

# **Koolanooka/Blue Hills Direct Shipping Iron Ore Mining Project, Shires of Morawa and Perenjori**

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**Sinosteel Midwest Corporation Limited**

**Report and recommendations  
of the Environmental Protection Authority**

**Environmental Protection Authority  
Perth, Western Australia  
Report 1328  
June 2009**

### **Environmental Impact Assessment Process Timelines**

<b>Date</b>	<b>Progress stages</b>	<b>Time (weeks)</b>
<b>25/09/06</b>	<b>Level of Assessment set (following any appeals upheld)</b>	
<b>22/09/08</b>	<b>Proponent Document Released for Public Comment</b>	<b>104</b>
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<b>21/04/09</b>	<b>Final Proponent response to the issues raised</b>	<b>22</b>
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Assessment No. 1653

## **Summary and recommendations**

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for Environment on the proposal by Sinosteel Midwest Corporation Limited to mine hematite ore at Koolanooka Hills and at two locations at Mungada (part of the Blue Hills Range), to reinstate the Mungada Haul Road to its original width and construct an accommodation camp at Old Karara Homestead.

Section 44 of the *Environmental Protection Act 1986* (EP Act) requires the EPA to report to the Minister for Environment on the outcome of its assessment of a proposal. The report must set out:

- The key environmental factors identified in the course of the assessment; and
- The EPA's recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may include in the report any other advice and recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the *Environmental Protection Act 1986*.

### **Key environmental factors and principles**

The EPA decided that the following key environmental factors relevant to the proposal required detailed evaluation in the report:

- (a) Flora and vegetation;
- (b) Fauna;
- (c) Landscape and recreational values; and
- (d) Rehabilitation and mine closure.

There were a number of other factors which were very relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

The following principles were considered by the EPA in relation to the proposal:

- (a) Principle 1: The precautionary principle;
- (b) Principle 2: The principle of intergenerational equity;
- (c) Principle 3: The principle of the conservation of biological diversity and ecological integrity; and
- (d) Principle 4: Principles relating to improved valuation, pricing and incentive mechanisms.

## Conclusion

The EPA has considered the proposal by Sinosteel Midwest Corporation Limited to expand hematite ore mining at Koolanooka Hills and to recommence mining of hematite ore at two locations at Mungada (part of the Blue Hills Range), to reinstate the Mungada Haul Road to its original width and construct an accommodation camp at Old Karara Homestead.

The EPA notes that the Koolanooka Hills occur in the Avon Wheatbelt 1 (AW1) subregion of the Interim Biogeographic Regionalisation of Australia (IBRA) classification. Ninety three percent of native vegetation in the Avon-Wheatbelt bioregion has already been cleared and only 1.63% of the AW1 subregion is under formal conservation reserve. The proposal would impact on approximately 6 ha of the Koolanooka Hills Threatened Ecological Community (TEC). However, as the area to be impacted is small and represents only approximately 0.11% of the total TEC area and a very small percentage of the remnant vegetation of the region, the EPA recommends that this component of the proposal could be approved. However, as the proposal impacts a critical asset, it would only be acceptable with an appropriate offset consistent with the requirements of EPA Position Statement 9 and Environmental Protection Bulletin 1.

The EPA has concluded that it is unlikely that the EPA's objectives would be compromised in the implementation of the Koolanooka Hills component of the proposal, but this would only be acceptable with an appropriate offset and if there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarized in Section 5.

The EPA notes that the proposals situated in the Mungada Ridge area are of short duration and have small amounts of hematite ore resources (1 million tonnes at Mungada West and 2.7 million tonnes at Mungada East) and would lead to expanded permanent pits, waste dumps and disturbed areas.

The EPA notes that the Mungada West proposal, including the Mungada Haul Road, would impact the Declared Rare Flora (DRF) *Acacia woodmaniorum* and a number of Priority Flora species and is situated on land purchased by the Department of Environment and Conservation (DEC) for the purpose of conservation. A small area of Priority Ecological Community (PEC) would be impacted by the waste dump. Although Mungada West is part of the Mt Karara/Mungada Ridge (Blue Hills) area considered in the *Strategic Review of the Conservation and Resource Values of the Banded Iron Formation of the Yilgarn Craton* (DEC & DoIR, 2007) (BIF Review) to have very high biodiversity conservation values, the EPA has taken into account that the impacts of Mungada West are less than those at Mungada East as it is removed from the main ridge, it impacts fewer individual plants of conservation significant flora and, with a requirement to redesign the waste dump, could avoid any impact to the area designated as a PEC. Therefore the EPA considers that this part of the proposal could be approved. As the proposal impacts a high value asset, it would only be acceptable with an appropriate offset.

The EPA has also concluded that it is unlikely that the EPA's objectives would be compromised in the implementation of the Haul Road and Camp components of the proposal, but this would only be acceptable with an appropriate offset and if there is

satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarized in Section 5.

The EPA has recently been advised that Government intends to accept relinquishment of a mining tenement over a portion of the Mungada Ridge for the creation of a Class 'A' Nature Reserve. This action would address some of the EPA's concerns about protecting the environmental values in the Blue Hills area, however it does not account for the entire landform feature.

Due to the high environmental values associated with the Mungada Ridge, it is the view of the EPA (EPA 2009a and 2009b) that the entire Mungada Ridge should be protected in the formal conservation estate. This approach is consistent with the BIF Review which recommended reservation of complete examples of landforms and ecosystems in their entirety, in areas of high environmental value.

The existing pit at Mungada East is 0.4 hectares (ha) in area and the proposed pit would impact a further 6 ha of the ridge. In addition, a 19.2 ha waste dump would be created on the slopes of the ridge. Nearly all of the impact area lies within a PEC and is situated on land purchased by the DEC for conservation purposes. Floristic community type 13 (Woodman 2008a), presumed to be regionally restricted, would be impacted and fragmented. The Karara Iron Ore Project, if approved, would also impact 53.9 percent of the known area of this community. Mungada East would also impact the DRF *Acacia woodmaniorum*, known only from Mungada Ridge and Jasper Hill, and three priority species. The waste dump would impact one inactive Malleefowl mound and be in close proximity to an active mound.

The conservation significant species the Gilled Slender Blue-tongue, *Cyclodomorphus branchialis*, has been found on Mungada Ridge.

During surveys for short range endemic species a snail of the genus *Bothriembryon*, considered to be a new species was found only in the Mungada East pit area and a centipede of the genus *Mecistocephala*, a potential short-range endemic, was also found only in the Mungada East pit area.

To expand the pit to 6.4 ha would increase the visual impact markedly.

All of the above indicates that the Mungada Ridge has very high environmental values. The EPA considers that this Ridge should be retained in its entirety and that any mining on the Ridge would be environmentally unacceptable. This would include the proposed Mungada East mine as it cannot be managed to meet the EPA's objectives in relation to the conservation of biodiversity and ecological integrity.

### **Recommendations**

The EPA submits the following recommendations to the Minister for Environment:

1. That the Minister notes that the proposal being assessed is to mine hematite ore at Koolanooka Hills and at two locations at Mungada (part of the Blue Hills Range), to reinstate the Mungada Haul Road to its original width and construct an accommodation camp at Old Karara Homestead;

2. That the Minister considers the report on the key environmental factors and principles as set out in Section 3;
3. That the Minister notes that the proposed Mungada East proposal occurs in an area that forms part of the Mungada Ridge and that the EPA recommends against approval of the Mungada East component of the proposal;
4. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised in the implementation of the Koolanooka Hills component of the proposal but this component would only be acceptable with an appropriate offset and satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarized in Section 5;
5. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised in the implementation of the Mungada West, including the Haul Road and camp, components of the proposal but these components would only be acceptable with an appropriate offset and satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarized in Section 5;
6. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report for the implementation of the Koolanooka Hills and Mungada West components of the proposal; and
7. That the Minister considers the EPA's recommendation that the whole of the Mungada Ridge should be protected in the formal conservation estate and protected from development.

### **Conditions**

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Sinosteel Midwest Corporation Limited to mine hematite ore at Koolanooka and Mungada West is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

- a) Protection of Threatened and Priority Ecological Communities;
- b) Protection of the Declared Rare Flora *Tecticornia bulbosa*;
- c) Construction of the Mungada Haul Road;
- d) Design, siting and footprint of waste dumps;
- e) Conservation significant reptiles;
- f) Short range endemic invertebrate fauna;
- g) Prevention of fauna mortality; and
- h) Rehabilitation and Mine Closure.

## **Other Advice**

Section 6 of this report contains other advice to Government. This advice includes:

- (a) the need for a secure conservation reserve in the Koolanooka Range to protect six native flora species that are endemic to the Range and have not been found elsewhere;
- (b) that the widening of Mungada Road (beyond its re-instatement), Koolanooka Springs Road and Munckton Road is not part of the assessed proposal; and
- (c) that there are archaeological and ethnographic surveys still to be undertaken and that Aboriginal heritage issues should be managed under the *Aboriginal Heritage Act 1972*.

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**Appendices**

1. List of submitters
2. References
3. Summary of identification of key environmental factors
4. Recommended Environmental Conditions and Proponent's Consolidated Commitments
5. Summary of submissions and proponent's response to submissions (in attached cd)

# 1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the key environmental factors and principles for the proposal by Midwest Corporation Limited, to mine hematite ore at Koolanooka Hills and at two locations at Mungada (part of the Blue Hills Range), to reinstate the Mungada Haul Road to its original width and construct an accommodation camp at Old Karara Homestead.

The proposal is to re-open and expand three historic pits, one situated on the northern end of Koolanooka Hills, one on Mungada Ridge (Mungada East) and one to the western side of Mungada Ridge (Mungada West). The pits are situated on the Banded Iron Formation of the Yilgarn Region. Hematite ore would be mined, crushed, screened and blended, and then exported through Geraldton Port.

The project is being formally assessed as the pit expansion at Koolanooka Hills would directly impact approximately four hectares of a Threatened Ecological Community (TEC). The expansion of the pits at Mungada West and East would impact a Priority Ecological Community (PEC) and on one Declared Rare Flora (DRF) species and other flora with restricted distributions.

The project is considered by the Commonwealth of Australia to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* because of potential significant impacts to listed threatened species and communities and listed migratory species. The project is being assessed under the bilateral agreement with the Western Australian Government.

Further details of the proposal are presented in Section 2 of this report. Section 3 describes the assessment context and Section 4 discusses the key environmental factors and principles for the proposal. The Conditions to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 5. Section 6 provides Other Advice by the EPA, Section 7 presents the EPA's conclusions and Section 8, the EPA's Recommendations.

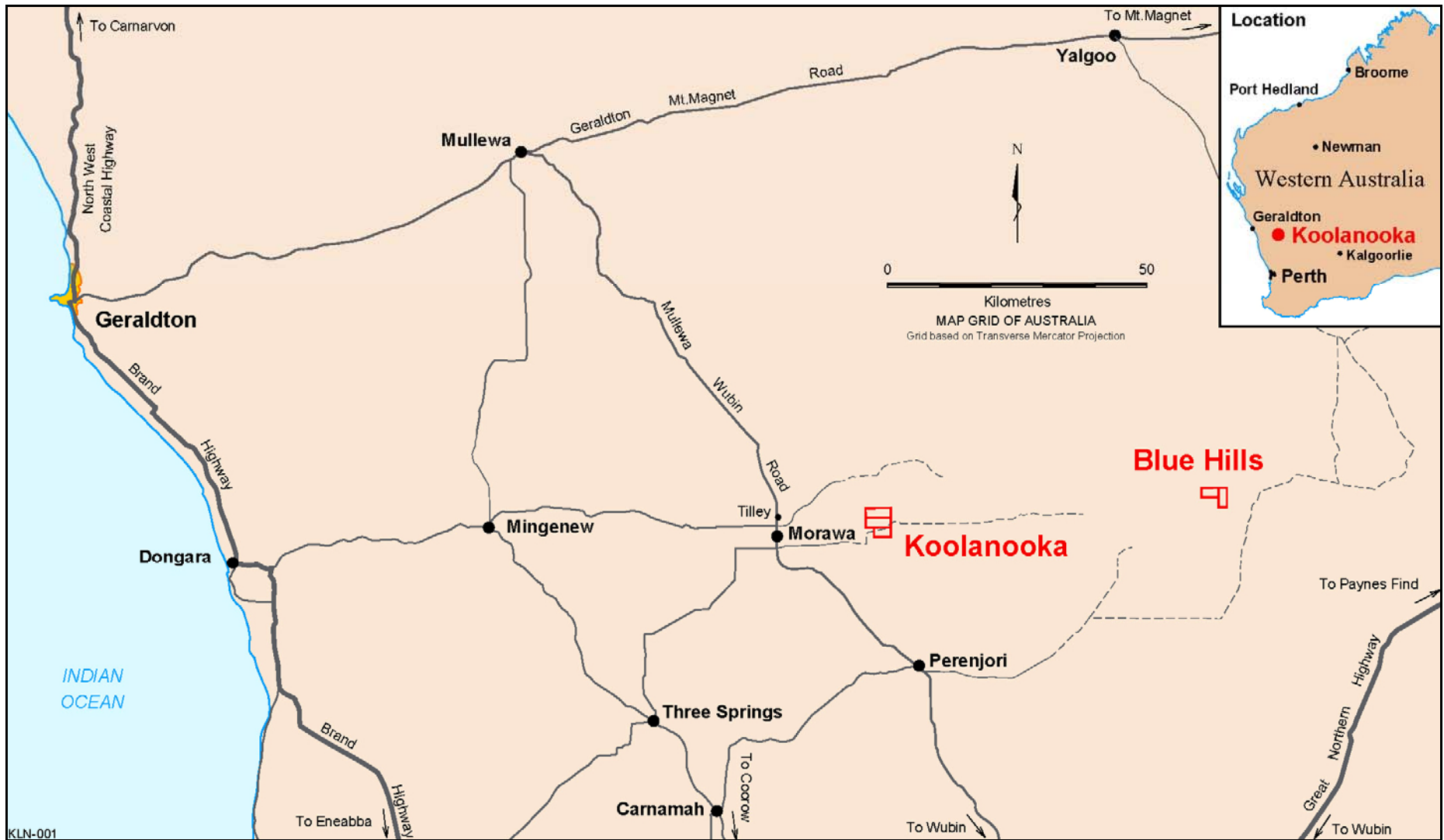
Appendix 5 (as an attached cd) contains a summary of submissions and the proponent's response to submissions and is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

## 2. The proposal

### Koolanooka Hills

Figure 1 shows the regional location of both the proposed Koolanooka site and the Mungada sites.

The mining and processing at Koolanooka would occur on Mining Lease 70/1013 and Mining Lease 70/1014. The whole of the existing and proposed disturbance occurs on private land (Lot 1) which is owned by Sinosteel Midwest Corporation Limited.



*Figure 1: Regional location*

At the Koolanooka site it is proposed to commence mining of hematite from the South Fold ore body to the south east of the existing pit (Figure 2). The cutback would start at 400 m Australian Height Datum (AHD) and the pit would not extend below the water table. Waste rock would be placed in two new waste dumps on areas previously disturbed by mining. These areas currently support some regrowth vegetation (Figure 2). Backfilling of part of the existing Koolanooka pit will only occur if it is determined that it is not feasible in future to mine the magnetite deposit below the pit.

A semi-mobile dry crushing and screening facility for the processing and blending of the various types and grades of ore would be established at Koolanooka. Two products would be produced, lump ore and fines. Additional facilities required at the site would be portable diesel power generator(s), diesel storage, portable offices, ablutions, workshop and first aid facility (to be established on pre-existing concrete foundations) and an explosives magazine.

The Public Environmental Review (PER) (Midwest, 2008) states that water for mining would be obtained from bores to the north of the operations, from water stored in the existing open pit and from an open sump near the operations. Water from the open pit has also been allocated to operations at Tilley Siding (EPA, 2007). Currently the proponent has a groundwater extraction licence for 165 megalitres per annum (ML/a), for operations at both Tilley Siding and Koolanooka. This would be sufficient to supply 180 kilolitres per day (kL/d) to each site for dust suppression purposes. However, sources of low salinity water (<5000 milligrams per litre (mg/L) total dissolved salts) are limited with potential sources of a total 82 ML/a having been identified to date (Rockwater, 2007). Low salinity water is required for dust suppression near to native vegetation to prevent adverse impact to vegetation. The proponent has exploration licences to search for additional water sources.

Potable water supplies would be obtained from the Water Corporation.

Ore from Koolanooka would be trucked to Tilley Rail Siding in three trailer 36.5 m long trucks. Ore would then be transported from Tilley Siding to Geraldton Port on the existing WestNet rail network for export. No covers are proposed for either trucks or rail wagons. Ore would be stored at the Port in an existing storage shed. Operations at the Port would be managed by the Geraldton Port Authority under its environmental licence issued under Part V of the *Environmental Protection Act 1986* and are not part of this assessment.

The operational workforce for Koolanooka Hills would be housed at Morawa.

The main characteristics of the Koolanooka Hills proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 4 of the PER (Midwest, 2008).



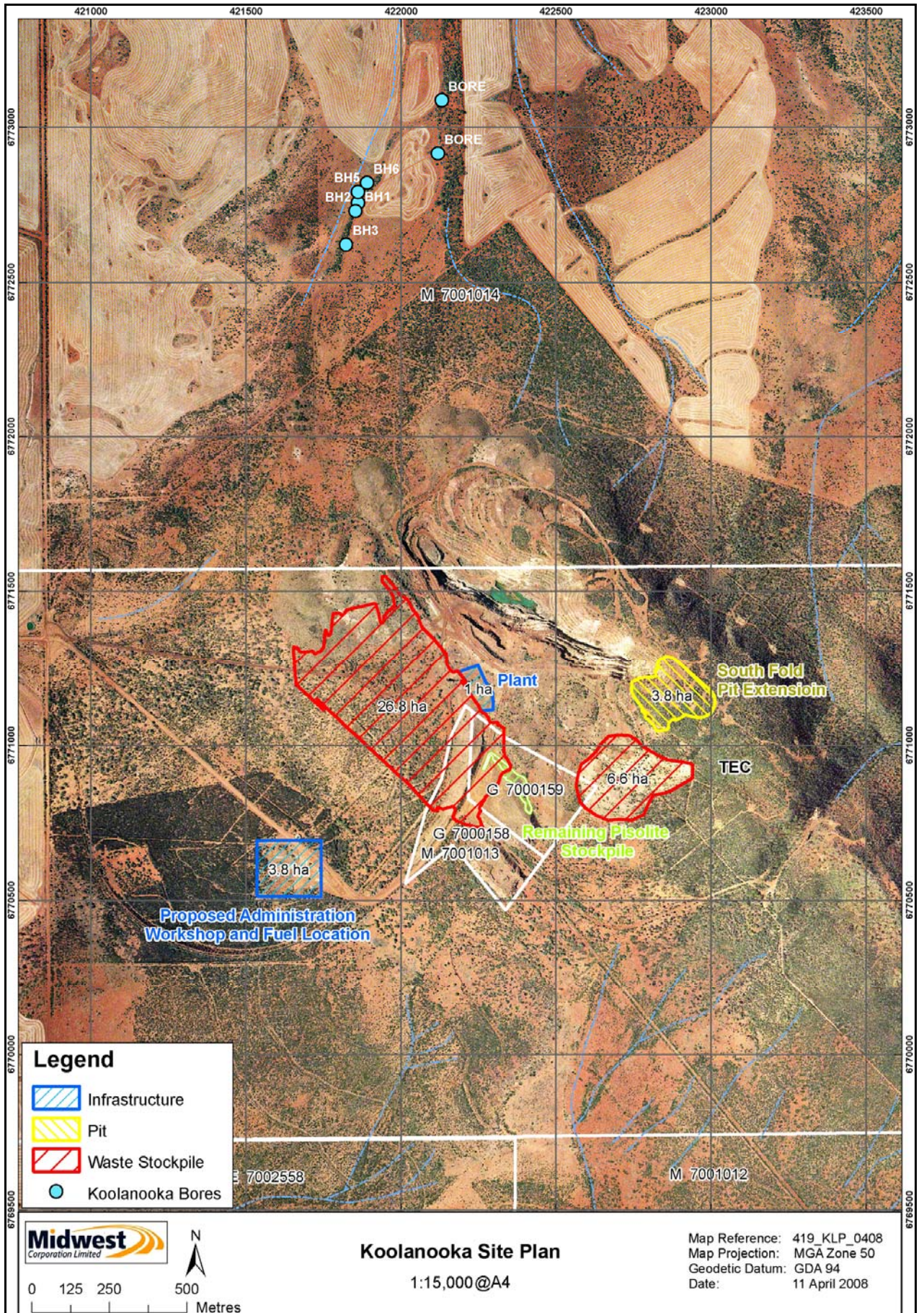


Figure 2: Koolanooka site plan



**Table 1: Summary of key proposal characteristics for Koolanooka Hills**

<b>Element</b>	<b>Description</b>
<b>Mining Operations</b>	
Project life span	Estimated at 1.5 years
Size of ore body	Approximately 2 Mt
Ore mining rate	Up to 2 Mtpa
Area of pit expansion	3.8 ha
Depth of new section	320 mAHD
Area of overburden stockpiles	Approximately 33.4 ha
Vegetation clearing	Approximately 4.5 ha of TEC of which 2.7 ha is intact (the balance having been impacted by previous exploration activities), with an additional 3.1 ha allowed for a dust buffer zone
Predisturbed area (cleared and regrowth areas)	Approximately 38.2 ha
<b>Processing</b>	
Crushing and Screening	Semi-mobile crushing and screening plant
<b>Mine Site Infrastructure</b>	
Power	Diesel generators 500-1000 kW
Water	180 kL/day from bores, pit and sump for dust suppression 50 kL/week (2.6 ML/a) of potable water from Water Corporation

Mt – Million tonnes

AHD – Australian Height Datum

ha – hectares

kW – kilowatts

pa – per annum

ML/a – Megalitres per annum

TEC – Threatened Ecological Community

kL – kilolitres

**Mungada (Blue Hills Range)**

The Mungada mine sites are located on Karara Station within the Shire of Perenjori. The area surrounding Blue Hills was formerly a pastoral lease, but is now CALM Purchased Lease (CPL) 16 (Karara Station) vested with the Conservation Commission, and is under direct management by the Department of Environment and Conservation. The entire area encompassing Karara Station, combined with other nearby CALM purchased stations (Lochada, Kadji Kadji and Warriedar) is proposed to form one contiguous Conservation Park. Karara station is 109,291 ha in size, and includes Windaning Hill and the Blue Hills Range.

Mining of hematite ore would be conducted at two locations, Mungada West and Mungada East, by expanding the historic pits (Figure 3). Mungada West pit would be expanded from 0.7 ha to 5.3 ha predominately to the west and Mungada East pit from 0.4 ha to 6.4 ha predominately to the north east. The pits would not extend below the watertable, unless further approvals are granted. Waste rock would be managed at Mungada West by dumping it to the east of the pit and at Mungada East by dumping it to the west of the pit (Figure 3). The dumps would be shaped to form extensions to the existing waste landforms.

The semi-mobile dry crushing and screening facility would be moved from Koolanooka and deployed at Mungada West. A total of five mining campaigns would be carried out between Koolanooka, Mungada West and Mungada East.

Additional facilities required at the Mungada West site would be portable diesel power generator(s), a workshop with site office, ablutions with crib huts and an explosives magazine.

Water for mining would be trucked from Koolanooka sources. Mining would not be undertaken at Koolanooka and Mungada simultaneously.

Ore from Mungada East would be trucked to the crushing plant at Mungada West, and ore from the plant would be trucked to Tilley Siding. Triple road trains would be required for the transportation of ore. For the transportation of ore from Mungada West the Mt Karara/Mungada Haul Road would need upgrading. This would require the removal of regrowth vegetation (older than 10 years) from the side table drains and road formation shoulders for 3 m on either side of the road. Construction materials would be sourced from the haul road surrounds and borrow pits.

The haul road on Miscellaneous Licence 59/62 (Mungada to Koolanooka) overlies CPL 16 at its eastern end and continues onto CPL 23 at its western end. It then continues west onto State Timber Reserve 2, Vacant Crown Land (VCL 12727) and into freehold land, where there are occurrences of the Koolanooka Hills TEC. At its western end it connects directly with the Mungada public road vested in the Shire of Morawa. The haul route then continues along the Koolanooka Spring Road to Fallon Road from which it enters the Koolanooka mine site and processing area. Ore would be transported from Koolanooka mine site to Tilley Rail Siding via Munckton Road. Transport of ore from Tilley Siding to Geraldton Port would be by rail as described for the Koolanooka Hills operation.

Approximately 365 ML of water during one year would be required for construction of the haul road. This water would be sourced from saline water sources, which have not been identified. The road would be surfaced with a lignosulphate binder to reduce on-going watering requirements. Additional water would be required on an on-going basis for maintenance of the road. Additional water sources are being sought to supplement supplies from the Koolanooka area.

Camp facilities for 30 - 70 people are proposed adjacent to Old Karara Homestead on Karara Station, part of the CALM Purchased Lease, to accommodate workers for the Mungada mine proposals (Figure 4). The camp would be sited on a cleared paddock away from the main drainage path.

Water for the camp would be supplied from existing and new bores, as necessary. Approximately 20 kL/day (7.3 ML/a) would be required. Drinking water might need further treatment due to naturally high fluoride and salt levels.



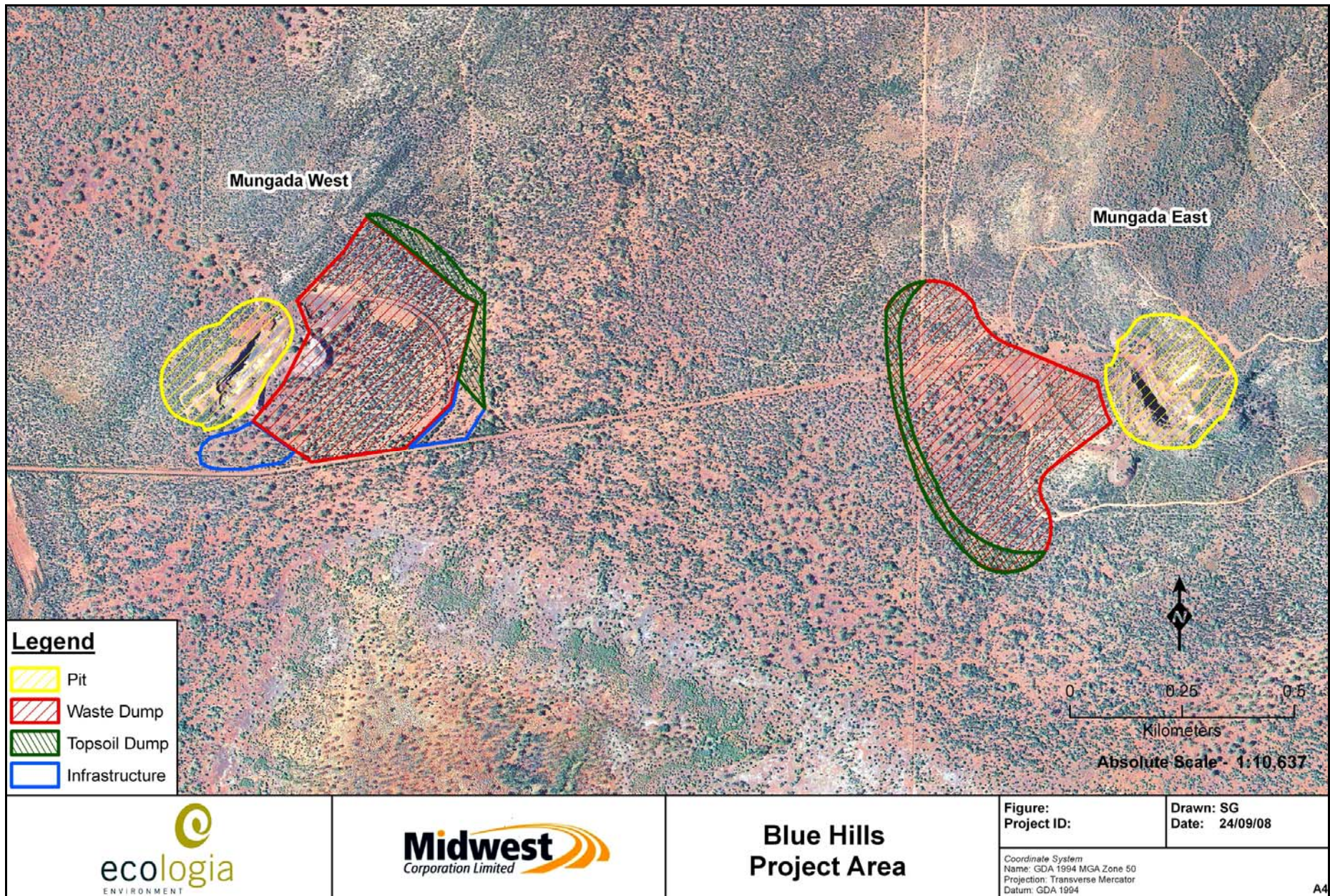
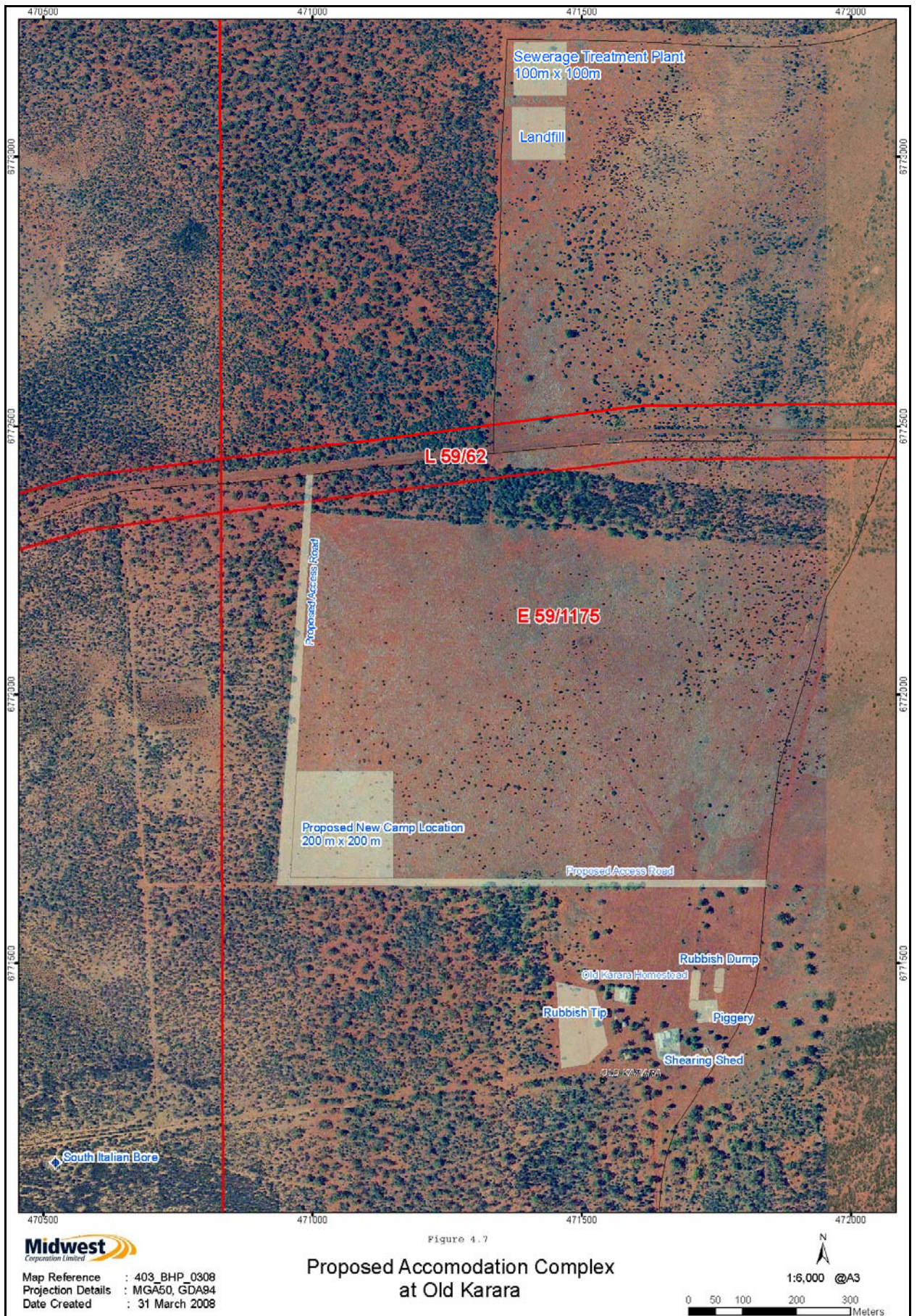


Figure 3: Mungada project area





**Figure 4:** Proposed accommodation complex at Old Karara Homestead



The site would be accessible from both the Mungada haul road and the Karara to Perenjori road. Mine site traffic would use the haul road, while public traffic would be routed from the Perenjori road, in order to keep mine and public traffic separate as far as possible. A traffic management plan would be developed and traffic managed in cooperation with DEC.

The main characteristics of the Mungada proposals are summarised in Tables 2 and 3 below. A detailed description of the proposal is provided in Section 4 of the PER (Midwest Corporation Limited, 2008).

**Table 2: Summary of key proposal characteristics for Mungada West**

<b>Element</b>	<b>Description</b>
<b>Mining Operations - Mungada West</b>	
Project life span	Approximately 2.25 years
Size of ore body	Approximately 1.1 Mt
Ore mining rate	Up to 2 Mta
Area of pit expansion	4.6 ha
Depth of new section	Approximately 315 m AHD
Area of overburden stockpiles	Approximately 18.1 ha
Ancillary facilities	Area: 2.5 ha
Vegetation clearing	22 ha
Predisturbed area (cleared and regrowth areas)	5.3 ha
<b>Processing</b>	
Crushing and Screening	Semi-mobile crushing and screening plant
<b>Mine Site Infrastructure</b>	
Power	500 - 100 kW supplied by diesel generators
Water	180 kL/day trucked from Koolanooka sources
<b>Haul Road Construction (Mungada Road)</b>	
Vegetation clearing (regrowth >10 years)	39.5 ha
Water	365 ML (one year of road construction) and on-going dust suppression requirement estimated at 65 ML/a
<b>Karara Camp</b>	
Area	4 ha plus access roads

**Table 3: Summary of key proposal characteristics for Mungada East**

Element	Description
<b>Mining Operations - Mungada East</b>	
Project life span	Approximately 2.5 years
Size of ore body	Approximately 2.7 Mt
Ore mining rate	Up to 2 Mta
Area of pit expansion	6 ha
Depth of new section	290 m AHD
Overburden stockpiles	19.2 ha
Vegetation clearing	18.8 ha
Predisturbed area (cleared and regrowth areas)	6.4 ha
<b>Mine Site Infrastructure</b>	
Water	180 kL/day trucked from Koolanooka sources

Mt – Million tonnes

AHD – Australian Height Datum

ha – hectares

kW – kilowatts

ML/a – Megalitres per annum

pa – per annum

Mm<sup>3</sup> – million cubic metre

TEC – Threatened Ecological Community

kL – kilolitres

mm - millimetres

Since release of the PER, a modification to the proposal has been made by the proponent. This is the inclusion of additional offsets proposed for the proposal. These were outlined to the DEC by email (John Kelly, 2009).

Additional information has been provided regarding the results of a survey for short range endemic species in the Response to Submissions (Midwest, 2009) and from ecologia (ecologia, 2009).

The potential impacts of the proposal initially predicted by the proponent in the PER document (Midwest, 2008) and their proposed management are summarised in Table S2 (Executive Summary) of the proponent's document.

### 3. Assessment context

The Banded Iron Formation (BIF) ranges of the Midwest and Goldfields have been identified as having significant environmental values. The BIF ranges are particularly important as they have high biodiversity conservation values relating to the presence of endemic, rare and restricted flora species and highly restricted and distinct plant communities and ecological communities. The ranges are also very distinct features in the regional landscape and in many cases possess outstanding landscape values. The BIF ranges also host a varied assemblage of fauna species (DEC & DoIR, 2007). Endemic species are those that are confined to a specific geographic area, and not found elsewhere (DEC & DoIR, 2007).

In September 2007 the *Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields* (DEC & DoIR, 2007) (BIF Review) was released. The document was prepared in order to provide “strategic level advice for Government for consideration of biodiversity conservation actions for the BIF ranges in the Yilgarn

Craton with a specific focus on the Midwest and the Goldfields regions” (DEC & DoIR, 2007). The findings of the BIF Review have direct implications for this proposal in terms of identified high biodiversity and landscape values of the Koolanooka and ‘Blue Hills’ area, in which areas the proposal is located.

The BIF Review was prepared to provide guidance for the consideration of biodiversity associated with BIF ranges, and on conservation actions for protection of the most important parts, following comments by the EPA about the need for the proposals to be considered within a broader context. While the BIF Review has yet to be endorsed by the current Government, it provides an important set of information and principles.

The BIF Review is based on three Key Principles that it states should be taken into account in environmental assessments and the provision of advice to Government. These are:

- i No development activity should proceed if it would result in the increase of a International Union for the Conservation of Nature and Natural Resources (IUCN) Threat Category of any plant or animal taxon;
- ii No development activity should proceed if it would result in the increase of a IUCN Threat Category of any ecological community; and
- iii 15 – 30% of the total number of ranges should be reserved in their entirety so complete examples of landform and ecosystem are protected (DEC & DoIR, 2007).

Additionally, three Guidance points are also provided:

- iv Conservation reserves should include at least 60% of largely contiguous ecosystem/habitat for each of the key BIF species and communities restricted to the BIF ranges;
- v Subject to key principles i and ii, an objective of detailed minesite planning should be to maximize protection of any flora species or floristic community type (FCT) identified as being restricted to the BIF or dependent on the BIF for its conservation; and
- vi Landscape, geodiversity, Aboriginal heritage values and the potential for nature based tourism should be taken into account in developing a reserve system, with methodologies and criteria used for identifying areas of significant value that should be protected (DEC & DoIR, 2007).

With regard to the already partly mined Koolanooka Range, the BIF Review found that the remainder of this range was worthy of full protection and there was scope to conserve a substantial proportion of the Range. As one of its findings the Government resolved to further consider “both the economic and biodiversity values present in the Koolanooka Hills when projects in this area come forward for assessment.”

The BIF Review also states that the Government “indicates a predisposition that in the interests of sustainable economic development in the highly bio-diverse Karara/Mungada/Blue Hills area, to allow the development of the identified magnetite

resource in the south west section of the range but the Government is not predisposed to the extraction of the hematite deposits of the area” (DEC & DoIR, 2007).

The current assessment is located in the Koolanooka Hills and at Mungada, part of the ‘Blue Hills Range’. For the purposes of this assessment, Koolanooka Hills is defined as the Koolanooka Hills only and the Koolanooka Range as both the Koolanooka and Perenjori Hills, while the Blue Hills Range is defined as comprising Mt Karara, Mungada Ridge and the adjoining Blue Hills (Figure 5).

The Koolanooka Hills proposal is located on privately owned land. The Mungada proposals are within the former Karara Pastoral Lease. This lease was purchased by the Department of Conservation and Land Management in 2002, and is currently being managed by the DEC for conservation purposes.

The EPA has previously assessed several mining proposals related to other BIF Ranges including:

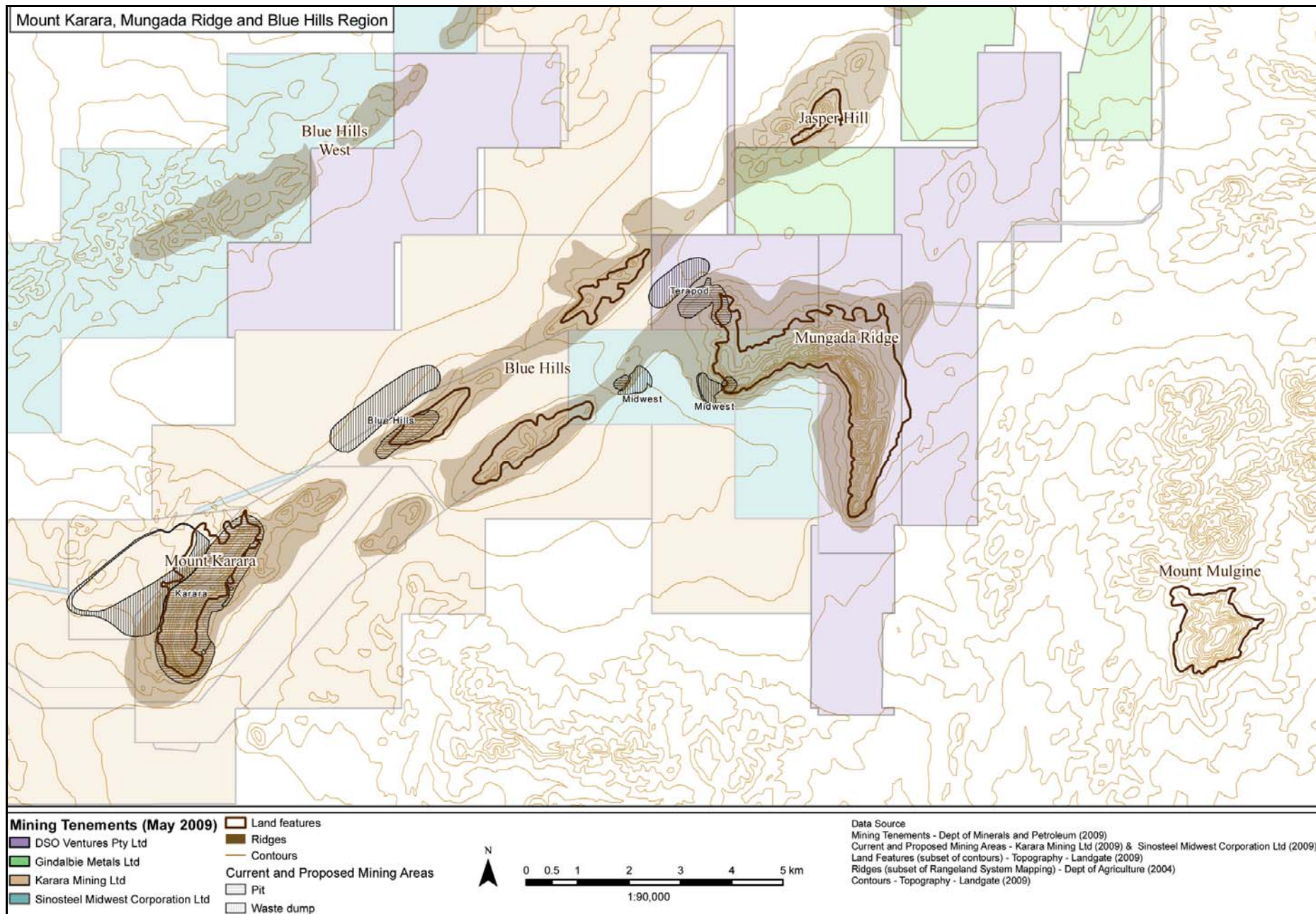
- Windarling Range;
- Jack Hills;
- Mt Manning; and
- Mt Gibson.

Presently, the EPA is formally assessing several other projects located on, or associated with BIF ranges in this region. Two projects specifically related to the Blue Hills Range that the EPA has recently assessed are Karara Mining Limited’s Karara and Mungada Iron Ore Projects (EPA 2009a and EPA 2009b).

## **4. Key environmental factors and principles**

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the key factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as Greenhouse Gas, Noise and Vibration, Asbestos, Waste and European Heritage are very relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation. Aboriginal heritage issues can be managed under the provisions of the *Aboriginal Heritage Act 1972*. This is further addressed in Section 6 Other Advice. Long term recreational and tourism values are addressed under Sections 4-3 and 4-4, Landscape and recreational values and Rehabilitation and mine closure.



**Figure 5: Extent of Blue Hills Range**

It is the EPA's opinion that the following key environmental factors for the proposal require detailed evaluation in this report:

- (a) Flora and vegetation;
- (b) Fauna;
- (c) Landscape and recreational values; and
- (d) Rehabilitation and mine closure.

The above key factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the key environmental factors and their assessment are contained in Sections 4.1 - 4.4. The description of each factor shows why it is relevant to the proposal and how it would be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

The following principles were considered by the EPA in relation to the proposal:

- (a) Principle 1: The precautionary principle;
- (b) Principle 2: The principle of intergenerational equity;
- (c) Principle 3: The principle of the conservation of biological diversity and ecological integrity; and
- (d) Principle 4: Principles relating to improved valuation, pricing and incentive mechanisms.

## **4.1 Flora and vegetation**

### **Description**

#### Koolanooka Hills

The Koolanooka Hills occur in the Avon Wheatbelt 1 (AW1) subregion of the Interim Biogeographic Regionalisation of Australia (IBRA) classification. 93% of native vegetation in the Avon-Wheatbelt bioregion has already been cleared and only 1.63% of the AW1 subregion is under formal conservation reserve (Midwest, 2008). The subregion is a high priority for the Comprehensive, Adequate and Representative (CAR) terrestrial reserve system.

Previous surveys of floristic communities and flora were undertaken in 2004 (ATA, 2004). More recent surveys for this proposal were undertaken over six periods from the 25th to 26th of July, 26th to 27th of September, 25th to 26th of October 2006 and the 28th February, 13th to 20th June and 9th and 10th of August 2007 (ecologia, 2008a).

The Koolanooka Hills flora survey comprised of two quadrats and a foot traverse survey of a 3.8 ha area identified by Midwest as the proposed disturbance area. The vegetation in the area has been heavily disturbed due to past exploration activities and

only 2.68 ha of vegetation remains. A combination of quadrats and boundary and centre traverses ensured that the whole area was traversed.

### ***Floristic communities***

The vegetation in the pit impact area is one of five plant assemblages of the Koolanooka System which are classified as Koolanooka Hills Threatened Ecological Community (TEC) by the Department of Environment and Conservation (DEC). The TEC occurs over two areas totalling 5419 ha. The plant assemblages of the Koolanooka System TEC are split into two occurrences, one at Perenjori Hills and the other at Koolanooka Hills. The area at Koolanooka Hills impacted by the project is 5.8 ha (including allowance for a 50 m dust impact zone), the vegetation of which is most closely linked to the DEC's vegetation community 3. The pit impact area constitutes 0.17% of the Koolanooka Hills TEC (area of 3496 ha) or 0.11% of the total TEC area.

### ***Conservation significant flora***

No Declared Rare Flora (DRF) or Priority Flora were found in the pit impact area during the current survey. Two weed species were recorded in the survey area. During 2006 and 2007 dry years were experienced in parts of the southern Murchison Region. Of the species found in the 2006/7 surveys approximately 24% were annuals. In surveys undertaken by DEC in 2005 total annual species accounted for approximately 41% of taxa. This difference can be explained by the drier weather experienced in 2006, as well as the fact that the area in which to place site quadrats was limited.

A survey by the DEC in 2005 identified the taxon *Millotia dimorpha* (P1), an annual, and the 2004 survey by ATA found *Persoonia pentasticha* (P3) in the vicinity of the proposal area.

The DRF *Tecticornia bulbosa* is known to occur along the Koolanooka – Tilley Siding haulage route, which is the only known occurrence of this taxon.

### ***Indirect impacts to flora***

A dust impact zone of 50 m from the pit edge has been allowed for the TEC area. This adds an additional 3.14 ha of TEC that may be adversely impacted by dust.

There is a shortage of low salinity water at the Koolanooka site. Dust suppression might be undertaken with water of greater than 5000 parts per million salinity. Vegetation may be impacted by overspray or discharge of saline water, if this is not adequately managed.

Increased fires in the area as a result of mining operations is also a potential indirect impact to flora.

### **Mungada West**

Both Mungada proposals are situated in the Tallering subregion (YAL2) of the Yalgoo Bioregion under IBRA classification. Only 11.6% of the total Yalgoo Bioregion area is in a formal conservation reserve. The majority of this figure comes from one conservation reserve in the Edel subregion (YAL1). As no vegetation



complexes of the Tallering Peak ironstone range are held in reserve they are a high priority for ecosystem reservation (Midwest, 2008).

Twenty four quadrats were assessed at Mungada West. In addition, the whole of the proposed impact area was surveyed by traversing the area and searching for Priority Flora.

#### ***Floristic communities***

The proposed pit and waste dump borders and includes 1.5 ha of an area classified by DEC as a PEC (Figure 6).

Using the floristic community types (FCT) in Woodman, 2008a the proposal would impact on FCTs 1a, 4/17 and 1a/2. FCT 1a is likely to be widespread within the region, with significant flora species not restricted to FCT 1a. FCT 4/17 is a mosaic of FCT 4 and FCT 17. The majority of the Mungada West proposal falls into this floristic community according to Woodman's mapping. FCT 4 occurs on landform types and topographical locations which may be restricted in the region (related to north facing slopes). It contains significant flora, several of which are moderately restricted or have relatively unknown distributions. FCT 17 is likely to be present within the region, supports significant flora of ranking less than P1, which are not restricted to FCT 17. FCT 2 is likely to experience a minor impact from the Mungada West proposal and is likely to be widespread in the region but supports significant flora including those of P1 ranking.

#### ***Conservation significant flora***

One DRF and three Priority Flora taxa were recorded during *ecologia's* surveys of the proposed mining disturbance areas at Mungada West (Figure 7). These were *Acacia woodmaniorum* (DRF) a species that appears to be restricted to Mungada Ridge and Jasper Hill, *Micromyrtus acuta* Rye (P1), *Micromyrtus trudgenii* (P3), and *Persoonia pentasticha* (P3). Due to different methodologies there are considerable discrepancies between the total number of these plants counted or estimated to exist in information presented by Karara Mining Ltd and Sinosteel Midwest Corporation. The impact to these taxa is considered further in the Assessment section.

No Priority weeds (i.e. weeds that are, or have the potential to become, pests to agriculture) or environmental weeds were recorded during the survey of the proposed impact area at the Mungada West.

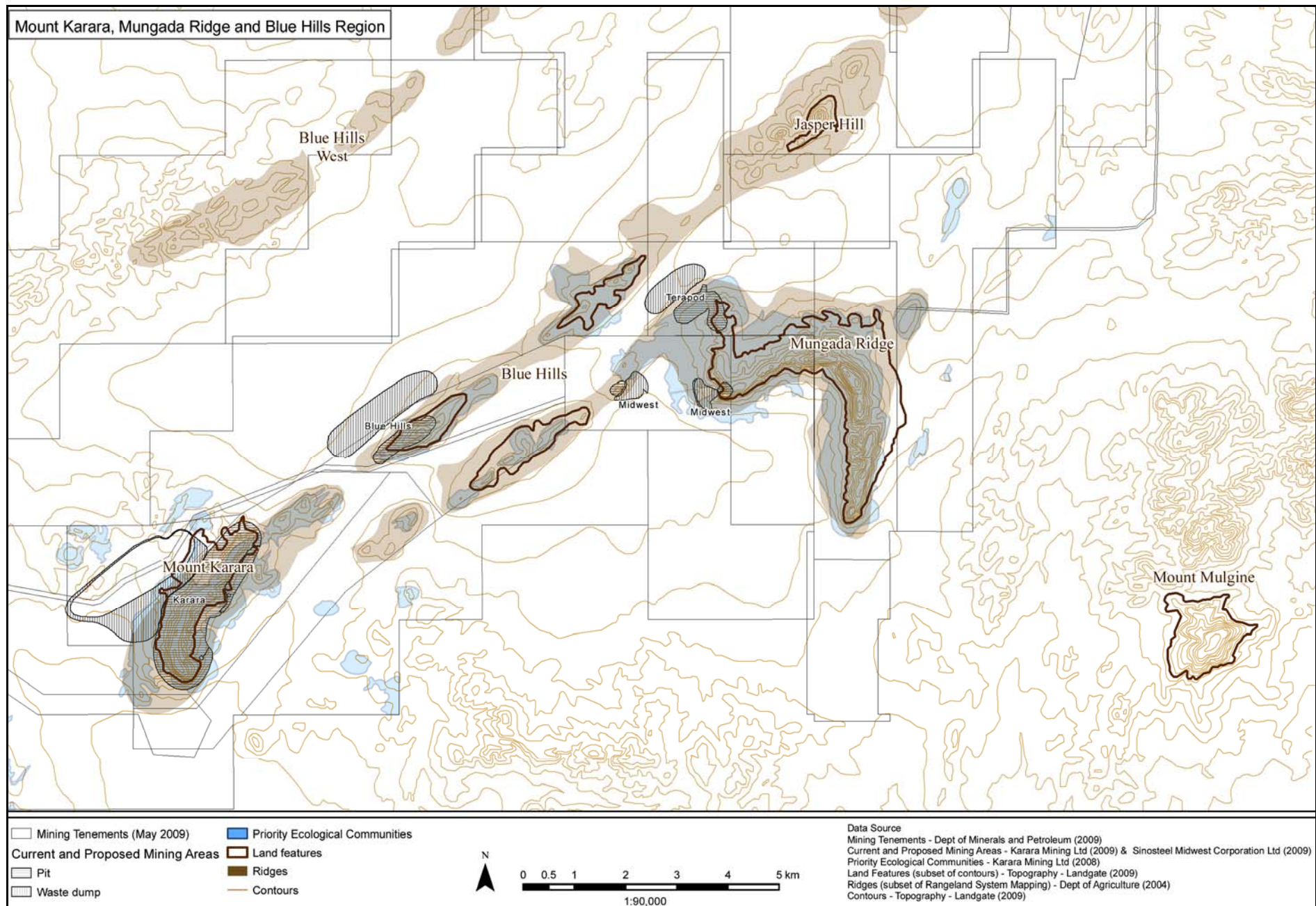
#### ***Indirect impacts to flora***

Flora at Mungada West may be impacted by dust, saline water used for dust suppression and fire caused by the mining operations. No dust impact zone has been allowed for by the proponent at Mungada West.

#### **Mungada East**

Seventeen quadrats were assessed at Mungada East. In addition, the whole of the proposed impact area was surveyed by traversing the area and searching for Priority Flora.

The proposed pit is in an area classified by DEC as a PEC and proposed waste dump is largely in the PEC (Figure 6).



**Figure 6:** Blue Hills vegetation complex Priority Ecological Community

### ***Floristic communities***

Using the floristic community types in Woodman, 2008a the proposal would impact on FCTs 1a/2, 12, 13 and 14. As described for Mungada West FCT 1a and 2 are likely to be widespread in the region, but support significant flora. 3.4 ha of the waste dump area impacts this FCT. The remainder of the waste dump area is on disturbed land or FCT 12. FCT 12 occurs on a limited range of upper slopes and crests locally and the full regional distribution is unknown. FCT 12 supports significant species, including the DRF *Acacia woodmaniorum*, and species with P1 rankings, and significant species of moderately restricted distributions.

The expansion of the pit would impact FCT 13 and marginally impact FCT 14. FCT 13 is known to occur in a limited area locally and regionally is presumed to be restricted to the local area. It supports significant species, including the DRF *Acacia woodmaniorum*, and species with P1 rankings, and significant species of restricted and moderately restricted distributions. FCT 14 occurs on a limited range locally and the full regional distribution is unknown. It also supports significant species, including the DRF *Acacia woodmaniorum*, and species with P1 rankings, and significant species of restricted and moderately restricted distributions.

### ***Conservation significant flora***

The same species, *Acacia woodmaniorum* (DRF), *Micromyrtus acuta* Rye (P1), *Micromyrtus trudgenii* (P3), and *Persoonia pentasticha* (P3) as at Mungada West were found at Mungada East. In addition an undescribed species, *Lepidosperma* sp. Blue Hills, a species of potential conservation significance, was recorded during ecologia's survey at Mungada East (ecologia, 2008a).

One Priority weed *Echium plantagineum* (Priority 1 weed) (Hussey *et al.*, 1997) was found at Mungada East on disturbed areas on lower slopes near the old mining pit. In addition to this, three environmental weeds were recorded in the area: False Cleavers (*Galium spurium*) and False Hairgrass (both *Pentaschistis airoides* subsp. *airoides* and *Pentaschistis airoides*).

### ***Indirect impacts to flora***

Flora at Mungada East might be impacted by dust, saline water used for dust suppression and fire caused by the mining operations. No dust impact zone has been allowed for by the proponent at Mungada East.

### **Mungada Haul Road**

The proposal is to widen the haul road by clearing three metres on either side of the 66 km long road. A total of 39.5 ha would be cleared. The only surveys of flora along the haul road have been undertaken for Karara Mining Ltd (Woodman, 2007). The vegetation to be cleared consists of regrowth over a period of approximately 30 years. At the western end the haul road intersects the Koolanooka Hills TEC.

Besides impact from vegetation clearing, vegetation at the roadside might be impacted by dust, saline water run-off from construction and dust suppression, and interruption to water flows.

## Karara Camp

The camp and its infrastructure would be situated on previously cleared paddocks with minimal regrowth.

## Cumulative impact

No cumulative impact study including other proposals in the area was undertaken. A combined impact on conservation significant flora was given for Mungada West and East.

### ***Proposed management of flora and vegetation (all areas)***

- Disturbance to natural vegetation would be minimised by siting infrastructure in disturbed areas as far as practicable;
- A two strand wire fence would be erected adjacent the South fold cutback at Koolanooka to restrict access into the Threatened Ecological Community. This fence would be adequately signposted with warning signs;
- Prior to commencement, disturbance areas would be demarcated in the field;
- Topsoil and vegetation from all clearance activity would be separately stockpiled in dedicated stockpile areas, in accordance with the management outlined in the Environmental Management Plan, and used in rehabilitation;
- Progressive rehabilitation would be conducted. Local provenance seed would be used for rehabilitation;
- Wherever possible, previously rehabilitated access tracks should be utilised in preference to clearing new tracks and no unauthorised off-track driving would be allowed;
- Where practicable on any temporary clearance required, raised blade disturbance would be conducted to minimise vegetation removal;
- Land disturbance requirements would be included in contracts with all earthmoving and land clearing contractors;
- Training on the identification and location of priority flora would be provided to employees;
- Dust generation from project activities would be minimised by engineering controls and use of dust suppression measures;
- Vehicle speeds would be restricted on cleared tracks to minimise the generation of dust;
- Invasion prevention and control of weed species would be managed in accordance with the weed management procedures in the Environmental Management Plan;
- A total fire ban would be in place and fire risk will be managed in accordance with the management procedure in the Environmental Management Plan;
- Drainage of the minor streams and drainage lines that the haul route crosses would be maintained with effective culverts and/or floodways. This aspect would be specifically considered when reshaping the Mt Karara/Mungada Haul Road; and
- Existing culverts would be re-established where possible under roads, embankments and formations to allow free flow of drainage water and to assist in water shedding from the site.

## Submissions

DEC submitted that:

- community descriptions were not accessed from DEC to determine vegetation community types;
- vegetation maps were not floristic plot-based and did not allow for easy assessment of regional significance;
- the proponent should consider offsets that provide for the on-going maintenance and management of the area as BIF areas cannot be directly offset;
- quantitative information was not provided on extent of impacts on floristic communities and remaining extent of communities outside of mine impact;
- dust suppression water might impact on vegetation. The proponent should monitor for impacts against defined criteria;
- the proponent should contain all stormwater and surface runoff on site so vegetation is not impacted;
- flora population figures did not match those provided for the same area by other proponents; and
- clarification was needed on actual areas surveyed for flora and survey intensity and whether regrowth areas have been surveyed for DRF and conservation significant flora.

A member of the public commented that PER failed to address cumulative impact assessment and to adequately address impacts. The submitter contended that the PER provided inadequate offsets and also provided commitments and management procedures that failed to meet best practice and failed to justify project.

The Wildflower Society and the Conservation Council commented that baseline studies were incomplete.

The Department of Environment, Water, Heritage and the Arts (DEWHA) commented that *Eucalyptus synandra* is listed as vulnerable threatened species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). *Eremophila viscida* and *E. nivea* are also listed as endangered under the EPBC Act.

## Assessment

The area considered for assessment comprises the areas impacted by mining at Koolanooka and Mungada West and East, the proposed camp at Old Karara Homestead, infrastructure areas, including the haul road and transport routes, borrow pits and water sources, and the areas adjacent to these direct impact areas.

The EPA's environmental objective for this factor 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 in knowledge. The EPA's principles for the conservation of biodiversity and ecological integrity include maintaining biodiversity in-situ and having a comprehensive, representative and adequate system of ecologically viable protected areas (EPA, 2004).

## Koolanooka

The EPA notes that the Koolanooka proposal is located in the Avon-Wheatbelt IBRA region where 93% of the vegetation has already been lost. As the remaining vegetation is below 10% it is considered as endangered and this is reflected in the classification of the vegetation of the Koolanooka Range as a Priority 1 TEC. There is also less than 2% of the vegetation of this region in secure reserves.

The EPA has concerns that the proponent has not clearly indicated its future intentions regarding mining at the site where there is also a magnetite resource and therefore the possible additive impacts of future proposals are unknown. In addition, the remainder of the Koolanooka Range is under Mining Tenement and none of it is held in secure reserve. Approval of mining of the Range at other locations would lead to further cumulative impacts to biodiversity.

However, as the area to be impacted by the current proposal is small, being less than 6 ha, and represents only approximately 0.11% of the total TEC area and a very small percentage of the remnant vegetation of the region, the EPA is of the opinion that the proposal may be approved provided that an overall environmental benefit results from the proposal (EPA, 2000). As the proposal impacts a critical environmental asset, the provision of an offset for the proposal is appropriate.

The proponent has proposed as an offset a five year cooperation agreement with the holder of the grazing lease adjacent to Koolanooka and Dingle Dell that forms part of the proposed Koolanooka Hills Conservation Reserve. The grazing lease covers an area of about 3300 ha and includes vegetation classified as a TEC.

The key points of the cooperation with the lease holder are:

- destocking of sheep, trapping and elimination of goats, and management of the TEC;
- Midwest to pay for fencing (\$2500 per km)/materials (\$1200-\$1500 per km) on the property, where it is found that fencing is required.; and
- annual audit by Midwest to quantify work done.

Midwest has also proposed that additional land, classified as a TEC and owned by Midwest, would be fenced where practicable and de-stocked (Midwest, 2009).

The above offset measures are subject to all components of the mining proposal receiving approval.

The DEC has advised that this proposed offset would assist in the conservation of biodiversity, particularly if goat-proof fencing was installed. However, it is not clear what protection and management will be available for the area after the five year agreement and whether this proposed offset would deliver a long lasting benefit to the environment. The benefits must continue after the development project has been completed (EPA, 2008). A net environmental benefit from the Koolanooka Hills component of the proposal is considered essential for the approval of this component.

The EPA recommends that condition 6 (Appendix 4), designed to reduce impacts from vegetation clearing, dust, saline water application for dust control, fire, weeds, disease and feral animals to the TEC, is imposed.

The EPA notes that the areas of regrowth vegetation have not been surveyed for priority flora. The proponent should investigate the optimisation of the design, siting and footprint of the waste dump with respect to native vegetation of conservation significance, prior to clearing (condition 9).

The EPA notes that the species *Eremophila viscida*, *Eucalyptus synandra* and *Eremophila nivea* listed under the EBPC Act were recorded in an earlier survey of a larger the area (ATA, 2004) and were not found in the current project area.

It is noted that Munckton Road which is used for haulage of ore to Tilley Siding, has the DRF *Tecticornia bulbosa* growing in close proximity to the road. This is the only known location of this DRF. To protect the species from dust impact from the transport of fine product the EPA recommends that truck loads of fine product be covered (condition 7).

It should be noted that the widening of Munckton Road is not part of this proposal and any proposal to widen the road that included the clearing of native vegetation would require the appropriate approvals. There is the potential for *Tecticornia bulbosa* to be impacted by widening of Munckton Road.

### Mungada West

#### ***Floristic communities***

Estimated direct impacts to FCTs (as defined by Woodman 2008a) are shown below:

**Table 4: Estimated impacts to floristic communities at Mungada West**

Floristic community	Estimated area of impact	Estimated percentage of community
FCT 1a	2.3 ha	0.3%
FCT 4/17	13.1 ha	2.8%
FCT 1a/2	2.4 ha	<0.1%
FCT 12	1.6 ha	0.2%

The EPA notes that no dust impact zone has been allowed around workings in this area and vegetation may also be impacted by saline water if this is used for dust suppression. Therefore impacted areas may be greater than those shown above. However, on its own, Mungada West should not represent a significant impact to the communities.

The EPA recommends that condition 6 (Appendix 4), designed to reduce impacts from vegetation clearing, dust, saline water application for dust control, fire, weeds, disease and feral animals to the PEC, is imposed.

The EPA recommends that the design and siting of the waste dump should be reviewed giving consideration to impact to the designated PEC area, habitat for significant flora and fauna, dump stability, hydrology and landscape and visual amenity (condition 9).

A Gilgai formation lies immediately to the south of the proposed waste dump site. This formation is a wetland system formed by the drying, cracking and swelling of a clay layer. As the vegetation of this area is likely to rely on surface and subsurface water drainage, it is important that the quantity of surface water to the area is maintained. This should be considered in fulfilling the recommended condition 9 above.

### ***Conservation significant flora***

The EPA notes that the proponent has estimated the numbers of conservation significant flora known outside the footprint (within 5 km) using an average number of plants based on numbers of plants in populations that are included on FloraBase. Karara Mining has estimated the total number of plants in the local area plus those at Jasper Hills and the range of hills south of Mungada Ridge. Plant numbers presented by Karara Mining have been either derived from detailed surveys or derived from projected habitat areas for each taxon and species density calculations from quadrats. Both sets of data are presented below to represent local and regional impact. The data for the number of plants to be directly impacted by the Mungada West proposal has been sourced from ecologia, 2008a. Data presented in the PER is at variance with data from the flora survey and it is not evident where this data has been sourced.

**Table 5: Estimated impacts to significant flora at Mungada West**

Species	Conservation Code	Estimated number of plants (Karara Mining)	Estimated number of plants within 5 km	Number of plants directly impacted	Estimated % of total population	Estimated % of local population
<i>Micromyrtus acuta</i> Rye ms	P1	240 000	340	10	0.004	2.94
<i>Micromyrtus trudgenii</i>	P3	353 095	7 555	1121	0.32	14.84
<i>Acacia woodmaniorum</i> ms	DRF	29 080	12 083	83	0.29	0.69
<i>Persoonia pentasticha</i>	P3	-	292	6	-	2.05

In particular there are occurrences of *Micromyrtus trudgenii* in close proximity to the pit (Figure 7) and the impact to this species may be greater than the 1121 plants predicted in ecologia 2008a. The only impact of any significance from the Mungada West proposal on its own, is the local impact to *Micromyrtus trudgenii*. However, even if the impact to this species is somewhat greater than predicted, in the context of total population the impact is unlikely to be significant.

The EPA notes that according to Karara Mining data *Polianthion collinum* (P3) may occur in the Mungada West pit area. The proponent should be aware of this species prior to clearing and endeavour to avoid it or otherwise manage the impact. In a regional context no significant impact is predicted to this species from this proposal.

The EPA notes that although the Mungada West area is not included in the PEC, it does support the same conservation significant species found at Mungada East, in particular the DRF *Acacia woodmaniorum*.

The proponent has offered as part of an offset package to relinquish E59/1059 for inclusion in a conservation reserve. Not much is known of the flora and fauna values of this area, known as Blue Hills West, but DEC advises that what is known indicates that species and communities are likely to be more representative of the more subdued



landforms in the area rather than being similar to Karara and Mungada. Flora surveys of Blue Hills West undertaken by the proponent for exploration purposes did not find the DRF *Acacia woodmaniorum* and Priority Flora *Micromyrtus trudgenii* and *M. acuta* Rye found on Mungada Ridge and at Mungada West. The proposed offset does not appear to have the same values as Mungada and does not provide a “like for like” offset. In addition, it is not known if the Minister for Mines and Petroleum would consent to exempting the lease from mining. The offset package also includes up to \$100 000 over five years as a contribution to management.

Although Mungada West is part of the Mt Karara/Mungada Ridge (Blue Hills) area considered in the BIF Review to have very high biodiversity conservation values, the EPA has taken into account that the impacts of Mungada West are less than those at Mungada East as it is removed from the main ridge, it impacts fewer individual plants of conservation significant flora and, with a requirement to redesign the waste dump, could avoid any impact to the area designated as a PEC. Therefore the EPA has decided that this part of the proposal could be approved. As the proposal impacts a high value asset, it would only be acceptable with an appropriate offset.

### Mungada East

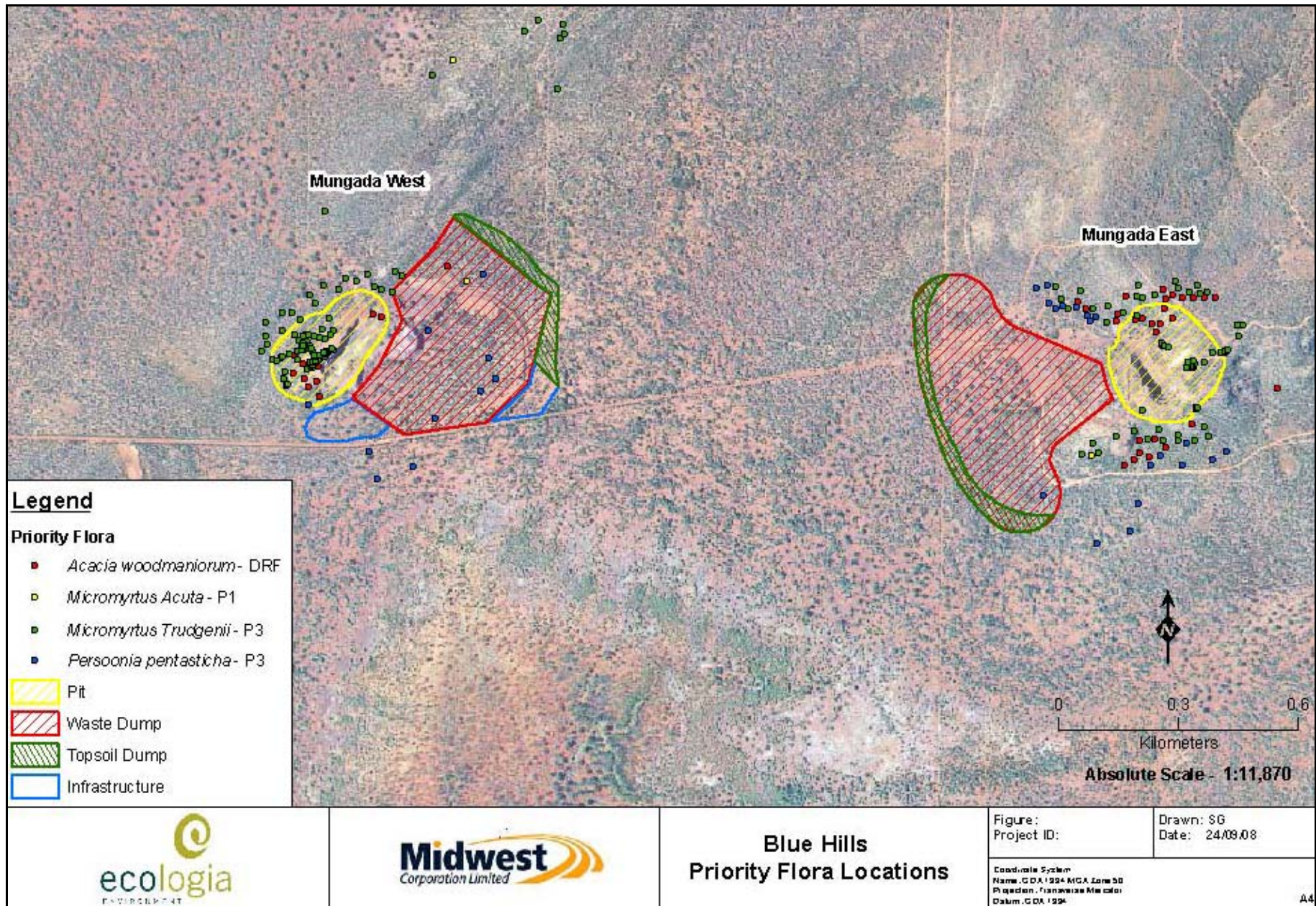
#### ***Floristic communities and conservation significant flora***

Due to the high environmental values associated with the Mungada Ridge, it is the view of the EPA that the entire Mungada Ridge should be protected in the formal conservation estate. This approach is consistent with the BIF Review which recommended reservation of complete examples of landform and ecosystems in their entirety, in areas of high environmental value. The EPA considers that the implementation of Mungada East component of the proposal would have a significant detrimental effect on the integrity and conservation values of the Ridge.

The majority of the proposal lies within the area defined as a PEC by the DEC. Mungada East pit would directly impact on FCTs 12, 13 and 14 by 12, 3.7 and 0.1 ha respectively. Although these are small areas the total areas of FCT 12, 13 and 14 are estimated to be 642.3, 258.1 ha and 324.1 ha, respectively. The pit would cut through the occurrence of FCT 13 (as mapped by Woodman, 2008a) cutting this occurrence of the community in two. The largest known occurrence of FCT 13 is on Mount Karara and the Karara Iron Ore Project, if approved, will impact 53.9% of the total known area of the community. FCT 13 is given a conservation significance rating of 5 by Woodman as:

- the FCT is not represented or represented poorly within the regional quadrat dataset (Markey and Dillon 2006);
- the FCT occurs on landforms that are restricted in the region; and
- Priority flora species (including P1 species)/significant flora species are known to occur in the FCT.

The EPA further notes that prior to the publication of the PER document, the location of the waste dump at Mungada East was changed. While this may be an improved location as it takes in more disturbed area, only three survey quadrats were located in the central area of the new location. Also no route has been shown for the new location of the access road. From the data presented by Karara Mining Ltd (Woodman, 2008b) it is possible that *Acacia karina* (P2), *Calotis* sp Perrivale Station (R J Cranfield 7096) (P3), *Rhodanthe collina* (P1) and more *Micromyrtus trudgenii* (P3) and *Acacia woodmaniorum* (DRF) may be located in the new waste dump or access road location.



**Figure 7: Rare and Priority Flora at Mungada West and Mungada East**



This, together with possible indirect impacts to vegetation from dust and saline water, makes it difficult to obtain a complete estimate of the impact to floristic communities and conservation significant species.

Estimates of impacts to conservation significant flora are given (ecologia, 2008a) as 728 plants of *Acacia woodmanorium* (DRF) and 1798 plants of *Micromyrtus trudgenii* (P3). Further occurrences of these species are found in proximity to the pit (Figure 7) and, as no dust buffer zone has been allowed, a greater number of plants may be impacted by mining than estimated in ecologia, 2008a.

### Haul Road

The EPA notes that no survey was undertaken of the regrowth along the Mungada Haul Road. Surveys carried out by Karara Mining Ltd found three priority species in close proximity to the road. Should widening of the Mungada Road by this proponent proceed the EPA recommends that a survey of the area to be cleared should be undertaken and priority species relocated or other management measures undertaken (condition 8).

The location of borrow pits have not been given. The EPA recommends that prior to the establishment of the pits, the proponent provide a report on the siting of proposed borrow pits, demonstrating that borrow pit sites have been optimised to avoid impact to flora, fauna and visual amenity (condition 8).

### Karara Camp

No significant environmental impacts are expected from this part of the proposal.

### ***Cumulative assessment***

The floristic communities most impacted by Karara Mining Ltd's Karara and Mungada proposals (should they be approved) would be FCT 13 and 14 of which approximately 54% and 65% respectively of the FCTs are impacted (Woodman, 2008b). The proposed impacts to these FCTs have the potential to increase the conservation status of the PEC to a TEC (Woodman, 2008b). The Mungada East proposal would have an additional impact of at least 1.4 % on FCT 13. The Mungada East proposal also impacts on approximately 1.9% of FCT 12 in addition to the approximately 9% impact from Karara Mining Ltd's proposals.

The Mungada West proposal would impact approximately 2.8% of the FCT 4/17. Karara Mining Limited proposals, if approved, would impact at most 5% of the community (Woodman, 2008b). The cumulative impact of the Mungada West proposal with that of the Karara proposals would not cause a significant impact to this FCT.

The flora species most impacted by Karara Mining Ltd's Karara and Mungada proposals are *Acacia karina* (23.2%) and *Lepidosperma* sp Blue hills (53.9%) (EPA, 2009a). There would be only a minor additional impact to *Lepidosperma* sp Blue hills at the Mungada East site. On current information there may be a minor impact to *Acacia karina* from the Mungada East waste dump, however, this is unlikely to be significant.

## Summary

With regard to the proposal at Koolanooka, it is the EPA's opinion that the proposal could meet the EPA's objective for flora and vegetation with an appropriate offset consistent with the requirements of EPA position statement 9 and environmental protection bulletin 1.

The following conditions have been recommended for operations at Koolanooka:

- management of vegetation clearing and impacts to the TEC (condition 6);
- monitoring of dust, saline water application, fire and feral species impacts to the TEC and implementation of additional management, if necessary (condition 6);
- covering of truck loads when transporting fine product along Munckton Road, due to the presence of the DRF *Tecticornia bulbosa* in close proximity to the road (condition 7);
- optimising the design, siting and footprints of the Koolanooka waste dumps to protect native vegetation of conservation significance (condition 9); and
- planning and implementation of progressive rehabilitation and final closure (condition 13).

With regard to the proposal at Mungada West, the haul road and camp, it is the EPA's opinion that the proposal could meet the EPA's objective for flora and vegetation with an appropriate offset.

The following conditions have been recommended for operations at Mungada West:

- management of vegetation clearing and impacts to the PEC (condition 6);
- monitoring of dust, saline water application, fire and feral species impacts to the PEC and implementation of additional management, if necessary (condition 6);
- surveying of the haul road for conservation significant flora and management of any found (condition 8);
- optimising borrow pit sites to avoid impacts to flora, fauna and visual amenity (condition 8);
- optimising the design, siting and footprint of the waste dump at Mungada West giving consideration to the PEC area, habitat for significant flora and fauna, dump stability, hydrology and landscape and visual amenity (condition 9);and
- planning and implementation of progressive rehabilitation and final closure (condition 13).

With regard to the proposal at Mungada East the EPA notes that the proposal would occupy 25.2 ha. Nearly all of the impact area lies within a PEC and is situated on land purchased by the DEC for conservation purposes. Floristic community type 13 (Woodman 2008a), presumed to be regionally restricted, would be impacted and fragmented. Mungada East would also impact the DRF *Acacia woodmaniorum*, known only from Mungada Ridge and Jasper Hill, and three priority species. The EPA considers that the implementation of Mungada East component of the proposal would have a significant detrimental effect on the integrity and conservation values of the Ridge. Impacts due to the Mungada East proposal would be greater than those

from the Mungada West proposal which is removed from the main ridge, impacts fewer individual plants of conservation significant flora and, with a requirement for the proponent to redesign the waste dump, could avoid any impact to the area designated as a PEC.

It is the EPA's opinion that the Mungada East proposal would not meet the EPA's objective for the conservation of biodiversity and ecological integrity. The EPA recommends that the Mungada Ridge in its entirety be protected from mining, exploration and any development.

## 4.2 Fauna

### Description

#### Koolanooka

#### *Vertebrate fauna*

Previous studies identified several conservation significant fauna species with the potential to occur in the Koolanooka area. Species are conservation significant if listed under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), *Western Australian Wildlife Conservation Act 1950: Wildlife Conservation (Specially Protected Fauna) Notice 2006* (WA Cons Act), under the EPBC Act 1999 *Migratory Species* or listed as Priority fauna by the Department of Environment and Conservation. (DEC).

These were:

- the Malleefowl *Leipoa ocellata* (EPBC Act, Vulnerable, WA Cons Act, Schedule 1);
- Slender-billed Thornbill *Acanthiza iredalei iredalei* (EPBC Act, Vulnerable);
- Carnaby's Black-Cockatoo *Calyptorhynchus latirostris* (EPBC Act, Endangered, WA Cons Act, Schedule 1);
- Peregrine Falcon *Falco peregrinus* (WA Cons Act, Schedule 4);
- Bush Stone-curlew *Burhinus grallarius* (DEC P4);
- Hooded Plover *Charadrius rubricollis* (DEC P4);
- White-browed Babbler *Pomatostomus superciliosus ashbyi* (DEC P4);
- Crested Bellbird *Oreoica gutturalis gutturalis* (DEC P4);
- Western Spiny-tailed Skink *Egernia stokesii badia* (EPBC Act Endangered, WA Cons Act, Schedule 1); and
- the Gilled Slender Blue-tongue *Cyclodomorphus branchialis* (WA Cons Act, Schedule 1).

A fauna survey was undertaken in June 1996 (Tingay,1996) and covered the entire northern section of Koolanooka Hills to south of Koolanooka Springs Road, and some surrounding farm land. The survey included bird surveys and several hours of hand searching of microhabitat refugia and some nocturnal searching. A further eight day fauna trapping program was conducted at Koolanooka from 15 -23 December 2003 (ATA, 2004). The study area encompassed approximately 6 400ha and consisted of trapping sites, bird surveys, spotlighting and hand searching at sites.

From the two surveys, five species of conservation significance were recorded at or near Koolanooka, the Malleefowl, White-browed Babbler, Crested Bellbird, Western

Spiny-tailed Skink and Gilled Slender Blue-tongue (Midwest 2008) and one protected migratory bird, the Rainbow Bee-eater *Merops ornatus* (EPBC ACT 1999 *Migratory Species*). A further brief visual survey of the proposed Koolanooka pit area undertaken in January 2007 specifically targeting conservation significant fauna and found no significant fauna.

The 2003 survey found 6 inactive Malleefowl mounds, one within the impact area of the pit, but no evidence of the presence of Malleefowl. The White-browed Babbler was found to be common in the area and it is not known if the species observed is the significant subspecies *Pomatostomus superciliosus ashbyi* or the non-significant northern *P.s. superciliosus*. The Crested Bellbird was found to be relatively common at Koolanooka and it is not known if the species observed is the significant southern species *Oreoica gutturalis gutturalis* or the non significant northern species.

The Western Spiny-tailed Skink was found adjacent to the proposed project area during the fauna survey in degraded areas with tin and abandoned car bodies surrounding farmhouses. The population would not be impacted by the project. A single individual of Gilled Slender Blue-tongue *Cyclodomorphus branchialis* was captured opportunistically at Koolanooka by ATA Environmental (ATA 2004). No location was given for this capture, but it is assumed that the species inhabits rocky ridges as those captured at Blue Hills. Extensions to the mining pit at Koolanooka could potentially impact this species if present; however, no *C. branchialis* were located during a survey of the extension area in 2007. The proponent considers that none of the above species would be significantly impacted by the mining proposal at Koolanooka.

The proponent considers it unlikely that mining activity would substantially impact habitat for the Rainbow Bee-eater, or seriously disrupt the lifecycle of an ecologically significant proportion of the population of this species.

### Mungada West and East

#### ***Vertebrate fauna***

A fauna survey of the Blue Hills area was undertaken by M.J. Bamford and J.A. Wilcox from 9 - 16 February 2004 (Bamford and Wilcox, 2004). The survey consisted of systematic trapping, bird census, spotlighting for nocturnal reptiles, birds and mammals, the use of mist-nets, a harp trap and an ultra-sonic detector for bats, searching for reptiles, collection of macro-invertebrates likely to represent range-restricted species and opportunistic sightings. The results of a survey undertaken of Karara and Mungada Haematite/Magnetite Projects for Karara Mining Limited in April, August and October 2006 (Bancroft and Bamford, 2006) have also been included by Midwest in their assessment of fauna in the Mungada area. No site location map was included for the 2006 survey. A short survey for conservation significant species was undertaken in 2007 as at Koolanooka.

Conservation significant species expected in the area include those expected at Koolanooka and also the Major Mitchell's Cockatoo *Cacatua leadbeateri* (WA Cons Act Schedule 4), and migratory species Fork-tailed Swift *Apus pacificus*, Great Egret *Ardea alba*, and Cattle Egret *Ardea ibis*.

The 2004 survey found only the Gilled Slender Blue-tongue, the Rainbow Bee-eater and White-browed Babbler of the listed species. The 2006 survey found 112 malleefowl mounds, of which 9 were active. A second Gilled Slender Blue-tongue was found at Karara. Peregrine Falcons were observed nesting on the east side of Mungada Ridge and Major Mitchell's Cockatoos were also observed and appeared to be nesting in the area. Sightings of Malleefowl and Major Mitchell's Cockatoos were also made in the January 2007 survey. Only four Malleefowl mounds were identified close to the Mungada West and East areas, two active and two inactive. However, a large number of Malleefowl mounds were identified by Karara Mining Limited in the general area and the area traversed by the Haul Road, indicating the presence of a number of Malleefowl in the area. Of the four mounds found near Mungada West and East, one inactive mound would be impacted by the Mungada East waste dump and an active mound was in close proximity to the dump.

The listed species Gilled Slender Blue-tongue and Peregrine Falcon appear to be reliant upon the ironstone ridges and would suffer habitat loss by the removal of ridge areas. The Malleefowl mounds appear to occur in the largest concentrations on the slopes of the ironstone ridges with gravelly loam soils and associated dense vegetation. Such areas are proposed for infrastructure and waste dumps and Malleefowl are likely to suffer habitat loss. Concentration of runoff from ironstone ridges is an important factor in the development of habitat with dense vegetation and modification of the ridges and slopes may impact runoff and this habitat. The Western Spiny-tailed Skink and Major Mitchell's Cockatoo are reliant upon the eucalypt woodlands and may suffer some habitat loss.

### **Haul Road**

A report on the fauna of the haul road joining Mt Karara/Mungada to Koolanooka listed 276 species as potentially occurring, comprising eight amphibians, 69 reptiles, 168 birds and 31 mammals (Bamford Consulting Ecologists 2006c). The authors note that the high potential diversity of the haul road is a result of it bridging a transition between the south-west and inland biogeographic zones. The potential bird list is increased by an additional 32 waterbirds based on the presence of wetlands, in particular Wheelamby Lake which is crossed by the road approximately 25 km east of Koolanooka.

Malleefowl, Major Mitchell's Cockatoo, White-browed Babbler and Crested Bellbird, were sighted along the haul road by ecologia (Midwest, 2008).

The fauna report concluded that the haul road should have a negligible impact on fauna, with the exception of roadkill, as long as disturbance is confined to the existing road footprint. The area around Lake Wheelhamby may also be an exception, however, as associated vegetation and soil types may support a distinctive fauna assemblage, especially of invertebrates.

The main issues identified with respect to fauna from the haul road are:

- impacts to surface hydrology which could affect seasonal wetlands, breeding by frogs and short range endemic fauna;
- loss of habitat from clearing and impact to vegetation if saline water is used on the road;

- loss and fragmentation of habitat associated with Weelhamby Lake and impact to range restricted invertebrates;
- roadkill for some snakes, Malleefowl and Major Mitchell's Cockatoos;
- increase of feral animal population; and
- impact to Malleefowl mounds or nest trees in areas outside of existing road footprint.

### **Karara Camp**

No direct impact to fauna from the camp is expected. However, the camp would have the potential to increase the population of feral animals if food and water sources are not strictly managed.

### ***Short Range Endemic fauna (SRE) (all areas)***

South-facing ridges and slopes are likely to be of particular importance for short range endemic invertebrates, as such invertebrates are typically associated with mesic refugia (i.e. an area with moderate moisture that remains habitable when the climate of the surrounding area has changed). Previous studies identified conservation significant invertebrates, the Tree Stem Trapdoor Spider *Aganippe castellum* (WA Cons Act Schedule 1) and Minnivale Trapdoor Spider (*Teyl* sp.) (WA Cons Act Schedule 1), with the potential to occur in the Koolanooka area.

The 2006 survey (Bancroft and Bamford, 2006) found the Shield-backed Trapdoor Spider *Idiosoma nigrum* (Idiopodidae) on the midslopes of Mungada Ridge and an undescribed species of *Aname* (Nemesiidae) which may be a SRE at Mungada Ridge. In addition Karara Mining Limited has found a large number Shield-backed Trapdoor Spider burrows, which are widely distributed through the Karara area from the ridge to the plain.

A targeted fauna survey in 2007 examined only three small areas at Koolanooka and Blue Hills, which were the “proposed expansion zones for existing pits” (Midwest, 2009). No rare spiders were recorded. The pit expansion area at Koolanooka contains *Allocasuarina campestris* which is known as a habitat of *Aganippe castellum* (WA Cons Act, Schedule 1). It is possible that this spider may be present and impacted in the pit expansion area.

SRE surveys were undertaken in two phases, the first being in January/February 2007 at four sites in the Koolanooka pit expansion and dust buffer zone area and two sites in the Mungada East pit expansion area (ecologia, 2007). The second phase consisted of sampling which occurred in June/July 2007 at three sites outside the pit expansion area at Mungada West and seven sites outside of the pit expansion area at Mungada East. The surveys consisted of a combination of pitfall trapping and invertebrate foraging. One hundred and seventeen specimens were collected representing 20 species of invertebrate. Not all species could be identified to genus and species level due to a lack of taxonomic knowledge in this area.

Of the 20 species, 10 were found only in the impact area of one pit expansion and one was only found in the impact area of two of the pit expansions. Of these 11 species, six are considered on expert opinion not to be SRE (ecologia, 2009). One species of pseudoscorpion found at Koolanooka only is considered to have low probability of being SRE and is unlikely to be restricted to the pit impact area only. Another



scorpion, located at Koolanooka, is a possible SRE but its range is also unlikely to be restricted to the pit impact area based on the extent of soil type in the area. There is insufficient information to determine the SRE status of the remaining three species, an arachnid of the Barychelidae family found in the Koolanooka pit area, a centipede of the genus *Mecistocephala* found in the Mungada East pit area and a snail of the genus *Bothriembryon*, considered to be a new species, found in the Mungada East pit area.

The SRE survey found that the vegetation to be cleared along the haul road was unlikely to harbour SRE and therefore the widening of the haul road was unlikely to severely impact any SRE.

### ***Subterranean fauna (all areas)***

#### *Stygofauna*

The sources of water proposed for all three mining activities and construction of the haul road are saline water from a sump on the edge of a salt lake, water from the old Koolanooka pit and low salinity water from bores within a fractured rock aquifer to the north of the Koolanooka site. Water for the Karara Camp would be sourced from an existing well or imported from Morawa or Perenjori. There would be no mining below the groundwater table.

Stygofauna surveys were undertaken in February 2007 and March 2008. The proposed borefield comprised eight existing bores suitable for stygofauna sampling. Four bores were sampled at Koolanooka during the first phase of sampling in February 2007 as the other four were in use. During the second phase in March 2008, seven bores were sampled within the Koolanooka Borefield and a single bore was sampled at Tilley Siding. In addition, four bores/wells were sampled regionally in order to assess the regional significance of the results within the project impact areas.

Although the water quality in the bores was suitable for stygofauna, Phase 1 yielded no stygofauna, while Phase 2 yielded two specimens of a stygobitic copepod from the genus *Microcyclops*. One of these specimens was collected within the project area and the other specimen was collected in a regional well approximately 70 km away from the project area. The species identity could not be confirmed as both specimens were immature, however, based on the location of the project area, the specimens are likely to belong to a widespread species *Microcyclops varicans* (ecologia 2008b, Midwest, 2008).

If additional new bores are required, these would be tested for stygofauna.

#### *Troglofauna*

Four phases of trap-baited sampling for troglofauna was conducted on sites for a total of 37 boreholes. All sampling sites were outside of the proposed Koolanooka pit and inside of the proposed Mungada West pit. At Mungada East ten sampling sites were in the pit area and four outside of it. The first phase occurred in February to March 2007 and was designed to be a pilot study for the project and sampled three boreholes. A second phase of sampling was carried out in December 2007 to February 2008. A single troglobitic spider, a new species, was collected opportunistically during the second phase of sampling at Koolanooka. Two more phases of sampling were undertaken to determine the abundance and distribution of this troglobitic spider as

well as to sample for the presence of other troglobitic species within the project impact areas (phase three: March – May 2008, phase four: June – July 2008). However, no more troglobitic spiders or additional troglobitic species were recorded during these phases (Midwest, 2008).

The troglobitic spider was found outside of the Koolanooka pit area and is expected to occur in other places on the range. It is recognised that given the troglobitic spider is a predatory species it is highly likely that other troglobitic fauna must be present in the Koolanooka Range as prey species. However, none were captured. The troglobitic specimen from Koolanooka was found on root matter drawn out of the bore. This supports the hypothesis that troglofauna are largely dependent on the availability of carbon and nitrogen which are limited in subterranean environments. The penetration of plant roots into these environments is believed to be one of the important processes which facilitate transport of nutrients from the surface into deeper strata. Roots of surface plants can reach to depths of over 20 m. It is plausible that troglofauna may be concentrated in areas where plant roots occur (ecologia, 2008c).

Based on site inspections of the proposed impact areas by zoologists, geologists and environmental scientists, there was no evidence of cavities open to the surface in the proposal impact area, and only minimal cavities have been encountered during test drilling. The proponent considers it extremely unlikely that impacts to troglofauna from the proposal in any of the three areas would be significant.

#### ***Management of impacts to fauna***

The following management measures are proposed:

- staged clearing would be conducted;
- disturbed areas would be rehabilitated as soon as possible, with ongoing rehabilitation throughout the mine life to facilitate habitat restoration;
- liaison with DEC regarding the management of fauna of conservation significance;
- implementing operational control procedures, site inductions and employee training programs to protect native fauna from intentional harm, and to appropriately manage injured fauna if found;
- wildfire from accidental ignition would be avoided as far as is possible;
- Midwest would investigate installing high pitched whistles on the front of road trains working the Blue Hills haul road, in an attempt to scare away fauna and reduce fauna road kills;
- dead trees would be regarded as valuable habitat and would be protected;
- rock hollows and overlays in the Blue Hills are important for some fauna and contain historically significant nests of stick-nest rats. Access to these caves by project personnel would be controlled;
- foundation holes, drill holes and trenches would be covered, fenced, banded or otherwise capped to prevent fauna entrapment. Holes and excavations would be inspected regularly for trapped fauna;
- the management of native, domestic pets and feral animals would be in accordance with the Environmental Management Plan presented in the PER;
- any death of fauna of conservation significance would be reported to DEC;
- rare and significant fauna species might be relocated where required;
- where appropriate a Threatened Fauna Management and Conservation Plan would be developed and implemented for the project; and

- wherever possible barbed wire would not be used on the project, to minimise harm to bats.

In addition, to help protect Malleefowl, Midwest would:

- become a financial member of the Malleefowl Preservation Society;
- record sightings of nests both active and inactive;
- limit speeds on haul roads to 90 km /hr and limit vehicle speed to a maximum of 50 km/hr at locations of known active malleefowl mounds;
- install warning signs as necessary;
- record sightings of birds in time/number/location; and
- develop a Malleefowl Management Plan in conjunction with the DEC.

### **Submissions**

DEC suggested that the proponent should consider contributing to a regional invasive animal (fox and feral goat) animal control program to offset impacts to Malleefowl. Impacts from the haul road to Short Range Endemic species, in particular shield-backed trapdoor spiders should be further considered. DEC commented that the impact of noise and vibration on conservation significant vertebrate fauna around the sites and haul road has not been considered.

DEWHA asked whether the state listed TEC provided habitat for Malleefowl.

The Conservation Council commented that troglofauna had been discovered on Mungada Ridge but that sampling methods appear inappropriate. It was suggested that no development should be considered until appropriate methods were developed and further surveys carried out for troglofauna.

### **Assessment**

The area considered for assessment comprises the areas impacted by mining at Koolanooka and Mungada West and East, the proposed camp at Old Karara Homestead, infrastructure areas, including the haul road and transport routes, borrow pits and water sources, and the areas adjacent to these impact areas.

The EPA's environmental objective for this factor 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.

#### Koolanooka

##### ***Vertebrate fauna***

Of the species of conservation significance found to be present at the Koolanooka those most likely to be impacted by the proposal are the Malleefowl and Gilled Slender Blue-tongue. Bird species, other than the Malleefowl, are not expected to be significantly impacted.

Malleefowl would be impacted by habitat loss, noise from mining operations and possibly road strike from machinery and trucks. The loss of habitat from the proposal would be small. The EPA notes that one mound is likely to be impacted by the proposal. Direct impact to Malleefowl is possible, particularly from truck movements and should be minimised by limiting speed in any areas where Malleefowl are

regularly sighted. The EPA recommends that the proponent prepare and implement strategies to avoid fauna deaths in areas of mining or mining related activities (condition 12).

As another significant impact to Malleefowl is from predatory feral animals, reduction of ferals would assist with the conservation of Malleefowl. The EPA notes that the Fauna Management Plan commits to reporting feral animals to the Site Manager and trapping and removal where required. The EPA recommends that the proponent make a greater effort, as a responsible landowner, to reduce predatory feral animals on its freehold land and gives consideration to extending reduction measures to surrounding land. The increase of water availability due to mining activities may serve to attract more feral animals and the proponent should include in management plans the management of water sources to ensure this does not occur.

The EPA notes that the Gilled Slender Blue-tongue has been found at Koolanooka and also at Mungada and Karara. This species, while apparently restricted to ironstone ridges, is known at several locations. The small amount of ridge area being removed at Koolanooka should not substantially reduce the habitat for the species or the population of the species. Nevertheless, the EPA recommends that prior to ground disturbing activities the proponent undertake field surveys for conservation significant reptiles and relocate any individuals found (condition 10).

The proponent has not addressed the issue of noise and vibration impact to fauna as the proponent considers that noise and vibration produced from the proposed low volume episodic mining operation will not have any significant detrimental impact to the conservation significant vertebrate fauna (Midwest 2009). Although no evidence is provided to support this assertion, the EPA is of the opinion that noise and vibration are unlikely to be a significant impacts to fauna.

#### Mungada West and East

##### ***Vertebrate fauna***

Conservation significant fauna sighted in this area include Malleefowl, Gilled Slender Blue-tongue, Peregrine Falcon and Major Mitchell Cockatoos. There is no description of how the brief rare fauna survey was carried out. From Appendix 2 in the Response to Submissions (Midwest, 2009) it appears that only the pit areas were surveyed and not the waste dump areas that are the greater areas of disturbance at Mungada. The EPA notes that Karara Mining Limited has found evidence of the presence of the Western Spiny-tailed Skink at 45 sites on their leases (Harris and Bamford, 2008). Evidence of the Skink was found in Eucalyptus woodland (preferred habitat) and in mixed Eucalyptus woodland with Acacia species. Similar habitat occurs in the waste dump area of the Mungada West pit. Potential habitat may also exist along the proposed haul road. The EPA recommends that prior to ground disturbing activities the proponent undertake field surveys for conservation significant reptiles and relocate any individuals found (condition 10).

The expected main impacts to fauna are direct impact to Malleefowl from mining activities, especially along the haul road, and loss of habitat for other significant species.

Bancroft and Bamford 2006 found that the most significant habitats in the Blue Hills/Mungada area were:

- Ironstone ridges, particularly where the rock formations are well developed to create micro-habitats for roosting bats, Woolley's Pseudantechinus and the Peregrine Falcon. The Mungada Ridge stands out in this respect. The Gilled Slender Blue-tongue may also be restricted to rocky habitats along ridges;
- Lower slopes of ironstone hills where water is concentrated, creating dense vegetation. Such areas are important for a number of significant bird species and also seem to be linked to general patterns of biodiversity;
- Temporary wetlands;
- Well-developed eucalypt woodlands.

These findings confirm the values of the Mungada Ridge, not only for flora but also for fauna, and support the EPA's view that the entire Mungada Ridge should be protected in the formal conservation estate to provide an example of a landform and ecosystem in its entirety as recommended in BIF Review.

The proposed Mungada East pit would expand the existing pit from 0.4 ha to 6.4 ha and impact on an additional 6 ha of the ridge, leaving a pit extending below ground level. The EPA considers that this would have a significant detrimental effect on the integrity and conservation values of the Ridge and is therefore environmentally unacceptable.

Although the proposal for Mungada West is likely to impact some fauna and fauna habitat, it is considered that the impact is not so severe as to be unacceptable.

The proponent has provided a management plan for the camp area with provisions for waste management so that fauna are not attracted to the camp and for the prevention of the introduction of feral or domestic animals.

#### Haul Road

##### ***Vertebrate fauna***

The expected main impact to fauna from the haul road is direct impact to Malleefowl. In order to mitigate impacts to Malleefowl the EPA recommends condition 12 to mitigate impacts to fauna.

The EPA recommends that impacts from the haul road to surface water drainage are avoided. The recommendations provided in Bamford 2006c that the flow of water through Wheelhamby Lake should not be altered and that locations where soil and existing landform suggest that surface drainage may be affected by the roadworks should be identified, should be implemented. Road planning should ensure that surface drainage is not disrupted (condition 8).

##### ***Short-range endemic species (all areas)***

The EPA notes that Karara Mining Limited has found a large number Shield-backed Trapdoor Spider burrows, which are widely distributed through the Karara area from the ridge to the plain. Also the 2006 fauna report (Bancroft and Bamford, 2006) noted that the lower slopes of ironstone hills where water is concentrated creating dense vegetation, is important habitat for the Shield-backed Trapdoor Spider.

The waste dump footprints at Mungada were not surveyed for burrows. As the burrows are clumped, well designed searching is required so that burrows are not missed. The EPA considers that the occurrence of Shield-backed Trapdoor Spiders should be investigated and taken into account when optimising the siting of the waste dump at Mungada West (condition 9).

Based on the SRE surveys carried out at Koolanooka the EPA considers that it is unlikely that the small area of disturbance for this proposal would impact the entire population of the undescribed Barychelidae spider and therefore finds the impact acceptable.

The EPA notes that no sampling for SRE was carried out in the Mungada West pit expansion area and that the one sampling site that may be in the dust impact zone returned no results. The two sampling sites to the north of Mungada West appear to be situated in a different floristic community type to that impacted by the pit expansion (Woodman, 2008a). It is therefore recommended that the pit area and adjacent area outside of the pit are surveyed for SRE prior to the commencement of the proposal. If any species is found that may have its International Union for the Conservation of Nature and Natural Resources (IUCN) Threat Category increased by the proposal (i.e. from initially not being listed as threatened under any category to being listed or having the threat category increased), management should be implemented to prevent this increase, as recommended in the BIF Review (condition 11).

The EPA concurs with the finding of the SRE report that the large diversity of invertebrates occurring at Koolanooka/Blue Hills gives the area significant conservation value. The finding of a potential new species of *Bothriembryon* snail at Mungada East and a centipede of the genus *Mecistocephala*, which may be a SRE, adds to the importance of conserving the Mungada Ridge in its entirety.

### ***Subterranean fauna (all areas)***

#### *Stygofauna*

The findings of the stygofauna survey are similar to those of Karara Mining Limited, which found no stygofauna in fractured rock aquifers but did find some in wells in unconfined alluvial aquifers in the area. The EPA agrees with the proponent's commitment to sample any new bores for stygofauna prior to use.

#### *Troglofauna*

The inability to find any further specimens of the troglobitic spider found at Koolanooka or other troglofauna on which it might feed, seems to indicate that sampling methods for troglofauna need to be reviewed. The troglobitic spider was found just outside of the impact area of the proposed Koolanooka pit.

Karara Mining Limited recorded only one troglobitic pseudoscorpion and a presumed troglophilic isopod species on the northern end of Mungada Ridge despite extensive trapping effort in their project area.

It would seem that there may be limited potential troglofauna habit in the project area. In the absence of further information the EPA can make no firm conclusions on the

impact of the proposals on troglofauna but it is assumed that as the troglobitic spider at Koolanooka was found outside the pit area and the proposed pit areas are small, it is unlikely that the entire population of a troglofauna species would be impacted.

The EPA considers the issue of fauna has been adequately addressed and the proposals for Koolanooka and Mungada West, including the haul road and camp, can meet the EPA's objective for this factor provided that conditions are imposed requiring the proponent to:

- control disruption of surface water drainage on haul road (condition 8);
- undertaking of a study to optimise the design, siting and footprint of the waste dump at Mungada West giving consideration to the impact to the designated PEC area, habitat for significant flora and fauna, dump stability, hydrology and landscape and visual amenity and site the waste dump (condition 9);
- survey for conservation significant reptiles, especially the Western Spiny-tailed Skink, *Egernia stokesii badia*, and the Gilled Slender Blue-tongue, *Cyclodomorphus branchialis*. in the proposal footprint and relocation of any found (condition 10); and
- undertake a survey of Mungada West pit expansion and adjacent area for SRE and manage any species if the proposal threatens to increase its IUCN Threat Category to prevent this increase (condition 11).

It is the EPA's recommendation that to protect fauna and fauna habitat found at Mungada Ridge the Mungada East proposal not be implemented and Mungada Ridge be placed in a Class "A" Nature Reserve protected from mining exploration, mining and any other development. Fauna and fauna habitat to be protected includes that of the Gilled Slender Blue-tongue and potential SRE.

### **4.3 Landscape and recreational values**

#### **Description**

##### **Koolanooka**

The Koolanooka area is listed in the Morawa Heritage Inventory, with the recommendation that, should the mine ever be re-opened, the site should be photographed prior to the commencement of earthworks. The project would minimise impact on the anthropocentric values of the BIF, and Midwest would ensure a photographic record of the mine is maintained (Midwest, 2008).

Visual representation of the anticipated final view is presented in the PER.

##### **Mungada Ridge**

The anthropocentric or geo-heritage values of the Blue Hills area are significant, with mining activities having a potential impact through loss of these values (Midwest, 2008). The proponent predicts that significant impact to the geo-heritage or anthropocentric values of the area would be unlikely after waste dumps have been blended appropriately into surrounding ridgelines and rehabilitation has been successfully conducted upon closure.

Visual representations of the anticipated final views are presented in the PER.

### ***Management***

At both mining areas, impacts would be minimised by:

- ensuring clearing only occurs in approved areas;
- locating overburden stockpiles in an area that minimises any impact to visual amenity or prominent drainage lines;
- shaping the stockpiles to blend in with local landforms;
- incorporating final landform into the project Closure Plan, which would be made available to stakeholders for comment;
- designing and locating roads and other infrastructure to minimise long term impacts on the area's future status and use as a conservation reserve;
- removing infrastructure and rehabilitating the site in line with the future land use requirements on closure;
- at Koolanooka reshaping existing waste dumps where possible, to better consider aesthetic concerns at this minesite.

### **Submissions**

The Wildflower Society commented that the PER does not address recreation and tourism and that the area has scenic and conservation values.

The Conservation Council submitted that the existing pits at Mungada have little visual impact and new pits would increase visual impact, and that Koolanooka is already unacceptably impacted and further mining would increase impact.

### **Assessment**

The area considered for assessment comprises all areas disturbed by mining at Koolanooka and Mungada West and East, the proposed camp at Old Karara Homestead, infrastructure, including the haul road and transport routes, borrow pits and water sources and public or privately owned areas from where the project may be viewed.

The EPA's environmental objective for this factor is to ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonably practicable and to ensure that existing and planned recreational uses are not compromised.

The BIF ranges have unique landscape and geodiversity values, as isolated, ancient ranges set within a predominantly flat landscape. The Karara/Mungada/Blue Hills were identified in the BIF Review as ranges supporting the highest level of biodiversity and landscape conservation value, and ideally warranting protection in their entirety. The existing pits and disturbance areas at Mungada West and Mungada East are small with pits occupying 0.7 and 0.4 ha respectively and pre-existing impacted areas 5.3 and 6.4 ha respectively. The proposal would increase the pit areas of Mungada West and Mungada East to 5.3 and 6.4 ha respectively and the impact areas to 25.9 and 25.6 ha respectively and increase the visual impact. The EPA recommends that the Mungada Ridge, being a particularly visually attractive range, is retained in its entirety. This would preclude the development of the Mungada East pit which is situated on the ridge.

The Karara/Mungada/Blue Hills area also forms part of a significant land parcel of former pastoral leases purchased by the State Government for the purpose of inclusion



in the conservation reserve system, in large part due to the biodiversity and visual/landscape values of the ranges. It is anticipated that the conservation reserve would be used for recreation and tourism and the EPA recommends that the Mungada Ridge be retained intact as a tourist attraction.

The area proposed for mining at Koolanooka has already been significantly visually impacted by previous operations and visual/landscape values are already compromised. However, Mungada West is not considered to have as great a visual/landscape as Mungada East as it is separated from the main ridge.

Should the Koolanooka and Mungada West proposals be implemented, the EPA recommends that rehabilitation with local species should be commenced as soon as areas become available for rehabilitation (condition 13). The dry climatic conditions in the area lead to slow plant growth. The revegetation of cleared areas and dumps with vegetation consistent with the surrounding area is necessary to minimise the visual impact.

The EPA considers the issue of landscape and recreational values has been adequately addressed for the Koolanooka and Mungada West proposal and these proposal can meet the EPA's objectives for this factor provided that conditions are imposed requiring the proposal to implement progressive rehabilitation and meet rehabilitation criteria.

#### **4.4 Rehabilitation and mine closure**

##### **Description**

##### ***Rehabilitation***

The Koolanooka pit area would be expanded by 3.8 ha, the Mungada West by 4.6 ha and the Mungada East by 6.0 ha. Rehabilitation of the pit areas is unlikely to be possible.

Waste dumps at Koolanooka would cover 32.6 ha, at Mungada West 20.6 ha and at Mungada East 19.2 ha.

Rehabilitation would occur progressively as disturbed areas are no longer utilised. Upon the completion of mining activities, should Sinosteel Midwest not undertake further operations, all sites impacted by the project would be rehabilitated. Rehabilitation activities will include;

- re-establishment of stable landform with erosion protection for long term stability;
- ripping of compacted areas and on contours of slopes; and
- spreading of vegetation debris to return organic matter to the area and provide supplementary seeding with appropriate species. Seed stock would be gathered during the pre-clearance of the area of impact, to provide an effective provenance seed-set for use during rehabilitation practices.

The rehabilitation programme would include development of completion criteria to indicate the stage when rehabilitation can be considered self sustaining (Midwest, 2008).

### **Closure**

A Conceptual Closure Plan has been provided in the PER. Closure will consist of:

- assessing the sites for contamination and remediation of contaminated sites to agreed criteria,
- decommissioning the site by dismantling and removal of infrastructure, disposal of waste materials, and the return of impacted areas to a variety of vegetation types and fauna habitats that simulate the pre-disturbance state or other agreed post-mining land use; and
- rehabilitation of the sites to established completion criteria.

### **Submissions**

The DEC commented that the source of topsoil for rehabilitation should be clarified.

The Wildflower Society suggested that a security for the full cost of rehabilitation should be imposed.

### **Assessment**

The area considered for assessment comprises all areas disturbed by mining at Koolanooka and Mungada West and East, the proposed camp at Old Karara Homestead, infrastructure, including the haul road and transport routes, borrow pits and water sources.

The EPA's environmental objective for this factor is to ensure, as far as practicable, that rehabilitation achieves a stable and functioning landform which is consistent with the surrounding landscape.

The EPA considers that progressive rehabilitation should be commenced as soon as practicable as vegetation in the area is slow growing and rehabilitation will assist in the mitigation of impacts to flora, fauna and landscape values. The EPA has recommended condition 13 which includes some rehabilitation criteria. It is anticipated that it may be decades before rehabilitated waste dumps and disturbed areas have sufficient vegetation cover to approximate natural areas. The EPA considers that where the proponent has undertaken exploration on the project mining leases, these areas should also be rehabilitated. Rehabilitation needs to be achieved to a standard compatible with the future uses of the areas.

The EPA notes that all mining in the proposal areas will be above the water table. Nevertheless permanent pits which may collect surface water will be created. The EPA recommends that the proponent ensure that on mine closure the pit voids do not cause impacts by attracting native fauna which may subsequently be harmed or fauna which may harm surrounding native vegetation (condition 13).

The pits also need to be managed in the long term consistent with the land use of the area. Mungada West is on land owned by the DEC which is likely to be used for tourism and recreation. The final closure plan should ensure that the long term management of the pit is considered and that there should be no liability for the State. Koolanooka is also used as a recreational area and long term management needs to be considered for this area as well if this use is to continue.

The EPA notes that the existing pit at Koolanooka will only be backfilled if magnetite mining is not developed in this area. Backfilling of the existing pit would reduce the impact of the mining proposal and improve the visual amenity of the area. The EPA supports backfilling of mining pits and encourages the proponent to come to an early decision on the feasibility of magnetite extraction.

The use of saline water for dust suppression has implications for the subsequent rehabilitation of salt contaminated areas. The proponent should consider this in the application of saline water to the sites.

The proponent will be required to provide environmental bonds for the proposal under the *Mining Act 1978* and the EPA considers that additional bonds are unnecessary. The EPA expects that the size of the bonds imposed by the Department of Mines and Petroleum should be commensurate with the sensitivity of the environment and scale and nature of the operation.

The EPA considers the issue of rehabilitation and closure has been adequately addressed for the Koolanooka and Mungada West components of the proposal and these components can meet the EPA's objective for this factor provided that conditions are imposed requiring the proponent to implement progressive rehabilitation, manage pit voids and provide a final closure plan that includes long term management of the site.

As discussed in Sections 4-1, 4-2 and 4-3, the EPA recommends that the environmental values of the Mungada Ridge be protected from mining, exploration and development and the Mungada East proposal not be approved for implementation.

#### **4.5 Environmental principles**

In preparing this report and recommendations, the EPA has had regard for the object and principles contained in s4A of the *Environmental Protection Act (1986)*. Appendix 3 contains a summary of the EPA's consideration of the principles.

### **5. Conditions and commitments**

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The proponent has provided commitments for offsets for the residual environmental impacts from the Koolanooka and Mungada proposals. The offsets are conditional on all the components of the proposal receiving approval and therefore will not be applicable if Mungada East is not approved.

#### **5.1 Recommended conditions**

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Sinosteel Midwest Corporation Limited to mine hematite ore at Koolanooka and Mungada West is approved for implementation. These

conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

- a) Protection of Threatened and Priority Ecological Communities;
- b) Protection of the Declared Rare Flora *Tecticornia bulbosa*;
- c) Construction of the Mungada Haul Road;
- d) Design, siting and footprint of waste dumps;
- e) Conservation significant reptiles;
- f) Short range endemic invertebrate fauna;
- g) Prevention of fauna mortality; and
- h) Rehabilitation and Mine Closure.

It should be noted that other regulatory mechanisms relevant to the proposal are:

- Part V of the *Environmental Protection Act 1986* – Works Approval and operating Licence;
- *Rights in Water and Irrigation Act 1914* – Groundwater Licence and Operating Strategy;
- *Wildlife Conservation Act 1950* – licence to handle and remove trapped native fauna; and
- *Mining Act 1978* – mining proposal is required to be approved by the Department of Mines and Petroleum and provide rehabilitation bonds

## 6. Other Advice

### *Conservation of the Koolanooka Range*

The EPA notes that there are six native flora species known to be endemic to the Koolanooka Range only. There are other mining tenements in place over the Range and therefore the creation of a secure conservation reservation to protect these species is a priority. The small percentage of this sub-region in conservation reserve adds to the urgency of creating a conservation reserve in the Koolanooka Range.

### *Widening of roads*

The EPA notes that any widening of Mungada Road or Koolanooka Springs road beyond reinstatement of the original width of the road (i.e. 3 metres on either side of the road) is not part of this proposal and any clearing of native vegetation will need to obtain the required approvals. Parts of these roads pass through the Koolanooka TEC area. The widening of Munckton Road is also not included in this proposal and the clearing of native vegetation will need to obtain the required approvals. The DRF *Tecticornia bulbosa* occurs along this road and is the only known occurrence of this taxon.

### *Aboriginal heritage*

The EPA notes that only limited Aboriginal archaeological and ethnographical surveys have been undertaken in the proposal areas. At Koolanooka the proponent has obtained a section 18 approval under the *Aboriginal Heritage Act 1972* to disturb site DIA 4496 which covers the entire length of the Koolanooka Hills for the purpose

of magnetite mining. The approval was subject to certain conditions however, including an archaeological survey. The EPA understands that an ethnographical study of the Koolanooka proposal area was undertaken in 2003 with the Widi Mob, but not with other Native Title applicants. The EPA notes that it is the intention of the proponent to conduct heritage surveys of the entire project area, including the haul road, with the Widi Binyari and Amangu Native Title claimants.

No registered Aboriginal heritage sites are known in the Mungada West area although there is archived data for the whole Mungada area. There are several sites registered in proximity to the haul road.

The EPA considers that Aboriginal heritage issues can be managed under the *Aboriginal Heritage Act 1972* and the proponent should be aware of the obligations and requirements of the Act and maintain a liaison with the Department of Indigenous Affairs.

## **7. Conclusions**

The EPA has considered the proposal by Sinosteel Midwest Corporation Limited to expand hematite ore mining at Koolanooka Hills and to recommence mining of hematite ore at two locations at Mungada (part of the Blue Hills Range), to reinstate the Mungada Haul Road to its original width and construct an accommodation camp at Old Karara Homestead.

The EPA notes that the Koolanooka Hills occur in the Avon Wheatbelt 1 (AW1) subregion of the Interim Biogeographic Regionalisation of Australia (IBRA) classification. Ninety three percent of native vegetation in the Avon-Wheatbelt bioregion has already been cleared and only 1.63% of the AW1 subregion is under formal conservation reserve. The proposal would impact on approximately 6 ha of the Koolanooka Hills Threatened Ecological Community (TEC). However, as the area to be impacted is small and represents only approximately 0.11% of the total TEC area and a very small percentage of the remnant vegetation of the region, the EPA recommends that this component of the proposal could be approved. However, as the proposal impacts a critical asset, it would only be acceptable with an appropriate offset consistent with the requirements of EPA Position Statement 9 and Environmental Protection Bulletin 1.

The EPA has concluded that it is unlikely that the EPA's objectives would be compromised in the implementation of the Koolanooka Hills component of the proposal, but this would only be acceptable with an appropriate offset and if there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarized in Section 5.

The EPA notes that the proposals situated in the Mungada Ridge area are of short duration and have small amounts of hematite ore resources (1 million tonnes at Mungada West and 2.7 million tonnes at Mungada East) and would lead to expanded permanent pits, waste dumps and disturbed areas.

The EPA notes that the Mungada West proposal, including the Mungada Haul Road, would impact the Declared Rare Flora (DRF) *Acacia woodmaniorum* and a number of



Priority Flora species and is situated on land purchased by the Department of Environment and Conservation (DEC) for the purpose of conservation. A small area of Priority Ecological Community (PEC) would be impacted by the waste dump. Although Mungada West is part of the Mt Karara/Mungada Ridge (Blue Hills) area considered in the *Strategic Review of the Conservation and Resource Values of the Banded Iron Formation of the Yilgarn Craton* (DEC & DoIR, 2007) (BIF Review) to have very high biodiversity conservation values, the EPA has taken into account that the impacts of Mungada West are less than those at Mungada East as it is removed from the main ridge, it impacts fewer individual plants of conservation significant flora and, with a requirement to redesign the waste dump, could avoid any impact to the area designated as a PEC. Therefore the EPA considers that this part of the proposal could be approved. As the proposal impacts a high value asset, it would only be acceptable with an appropriate offset.

The EPA has also concluded that it is unlikely that the EPA's objectives would be compromised in the implementation of the Haul Road and Camp components of the proposal, but this would only be acceptable with an appropriate offset and if there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarized in Section 5.

The EPA has recently been advised that Government intends to accept relinquishment of a mining tenement over a portion of the Mungada Ridge for the creation of a Class 'A' Nature Reserve. This action would address some of the EPA's concerns about protecting the environmental values in the Blue Hills area, however it does not account for the entire landform feature.

Due to the high environmental values associated with the Mungada Ridge, it is the view of the EPA (EPA 2009a and 2009b) that the entire Mungada Ridge should be protected in the formal conservation estate. This approach is consistent with the BIF Review which recommended reservation of complete examples of landforms and ecosystems in their entirety, in areas of high environmental value.

The existing pit at Mungada East is 0.4 hectares (ha) in area and the proposed pit would impact a further 6 ha of the ridge. In addition, a 19.2 ha waste dump would be created on the slopes of the ridge. Nearly all of the impact area lies within a PEC and is situated on land purchased by the DEC for conservation purposes. Floristic community type 13 (Woodman 2008a), presumed to be regionally restricted, would be impacted and fragmented. The Karara Iron Ore Project, if approved, would also impact 53.9 percent of the known area of this community. Mungada East would also impact the DRF *Acacia woodmaniorum*, known only from Mungada Ridge and Jasper Hill, and three priority species. The waste dump would impact one inactive Malleefowl mound and be in close proximity to an active mound.

The conservation significant species the Gilled Slender Blue-tongue, *Cyclodomorphus branchialis*, has been found on Mungada Ridge.

During surveys for short range endemic species a snail of the genus *Bothriembryon*, considered to be a new species was found only in the Mungada East pit area and a centipede of the genus *Mecistocephala*, a potential short-range endemic, was also found only in the Mungada East pit area.

To expand the pit to 6.4 ha would increase the visual impact markedly.

All of the above indicates that the Mungada Ridge has very high environmental values. The EPA considers that this Ridge should be retained in its entirety and that any mining on the Ridge would be environmentally unacceptable. This would include the proposed Mungada East mine as it cannot be managed to meet the EPA's objectives in relation to the conservation of biodiversity and ecological integrity.

## **8. Recommendations**

The EPA submits the following recommendations to the Minister for Environment:

1. That the Minister notes that the proposal being assessed is to mine hematite ore at Koolanooka Hills and at two locations at Mungada (part of the Blue Hills Range), to reinstate the Mungada Haul Road to its original width and construct an accommodation camp at Old Karara Homestead;
2. That the Minister considers the report on the key environmental factors and principles as set out in Section 3;
3. That the Minister notes that the proposed Mungada East proposal occurs in an area that forms part of the Mungada Ridge and that the EPA recommends against approval of the Mungada East component of the proposal;
4. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised in the implementation of the Koolanooka Hills component of the proposal but this component would only be acceptable with an appropriate offset and satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarized in Section 5;
5. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised in the implementation of the Mungada West, including the Haul Road and camp, components of the proposal but these components would only be acceptable with an appropriate offset and satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarized in Section 5;
6. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report for the implementation of the Koolanooka Hills and Mungada West components of the proposal; and
7. That the Minister considers the EPA's recommendation that the whole of the Mungada Ridge should be protected in the formal conservation estate and protected from development.

### **Conditions**

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by Sinosteel Midwest Corporation Limited to mine hematite ore at Koolanooka and Mungada West is approved for implementation.

These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

- (a) Protection of Threatened and Priority Ecological Communities;
- (b) Protection of the Declared Rare Flora *Tecticornia bulbosa*;
- (c) Construction of the Mungada Haul Road;
- (d) Design, siting and footprint of waste dumps;
- (e) Conservation significant reptiles;
- (f) Short range endemic invertebrate fauna;
- (g) Prevention of fauna mortality; and
- (h) Rehabilitation and Mine Closure.

# **Appendix 1**

## **List of submitters**

**Organisations:**

Department of Water  
Department of Environment and Conservation  
Shire of Morawa  
Conservation Council  
Wildflower Society

**Individuals:**

M Roberts



# **Appendix 2**

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## **Appendix 3**

**Summary of identification of key environmental factors and principles**

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments received during the Public Review Period	Identification of Key Environmental Factors
<b>BIOPHYSICAL</b>			
Conservation values	Koolanooka and Mungada: BIF Review identified these ranges as supporting highest level of biodiversity and landscape conservation value.	<p><b>DEC:</b> None of Koolanooka TEC in reserves. BIF Review recognises Koolanooka Range as worthy of full protection. Hematite mining at Mungada inconsistent with findings of BIF Review. There would be significant cumulative impacts if Mungada proposals and other magnetite proposals proceeded.</p> <p><b>Public:</b> BIF Review recommendations should be followed. Should be no development on lease purchased by CALM for conservation.</p> <p><b>Wildflower Society:</b> Blue Hills and Lochada, Karara lease should be reserved. Koolanooka Hills should be reserved. PER does not address BIF Review. PER does not address principles of Intergenerational Equity, Conservation of Biological Diversity and Ecological Integrity.</p> <p><b>Conservation Council:</b> supports Govt position on no hematite mining on Mungada/Blue Hills area. PER has not addressed BIF review issues for Koolanooka. Areas have not been put into conservation reserve.</p>	Conservation values considered to be relevant to the proposal and are addressed in the report in Section 4.
Floristic communities	Koolanooka: impact to Threatened Ecological Community (TEC) Mungada also listed as Priority 1 ecological community. Haul road: clearing of native vegetation and possible priority species. Koolanooka and Mungada: potential introduction of weeds, increased fire risk, damage to vegetation from dust and saline water use for dust suppression.	<p><b>DEC:</b> community descriptions not accessed from DEC to determine vegetation community types. Vegetation maps not floristic plot-based and do not allow for easy assessment of regional significance. The proponent should consider offsets that provide for the on-going maintenance and management of the area. BIF areas cannot be directly offset. Quantitative information is not provided on extent of impacts on floristic communities and remaining extent of communities outside of mine impact. Dust suppression water may impact on vegetation. Proponent should define limits of impact based on impact criteria and monitor for impacts. The proponent should contain all stormwater and surface runoff on site so vegetation not impacted.</p> <p><b>Public:</b> PER fails to address cumulative impact assessment and to adequately address impacts. Provides inadequate offsets. Provides commitments and management procedures that fail to meet best practice, fails to justify project.</p> <p><b>Wildflower Society:</b> baseline studies incomplete.</p> <p><b>Conservation Council:</b> baseline studies incomplete.</p>	Floristic communities considered to be a relevant environmental factor and addressed in report.
Flora	Koolanooka: no DRF or Priority flora found in direct	<b>DEC:</b> Flora population figures do not match those provided for the same area by other proponents. Clarification is	Flora considered to be a relevant environmental factor and addressed in report.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments received during the Public Review Period	Identification of Key Environmental Factors
	<p>impact area. <i>Millotia dimorpha</i> (P1) present near mining area.</p> <p>Mungada: impact to 1 DRF, 3 Priority species and one new species.</p> <p>Haul road: potential impact to 3 Priority species</p>	<p>needed on actual areas surveyed for flora and survey intensity and whether regrowth areas have been surveyed for DRF and conservation significant flora.</p> <p><b>DEWHA:</b> <i>Eucalyptus synandra</i> listed as vulnerable threatened species. <i>Eremophila viscida</i> and <i>E. nivea</i> also listed as endangered.</p>	
Fauna	<p>Koolanooka and Mungada: potential impact to conservation significant species and habitat, increased fire risk. Potential for impact to SRE and troglofauna.</p> <p>Potential impact to stygofauna from new bores.</p>	<p><b>DEC:</b> The proponent should consider contributing to a regional invasive animal (fox and feral goat) animal control program to offset impacts to malleefowl. Impacts from the haul road to Short Range Endemics, in particular shield-backed trapdoor spider should be further considered.</p> <p><b>EPBC:</b> Does the state listed TEC provide habitat for malleefowl?</p> <p><b>Conservation Council:</b> Troglofauna discovered on Mungada Ridge but sampling methods appear inappropriate. No development should be considered until appropriate methods developed and further survey for troglofauna.</p>	Fauna considered to be a relevant environmental factor and addressed in report.
Rehabilitation and closure	Site would be rehabilitated and decommissioned	<p><b>DEC:</b> clarify source of topsoil for rehabilitation</p> <p><b>Wildflower Society:</b> A security for the full cost of rehabilitation should be imposed.</p>	Rehabilitation and closure considered to be a relevant environmental factor and addressed in report.
Water quantity	<p>Koolanooka: Reduction of resource.</p> <p>Mungada: Potential impact to Gilgai formation.</p>	<p><b>DOW:</b> Project allocated 165ML/y for both Tilley Siding and Koolanooka mining, which is insufficient for full needs of project. Proponent has exploration licences to search for additional sources. Water suppression needs stated as 400 kL/day in consultant report and 180 kL/day in PER. Karara camp water supply has not been established. Proponent would need a groundwater licence to source water from Morawa or Perenjori.</p>	Water quantity considered to be a relevant environmental factor. Sufficient water is available for limited use (180kL/day) for dust suppression at Tilley Siding and Koolanooka, but supply of low salinity water is limited. The proponent is currently seeking additional water resources. Insufficient low salinity water could lead to use of saline water and vegetation impacts. Issue addressed under vegetation and flora section.
<b>POLLUTION</b>			
Dust	Koolanooka and Mungada: potential impact to vegetation from blasting and operational dust.	<p><b>DEC:</b> More information should be obtained to provide realistic prediction of dust impacts to flora and a realistic basis for managing the impacts to within predefined acceptable limits. Proponent should define limits of measurable indirect impacts (disturbance footprint) based on impact criteria (vegetation health and/or condition and dust deposition). Monitoring should be undertaken. (Koolanooka and Mungada). DEC questions validity of dust deposition</p>	Dust considered to be a relevant environmental factor for impact to native vegetation. Vegetation impact is addressed in vegetation and flora section.



Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments received during the Public Review Period	Identification of Key Environmental Factors
		<p>guidelines used, need for guidelines to ensure dust does not have a negative impact on TEC. Best practice dust control methods are recommended.</p> <p><b>Wildflower Society:</b> concerned about impact of dust on vegetation. 50 m buffer considered inadequate based on Windarling.</p>	
Water quality	Koolanooka and Mungada: potential contamination of groundwater and Gilgai formation. Impact of saline dust suppression water on vegetation if not managed on site.	<b>DEC:</b> contain all stormwater and surface runoff on site so vegetation not impacted.	Water quality considered to be a relevant environmental factor with regard to potential impacts to vegetation. Vegetation impact is addressed in vegetation and flora section. Pollution issues can be managed under Part V of the <i>Environmental Protection Act 1986</i> .
Greenhouse Gas and other air emissions	Koolanooka and Mungada: Emissions from equipment and transport, power generation and blasting.	No submissions	Greenhouse gases and air emissions are relatively minor and do not require further assessment by the EPA.
Noise and Vibration	Koolanooka and Mungada: Noise and vibration emitted from blasting, operations and transport.	<b>DEC:</b> the impact of noise and vibration on conservation significant vertebrate fauna around the sites and haul road has not been considered.	Noise impact to fauna has not been addressed by the proponent. While it is possible that noise may impact fauna initially, it is unlikely to be the largest impact to fauna in the long-term. This issue is commented on in the report.
Asbestos	Presence of asbestiform minerals unlikely.	No submissions	<p>The proponent states that asbestiform minerals have not been observed or logged in historical or recent diamond drill core from either deposit. Previous mining operations at both the Koolanooka and Blue Hills sites by WMC in the late 1960s to the early 1970s similarly do not record any occurrence of asbestiform minerals in either the ore or waste products extracted. Employees would refer to the regional-asbestos/fibrous mineral location plan to identify units predisposed to this type of mineral occurrence, and would check with the Environmental Officer or Senior Geologist if in doubt. An asbestos management plan would be in place if asbestos was found.</p> <p><b>Factor does not require further EPA evaluation.</b></p>
Acid and Metalliferous Drainage	Given the low sulphur content of the ore and the lack of any observable issues at existing	No submissions	Samples obtained from all three pits were tested. Assessment confirmed that all samples were within guideline values and no treatment was

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments received during the Public Review Period	Identification of Key Environmental Factors
	waste rock stockpiles generated from previous mining over thirty years ago, the potential for acid generation is unlikely.		recommended. <b>Factor does not require further EPA evaluation.</b>
Waste	Koolanooka and Mungada: Waste rock dumps, general waste including domestic, oil and grease, and sewage	No submissions	Waste considered to be a relevant environmental factor. The proponent has undertaken to construct waste dumps in compliance with the DMP guidelines and with a rounded footprint to conform with surrounding natural landforms. If waste dumps are placed near drainage channels they would be monitored and rock armoured or culvert channelled if necessary to prevent scouring and erosion. Windrows would be used along the crest of slopes to prevent erosion of the slopes. Toe windrows would be used to contain eroded material if needed. Waste dump design would consider the physical nature of material and landform stability, chemical nature of waste materials, associated pollution prevention, integration into surrounding landscape and revegetation issues. Dumps would be rehabilitated to achieve a safe, stable and functioning ecosystem that meets the requirements of the post-mining land use. Project, domestic and construction waste would be minimised through reuse and recycling where appropriate. General waste would be managed by a licensed contractor and removed from site for disposal in an approved landfill. <b>Factor does not require further EPA evaluation.</b>
<b>SOCIAL SURROUNDINGS</b>			
Heritage/Aboriginal heritage	Koolanooka and Mungada: potential impact to Aboriginal archaeological and ethnographical sites. Impact to Koolanooka historic site.	<b>Conservation Council:</b> Koolanooka is acknowledged Aboriginal spiritual area.	The proponent has fulfilled a requirement to retain a photographic record of the old mining area for European heritage requirements. A Section 18 approval under the Aboriginal Heritage Act has already been granted to disturb the listed site over the Koolanooka Hills. The approval was subject to archaeological surveys which have not as yet been undertaken. Ethnographic surveys would also be undertaken. At Mungada it is not planned to disturb registered Aboriginal sites at this stage. Aboriginal heritage issues can be managed under the provisions

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments received during the Public Review Period	Identification of Key Environmental Factors
			of the <i>Aboriginal Heritage Act 1972</i> . This is further addressed in Other Advice.
Landscape value/Visual amenity	Koolanooka: area of high elevation removed. Impacts would be visible Mungada: elevated areas removed. Impacts would be visible.	<b>Wildflower Society:</b> PER does not address recreation and tourism and area has scenic and conservation values. <b>Conservation Council:</b> existing pits at Mungada have little visual impact. New pits would increase visual impact. Koolanooka is already unacceptably impacted and further mining would increase impact.	Landscape value is considered to be a relevant environmental factor and addressed in report.
Recreational and tourism values	Project has the potential to impact on recreational and tourism values	<b>Wildflower Society:</b> PER does not address recreation and tourism and area has scenic and conservation values. Access to Blue Hills is not addressed. <b>Conservation Council:</b> Existing historic mining at Koolanooka and Mungada could be a tourist attraction. Further mining would destroy historic areas.	Recreation considered to be a relevant environmental factor and addressed in report. Long term recreational and tourism values are address under the rehabilitation and closure section.
Social impacts/sustainability	Project has potential to influence local accommodation, transport, businesses, servicing and education and training.	<b>Shire of Morawa:</b> proponent should consider mix of accommodation options for workers, life cycle costs of impacts to infrastructure, synergies in operations of transport activities and collaborating with Shire in developing small businesses, tourism, a nursery and renewable energy supply. The proponent should also consider actively developing training and educational opportunities for the community and having a 'shop front' in Morawa. <b>Public:</b> economic, social and environmental sustainability is not considered.	Not an environmental factor. Cannot be dealt with under the <i>Environmental Protection Act 1986</i> .

PRINCIPLES		
Principle	Relevant Yes/No	If yes, Consideration
<p>1. The precautionary principle</p> <p><i>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.</i></p> <p><i>In application of this precautionary principle, decisions should be guided by –</i></p> <p>(a) <i>careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i></p> <p>(b) <i>an assessment of the risk-weighted consequences of various options.</i></p>	Yes	Proposal will impact a TEC and significant flora. Therefore proponent is required to evaluate options to avoid serious or irreversible harm to the floristic communities and flora, and demonstrate the chosen option results in the least impact practicable. Floristic communities and flora is a relevant environmental factor discussed in this report.

<b>PRINCIPLES</b>		
<b>Principle</b>	<b>Relevant Yes/No</b>	<b>If yes, Consideration</b>
<p>2. The principle of intergenerational equity  <i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>		
	Yes	<p>Proposal would result in the loss of native vegetation and fauna and has the potential to impact diversity. Floristic communities and flora and fauna are relevant environmental factors discussed in this report. Landscape values of the areas would be impact and landscape and visual values are discussed in this report.</p> <p>The resource (iron ore) would be permanently depleted in this area. The product (iron) can be used for infrastructure which may benefit future generations, and can also be recycled for future use.</p>
<p>3. The principle of the conservation of biological diversity and ecological integrity  <i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p>		
	Yes	<p>The proposal would result in the clearing of native vegetation and fauna habitat and has the potential to affect biological diversity/integrity. Floristic communities and flora and fauna are relevant environmental factors discussed in this report.</p>
<p>4. Principles relating to improved valuation, pricing and incentive mechanisms  <i>(1) Environmental factors should be included in the valuation of assets and services.  (2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.  (3) 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 waste.  (4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximize benefits and/or minimize costs to develop their own solution and responses to environmental problems.</i></p>		
	Yes	<p>The proposal would result in waste dumps and pits. The proponent should bear the cost of rehabilitation and closure management.</p>
<p>5. The principle of waste minimisation  <i>All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.</i></p>		
	No	

# **Appendix 4**

## **Recommended Environmental Conditions and Proponent's Consolidated Commitments**

### Nominated Decision-Making Authorities

Section 44(2) of the *Environmental Protection Act 1986* (EP Act) specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities, and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified for this consultation:

<b>Decision-making Authority</b>	<b>Approval</b>
1. Minister for Lands	Decision about proposed nature reserve (post-approval decision)
2. Minister for Mines and Petroleum	Approvals under the <i>Mining Act 1978</i>
3. Minister for Environment	Approvals under the <i>Wildlife Conservation Act 1950</i>
4. Department of Water	Approvals under the <i>Rights in Water and Irrigation Act 1914</i>
5. Department of Environment and Conservation	Works Approval and Licence



RECOMMENDED ENVIRONMENTAL CONDITIONS

**STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED  
(PURSUANT TO THE PROVISIONS OF THE  
ENVIRONMENTAL PROTECTION ACT 1986)**

KOOLANOOKA/BLUE HILLS DIRECT SHIPPING ORE MINING PROJECT  
SHIRES OF MORAWA AND PERENJORI

**Proposal:** The proposal is to mine hematite ore at Koolanooka Hills and at Mungada West (part of the Blue Hills Range), to reinstate the Mungada Haul Road to its original width and construct an accommodation camp at Old Karara Homestead.

The proposal is further documented in schedule 1 of this statement.

**Proponent:** Sinosteel Midwest Corporation Limited

**Proponent Address:** Suite 2, 32 Kings Park Road  
WEST PERTH WA 6005

**Assessment Number:** 1653

**Report of the Environmental Protection Authority:** Report 1328

The proposal referred to in the above report of the Environmental Protection Authority may be implemented. The implementation of that proposal is subject to the following conditions and procedures:

**1 Proposal Implementation**

1-1 The proponent shall implement the proposal as documented and described in schedule 1 of this statement subject to the conditions and procedures of this statement. In implementing the proposal, the proponent shall not increase the proposal footprint beyond that delineated by AMG coordinates listed in schedule 2 (attached). (Coordinates to be attached to final statement)

**2 Proponent Nomination and Contact Details**

2-1 The proponent for the time being nominated by the Minister for Environment under sections 38(6) or 38(7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal.

2-2 The proponent shall notify the Chief Executive Officer of the Department of Environment and Conservation (CEO) of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.

### **3 Time Limit of Authorisation**

- 3-1 The authorisation to implement the proposal provided for in this statement shall lapse and be void five years after the date of this statement if the proposal to which this statement relates is not substantially commenced.
- 3-2 The proponent shall provide the CEO with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.

### **4 Compliance Reporting**

- 4-1 The proponent shall prepare and maintain a compliance assessment plan to the satisfaction of the Chief Executive Officer of the Department of Environment and Conservation.
- 4-2 The proponent shall submit to the Chief Executive Officer of the Department of Environment and Conservation, the compliance assessment plan required by condition 4-1 at least 6 months prior to the first compliance report required by condition 4-6. The compliance assessment plan shall indicate:
- 1 the frequency of compliance reporting;
  - 2 the approach and timing of compliance assessments;
  - 3 the retention of compliance assessments;
  - 4 reporting of potential non-compliances and corrective actions taken;
  - 5 the table of contents of compliance reports; and
  - 6 public availability of compliance reports.
- 4-3 The proponent shall assess compliance with conditions in accordance with the compliance assessment plan required by condition 4-1.
- 4-4 The proponent shall retain reports of all compliance assessments described in the compliance assessment plan required by condition 4-1 and shall make those reports available when requested by the Chief Executive Officer of the Department of Environment and Conservation.
- 4-5 The proponent shall advise the Chief Executive Officer of the Department of Environment and Conservation of any potential non-compliance as soon as practicable.
- 4-6 The proponent shall submit a compliance assessment report annually from the date of issue of this Implementation Statement addressing the previous twelve month period or other period as agreed by the Chief Executive Officer of the Department of Environment and Conservation. The compliance assessment report shall:

- 1 be endorsed by the proponent's Managing Director or a person, approved in writing by the Department of Environment and Conservation, delegated to sign on the Managing Director's behalf;
- 2 include a statement as to whether the proponent has complied with the conditions;
- 3 identify all potential non-compliances and describe corrective and preventative actions taken;
- 4 be made publicly available in accordance with the approved compliance assessment plan; and
- 5 indicate any proposed changes to the compliance assessment plan required by condition 4-1.

## **5 Performance Review and Reporting**

- 5-1 The proponent shall submit to the CEO a Performance Review Report at the conclusion of the first year after the start of implementation and then, at such intervals as the CEO may regard as reasonable, which addresses:
1. the major environmental risks and impacts; the performance objectives, standards and criteria related to these; the success of risk reduction/impact mitigation measures and results of monitoring related to management of the major risks and impacts;
  2. the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best available technology where practicable; and
  3. significant improvements gained in environmental management which could be applied to this and other similar projects.

## **6 Threatened and Priority Ecological Communities**

- 6-1 During construction the proponent shall ensure that there is a system to delineate the area of works in order to minimise the disturbance to, or loss of, the Threatened Ecological Community "Plant assemblages of the Koolanooka System" and the Blue Hills vegetation complex Priority Ecological Community.
- 6-2 During operations, the proponent shall conduct mining and mining related activities in a manner which ensures that land clearing is kept to a minimum and adverse impacts from mining and mining related activities are managed and controlled.
- 6-3 At all times the proponent shall ensure adverse impacts from other threatening processes such as fire, weeds, disease and feral animals are managed and controlled.
- 6-4 The proponent shall develop and implement procedures and measures to restrict access to areas that support the Threatened Ecological Community "Plant

assemblages of the Koolanooka System” and the Blue Hills vegetation complex Priority Ecological Community to authorised personnel only.

6-5 In the event that the requirements of condition 6-2, 6-3, and 6-4 are not being met or are not likely to be met, the proponent shall immediately propose additional management measures and shall implement approved measures to the satisfaction of the CEO of the Department of Environment and Conservation.

6-6 The proponent shall monitor impacts from mining and mining related activities due to:

1. dust;
2. saline water application for dust control;
3. fire; and
4. feral species

on the Threatened Ecological Community “Plant assemblages of the Koolanooka System” and the Blue Hills vegetation complex Priority Ecological Community referred to in condition 6-1. This monitoring is to be carried out to the satisfaction of the CEO of the Department of Environment and Conservation.

6-7 In the event that the monitoring required by condition 6-6 shows impacts from dust, saline water application for dust control, fire and feral species exceed criteria determined by the Department of Environment and Conservation, the proponent shall implement further management measures to the satisfaction of the CEO of the Department of Environment and Conservation.

## **7 Declared Rare Flora**

7-1 In order to protect the Declared Rare Flora *Tecticornia bulbosa* from dust impact the proponent shall cover all truck loads of fine product transported along Munckton Road to the satisfaction of the CEO of the Department of Environment and Conservation.

## **8 Mungada Haul Road**

8-1 Prior to ground disturbing activities for the Mungada Haul Road the proponent shall undertake a flora survey of the vegetation to be cleared to identify flora of conservation significance to the satisfaction of the CEO of the Department of Environment and Conservation.

8-2 Should flora of conservation significance be identified the proponent shall relocate plants, collect seed or take other action to the satisfaction of the CEO of the Department of Environment and Conservation.

8-3 The proponent shall design and build the Mungada Haul Road to control disruption to surface water drainage, particularly in the area of Wheelhamby Lake, to the satisfaction of the CEO of the Department of Environment and Conservation.

8-4 Prior to ground disturbing activities for the Mungada Haul Road the proponent shall provide a report on the siting of proposed borrow pits, demonstrating that borrow pit

sites have been optimised to avoid impact to flora, fauna and visual amenity to the satisfaction of the CEO of the Department of Environment and Conservation.

## **9 Waste Dumps**

9-1 Prior to ground disturbing activities at Koolanooka the proponent shall optimise design and siting and footprint of the Koolanooka waste dumps to protect native vegetation of conservation significance to the satisfaction of the CEO of the Department of Environment and Conservation.

9-2 Prior to ground disturbing activities at Mungada West the proponent shall optimise the design, siting and footprint of the Mungada West waste dump with regard to:

1. protecting the Blue Hills vegetation complex Priority Ecological Community;
2. protecting conservation significant flora;
3. protecting conservation significant fauna (including the Trapdoor Spider *Idiosoma nigrum*);
4. dump stability;
5. hydrology (including surface and sub-surface drainage to the Gilgai formation); and
6. landscape and visual amenity,

to the satisfaction of the CEO of the Department of Environment and Conservation.

## **10 Conservation significant reptiles**

10-1 Prior to ground disturbing activities the proponent shall carry out field surveys for conservation significant reptile species, especially the Western Spiny-tailed Skink, *Egernia stokesii badia*, and the Gilled Slender Blue-tongue, *Cyclodomorphus branchialis*.

10-2 Should any conservation significant reptile species be located, these shall be re-located into areas of suitable habitat in an area safe from disturbance from mining and associated operations.

10-3 Relocation of conservation significant reptile species as required by condition 10-2 shall be carried out to the requirements of the CEO of the Department of Environment and Conservation.

## **11 Short range endemic invertebrate fauna**

11-1 Prior to ground disturbing activities the proponent shall carry out field surveys for short range endemic invertebrate fauna species in the proposed pit area and adjacent area of Mundaga West to the satisfaction of the CEO of the Department of Environment and Conservation.

11-2 Should the survey required by condition 11-1 result in the discovery of short range endemic invertebrate fauna species whose International Union for the Conservation of Nature and Natural Resources (IUCN) Threat Category increased by the proposal (i.e.

from initially not being listed as threatened under any category to being listed or having the threat category increased) by implementation of the proposal, the proponent shall undertake management action to the satisfaction of the CEO of the Department of Environment and Conservation.

## **12 Fauna mortality**

- 12-1 The proponent shall prepare and implement strategies to avoid fauna deaths in areas of mining or mining related activities.
- 12-2 Prior to ground disturbing activity the proponent shall prepare and implement a Fauna Mortality Register for conservation significant species in the proposal area.
- 12-3 The proponent shall submit the strategies required by condition 12-1 to the CEO of the Department of Environment and Conservation.
- 12-4 The proponent shall review and revise the strategies required by condition 12-1 as required by the CEO of the Department of Environment and Conservation.

## **13 Rehabilitation and Mine Closure**

- 13-1 Within six months after the start of implementation of the proposal at Koolanooka the proponent shall provide a detailed rehabilitation planning strategy to ensure that the characteristics of the constructed waste dumps optimise rehabilitation outcomes. Consistent with Environmental Protection Authority Guidance 6 “Rehabilitation of Terrestrial Ecosystems” the strategy should consider:
  - 1. soil chemistry and physical properties;
  - 2. landform;
  - 3. hydrology; and
  - 4. appropriate plant species,specific to the site to the satisfaction of the CEO of the Department of Environment and Conservation.
- 13-2 Within six months after the start of implementation of the proposal at Mungada West, the proponent shall provide a detailed rehabilitation planning strategy to ensure that the characteristics of the constructed waste dump optimise rehabilitation outcomes. Consistent with Environmental Protection Authority Guidance 6 “Rehabilitation of Terrestrial Ecosystems” the strategy should consider:
  - 1. soil chemistry and physical properties;
  - 2. landform;
  - 3. hydrology; and
  - 4. appropriate plant species,specific to the site to the satisfaction of the CEO of the Department of Environment and Conservation.
- 13-3 As mining progresses, the proponent shall commence progressive rehabilitation of the mine site area in accordance with the following:



- 1 Re-establishment of vegetation in the rehabilitation area to be comparable with that of the pre-mining vegetation such that the following criteria are met within five years following the cessation of productive mining:
  - (a) flora and vegetation are re-established with not less than 70 percent species composition (not including weed species); and
  - (b) weed coverage no more than that in undisturbed bushland in the area or less than 10%, whichever is the lesser.
- 2 A schedule of the rate of rehabilitation acceptable to the CEO of the Department of Environment and Conservation.
- 13-2 The proponent shall ensure that, after mine closure, the final pit voids do not cause significant environmental impacts arising from groundwater pollution or through attracting native fauna which may be harmed by contact with the water or by attracting fauna or stock which may harm surrounding vegetation, or predators which may prey on native fauna.
- 13-3 In liaison with the Department of Environment and Conservation, the proponent shall monitor progressively the performance of rehabilitation required by condition 13-1 based on annual reporting.
- 13-4 The proponent shall submit annually a report of the rehabilitation performance monitoring required by condition 13-3 to the CEO of the Department of Environment and Conservation.

Note: In fulfilment of the above mine closure and rehabilitation conditions, the Environmental Protection Authority expects the proponent to liaise with the Department of Mines and Petroleum.

- 13-5 At least six months prior to the anticipated date of closure, the proponent shall provide a final closure plan which addresses:
  1. removal or, if agreed in writing by the appropriate regulatory authority, retention of plant and infrastructure agreed in consultation with relevant stakeholders;
  2. identification of contaminated areas, including provision of evidence of notification and proposed management measures to relevant statutory authorities;
  3. long-term management of areas impacted by mining activities,

to the satisfaction of the CEO of the Department of Environment and Conservation.

#### 14 **Implementation strategy**

- 14-1 Prior to ground disturbing activities, the proponent shall prepare an implementation strategy setting out management and monitoring strategies and objectives for meeting the requirements of conditions within this Statement to the satisfaction of the CEO of the Department of Environment and Conservation.

1. The Minister for Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment and Conservation over the fulfilment of the requirements of the conditions.
2. The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the *Environmental Protection Act 1986*.

## Schedule 1

### The Proposal (Assessment No. 1653)

The proposal is to:

- mine hematite from an area of 4.5 hectares, known as the South Fold Cutback, on Mining Leases 70/1013 and 70/1014 at Koolanooka Hills in the Shire of Morawa and construct two waste dumps;
- mine hematite from an area of 5.3 hectares on Mining Lease 59/595 at Mungada West in the Shire of Perenjori and construct one waste dump;
- install and use semi-mobile crushing equipment to produce product;
- construct mining infrastructure at Koolanooka and Mungada West;
- re-instate the Mungada Haul Road to its original width; and
- construct an accommodation camp at Old Karara Homestead.

The location of the various project components is shown in Figures 1, 2 and 3.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in sections Section 4 of the project referral document, *Koolanooka – Blue Hills Direct Shipping Ore (DSO) Mining Project*, prepared by ecologia Environment, Perth, Western Australia (September 2008).

**Table 1: Summary of key proposal characteristics for Koolanooka Hills and Mungada West**

Element	Description	
	Koolanooka	Mungada West
<b>Mining Operations</b>		
Project life span	Estimated at 1.5 years	Estimated at 2.25 years
Size of ore body	Approximately 2 Mt	Approximately 1.1 Mt
Ore mining rate	Up to 2 Mtpa	Up to 2 Mta
Area of pit expansion	3.8 ha	4.6 ha
Depth of new section	Approximately 320 mAHD	Approximately 315 m AHD
Area of overburden stockpiles	Approximately 33.4 ha	Approximately 18.1 ha
Area of ancillary facilities	Pre-existing area	2.5 ha
Vegetation clearing	A maximum of 4.5 ha of TEC (of which 1.8 ha has already been cleared). An additional 3.1 ha is allowed for a dust buffer zone but will not be cleared.	A maximum of 22 ha
Predisturbed area (cleared and regrowth areas)	Approximately 38.2 ha	Approximately 5.3 ha
<b>Processing</b>		
Crushing and Screening	Semi-mobile crushing and screening plant	Semi-mobile crushing and screening plant
<b>Mine Site Infrastructure</b>		
Power	Diesel generators 500-1000 kW	Diesel generators 500 - 100 kW
Water	180 kL/d sourced from bores, Koolanooka pit and saline sump	180 kL/day trucked from Koolanooka sources

Element	Description	
	Koolanooka	Mungada West
<b>Haul Road Construction (Mungada Road)</b>		
Vegetation clearing (regrowth >10 years)	N/A	Maximum of 39.5 ha
Water	N/A	365 ML (one year of road construction) and on-going dust suppression requirement estimated at 65 ML/a (source unspecified)
<b>Karara Camp</b>		
Area		4 ha plus access roads

**Abbreviations**

Mt – Million tonnes

AHD – Australian Height Datum

ha – hectares

kW – kilowatts

N/A – not applicable

pa – per annum

ML/a – Megalitres per annum

TEC – Threatened Ecological Community

kL – kilolitres

**Figures (to be attached to final statement)**

Figure 1 Koolanooka site plan

Figure 2 Mungada West site plan

Figure 3 Accommodation camp site plan



# **Appendix 5**

## **Summary of Submissions and Proponent's Response to Submissions**