potential impact of the Deception Deposit proposal to fauna values is managed to an acceptable standard	managed to meet EPA's objective.
Mine Closure	EPA Objectives: Decommissioning: To ensure, as far as practicable, that rehabilitation achieves a stable and functioning landform which is consistent with the surrounding landscape and other environmental values (EPA 2010b). EPA Guidance: • EPA Guidance Statement #6: Rehabilitation of Terrestrial Ecosystems (EPA 2006b). • Guidelines for Preparing Mine Closure Plans (DMP & EPA 2011).	The Deception Deposit proposal area is currently has minimal land disturbance from mineral exploration and pastoral activities, with the land area being covered by native vegetation. Geochemical characterisation of the Deception Deposit has identified the majority of waste rock is non-PAF and non-saline, and with a low risk of metaliferous drainage.	Mine closure of the Deception Deposit proposal will result in: • All mine infrastructure removed; • Mine areas being rehabilitated with native vegetation; and • An open mine void containing permanent surface water (saline).	Cliffs will undertake mine closure for the Deception Deposit proposal by implementation of: • Mine Closure Plan (Cliffs 2011g; Appendix 8). Implementation of the above management actions is expected to result in acceptable mine closure of the Deception Deposit proposal.	Implementation of the proposed mine closure actions will result in acceptable mine closure of the Deception Deposit proposal. Accordingly, mine closure of the Deception Deposit proposal can be managed to meet EPA's objective.

Table 1-3 Summary of Other Factors, EPA Objectives and Guidance, Natural and Human Environment, Potential Impact, Management Proposed and Predicted Outcome for the Deception Deposit Proposal.

FACTOR	EPA OBJECTIVE and EPA GUIDANCE	NATURAL & HUMAN ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOME
Other Environmental Factors					
Conservation Areas	EPA Objective: Conservation areas: To protect the environmental values of areas identified as having significant environmental attributes (EPA 2010b). EPA Guidance: N/A.	The Deception Deposit proposal will not impact any conservation reserve currently declared under the *Land Administration Act 1997* (WA). The Deception Deposit proposal partially coincides with a proposed Conservation and Mining Reserve (WA Minister for Environment and WA Minister for Mines and Petroleum 2010)	The Deception Deposit proposal will not impact any conservation reserve currently declared under the *Land Administration Act 1997* (WA). The Deception Deposit proposal is expected to partially impact the area of the proposed Conservation and Mining Reserve.	No management actions are proposed as the Deception Deposit proposal will not impact any conservation reserve currently declared under the *Land Administration Act 1997* (WA). No management actions are proposed as the Deception Deposit proposal is not expected to have a significant impact on flora values or fauna values (refer Table 1-3, above) associated with the proposed Conservation and Mining Reserve. Further, development of the Deception Deposit proposal mine infrastructure is consistent with the accepted uses for the proposed Conservation and Mining Reserve.	The Deception Deposit proposal will not impact any conservation reserve currently declared under the *Land Administration Act 1997* (WA). Development of the Deception Deposit proposal mine infrastructure will be consistent with the accepted uses for the proposed Conservation and Mining Reserve. Accordingly, the potential impact of the Deception Deposit proposal to conservation areas can be managed to meet EPA's objective.
Water Quality	EPA Objectives: Water: To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected (EPA 2010b). Water Quality: To ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2010b). EPA Guidance: N/A.	Groundwater at the Deception Deposit is located at an elevation of approximately 425mAHD (Rockwater 2011; Appendix 10), being approximately 65m below the natural ground elevation. Mining will occur to a depth of 254mAHD, being approximately 170m below the natural groundwater elevation. Cliffs has been granted Groundwater Licence GWL154459 by DoW under the *Rights in Water and Irrigation Act 1914* (WA) for groundwater supplies for the Yilgarn Operations, including the area of the Deception Deposit proposal. Cliffs mages its groundwater operations in accordance with a Groundwater Management Plan (Cliffs 2011h;	Mining of the Deception Deposit will occur to an elevation of 254mAHD, being up to approximately 170m below the 425mAHD natural groundwater elevation. Development of the Deception Deposit proposal will require groundwater dewatering, estimated at 22L/s (Rockwater 2011; Appendix 10). Following the cessation of mine dewatering, the groundwater is expected to recover and fill the lower portion of the Deception Deposit mine pit to an elevation of approximately 340mAHD, with no impact to regional groundwater elevation or regional groundwater quality (Rockwater 2011). Impacts to flora from groundwater	Implementation of Cliffs' Groundwater Management Plan (Cliffs 2011h; Appendix 9) in accordance with the *Rights in Water and Irrigation Act 1914* (WA) and Groundwater Licence GWL154459, as regulated by DoW, is expected to ensure the potential impact of the Deception Deposit proposal to groundwater is managed to an acceptable standard. Drainage for mine infrastructure areas will be managed using a combination of table drains, sumps and earthen bunding (as required) to control stormwater and allow it to infiltrate and/or evaporate.	The Deception Deposit is expected to result in a localised and manageable impact to groundwater during mine operations. The Deception Deposit is expected to result in post-mining permanent surface water within the mine pit following the cessation of mine dewatering, with this permanent surface water not expected to impact regional groundwater elevation or regional groundwater quality. Implementation of Cliffs' Groundwater Management Plan (Cliffs 2011h; Appendix 9) in accordance with the *Rights in Water and Irrigation Act 1914* (WA) and Groundwater Licence

FACTOR	EPA OBJECTIVE and EPA GUIDANCE	NATURAL & HUMAN ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOME
		Appendix 9) approved by DoW. Mineral exploration is currently the primary use of the groundwater resource in Deception Deposit proposal area. There are no surface water features in the vicinity of the Deception Deposit proposal. Groundwater wells for both agricultural and mineral exploration purposes exist in the vicinity of the Deception Deposit proposal.	drawdown are not expected as the flora present is not groundwater dependent. Impacts to fauna from a permanent water feature within the Deception Deposit mine pit are considered unlikely due to the water salinity and the unfavourable access. Impacts from stormwater (drainage) are not expected when managed using a combination of table drains, sumps and earthen bunding (as required) to control stormwater and allow it to infiltrate and/or evaporate.		GWL154459 , is expected to ensure the potential impact of the Deception Deposit proposal to groundwater is managed to an acceptable standard. The Deception Deposit is expected to result in no impact from stormwater when managed using a combination of table drains, sumps and earthen bunding (as required) to control stormwater and allow it to infiltrate and/or evaporate. Accordingly, the potential impacts of the Deception Deposit proposal to groundwater and stormwater can be managed to meet EPA's objective.
Air Quality	EPA Objective: Air Quality: To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2010b). EPA Guidance: • EPA Guidance Statement #18: Prevention of Air Quality Impacts from Land Development Sites (EPA 2000).	There are no existing land uses or human dwellings in the vicinity of the Deception Deposit proposal that could be affected by changes in air quality.	Mine operations are expected to generate dust from activities including blasting, excavation, loading and transport of ore and waste rock. Dust has the potential to impact air quality.	Cliffs will manage the potential for impact from dust for the Deception Deposit proposal by implementation of Cliffs' Dust Management Plan (Cliffs 2011e; Appendix 6). Implementation of the management actions contained in the Dust Management Plan is expected to ensure the potential impact of the Deception Deposit proposal from dust is managed to an acceptable standard.	Implementation of Cliffs' Dust Management Plan (Cliffs 2011e) is expected to ensure the potential impact of the Deception Deposit proposal from dust is managed to an acceptable standard.. Accordingly, the potential impacts of the Deception Deposit proposal on air quality can be managed to meet EPA's objective.
Greenhouse Gasses	EPA Objective: Greenhouse Gasses: To minimise emissions to levels as low as practicable on an ongoing basis and consider offsets to further reduce cumulative emissions (EPA 2010b). EPA Guidance:	N/A	Greenhouse gas emissions are expected from mine infrastructure powered by fuel-burning equipment (e.g. haulage trucks and light vehicles, mine offices). The Deception Deposit proposal is expected to emit an estimated 11,000 tonnes per year[1] of	Greenhouse gas emissions will be minimised through internal economic rationalisation to reduce costs associated with fuel burning equipment. No specific management actions or offsets are proposed as greenhouse gas emissions are not expected to be significant.	The Deception Deposit proposal is not expected to have a significant impact from greenhouse gas emissions. Accordingly, the potential impacts of the Deception Deposit proposal to greenhouse gas emissions can be managed to

[1] Estimation based on greenhouse gas emissions calculated for Cliffs' existing Windarling Range mine operations, scaled to 9.2 million tonnes ore volume of the Deception Deposit, over a mining period of 8 years mining for the Deception Deposit proposal.

FACTOR	EPA OBJECTIVE and EPA GUIDANCE	NATURAL & HUMAN ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOME
	• EPA Guidance Statement #12: Guidance Statement for Minimising Greenhouse Gas Emissions (EPA 2002a).		greenhouse gasses; being approximately one tenth of the 100,000 tonnes per annum emissions trigger used by EPA (refer Cliffs 2011a).		meet EPA's objective.
Noise	EPA Objective: Noise: To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring the noise levels meet statutory requirements and acceptable standards (EPA 2010b). EPA Guidance: • EPA Guidance Statement #8: Environmental Noise (EPA 2007b).	The nearest residential dwelling is located approximately 20km to the north of the Deception Deposit proposal.	Noise generated from the Deception Deposit proposal is not expected to affect the nearest residential dwelling located approximately 20km to the north.	Noise generated from the Deception Deposit proposal will be managed in accordance with the *Environmental Protection (Noise) Regulations 1997* (WA) as a standard mine operational matter.	The Deception Deposit proposal is not expected to result in a significant impact from noise. Accordingly, the potential impacts of the Deception Deposit proposal from noise can be managed to meet EPA's objective.
Social Factors					
Heritage and Native Title	EPA Objective: Heritage: To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation (EPA 2010b). EPA Guidance: • EPA Guidance Statement #41: Assessment of Aboriginal Heritage (EPA 2004c).	The Deception Deposit proposal does not coincide with any record of Aboriginal heritage on the Register of Aboriginal Heritage Sites maintained under the *Aboriginal Heritage Act 1972* (WA) (DIA 2011a; DIA 2011b). The Deception Deposit proposal does not coincide with any record of European heritage under the *Heritage of Western Australia Act 1990* (WA) (HCWA 2011a; HCWA 2011b). The Deception Deposit proposal does not coincide with any area of determined Native Title under the *Native Title Act 1993* (C'th) (NNTT 2011a; NNTT 2011b).	The Deception Deposit proposal is not expected to impact: • any record of Aboriginal heritage on the Register of Aboriginal Heritage Sites maintained under the *Aboriginal Heritage Act 1972* (WA) (DIA 2011a; DIA 2011b); • any record of European heritage under the *Heritage of Western Australia Act 1990* (WA) (HCWA 2011a; HCWA 2011b); and • any area of determined Native Title under the *Native Title Act 1993* (C'th) (NNTT 2011a; NNTT 2011b).	No management actions are proposed as the Deception Deposit proposal is not expected to impact any record of Aboriginal heritage or European heritage, or any area of determined Native Title. If currently unknown matters of heritage or native title are identified during proposal implementation, these matters will be managed in accordance with the *Aboriginal Heritage Act 1972* (WA), *Heritage of Western Australia Act 1990* (WA) and the *Native Title Act 1993* (C'th) in consultation with the respective regulatory agencies.	The Deception Deposit proposal is not expected to impact any record of Aboriginal Heritage or European heritage, or any area of determined Native Title. Accordingly, the potential impacts of the Deception Deposit proposal to heritage can be managed to meet EPA's objective.
Visual Amenity and Recreation	EPA Objective: Visual Amenity: To ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonably practicable (EPA 2010b). Recreation: To ensure that existing and	The area of the Deception Deposit (510m peak elevation) does not have notable visual amenity value. Areas of visual amenity value have been recorded in the region, such as the nearby Yorkadine Hills (635mAHD peak elevation) and the	The Deception Deposit proposal is expected to result in a localised and permanent change to the landscape through the development of a mine pit and waste rock landform. The impacts to visual amenity from this	No management actions are proposed as the Deception Deposit proposal is not expected to have a significant impact to visual amenity. Potential visual impact from parts of the Yorkadine Hills are expected to be limited to approximately 4% of total	The Deception Deposit proposal is not expected to result in a significant impact to visual amenity or recreation. Accordingly, the EPA's objectives for visual amenity and recreation

FACTOR	EPA OBJECTIVE and EPA GUIDANCE	NATURAL & HUMAN ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOME
	planned recreational uses are not compromised. EPA Guidance: N/A.	Die Hardy Range (645mAHD peak elevation). There are no known areas within the area of the Deception Deposit proposal that are used for recreation purposes.	landscape change are expected to be localised. During mine operations, the Deception Deposit proposal mine area is expected to be distantly visible from parts of the nearby Yorkadine Hills (located approximately 8km south-east). An impact to recreation is not expected. Access to Yorkadine Hills, Die Hardy Range and Pigeon Rocks will continue via pastoral access tracks (refer Figure 1-2).	landscape views during mine operations, with no post-mining visual amenity impact following rehabilitation works to be undertaken during mine closure. No management actions are proposed as the Deception Deposit proposal is not expected to impact recreation.	can be met.
Economic Factors					
Commonwealth, State and Regional Economies	EPA Objective: N/A. EPA Guidance: N/A.	Cliffs' Yilgarn Operations has direct and indirect benefits to the Commonwealth, State and regional economies through taxation, mineral royalties and investment.	The Deception Deposit proposal is expected to have a direct gross economic value of approximately A$1.44billion, with an estimated direct economic value of more than A$500million in taxation and royalties for the Commonwealth and Western Australian governments. The Deception Deposit proposal is expected to have a positive indirect economic impact for the regional economies of the Shire of Menzies and the Shire of Yilgarn through the continued purchase of goods and services, which generates and maintains local employment and local economic activity.	No management actions are proposed as the Deception Deposit proposal is expected to have a positive economic impact to Commonwealth, State and regional economies.	The Deception Deposit proposal is expected to have a positive economic impact on Commonwealth, State and regional economies.

1.9 Principles of Environmental Protection

Section 4A of the *Environmental Protection Act 1986* (WA) identifies that the objective of the Act is to protect the environment having regard to five principles of environmental protection. The five principles of environmental protection are further expanded with supporting principles in EPA Position Statement No. 7 (EPA 2004d). In accordance with the intent outlined in EPA (2010a; 2010b), the manner in which the Deception Deposit proposal addresses the principles of environmental protection are identified in Table 1-4.

Principles of Environmental Protection	Deception Deposit proposal
The Precautionary Principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In the application of the precautionary principle, decisions should be guided by —* *a. careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *b. an assessment of the risk-weighted consequences of various options.*	Environmental surveys have been undertaken to assist in determining the potential environmental values of the Deception Deposit proposal area. The results of the environmental surveys have been a fundamental consideration in proposal design by ensuring that potential impacts to areas containing notable species (biological diversity) and communities (ecosystem diversity) are avoided or minimised as far as practicable. Where a lack of full scientific certainty arises, the precautionary principle has been applied (in accordance with Stein (1999)) through adopting a risk-based approach to address such uncertainty and through adopting cost-effective measures to minimise the risk of impacts.
The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.*	The Deception Deposit proposal incorporates decommissioning actions following the completion of mining in order to seek to restore the health, diversity and productivity of the environment for the benefit of future generations.
The principle of conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	Environmental surveys have been undertaken to assist in determining the potential environmental values of the Deception Deposit proposal area. The results of the environmental surveys have been a fundamental consideration in proposal design by ensuring that potential impacts to areas containing notable species (biological diversity) and communities (ecosystem diversity) are avoided or minimised as far as practicable.
Principles relating to improved valuation, pricing and incentive mechanisms *a. Environmental factors should be included in the valuation of assets and services.* *b. The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance or abatement.* *c. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.* *d. Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.*	Costs associated with the Deception Deposit proposal (including provision of environmental staff and implementation of environmental management plans) will be borne exclusively by Cliffs. Funding for these costs will be obtained through the international customers purchasing the extracted ore product. The environmental goals for the proposal have been identified and are included in environmental management plans for the Deception Deposit proposal. The environmental impact of the Deception Deposit proposal has been minimised to the lowest level practicable whilst still allowing for efficient mine operations. Further reductions to the environmental impact of the proposal, if identified, will be implemented where practicable. Cliffs' commitment to continual improvement is reflected in Cliffs' Environmental Policy (Cliffs Natural Resources 2008; Appendix 1).
The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	The creation of waste rock extracted from the Deception Deposit mine pit has been minimised as part of mine pit design. This has ensured minimal generation of waste rock that would require excavation, handling and disposal to the environment.

Table 1-4 Deception Deposit Proposal and the Principles of Environmental Protection. The Principles of Environmental Protection are contained in s4A of the *Environmental Protection Act 1986* (WA).

1.10 Consideration of Alternatives

In accordance with EPA (2008a), Cliffs has considered a number of alternatives in relation to the design of the Deception Deposit proposal. These considerations included design alternatives, no-development and environmental offsets, as identified below.

1.10.1 Mine Layout

Cliffs has investigated a number of alternate mine layouts during planning for the Deception Deposit proposal. These alternate mine layouts sought to minimise and/or avoid the impact to environmental and heritage values, to co-locate the impact areas where possible in order to reduce edge effects, and to maximise operational efficiencies. The mine layout presented in this document is considered to represent the optimal mine layout in consideration of environmental, heritage and operational factors.

1.10.2 Waste Rock Landform Design

Cliffs has investigated waste rock landform designs based on a 15^{o} degree slope and 10m berm configuration and a 20^{o} degree slope and 5m berm configuration. The 15^{o} degree slope and 10m berm configuration is consistent with the waste rock landform design used at Cliffs' Koolyanobbing Range mine operations, whereas the 20^{o} degree slope and 5m berm configuration is consistent with the waste rock landform design used at Cliffs' Windarling Range mine operations. The operational and decommissioning aspects of both designs have been considered by Cliffs.

The primary benefit of a 20^{o} degree slope and 5m berm configuration is that the total area of disturbance is lower due to the landform being steeper. In contrast, previous rehabilitation experience and guidance identifies that a gentler 15^{o} slope is more likely to produce improved rehabilitation and improved operational safety for mine staff.

In consideration of the alternatives available, the gentler 15^{o} degree slope and 10m berm configuration was selected for the Deception Deposit waste rock landform due to the improved rehabilitation attributes and improved operator safety.

1.10.3 Mine Pit Backfilling or Limited Mining

Following the completion of mining, the lower portion of the Deception Deposit mine pit will contain post-mining permanent surface water as a result of the mining occurring below the 425mAHD natural groundwater elevation. Backfilling of mine pits can occur where there are mine pits developed in close proximity; such as Cliffs' Windarling Range W1 Deposit mine pit, which is scheduled to backfill the adjacent exhausted Windarling Range W2 Deposit mine pit.

Cliffs has considered an alternative to backfill the exhausted Deception Deposit mine pit to the natural groundwater elevation to prevent the formation of the post-mining permanent surface water. An estimated 26,000,000m^3 of waste rock would be required to backfill the exhausted Deception Deposit mine pit. As there are no other mine pits in close proximity to the Deception Deposit mine pit, there is no opportunity to schedule mine operations to enable direct waste rock disposal from a separate mine pit into the Deception Deposit mine pit. Accordingly, backfilling would require waste rock to be re-excavated from the Deception Deposit waste rock landform at the completion of mining, for which to backfill the Deception Deposit mine pit to the natural groundwater elevation of approximately 425mAHD has been conservatively estimated at more than A$230million. Due to the significant economic cost, re-excavation and backfilling is not proposed.

Cliffs has also considered an alternative of not mining below the natural groundwater elevation to prevent the formation of the post-mining permanent surface water. Not mining of the Deception Deposit below 425mAHD would forgo an estimated 6.2Mt of ore having a conservative economic value of more than A$970million, being more than 60% of the total Deception Deposit ore resource. As not mining below the 425mAHD natural groundwater elevation would forgo significant financial value and make the Deception Deposit proposal economically unviable, this alternative is not proposed.

1.10.4 No Development

Cliffs has considered a 'no development' alternative for the Deception Deposit proposal. A no development alternative would have alternate environment, social and economic impacts, as identified below:

Environmental -
A no development option would retain the current flora values (refer Section 3.1) and fauna values (refer Section 3.2) of the Deception Deposit area.

Social -
A no development option would result in no localised impact to the visual amenity of the Deception Deposit area.

Economic -
A no development option would result in potential economic benefits forgone for the taxation and royalties payments to Commonwealth and State Governments, and employment and economic development in regional and local businesses in the Shire of Menzies, Shire of Yilgarn and the Shire of Esperance.

This impact assessment identifies that subject to implementation of the EMS, EMPs and Cliffs' commitments for the proposal, the Deception Deposit proposal will have a non-significant negative impact to environmental factors and social factors, and a positive impact to economic factors. Accordingly, Cliffs considers that the Deception Deposit proposal can be implemented and managed to meet acceptable community objectives and standards. Accordingly, a 'no development' alternative is not proposed.

1.10.5 Environmental Offsets

Cliffs has considered the application of environmental offsets for the Deception Deposit proposal, consistent with the EPA guidance on environmental offsets (EPA 2006a; EPA 2008b). Offsets are defined by EPA (2008b) as *"activities undertaken to counter adverse environmental impacts arising from development"* and used *"with a goal of achieving a net environmental benefit"*.

As identified in EPA (2008a), "*offsets should only be considered after all efforts to avoid and minimise environmental impacts have been made and significant environmental impacts still remain"*. EPA (2008b) further identifies that offsets are applied to "*proposals or schemes referred to the EPA that have significant adverse impacts on biodiversity assets of 'high' or 'critical' value"*. Definitions of 'high value asset" and 'critical value asset' are defined in EPA (2006a).

The Deception Deposit proposal will not impact on biodiversity assets of 'high' or 'critical' value. Furthermore, the environmental impacts of the Deception Deposit proposal are not expected to be significant. Accordingly, offsets for the Deception Deposit proposal have not been proposed.

1.11 Future Proposal Changes

Cliffs may require additional infrastructure and/or areas for the Deception Deposit proposal in the future that is not within the current proposal scope. Although Cliffs does not have any intention for such additional infrastructure or additional areas at this time, it is appropriate to identify that changes in Cliffs' operational requirements may occur in the future as a result of changes in matters such as geological knowledge, operational requirements and government requirements. If changes to the infrastructure or areas of the Deception Deposit proposal area are required by Cliffs in the future, Cliffs will assess the potential impacts and seek the necessary statutory environmental and mining approvals for such changes at that time.

2 Natural and Human Environments

The natural and human environments of the Yilgarn region have been described extensively in various environmental and planning documents. Section 2 provides a summary on the existing natural and human environments relevant to the Deception Deposit proposal.

2.1 Climate

The climate of the Deception Deposit region is characterised by hot, dry summers and mild, wet winters. Maximum temperature peaks (>30^{o}C) occur between November and March. Rainfall occurs throughout the year with approximately 300mm annually, occurring within approximately 40 rainfall days (BOM 2011b; BOM 2011c[1])

2.2 Geology and Topography

The Deception Deposit area is within the Yilgarn Craton, which covers an area of approximately 62,000,000ha, being approximately 24% of the area of Western Australia (Gibson *et al.* 2007). A craton is a tectonically stable part of the Earth's crust which has not been deformed for a long period of time. Cliffs' Yilgarn Operations takes its name from being within the area of the Yilgarn Craton.

The majority of the region is gently undulating at approximately 400mAHD to 470mAHD, with low ironstone ridges rising above the surrounding plains to between approximately 500mAHD to 650mAHD.

The Deception Deposit mine area has elevations ranging between approximately 460mAHD to 510mAHD, with the Deception Deposit mine pit having being a low rise in the landscape with elevations between 480mAHD and 510mAHD. By comparison, the nearby Yorkadine Hills has a peak elevation of 635mAHD (located approximately 8km south-east), Die Hardy Range at 645mAHD peak (located approximately 9km south-east) and the Windarling Range at 560mAHD peak (located approximately 18km south).

2.3 Flora

The Deception Deposit proposal is located in the Coolgardie Bioregion, near the southern boundary of the Murchison Bioregion. The Yilgarn Region contains over 1000 flora species, including flora species declared as 'Rare Flora' under the *Wildlife Conservation Act 1950* (WA) and flora species classified by DEC as 'priority' (DEC 2008).

A flora and vegetation survey of the Deception Deposit proposal area has identified the presence 324 native vascular flora species, of which 7 species are classified by DEC and 'Priority'. A total of 33 vegetation units were also identified (Biota 2011a; Appendix 13). A description of the flora species and vegetation units present and the potential impacts of the Deception Deposit proposal are provided in Section 3.1.

Flora and vegetation survey of the Deception Deposit proposal area did not identify the presence of flora declared as 'Rare Flora' under the *Wildlife Conservation Act 1950* (WA), 'Threatened Species' of flora or

[1] Climate statistics from the nearest monitoring stations maintained by the Australian Bureau of Meteorology at Southern Cross Airfield (approximately 150km south) and Menzies (approximately 170km east) have been used to generate estimates.

'Threatened Ecological Communities' protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), or 'Priority Ecological Communities' classified by DEC (Biota 2011a).

2.4 Fauna

The Yilgarn Region is known to contain a variety of vertebrate and invertebrate fauna species, supported by fauna habitats of both plains and ridges. The fauna diversity of the Yilgarn Region is not well documented, with the areas surveyed for fauna predominantly being associated with mineral exploration and mining operations.

Surveys for vertebrate fauna within the Deception Deposit proposal area identified 99 vertebrate fauna species comprising of birds, mammals, amphibians and reptiles (Biota 2011b; Appendix 14). Most notably, the survey results included identification of 2 vertebrate fauna species protected under both the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) and the *Wildlife Conservation Act 1950* (WA), 2 vertebrate fauna species listed by DEC as 'Priority', and 7 species of feral fauna.

Surveys for short-range endemic invertebrate fauna within the Deception Deposit proposal area identified several short-range taxa including a land snail, millipedes and mygalomorph spiders (Biota 2011c; Appendix 15).

Surveys for troglofauna subterranean fauna within the Deception Deposit proposal area did not identify the presence troglofauna (Biota 2011d; Appendix 16). Surveys for stygobitic subterranean fauna at the nearby Windarling Range, Mt Jackson Range and Koolyanobbing Range did not identify stygobitic subterranean fauna (WRM 2008; WRM 2009), and similarly, stygobitic subterranean fauna are not expected within the Deception Deposit proposal.

A description of the fauna species present and the potential impacts of the Deception Deposit proposal are provided in Section 3.2.

2.5 Groundwater

The Deception Deposit proposal area is located within the Goldfields Groundwater Management Area proclaimed under the *Rights in Water and Irrigation Act 1914* (WA) as regulated by DoW. The main use of this groundwater resource is in mineral exploration and mining operations.

Groundwater at the Deception Deposit mine area occurs at approximately 425mAHD, with the land of the Deception Deposit being at an elevation of between approximately 480mAHD to 510mAHD. Groundwater salinity at the Deception Deposit is estimated to be moderate (25,000mg/L), being comparable to salinity recorded at the Windarling Range (to 30,000mg/L) located approximately 18km to the south (Rockwater 2003; Rockwater 2011).

The Deception Deposit haul road coincides with part of a Reserve 9644 in the area of Pigeon Rocks that is vested with the DoW under the *Land Administration Act 1997* (WA), with the purpose of this reserve understood to be for groundwater supply for pastoral use. The Deception Deposit haul road will not impact the groundwater within this reserve. Further, DoW has advised it will be seeking to remove its vested interest in this reserve as it has not been used (pers. com. D Theta of DoW to Cliffs, June 2011)

2.6 Surface Water

The Deception Deposit proposal area lies within the Internal Drainage Division of Western Australia.

Salt lakes are characteristic of the Yilgarn region, with the nearest salt lakes being Lake Barlee (located approximately 30km north of the Deception Deposit proposal) and Lake Deborah (located approximately 80km south of the Deception Deposit proposal).

There are no natural permanent surface water features in the immediate vicinity of the Deception Deposit proposal. The nearest natural surface water feature in the immediate vicinity of the Deception Deposit proposal is located at Pigeon Rocks, located approximately 7km south of the Deception Deposit mine area, where fresh water periodically pools form in the granite outcropping following rainfall.

Permanent surface water in the area is scarce and mainly comprises of dams excavated to provide groundwater to support pastoral and mining activities. The nearest permanent surface water dams in the immediate vicinity of the Deception Deposit proposal is at Pigeon Rocks, located approximately located approximately 7km south of the Deception Deposit mine area, where a pastoral bore provides water for stock.

2.7 Conservation Areas

The Deception Deposit proposal is not located within any conservation area declared under the *Land Administration Act 1997* (WA).

The Deception Deposit proposal partially coincides with a proposed Conservation and Mining Reserve (WA Minister for Environment & WA Minister for Mines and Petroleum 2010), with the northernmost end of the Deception Deposit Mine Pit and the Deception Deposit Waste Rock Landform occurring outside of this proposed reserve. This proposed reserve has yet to be proclaimed as formal land tenure under the *Land Administration Act 1997* (WA).

The Deception Deposit proposal is located approximately 4km west of a proposed 'Class A' Nature Reserve (WA Minister for Environment & WA Minister for Mines and Petroleum 2010). This proposed reserve has yet to be proclaimed as formal land tenure under the *Land Administration Act 1997* (WA).

The Helena and Aurora Range Conservation Park, classified as a 'Class C' reserve, is located approximately 10km to the east of the Deception Deposit proposal area. The Mt Manning Range Nature Reserve, also a 'Class C' reserve, abuts the eastern boundary of the Helena and Aurora Range Conservation Park; being approximately 20km to the east of the Deception Deposit proposal area.

2.8 Pastoral Leases

The Deception Deposit proposal is wholly located within the Diemals Pastoral Lease which covers an area of approximately 313,000ha. The Diemals Pastoral lease also covers Cliffs' Windarling Range mine operations.

Part of the Diemals Pastoral Lease has been proposed by Government to be excluded in 2015 when the lease expires and is available for renewal, with the proposed expired portion having a land tenure of Vacant Crown

Land. This area of proposed exclusion coincides with most of the Deception Deposit proposal area. This area of proposed exclusion is the same area proposed for the Conservation and Mining Reserve referred to above.

Other pastoral leases in the region include the Mt Jackson Pastoral Lease (covering Cliffs' Mt Jackson Range mine operations) and the Brontie Pastoral Lease (covering Cliffs' Koolyanobbing Range mine operations). Low intensity grazing has occurred on these pastoral leases for more than 50 years, with mining and mineral exploration occurring within boundaries of these pastoral lease boundaries for more than 30 years.

2.9 Demography

The Shire of Menzies encompasses an area of approximately 13 million hectares and is centred on the town of Menzies, situated approximately 730km east of Perth and approximately 170km east-north-east of the Deception Deposit proposal area. The township of Menzies was established in 1895 following the finding of gold deposits in the region (Shire of Menzies 2009). The Shire of Menzies has a population of approximately 220 people, of which approximately 60% are Aboriginal (indigenous) Australians (ABS 2007a). Agriculture, mining and tourism are the key local industries of the Shire of Menzies (Shire of Menzies 2009). The key areas of employment in the Shire of Menzies are in local government administration and agriculture (ABS 2007a).

The Shire of Yilgarn encompasses an area of approximately 3 million hectares and is centred on the town of Southern Cross, situated approximately 370km east of Perth and approximately 150km south of the Deception Deposit proposal area. The Shire of Yilgarn has a population of approximately 1400 people (ABS 2007b). Agriculture and mining are the key local industries within the Shire of Yilgarn (Shire of Yilgarn 2008; ABS 2007b). The key areas of employment in the Shire of Yilgarn are agriculture and mining (ABS 2007b).

2.10 Aboriginal Heritage

The Department of Indigenous Affairs maintains a register of Aboriginal heritage places in accordance with the *Aboriginal Heritage Act 1972* (WA). The Deception Deposit proposal does not coincide with any record of Aboriginal heritage on this register (DIA 2011a; DIA 2011b).

2.11 Native Title

A record of Native Title applications and Native Title determinations is maintained by the National Native Title Tribunal and the Federal Court of Australia in accordance with the *Native Title Act 1993* (C'th). The Deception Deposit proposal area does not coincide with any Native Title application or any Native Title determination under the *Native Title Act 1993* (C'th) (NNTT 2011a).

2.12 European Heritage

The Heritage Council of Western Australia maintains a State Register of Heritage Places under the *Heritage of Western Australia Act 1990* (WA). The Shire of Menzies contains 8 records on the State Register of Heritage Places (HCWA 2011a). The Shire of Yilgarn contains 4 records on the State Register of Heritage Places (HCWA 2011b). The Deception Deposit proposal does not coincide with any record on the State Register of Heritage Places (HCWA 2011a; HCWA 2011b).

3 Environmental Impact Assessment

The intention of this Environmental Impact Assessment, Section 3, is to provide an assessment of the environmental factors identified by EPA (2011a) as being key environmental factors for the Deception Deposit proposal, being:

- Flora;
- Fauna; and
- Mine Closure.

The assessment is based on a range of surveys and investigations that have been undertaken by appropriately qualified and reputable consultants for their study field, and provides an overview of the outcomes of those investigations in context with the Deception Deposit proposal. Further detail from the surveys and investigations for the Deception Deposit proposal can be sourced directly from the relevant survey and investigation reports, which are provided on the compact disc attached at the rear of this EIA-API document.

3.1 Flora

3.1.1 Aspect

Development of the Deception Deposit proposal will require the clearing of up to 547.6ha of land supporting native vegetation. The vegetation of the Deception Deposit proposal area contains an array of flora species and vegetation units, of which a number of flora species have been classified by DEC as 'priority'.

Section 3.1 provides an assessment of the potential impact of the Deception Deposit proposal on flora species and vegetation units within the proposal area, and where appropriate, an assessment of the potential impact at a regional scale.

3.1.2 EPA Objective

The EPA's objective for flora is:

- To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement of knowledge (EPA 2010b).

3.1.3 Legislation, Guidelines, Standards and Approvals

- Yilgarn Operations Land Clearing Management Plan (Cliffs 2011b; Appendix 3);
- Yilgarn Operations Weed Management Plan (Cliffs 2011c; Appendix 4);
- Yilgarn Operations Fire Management Plan (Cliffs 2011d; Appendix 5);
- Yilgarn Operations Dust Management Plan (Cliffs 2011e; Appendix 6);
- *Environmental Protection Act 1986* (WA);
- *Wildlife Conservation Act 1950* (WA);
- *Environment Protection and Biodiversity Conservation Act 1999* (C'th);
- EPA Guidance Statement 51: Guidance for the Assessment of Environmental Factors – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004a);

- EPA Guidance Statement 55: Guidance for the Assessment of Environmental Factors – Implementing Best Practice in Proposals submitted to the Environmental Impact Assessment Process (EPA 2003a); and
- EPA Position Statement 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002b).

3.1.4 Environmental Impact Assessment

Legislative Framework for Flora Protection

All native flora and vegetation in Western Australia is protected under the *Environmental Protection Act 1986* (WA) by virtue of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (WA). Specific flora species may be afforded special protection under the *Wildlife Conservation Act 1950* (WA) and the *Environment Protection and Biodiversity Conservation Act 1999* (C'th). The *Environment Protection and Biodiversity Conservation Act 1999* (C'th) may also afford special protection to vegetation units.

The following text provides a description[1] of the classifications used in flora protection:

Threatened Species

Threatened Species is a flora species declared by the Commonwealth Minister for Environment and is protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) as a matter of national environmental significance for being extinct, facing a risk of extinction, or in need of a conservation program to prevent the species from a risk of extinction. Threatened species are allocated a category of extinct, extinct in the wild, critically endangered, endangered, vulnerable or conservation dependent.

Rare Flora

Rare Flora is flora declared by the Western Australian Minister for Environment and is protected under the *Wildlife Conservation Act 1950* (WA) as being likely to become extinct, or is rare, or otherwise in need of special protection.

Priority Flora

Priority flora is flora which are known from one, a few or several populations which may or may not be under threat, or may otherwise be rare. Classifications are made by DEC and categorised into 4 priority categories, with Priority 1 (P1) being of the highest conservation significance. Priority flora have no specific legal protection under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), *Wildlife Conservation Act 1950* (WA) or the *Environmental Protection Act 1986* (WA).

Threatened Ecological Community

A Threatened Ecological Community (TEC) is a naturally occurring vegetation unit that occurs in a particular type of habitat that is facing a high, very high or extremely high risk of extinction in the wild in the medium-term, near or immediate future. Threatened Ecological Communities are declared and protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) as a matter of national environmental significance, and allocated a classification of vulnerable, endangered or critically endangered. Threatened Ecological Communities declared under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) are also protected under the *Environmental Protection Act 1986* (WA). The DEC also has a process for identifying TECs, however, decisions through this process do not have a statutory basis.

[1] Descriptions are consolidated from review of the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), *Wildlife Conservation Act 1950* (WA), Biota (2011a) and flora literature published by DEC and DoSEWPC.

Priority Ecological Community

A Priority Ecological Community (PEC) is a naturally occurring vegetation unit that occurs in a particular type of habitat that is known from a few to many occurrences, which may or may not be managed for conservation, and which may or may not be under threat. Classifications are made by DEC and categorised into 5 categories, with Priority 1 being of the highest conservation significance. Priority Ecological Communities have no specific legal protection under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), *Wildlife Conservation Act 1950* (WA) or the *Environmental Protection Act 1986* (WA).

Flora of the Deception Deposit

Surveys undertaken by Biota (2011a; Appendix 13) of the Deception Deposit proposal area were undertaken during 2010 and 2011, covering an area of approximately 1,100ha. The surveys identified the occurrence of 7 flora species classified by DEC as priority. A total of 33 vegetation units were also identified. No Rare Flora, TECs or PECs were identified by the surveys.

The DEC-classified priority flora species recorded by Biota (2011a) in the vicinity of the Deception Deposit proposal were:

- *Baeckea ochropetala* (P1);
- *Baeckea* sp. Parker Range (P3)
- *Philotheca coateana* (P3);
- *Spartothamnella* sp. Helena & Aurora Range (P3);
- *Banksia arborea* (P4);
- *Eucalyptus formanii* (P4); and
- *Grevillea erectiloba* (P4).

Biota (2011a) also identified potential new species or subspecies, being:

- *Philotheca deserti* subsp. nov; and
- *Calytrix* sp. nov.

The locations of flora species and vegetation units recorded in the vicinity of the Deception Deposit proposal is depicted in Figures 3-1a to 3-1d and Figures 3-2a to 3-2e, respectively.

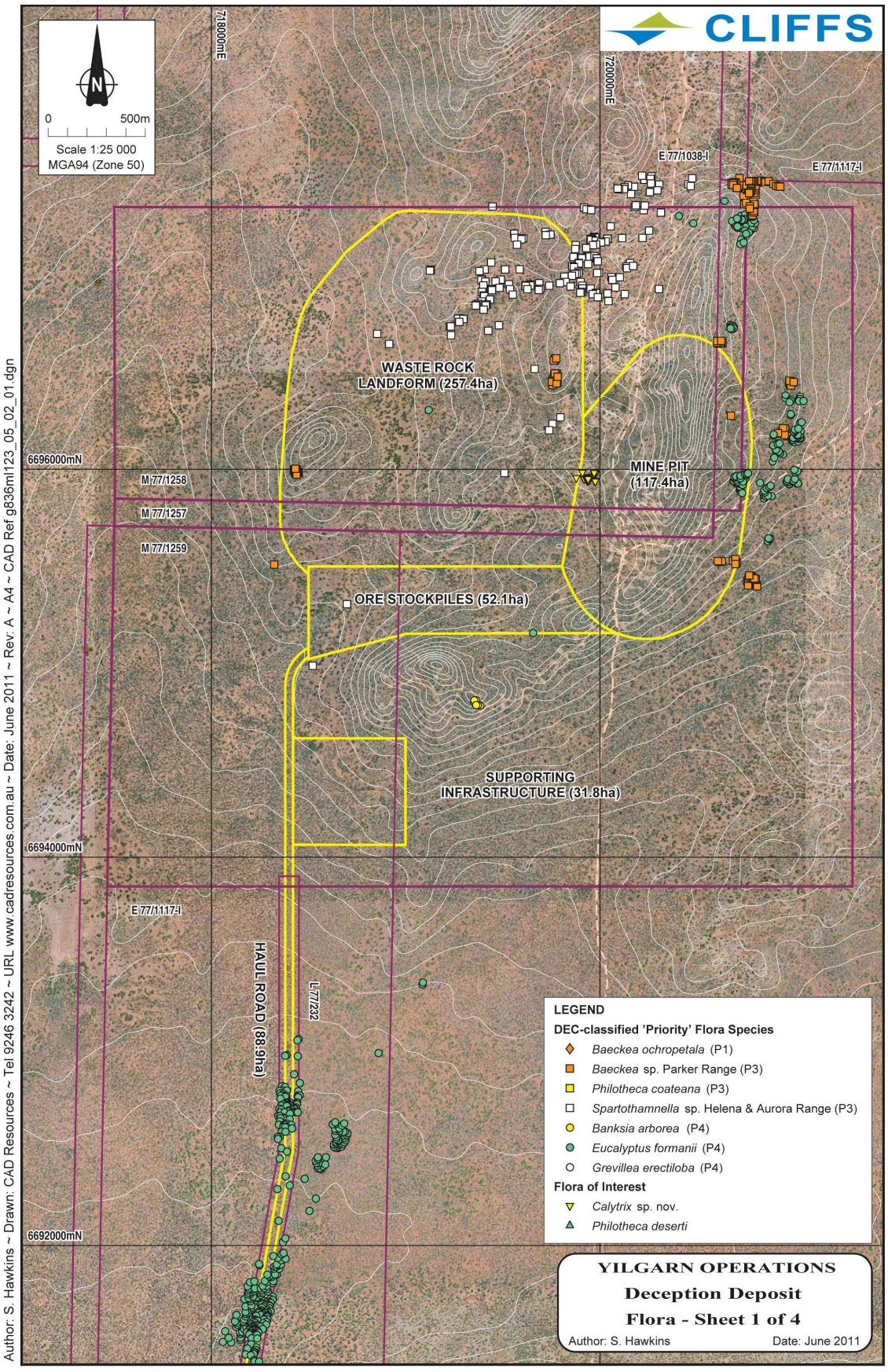

Figure 3-1a Flora Species recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011a).

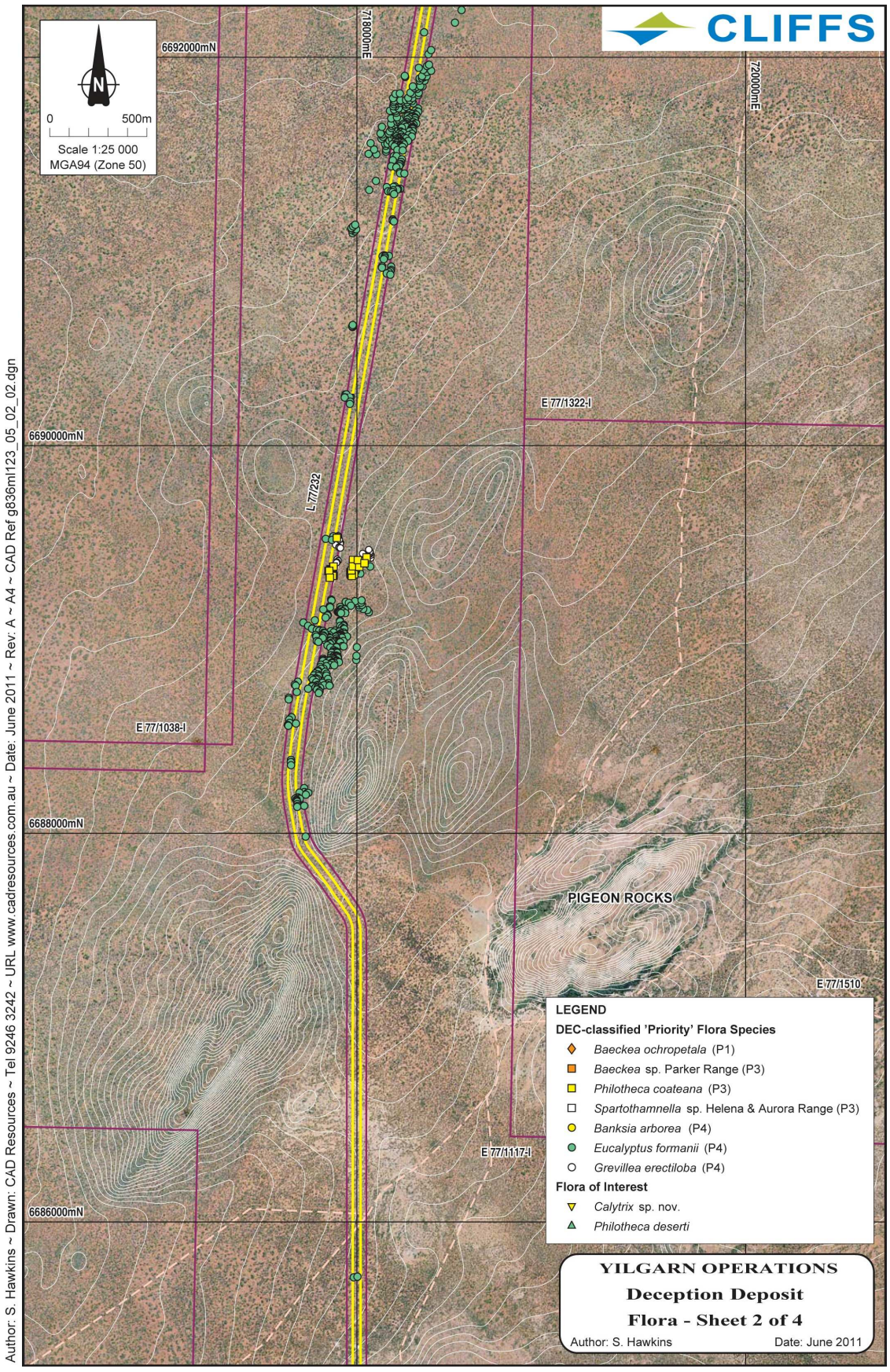

Figure 3-1b Flora Species recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011a).

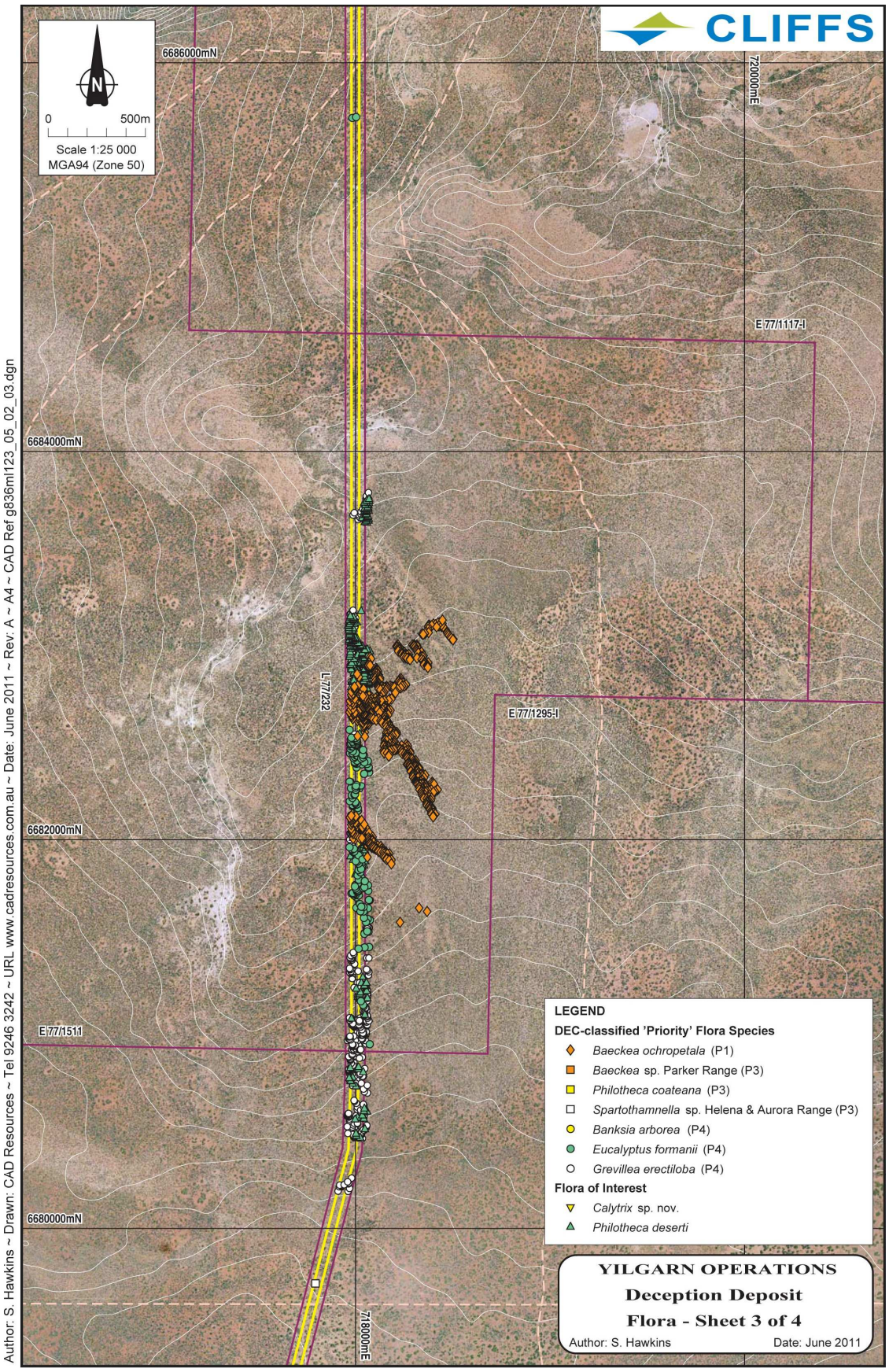

Figure 3-1c Flora Species recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011a).

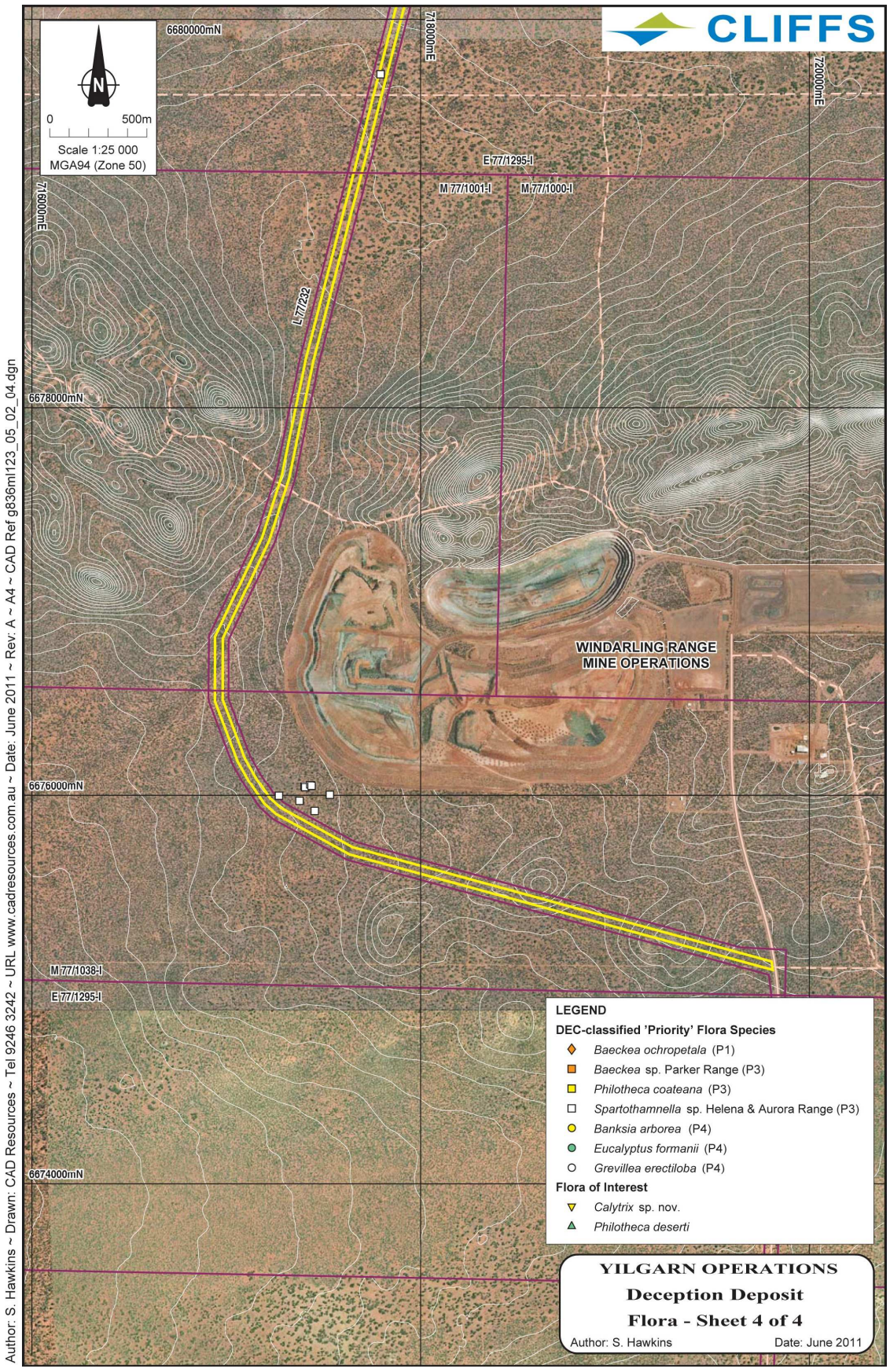

Figure 3-1d Flora Species recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011a).

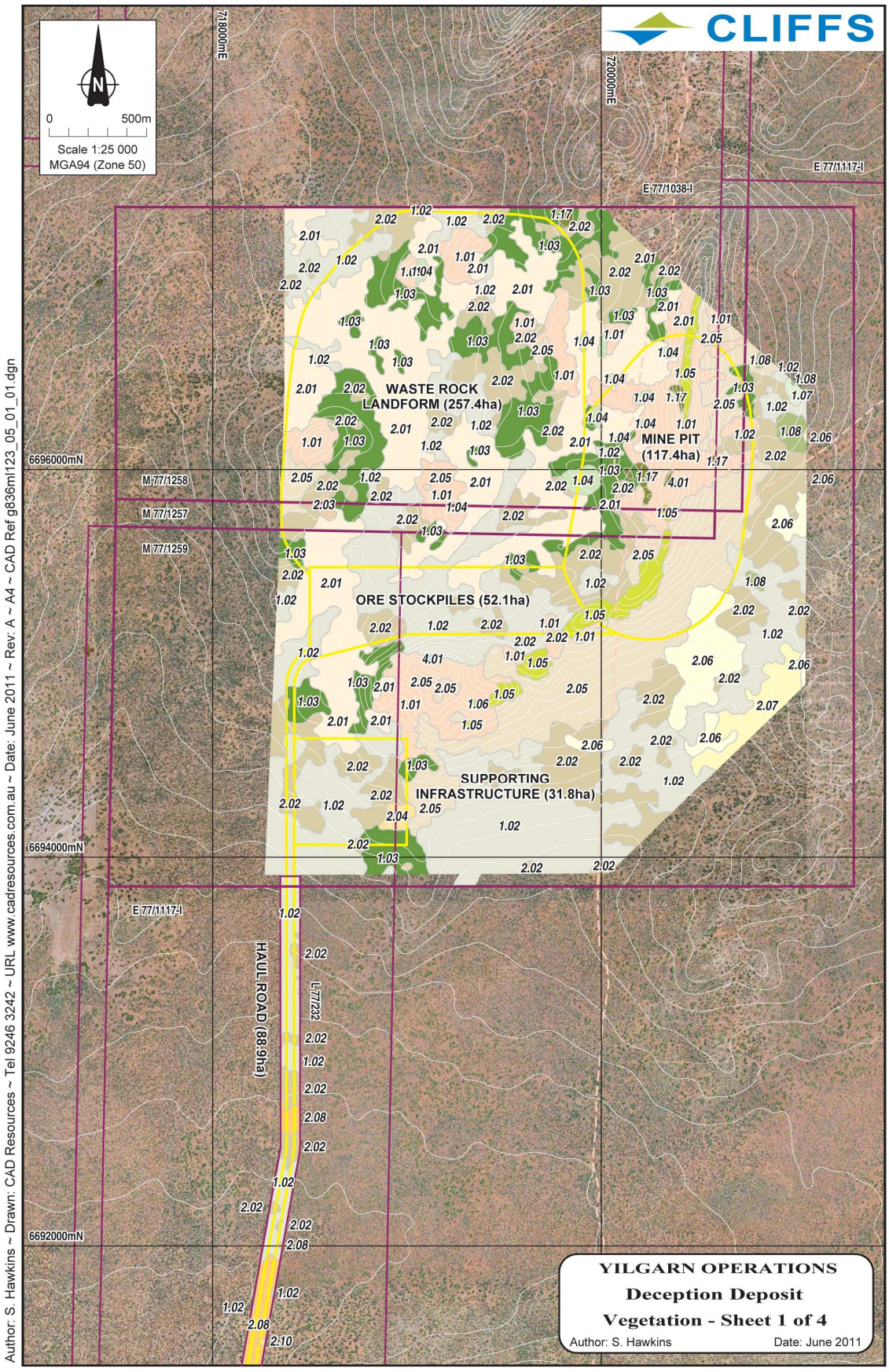

Figure 3-2a Vegetation Units recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011a).

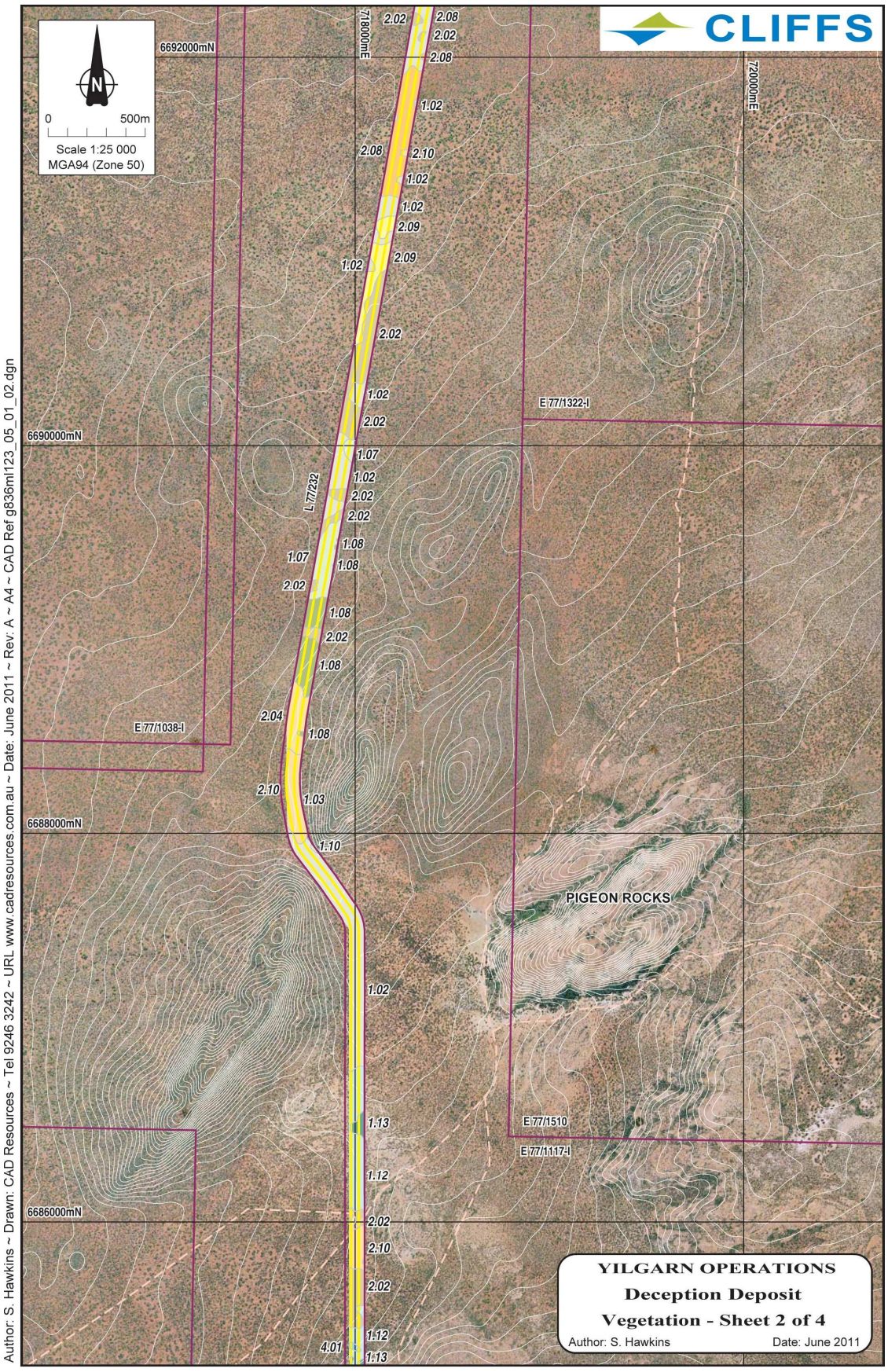

Figure 3-2b Vegetation Units recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011a).

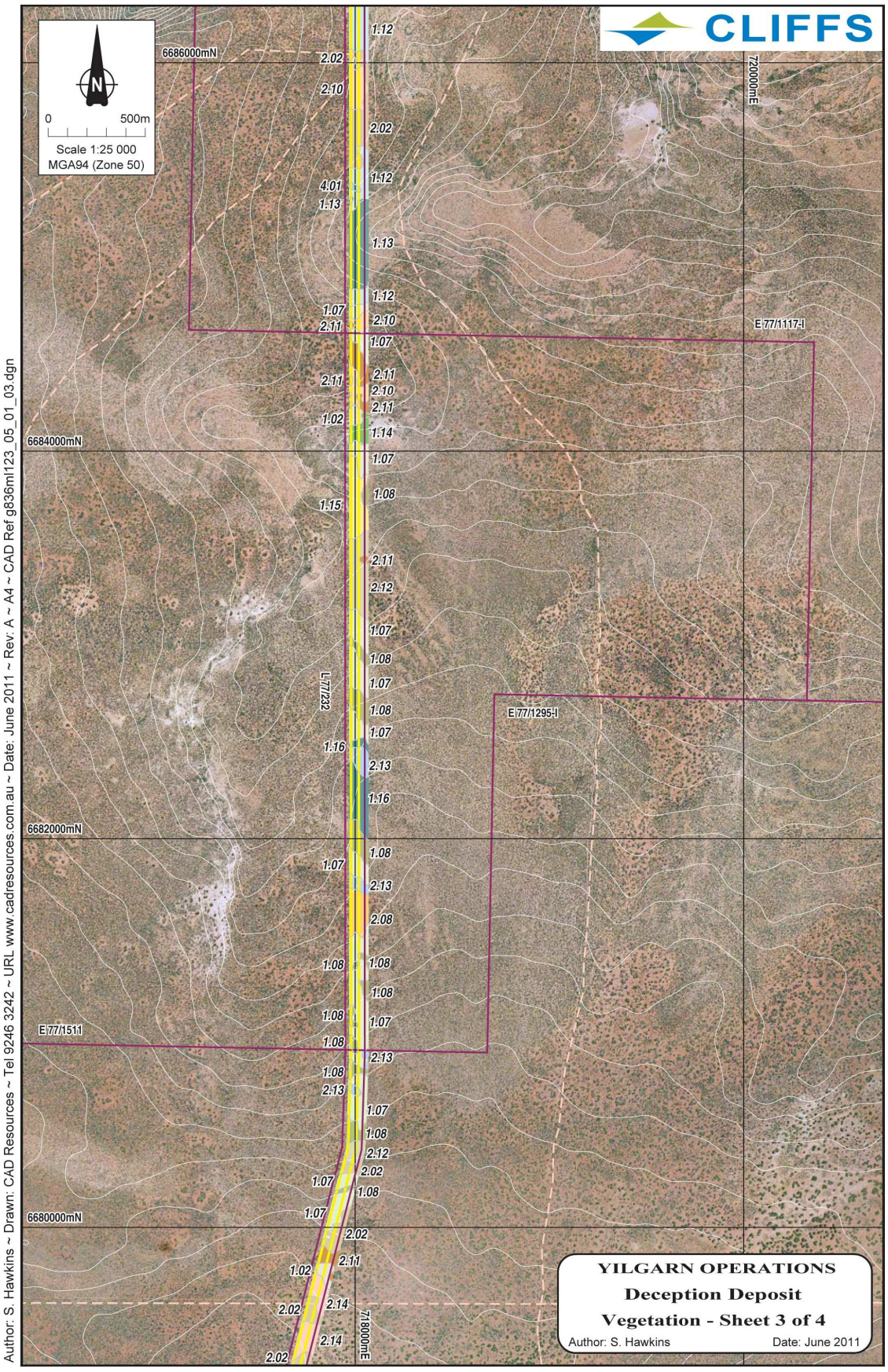

Figure 3-2c Vegetation Units recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011a).

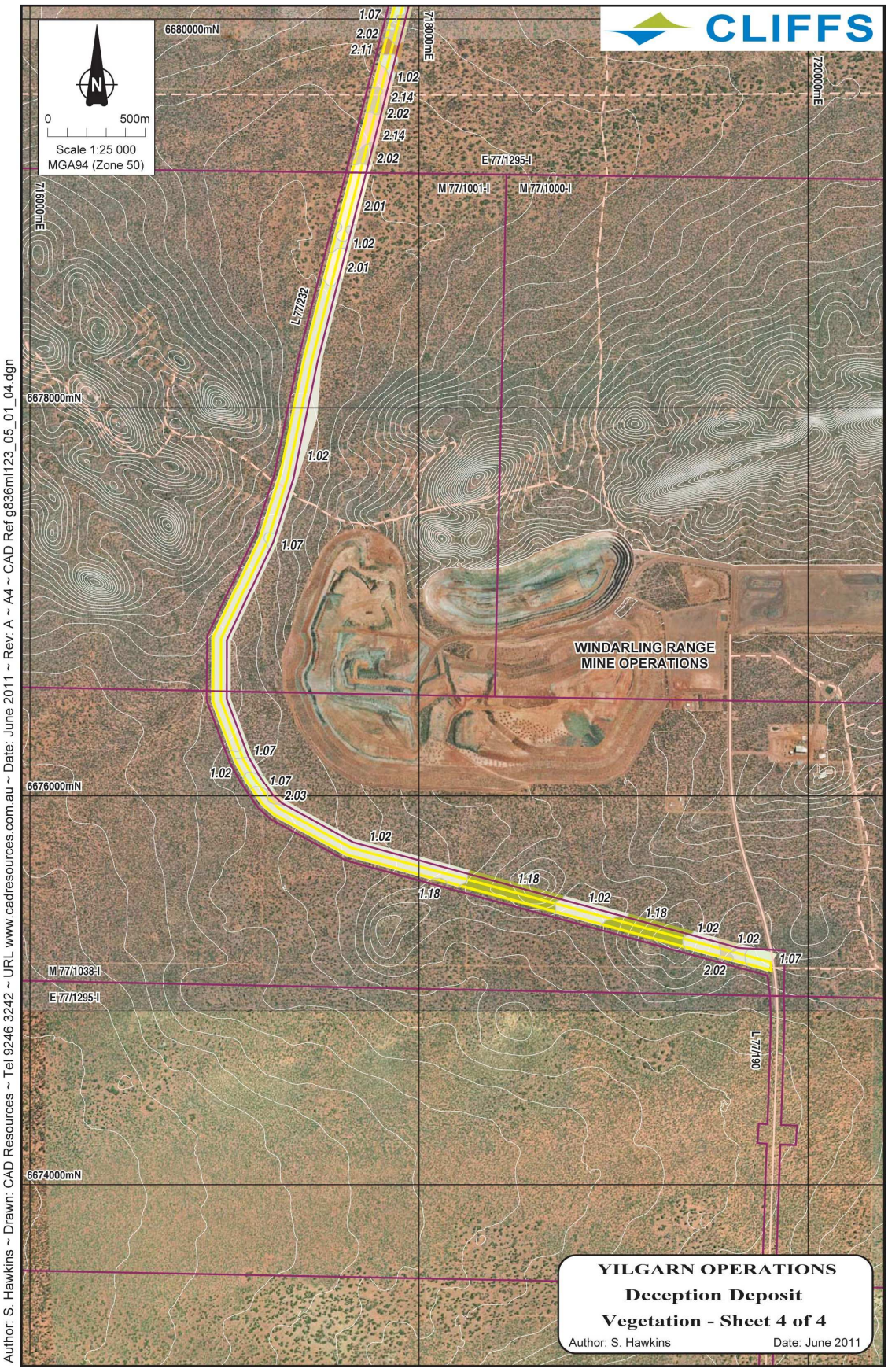

Figure 3-2d Vegetation Units recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011a).

Figure 3-2e Vegetation Units recorded in the vicinity of the Deception Deposit Proposal. The vegetation unit codes and descriptions are identified. Source: Biota (2011a).

Assessment of Potential Impact to Flora Species

A total of 324 native vascular flora species were recorded by Biota (2011a) in the area of the Deception Deposit proposal. An assessment of the potential impacts to the key flora species is provided below. Table 3-1 identifies the expected number of individuals of each key flora species to be impacted by of the Deception Deposit proposal.

***Baeckea ochropetala* (P1)**

Baeckea ochropetala was listed by DEC as a Priority 1 flora species in early 2011 following a review of specimens assigned to this name within the Western Australian Herbarium (Biota 2011a; DEC 2011). *Baeckea ochropetala* is described as an erect shrub to 2m in height with white/pink flowers (DEC 2011). As identified by Biota (2011a) 9,740 individuals of *B. ochropetala* were individually recorded in the area of the Deception Deposit proposal, extending over an area of approximately 1500m length and 500m width, both within and outside of the area of the Deception Deposit haul road (Figure 3-1c). As identified by Biota (2011a), it is likely additional individuals occur in other suitable habitat outside of the surveyed area.

Currently, *B. ochropetala* is recorded from two other locations, however specific records as to their location or the number of individuals at each location are not available (Biota 2011a). These two locations are believed to occur approximately 25km south of the southern end of the Deception Deposit haul road, and approximately 75km north-east of the Deception Deposit mine area (Biota 2011a). These records support the view of Biota (2011a) that further survey would result in additional individuals of *B. ochropetala* being recorded outside of the Deception Deposit proposal area.

Based on the recorded locations of *B. ochropetala* and the Deception Deposit proposal impact areas, it is estimated that 1,217 individuals of *B. ochropetala* will be impacted by the Deception Deposit proposal.

***Baeckea* sp. Parker Range (P3)**

Baeckea sp. Parker Range is a rounded, erect shrub to 1.5m height with pink flowers (DEC 2011). As identified in Biota (2011a), *Baeckea* sp. Parker Range was recorded within and outside of the Deception Deposit mine area (Figure 3-1a), with a total of 859 individuals recorded. *Baeckea* sp. Parker Range has also been recorded north of the mine area where an additional 596 individuals have been previously recorded, as well as being recorded approximately 2km east of the mine area in unknown numbers. As most of the region has yet to be subject to flora survey, it is likely that additional populations of *Baeckea* sp. Parker Range are likely to exist that have not been recorded.

Based on the recorded locations of *Baeckea* sp. Parker Range and the Deception Deposit proposal impact areas, it is estimated that 486 individuals of *Baeckea* sp. Parker Range will be impacted by the Deception Deposit proposal.

***Philotheca coateana* (P3)**

Philotheca coateana is a shrub to 0.5m height with glabrous branchlets, 3-4mm long leaf blades and white/pink flowers (DEC 2011). As identified in Biota (2011a), *Philotheca coateana* was recorded within and outside the northern half of Deception Deposit haul road (Figure 3-1b), with a total of 138 individuals recorded.

As identified by DEC (2011), *P. coateana* has a wide distribution in Western Australia, spanning a linear distance of more than 400km.

Based on the recorded locations of *Philotheca coateana* and the Deception Deposit proposal impact areas, it is estimated that 1 individual of *Philotheca coateana* will be impacted by the Deception Deposit proposal.

Philotheca coateana was listed by DEC as Priority 3 after most of the field surveys were completed, and as such, the distribution of *P. coateana* may be more widespread than recorded, both within and outside of the Deception Deposit proposal area. As identified by Biota (2011a), *P. coateana* was recorded as associated with vegetation units 1.07 and 1.08, which were recorded at several locations throughout the north-south extent of the surveyed area, located both within and outside of the impact areas for the Deception Deposit proposal.

***Spartothamnella* sp. Helena & Aurora Range (P3)**

Spartothamnella sp. Helena & Aurora Range is a multi-stemmed woolly shrub with white flowers and red fruit (Biota 2011a). A total of 213 individuals of *Spartothamnella* sp. Helena & Aurora Range were recorded by Biota (2011a), spanning the length of the Deception Deposit proposal, with individuals located both within and outside of the Deception Deposit impact areas (Figures 3-1a, 3-1c and 3-1d).

A further 50 locations of *Spartothamnella* sp. Helena & Aurora Range have been recorded west of the Deception Deposit haul road (S Reiffer pers. com. in Biota 2011a) and a further 35 individuals north of the Deception Deposit mine area (Western Botanical 2010 in Biota 2011a). *Spartothamnella* sp. Helena & Aurora Range have previously been recorded at the Helena and Aurora Range, Windarling Range, Mt Jackson Range, Perrinvale Range, Koolyanobbing Range and Mt Finnerty Range (Western Botanical 2009). More than 1,100 extant individuals of *Spartothamnella* sp. Helena & Aurora Range have been recorded to date at 30 separate locations (S Reiffer pers. com to S Hawkins, April 2011). DEC (2011) identifies *Spartothamnella* sp. Helena & Aurora Range as having a linear distribution of more than 400km.

Based on the recorded locations of *Spartothamnella* sp. Helena & Aurora Range and the Deception Deposit proposal impact areas, it is estimated that 126 individuals of *Spartothamnella* sp. Helena & Aurora Range will be impacted by the Deception Deposit proposal.

***Banksia arborea* (P4)**

Banksia arborea, previously referred to as *Dryandra arborea*, is a tree to 8m height with yellow flowers (DEC 2011) and spiked leaves. A total of 8 individuals of *Banksia arborea* were recorded by Biota (2011a), all being located outside of the Deception Deposit impact area (Figure 3-1a).

Banksia arborea occurs on most ironstone ranges in the vicinity, with previous local recordings at the Mt Jackson Range, Windarling Range and the Koolyanobbing Range (Western Botanical 2009). *Banksia arborea* has also been recorded in Cliffs' mine rehabilitation works at the Mt Jackson Range (pers. com. J Shepherdson of Cliffs, July 2010). DEC (2011) indicates *Banksia arborea* as having a linear distribution of approximately 200km.

Based on the recorded locations of *Banksia arborea* and the Deception Deposit proposal impact areas, nil individuals of *Banksia arborea* are expected to be impacted by the Deception Deposit proposal.

***Eucalyptus formanii* (P4)**

Eucalyptus formanii is a tree to 11m height with flaky, fibrous bark and very narrow erect leaves (Biota 2011a; DEC 2011). A total of 1,153 individuals of *E. formanii* were recorded by Biota (2011a),

spanning the northern two-thirds of the Deception Deposit proposal areas, with individuals located both within and outside of the Deception Deposit impact areas (Figures 3-1a, 3-1b and 3-1c).

Eucalyptus formanii has a linear distribution of approximately 100km (DEC 2011), with previous records also at the Windarling Range and the Mt Jackson Range (Western Botanical 2009). Previous surveys in the vicinity of the Deception Deposit proposal recorded further individuals of *E. formanii* not captured by the current survey (Biota 2011a).

Based on the recorded locations of *E. formanii* and the Deception Deposit proposal impact areas, it is estimated that 298 individuals of *E. formanii* will be impacted by the Deception Deposit proposal.

***Grevillea erectiloba* (P4)**

Grevillea erectiloba is a shrub to 3m height with red flowers (DEC 2011). A total of 735 individuals of *G. erectiloba* were recorded by Biota (2011a), occurring across the central area of the Deception Deposit haul road, with individuals located both within and outside of the Deception Deposit impact areas (Figures 3-1b and 3-1c).

Grevillea erectiloba has a linear distribution of approximately 200km within the region, with an additional isolated record from the Nullarbor bioregion (DEC 2011). Within the local area, *G. erectiloba* has also been recorded at the Koolyanobbing Range (Western Botanical for Cliffs, unpublished).

Based on the recorded locations of *G. erectiloba* and the Deception Deposit proposal impact areas, it is estimated that 283 individuals of *G. erectiloba* will be impacted by the Deception Deposit proposal.

***Philotheca deserti* ssp. nov.**

Philotheca deserti recorded appeared to differ from either of the currently described subspecies, and therefore may represent a new subspecies (M Hislop pers. com. in Biota 2011a). The recorded individuals were consequently described as *Philotheca deserti* ssp. nov by Biota (2011a). A total of 1,003 individuals of *P. deserti* ssp. nov were recorded by Biota (2011a), occurring in the southern half of the Deception Deposit haul road, with individuals located both within and outside of the Deception Deposit impact areas (Figure 3-1c). Additional individuals of *P. deserti* ssp. nov also occur outside of the surveyed area for the haul road, however the number of these individuals were not recorded.

Philotheca deserti and its subspecies have a linear distribution of more than 500km within the region (DEC 2011); which provides an indication of the extent of potential habitat available for *Philotheca deserti* ssp.nov.

Based on the recorded locations of *P. deserti* ssp. nov and the Deception Deposit proposal impact areas, it is estimated that 300 individuals of *P. deserti* ssp. nov will be impacted by the Deception Deposit proposal.

***Calytrix* sp. nov**

Calytrix sp. nov is a shrub to 0.5m height with pink and yellow flowers. A total of 219 individuals of *Calytrix* sp. nov were recorded by Biota (2011a), occurring within the Deception Deposit mine area (Figure 3-1a).

Calytrix sp. nov were previously collected by botanical consultants Western Botanical at the Mt Jackson Range, located approximately 45km south of the Deception Deposit mine area, and described

by the name *Calytrix* sp. Jackson Range duricrust affin. *glutinosa* (B Eckermann pers. com. 2011 in Biota 2011a). Six different locations have been recorded at the Mt Jackson Range, however the number of individuals in each location has not been recorded (B Eckermann pers. com. to S Hawkins June 2011). The recordings at the Mt Jackson Range confirm that *Calytrix* sp. nov. has a distribution beyond the Deception Deposit proposal area. Additional locations of *Calytrix* sp. nov. would be expected to be recorded from additional surveys in the region.

Based on the recorded locations of *Calytrix* sp. nov and the Deception Deposit proposal impact areas, it is estimated that 219 individuals of *Calytrix* sp. nov will be impacted by the Deception Deposit proposal.

Flora Species	Estimated Impact (No. Individuals)
Baeckea ochropetala (P1)	1,217
Baeckea sp. Parker Range (P3)	486
Philotheca coateana (P3)	1
Spartothamnella sp. Helena & Aurora Range (P3)	126
Banksia arborea (P4)	0
Eucalyptus formanii (P4)	298
Grevillea erectiloba (P4)	283
Philotheca deserti ssp. nov.	300
Calytrix sp. nov	219

Table 3-1 Flora Species Impact Table for the Deception Deposit Proposal. The estimated number of individuals of each key flora species to be impacted by the Deception Deposit proposal is identified.

Other Flora Species

A total of 324 native vascular flora species were recorded by Biota (2011a), with the impacts to the key flora species addressed above. The other flora species recorded by Biota (2011a) are generally considered to have wide distributions and are not threatened. Accordingly, an assessment of each of these other flora species is not provided.

Based on the recorded populations and distributions of the above species, both from surveys of the Deception Deposit proposal area and regional records, the Deception Deposit proposal is not expected to have a significant impact to flora values.

Assessment of Potential Impact to Vegetation Units

A total of 33 vegetation units were recorded by Biota (2011a) in the area of the Deception Deposit proposal. Of these, 28 vegetation units are expected to be impacted by the Deception Deposit proposal. All vegetation units recorded within the Deception Deposit impact areas have also been recorded outside of the impact areas. Table 3-2 identifies each vegetation unit recorded and the estimated area of each vegetation unit to be impacted by of the Deception Deposit proposal

Similarly as to the case for flora species, the vegetation units recorded in the vicinity of the Deception Deposit proposal area expected to have a broader distribution than the area surveyed. As identified by Biota (2011a), many of the vegetation units have also been recorded at the Windarling Range, thereby supporting the view

that the vegetation units recorded in the vicinity of the Deception Deposit proposal can be expected to have a broader distribution than the area surveyed in Biota (2011a).

Vegetation Unit	Estimated Impact (ha)
1.01	55.9
1.02	114.8
1.03	66.4
1.04	5.4
1.05	9.2
1.06	0.0
1.07	10.3
1.08	4.4
1.09	0.0
1.10	0.0
1.11	0.0
1.12	3.7
1.13	2.0
1.14	0.3
1.15	1.6
1.16	1.3
1.17	2.0
1.18	3.6
2.01	128.1
2.02	76.0
2.03	1.2
2.04	2.7
2.05	41.8
2.06	2.6
2.07	0.0
2.08	4.1
2.09	1.4
2.10	3.7
2.11	1.0
2.12	1.9
2.13	0.8
2.14	1.2
4.01	0.2

Table 3-2 Vegetation Units Impact Table for the Deception Deposit Proposal. The estimated area of each vegetation unit to be impacted by the Deception Deposit proposal is identified.

Assessment of Potential Cumulative Impact to Flora

Cumulative impacts in environmental impact assessment are often difficult to predict as a result of the inherent limitation of insufficient regional data. Accordingly, assessments of cumulative impacts are often broad in context, with a similar broad approach applied for assessment of cumulative impacts for the Deception Deposit proposal.

All of the DEC-classified 'priority' flora species recorded within the vicinity of the Deception Deposit proposal were recorded both within and outside of the Deception Deposit proposal impact areas, and all have known distributions that extend beyond the surveyed areas. Implementation of the Deception Deposit proposal is considered unlikely to result in a cumulative impact to any DEC-classified 'priority' flora species that would change the conservation status of such species.

Whilst the Deception Deposit mine area has been subject to mineral exploration works over several years, this vegetation is largely intact and undisturbed. Similarly, there is no notable land clearing in the vicinity of the proposal area. As such, a significant cumulative impact to flora values from implementation of the Deception Deposit proposal is not expected.

The southern 5km of the Deception Deposit haul road occur in the area of the Windarling Range, of which part of the Windarling Range has been subject to notable land clearing resulting from development of Cliffs' Windarling Range mine operations. Cliffs currently has land clearing approval of approximately 600ha for the Windarling Range. The 5km section of the Deception Deposit haul road within the area of the Windarling Range will be approximately 20ha (based on a nominal 40m width), which is not considered a significant increase to the existing approved impacts in this area.

Assessment of Potential Indirect Impact to Flora - Introduced Flora (Weeds)

Weeds are introduced (non-native) flora. Weeds can spread quickly into disturbed land and compete for resources with native flora, with potential to subsequently affect the quality of the habitat for use by native fauna. The introduction of mine operations has the potential to introduce new weed species and increase the distribution of existing weed species.

Biota (2011a) identified 11 weed species within the vicinity of the Deception Deposit. The sources of these existing weed species are likely to be from a combination of historical pastoral activities, transport by vehicles on local access tracks, and wind.

Having regard to the opportunistic nature of weeds to germinate during favourable conditions from seed stored in the soil profile, there is a reasonable expectation that additional weed species not identified during the survey occur within the Deception Deposit proposal area. Biota (2011a) identified a number of additional weed species in an area near the haul road in the vicinity of Pigeon Rocks. Additionally, Cliffs' records indicate a further 20 weed species having been recorded in the region from a range of surveys undertaken since 2001 (Cliffs 2011c; Appendix 4).

Management of weeds at Cliffs' existing Yilgarn Operations is undertaken in accordance with a Weed Management Plan (Cliffs 2011c; Appendix 4). The introduction and spread of weeds is an operational matter that can be managed through the implementation of hygiene practices and monitoring identified in the Weed Management Plan. Cliffs will implement the Weed Management Plan for the management of weeds for the Deception Deposit proposal. Based on the management actions proposed and the management of weeds at Cliffs' existing mine operations, the Deception Deposit proposal is not expected to result in a significant introduction or significant spread of weeds.

Potential indirect impacts from weeds can be managed through standard weed prevention and weed control practices. Implementation of Cliffs' Weed Management Plan (Cliffs 2011c; Appendix 4) will ensure that the potential for weed introduction and weed spread are minimised and controlled to reduce the risk of indirect impacts from weeds.

Assessment of Potential Indirect Impact to Flora - Fire

Whilst the introduction of mine operations has the potential to introduce new ignition sources that could lead to fire, and subsequent significant indirect impacts to flora and vegetation, the risk of fire is an operational matter that can be managed through standard fire prevention and fire response practices. Implementation of Cliffs' Fire Management Plan (Cliffs 2011d; Appendix 5) has resulted in no uncontrolled fires from Cliffs' existing mine operations to date. Furthermore, the presence of Cliffs' mine operations has improved fire management with the region, with Cliffs' having previously provided resources to DEC and the Shire of Yilgarn to assist with fire management and fire response.

Implementation of Cliffs' Fire Management Plan for the Deception Deposit proposal will ensure that the potential for indirect impacts from fire is minimised. As a result of the management actions proposed, the risk of fire from the Deception Deposit proposal is not expected to be significant.

Assessment of Potential Indirect Impact to Flora - Dust

Flora has been documented as a sensitive dust receptor (refer to Farmer 1993 for an extensive literature review). Dust has the potential to settle on vegetation, which in turn, has the potential to reduce the intensity of light required for plant photosynthesis, influence gaseous exchange required for plant respiration, increase leaf temperature and increase plant transpiration (Farmer 1993; Hirano *et al.* 1995).

As identified by Figure 1-4, the Deception Deposit mine area infrastructure has been predominantly co-located, with the mine pit, waste rock landform and or stockpile areas connected. This will result in reduced perimeter edge with the potential to be impacted by dust emissions.

As also identified by Section 1.4, the mine pit and waste rock landform areas identified by Figure 1-4 incorporate areas for abandonment bunding and stockpiling of vegetation, topsoil and subsoil; which will result in the physical location of the mine pit and waste rock landform being more than 100m from the edge identified in Figure 1-4, thereby reducing the potential for dust generated from the mine pit and waste rock landform from impacting the surrounding native vegetation.

The potential for dust generation for the Deception Deposit proposal is expected to be greatest during initial period of mine development as a result of a focus on land clearing for infrastructure development.

The potential for dust generation from the Deception Deposit proposal can be expected to reduce over the mining life as a result of:

- Reduced land clearing (mine operations occurring within cleared areas);
- Increased mine pit wall height as the pit is deepened, resulting in a reduced potential for dust to escape over the crest of a mine pit;
- Increased retained soil moisture for mining occurring below the natural groundwater elevation, resulting in a reduced number of dry particles with the potential to generate dust;
- Progressive rehabilitation of cleared areas during the mine life (in particular, progressive rehabilitation of the waste rock landform); and
- Natural stabilisation of the surfaces of the mine pit walls, waste rock landform and the haul road.

As identified in Section 3.1, the flora and vegetation values surrounding the Deception Deposit proposal does not include Threatened Species of flora or Threatened Ecological Communities protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), or Rare Flora declared under the *Wildlife Conservation Act 1950* (WA). The flora and vegetation values surrounding the Deception Deposit proposal are limited to a number of 'Priority Flora' classified by DEC; which are widely distributed. Accordingly, if the Deception Deposit did result in a dust impact to the adjacent flora, significant flora values would not be impacted.

Potential indirect impacts from dust can be managed through standard dust prevention and dust minimisation practices. Implementation of Cliffs' Dust Management Plan (Cliffs 2011e; Appendix 6) will ensure that the potential for indirect impact of dust to flora is minimised as far as practicable.

Assessment of Potential Indirect Impact to Flora – Groundwater Dependency

The depth to groundwater, being approximately 75m below ground level, and the groundwater salinity, being approximately 25,000mg/L (Rockwater 2011), are likely to be restrictive to groundwater dependency of flora. The flora surrounding the Deception Deposit mine pit is dominated by overstorey of *Acacia* and *Eucalyptus* (Biota 2011a). Water supply to species of these genera occurs predominantly through the lateral roots sourcing water from within the soil profile, noting the groundwater salinity is likely to restrict groundwater uptake. As the Deception Deposit proposal area is not expected to contain groundwater-dependent flora, accordingly, a potential for impact to groundwater-dependent flora is not expected.

To note, similar dominant flora species occur at Cliffs' Windarling Range mine operations. These flora species have not indicated any decline in health following significant dewatering drawdown (+10m) from mine operations; thereby confirming the absence of groundwater dependent flora at this location.

3.1.5 Management Actions

Land Clearing Management

Land clearing at Cliffs' existing Yilgarn Operations is undertaken in accordance with a Land Clearing Management Plan (Cliffs 2011b; Appendix 3), which forms part of Cliffs' ISO 14001:2004-certified Environmental Management System. The Land Clearing Management Plan has been implemented at the Yilgarn Operations since 2004 and has been subject to previous review by EPA, DEC, DMP and DoSEWPC.

Cliffs' Land Clearing Management Plan outlines a range of management actions, which in relation to flora and vegetation include:

1. Minimising vegetation clearing;
2. Site Disturbance Permit procedure to control land clearing;
3. Monitoring of land clearing;
4. Auditing of clearing areas against approved Site Disturbance Permits;
5. Rehabilitation of disturbed areas;
6. Reporting to government of land clearing areas; and
7. Education and training of mine personnel.

Cliffs will implement the Land Clearing Management Plan to ensure that land clearing is appropriately managed for the Deception Deposit proposal.

Weed Management

Weeds at Cliffs' existing Yilgarn Operations is undertaken in accordance with a Weed Clearing Management Plan (Cliffs 2011c; Appendix 4), which forms part of as part of Cliffs' ISO 14001:2004-certified Environmental Management System. The Weed Management Plan has been implemented at the Yilgarn Operations since 2004 and has been subject to previous review by EPA, DEC, DMP and DoSEWPC.

Cliffs' Weed Management Plan outlines a range of management actions, which in relation to flora and vegetation include:

1. Targeted surveys and opportunistic observations for weeds;
2. Recording and maintenance of a weed database;
3. Chemical and/or mechanical control of high risk weed areas;
4. Hygiene procedures for machinery and equipment
5. Education and training of mine personnel.

Cliffs will implement the Weed Management Plan to ensure that weeds are appropriately managed for the Deception Deposit proposal.

Fire Management

Fire at Cliffs' existing Yilgarn Operations is undertaken in accordance with a Fire Management Plan (Cliffs 2011d; Appendix 5), which forms part of as part of Cliffs' ISO 14001:2004-certified Environmental Management System. The Fire Management Plan has been implemented at the Yilgarn Operations since 2004 and has been subject to previous review by EPA, DEC, DMP and DoSEWPC.

Cliffs' Fire Management Plan outlines a range of management actions, which in relation to flora and vegetation include:

1. Risk assessment of fire as part of safety inspections;
2. Provision of fire fighting equipment;
3. Signage identifying prohibition of fires within mining tenements;
4. Establishing fire breaks;
5. Response to fires where they occur;
6. Reporting to government of fires; and
7. Education and training of mine personnel.

Cliffs will implement the Fire Management Plan to ensure that the potential risk of fire is appropriately managed for the Deception Deposit proposal.

Dust Management

Cliffs' existing Yilgarn Operations are undertaken in accordance with a Dust Management Plan (Cliffs 2011e; Appendix 6), which forms part of as part of Cliffs' ISO 14001:2004-certified Environmental Management System. The Dust Management Plan has been implemented at the Yilgarn Operations since 2004 and has been subject to previous review by EPA, DEC, DMP and DoSEWPC.

Cliffs' Dust Management Plan outlines a range of management actions, which in relation to flora and vegetation include:

1. Undertaking land clearing only when necessary;
2. Avoiding land clearing and handling of topsoil when winds are high;
3. Dampening of roads and open areas with water trucks to minimise dust generation;
4. Monitoring of flora and vegetation adjacent to mine operations for dust impacts;
5. Undertaking progressive land rehabilitation works to minimise exposed areas; and

6. Education and training of mine personnel.

Cliffs will implement the Dust Clearing Management Plan to ensure that land clearing is appropriately managed for the Deception Deposit proposal.

Mine Closure
Mine closure actions to restore flora and vegetation values are addressed in Section 3.3 Mine Closure.

3.1.6 Commitments

Cliffs makes the following commitments for management of potential impacts to flora and vegetation for the Deception Deposit proposal:

1. **Land Clearing Management**
   1-1 Cliffs will undertake management of land clearing in accordance with the Land Clearing Management Plan (Cliffs 2011b; Appendix 3) during implementation of the Deception Deposit proposal.
2. **Weed Management**
   2-1 Cliffs will undertake management of weeds in accordance with the Weed Management Plan (Cliffs 2011c; Appendix 4) during implementation of the Deception Deposit proposal.
3. **Fire Management**
   3-1 Cliffs will undertake management of fire in accordance with the Fire Management Plan (Cliffs 2011d; Appendix 5) during implementation of the Deception Deposit proposal.
4. **Dust Management**
   4-1 Cliffs will undertake management of dust in accordance with the Dust Management Plan (Cliffs 2011e; Appendix 6) during implementation of the Deception Deposit proposal.

A consolidation of Cliffs' commitments for the Deception Deposit proposal is contained in Section 5.

3.1.7 Conclusion

As identified by the above assessment, the potential impact of the Deception Deposit proposal to flora values is not expected to be significant. The potential impact to flora values can be managed through implementation of actions contained in the Land Clearing Management Plan, Weed Management Plan, Fire Management Plan and the Dust Management Plan.

Accordingly, EPA's objective for this factor can be met.

3.2 Fauna

3.2.1 Aspect

The Deception Deposit proposal area provides habitat to an array of fauna species, some of which are specifically protected by legislation. Development of the Deception Deposit proposal will require the clearing of a proportion of this habitat. Mine operations (such as vehicle movements) may also have a potential impact to fauna species that enter the mine area or the haul road. Section 3.2 provides an assessment of the potential impact of the Deception Deposit proposal on fauna.

3.2.2 EPA Objective

The EPA's objective for fauna is:

- To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge (EPA 2010b).

3.2.3 Legislation, Guidelines, Standards and Approvals

- Yilgarn Operations Fauna Management Plan (Cliffs 2011f; Appendix 7);
- Yilgarn Operations Land Clearing Management Plan (Cliffs 2011b; Appendix 3);
- *Environmental Protection Act 1986* (WA);
- *Wildlife Conservation Act 1950* (WA);
- *Environment Protection and Biodiversity Conservation Act 1999* (C'th);
- Japan-Australia Migratory Bird Agreement 1974 (Government of Australia and Government of Japan 1981);
- China-Australia Migratory Bird Agreement 1986 (Government of Australia and Government of the People's Republic of China 1988);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (Government of Australia and Government of the Republic of Korea 2007);
- Convention on the Conservation of Migratory Species of Wild Animals 1979 (Government of Australia 1979);
- EPA Guidance Statement 20: Guidance for Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia (EPA 2009b);
- EPA Guidance Statement 54: Guidance for Sampling Fauna in Groundwater and Caves for Environmental Impact Assessment (EPA 2003b);
- EPA Guidance Statement 54a: Guidance for the Assessment of Environmental Factors - Sampling methods and survey considerations for subterranean fauna in Western Australia (EPA 2007a);
- EPA Guidance Statement 55: Guidance for the Assessment of Environmental Factors – Implementing Best Practice in Proposals Submitted to the Environmental Impact Assessment Process (EPA 2003a);
- EPA Guidance Statement 56: Guidance for the Assessment of Environmental Factors – Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004b);
- EPA Position Statement 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002b); and
- Technical Guide: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA & DEC 2010).

3.2.4 Environmental Impact Assessment

Legislative Framework for Fauna Protection

All native fauna in Western Australia is afforded general protection under the *Wildlife Conservation Act 1950* (WA). Specific fauna species may also be afforded special protection under the *Wildlife Conservation Act 1950* (WA) or the *Environment Protection and Biodiversity Conservation Act 1999* (C'th).

The following text provides a description[1] of the classifications used in fauna protection:

Threatened Species

Threatened Species is a fauna species declared by the Commonwealth Minister for Environment and is protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) as a matter of national environmental significance for being extinct, facing a risk of extinction, or in need of a conservation program to prevent the species from a risk of extinction. Threatened Species are allocated a category of extinct, extinct in the wild, critically endangered, endangered, vulnerable or conservation dependent.

Migratory Species

Migratory Species are declared by the Commonwealth Minister for Environment and is protected under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) as a matter of national environmental significance for being a migratory species listed under the Convention on the Conservation of Migratory Species of Wild Animals 1979 (Bonn Convention), Japan-Australia Migratory Bird Agreement 1974, China-Australia Migratory Bird Agreement 1986 or the Republic of Korea-Australia Migratory Bird Agreement 2007. *Migratory Species* also means fauna declared by the Western Australian Minister for Environment as Specially Protected Fauna under the *Wildlife Conservation Act 1950* (WA) due to it being a migratory species.

Specially Protected Fauna

Specially Protected Fauna is fauna declared by the Western Australian Minister for Environment and is protected under the *Wildlife Conservation Act 1950* (WA) as being rare, likely to become extinct, otherwise in need of special protection, or is an avifauna species protected by an international government agreement.

Priority Fauna

Priority Fauna are fauna which are known from one, a few or several populations which may or may not be under threat, or may otherwise be rare. Classifications are made by DEC and categorised into 5 priority categories, with Priority 1 being of the highest conservation significance. Priority fauna have no specific legal protection under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), *Wildlife Conservation Act 1950* (WA) or the *Environmental Protection Act 1986* (WA).

Fauna of the Deception Deposit

Vertebrate fauna surveys undertaken in 2010 by Biota (2011b; Appendix 14) of the Deception Deposit proposal area identified a total of 99 vertebrate fauna species, comprising of 51 species of avifauna, 26 reptile species, 20 mammals and 2 amphibian species. The recorded fauna assemblage included 4 fauna species of conservation significance, being:

- Malleefowl *Leipoa ocellata* (Threatened Species, Specially Protected Fauna)[2];
- Rainbow Bee-eater *Merops ornatus* (Migratory Species, Specially Protected Fauna);
- Crested Bellbird (Southern) *Oreoica gutturalis gutturalis* (Priority 4); and

[1] Descriptions are consolidated from review of the *Environment Protection and Biodiversity Conservation Act 1999* (C'th), *Wildlife Conservation Act 1950* (WA), Biota (2011b) and flora literature published by DEC and DoSEWPC.

[2] Recordings of *L. ocellata* were from inactive *L. ocellata* nest mounds only. No individuals of *L.* ocellata were recorded.

- White-browed babbler (Wheatbelt) *Pomatostomus supercilious ashby* (Priority 4).

Potential Short-Range Endemic (SRE) invertebrate fauna recorded within the vicinity of the Deception Deposit proposal in 2010 by Biota (2011c; Appendix 15) includes 22 mygalomorph spider taxa, 3 millipede taxa and one snail taxa. None of the potential SRE invertebrate taxa are considered to be of conservation significance.

Surveys for troglobitic subterranean fauna undertaken in 2010 by Biota (2011d; Appendix 16) in the vicinity of the Deception Deposit did not identify the presence of any troglobitic fauna.

Surveys for stygobitic subterranean fauna have not been undertaken within the vicinity of the Deception Deposit as previous investigations at the nearby Windarling Range, Mt Jackson Range and Koolyanobbing Range did not identify stygobitic subterranean fauna (WRM 2008; WRM 2009).

The spot location records of *L. ocellata* nest mounds and potential SRE invertebrate fauna recorded in the vicinity of the Deception Deposit proposal is depicted in Figures 3-3a to 3-3d. Spot location records for other fauna species (e.g. avifauna) are not available having regard to the mobility of such fauna species.

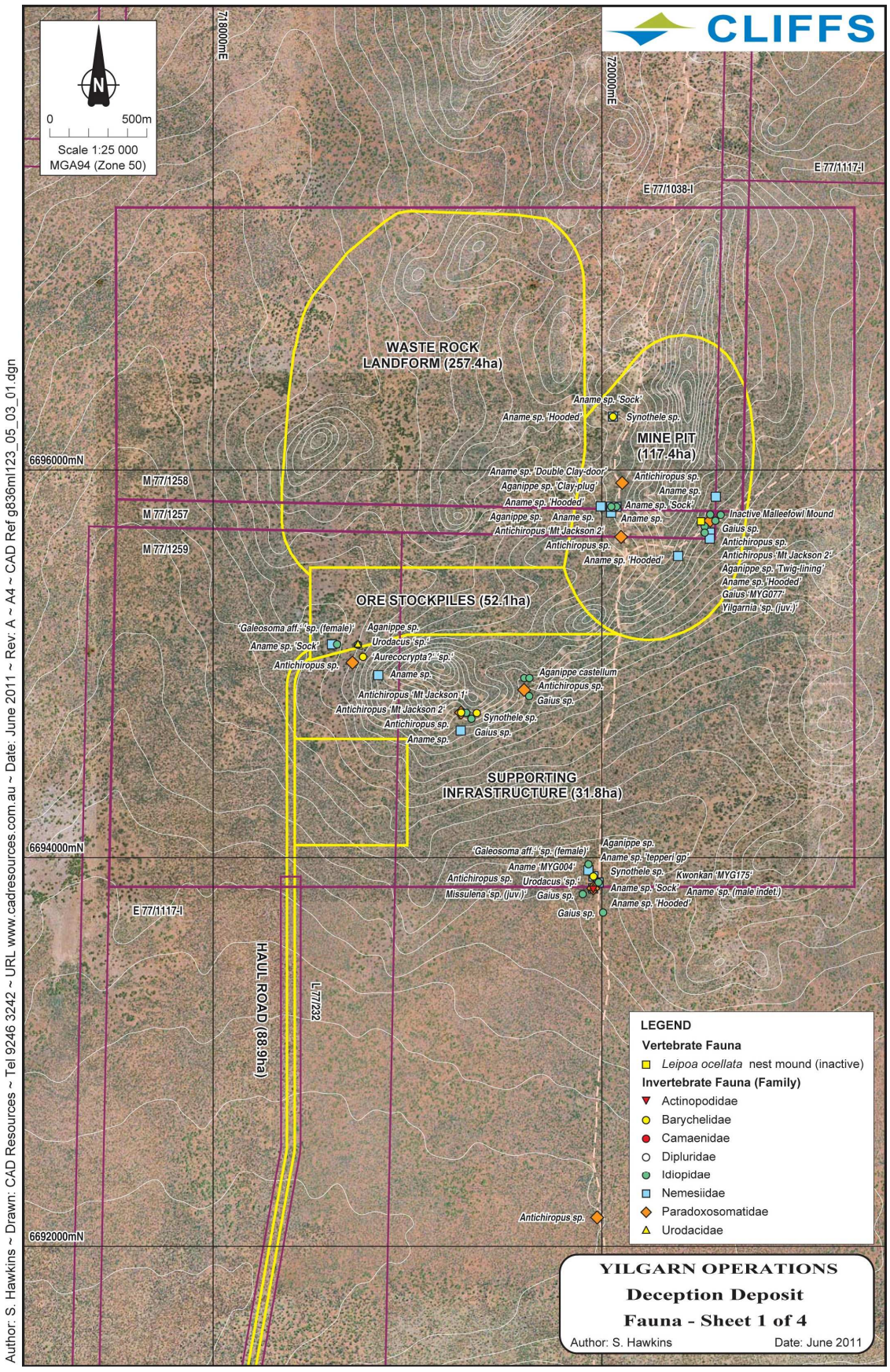

Figure 3-3a Fauna Species recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011b).

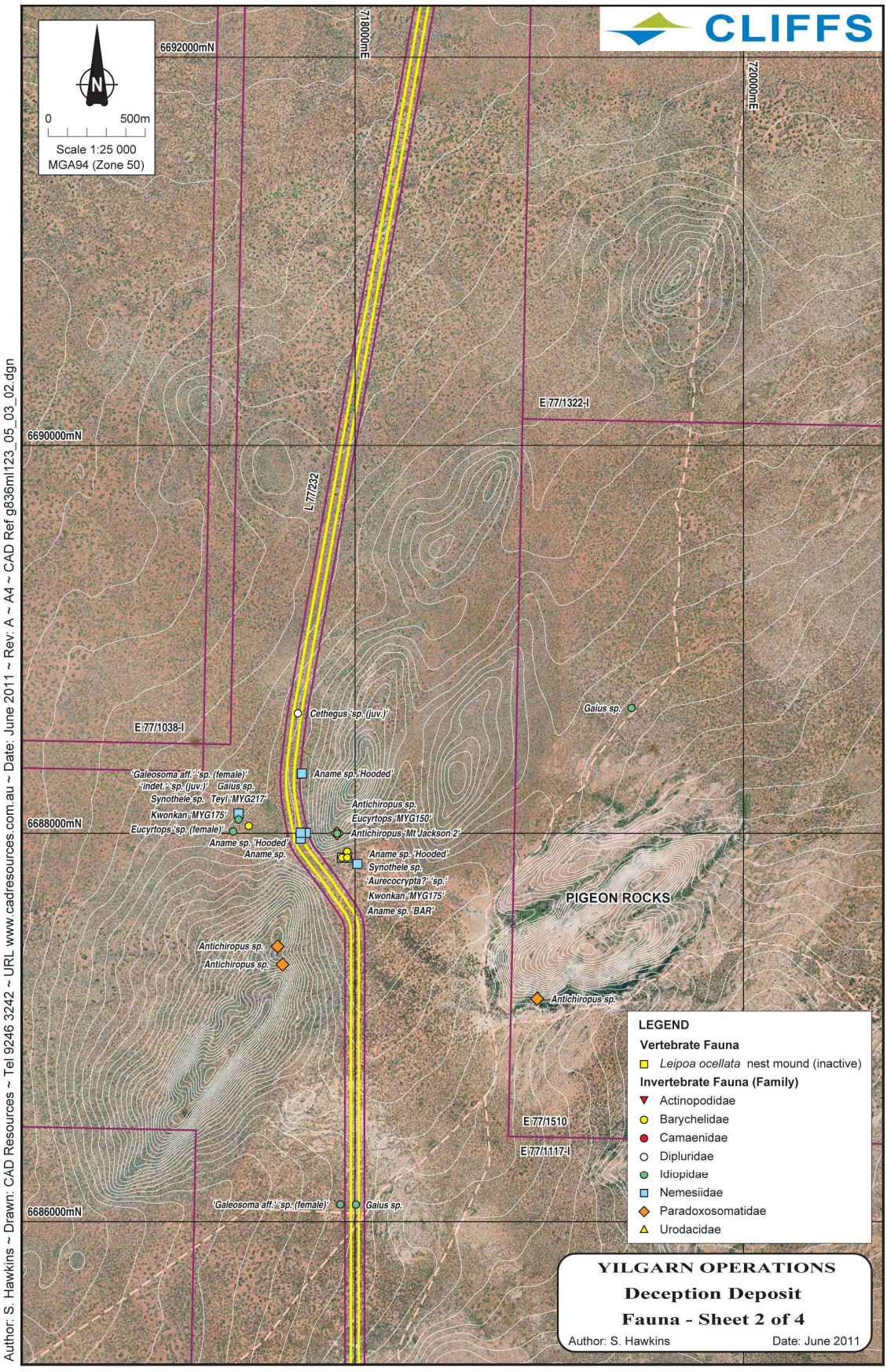

Figure 3-3b Fauna Species recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011b).

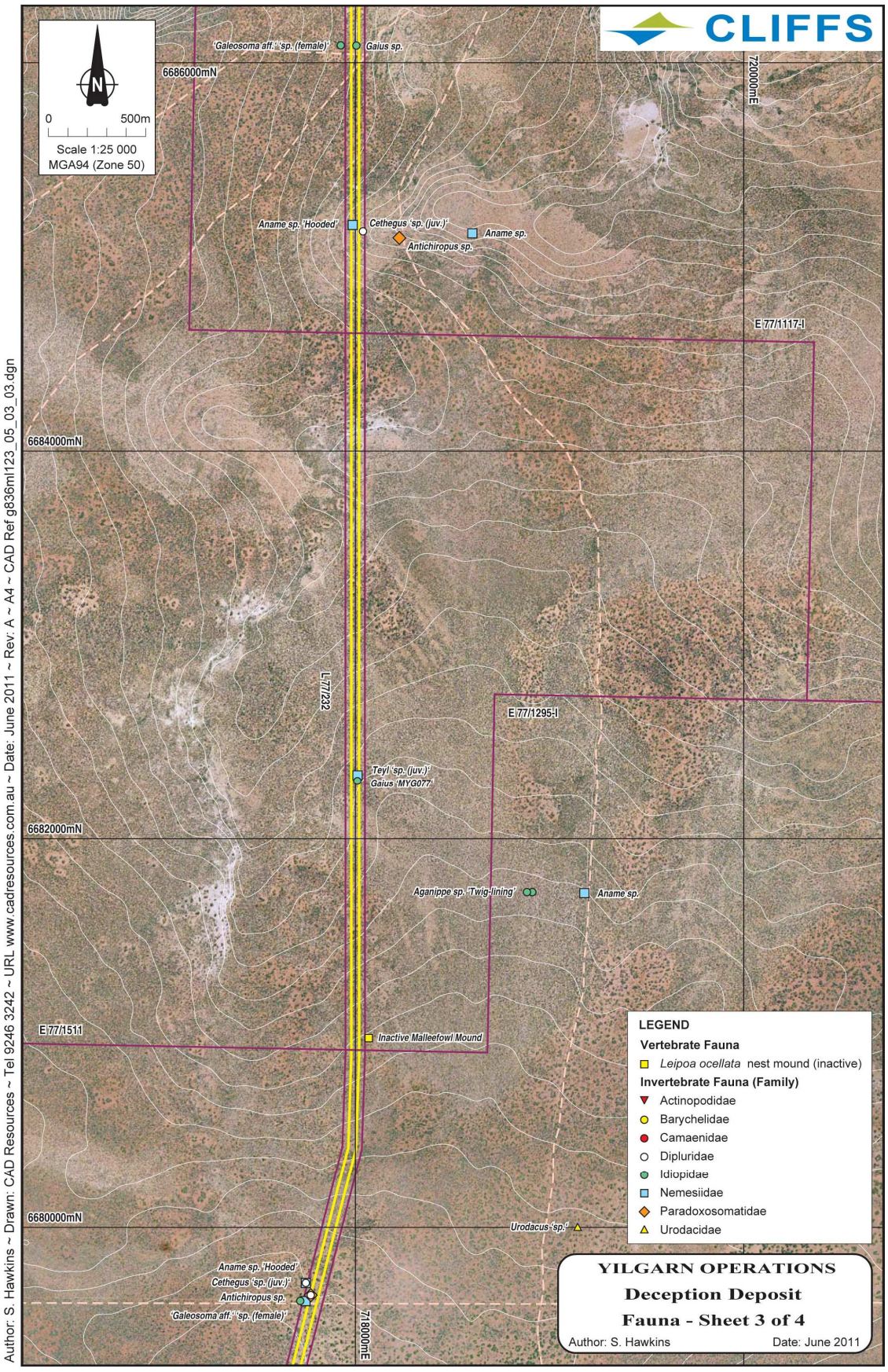

Figure 3-3c Fauna Species recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011b).

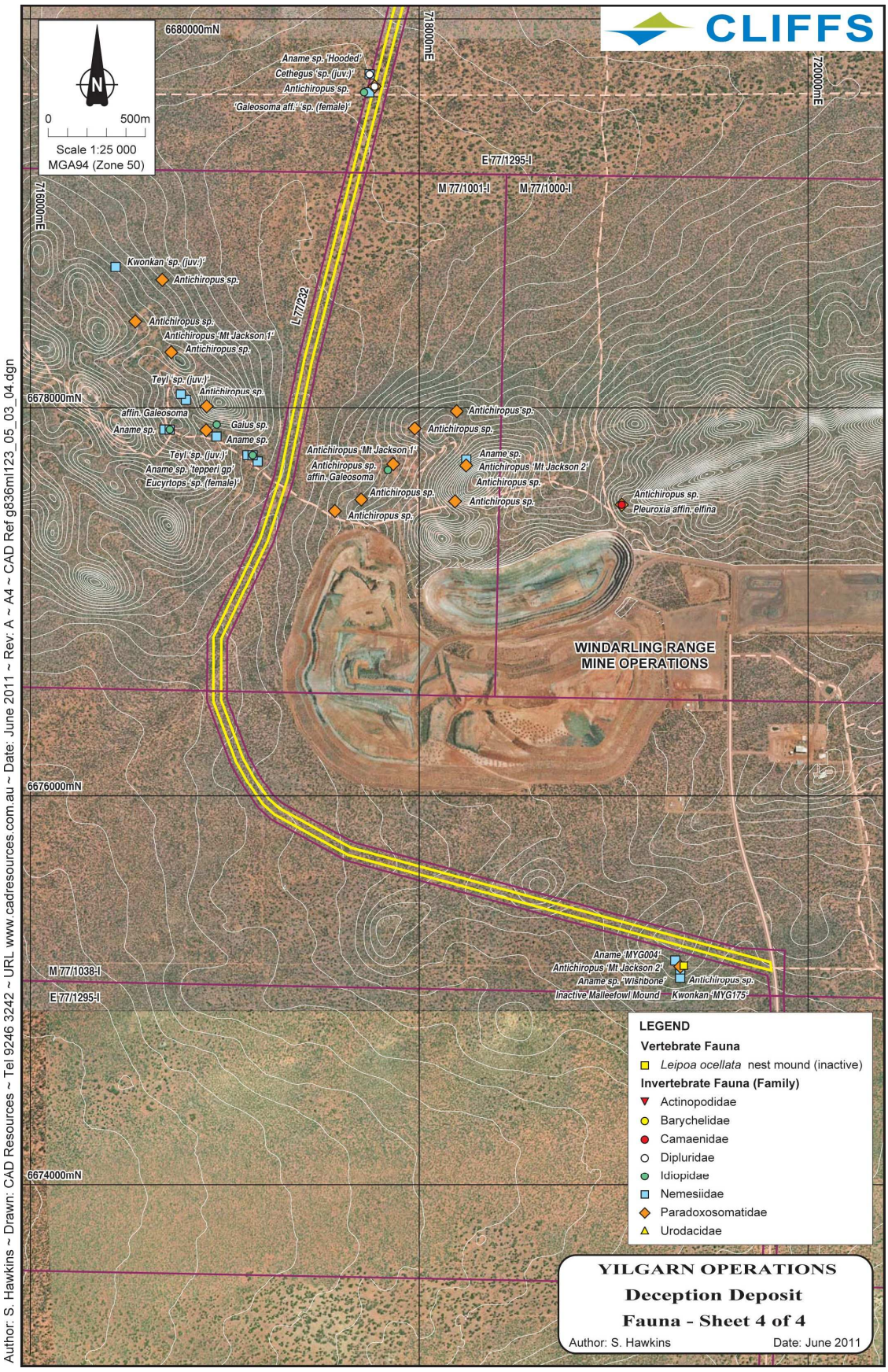

Figure 3-3d Fauna Species recorded in the vicinity of the Deception Deposit Proposal. The Deception Deposit proposal infrastructure is identified in yellow. Source: Biota (2011b).

Assessment of Potential Impact to Vertebrate Fauna Species

A total of 99 vertebrate fauna species were recorded by Biota (2011b) in the area of the Deception Deposit proposal. An assessment of the potential impacts to vertebrate fauna species is provided below:

Malleefowl *Leipoa ocellata* (Threatened Species, Specially Protected Fauna)

Leipoa ocellata is listed as a Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) and as Specially Protected Fauna under the *Wildlife Conservation Act 1950* (WA).

Leipoa ocellata is a large ground-dwelling omnivorous bird with mottled grey, brown, tan and black plumage that characteristically build a mounded nest on the ground (DoSEWPC & WWF c.2006). *L. ocellata* is widely distributed across Australia, with populations in Western Australia, South Australia, New South Wales and Victoria. Across Australia, *L. ocellata* has shown a historical decline in range, with the principal threats being habitat loss and habitat fragmentation/isolation from pastoral clearing (DEHSA 2007).

As identified in Biota (2011b), 1 inactive *L. ocellata* nest mound was located within the Deception Deposit mine area which will be impacted by the mine pit (Figure 3-3a). A further 2 inactive nest mounds were located adjacent to the southern end of the Deception Deposit haul road, which will not be impacted (Figures 3-3c and 3-3d). No recently active *L. ocellata* nest mounds or *L. ocellata* individuals were recorded during the survey. The absence of active *L. ocellata* nest mounds and the low number of inactive *L ocellata* nest mounds indicate that the area of the Deception Deposit proposal is not a key nesting habitat for an *L. ocellata* population within the region.

Based on the recording of inactive *L. ocellata* nest mounds, and the absence of active *L. ocellata* nest mounds or sightings of *L. ocellata* individuals, no individuals of *L. ocellata* are expected to be impacted by the Deception Deposit proposal. Whilst noting the above conclusion, it is possible that active *L. ocellata* nest mounds may occur beyond the area surveyed in proximity to the Deception Deposit proposal, and as such, it is possible that parts of the Deception Deposit proposal area may be periodically used for *L. ocellata* foraging. Due to the absence of recorded live individuals from the surveys, the extent of such foraging, or the potential for impact from the Deception Deposit proposal to periodic foraging, is unable to be determined.

Rainbow Bee-eater *Merops ornatus* (Migratory Species, Specially Protected Fauna)

Merops ornatus is listed as a Migratory Species under the *Environment Protection and Biodiversity Conservation Act 1999* (C'th) and as Specially Protected Fauna under the *Wildlife Conservation Act 1950* (WA).

Merops ornatus is a medium-sized bird with distribution across most of Australia, except Tasmania, in areas of open woodland or forest or shrubland, and usually in close proximity to permanent water. Internationally, *M. ornatus* has been recorded in parts of Indonesia and Papua New Guinea, and as far north as Japan. This species is readily distinguishable by its blue, green and chestnut colourings. This species feed aerially for insects and nests in burrows on the ground. *Merops ornatus* is not considered to be globally threatened, with its only recorded threat in Australia being the Cane Toad *Bufo marinus* (DoSEWPC 2011).

As identified in Biota (2011b), *M. ornatus* was recorded on 11 occasions during survey of the Deception Deposit proposal area. *Merops ornatus* has also been recorded during other surveys within the region, including the Windarling Range, Mt Jackson Range and Bungalbin Hill (Ecologia 2001 in

Biota 2011b). *Merops ornatus* is also regularly observed at Cliffs' Koolyanobbing Range mine operations (pers. com. J Shepherdson, July 2011). The broad habitat utilisation and high mobility of *M. ornatus* means that this species is likely to use the area of the Deception Deposit for feeding and fly-over, however the absence of permanent water in the area indicates that nesting is unlikely.

Whilst *M. ornatus* was recorded on multiple times within the area of the Deception Deposit proposal, as identified by Biota (2011b), the broad habitat utilisation, high mobility and absence of nesting suggests that individuals of *M. ornatus* are unlikely to be impacted by the Deception Deposit proposal.

Crested Bellbird (Southern) *Oreoica gutturalis gutturalis* (Priority 4)
Oreoica gutturalis gutturalis is listed as Priority 4 by DEC. Priority 4 is a classification for species which have been adequately surveyed, for which sufficient knowledge is available, that are not currently threatened or in need of special protection but could become so if circumstances change, and which are declining significantly but are not yet threatened (Biota 2011b).

Oreoica gutturalis gutturalis is a sedentary and solitary species that inhabits woodland, mallee and acacia shrublands (Biota 2011b). It is widespread in the arid zone, but scarce and patchily distributed in wetter areas (Johnstone and Storr 1998 in Biota 2011b).

As identified in Biota (2011b), *Oreoica gutturalis gutturalis* was recorded on 34 occasions during survey of the Deception Deposit proposal area. *Oreoica gutturalis gutturalis* has also been recorded during multiple other fauna surveys of the region undertaken between 2000 and 2007 (BCE 2009).

As identified by Biota (2011b) the broad habitat utilisation of *Oreoica gutturalis gutturalis* means that impact to this species is likely to be limited to a localised loss of habitat. Impacts to individuals of *Oreoica gutturalis gutturalis* from implementation of the Deception Deposit proposal are not expected.

White-browed babbler (Wheatbelt) *Pomatostomus supercilious ashby* (Priority 4)
Pomatostomus supercilious ashby is listed as Priority 4 by DEC. Priority 4 is a classification for species which have been adequately surveyed, for which sufficient knowledge is available, that are not currently threatened or in need of special protection but could become so if circumstances change, and which are declining significantly but are not yet threatened (Biota 2011b).

Pomatostomus supercilious ashby inhabits eucalypt forests and woodlands, occurring mainly in the arid and semi-arid zones. This species is mainly insectivorous and forages on or near the ground for insects and seeds (Biota 2011b).

As identified in Biota (2011b), *Pomatostomus supercilious ashby* was recorded on 11 occasions during survey of the Deception Deposit proposal area. *Pomatostomus supercilious ashby* has also been recorded during multiple other surveys within fauna surveys of the region undertaken during 2000 and 2007 (BCE 2009).

As identified by Biota (2011b) the vegetation and habitats in which *Pomatostomus supercilious ashby* was recorded is widespread in the region, such that impact to this species is likely to be limited to a localised loss of habitat. Impacts to individuals of *Pomatostomus supercilious ashby* from implementation of the Deception Deposit proposal are not expected.

Other Vertebrate Fauna Species

A total of 99 vertebrate fauna species were recorded by Biota (2011b), with the impacts to the recorded fauna species of conservation significance addressed above. As the other fauna species are generally considered to have wide distributions and are not threatened, significant impact to the long-term viability of populations of such species is not expected. Accordingly, an assessment of the potential for impact to each of these fauna species is not provided.

As identified by Biota (2011b), a number of vertebrate fauna species of conservation significance are considered likely to occur in the area of the Deception Deposit proposal, however were not recorded during the field surveys. These fauna included the Peregrine Falcon *Falco peregrinus* (Specially Protected Fauna), Major Mitchell's Cockatoo *Cacatua leadbeateri* (Specially Protected Fauna), Australia Bustard *Ardeotis australis* (Priority 4) and the Inland Greater Long-eared Bat *Nyctophilus major tor* (Priority 4). Biota (2011b) identifies that if these species are present within the area of the Deception Deposit proposal, then the potential for impact is considered minor based on the presence and extent of suitable habitat available.

Based on the recorded populations and distributions of the above species, both from surveys of the Deception Deposit proposal area and regional records, the Deception Deposit proposal is not expected to have a significant impact to vertebrate fauna values.

Assessment of Potential Impact to Potential Short-Range Endemic Fauna Species

A total of 26 potential SRE invertebrate fauna were recorded by Biota (2011c) in the area of the Deception Deposit proposal. Short-range endemic invertebrate fauna are generally described as fauna having a naturally small spatial distribution (<10,000km^2), and typically with characteristics that include poor powers of dispersal, confinement to discontinuous habitats, activity restricted to seasons (active during cooler and wetter months) and/or low levels of fecundity (resulting in low abundance) (Harvey 2002 in EPA 2009).

The potential SRE fauna assemblage of the Deception Deposit area included 22 mygalomorph spider taxa, 3 millipede taxa and one snail taxa. None of the potential SRE invertebrate taxa are considered to be of conservation significance.

As identified by Biota (2011c), all taxa recorded within the Deception Deposit area were also recorded at contextual sites (beyond the proposed impact areas) or are considered likely to occur outside of the Deception Deposit area based on the wider distribution of habitat types. Accordingly, the objectives of EPA (2009) for potential SRE invertebrate fauna can be met.

Assessment of Potential Cumulative Impact to Fauna

Cumulative impacts in environmental impact assessment are often difficult to predict as a result of the inherent limitation of insufficient regional data. Accordingly, assessments of cumulative impacts are often broad in context, with a similar broad approach applied for assessment of cumulative impacts for the Deception Deposit proposal.

As identified above, direct impacts to fauna values from implementation of the Deception Deposit proposal is unlikely to be significant. Similarly, the impact to values fauna from implementation of the Deception Deposit proposal along with existing impacts in the region is unlikely to result in a cumulative impact that would change the conservation status of any fauna species.

Whilst the Deception Deposit mine area has been subject to mineral exploration works over several years, the vegetation is largely intact and undisturbed. Similarly, the area of the Deception Deposit haul road is also

predominantly undisturbed. There is no notable land clearing in the vicinity of these proposal areas, and as such, cumulative impacts from the Deception Deposit proposal to fauna habitat is not relevant.

The southern 5km of the Deception Deposit haul road occur in the area of the Windarling Range, of which part of the Windarling Range has been subject to notable land clearing resulting from development of Cliffs' Windarling Range mine operations. Cliffs currently has land clearing approval of approximately 600ha for the Windarling Range. The 5km section of the Deception Deposit haul road within the area of the Windarling Range will be approximately 20ha (based on a nominal 40m width), which is not considered a significant increase to the existing approved impacts to fauna habitat in this area.

Assessment of Potential Indirect Impact to Fauna - Collision

The potential for indirect impact to fauna from collision with mine vehicles is a relevant consideration for fauna having low mobility and/or low population densities. Fauna with low movement speed, such as *L. ocellata* and potential SRE invertebrate fauna, have a low ability to avoid impact if a collision is likely. A collision with a fauna species having a low population density, such as *L. ocellata*, could be considered a significant impact to the local population.

The potential for significant indirect impact to *L. ocellata* is considered low based on Cliffs' existing mine operations, whereby only 1 *L .ocellata* collision with a mine vehicle has been recorded across all Cliffs' mine operations in the previous 7 years (2004 to present). The potential for significant indirect impact to potential SRE invertebrate fauna is also considered low as such fauna are considered unlikely to move beyond the areas of available habitat given the lack of cover and exposure to predators

Assessment of Potential Indirect Impact to Fauna – Post-mining Permanent Surface Water

In previous environmental assessments of mine operations in the Yilgarn region, EPA have suggested a potential risk for the attraction of native and feral fauna to post-mining permanent surface water remaining in mine pits, and the potential for such feral fauna to be sustained and subsequently predate upon native fauna and graze upon native flora (EPA 2010c; EPA 2010d; EPA 2010e; EPA 2011c). The basis for this theory from EPA is understood by Cliffs to arise from the recording of feral fauna to agricultural water sources, and the potential for subsequent impact from predation and grazing.

Based on the modelling undertaken by Rockwater (2011; Appendix 10), the post-mining permanent surface water within the Deception Deposit mine pit will stabilise at an elevation of approximately 340mAHD, being approximately 150m below the surrounding land. The mine pit depth, combined with the step sides of the decommissioned mine pit, will make this post-mining permanent surface water predominantly inaccessible for fauna.

The salinity of the post-mining permanent surface water is expected to increase over time as a result of high evaporation from within the mine pit (removal of fresh water) and infiltration into the mine pit of moderately saline groundwater. The post-mining permanent surface water within the Deception Deposit mine pit is expected to have a salinity of approximately 25,000mg/L (Rockwater 2011) and consequently will be unpalatable for most fauna species, and as such, if fauna were attracted and able to access the water, it would unlikely sustain a fauna population. Further, in previous assessment of deepening Cliffs' Windarling Range W2 Deposit Mine Pit that would similarly result in post-mining permanent surface water, specifically in relation to goats, DEC advised that despite the presence of fresh and saline water sources in the region a sustained feral fauna population has not occurred and an increase in available water was unlikely to change this status (pers. com. M Onus in Cliffs 2008).

Accordingly, the risk of attraction of native and feral fauna to post-mining permanent surface water remaining in the Deception Deposit mine pit is considered low, as is the risk for feral fauna to be sustained and subsequently predate upon native fauna and graze upon native flora.

To note, the Deception Deposit proposal is located within the Diemals Pastoral Lease, which contains many fresh water watering points for stock; the nearest being at Pigeon Rock approximately 7km to the south of the Deception Deposit mine area. Implementation of the Deception Deposit proposal is not expected to significantly alter this current availability of water to fauna.

3.2.5 Management Actions

Fauna Management

Fauna at Cliffs' existing Yilgarn Operations is undertaken in accordance with a Fauna Management Plan (Cliffs 2011f; Appendix 7), which forms part of as part of Cliffs' ISO 14001:2004-certified Environmental Management System.

Cliffs' Fauna Management Plan outlines a range of management actions, which in relation to fauna include:

1. Vehicle speeds restricted to 90km on haul roads and 60km/hr (or less) within mine areas;
2. Prohibition of off-road vehicle use;
3. Prohibition of capturing or harm to native fauna;
4. Recording of feral fauna sightings;
5. Trapping of feral cats;
6. Fencing of water supply dams to exclude fauna, with fauna egress matting installed to assist with fauna escape in the event of access;
7. Recording and reporting to government of *L. ocellata* mortalities; and
8. Education and training of mine personnel.

Cliffs will implement the Fauna Management Plan to ensure that fauna are appropriately managed for the Deception Deposit proposal.

Land Clearing Management

Land clearing at Cliffs' existing Yilgarn Operations is undertaken in accordance with a Land Clearing Management Plan (Cliffs 2011b; Appendix 3), which forms part of Cliffs' ISO 14001:2004-certified Environmental Management System. The Land Clearing Management Plan has been implemented at the Yilgarn Operations since 2004 and has been subject to previous review by EPA, DEC, DMP and DoSEWPC.

Cliffs' Land Clearing Management Plan outlines a range of management actions, which in relation to fauna include:

1. Minimising vegetation clearing;
2. Site Disturbance Permit procedure to control land clearing;
3. Monitoring of land clearing;
4. Auditing of clearing areas against approved Site Disturbance Permits;
5. Rehabilitation of disturbed areas;
6. Reporting to government of land clearing areas; and
7. Education and training of mine personnel.

Cliffs will implement the Land Clearing Management Plan to ensure that land clearing is appropriately managed for the Deception Deposit proposal.

Mine Closure

Mine closure actions to restore flora and vegetation values in order to restore fauna habitat values is addressed in Section 3.3 Mine Closure.

3.2.6 Commitments

Cliffs makes the following commitments for management of potential impacts to fauna for the Deception Deposit proposal:

1. **Fauna Management**
   - 1-1 Cliffs will undertake management of fauna in accordance with the Fauna Management Plan (Cliffs 2011f; Appendix 7) during implementation of the Deception Deposit proposal.
2. **Land Clearing Management**
   - 2-1 Cliffs will undertake management of land clearing in accordance with the Land Clearing Management Plan (Cliffs 2011b; Appendix 3) during implementation of the Deception Deposit proposal.

A consolidation of Cliffs' commitments for the Deception Deposit proposal is contained in Section 5.

3.2.7 Conclusion

As identified by the above assessment, the potential impact of the Deception Deposit proposal to fauna values is not expected to be significant. The potential impact to fauna values can be managed through implementation of actions contained in the Land Clearing Management Plan and the Fauna Management Plan.

Accordingly, EPA's objective for this factor can be met.

3.3 Mine Closure

3.3.1 Aspect

The Deception Deposit proposal will require mine closure following the completion of mining. Section 3.3 assesses mine closure for the Deception Deposit proposal.

3.3.2 EPA Objective

The EPA's objective for decommissioning is:

- To ensure, as far as practicable, that rehabilitation achieves a stable and functioning landform which is consistent with the surrounding landscape and other environmental values (EPA 2010b).

3.3.3 Legislation, Guidelines, Standards and Approvals

- Yilgarn Operations Deception Deposit Mine Closure Plan (Cliffs 2011g; Appendix 8)
- *Mining Act 1978* (WA);
- *Environmental Protection Act 1986* (WA);
- *Mines Safety and Inspection Regulations 1995* (WA);
- Guidelines for Preparing Mine Closure Plans (DMP & EPA 2011);
- Strategic Framework for Mine Closure (ANZMEC & MCA 2000);
- Mine Closure and Completion: Leading Practice Sustainable Development Program for the Mining Industry (Department of Industry, Tourism and Resources 2006);
- Safety Bund Walls Around Open Pit Mines – Guideline (DMP 1997);
- Environmental Notes on Mining: Waste Rock Dumps (DMP 2001);
- Managing Sulphidic Mine Wastes and Acid Drainage: Best Practice Environmental Management in Mining (DoSEWPC 1997); and
- EPA Guidance Statement 6: Guidance for the Assessment of Environmental Factors – Rehabilitation of Terrestrial Ecosystems (EPA 2006b).

3.3.4 Environmental Impact Assessment

Legislative Framework for Mine Closure

Mine closure in Western Australia is principally regulated under the *Mining Act 1978* (WA) administered by DMP. More recently, EPA given additional focus to mine closure for mine developments assessed under the *Environmental Protection Act 1986* (WA). In June 2011, DMP and EPA published a guideline on mine closure that seeks to outline the requirements for mine closure that will meet the requirements of both DMP and EPA under both the *Mining Act 1978* (WA) and the *Environmental Protection Act 1986* (WA), respectively.

Consistent with DMP and EPA (2011), for the purposes of mine closure, the components of the Deception Deposit proposal are each managed as a Mine Closure Management Unit, with mine closure objectives and completion criteria specified for each Mine Closure Management Unit. The Mine Closure Management Units for the Deception Deposit proposal are identified in Figure 3-4.

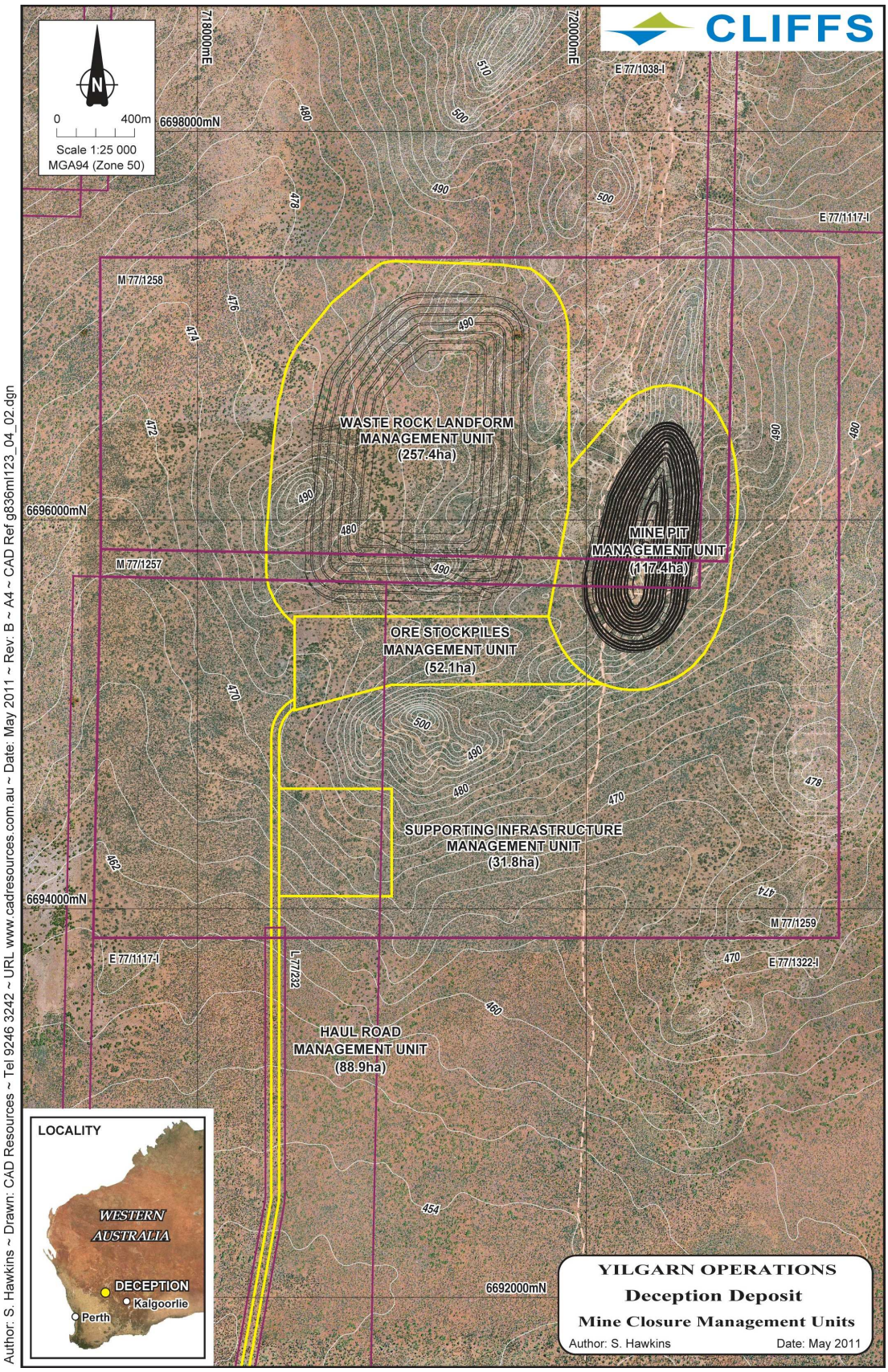

Figure 3-4 Mine Closure Management Units for the Deception Deposit Proposal. Consistent with DMP and EPA (2011), the components of the Deception Deposit proposal are each considered as a separate Mine Closure Management Unit.

Mine Closure of the Deception Deposit Proposal

In accordance with DMP & EPA (2011), Cliffs has prepared a Mine Closure Plan for the Deception Deposit proposal (Cliffs 2011g; Appendix 8). The Mine Closure Plan addresses the following key considerations for mine closure:

- Mine closure aspects;
- Mine closure objectives;
- Completion criteria;
- Financial provision; and
- Monitoring.

The key considerations for mine closure of the Deception Deposit proposal, as outlined within the Mine Closure Plan (Cliffs 2011g; Appendix 8), are summarised below:

Mine Closure Aspects

The mine closure aspects relevant to the Deception Deposit proposal have been considered by Cliffs, based on the proposal design and Cliffs' experience obtained from preliminary mine closure at existing mine operations. The key mine closure aspects are:

- Infrastructure retention or removal;
- Safety;
- Contamination;
- Rehabilitation;
- Water quality; and
- Long-term management.

Each of the aspects listed above is addressed below for mine closure of the Deception Deposit proposal.

Infrastructure Retention or Removal

At the completion of mine operations, above-ground infrastructure such as buildings and machinery will need to be removed. This infrastructure will be re-used, recycled or disposed of (as appropriate).

The haul road may have suitable uses post-mining if retained, such as access for ongoing mining, conservation, tourism or pastoralism. At a time near mine closure, a decision will be made as to the retention or removal of the haul road (and internal mine roads), in part, or in full. The decision as to the retention or removal of the haul road will be made in consultation with relevant landowners, tenement holders, DMP and EPA.

Safety

In consideration of the mine pit design and the unweathered geological rock structure of the Deception Deposit, in accordance with DMP (1997) and for the purposes of human and fauna safety, Cliffs will need to install a continuous abandonment bund around the mine pit at mine closure. The abandonment bund will be at least 2m in height with a 5m base width, and located within the outer 10m of the mine pit footprint boundary (yellow) identified in Figure 3-4.

Contamination

Characterisation of waste rock from the Deception Deposit undertaken by Soil Water Consultants (SWC 2011a; Appendix 11) identified:

- The majority (99%) of waste rock is classified as non-PAF, and accordingly, the waste rock does not require specific management for disposal;
- The majority of waste rock is classified as non-saline, and accordingly, the waste rock does not require specific management for disposal;
- The dominant waste rock materials generally contain low levels of metalloids, and accordingly, the risk of metaliferous drainage is considered low; and
- PAF material was recorded outside of the mine pit (located several metres below the base of the mine pit where the lithologies change from mineralised (ore) to unmineralised), with the volume of PAF material being small and not expected to impact post-mining water quality within the mine pit.

Based on the waste rock characterisation undertaken by SWC (2011a), the Deception Deposit proposal is not expected to have risk of contamination from the disposal of waste rock, and no specific management strategies will be necessary for waste rock disposal.

Mine operations may also have the potential to result in localised areas of contamination, such as those which may occur from chemical or hydrocarbon spillages or leaks. The risk of potentially contaminated areas will be greatest in the supporting infrastructure management unit where potentially contaminating materials will be stored. Such potentially contaminated areas will be investigated and remediated as part of mine closure, with specific focus to areas including hydrocarbon (fuels and oils) storage areas, chemical and explosives storage areas, power generation facilities, equipment wash-down bays and drainage sumps. As the areas occupied by these facilities form a small component of the Deception Deposit proposal, the potential degree of contamination is expected to be small, and manageable by in-situ treatment and/or deep burial.

Rehabilitation

Characterisation of soils from the Deception Deposit proposal area undertaken by Soil Water Consultants (SWC 2011b; Appendix 12) identified:

- 3 soil units occurred across the Deception Deposit proposal area;
- 2 soil units are suitable for use as topsoil in rehabilitation works, with the remaining 1 soil unit not suitable for topsoil use (due to dispersive and erosive properties) and therefore should be used as subsoil;
- All topsoils and subsoils were non-saline and non-sodic; and
- Appropriate removal and use of topsoil and subsoil will produce a rehabilitation topsoil depth of approximately 0.6m and a subsoil depth of approximately 0.5m, both which will be favourable growth mediums for rehabilitation works.

Rehabilitation of the Deception Deposit proposal will include the following general actions, which are consistent with the general rehabilitation practices employed at mines in Western Australia:

- Deep ripping of hardstand areas for improved soil condition and drainage;

- Respreading of stored topsoil, subsoil and retained vegetation (that were stockpiled during initial mine clearing) to provide a plant growth medium, topsoil-stored seed and a microclimate for seed growth; and
- Spreading of seed collected during mine operations.

Where possible, rehabilitation actions will be undertaken progressively during mine development. Progressive rehabilitation works will predominantly apply to the waste rock landform, with such rehabilitation expected to commence from approximately 2016 when construction of the first lifts have been completed.

The mine closure management unit for the mine pit will not be rehabilitated as the consolidated rock substrate and steep sides are not conducive to plant growth. Additionally, it is not safe for mine personnel to attempt rehabilitation works on the steep sides of a mine pit.

Figure 2-5 identifies a conceptual cross-section design of the Deception Deposit waste rock landform and the placement of topsoil and subsoil for rehabilitation works. Conceptual impressions of the Deception Deposit proposal area during mining and post-mining are provided in Figures 3-6 and 3-7 to indicate the spatial extent of mine operations and rehabilitation works at the completion of mine closure.

Water Quality

Rockwater Pty Ltd has undertaken groundwater modelling for the Deception Deposit, including the post-mining groundwater recovery. Rockwater (2011; Appendix 10) identifies that the groundwater is expected to recover and fill the lower portion of the Deception Deposit mine pit to an elevation of approximately 275mAHD (20m water depth) within the first year after the cessation of mine dewatering, to approximately 300mAHD (45m water depth) within 3 years, and stabilise at an elevation of approximately 340mAHD (65m water depth) within approximately 12 years.

As also identified by Rockwater (2011), the Deception Deposit mine pit will act as a groundwater sink, with groundwater moving towards the mine pit (not out of the mine pit), such that any change to the water quality within the mine pit will be confined to within the mine pit itself; with no impact to the surrounding groundwater quality.

The salinity of the post-mining permanent surface water is expected to increase over time as a result of high evaporation from within the mine pit (removal of fresh water) and infiltration of moderately saline groundwater to within the mine pit. This expected change in water salinity of the post-mining permanent surface water is not considered significant, noting the expected water salinity is well within the natural regional groundwater salinity ranges (refer Section 2.5).

Geochemical characterisation of waste rock of the Deception Deposit mine pit undertaken by Soil Water Consultants (2011a) identified that no PAF waste rock is expected in the walls of the mine pit, with only limited PAF material outside of the mine pit (several metres below the base of the mine pit) that is not expected to impact post-mining water quality within the mine pit. If the water quality of the post-mining permanent surface water within the Deception Deposit mine pit did change as a result of PAF material located outside of the mine pit, being contrary to the findings of SWC (2011a), then as noted by Rockwater (2011), any

change to the water quality would be confined to the Deception Deposit mine pit itself, with no impact to the surrounding groundwater quality.

There are no mine closure management actions which Cliffs could implement to control the recovery of the groundwater following the completion of mining, nor is such control considered necessary. There are similarly no mine closure management actions which Cliffs could implement to control the water quality within the mine pit following the completion of mining, nor is such control considered necessary as any water quality changes would be confined to the mine pit itself. Accordingly, no management actions with regards to water quality are proposed for mine closure.

Long-term Management

The Deception Deposit proposal is located within the Diemals Pastoral Lease, being one of many pastoral leases in the Yilgarn region on which pastoral activities have occurred for more than 50 years. A part of the Diemals Pastoral Lease has been proposed by Government to be excluded in 2015 when the lease expires and is available for renewal, with the proposed expired portion to have a land tenure of Vacant Crown Land. The Western Australian Government also announced in 2012 a proposal to create a "Conservation and Mining Reserve' coinciding with a proportion of the Diemals Pastoral Lease, with reservation yet to progress through the *Land Administration Act 1997* (WA). The area of proposed exclusion from the Pastoral Lease and the area of the proposed Conservation and Mining Reserve coincides with most of the Deception Deposit proposal area, excepting the northernmost end of the Deception Deposit Mine Pit and the Deception Deposit Waste Rock Landform for which the underlying land tenure will remain as part of the Diemals Pastoral Lease. Given the current land use and the proposed future land uses, the post-mining land use for the land areas covered by the Deception Deposit proposal is considered uncertain.

Irrespective of this current uncertainty, Cliffs' broad mine closure objective will be to rehabilitate with native vegetation the areas disturbed by the Deception Deposit proposal, and to ensure that the land and landforms are safe, stable and non-polluting to enable a post-mining land use. This broad mine closure objective is generally expected to result in an acceptable standard that will enable long-term management by the then landowner.

Mine Closure Objectives

As identified above, Cliffs' broad mine closure objective will be to rehabilitate with native vegetation the areas disturbed by the Deception Deposit proposal, and to ensure that the land and landforms are safe, stable and non-polluting to enable a post-mining land use. Consistent with DMP and EPA (2011), for the purposes of mine closure, the components of the Deception Deposit proposal are each considered as mine closure management units, with mine closure objectives specified for each mine closure management unit. Cliffs' mine closure objectives for each mine closure management unit for the Deception Deposit proposal are identified in Table 3-3.

Management Unit	Mine Closure Objective
Mine Pit	Abandonment bunding installed around the crest of the mine pit
Waste Rock Landform	Safe, stable and non-polluting
	Rehabilitated with native vegetation
Ore Stockpiles	Rehabilitated with native vegetation
Support Infrastructure	Infrastructure removed
	Contamination remediated
	Rehabilitated with native vegetation
Haul Road	Rehabilitated with native vegetation[1]

Table 3-3 Mine Closure Objectives for the Deception Deposit Proposal. The mine closure objectives for each mine closure management unit are identified. The mine closure objectives are based on the identified mine closure aspects.

[1] Subject to the retention of removal considerations identified above.

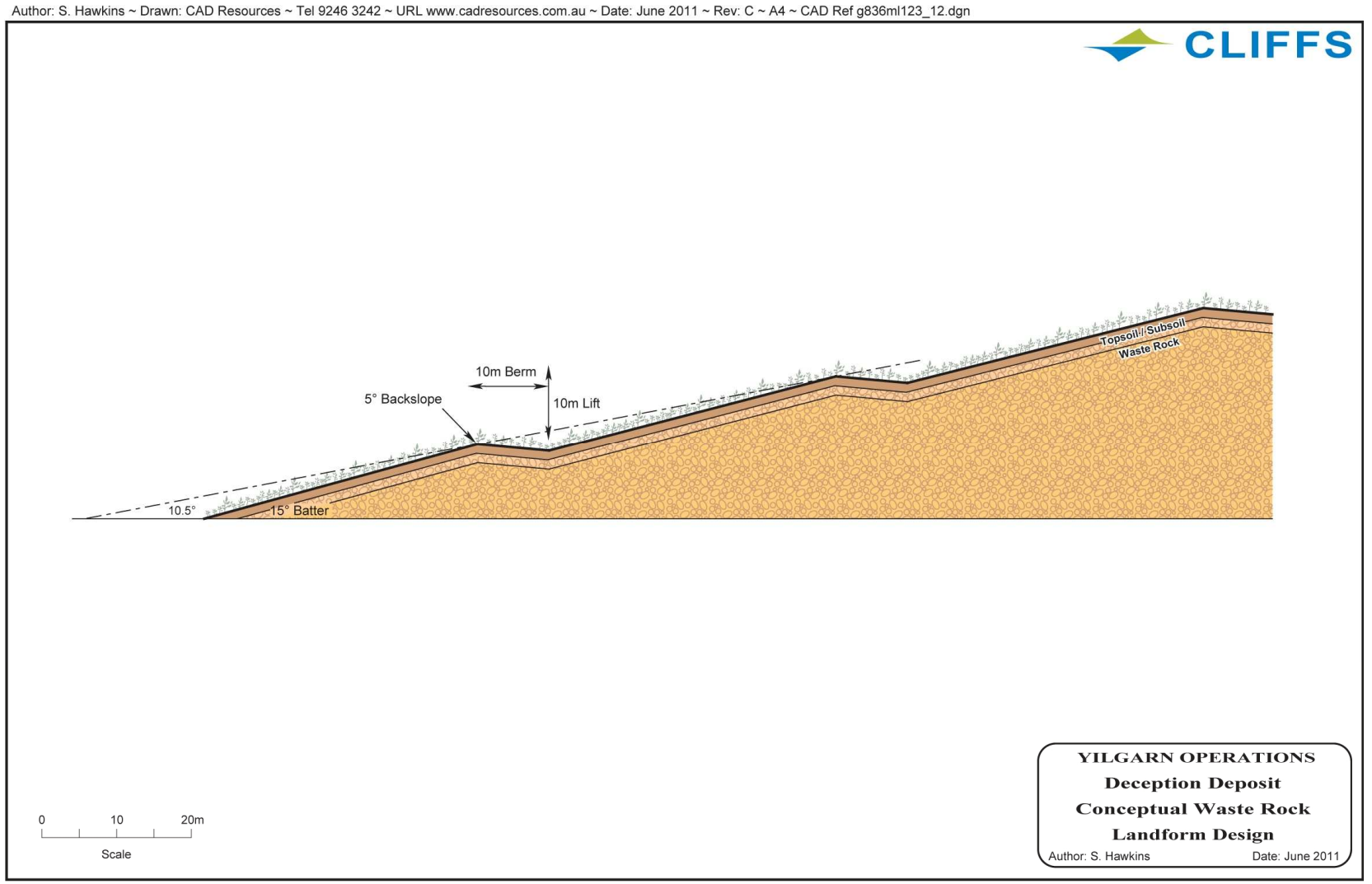

Figure 3-5 Waste Rock Landform Conceptual Design Cross-section for the Deception Deposit Proposal. The conceptual design of the Waste Rock Landform is based on 10m lifts having a 15^{o} batter, a 10m berm with a 5^{o} backslope between lifts, and having an overall angle of 10.5^{o}. Topsoil and subsoil overlay the waste rock to provide a growth media for the rehabilitation works.

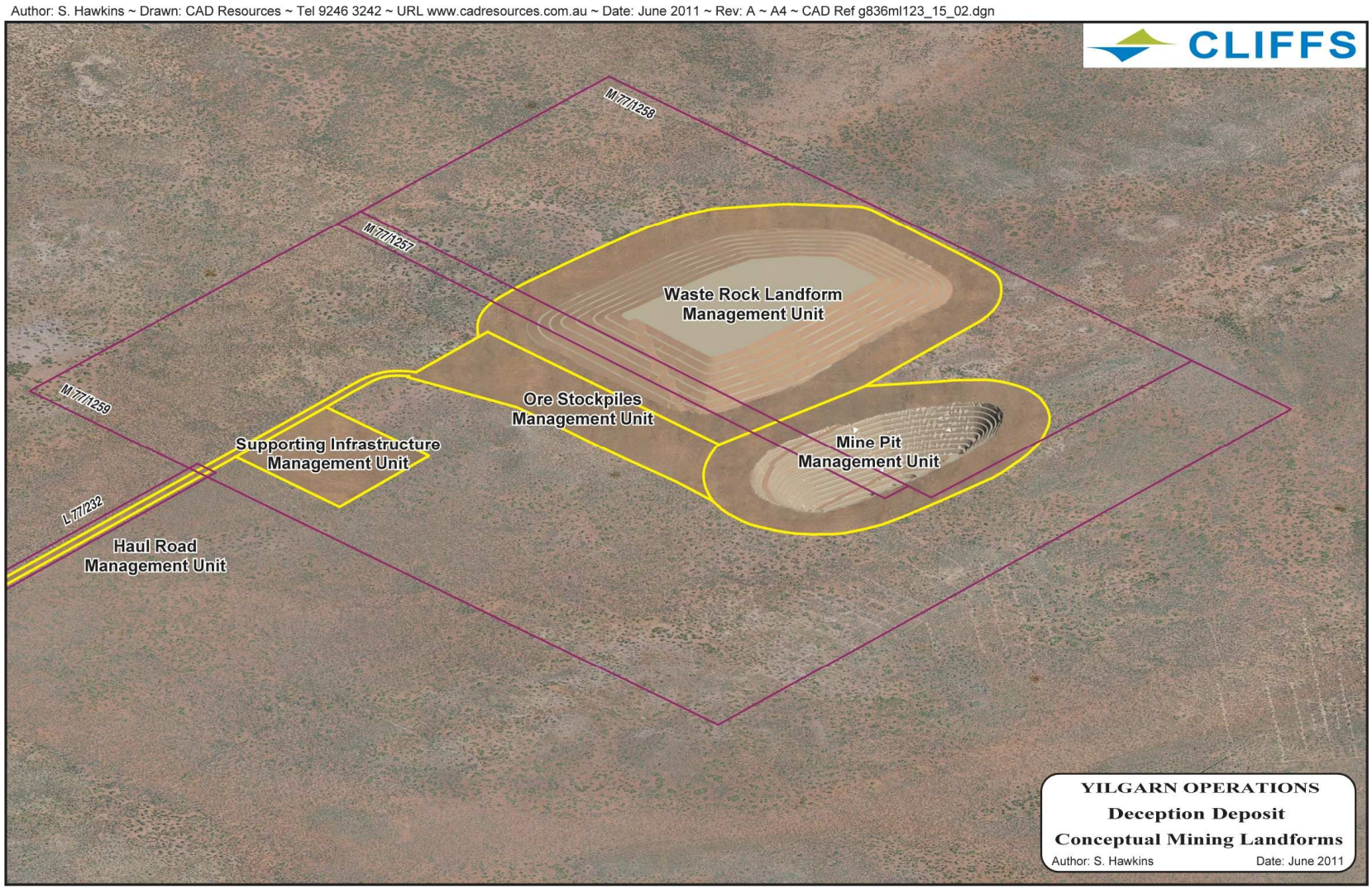

Figure 3-6 Conceptual Impression of the Deception Deposit mine area in Mining. A three-dimensional conceptual impression of the Deception Deposit mine area landforms during mine operations is depicted. The mine closure management units for the Deception Deposit proposal are identified.

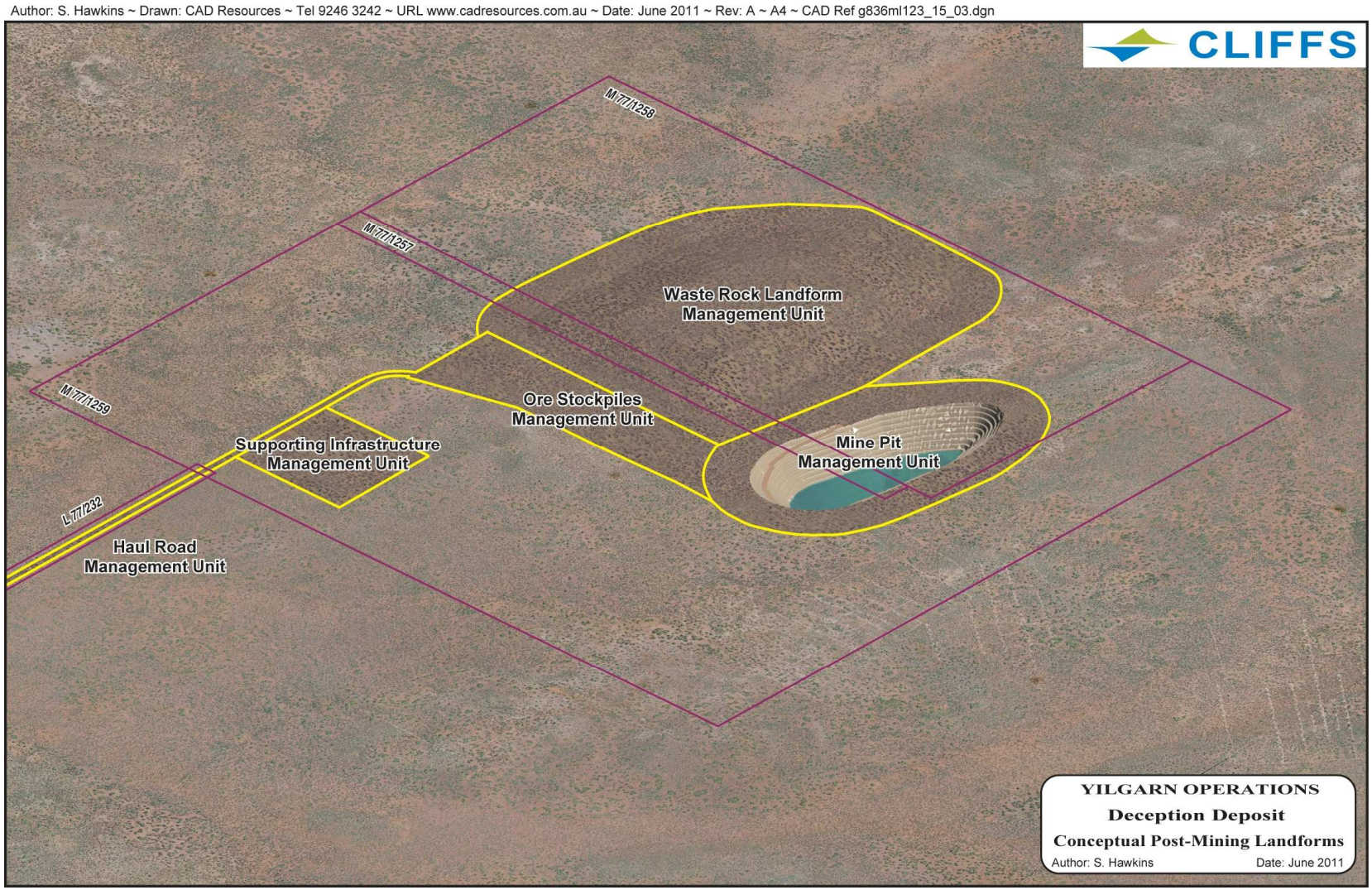

Figure 3-7 Conceptual Impression of the Deception Deposit mine area Post-Mining. A three-dimensional conceptual impression of the Deception Deposit mine area landforms post-mining is depicted. The mine closure management units for the Deception Deposit proposal are identified. The impression depicts the impacted areas as rehabilitated as at the completion of mine closure, with post-mining permanent surface water within the Deception Deposit Mine Pit.

Completion Criteria

Completion criteria are an agreed set of performance indicators, which upon being met, will demonstrate successful mine closure, and subsequently, allow for long-term responsibility of the land to be transferred from the miner to the landowner. As outlined in DMP & EPA (2011), development of interim completion criteria should commence in the project approval stage, with the interim completion criteria refined during based on data obtained during proposal implementation. This process for development of completion criteria is illustrated in Figure 3-8.

In development of interim completion criteria, it is important to have regard to the following considerations:

- Mine landforms will be structurally different to natural landforms as a result of their different physical and chemical characteristics;
- Flora species composition and structure on mine landforms will be different to natural landforms as a result of the ability for each species to regenerate and/or be a function of the habitat requirements of each species;
- Separate completion criteria may be required for each management unit to address the differences in their physical and chemical characteristics; and
- Completion criteria should be developed over time based on the results monitoring of initial rehabilitation, consideration of appropriate reference sites and an improved understanding of physical and chemical characteristics of the rehabilitated landform.

Based on the mine closure objectives identified above, and knowledge gained from Cliffs' existing mine operations, Cliffs has developed interim completion criteria for the Deception Deposit mine operations. The interim completion criteria will be refined during implementation of the Deception Deposit proposal; consistent with the philosophy outlined in DMP & EPA (2011). Cliffs' interim completion criteria for the Deception Deposit proposal are provided in Table 3-4.

The interim completion criteria identified in Table 3-4 which relate to the safety, stability and waste containment for the waste rock landform identify the design criteria depicted in Figure 3-5, with this design criteria based on accepted mine engineering design and the experience of Cliffs in waste rock landform construction at its existing operations.

The interim completion criteria identified in Table 3-4 which relate to rehabilitation are based on the completion criteria recommended by EPA in previous mine development approvals for a flora species diversity (number of species per quadrat) of ≥70% of reference sites and foliar cover of ≥70% of reference sites, with the completion criteria of ≤5% weed cover being half of the ≤10% weed cover criterion previously recommended by EPA.

The interim completion criteria have been drafted in a manner such that they are directly measurable (e.g. percentages, angles, etc), or alternatively, can be determined by professional judgement of a competent professional for that field.

As outlined in DMP & EPA (2011) and illustrated in Figure 3-8, the completion criteria will be refined during proposal implementation based on additional data obtained. This data to be obtained during implementation of the Deception Deposit proposal is expected to include:

- Rehabilitation monitoring data from each mine closure management unit; and
- Reference site selection and assessment.

During proposal implementation, appropriate reference sites in non-impact areas will be selected for each mine closure management unit to assist in defining the final completion criteria. As each mine closure management unit will have different physical and structural properties, it is expected that separate reference sites will be selected for each mine closure management unit that best reflect the physical and structural properties (e.g. soil structure, elevation and aspect).

Development of the final completion criteria will include consultation with DMP and EPA as the key government stakeholders, and noting the expertise of these government agencies in mine closure standards accepted in Western Australia, with Cliffs' other stakeholders informed of the final agreed completion criteria. Similarly as identified for the interim completion criteria above, the final completion criteria should drafted with the objective of being directly measurable, or alternatively, can be determined by professional judgement of a competent professional for that field.

With specific regard to the final completion criteria for rehabilitation, the final completion criteria will need to be met for a specified number of consecutive years to provide confidence to DMP and EPA that the rehabilitation works will achieve native vegetation that is likely to be of self-sustaining ecosystem function in the long-term following the completion of mine closure.

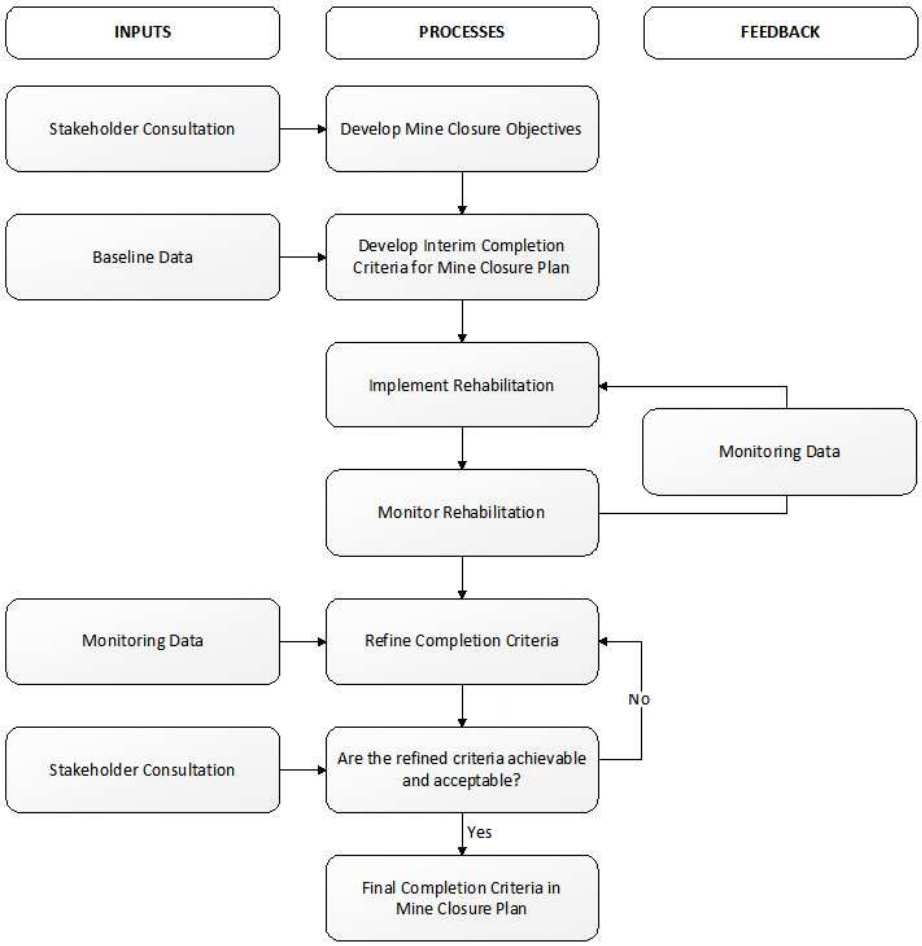

Figure 3-8 Process for Development of Mine Closure Completion Criteria. The development of completion criteria is an iterative process whereby the criteria is refined during proposal implementation through incorporating the monitoring data results from initial rehabilitation and ongoing stakeholder consultation. Adapted from Nichols (2010).

Management Unit	Mine Closure Objective	Interim Completion Criteria
Mine Pit	Abandonment bunding installed	• Abandonment bunding installed to design criteria: o 2m height o 5m base width o Located beyond zone of potential instability
Waste Rock Landform	Safe, stable and non-polluting	• Construction to design criteria: o 15° batters o 10m lifts o 10m berms with 5° backslope o Outer cover of topsoil and subsoil for rehabilitation • Surface water drainage controlled, comparable with drainage in surrounding areas
	Rehabilitated with native vegetation	• Flora species diversity ≥70% of reference sites • Percentage foliar cover ≥70% of reference sites • Weeds ≤5% cover
Ore Stockpiles	Rehabilitated with native vegetation	• Flora species diversity ≥70% of reference sites • Percentage foliar cover ≥70% of reference sites • Weeds ≤5% cover
Support Infrastructure	Infrastructure removed	• All above ground infrastructure removed
	Contamination remediated	• Potentially contaminated areas are investigated and remediated where appropriate
	Rehabilitated with native vegetation	• Flora species diversity ≥70% of reference sites • Percentage foliar cover ≥70% of reference sites • Weeds ≤5% cover
Haul Road	Rehabilitated with native vegetation	• Flora species diversity ≥70% of reference sites • Percentage foliar cover ≥70% of reference sites • Weeds ≤5% cover

Table 3-4 Interim Mine Closure Completion Criteria for the Deception Deposit Proposal.

Financial Provision

Cliffs maintains financial provision for mine closure costs, with this financial provision maintained as a liability on corporate accounts. The estimates are based on established unit rate cost estimates provided by industry third parties providing service to Cliffs. The underlying rehabilitation cost assumptions and the resulting unit cost estimates are independently reviewed every three years to ensure the estimated unit costs are periodically refined to reflect true cost, with the financial provision reviewed each six months to account for changes in the area of land disturbance.

Cliffs' mine closure cost for the Deception Deposit proposal has been estimated at approximately A$9million, based on the unit cost estimates and the area of each mine closure management unit. As previously agreed with EPA (T Gentle pers. com. July 2011), the breakdown of financial provisions has not been provided in this EIA-API document or the appended Mine Closure Plan as such detail is commercial-in-confidence and not necessary for the purposes of EPA's environmental impact assessment processes under the *Environmental Protection Act 1986* (WA). The specific breakdown of the financial provisions will be considered by DMP as part of the *Mining Act 1978* (WA) assessment processes of the Mine Closure Plan.

Monitoring

Monitoring of mine closure is necessary to assist in the development of final completion criteria, and in determining whether the final completion criteria have been met.

Monitoring of mine closure is expected to commence from 2016 as part of progressive rehabilitation of the waste rock landform (as identified above) and continue for 10 years to 2026 when Cliffs anticipates the final completion criteria will be met. Formal monitoring has been scheduled by Cliffs to occur each 2 years from 2016, which will be in addition to the informal monitoring (observations) by Cliffs' on-site environmental personnel during proposal implementation and progressive mine closure. Table 3-6 identifies the monitoring to be undertaken to monitor against each completion criteria and the frequency of monitoring.

Monitoring by visual inspection will be undertaken by suitably qualified environmental and/or geological personnel from Cliffs, or consultants to Cliffs having equivalent qualification. Monitoring by botanical assessment will be undertaken by suitably qualified environmental personnel from Cliffs, or consultants to Cliffs having equivalent qualification. Monitoring by contamination assessment will be undertaken by suitably qualified environmental personnel from Cliffs, or consultants to Cliffs having equivalent qualification.

Where monitoring indicates that progress towards meeting the completion criteria is not progressing as necessary, contingency actions will be implemented, which may include additional civil earthworks, additional removal of infrastructure, further investigation and remediation of contamination, and/or additional revegetation works, with subsequent additional monitoring to then also be implemented.

Management Units	Interim Completion Criteria	Monitoring	Frequency
Mine Pit	• Abandonment bunding installed to design criteria: o 2m height o 5m base width o Located beyond zone of potential instability	Survey	Once, 2022
Waste Rock Landform	• Construction to design criteria: o 15° batters o 10m lifts o 10m berms with 5° backslope o Outer cover of topsoil and subsoil for rehabilitation	Survey	Each 2 years, 2016-2026
	• Surface water drainage controlled, comparable with drainage in surrounding areas	Visual inspection	Each 2 years, 2016-2026
	• Flora species diversity ≥70% of reference sites • Percentage foliar cover ≥70% of reference sites • Weeds ≤5% cover	Botanical assessment	Each 2 years, 2016-2026
Ore Stockpiles	• Flora species diversity ≥70% of reference sites • Percentage foliar cover ≥70% of reference sites • Weeds ≤5% cover	Botanical assessment	Each 2 years, 2022 to 2026
Support Infrastructure	• All above ground infrastructure removed	Visual inspection	Each 2 years, 2022 to 2026
	• Potentially contaminated areas are investigated and remediated where appropriate	Contamination assessment	Each 2 years, 2022 to 2026
	• Flora species diversity ≥70% of reference sites • Percentage foliar cover ≥70% of reference sites • Weeds ≤5% cover	Botanical assessment	Each 2 years, 2022 to 2026
Haul Road	• Flora species diversity ≥70% of reference sites • Percentage foliar cover ≥70% of reference sites • Weeds ≤5% cover	Botanical assessment	Each 2 years, 2022 to 2026

Table 3-5 Mine Closure Monitoring for the Deception Deposit Proposal.

3.3.5 Management Actions

As identified above, Cliffs has prepared a Mine Closure Plan for the Deception Deposit proposal (Cliffs 2011g; Appendix 8), consistent with the requirements of DMP & EPA (2011). The Mine Closure Plan addressed the following key actions for mine closure:

- Mine closure aspects;
- Mine closure objectives;
- Completion criteria;
- Financial provision; and
- Monitoring.

Cliffs will implement the Mine Closure Plan for the Deception Deposit proposal to ensure that the mine operations are appropriately decommissioned.

3.3.6 Commitments

Cliffs makes the following commitments for decommissioning of the Deception Deposit proposal:

1 Mine Closure

1-1 Cliffs will undertake management of mine closure in accordance with the Yilgarn Operations Deception Deposit Mine Closure Plan (Cliffs 2011g; Appendix 8) during implementation of the Deception Deposit proposal.

A consolidation of Cliffs' commitments for the Deception Deposit proposal is contained in Section 5.

3.3.7 Conclusion

As identified by the above assessment, the Deception Deposit proposal infrastructure will be decommissioned in accordance with the requirements outlined in DMP & EPA (2011). Accordingly, EPA's objective for this factor can be met.

4 Consultation

Consultation is a fundamental component of an impact assessment process. As part of planning for the Deception Deposit proposal, Cliffs has identified a number of key stakeholders. These stakeholders include both government and non-government organisations. Details of the consultations undertaken for the Deception Deposit proposal are identified below.

4.1 Government Organisations Consulted

4.1.1 Environmental Protection Authority

Prior to referral of the Deception Deposit proposal, informal preliminary consultation was held with EPA (Mr R Sutherland) on 15th March 2011. This informal preliminary consultation discussed the general location of the Deception Deposit proposal, environmental surveys being undertaken and the proposed referral to EPA.

The Deception Deposit proposal was referred to EPA on 7th April 2011 (Cliffs 2011a) under s38(1) of the *Environmental Protection Act 1986* (WA). The proposal referral document identified the scope of the Deception Deposit proposal, included maps identifying the proposal infrastructure relevant to key environmental matters, EMPs proposed for management of the environmental aspects of the proposal, and the key environmental reports completed to support the proposal referral.

The Deception Deposit proposal was made available for public comment by EPA between 28th April 2011 and 4th May 2011.

The EPA reviewed the Deception Deposit referral submitted by Cliffs and set a level of assessment at Assessment on Proponent Information on 11th May 2011 (EPA 2011b).

On 7th June 2011, Cliffs met with EPA (M Jefferies, P Tapsell, C Stanley) to discuss the environmental assessment approach, key environmental factors requiring assessment and assessment timelines.

On 23rd June 2011, EPA provided its scoping guideline for development of this EIA-API document (EPA 2011a), outlining the key environmental factors for assessment as being:

- Flora;
- Fauna; and
- Mine Closure.

On 18th July 2011, DMP (C Stanley, T Gentle) attended a workshop hosted by Cliffs to discuss the draft Mine Closure Plan. Key aspects discussed included completion criteria (including ecosystem function assumptions), risk assessment process, risk of acid and metaliferous drainage, monitoring/auditing during mine operations set the foundation for acceptable mine closure (e.g. topsoil resources stockpiled for use in rehabilitation, appropriate disposal of waste rock), and financial provisions. The key outcome from the workshop was an agreement by Cliffs to ensure the key aspects discussed were addressed in the final Mine Closure Plan.

On 1st August 2011, Cliffs submitted to EPA an EIA-API document (Revision C), prepared in accordance with the requirements of the Environmental Protection Authority Scoping Guideline (EPA 2011a) and in accordance with the *Environmental Impact Assessment Administrative Procedures 2010* (EPA 2010a). On 8th August 2011, EPA requested amendments to the EIA-API document, with amendments to the EIA-API document made by Cliffs to incorporate the key investigation reports (flora, fauna, groundwater and waste characterisation) as

appendices within the EIA-API document itself (in addition to the digital copies of these reports that area provided on attached compact disc) and to provide additional contextual information on stormwater management in Sections 1.4 and 1.8. This EIA-API document (Revision D) was submitted to EPA on 15th August 2011 for assessment.

Consultation between EPA and Cliffs on the Deception Deposit proposal will be ongoing through the environmental assessment and approvals processes under the *Environmental Protection Act 1986* (WA), with the Deception Deposit proposal to be monitored by EPA during its implementation.

4.1.2 Department of Mines and Petroleum

Prior to referral of the Deception Deposit proposal, informal preliminary consultation was held with DMP (R De Bari, J Diss, M Freeman) on 4th April 2011. This informal preliminary consultation discussed the general location of the Deception Deposit proposal, environmental surveys being undertaken and the proposed referral to EPA.

On 7th April 2011, DMP was also provided a copy of the Deception Deposit proposal referral submitted to EPA (Cliffs 2011a), which included the scope of the Deception Deposit proposal, maps identifying the proposal infrastructure relevant to key environmental matters, EMPs proposed for management of the environmental aspects of the proposal, and the key environmental reports completed to support the proposal referral.

On 29th June 2011, a meeting was held with DMP (E Bouwhuis, R De Bari, T Sujdovic) to discuss key aspects and impacts of the Deception Deposit proposal. Consultation focussed on preparing a Mine Closure Plan consistent with DMP & EPA (2011). Key aspects discussed included mine infrastructure, post-mining landforms (including post-mining permanent surface water within the mine pit), drainage design and management, and financial provisions.

On 18th July 2011, DMP (E Bouwhuis, R De Bari, T Sujdovic) attended a workshop hosted by Cliffs to discuss the draft Mine Closure Plan. Key aspects discussed included completion criteria (including ecosystem function assumptions), risk assessment process, risk of acid and metaliferous drainage, monitoring/auditing during mine operations set the foundation for acceptable mine closure (e.g. topsoil resources stockpiled for use in rehabilitation, appropriate disposal of waste rock), and financial provisions. The key outcome from the workshop was an agreement by Cliffs to ensure the key aspects discussed were addressed in the final Mine Closure Plan.

Consultation between DMP and Cliffs on the Deception Deposit proposal will be ongoing through the environmental and mining assessment and approvals processes under the *Mining Act 1978* (WA), environmental assessment and approvals processes under the *Environmental Protection Act 1986* (WA), and during implementation of the Deception Deposit proposal under the *Mining Act 1978* (WA).

4.1.3 Department of Environment and Conservation

Prior to referral of the Deception Deposit proposal, informal preliminary consultation was held with DEC (D Coffey, S Thomas, D Pickles, M Smith) on 18th March 2011. This informal preliminary consultation discussed the general location of the Deception Deposit proposal, environmental surveys being undertaken and the proposed referral to EPA.

On 7th April 2011, DEC was also provided a copy of the Deception Deposit proposal referral document submitted to EPA (Cliffs 2011a), which included the scope of the Deception Deposit proposal, maps identifying

the proposal infrastructure relevant to key environmental matters, EMPs proposed for management of the environmental aspects of the proposal, and the key environmental reports completed to support the proposal referral. Copies of the Deception Deposit proposal referral document were provided to both the Perth (Kensington) and Regional (Kalgoorlie) offices of DEC.

On 14th July 2011, a meeting was held with DEC (D Coffey, M Smith) to discuss key aspects and impacts of the Deception Deposit proposal. This consultation specifically discussed matters including the potential impact and regional context for the flora species *Baeckea ochropetala* (P1), the proposed Conservation and Mining Reserve, potential for visual impact from nearby ranges, and mine closure aspects including development of completion criteria and post-mining permanent surface water within the mine pit. The outcome of this consultation was a commitment by Cliffs to ensure the matters raised by DEC were addressed within this EIA-API document.

An invitation also was extended to DEC (D Coffey) to attend the workshop hosted by Cliffs on 18th July 2011 on the draft Mine Closure Plan for the Deception Deposit proposal. Whilst the DEC was unfortunately not available to attend this workshop, mine closure aspects had previously been discussed with DEC at the meeting of 14th July 2011.

Consultation between DEC and Cliffs on the Deception Deposit proposal will be ongoing through the environmental assessment and approvals processes under the *Environmental Protection Act 1986* (WA), and during implementation of the Deception Deposit proposal following the proposed excision of part of the Diemals Pastoral lease in 2015 and/or following proclamation the proposed Conservation and Mining Reserve.

4.1.4 Department of Water

On 27th June 2011, a meeting was held with DoW (Y Brookes, R Short, J McIntosh) to discuss key aspects and impacts of the Deception Deposit proposal. Consultation focussed on mine infrastructure, groundwater dewatering and groundwater modelling, land planning, post-mining permanent surface water within the mine pit, and processes for groundwater licensing. The outcomes of the consultation were that DoW were comfortable that the relevant aspects and impacts to water had been considered by Cliffs, and that these aspects and impacts could be managed in accordance with the current Groundwater Licence GWL154459 and the processes under the *Rights in Water and Irrigation Act 1914* (WA).

Consultation between DoW and Cliffs on the Deception Deposit proposal will be ongoing through annual reporting under Groundwater Licence GWL154459 and the processes under the *Rights in Water and Irrigation Act 1914* (WA).

4.1.5 Shire of Menzies

Prior to referral of the Deception Deposit proposal, informal preliminary consultation was held with the Shire of Menzies on 1st April 2011 (B Seale) and 12th April 2011 (Shire of Menzies Council). These informal preliminary consultations discussed the general location of the Deception Deposit proposal, infrastructure and proposed implementation schedule.

On 7th April 2011, the Shire of Menzies was also provided a copy of the Deception Deposit proposal referral submitted to EPA (Cliffs 2011a), which included the scope of the Deception Deposit proposal, maps identifying the proposal infrastructure relevant to key environmental matters, EMPs proposed for management of the environmental aspects of the proposal, and the key environmental reports completed to support the proposal referral.

On 19th April 2011, in response to the Deception Deposit proposal referral provided by Cliffs, the Shire of Menzies provided written advice to Cliffs that it had no objections to the proposal, and was pleased to be supportive of the proposal (Shire of Menzies 2011).

On 7th July 2011, in response to further opportunities for consultation on the Deception Deposit proposal, the Shire of Menzies (B Searle) advised they had no outstanding issues requiring consideration and were pleased to be supportive of the proposal.

Consultation between the Shire of Menzies and Cliffs on the Deception Deposit proposal will be ongoing through the land planning assessment and approvals process under the *Planning and Development Act 2005* (WA), through the environmental assessment and approvals processes under the *Environmental Protection Act 1986* (WA), and during implementation of the Deception Deposit proposal.

4.1.6 Shire of Yilgarn

Prior to referral of the Deception Deposit proposal, informal preliminary consultation was held with the Shire of Yilgarn (J Sowiak) on 1st April 2011. This informal preliminary consultation discussed the general location of the Deception Deposit proposal.

On 7th April 2011, the Shire of Yilgarn (J Sowiak) was also provided a copy of the Deception Deposit proposal referral submitted to EPA (Cliffs 2011a), which included the scope of the Deception Deposit proposal, maps identifying the proposal infrastructure relevant to key environmental matters, EMPs proposed for management of the environmental aspects of the proposal, and the key environmental reports completed to support the proposal referral.

On 15th April 2011, the Shire of Yilgarn Council was provided a briefing on Cliffs' existing mine operations and the proposed extension with the Deception Deposit proposal. The key aspects of the Deception Deposit proposal discussed included the proposal location, proposal infrastructure (haul road within the Shire of Yilgarn) and the proposed implementation schedule.

Consultation between the Shire of Yilgarn and Cliffs on the Deception Deposit proposal will be ongoing through the environmental assessment and approvals processes under the *Environmental Protection Act 1986* (WA), and during implementation of the Deception Deposit proposal.

4.2 Non-Government Organisations Consulted

The Yilgarn Operations Community Reference Group (CRG) was formed in 2004 to provide review and comment on the environmental aspects of Cliffs' Yilgarn Operations. The CRG meets twice per year, in March and September. The CRG includes members of:

- Shire of Yilgarn;
- Malleefowl Preservation Group;
- Wildflower Society of Western Australia;
- Windarling Preservation Group;
- Yilgarn Land Conservation District Committee;
- Toodyay Naturalists Club;
- Pastoral representatives; and
- Community representatives.

Prior to referral of the Deception Deposit proposal, informal preliminary consultation was held with the CRG on 17th March 2011. Representatives of DEC (Mr D Pickles and Ms J Jackson) were also in attendance at this meeting. This informal preliminary consultation discussed the general location of the Deception Deposit proposal, environmental surveys being undertaken and the proposed referral to EPA.

In addition to the above consultation with the Community Reference Group, specific consultation was also undertaken with the Wildflower Society of Western Australia (B Moyle) on 22nd July 2011, consistent with the request of EPA (2011b). This consultation discussed the Deception Deposit proposal infrastructure, potential impacts to DEC-classified 'priority' flora species (in particular, *Eucalyptus formanii*), the proposed Conservation and Mining Reserve, potential for impact to pastoral access tracks, post-mining landforms and the potential visual amenity impact.

Consultation between the CRG and Cliffs on the Deception Deposit proposal will be ongoing through the set CRG meetings, both during its environmental assessment and during proposal implementation.

4.3 Ongoing Consultation

Consultation with the key regulatory agencies for the Deception Deposit proposal, being EPA and DMP and DoW, will be ongoing during implementation of the Deception Deposit proposal through the annual compliance reporting provisions under the statutory approvals issued or managed by these agencies.

Consultation with DEC is also expected to be ongoing during implementation of the Deception Deposit proposal following the proclamation of the proposed Conservation and Mining Reserve coinciding with the part of the Deception Deposit proposal area.

Consultation with the community through the CRG is also expected to be ongoing during implementation of the Deception Deposit proposal.

5 Environmental Commitments

As part of this impact assessment, Cliffs has made a number of environmental commitments for the management of environmental factors relevant to the Deception Deposit proposal. Cliffs intends that these commitments will become legally binding in the approval from the WA Minister for Environment for the Deception Deposit proposal under s45(5) the *Environmental Protection Act 1986* (WA).

The consolidation of Cliffs' environmental commitments for the Deception Deposit proposal under the *Environmental Protection Act 1986* (WA) is below. For consistency, Cliffs has drafted these commitments in the same written text manner as the conditions imposed by the WA Minister for Environment.

1. Land Clearing Management

1-1 Cliffs will undertake management of land clearing in accordance with the Land Clearing Management Plan (Cliffs 2011b; Appendix 3) during implementation of the Deception Deposit proposal.

2. Weed Management

2-1 Cliffs will undertake management of weeds in accordance with the Weed Management Plan (Cliffs 2011c; Appendix 4) during implementation of the Deception Deposit proposal.

3. Fire Management

3-1 Cliffs undertake management of fire in accordance with the Fire Management Plan (Cliffs 2011d; Appendix 5) during implementation of the Deception Deposit proposal.

4. Dust Management

4-1 Cliffs will undertake management of dust in accordance with the Dust Management Plan (Cliffs 2011e; Appendix 6) during implementation of the Deception Deposit proposal.

5. Fauna Management

5-1 Cliffs will undertake management of fauna in accordance with the Fauna Management Plan (Cliffs 2011f; Appendix 7) during implementation of the Deception Deposit proposal.

6. Mine Closure

6-1 Cliffs will undertake management of mine closure in accordance with the Yilgarn Operations Deception Deposit Mine Closure Plan (Cliffs 2011g; Appendix 8) during implementation of the Deception Deposit proposal.

To note, Cliffs' commitments to implement the EMPs includes implementation of subsequent revisions.

6 Study Team

Development of this EIA-API document has involved a range of supporting consultants. The key consultants and their contributions are acknowledged and appreciated by Cliffs.

Globe Environments Australia Pty Ltd
www.GlobeEnvironments.com.au

- Project Management
- Environmental Impact Assessment
- Government Approvals

Biota Environmental Sciences Pty Ltd
www.Biota.net.au

- Flora and Vegetation Survey
- Vertebrate Fauna Survey
- Invertebrate Fauna Survey
- Troglobitic Fauna Survey

Rockwater Pty Ltd
www.Rockwater.com.au

- Groundwater Modelling

Soil Water Consultants Pty Ltd
www.SoilWater.biz

- Soil Characterisation
- Geochemical Characterisation

CAD Resources
www.CADResources.com.au

- Mapping and GIS Services

7 References

Note: Where an organisational name has changed since the original date of publication, the new organisational name has been used and the former organisational name noted.

Australian and New Zealand Minerals and Energy Council and the Minerals Council of Australia (2000) *Strategic Framework for Mine Closure*. Commonwealth of Australia, Canberra. August 2000.

Australian Bureau of Statistics (2007a) *2006 Census QuickStats – Menzies*. Accessed 9 March 2010 from Australian Bureau of Statistics website at www.censusdata.abs.gov.au.

Australian Bureau of Statistics (2007b) *2006 Census QuickStats – Yilgarn*. Accessed 17 October 2008 from Australian Bureau of Statistics website at www.censusdata.abs.gov.au.

Bamford Consulting Ecologists (2009) *Fauna Surveys of the Mt Jackson Range, Western Australia, 2000 to 2008*. Report prepared by Bancroft W and Bamford M for Cliffs Asia Pacific Iron Ore Pty Ltd (formerly as Portman Iron Ore Limited), April 2009.

Biota Environmental Sciences Pty Ltd (2011a) *Deception Deposit Vegetation and Flora Survey*. Report prepared by Maier M, Chukowry P and Anderson P of Biota Environmental Sciences Pty Ltd for Cliffs Asia Pacific Iron Ore Pty Ltd, June 2011.

Biota Environmental Sciences Pty Ltd (2011b) *Deception Deposit Vertebrate Fauna* Survey. Report prepared by Cartledge V, Cairnes J and Sachse T of Biota Environmental Sciences Pty Ltd for Cliffs Asia Pacific Iron Ore Pty Ltd, March 2011.

Biota Environmental Sciences Pty Ltd (2011c) *Deception Deposit Short Range Endemic Invertebrate Fauna* Survey. Report prepared by Watson N and Teale R of Biota Environmental Sciences Pty Ltd for Cliffs Asia Pacific Iron Ore Pty Ltd, March 2011.

Biota Environmental Sciences Pty Ltd (2011d) *Deception Deposit Troglobitic Fauna Assessment*. Report prepared by Cairnes J of Biota Environmental Sciences Pty Ltd for Cliffs Asia Pacific Iron Ore Pty Ltd, February 2011.

Bureau of Meteorology (2011a). *ARI and AEP*. Website page. Accessed 25 July 2011 from the Australian Bureau of Meteorology website at http://reg.bom.gov.au/water/designRainfalls/ifd/glossary.shtml.

Bureau of Meteorology (2011b). Climate Statistics for Australia Locations: Southern Cross Airfield, 1996-2011. Accessed 2 March 2011 from the Australian Bureau of Meteorology website at http://www.bom.gov.au/climate/averages/tables/cw_012074.shtml

Bureau of Meteorology (2011c). Climate Statistics for Australia Locations: Menzies, 1981-2009. Accessed 2 March 2011 from the Australian Bureau of Meteorology website at http://www.bom.gov.au/climate/averages/tables/cw_012052.shtml

Cliffs Natural Resources Incorporated and Associated Companies (2008) *Environmental Policy*. October 2008.

Cliffs Asia Pacific Iron Ore Pty Ltd (2008) *Koolyanobbing Iron Ore Project W2 Pit Mining Below the Groundwater Table Environmental Impact Assessment (Environmental Protection Statement).* Prepared for Cliffs Asia Pacific Iron Ore Pty Ltd (formerly as Portman Iron Ore Limited) by Globe Environments Australia Pty Ltd. July 2008.

Cliffs Asia Pacific Iron Ore Pty Ltd (2011a) *Referral under Section 38(1) of the Environmental Protection Act 1986 (WA): Yilgarn Operations – Deception Deposit*. Referral to the Environmental Protection Authority, 7 April 2011.

Cliffs Asia Pacific Iron Ore Pty Ltd (2011b) *Yilgarn Operations Land Clearing Management Plan*. Revision F, April 2011.

Cliffs Asia Pacific Iron Ore Pty Ltd (2011c) *Yilgarn Operations Weed Management Plan*. Revision G, April 2011.

Cliffs Asia Pacific Iron Ore Pty Ltd (2011d) *Yilgarn Operations Fire Management Plan*. Revision D, April 2011.

Cliffs Asia Pacific Iron Ore Pty Ltd (2011e) *Yilgarn Operations Dust Management Plan*. Revision E, April 2011.

Cliffs Asia Pacific Iron Ore Pty Ltd (2011f) *Yilgarn Operations Fauna Management Plan*. Revision A, June 2011.

Cliffs Asia Pacific Iron Ore Pty Ltd (2011g) *Yilgarn Operations Deception Deposit Mine Closure Plan*. Revision D, August 2011.

Cliffs Asia Pacific Iron Ore Pty Ltd (2011h) *Yilgarn Operations Groundwater Management Plan.* June 2011.

Department of Environment and Conservation (2008) *Issues Paper: Northern Yilgarn (Mt Manning Range, Mt Elvire and Jaurdi) Conservation Reserves Management Plan*. Department of Environment and Conservation, Perth, Western Australia.

Department of Environment and Conservation (2010) *Environmental Protection Act 1986 Licence 5058/9*. Issued to Cliffs Asia Pacific Iron Ore Pty Ltd, September 2010.

Department of Environment and Conservation (2011) *FloraBase*. Accessed 14th April 2011 from http:/www.florabase.calm.wa.gov.au.

Department of Environment and Heritage South Australia (2007) *National Recovery Plan for Malleefowl Leipoa ocellata*. Approved March 2001. Prepared by Benshemesh J.

Department of Indigenous Affairs (2011a) *Aboriginal Heritage Inquiry System Search: Local Government Area Menzies*. Department of Indigenous Affairs website http://www.dia.wa.gov.au. Accessed 20 July 2011.

Department of Indigenous Affairs (2011b) *Aboriginal Heritage Inquiry System Search: Local Government Area Yilgarn*. Department of Indigenous Affairs website http://www.dia.wa.gov.au. Accessed 20 July 2011.

Department of Industry, Tourism and Resources (2006) *Mine Closure and Completion: Leading Practice Sustainable Development Program for the Mining Industry*.

Department of Mines and Petroleum (1997) *Safety Bund Walls Around Abandoned Open Pit Mines.* Guideline ZMA048HA, December 1997. Produced by the former Department of Industry and Resources.

Department of Mines and Petroleum (2001) *Environmental Notes on Mining: Waste Rock Dumps.* Environment Division, January 2001. Produced by the former Department of Industry and Resources.

Department of Mines and Petroleum and Environmental Protection Authority (2011) *Guidelines for Preparing Mine Closure Plans.* June 2011.

Department of Sustainability, Environment Water, Population and Communities (1997) *Managing Sulphidic Mine Wastes and Acid Drainage: Best Practice Environmental Management in Mining.* Produced by the former Environment Australia.

Department of Sustainability, Environment, Water, Population and Communities (2011) *Merops ornatus.* In *Species Profile and Threats Database*. Accessed 25th July 2011 from http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=670.

Department of Sustainability, Environment, Water, Population and Communities and the World Wildlife Fund Australia (c.2006) *Australian Threatened Species: Malleefowl Leipoa ocellata*. Information Sheet. Produced by the Threatened Species Network (former Department of Environment and Heritage and the World Wildlife Fund Australia).

Department of Water (2011) *Groundwater Licence GWL154459.* Issued to Cliffs Asia Pacific Iron Ore Pty Ltd under s5C the *Rights in Water and Irrigation Act 1914* (WA), July 2011.

Environmental Protection Authority (2000) *EPA Guidance Statement 18: Prevention of Air Quality Impacts from Land Development Sites.* March 2000.

Environmental Protection Authority (2002a) EPA Guidance Statement 12: *Guidance Statement for Minimising Greenhouse Gas Emissions*. October 2002.

Environmental Protection Authority (2002b) *EPA Position Statement 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection*. March 2002.

Environmental Protection Authority (2003a) *EPA Guidance Statement 55: Implementing Best Practice in proposals submitted to the EIA process.* December 2003.

Environmental Protection Authority (2003b) *EPA Guidance Statement 54: Guidance for sampling fauna in groundwater and caves for environmental impact assessment.* December 2003.

Environmental Protection Authority (2004a) *EPA Guidance Statement 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.* June 2004.

Environmental Protection Authority (2004b) *EPA Guidance Statement 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia*. June 2004.

Environmental Protection Authority (2004c) *EPA Guidance Statement 41: Assessment of Aboriginal Heritage*. April 2004.

Environmental Protection Authority (2004d) *EPA Position Statement 7 – Principles of Environmental Protection.* August 2004.

Environmental Protection Authority (2006a) *EPA Position Statement 9: Environmental Offsets*. January 2006.

Environmental Protection Authority (2006b) *EPA Guidance Statement 6: Rehabilitation of Terrestrial Ecosystems*. June 2006.

Environmental Protection Authority (2007a) *EPA Guidance Statement 54a: Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia*. A Technical appendix to Guidance Statement 54. August 2007.

Environmental Protection Authority (2007b) *EPA Guidance Statement 8 (Draft): Environmental Noise*. May 2007.

Environmental Protection Authority (2008a) *Guidance Statement 33: Environmental Guidance for Planning and Development.* May 2008.

Environmental Protection Authority (2008b) *EPA Guidance Statement 19: Environmental Offsets – Biodiversity.* Includes 3 pages entitled Environmental Protection Bulletin No. 1. September 2008.

Environmental Protection Authority (2009) *EPA Guidance Statement 20: Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia.* May 2009.

Environmental Protection Authority (2010a) *Environmental Impact Assessment Administrative Procedures 2010.* Government Gazette No. 223, November 2010.

Environmental Protection Authority (2010b) *Guide to EIA Principles, Factors and Objectives*. November 2010.

Environmental Protection Authority (2010c) *Jimblebar Iron Ore Project: Report and Recommendations of the Environmental Protection Authority.* Report 1371. October 2010.

Environmental Protection Authority (2010d) *Carina Iron Ore Project: Report and Recommendations of the Environmental Protection Authority.* Report 1368. October 2010.

Environmental Protection Authority (2010e) *Tropicana Gold Project: Report and Recommendations of the Environmental Protection Authority.* Report 1361. July 2010.

Environmental Protection Authority (2011a) *Weekly record of determinations for development proposals: Yilgarn Operations Deception Deposit.* Chairman's determination, May 2011.

Environmental Protection Authority (2011b) *EPA Prepared Scoping Guideline: Yilgarn Operations Deception Deposit.* Letter to Cliffs Asia Pacific Iron Ore Pty Ltd, June 2011.

Environmental Protection Authority (2011c) *Central West Coal Project: Report and Recommendations of the Environmental Protection Authority.* Report 1382. February 2011.

Environmental Protection Authority and Department of Environment and Conservation (2010) *Technical Guide: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. Edited by Hyder M, Dell J and Cowan M. September 2010.

Farmer A M (1993) The effects of dust on vegetation – a review. In: *Environmental Pollution*. Volume 79, pages 63-75. Elsevier Science Limited.

Gibson N, Coates D J and Thiele K R (2007) Taxonomic research and the conservation status of flora in the Yilgarn Banded Iron Formation ranges. In: *Nuytsia*. Vol 17, p 1-12, ISSN 0085-4417. Published by the Western Australian Herbarium of the Department of Environment and Conservation, Bentley, Western Australia.

Government of Australia (1979) *Convention on the Conservation of Migratory Species of Wild Animals*. Bonn Convention. Australian Treaty Series 1991, ATS 32.

Government of Australia and Government of Japan (1981) *Japan - Australia Migratory Bird Agreement*. Australian Treaty Series 1981 No 6.

Government of Australia and Government of the People's Republic of China (1988) *China - Australia Migratory Bird Agreement.* Australian Treaty Series 1988 No 22.

Government of Australia and Government of the Republic of Korea (2007) Republic of Korea - *Australia Migratory Bird Agreement.* Australian Treaty Series 2007, ATS 24.

Heritage Council of Western Australia (2011a) *State Register of Heritage Places Database Search – Menzies Local Government Area*. Heritage Council of Western Australia website http://register.heritage.wa.gov.au. Accessed 13th April 2011.

Heritage Council of Western Australia (2011b) *State Register of Heritage Places Database Search – Yilgarn Local Government Area*. Heritage Council of Western Australia website http://register.heritage.wa.gov.au. Accessed 13th April 2011.

Hirano T, Kiyota M and Aiga I (1995) Physical effects of dust on leaf physiology of cucumber and kidney bean plants. In: *Environmental Pollution*. Volume 89 p255-261. Elsevier Science Limited.

National Health and Medical Research Council and the Natural Resource Management Ministerial Council (2004) *Australian Drinking Water Guidelines*. National Water Quality Management Strategy.

National Native Title Tribunal (2011a) *Western Australia Native Title Applications and Determination Areas*. Map of areas recorded by the Federal Court as at 31 December 2010. Map dated 4 January 2011.

National Native Title Tribunal (2011b) *National Native Title Tribunal Website*. Available at http://www.nntt.gov.au. 4 May 2011.

NCS International (2011) *Certified Environmental Management System ISO 14001 – Cliffs Asia Pacific Iron Ore Pty Ltd*. AS/NZS ISO 14001:2004 Environmental Management System Certification issued to Cliffs Asia Pacific Iron Ore Pty Ltd. June 2011.

Nichols O (2010) *Development of Completion Criteria for Different Regions*. Workshop on Integrating Sustainability into Life-of-Mine Planning. Hosted by the Sustainable Minerals Institute, Fremantle, April 2010.

Rockwater Pty Ltd (2003) *Groundwater Supplies for Koolyanobbing-Windarling Haul Road – Completion Report for Drilling, Bore Construction and Test-Pumping*. Report for Cliffs Asia Pacific Iron Ore Pty Ltd (formerly as Portman Iron Ore Limited), December 2003.

Rockwater Pty Ltd (2007a) *Windarling W2 Pit Dewatering Evaluation for 2007 and Void Water Balance.* Report for Cliffs Asia Pacific Iron Ore Pty Ltd (formerly as Portman Iron Ore Limited), December 2007.

Rockwater Pty Ltd (2007b) *Koolyanobbing Iron Ore Project Mt Jackson J1 Deposit - Numerical Modelling of Groundwater Dewatering*. Report for Cliffs Asia Pacific Iron Ore Pty Ltd (formerly as Portman Iron Ore Limited), December 2007.

Rockwater Pty Ltd (2011) *Deception Iron Ore Deposit Assessment of Dewatering and Final Void Water Level*. Report prepared by de Broekert P of Rockwater Pty Ltd for Cliffs Asia Pacific Iron Ore Pty Ltd. April 2011.

Shire of Menzies (2003) *Shire of Menzies Town Planning Scheme No. 1*. Prepared by the Department for Planning and Infrastructure, June 2003. As amended December 2010.

Shire of Menzies (2009) *Shire of Menzies Website www.menzies.wa.gov.au*. Dated December 2009. Accessed 9 March 2011 and 28 April 2011.

Shire of Menzies (2011) *Section 38(1) Environmental Act 1986 Yilgarn Operations Deception Deposit.* Letter from Shire of Menzies to Cliffs Asia Pacific Iron Ore Pty Ltd, 19 April 2011.

Shire of Yilgarn (2003) *Shire of Yilgarn Town Planning Scheme No. 2*. Prepared by the Department for Planning and Infrastructure, November 2003.

Shire of Yilgarn (2008) *Shire of Yilgarn Website www.yilgarn.wa.gov.au*. Dated as Copyright 2007-2008. Accessed 24 April 2008, 14 October 2008 and 28 April 2011.

Soil Water Consultants (2011a) *Deception Deposit Geochemical Characterisation*. Report for Cliffs Asia Pacific Iron Ore Pty Ltd, July 2011.

Soil Water Consultants (2011b) *Deception Deposit Pre-Mine Soil Characterisation*. Report for Cliffs Asia Pacific Iron Ore Pty Ltd, July 2011.

Stein P L, Hon. Justice (1999) *Are Decision-makers too cautious with the Precautionary Principle?* Land and Environment Court of New South Wales Annual Conference. October 1999.

Western Australian Minister for Environment (2003) Statement 627: *Koolyanobbing Iron Ore Expansion, Windarling Range and Mt Jackson, Shire of Yilgarn.* Approval to Cliffs Asia Pacific Iron Ore Pty Ltd (formerly as Portman Iron Ore Limited) under s45(5) of the *Environmental Protection Act 1986* (WA), June 2003.

Western Australian Minister for Environment and Western Australian Minister for Mines and Petroleum (2010) *New conservation, mining arrangements for Mt Manning*. Media Statement dated 1st September 2010. Accessed on 3rd March 2011 from http://www.mediastatements.wa.gov.au.

Wetland Research and Management (2008) *Stygofauna sampling at W2.* Report to Cliffs Asia Pacific Iron Ore Pty Ltd (formerly as Portman Iron Ore Limited). February 2008.

Wetland Research and Management (2009) *Stygofauna sampling at Mt Jackson J1 Deposit, Western Australia.* Report to Cliffs Asia Pacific Iron Ore Pty Ltd (formerly as Portman Iron Ore Limited). January 2009.

Western Australian legislation cited can be obtained from the State Law Publisher at http://www.slp.wa.gov.au. Commonwealth legislation and International Treaties cited can be obtained from the Australian Legal Information Institute at http://www.austlii.edu.au.