



Report and recommendations of the Environmental Protection Authority



Weld Range Iron Ore Project

Sinosteel Midwest Management Pty Ltd

Report 1441

June 2012

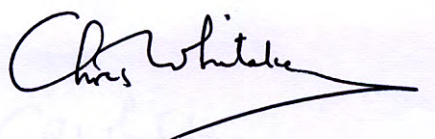
Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
19/11/07	Level of Assessment set (date appeals process completed)	
06/09/10	Proponent Document Released for Public Comment	6 weeks
18/10/10	Public Comment Period Closed	7 weeks
18/05/12	Final Proponent response to the issues raised	83 weeks
13/06/12	*EPA report to the Minister for Environment (including two weeks consultation on conditions)	3 weeks
18/06/12	Publication of EPA report	1 week
02/07/12	Close of appeals period	2 weeks

STATEMENT ON TIMELINES

Timelines for an assessment may vary according to the complexity of the project and are usually agreed with the proponent soon after the level of assessment is determined.

*In this case, the Environmental Protection Authority met its agreed timeline objective of 10 weeks for the completion of the assessment and provision of a recommendation to the Minister.



Dr Chris Whitaker
Acting Chairman

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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 (SMC) to develop an iron ore mine and associated infrastructure at Weld Range.

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 EP Act.

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) Short range endemics;
- (d) Groundwater and surface water;
- (e) Aboriginal heritage; and
- (f) Rehabilitation and mine closure.

There were a number of other factors which were 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) the precautionary principle;
- (b) the principle of intergenerational equity;
- (c) the principle of the conservation of biological diversity and ecological integrity;

- (d) principles relating to improved valuations, pricing and incentive mechanisms; and
- (e) the principle of waste minimisation.

Conclusion

The EPA has considered the proposal by SMC to develop an iron ore mine and associated infrastructure at Weld Range located 85 kilometres (km) south-west of Meekatharra and 60 km north-west of Cue in the Midwest region of Western Australia.

Flora and vegetation

The proposal requires the clearing of 3589 hectares (ha) of native vegetation. The EPA notes that the project area is located on the Banded Iron Formation (BIF) ranges of the Midwest, which is an area of very significant biodiversity value as a consequence of its unique geology, soils and relative isolation.

No Declared Rare Flora (DRF) or Threatened Ecological Communities (TECs) were recorded in the project area, however the Priority 1 Priority Ecological Community (PEC) “Weld Range vegetation complexes (Banded Iron Formation)” incorporates much of the vegetation within the project area. The PEC at Weld Range represents a rare vegetation complex and is considered currently under threat from mining. The EPA notes that the proposal would cause the loss of 8.15% of the PEC and the EPA is satisfied that this extent of impact is not significant.

All vegetation communities extend beyond the project footprint however, several vegetation communities are locally significant. Vegetation communities 7a and 7b have been identified as potentially groundwater dependent. The EPA acknowledges that vegetation communities 7a and 7b are locally significant as they occur on a seasonally inundated salt pan which provides a refuge to threatened fauna species. These communities contain plant species that are thought to provide suitable habitat for the Slender-billed Thornbill, a species listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC).

A total of 25 Priority flora species have been recorded in the project area, of which 14 Priority species will be directly impacted. A total of three species appear to be regionally restricted to BIF ranges and other areas subject to mining tenements. These are *Micromyrtus placoides* (P3), *Beyeria lapidicola* (P1), and *Prostanthera ferricola* (P3).

The EPA acknowledges that all Priority flora to be impacted by the proposal have a distribution of at least 100 km and are not endemic to the Weld Range, with the exception of the newly described species *Acacia species Wilgie Mia* (P1) and the undescribed species *Hemigenia sp. nov. (aff exilis)*, which have only been recorded in community 4a. *Hemigenia virescens* was recorded during flora surveys and is regionally restricted. The EPA is also advised that new information for *Acacia sp Wilgie Mia* has been recently obtained which details that additional populations of this species have been recorded, which

has reduced the impacts to 1.02%. *Hemigenia sp. nov (aff Exilis)* would not be directly impacted.

The EPA has recommended Condition 6 'Flora and vegetation' to limit the area of clearing to that required for the proposal, and for targeted flora surveys to be carried out to improve the knowledge of Priority and other important flora species. Condition 7 'Weeds' ensures that the number of species and intensity of weeds does not increase due to project implementation and Condition 8 'Groundwater dependent ecosystems' has been recommended to ensure that the drawdown boundary does not extend further than the area predicted by groundwater modeling and that areas expected to be impacted by groundwater drawdown are monitored and impacts are mitigated, thereby limiting the impacts to groundwater dependent vegetation. The EPA considers that residual impacts to flora and vegetation should be offset and has recommended Condition 10 'Residual impact and risk management measures'.

Fauna

Five significant fauna species have been recorded in the project area. These were the Slender-billed Thornbill (*Acanthiza iredalei iredalei*) (EPBC, Vulnerable), Peregrine Falcon (*Falco peregrines*) (Wildlife Conservation Act 1950 (WCA, S4), Long-tailed Dunnart (*Sminthopsis longicaudata*) (Department of Environment and Conservation, (DEC, P3), Bush Stone-curlew (*Burhinus grallarius*) (DEC, P4) and a fossorial skink (*Lerista eupoda*) (DEC, P1).

The Slender-billed Thornbill was recorded in chenopod shrubland within vegetation community 7b during the fauna surveys. Communities 7a and 7b are considered to be groundwater dependent and contain plant species that are thought to provide suitable habitat for the Slender-billed Thornbill.

The Rainbow Bee-eater (*Merops ornatus*) (EPBC Act, Migratory) and Australian Bustard (*Ardeotis australis*) (DEC, P4) were not recorded in the surveys but are likely to occur in the project area. The EPA considers that none of the fauna species will be significantly impacted by the proposal as their habitats are widespread outside the impact area.

One juvenile stygobitic copepod from the order Calanoida was found in a troglofauna trap in the Madoonga pit area, however it is unclear if this specimen is the result of contamination. As the aquifer in which the specimen was found extends outside the project area, the species is unlikely to be restricted to the impact area.

The EPA notes that a single centipede specimen from the order Scolopendromorpha (identified as Cryptopidae) was collected from a single bore in the Beebyn impact area and that habitat analysis shows that 30% of the troglofauna habitat on Weld Range will be impacted by the proposal. The EPA considers that troglofauna will not be significantly impacted by the proposal as the habitat is widespread throughout the range and is continuous.

The recommended Condition 6 'Flora and vegetation' that restricts clearing to the required areas and Condition 8 'Groundwater dependent ecosystems' that ensures groundwater drawdown impacts are mitigated and drawdown does not extend further than the area predicted will also ensure the protection of fauna habitat.

Short range endemics (SREs)

A total of 81 invertebrate species were collected from the project area. Results showed that five of the species are considered to be SREs, two are likely, 22 are potentially SREs, eight are unlikely and 32 are undetermined. The species which are determined to be SREs are Shield-backed Trapdoor Spider (*Idiosoma nigrum*), (Schedule 1 species), WCA, Curtain-web Spider (*Cethegus Sp MUR HH 'Hamilton Hill'*); Curtain-web Spider (*Cethegus Sp MUR WRS 'Weld Range South'*); a land snail (*Pleuroxia species*); and a millipede (*Antichiropus sp. 'Weld Range'*).

The population of *Idiosoma nigrum* at Weld Range is the largest known in Australia and extends their known distribution by 200 km north.

A total of five populations of *Idiosoma nigrum* were recorded along the range. The proposal will impact two of these populations. Genetic work confirmed that each of the five populations do not experience gene flow between each other so the three remaining populations - Weld Range North, Wilgie Mia, and Hampton Hill - are viable populations in their own right. It is expected that 12% of the *Idiosoma nigrum* population at Weld Range will be impacted by the proposal.

The EPA notes that *Cethegus sp. MUR HH 'Hampton Hill'* and *Cethegus sp. MUH WRS 'Weld Range South'* are new species that were recorded during the SRE surveys at Weld Range. Research shows that the two species are different from each other and cannot disperse more than one kilometre.

The EPA considers that, as the SRE species are both inside and outside the proposal footprint, they are not expected to be significantly impacted by the proposal.

Condition 9 'Short range endemics' has been recommended to restrict clearing to the area required for the proposal and to monitor the impacts of the proposal on known short range endemics populations surrounding the impact area. The EPA notes that *Idiosoma nigrum* and the *Cethegus sp. MUR* will be managed in separate conservation zones. The EPA considers that the residual impacts to *Idiosoma nigrum* and the *Cethegus MUR* species should be offset and has recommended Condition 10 'Residual impact and risk management measures'.

Groundwater and surface water

The EPA notes that the water table would be lowered by 185 metres (m) at Madoonga and 190 m at Beebyn to allow for dry mining conditions. Dewatering from the pits would supply all of the water needed for processing and excess would be discharged into a lined evaporation pond.

Static and kinetic testing has been carried out on ore and waste within the preliminary feasibility study (PFS) pit design. Results show that potentially acid forming (PAF) material is present within the pit area, however the EPA considers that encapsulation of PAF material is an adequate method to manage the production of acid and/or metalliferous drainage. The EPA notes that short term leaching tests from some rock types showed elevated levels of selenium and nickel in leachate. The Department of Mines and Petroleum (DMP) will address the management of the waste dumps when a detailed mining proposal and mine closure plan is submitted as required by the *Mining Act 1978* (Mining Act).

Aboriginal heritage

The EPA notes that several significant heritage sites occur in the project area. The EPA understands that SMC are currently finalising a mining agreement with the Wadjarri people, which will ensure the protection of all significant sites that the SMC and the Wadjarri people have agreed to protect. The proposal is subject to the requirements of the *Aboriginal Heritage Act 1972* and the proponent will need to satisfy the requirements of the Act to give effect to any agreed outcomes.

Rehabilitation and mine closure

The EPA understands that rehabilitation will be undertaken progressively throughout the operation and that the pits will not be backfilled, resulting in the formation of pit lakes. The EPA considers that rehabilitation and mine closure can be adequately managed by the DMP consistent with the *Guidelines for Preparing Mine Closure Plans* and the requirements of the Mining Act.

The EPA has therefore concluded that it is likely that the EPA's objectives would be achieved provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4.

Recommendations

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

1. That the Minister notes that the proposal being assessed is for the development and operation of an iron ore mine;
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 the EPA has concluded that it is likely that the EPA's objectives would be achieved, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4 and summarised in Section 4;
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report; and

5. That the Minister notes the EPA's other advice presented in Section 5 regarding the Square Kilometre Array.

Conditions

Having considered the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by SMC to develop an iron ore mine and associated infrastructure at Weld Range is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

- (a) Flora and vegetation;
- (b) Weeds;
- (c) Groundwater dependent ecosystems;
- (d) Short range endemics; and
- (e) Residual impact and risk management measures.

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3. Summary of identification of key environmental factors
4. Recommended Environmental Conditions and nominated Decision-Making Authorities
5. Summary of submissions and proponent's response to submissions

1. Introduction and background

This report provides the advice and recommendations of the EPA to the Minister for Environment on the key environmental factors and principles for the proposal by Sinosteel Midwest Corporation Limited, to develop an iron ore mine at Weld Range, located 85 km southwest of Meekatharra and 60 km northwest of Cue in the Midwest region of Western Australia (Figure 1), and develop associated infrastructure for the project.

The proposal includes mining of two main deposits, namely Madoonga and Beebyn, over a period of 11 years and the construction of all infrastructure. This requires the direct disturbance of 3589 ha of native vegetation for pits, waste dumps, run of mine (ROM) pads, a central processing facility (CPF), an evaporation pond, construction of an airfield, train load out facility, accommodation village, administration buildings, powerhouse, magazines, turkey nest dam, haul road and access roads. Dewatering below the water table would be required to provide dry mining conditions. Water from dewatering would supply the water for operations. Surplus saline water produced from dewatering would be disposed of to a lined evaporation pond.

The proposal was referred to the EPA on 19 October 2007. The EPA set the level of assessment at Public Environmental Review (PER) on 19 November 2007. The PER document was made available for a public review period of six weeks, from 6 September 2010 to 18 October 2010.

The proposal is being assessed at a level of PER because:

- The mine would require the clearing of 3589 ha of native vegetation, of which a large proportion is on the Weld Range. The geology of Weld Range is BIF. The BIF ranges of the Midwest are of very significant biodiversity value because of their unique geology, soils and relative isolation. The PEC 'Weld Range vegetation complexes (Banded Ironstone Formations)' occurs over much of the Weld Range and represents a rare vegetation complex which is considered under threat from mining.
- Mining would occur below the water table and require dewatering of the mine pits. This has the potential to impact on phreatophytic vegetation and subterranean fauna.
- Mining would cause the loss of 12% of the mygalomorph spider, *Idiosoma nigrum*, which is protected at state level and listed as schedule 1 Vulnerable. Four other SRE species would be impacted by the proposal.
- Fresh and saline water would be used for processing and dust suppression whereas excess saline water would be disposed of in a lined evaporation pond.

The *Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields* (BIF Strategic Review) identified that there is a predisposition towards development at Weld Range, as it is considered to have a lower biodiversity value than other BIF ranges.

The BIF Strategic Review states that ‘mining should be carried out sustainably by ensuring that critical thresholds for conservation of biodiversity are recognised in the consideration of development proposals and that best practice environmental management and mitigation programmes are committed to’. This assessment recognises that the key principles described in the BIF Strategic Review include:

- no development that would result in the increase of an International Union for Conservation of Nature (IUCN) threat category of any plant or animal taxon, or any ecological community; and
- 15-30% of the total number of BIF ranges should be preserved in their entirety where development has not significantly progressed.

The Weld Range Iron Ore project has been considered under the EPBC Act and is currently being assessed as a controlled action by the Department of Sustainability, Environment, Water, Population and Communities (DoSEWPC). The controlled actions are:

- impacts to the Slender-billed Thornbill (Listed threatened species and communities, sections 18 and 18A); and
- impacts to the Wilgie Mia National Heritage Place (A National Heritage Place Sections 15B and 15C).

Further details of the proposal are presented in Section 2 of this report. Section 3 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 4. Section 5 provides other advice by the EPA and Section 6 presents the EPA’s recommendations.

Appendix 5 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

The Weld Range Iron Ore Project, involves the mining of approximately 150 million tonnes (mt) of haematite iron ore. The mine site is located approximately 85 km south-west of Meekatharra and 60 km north-west of Cue in the Midwest region of Western Australia (Figure 1).

Mining would be carried out concurrently from two main open pits, namely Madoonga and Beebyn, which are located approximately 22 km apart at Weld Range (Figure 2). The mining operation would involve mining above and below the water table using conventional drill, blast and haul methods and is expected to continue for 11 years. Ore would be primary crushed at each pit ROM area and then transported to the processing plant via road train, where it would be crushed and screened to provide lump and fines product. The two deposits would be mined concurrently to allow for a degree of blending with the higher Beebyn iron ore grades and the lower Madoonga iron ore grades.

Mining operations would provide 15 mt of ore per annum, with an average overburden to ore strip ratio of 5.3:1. Overburden would be placed in the waste dumps located adjacent to the Beebyn and Madoonga pits (Figure 2).

The ore would be stockpiled and then transported off site via a rail load out facility to Oakajee Port. The Oakajee rail line has been assessed as a separate proposal.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Section 5 of the PER (*Weld Range Iron Ore Project, Public Environmental Review* (Sinosteel Midwest Corporation Limited, 2010)).

Table 1: Summary of key proposal characteristics

Element	Description
Total overburden	<ul style="list-style-type: none">• Not more than 723 million tonnes.
Overburden storage areas	<ul style="list-style-type: none">• Placement of overburden in Waste Dumps adjacent to Madoonga and Beebyn pits.
Land disturbance area	<ul style="list-style-type: none">• Not more than 3589 hectares
Madoonga pit and waste dumps Beebyn pit and waste dumps	<ul style="list-style-type: none">• Not more than 625.5 hectares• Not more than 1098 hectares
Pit depth Madoonga Pit depth Beebyn	<ul style="list-style-type: none">• Up to 205 metres• Up to 225 metres
Water demand	<ul style="list-style-type: none">• Up to 4.96 gigalitres per annum (GLpa), of which up to 2.20 GLpa of fresh water for processing, Central Processing Facility (CPF) and village, and up to 2.76 GLpa of water with higher salinity for dust suppression at the pits, CPF and village.

Element	Description
Mine dewatering	<ul style="list-style-type: none"> Water abstraction at a rate of 11.95 GLpa from the Madoonga and Beebyn pits.
Excess water discharge	<ul style="list-style-type: none"> Construction of a pipeline to convey excess dewatering discharge to the Evaporation Pond. It is estimated that up to 7 GLpa of highly saline water (10,000 to 60,000 TDS) would be transported into the evaporation pond.
Evaporation pond	<ul style="list-style-type: none"> Not more than 330 hectares.

Changes to the proposal since public release of the PER document are detailed in the Response to Submissions document in Appendix 5 of this report.

The changes include:

- deletion of the tailings storage facility;
- the evaporation/infiltration pond will now be a lined evaporation pond and has been redesigned;
- change in the location of the haul road, increasing the footprint;
- reduction in the footprint of the Madoonga and Beebyn waste dumps;
- change in the method of managing salt at closure; and
- removal of the large borrow pit.

The potential impacts of the proposal initially predicted by the proponent and their proposed management are summarised in Table ES1 of the PER document (Ecologia 2010d).



Figure 1: Location of the Weld Range Iron Ore Project

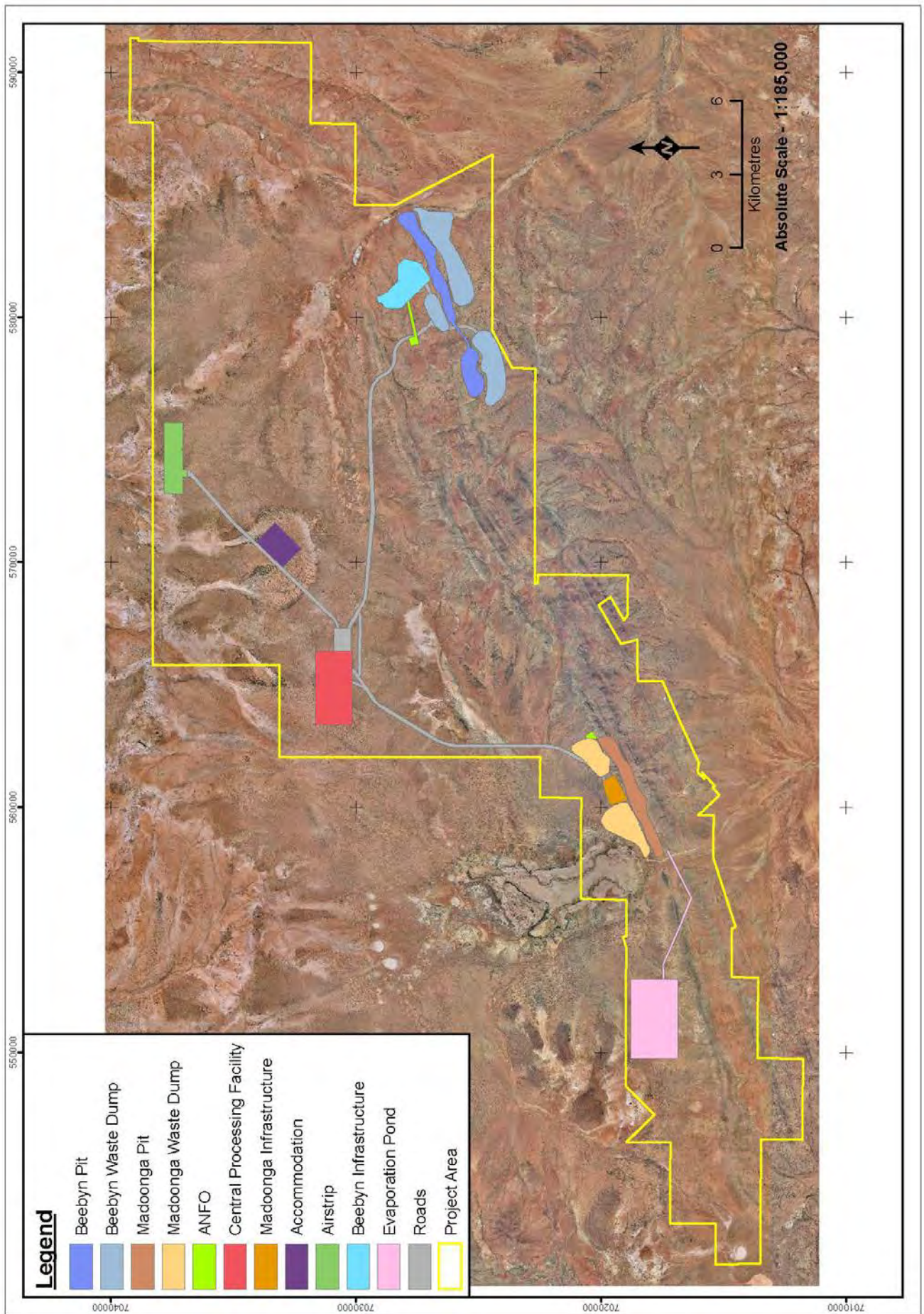


Figure 2: Mine Site Layout

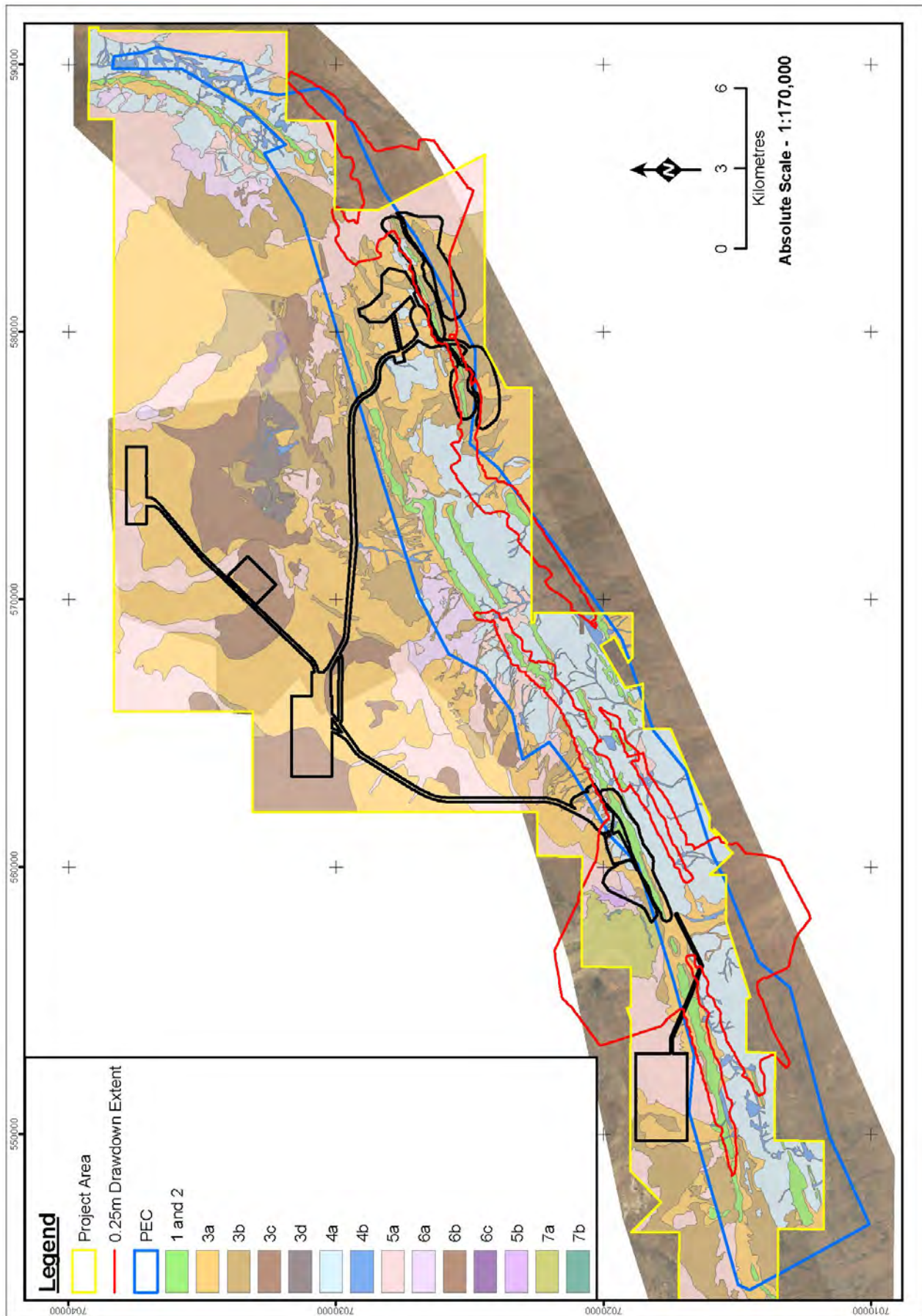


Figure 3: Progression of drawdown relative to the vegetation at Weld Range

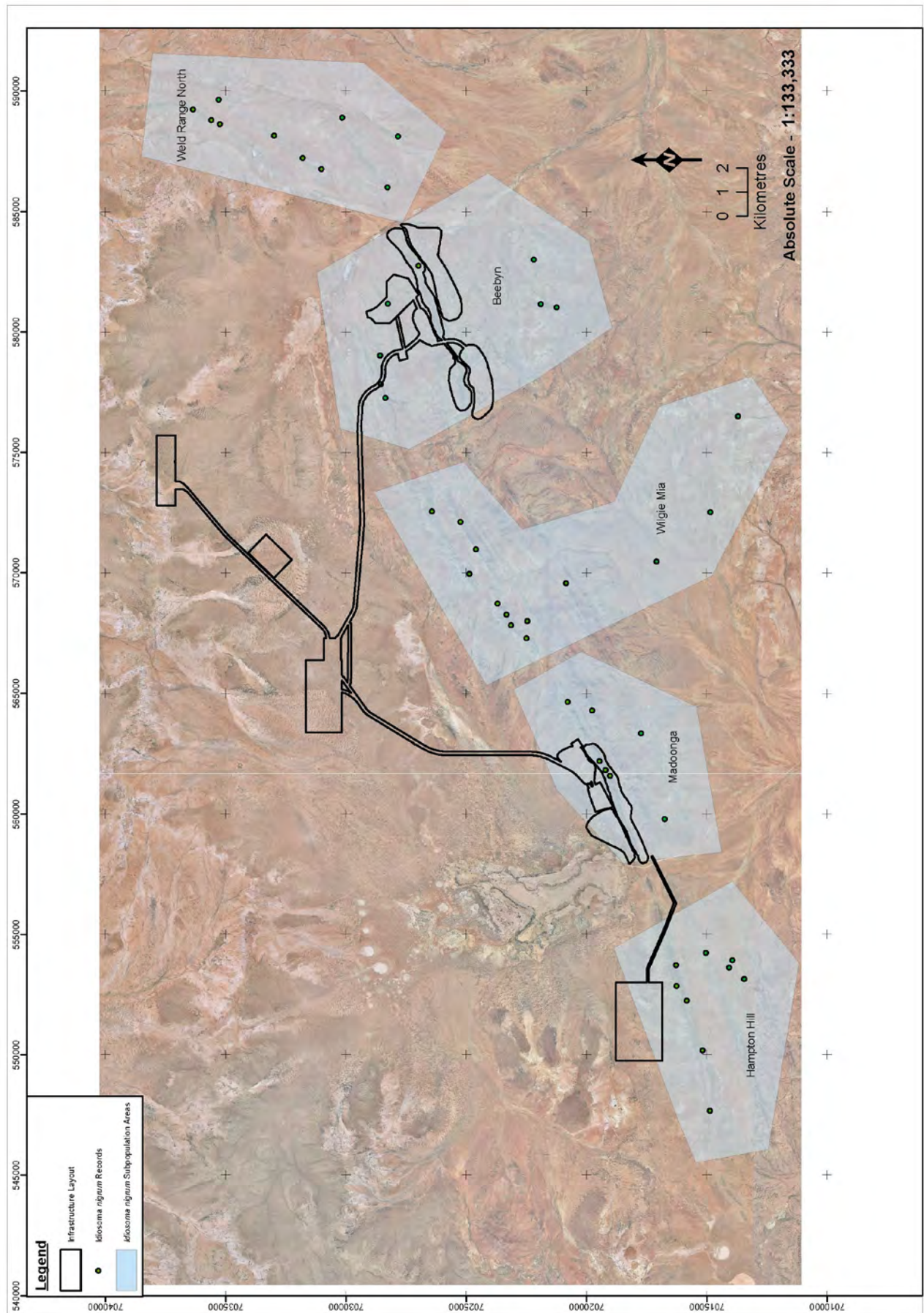


Figure 4: *Idiosoma nigrum* sub populations

3. Key environmental factors and principles

Section 44 of the EP Act requires the EPA to report to the Minister for Environment on the key 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 dust, noise, greenhouse gas emissions, waste materials, visual amenity and geoheritage, and the Murchison Radio Astronomy Observatory (MRO) are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

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) Short range endemics;
- (d) Groundwater and surface water;
- (e) Aboriginal heritage; and
- (f) 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 3.1 - 3.6. 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) the precautionary principle;
- (b) the principle of intergenerational equality;
- (c) the principle of the conservation of biological diversity and ecological integrity;
- (d) Principles relating to improved valuations, pricing and incentive mechanisms; and
- (e) the principle of waste minimisation.

3.1 Flora and vegetation

Description

The proposal has the potential to impact flora and vegetation from clearing, groundwater drawdown, changes to surface water flows, increased salinity of soils, erosion, sedimentation, spread of weeds, dust and fire.

The project area is located within the Murchison botanical district of the Eremaean botanical province. The region is well known for its dominance of Mulga (*Acacia aneura*) Woodlands. The Murchison botanical district is divided into two subregions, of which the Weld Range falls into the Western Murchison subregion.

From a regional perspective, Weld Range has a high conservation value, as it is one of the few areas of relief (hills and ridges) in an area dominated by flat plains. The proposal requires the clearing of 3,589 ha of native vegetation.

A level two flora and vegetation survey of the Weld Range project area was carried out in three phases in November 2006, April 2007 and July 2008 (Ecologia 2010b). Following the flora and vegetation survey, a targeted threatened flora survey was conducted between May 2008 and August 2009 (Ecologia 2010b). A floristic survey targeting Declared Rare and Priority Flora was carried out in the evaporation pond area in July 2010 (Ecologia 2010e), and a survey of the new haul roads was carried out in March 2011 (Ecologia 2011d).

In addition to the recent surveys, several regional vegetation surveys have been carried out since 1963, specifically a survey of vegetation communities and flora by the DEC in late August 2005. The results of the DEC's surveys have been included in the flora and vegetation results.

No ecological communities listed under the EPBC Act or WC Act have been recorded in the project area. No TECs listed by the DEC have been identified in the project area, however the Priority 1 PEC "Weld Range vegetation complexes (Banded Iron Formation)" incorporates much of the vegetation within the project area. The PEC at Weld Range represents a rare vegetation complex and is considered currently under threat from mining. It is expected that 8.15% of the PEC would be impacted by the project.

The Weld Range project is primarily located on the Weld land system, which is only known from the Murchison area. It is described as rugged ranges and ridges of mainly Archaean metamorphosed sedimentary rocks supporting *Acacia* species shrublands. A total of 1202 ha is expected to be impacted of a total of 37 235 ha in WA, equating to an impact of 3.23%. The proposal will also impact on the Yarrameedie land system, which is described as undulating stony interfluvies, drainage floors and pediment (foothill) plains below major ranges of crystalline rocks, supporting sparse Mulga shrublands. The project is expected to impact 854 ha of this land system out of 68,324 ha recorded in Western Australia, equating to 1.25%. A total of 44,169 ha of this land system is present in the Murchison area. The Weld and Yarrameedie land

systems are rated as regionally significant as they are mapped over small areas of Western Australia and the Murchison and 34% of the Yarrameedie land system is in poor condition.

The Mileura land system is unique as it consists of seasonally inundated claypans supporting halophytic shrublands. These shrublands form unique habitats with species such as Slender-billed Thornbill and White-winged Fairy-wren restricted to these habitats (Curry *et al.* 1994). The proposal is expected to impact 12 ha of the Mileura land system of a total of 261 223 ha found in Western Australia (WA), equating to 0.005%. A total of 206 496 ha of the Mileura land system has been recorded from the Murchison region.

The vegetation at Weld Range is described by Beard (Beard 1976) as dominated by *Acacia aneura* and *Acacia quadrimarginea* with an understorey of *Eremophila latrobei*, *Eremophila oppositifolia*, *Scaevola spinescens*, *Ptilotus obovatus*, *Olearia stuartii* and *Lepidium*. The lower slopes are dominated by *Acacia aneura* and *Acacia ramulosa* var. *linophylla*, with some *Acacia grasbyi*.

Three of Beard's vegetation units are considered to have high regional significance, due to their limited distribution in Western Australia. These are *Acacia aneura* and *Acacia quadrimarginea* scrub (a 1.14 Si), *Acacia aneura* and *Acacia grasbyi* low woodland (a 1.17 Li) and *Acacia aneura*, *Acacia ramulosa* and *Acacia linophylla* (now *ramulosa* var. *linophylla*) low woodland (a 1.9 Li), however all of these vegetation units are expected to be impacted by less than 1%.

During recent surveys seven major vegetation communities were described, associated with 17 sub communities.

Three vegetation units are considered to have high local conservation significance.

- Communities 1 and 2, which are *Acacia aneura* low woodland over mixed open shrubs, are restricted to the BIF ridges and outcrops which are the target of mining activities. These communities have been identified as state conservation significant due to their restricted occurrence outside the PEC, and of local significance due to the high number of taxa which are locally restricted to them (Ecologia 2010b). It is expected that 231 ha of the 1695 ha recorded in the study area will be impacted by the proposal, equating to 13.63%. A total of 80% of communities 1 and 2 lie within the PEC.
- Community 4a is *Acacia* species Weld Range and *Acacia aneura* var. *microcarpa* open tall shrubland over *Eremophila macmillaniana* and mixed spp. Open mid shrubland over *Ptilotus obovatus* open low woodland is considered to be locally and possibly regionally significant due to the high number of conservation significant flora recorded within it. It is the only community that includes the newly described taxa *Acacia* sp. *Wilgie Mia* (P1) and undescribed taxa *Hemigenia* sp. nov.

(*aff exilis*). It is expected that 263 ha of the 8412 ha recorded in the project area would be impacted by the proposal, equating to 3.12%.

- Community 7b, which is *Eucalyptus carnei* and *E. trivalva* woodland over *Cratystylis subspinescens* and *Muehlenbeckia florulenta* low sparse shrubland over mixed low tussock grasses, is considered to be locally significant as it occurs on a seasonally inundated salt pan which provides a refuge for threatened fauna species. A total of 14 ha of Community 7b has been identified within the project area. Due to revisions of the project it is expected that none of this sub-community would be impacted due to clearing, however it is expected that all of Community 7b may be impacted by groundwater drawdown.

A total of 393 flora species from 57 families and 140 genera have been recorded in the project area. No threatened flora listed under the EPBC Act or DRF listed under the WC Act have been recorded in the project area during recent surveys.

Conospermum toddii (Endangered, EPBC Act and DRF under the WC Act) and *Eremophila rostrata* subsp. *rostrata* (DRF, WC Act) are known in the Murchison region but have not been recorded during the recent surveys.

A total of 27 Priority flora species were originally recorded in the project area. These are listed in Table 4.6 of the PER (Ecologia 2010d).

Due to additional surveys and some Priority species being delisted, 25 Priority species are now recorded as being present at Weld Range. Of the 25 flora species recorded five are P1, 16 are P3 and four are P4. It is expected that a total of 14 Priority species will be directly impacted by the proposal, of which three are P1, eight are P3 and three are P4.

Of the Priority flora species to be impacted, three species appear to be regionally restricted to BIF ranges and other areas subject to mining tenements. These are *Micromyrtus placoides* (P3), *Beyeria lapidicola* (P1), and *Prostanthera ferricola* (P3).

The only known population of *Prostanthera ferricola* (P3) at Weld Range will be removed. A total of 22 populations are lodged at the WA Herbarium and are recorded from Robinson Ranges, Jack Hills, Wiluna West Range, Moolagool Station and Weld Range (Ecologia 2010g).

A total of 3% of *Beyeria lapidicola* (P1) within the project area will be impacted by the proposal, which results in a total impact of 2% of all known populations. This species is bounded by Meekatharra, Wiluna and Menzies. Nine collections are currently lodged at the WA Herbarium from locations including Ida valley - Mt Forrest Conservation Park, Weld Range and Wiluna West Range (Ecologia 2010g).

A total of 22% of *Micromyrtus placoides* (P3) within the project area will be impacted by the proposal, which results in a total impact of 22% of all known

populations. This species occurs in the western Murchison and northern Yalgoo, and its distribution is from Cue in the east to Mount Narryer in the West. A total of 23 collections are currently lodged at the WA Herbarium from locations including Weld Range, Talling Peak, Mount Narryer and Cue (Ecologia 2010g).

During the targeted haul road Priority flora survey, *Hemigenia virescens* (P3) was recorded for the first time within the Weld Range study area. This species resembles *Hemigenia tysonii* (P3), which has previously been recorded within the Weld Range project area, but can be distinguished when flowering material is present by the longer bracteoles and the amount of hair on the leaves. It is expected that 90% of *Hemigenia virescens* at Weld Range will be impacted by the proposal, however, as the distribution of *Hemigenia virescens* and *Hemigenia tysonii* overlap, the proponent has advised that it is likely that some plants identified previously as *Hemigenia tysonii* may be *Hemigenia virescens*. Seven populations of *Hemigenia virescens* have been recorded outside the project area, which results in an impact of 40% to *Hemigenia virescens* populations (Ecologia 2012a).

The DEC has advised that *Hemigenia virescens* is regionally restricted and there are no recorded populations located in formal IUCN reserves or other areas secure from development. This species occurs on DEC's Doolgunna former pastoral lease, however this area is being heavily impacted by mineral exploration. The DEC has also advised that many of the specimens in the herbarium were collected over 20 years ago and therefore it is unclear if they are still present in the areas originally collected.

All of the Priority flora species to be impacted by the proposal have distributions in excess of 100 km and are therefore not endemic to Weld Range, with the exception of the newly described species *Acacia species Wilgie Mia* (P1) and the undescribed species *Hemigenia sp. nov. (aff. exilis)*, which have only been recorded in Community 4a.

Two previously undescribed taxa were recorded during the recent surveys. These species are *Hemigenia sp. nov. (aff. Exilis)* and *Acacia sp. nov. (aff. kochii)*, now known as *Acacia sp. Wilgie Mia* (Ecologia 2010g).

Acacia sp. Wilgie Mia has recently been listed as a Priority 1 species and is known from the Weld Range area. Recent information shows that *Acacia sp. Wilgie Mia* is known from eight populations of which three are in the project footprint. A total of 30 plants are expected to be impacted out of 2949 recorded, equating to 1.02% (Ecologia 2012a). Three records of *Hemigenia sp. nov (aff. Exilis)* have been recorded in the recent surveys. This species has not yet been taxonomically defined. It is expected that this species would not be directly impacted by the proposal, however one record may be subject to indirect impacts from dust given its location close to the Madoonga pit.

During the recent surveys, six weed species classified as 'Environmental Weeds', by the Environmental Weed Strategy for WA were recorded in the

study area. No 'declared plants' listed under the *Agricultural and Related Resources and Protection Act, 1976* (ARRP) have been recorded.

Indirect impacts from groundwater drawdown, changes to surface water flows and dust

In addition to the 3589 ha to be directly impacted by the proposal, it is expected that approximately 1030 ha may be impacted due to groundwater drawdown and 1365 ha may be impacted due to dust.

Most of the vegetation in the project area uses surface water for its water needs. Mulga (*Acacia aneura*) is particularly affected by alterations to surface water flows.

Vegetation communities 7a and 7b have been identified as potentially groundwater dependent and occur in the vicinity of saline clay pans and seasonally inundated zones at Madoonga. *Melaleuca stereophloia* is the dominant species in Community 7a and is a frequent obligate phreatophyte, which has shown to have less resilience to changes in the water availability. It is expected that other species in Community 7a, such as *Tecticornia* species and *Frankenia laxiflora*, are highly likely to be affected by the water table. Community 7b is characterised by woodland of *Eucalyptus carnei* and *E. trivalvis* over sparse shrubs of *Cratystlis subspinescens* and *Muehlenbeckia florulenta* over tussock grasses. *E. carnei* and *E. trivalvis* are not obligate phreatophytes, as they have been found in areas with a low water table. They may, however, be reliant on the high water table at Madoonga. It is expected that 1016 ha of Community 7a would potentially be impacted by drawdown, out of 1958 ha mapped, equating to 52%. Community 7a extends further north beyond the boundaries of the area mapped (Ecologia 2012a). It is expected that all of the 14 ha mapped of Community 7b may be impacted by groundwater drawdown. Fine scale mapping has not been carried out on Vegetation Community 7a outside the survey area, so it is not possible to ascertain whether Community 7b is present outside the survey area at this time.

Water from dewatering at Beebyn would be used for dust suppression on the mine site. The regional groundwater is generally fresh (TDS<500 milligrams per litre (mg/l) to marginal (500 <TDS <1,500 mg/l) except for the boreholes or wells located in the paleochannels at Madoonga, which are brackish (1,500 <TDS <5,000 mg/l) varying from 2,643 mg/l to 4,900 mg/l. Three boreholes at Madoonga recorded salinities of 35 000 mg/l, 46 000 mg/l and 48 000 mg/l. The proponent has advised that water from Madoonga will not be used for dust suppression as there is the potential that water with a high salinity can have a detrimental effect on vegetation.

The proponent has developed a Rare Flora Management Plan (RFMP) and a Groundwater Management Plan (GWMP) which include management measures to minimise the impacts of the project on flora and vegetation.

Some of the management actions are as follows:

- vegetation clearing would be minimised and earthworks would be carried out at an appropriate time of year to reduce deterioration from surface water flows;
- culverts would be incorporated into infrastructure, when crossing drainage lines;
- the height of stockpiles and cleared vegetation would be minimised;
- disturbance to vegetation associated with drainage lines and seasonally inundated low lying areas would be avoided or minimised where possible.
- impacts to Vegetation Community 7a would be avoided;
- further research into the distribution of priority flora at Weld Range;
- a goat control and destocking program would be carried out on Weld Range and surrounds to promote vegetation regrowth;
- dust control measures would be carried out;
- salinity levels in water used for dust suppression would not be excessive and runoff would be avoided;
- dust suppression activities would be designed in line with the requirements of the DoW *Water Quality Protection Guidelines* (2000), and the water used would be of suitable quality to minimise and avoid ecological damage;
- off road driving would be limited;
- progressive rehabilitation would be undertaken using local native species;
- baseline and long term monitoring to assess the impacts of dewatering on phreatophytic vegetation; and
- monitoring of vehicle hygiene, weed control and flora and vegetation.

The proponent has committed to carrying out a baseline and long term monitoring program to identify any impacts to groundwater dependent vegetation as a result of dewatering (Ecologia 2010d). If vegetation stress is noted then supplementary water will be provided to counteract the effect of dewatering.

Submissions

The key comments in the submissions focused on:

- the likelihood of the proposal changing the threat status of conservation significant flora under the World Conservation Union (IUCN) categories;
- the resolution of the taxonomic status of *Hemigenia sp. nov (aff. Kochii)* and *Acacia sp. nov (aff. Exilis)* and the clarification of the conservation value of Community 5b;

- additional targeted flora surveys to be carried out for the access tracks leading to the infrastructure area and provision of final impact figures; and
- monitoring of impacts of drawdown on groundwater dependent ecosystems.

Assessment

The EPA's environmental objectives for this factor are to:

- protect Declared Rare and Priority Flora, consistent with the provisions of the *Wildlife Conservation Act 1950*; and
- maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.

The proposal requires the clearing of 3589 ha of native vegetation.

The EPA notes that numerous vegetation surveys have been carried out in the project area since 1963 and that recent flora surveys have been carried out both by the DEC in August 2005 and the proponent between July 2006 and March 2011. The EPA considers that the flora and vegetation surveys carried out by the proponent are in accordance with EPA Guidance Statement 51 and that the level of flora and vegetation work carried out is acceptable.

All vegetation communities extend beyond the project footprint, however several vegetation communities are locally significant. The EPA recognises that changes made to the proposal since the release of the PER have largely reduced the impacts to locally significant vegetation communities, and that impacts are not expected to be significant.

Vegetation communities 7a and 7b have been identified as potentially groundwater dependent. The EPA acknowledges that vegetation communities 7a and 7b are locally significant as they occur on a seasonally inundated salt pan which provides a refuge to threatened fauna species. These communities contain plant species that are thought to provide suitable habitat for the Slender-billed Thornbill. The EPA notes that Community 7a extends further beyond the mapped area.

The EPA also notes that the impact to communities 7a and 7b will occur gradually and therefore can be monitored and potentially mitigated. The level of impact, if it occurs, would also be expected towards the end of dewatering at nine years. Rapid recovery of the water table in this area is expected in the first five years after active dewatering ceases because regional groundwater flows are towards this area.

The proponent has revised the shape of the Madoonga waste dump to reduce the impact on vegetation communities 7a and 7b. The EPA also notes that a long term monitoring program will be carried out to identify any impacts from dewatering on potential phreatophytic vegetation and that should stress be noted, supplementary water will be provided to counteract the impacts from dewatering. The EPA considers this to be a feasible option given that most of

Vegetation Community 7a consists of fringing vegetation around an ephemeral lake and the proponent has sufficient water for irrigation.

No DRF or TECs were recorded in the project area, however the Priority 1 PEC "Weld Range vegetation complexes (Banded Iron Formation)" incorporates much of the vegetation within the project area. The PEC at Weld Range represents a rare vegetation complex and is considered currently under threat from mining. The EPA notes that the proposal would cause the loss of 8.15% of the PEC. The EPA also notes that 13.9 ha of the PEC lies within the Wilgie Mia aboriginal reserve which is planned to be protected as part of the mining agreement between SMC and the traditional owners. The EPA is advised that the mining agreement is in the final stages of sign off.

SMC have identified nine further iron ore deposits at Weld Range which may be developed in the future. The EPA notes that if all nine deposits were mined it would increase the impact to the PEC by a further 1.63%, resulting in a total cumulative impact of 9.78%.

A total of 25 Priority flora species have been recorded in the project area, of which 14 priority species will be directly impacted. The EPA acknowledges that all Priority flora to be impacted by the proposal has a distribution of at least 100 km and is not endemic to the Weld Range, with the exception of the newly described species *Acacia species Wilgie Mia*, and the undescribed species *Hemigenia sp. nov. (aff exilis)*, which have only been recorded in Community 4a at Weld Range.

Of the 14 Priority flora species to be impacted, three appear to be regionally restricted to BIF ranges and other areas subject to mining tenements. These are *Micromyrtus placoides* (P3), *Beyeria lapidicola* (P1), and *Prostanthera ferricola* (P3).

The DEC has advised that the project is likely to have a substantial impact on the distribution and size of local populations of these species, and that further survey work in the region would improve the knowledge of their conservation status and habitat requirements.

The EPA notes that the potential extent of impact to *Hemigenia virescens* is unclear as the targeted haul road survey was only carried out in the haul road area and that previous records of *Hemigenia tysonii* may in fact be *Hemigenia virescens* due to their similarities and similar distribution. It is therefore likely that additional surveys will identify additional plants and clarify the extent of distribution of this species.

The EPA also notes the advice of the DEC which details that *Hemigenia virescens* is regionally restricted and there are no recorded populations located in formal IUCN reserves or other areas secure from development. This species does occur on DEC's Doolgunna former pastoral lease however this area is being heavily impacted by mineral exploration.

The EPA is also advised that new information for *Acacia sp Wilgie Mia* has been recently obtained which details that additional populations of this species have been recorded, which has reduced the impacts to 1.02%. *Hemigenia sp. nov (aff Exilis)* has not yet been formally described, however it should be considered to be taxonomically distinct. This species would not be directly impacted, however one of the three populations recorded within the project area is located close to the Madoonga waste dump and may be impacted by dust.

Dust suppression activities will be designed in line with the requirements of the DoW *Water Quality Protection Guidelines* (2000), and the water used would be of suitable quality to minimise and avoid ecological damage.

The EPA has recommended Condition 6 'Flora and vegetation' which limits the impact to conservation significant flora and vegetation communities to an agreed disturbance footprint, and which monitors the health of the conservation significant flora and vegetation communities in areas expected to be subject to indirect impacts and allows a decline to agreed limits. This condition also ensures that the proponent carries out a targeted survey to increase the knowledge of the distribution of *Micromyrtus placoides*, *Beyeria lapidicola*, *Prostanthera ferricola*, *Acacia sp. Wilgie Mia*, *Acacia sp. nov (aff. Exilis)* and *Hemigenia virescens*.

The EPA recommends Condition 7 'Weeds' to ensure that the number of species of weeds, the intensity of weed infestation and the extent of weed distribution does not increase as a result of implementing the proposal.

Condition 8 'Groundwater dependent ecosystems' has been recommended to limit the groundwater drawdown to the 0.25 m contour specified on Figure 3 in order to protect groundwater dependent ecosystems (GDEs) outside the impact area, and to monitor and mitigate impacts to GDEs within the 0.25 m contour to ensure no irreversible loss.

SMC has proposed two mitigation strategies to address the residual environmental impacts of the proposal in its May 2012 Draft Environmental Offsets Plan. These focus on improving vegetation condition and improving knowledge of the species and their distributions. The programs include a goat control and destocking program and research into the distribution of Priority flora species on Weld Range.

The EPA has concluded that the proposed environmental offsets measures sufficiently address the residual environmental impacts and risks of the proposal on the State's biodiversity assets. The EPA considers that residual impacts to flora and vegetation should be offset and has recommended Condition 10 'Residual impact and risk management measures' to ensure that the residual measures are transparent and auditable.

The EPA notes that the proponent has prepared a RFMP and a GWMP in order to minimise impacts to flora and vegetation.

Summary

Having particular regard to:

- (a) changes made to the proposal to reduce the impacts to conservation significant flora and vegetation;
- (b) the project not causing a decline in the threat status of conservation significant flora under the World Conservation Union (IUCN) categories;
- (c) a direct impact of no more than 8.15 % of the PEC; and
- (d) Community 7a being present outside the 0.25 m drawdown area,

it is the EPA's opinion that it is likely that the EPA's environmental objectives for this factor can be achieved provided conditions 6, 7, 8 and 10 are imposed.

3.2 Fauna

Description

The proposal has the potential to impact terrestrial fauna by direct loss and disturbance of habitat due to clearing of native vegetation, dewatering and the creation of pit lakes. There is also the potential for fauna to be impacted by dust, noise, light and vehicle strikes.

A two phase, Level 2 vertebrate fauna survey was carried out above the main ore bodies and in the areas that best represent the fauna habitats of Weld Range in September 2006 and between March and April 2007. Further surveys of an extension to the Range were carried out in April and September 2007. Two additional Level 1 surveys of the infrastructure areas were carried out between August and September 2008 (Ecologia 2009e). Opportunistic sampling was also carried out on the new haul road and infrastructure area in March 2011 (Ecologia 2011a).

A vertebrate fauna survey has not been carried out in the evaporation pond area and pipeline route as the proponent believes that adequate vertebrate fauna surveys have been carried out in the area.

A total of 10 main fauna habitat types occur in the project area, which include an additional seven smaller habitats.

The Mileura land system is unique to the project area as it consists of seasonally inundated clay pans supporting halophytic shrublands. The shrublands form a unique habitat with species such as the Slender-billed Thornbill and White-winged Fairy-wren restricted to these habitats.

The Slender-billed Thornbill (*Acanthiza iredalei iredalei*) (EPBC Act, Vulnerable) and the Peregrine Falcon (*Falco peregrines*) (WC Act, S4) were recorded in the survey area.

A total of eight Slender-billed Thornbills were recorded in an area of chenopod shrubland within Vegetation Community 7b. Communities 7a and 7b contain plant species that are thought to provide suitable habitat for the Slender-billed Thornbill, however Community 7a is expected to be the preferred habitat.

The population at Weld Range is expected to be relatively small, 10 to 20 individuals, and is likely to be restricted to communities 7a and 7b. The importance of habitat for dispersal across the landscape is not well understood, however communities 7a and 7b may provide a staging post for individuals to disperse through the region.

The population at Weld Range is expected to be part of the western edge of the central southern Western Australia subpopulation, one of seven subpopulations across Australia. This population includes populations associated with Lake Annean (65 km east of Weld Range), Lake Austin (75 km south east of Weld Range), and populations to the south-east, associated with Lake Barlee (300 km) and Lake Ballard (400 km).

The proponent has changed the proposal to avoid direct impact to communities 7a, resulting in 3.7 ha of the 635 ha recorded in the project area being directly impacted (0.58%). The total area of Community 7a which has been mapped in the Weld Range area is 1958 ha. It is expected that 52% of Community 7a is potentially impacted by groundwater drawdown. The lowering of the water table is expected to lead to changes in the composition of vegetation mapped in Community 7a due to the impact on *Melaleuca stereophloia*, one of the dominant species of the sub stratum. No specific data is available regarding the water table dependence of *M. stereophloia*, however *Melaleuca* species present in areas with shallow water tables are typically phreatophytic with shallow root systems that are vulnerable to lowering of the water table (Ecologia 2012a). Although not confirmed, it is expected that Vegetation Community 7a extends further than the area mapped, and covers an area of 3500 ha. Slender-billed Thornbills are sedentary and will remain in a single location, however they do have the ability to disperse to other suitable habitats.

Three priority fauna as listed by the DEC were also recorded. These species are Long-tailed Dunnart (*Sminthopsis longicaudata*) (P3), Bush Stone-curlew (*Burhinus grallarius*) (P4) and a fossorial skink (*Lerista eupoda*) (P1).

The fossorial skink is known to be endemic to the Murchison bioregion and inhabits a wide range of habitats on Weld Range and the surrounding flat plains. It is known to have a very restricted range from between Cue in the south, Nannine in the north and Weld Range to the west, covering approximately 10,000 km². The proposal is expected to impact 12.5% of the Weld Range and hence, 87.5% of the range would be undisturbed.

The Rainbow Bee-eater (*Merops ornatus*) (EPBC Act, Migratory) and Australian Bustard (*Ardeotis australis*) (DEC, P4) were not recorded in the surveys but are likely to occur in the project area.

Malleefowl (*Leipoa ocellata*) which is listed as Vulnerable under the EPBC Act and WCA has been known to occur in the area in the past, however the proponent considers that they have declined in the area with few recent sightings. During the fauna surveys three inactive Malleefowl (*Leipoa ocellata*) nests were found.

The proposal will leave pit lakes at closure, which may present a risk to fauna due to water quality and encouraging feral animals to the area, increasing predation and grazing pressure on surrounding vegetation.

Subterranean fauna

The proposal has the potential to impact subterranean fauna by direct loss due to excavation of habitat, and indirect loss due to groundwater drawdown and contamination.

A four phase stygofauna survey was carried out between April 2008 and March 2009. Regional bores and wells were sampled in August 2008 and February 2009 (Ecologia 2009d).

No stygobiotic species were found within or outside the direct impact area at Beebyn during the surveys, however one juvenile stygobitic copepod from the order Calanoida was found in a troglifauna trap in the Madoonga pit area, suggesting that stygofauna may be present in the Madoonga pit area. Several bores nearby were sampled but did not yield any stygofauna. The proponent advises that the stygobitic copepod may be a contaminant of the bore rather than residing in the aquifer. The aquifer in the Madoonga pit area extends outside of the impact area, is generally unconfined and largely consists of a fractured rock system over the range itself (SRK 2010a).

Aquatic crustaceans from two different orders (Ostracoda and Copepoda) were recorded from nine wells located outside the impact area. These species are widespread and found in surface waters elsewhere.

A two phase troglifauna survey was carried out between May and July 2007, and June and August 2008 (Ecologia 2011b).

A single centipede specimen from the order Scolopendromorpha (identified as Cryptopidae) was collected from a single bore in the Beebyn impact area. Cryptopids have been identified elsewhere in Western Australia from Robe Valley, Mesa A, and a cave on the Nullarbor Plain, however no records exist near Weld Range or other ranges in the Midwest region. The species has an unknown conservation value but is likely to be a troglobite. No other troglifauna species were recorded during the surveys. A habitat assessment was carried out which identified that dolorite was a suitable troglobitic habitat. The dolorite habitat is widespread throughout the range, and is continuous between Beebyn and Madoonga and at the Aboriginal Reserve Wilgie Mia. It is expected that 7% of the troglifauna habitat will be directly impacted and a further 23% will be indirectly impacted by the proposal, equating to a total impact of 30% of the Weld Range.

Collembolans (springtails) and Acarina (mites) were found in samples inside and outside the impact area. These species have not been confirmed to be troglobitic, and given their existence outside the impact area they are unlikely to be significantly impacted by the proposal.

The proponent has developed management measures to minimise the impacts of the project on fauna. Some of the management actions are as follows:

- progressive rehabilitation to establish habitat restoration;
- native vegetation which is used by local fauna would be used during rehabilitation;
- remnant vegetation would be retained and used on the mine site;
- mature trees with hollows would be retained where possible;
- drill holes would be capped to prevent fauna entrapment;
- contractors would be trained to recognise and avoid Rainbow Bee-eater (*merops ornatus*) burrows;
- trapping and relocating of the Long Tailed Dunnart (*Sminthopsis longicaudata*) to outside the impact area;
- animal access to pit lakes would be discouraged through fencing;
- a goat control and destocking program would be carried out on Weld Range to promote vegetation growth; and
- site personnel would be trained to recognise species that are conservation significant and would report all findings to environmental personnel.

Submissions

The key comments in the submissions focused on:

- determining the significance of the potential impacts of the project on the fossorial skink (*Lerista eupoda*) and its habitat;
- determining whether the juvenile calanoid copepod species found at Madoonga is truly stygobitic or a result of contamination;
- demonstrating that the juvenile calanoid copepod and its habitat are not restricted to the Madoonga pit area and drawdown disturbance area.;
- determining the likelihood of the troglobitic centepede and its habitat not being restricted to the Beebyn pit area and area of groundwater drawdown; and
- the mine pit voids being backfilled to a level that will prevent the formation of pit lakes or that a condition be imposed to require the pit voids to be fenced to an adequate standard to restrict feral animals and conservation significant fauna and funds provided to manage the fencing in perpetuity.

Assessment

The EPA's environmental objectives for this factor are to:

- protect Specially Protected (Threatened) and Priority Fauna and their habitats, consistent with the provisions of the WC Act;
- protect fauna listed on the Schedules of the EPBC Act; and
- maintain the abundance, species diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impact and improvement in knowledge.

The EPA considers that the terrestrial vertebrate fauna surveys have been carried out in accordance with Guidance Statement 56 and that the subterranean fauna surveys have been carried out in accordance with Guidance Statement 54a.

The EPA notes that the Slender-billed Thornbill (*Acanthiza iredalei iredalei*), listed as Vulnerable under the EPBC Act, was recorded in the chenopod shrublands within the project area and that the proponent has modified the shape and size of the Madoonga waste dump to avoid its habitat.

The EPA also notes that the habitat of the Slender-billed Thornbill is likely to be impacted by groundwater drawdown. It is expected that the impact to communities 7a and 7b will occur gradually and therefore can be monitored and potentially mitigated. The potential impact of 52% of Community 7a and 100% of Community 7b, if it occurs, would be expected towards the end of dewatering at nine years. Rapid recovery of the water table in this area is expected in the first five years after active dewatering ceases because regional groundwater flows are towards this area.

The EPA acknowledges that the proponent will monitor the impacts to communities 7a and 7b during dewatering and will irrigate the area should the health of these communities decline. The EPA considers that this is a feasible mitigation option given that the vegetation is fringing around an ephemeral lake and the proponent has sufficient available water. In addition to this, the proponent will destock and remove goats from Weld Range and surrounds, which would have a positive impact on the condition of vegetation communities 7a and 7b.

The EPA acknowledges that the proposal may potentially impact a small number of individuals of the Slender-billed Thornbill however, it is also likely that these individuals are not specifically reliant on vegetation communities 7a and 7b and therefore, the impacts are unlikely to be significant.

The EPA considers that it is likely that the Peregrine Falcon (*Falco peregrinus*) would not be significantly impacted by the proposal as it is a nomadic species that is widespread throughout Australia and inhabits a wide range of habitats. The remainder of the Weld Range would continue to provide suitable nesting

and breeding habitat for this species. This species has been recorded at Jack Hills and Koonamara.

The EPA notes that the fossorial skink (*Lerista eupoda*) is likely to be impacted by the proposal as it has a restricted range between Cue in the south, Nannine in the north and Weld Range to the west, covering approximately 10 000 km². Although 12.5% of Weld Range will be directly impacted, the skink is not limited to this area and is present outside the range, and inhabits a wide range of habitats.

Survey results suggest that the Long Tailed Dunnart (*Sminthopsis longicaudata*) prefers the rocky range habitat rather than the surrounding plains. The loss of 12.5% of the rocky habitat at Weld Range is expected to have a localised reduction in abundance of this species, but it is unlikely to be significantly impacted. This species has been recorded from widely separated populations in the Pilbara, Murchison, Gibson Desert, southern Carnarvon and in the Western MacDonnell Ranges (Northern Territory) (Burbridge et al. 2008).

The Bush Stone-curlew (*Burhinus grallarius*) may be impacted by the destruction of nests and increased predation due to the project, however it is noted that the species is widespread in the region and is unlikely to be significantly impacted.

The EPA understands that a juvenile stygobitic copepod from the order Calanoida was found in a troglotauna trap in the Madoonga pit area, and that it is unclear if this specimen is the result of contamination. As the aquifer in which the specimen was found extends outside the project area, the species is not expected to be restricted to the impact area.

The EPA notes that a single centipede specimen from the order Scolopendromorpha (identified as Cryptopidae) was collected from a single bore in the Beebyn impact area and that habitat analysis shows that 30% of the troglotauna habitat on Weld Range will be impacted by the proposal. The EPA considers that troglotauna will not be significantly impacted by the proposal as the habitat is widespread throughout the range and is continuous.

The EPA notes that the proponent has prepared a fauna management plan, which details management measures to reduce the impacts of the proposal on Fauna. The recommended Condition 6 'Flora and vegetation' that restricts clearing to the required areas and Condition 8 'Groundwater dependent ecosystems' that ensures groundwater drawdown impacts are mitigated and drawdown does not extend further than the area predicted will also ensure the protection of fauna habitat.

Summary

Having particular regard to:

- (a) changes made to the proposal to reduce the impacts to the habitat of the Slender-billed Thornbill;
- (b) the aquifer in which the stygobitic copepod was found being continuous and outside the project area;
- (c) the troglodfauna habitat being continuous and extending beyond Weld Range; and
- (d) implementation of the management measures to protect fauna,

it is the EPA's opinion that it is likely that the EPA's environmental objectives for this factor can be achieved provided that Condition 6 'Flora and vegetation' which limits clearing to the areas proposed by the proponent and condition 8 'Groundwater dependent ecosystems' that limits groundwater drawdown and manages the impacts to GDEs, is imposed.

3.3 Short range endemics (SREs)

Description

The proposal has the potential to impact short range endemics (SREs) by disturbance of habitat due to clearing, dust, fire and vibration.

An SRE survey was carried out at Madoonga, Beebyn and Hampton Hill between August and November 2006 and at Weld Range North between April and August 2007 (Ecologia 2009a). Following this initial SRE survey, several additional surveys were then carried out in order to identify which species were true SREs and to understand the level of which they would be impacted by the project. The additional surveys were a Shield-back Spider *Idiosoma nigrum* targeted survey, carried out in October 2007 and in June 2009 (Ecologia 2009c), an *Idiosoma nigrum* population genetic study (Ecologia, 2010a), a targeted survey and genetic analysis for male specimens of *Aureocrypta sp.* within the Shire of Chittering in June to August 2008 (Ecologia 2009f), and an additional sampling and genetic study of the Curtain-web spider, *Cethegus fugax* in September to October 2006, June to August 2007 and April 2008 (Ecologia 2009b).

Following the decision by the proponent to include an evaporation pond into the project design, a targeted SRE survey was carried out in the evaporation pond area in October 2010 (Ecologia 2010f). The proponent then moved the haul road and so undertook an additional survey of the new haul road between February and March 2011 (Ecologia 2011d).

A total of 81 invertebrate species were collected from the project area. Results showed that five of the species are considered to be SREs, two are likely, 22 are potentially SREs, eight are unlikely and 32 are undetermined.

The species considered to be SREs are:

- Shield-backed Trapdoor Spider (*Idiosoma nigrum*), (Schedule 1 species, WCA);
- Curtain-web Spider (*Cethegus Sp MUR HH 'Hamilton Hill'*);
- Curtain-web Spider (*Cethegus Sp MUR WRS 'Weld Range South'*);
- a land snail (*Pleuroxia species*); and
- a millipede (*Antichiropus sp. 'Weld Range'*).

Idiosoma nigrum

Idiosoma nigrum is listed as Schedule 1, Vulnerable, under the WCA. Eight male specimens and two juveniles were recorded within the project area during the SRE survey (Ecologia 2009a). The population of *Idiosoma nigrum* at Weld Range is the largest known in Australia and extends their known distribution by 200 km north.

During the targeted survey, 1708 burrows were found within the boundaries of drainage lines under *Acacia* vegetation. The spider was present at each of the five sections of the range, namely Hampton Hill, Madoonga, Wilgie Mia Aboriginal reserve, Beebyn and Weld Range North (Figure 4).

The ratios between the adults, juveniles and emergents show that the populations at Weld Range North and Hampton Hill are growing, the populations at Madoonga and Wilgie Mia are declining and the population at Beebyn had been growing until recently, but is now stagnating.

As part of the *Idiosoma nigrum* Population Genetic Study (Ecologia 2010a), specimens were collected from three areas (Weld Range North, Weld Range South and Hampton Hill) which were separated by a distance of approximately 15 km. The results showed that the genetic structure of *Idiosoma nigrum* is largely determined by the geographic features of the range and that gene flow does not occur between each area, which is likely to be the major cause of their inbred status. It would be critical that each population is managed as a separate entity.

The project would directly impact 69% of the Madoonga population and 3% of the Beebyn population representing 9% of the total population. It is expected that the loss of 69% of the Madoonga population would cause the loss of this population, due to inbreeding depression. It is possible that the Beebyn population would also be lost due to indirect impact from hydrological changes. The total loss to *Idiosoma nigrum* from direct and indirect impacts is expected to be 12%.

Regional surveys showed that two populations exist on DEC pastoral leases at Dalaranga and Lakeside. Further regional surveys showed that species previously identified in the Wheatbelt and southern Midwest were not *Idiosoma nigrum* and that this species are unlikely to exist in the interior of the

Wheatbelt and Midwest until the large BIF ranges of the Midwest to the north and the higher rainfall of the central Wheatbelt to the south are reached.

***Cethegus* sp. 'fugax complex'**

The Curtain-web spider, thought to be of species complex *Cethegus* 'fugax', was recorded during the SRE survey at Hampton Hill and Weld Range South (Madoonga, Wilgie Mia and Beebyn). In order to clarify its status, specimens were collected from Weld Range, Jack Hills, Robinson Range, Blue Hills, Mt Helena, and three sites in the Great Victoria Desert. Morphological and genetic analysis was carried out, which confirmed that the species collected at Weld Range was a new undescribed species which was unable to disperse more than one kilometre across the 'gap' between Madoonga and Hampton Hill. A total of five subspecies were recorded from the Murchison region, two at Weld Range, two at Jack Hills and one at Robinson Range. The subspecies at Weld Range, were as different from each other as they were from the subspecies at Jack Hills and Robinson Range, therefore requiring separate conservation management (Ecologia 2009b).

The species at Weld Range were named *Cethegus* sp. MUR HH 'Hampton Hill' and *Cethegus* sp. MUR WRS 'Weld Range South'. It is expected that 9.9% of the *Cethegus* sp. MUR HH 'Hampton Hill' and 2.9% of the *Cethegus* sp. MUR WRS 'Weld Range South' habitat within the project area would be impacted by the proposal due to clearing and dust.

***Pleuroxia* sp.**

A single snail species was recorded at Weld Range during the SRE surveys. The snail species was identified as belonging to the genus *Pleuroxia*, and was the most similar to *Pleuroxia bethana*, despite some differences. In the absence of definite identification it is thought that the species is a short range endemic as it is likely to be restricted to the rocky habitat of Weld Range. (Ecologia 2009a).

It is expected that 4.6% of the *Pleuroxia* sp. habitat within the project area would be impacted by the proposal. Populations of *Pleuroxia* sp. were recorded within the Wilgie Mia Aboriginal reserve and at Hampton Hill, which are outside the project area, hence are expected to be partially impacted.

***Antichiropus* sp.**

A single species of millipede was identified at Weld Range during the SRE survey. The species was identified as *Antichiropus* (Paradoxosomatidae) and represent a new species that has not been collected previously. The species is likely to be an SRE that is restricted to Weld Range. It is expected that 7.6% of this species habitat within the project area would be impacted by the proposal. *Antichiropus* was recorded at Hampton Hill, which is outside the project area.

Management

The proponent has developed management measures to minimise the impacts of the project on SREs. Some of the management actions are as follows:

- designated conservation zones to be established for *Idiosoma nigrum* at Hampton Hill, Weld Range South and Weld Range North;
- designated conservation zones at Hampton Hill for *Cethegus sp. MUR HH* 'Hampton Hill' and at Weld Range South for *Cethegus sp. MUR WRS* 'Weld Range South';
- avoidance, where possible, of areas where *Idiosoma nigrum* burrows are present;
- monitoring of *Idiosoma nigrum* and *Cethegus sp MUR* populations;
- a destocking and goat control program will be carried out on Weld Range;
- training of site staff to recognise and avoid *Idiosoma nigrum* burrows;
- dust suppression measures;
- establishment of a mygalomorph conservation team;
- development of a Bushfire Management Plan (BMP); and
- cleared areas would be rehabilitated as soon as possible.

Submissions

The key comments in the submissions focused on:

- the implementation of offset measures to mitigate the impacts on *Idiosoma nigrum*; and
- the SRE status being determined for the 45 species collected.

Assessment

The EPA's environmental objectives for this factor are to:

- protect Specially Protected (Threatened) Fauna and their habitats, consistent with the provisions of the *Wildlife Conservation Act 1950*; and
- maintain the abundance, species diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impact and improvement in knowledge.

The EPA considers that the SRE surveys have been carried out in accordance with guidance statements 20 and 56.

The EPA notes that all 81 species found in the SRE surveys have had their SRE status identified, have been found both inside and outside of the impact

areas, or were found in habitats which are well represented in the area. The EPA also notes that species found in the haul road survey are unlikely to be restricted as they were found on flat plains which are widespread in the project area. The results show that five species were likely to be SREs. The Shield Back spider, *Idiosoma nigrum*, is listed as Schedule 1, Vulnerable, and is protected under the WC Act. It is noted that *Idiosoma nigrum* found at Weld Range represents the largest population in Australia and extends the range of the species by 200 km north. The proposal is likely to cause the loss of two of the populations at Weld Range, namely Madoonga and Beebyn, leaving three populations remaining. The total impact to the species at Weld Range is 12%.

Genetic work confirmed that each of the five populations do not experience gene flow among each other so the three remaining populations, Weld Range North, Wilgie Mia, and Hampton Hill are viable populations in their own right.

The EPA considers that it is unlikely that the *Idiosoma nigrum* species would be significantly impacted by the proposal, provided that each population is individually managed and stock animals are removed from the Weld Range, as proposed in the Spider Management Plan.

The EPA notes that *Cethegus sp. MUR HH 'Hampton Hill'* and *Cethegus sp. MUH WRS 'Weld Range South'* are new species that were recorded during the SRE survey at Weld Range. Research shows that the two species are different from each other and cannot disperse more than one kilometre.

The EPA considers that provided the two species have separate conservation management and that the remaining populations are protected in conservation areas, as proposed in the Spider Management Plan, then it is unlikely that *Cethegus sp. MUR HH 'Hamilton Hill'* and *Cethegus sp. MUR WRS 'Weld Range South'* would be significantly impacted by the proposal.

Pleuroxia sp. (snail) and *Antichiropus* (millipede) were recorded during the SRE surveys at Weld Range and although their status has not yet been clarified they are thought to be SREs as they are likely to be restricted to the Weld Range. The EPA considers that as these species are both inside and outside the proposal footprint they are not expected to be significantly impacted.

The EPA has recommended Condition 9 'Short range endemics' which limits impacts to short range endemic species to the direct impact area of the proposal, and ensures that monitoring is carried out within one kilometre of the direct impact area and trigger levels set.

The EPA considers that residual impacts to *Idiosoma nigrum* and the *Cethegus MUR* species should be offset and has recommended condition 10 'Residual impact and risk management measures'.

The EPA notes that the proponent has prepared a Spider Management Plan, which details management measures to reduce the impacts of the proposal on

Idiosoma nigrum and *Cethegus* sp. MUR HH 'Hampton Hill' and *Cethegus* sp. MUR WRS 'Weld Range South'.

Summary

Having particular regard to the:

- (a) SRE species being present within and outside the project footprint;
- (b) SRE habitat being widespread within the project area;
- (c) conservation zones being established for the protection of *Idiosoma nigrum* and *Cethegus* sp. MUR 'Hamilton Hill' and 'Weld Range South'; and
- (d) destocking and feral goat control program being carried out across the range,

it is the EPA's opinion that it is likely that the EPA's environmental objectives for this factor can be achieved, providing that conditions 9 and 10 are imposed.

3.4 Groundwater and surface water

Description

Dewatering of the mine pits would cause groundwater drawdown, which could potentially affect phreatophytic vegetation and Stygofauna. The potential impacts to vegetation are discussed in section 3.1 and the potential impacts to stygofauna are discussed in section 3.2. Groundwater quality can be affected by the potential leakage of acid forming material and hydrocarbon spills, as well as leakage of saline water from the evaporation pond.

The proposal would require dewatering at both Madoonga and Beebyn pits to enable dry floor mining to occur.

A hydrogeological investigation was carried out in 2007 and 2008 (SRK Consulting 2008a), followed by further field work in March and November 2009 to enhance the regional understanding of the project area (SRK Consulting 2010a).

Surveys showed that a total of seven hydrological units were defined in the area, of which three contained the most groundwater. These were the unconsolidated sediments that cover the flatlands of the north and south of the range, a significant palaeochannel that was identified in the area known as the gap, and the BIF. The palaeochannel is relatively impermeable however, a fractured zone is located below it which is believed to be highly permeable and could contribute considerable inflow into Madoonga pit. The BIF holds significant amounts of groundwater. A numerical groundwater model was carried out for a period of nine years (SRK 2009b) as dewatering would not be required for the first two years of the 11 year project when development and

pre-stripping would be carried out. The groundwater drawdown model was rerun and included more comprehensive data in February 2012 (SRK 2012a). Recharge occurs mainly from the infiltration of rainfall and some recharge through creek beds between the ridges that form Weld Range.

The regional groundwater is fresh ($\text{TDS} < 500 \text{ mg/l}$) to marginal ($500 < \text{TDS} < 1,500 \text{ mg/l}$), except in the boreholes or wells located in the paleochannels. The water in the palaeochannel is brackish ($1,500 < \text{TDS} < 5,000 \text{ mg/l}$). A total of three bores had a high salinity of 48,000 mg/l, 46,000 mg/l and 35,000 mg/l. The bores that have the highest salinity reflect the proximity of the bore holes to the tertiary palaeochannel. The areas of high salinity correspond to low topographic areas and surface drainage systems. The high salinity in the surficial aquifers is due to the shallow water table and high evaporation rate.

The regional groundwater moves from the north towards the south-east following the tertiary palaeochannel drainage direction and ranges from five to 50 m below ground (mbg).

A total of 11 boreholes pumping at a combined rate of 275 litres per second (l/s) at Madoonga and nine boreholes pumping at a combined rate of 105 l/s in Beebyn would be required to achieve drawdown of 180 m for mining operations. Water abstraction is estimated to be 6.74 gegalitres per annum (GLpa) to 11.95 GLpa.

The groundwater model predicts that the 0.25 m drawdown level would extend to 23 km by 9.5 km at Madoonga and 23.5 km by 5.2 km at Beebyn (Figure 3).

It is expected that five bores would be impacted by the proposal, all of which are on Madoonga station, which is owned by SMC, therefore other users will not be impacted. The proponent would monitor the impacts of the project on stock watering bores each month and would mitigate any impacts caused by the project.

Water supply

The annual water usage for the project has been estimated at 3.19 GLpa to 4.96 GLpa. Between 1.69 GLpa and 2.20 GLpa of fresh water from Beebyn pit would be used for mine processing activities, whereas 1.5 GLpa to 2.76 GLpa of water from Beebyn with a higher salinity would be used for dust suppression. Raw water sourced from Beebyn is suitable for dust suppression and will be treated via reverse osmosis to become available for potable use. The proponent has advised that water extracted from Madoonga pit will not be suitable for dust suppression due to higher levels of salinity.

Water discharge

It is expected that a maximum of 8.7 GLpa of saline water would be transported by an above ground pipeline to a lined evaporation pond located close to the Madoonga pit. The proponent has not finalised how they propose to dispose of salt from the evaporation pond post closure, however they are considering a hierarchy of salt disposal options (SMC 2012).

The evaporation pond will consist of multiple cells of approximately 400 m by 200 m, each connected by a low, wide overflow spillway. Potential overtopping will be controlled by limiting the maximum water level in each cell.

A detailed design will be provided to the DMP prior to construction.

The groundwater salinity in the evaporation pond area ranges between 740 mg/l and 4800 mg/l. Inflow into the evaporation pond is expected to have an average salt concentration of 25,000 TDS, varying from 10,000 TDS to 60,000 TDS.

Rebound and pit lakes

Groundwater modeling (Ecologia 2010d) indicates that the Madoonga and Beebyn pits would function as groundwater sinks with groundwater flowing towards them. Groundwater recovery is expected to be rapid for the first five years, followed by a slowdown. It is estimated that after 25 years the water level would rise to 430 m RL at Madoonga, which is 55 m below the pre-mining water level and 480 m RL at Beebyn, which is 10 m below the pre-mining water level. (SMC 2012)

Due to the evaporation rate being higher than the rate of inflow and rainfall it is expected that the concentration of solutes in the pits will increase over time.

As the pit lakes will become more saline over time there is the potential for saline water to move out of the pits to the surrounding environment. The only sensitive receptor in the project area is the chenopod shrubland north of Madoonga gap, known as the 'Foodbowl'. Any movement of saline water is likely to be in a south-easterly direction and away from the 'Foodbowl'.

Acid and/or metalliferous drainage

Drainage from waste rock and pit walls may potentially contain metals and metalloids such as selenium, nickel and arsenic. This may occur under acid, neutral or alkaline conditions. Acid and/or metalliferous drainage (AMD) forms where rocks or soils containing sulphides are excavated and/or exposed to air, leading to oxidation of sulphides and the formation of acid.

A two phase geochemical characterisation program, including static and kinetic testing, was carried out to assess the potential for AMD from rocks exposed during mining (SRK 2011a).

Geochemical testing was carried out on samples taken from the original PFS pit design, which was estimated to produce 364 million tonnes (Mt) of waste. Since the samples were taken, the project has progressed to the next stage and the pits have been deepened by 50 m. The new pit design is named BFS (VI), and is expected to produce 723 Mt of waste.

Based on the PFS pit design the project is expected to produce 20.6 Mt of Potentially Acid Forming (PAF) material at Madoonga, equating to 7.5% of the waste rock, and 3.3 Mt at Beebyn, equating to 0.75% of the waste rock. The PAF lithologies include BIF, hydrated, mafic and shale. All mineralised rock

was classed as Non Acid Forming (NAF). The amount of material likely to be PAF in the BFS (VI) pit design is unknown, however it is likely that the total PAF would be 49 Mt, which is almost double that of the PFS pit design.

Kinetic testing has been carried out on waste of low grade mineralised ore with a sulphur content less than 0.1wt%, of which results showed low and decreasing rates of oxidation. A total of 91% of samples had a sulphur content of less than 0.1wt%. Kinetic testing on material with higher sulphur content, between 0.1wt% and 23.8wt% was carried out for a period of 45 weeks.

Short term leach tests from some rock types identified elevated levels of selenium and nickel in leachate. These may be mobile under near neutral conditions.

Based on the results of the geochemical testing, the waste rock water quality has been estimated (SRK 2011b). Results indicate that with no management the Madoonga waste dump is likely to be net acid generating and percolate is likely to contain elevated concentrations of sulphate and metals. The seepage water is likely to be unacceptable for direct discharge.

It is estimated that the seepage from the Beebyn waste dumps is expected to be neutral in pH and as a result most metals are at relatively low concentrations. It is therefore possible that no mitigation of the Beebyn pits would be required, however further assessment would need to be done to confirm this.

Mitigation measures at Madoonga are detailed below and presented in the Acid Mine Drainage Management Plan (AMDMP). These mitigation measures would reduce oxidation of the PAF material and reduce infiltration. Estimates show that with mitigation the seepage from the waste dumps is expected to be near neutral in pH and the concentrations of metals will decrease.

Management

A GWMP and an AMDMP have been developed to manage the impacts of the proposal on groundwater, and include measures such as:

- elevated encapsulation of PAF waste within cells of NAF waste within the waste dumps to minimise the risk of AMD seepage;
- placement of PAF waste more than 20 m from the edge of the waste dump to reduce oxidation;
- waste dump design to include a cover to reduce the infiltration of precipitation into the dump;
- batters of the waste dumps will be constructed using material resistant to erosion;

- diversion channels will be constructed to prevent runoff from undisturbed lands contacting the dumps and dump runoff will be channeled to settling ponds;
- continuation of static and kinetic testing throughout the operations phase;
- an AMD monitoring strategy will be completed prior to the commencement of mining;
- monitoring boreholes upstream and downstream of each pit and downstream of the evaporation pond, including measuring groundwater levels, pH, Total Dissolved Solids (TDS) and Electrical Conductivity (EC) on a monthly basis and chemical analysis on a six monthly basis;
- operational monitoring (pumping rates, water abstraction etc) to demonstrate that water abstraction and disposal are as per the approval conditions.
- environmental condition monitoring (eg. vegetation health) to identify symptoms of biological response to changes in groundwater conditions to be carried out yearly;
- monitoring of pit lakes yearly for the first four years then every five years to 25 years for salinity, pH, leachate of contaminants. Monitoring would cease when two consecutive results are the same, indicating a stable and acceptable environment.
- establishment of physical, chemical and biological baseline conditions prior to mine development; and
- mitigation of any impacts to stock watering bores.

Fuel handling areas would be bunded to avoid spills and would be located outside floodplains and monitored to assess the effectiveness of the surface water management procedures.

Management of water quality in pit lakes

The proponent has prepared a Conceptual Mine Closure Plan (CMCP) for pit lakes, which includes the management of water quality in the pit lakes. The proponent has advised that the open pits will be fenced to prevent fauna being attracted to the water source. This is discussed further in section 3.6 (Mine closure and rehabilitation).

Submissions

The key comments in the submissions focused on:

- the impacts arising from the use of the evaporation/infiltration pond;
- potential long term impacts on ecohydrological water requirement associated with communities 7a and 7b should be quantified within the drawdown cones; and
- the significance of the 'Food Bowl'.

Assessment

The EPA's environmental objectives for this factor are to:

- ensure that beneficial uses of groundwater can be maintained; and
- maintain or improve the quantity of groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected.

The EPA acknowledges that hydrogeological monitoring carried out to date has provided sufficient data to be used in a groundwater model. The groundwater model assesses the potential impacts resulting from dewatering on groundwater levels.

The EPA notes that the water table would be lowered by 180 m at Madoonga and Beebyn to allow for dry mining and that water would be abstracted at a maximum rate of 11.95 GLpa for nine years. Dewatering from the pits would supply all of the water needed for processing, and a maximum of 8.7 GLpa of saline water, ranging from 10,000 TDS to 60,000 TDS would be discharged into an evaporation pond. The impacts of the dewatering on flora, vegetation and fauna have been discussed in sections 3.1 and 3.2.

Modelling indicates that the two pits would function as groundwater sinks with groundwater flowing towards them. The EPA notes that the pit lakes are likely to become saline over time and that saline water may move out of the pits. The EPA also notes that groundwater in the pits is expected to recover below the existing groundwater levels and there are no sensitive receptors downstream of the pits. The EPA understands that the quality of water in the pit lakes will be monitored and managed as part of the CMCP.

Geochemical characterisation has been carried out on waste and mineralised materials from within the original PFS pit shell, and static and kinetic testing has also been conducted. The EPA notes that approximately 21 Mt of the waste at Madoonga and 3.3 Mt of waste at Beebyn is expected to be PAF. The EPA also notes that the amount of PAF calculated is based on the smaller PFS pit design, and that the current pit design (BFS VI) is 50 m deeper than the original PFS pits. This increases the total waste from 364 Mt to 723 Mt. As the BFS (VI) pit shells contain about twice the mass of waste identified within the PFS pit shells it is possible that the total mass of waste classed as PAF for the BFS (VI) pit shell would be 49 Mt. The waste dump plans are based on the total excavation of 723 Mt of waste rock. The EPA expects the proponent to ensure that it has an adequate amount of NAF to encapsulate the amount of PAF mined from the BFS (VI) pits.

The short term leaching tests from some rock types showed elevated levels of selenium and nickel in leachate and that these elements may be mobile under near neutral pH conditions. Elevated selenium levels are of particular concern because of the potential for this element to be biomagnified in local ecosystems. The EPA would expect the proponent to further investigate the

magnitude of the potential selenium hazard and to investigate the potential for nickel to be leached into the environment.

The EPA also considers that static and kinetic testing should continue throughout the operation phase to further inform the management of potential acid and metalliferous drainage and considers that the management measures are adequate.

The EPA notes that the waste rock water quality has been estimated based on the results of static and kinetic testing, and results show that with the appropriate encapsulation of PAF material at Madoonga the water quality seepage from the dump base is expected to be near neutral in pH and the concentrations of metals decreasing. The seepage from the dump base at Beebyn should remain neutral in pH and metals are expected to be low.

The DMP will address the management of the waste dumps when a detailed mining proposal and mine closure plan is submitted as required by the *Mining Act 1978*.

The EPA notes that a GWMP and an AMDMP have been provided and contain adequate measures to manage the impacts of the proposal on groundwater.

Summary

Having particular regard to:

- a) the availability of water for mine operations;
- b) investigations into the magnitude of the potential selenium hazard and investigation into the potential for nickel to be leached into the environment;
- c) the implementation of the GWMP and the AMDMP, and
- d) the requirement for a Mine Closure Plan under the *Mining Act 1978* to address acid and metalliferous drainage management,

it is the EPA's opinion that it is likely that the EPA's environmental objectives for this factor can be achieved.

3.5 Aboriginal heritage

Description

Aboriginal heritage sites have the potential to be removed, damaged or altered by mining activities, or as a result of dewatering, changes in water flows, dust and fire.

Several archaeological and ethnographic surveys have been carried out in the Weld Range area since 2006. SMC has advised it consulted with the Wadjarri people to identify the significance of the sites in the Weld Range area and

determine which sites can be impacted and how to manage sites that are deemed significant.

The EPA is advised that SMC is also in the final stages of negotiating a mining agreement with the Wadjarri people.

A total of 37 registered sites lie within the project area. Of these, the majority are artefact scatters and the EPA is advised that these sites are not of great significance, however seven sites are deemed significant. The EPA is also advised that the Wadjarri people have allowed two of the significant sites to be impacted, and the remaining significant sites will be protected.

Submissions

The key comments in the submissions focused on:

- a total of 37 sites being present directly within the project footprint.

Assessment

The EPA's environmental objectives for this factor are:

- ensure that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area; and
- ensure that the proposal complies with the requirements of the *Aboriginal Heritage Act 1972*.

With regard to Aboriginal cultural heritage and social surroundings the EPA is informed by its Guidance Statement 41 *Assessment of Aboriginal Heritage*. The EPA gives consideration to Aboriginal heritage matters to the extent that they may be affected by the impacts of the proposal on the physical or biological surroundings. The EPA expects the proponent to demonstrate that the relevant Aboriginal heritage issues have been identified to the satisfaction of the Department of Indigenous Affairs (DIA) and that the proponent has properly considered how to minimise any adverse impact by the proposal on heritage values.

The EPA notes that SMC are currently finalising a mining agreement with the Wadjarri people. A Cultural Heritage Management Plan (CHMP) will also be developed once negotiations have been finalised.

The EPA also notes that SMC are liaising with the DIA in relation to impacts at Weld Range.

The proposal is subject to the requirements of the *Aboriginal Heritage Act 1972* and the proponent will need to satisfy the requirements of the Act to give effect to any agreed outcomes.

Summary

Having particular regard to the:

- (a) avoidance and management of significant sites, as agreed with the Wadjjarri people;
- (b) need for a mining agreement; and
- (c) requirements of the *Aboriginal Heritage Act 1972*,

it is the EPA's opinion that it is likely that the EPA's environmental objectives for this factor can be achieved.

3.6 Rehabilitation and mine closure

Description

Open cut mining would be used to mine the Madoonga and Beebyn deposits. The mining operation would involve mining above and below the water table for a period of 11 years.

Areas of disturbance created during the life of the project would be progressively rehabilitated as the areas become redundant. Haul roads and road surfaces would be re-profiled to blend with the surrounding topography, and where necessary would allow free drainage to reduce impacts to surface water flows.

Topsoil would be spread and ripped to create a foundation into which native flora would be planted or seeded. Completion criteria for revegetation would be developed in consultation with the DEC to determine when revegetation would be considered self sustaining. Rehabilitation areas would be monitored using quadrats and photographs until the revegetation meets the required completion criteria.

Waste dumps

A total of five waste dumps, three at Beebyn, and two at Madoonga, are expected to be left after the mining operation has ceased. A portion of the Madoonga waste dump is located within the flood plain associated with the area known as the Food Bowl. The waste dumps would be rehabilitated post mining, and would incorporate a crestal bund, which would be installed on the top of the waste dumps to retain water. The proponent would conduct research to determine the best angle of slope, based on the type of material in the waste dump, to ensure that they are compatible with the surrounding landscape. Topsoil would be spread and ripped to create rock armoring, prior to loose vegetation being spread on the surface to reduce erosion. Additional waste rock material would be placed on the surface of structures to break up the uniformity of the surfaces.

Pits

The proponent has considered backfilling the pits, and although feasible, modeling shows that only limited amounts of waste would be able to be stowed in the pits in order to achieve the required production. The majority of waste would be placed in out of pit waste dumps and two pit lakes will be left post mining. Potential problems associated with pit lakes are:

- reduced water quality over time (either from salinity and/or potentially acid and/or metalliferous mine drainage);
- harm to wildlife, birds or stock that may come in contact with pit lake water; or
- available water attracting more animals, leading to over-grazing of surrounding vegetation or attracting increased numbers of predators which may impact native wildlife in the area.

SMC has proposed to construct fencing around the pits to deter native and feral animals from potable water sources.

Closure

Closure would involve the demolition and removal of all redundant plant and infrastructure. Below ground infrastructure will be cut off, capped if required and left in situ.

A Conceptual Closure Plan (CCP) has been developed in alignment with AMEC Mine Closure Guidelines (AMEC 2000) and ANZMECC Strategic Framework for Mine Closure (ANZMECC 2000). The plan includes management strategies for the implementation of progressive rehabilitation and closure of the project, and includes a plan for:

- consultation with government regulators, non government organisations and community stakeholders in the development of agreed closure criteria;
- the development of a detailed mine closure and rehabilitation plan within two years of commencement of operations;
- annual review of mine closure and rehabilitation plan; and post closure monitoring;
- liaison and agreement with DMP should infrastructure be proposed to be left behind; and
- post closure monitoring of the rehabilitation areas to meet closure criteria.

The proponent has committed to review and update the CCP throughout the life of the mine and finalise the plan, in consultation with the DEC and the DMP 24 months prior to mine closure.

The closure plan was prepared before the release of the DMP/EPA Guidelines for preparing Mine Closure Plans released in 2011 (DMP/EPA, 2011).

Subsequent reviews of the plan will bring it in line with these guidelines. Key matters to be considered by the DMP in approving the plan include:

- designing waste dumps so that they are non polluting, stable and able to support native vegetation comparable with natural analogue landforms;
- progressive rehabilitation of disturbed areas with local provenance vegetation and with percentage cover and species diversity comparable to undisturbed natural analogue sites;
- development of trigger levels, monitoring of pit lake water chemistry and undertaking approved remediation to ensure that the formation of the pit lakes does not adversely affect fauna or regional groundwater; and
- confirmation of rehabilitation completion criteria to apply to disturbed areas.

The final land use is expected to comprise of pastoralism with some restricted zones associated with mining operations.

Submissions

The key comments in the submissions focused on:

- the backfilling the pit voids;
- fencing of the pit voids should backfilling not occur; and
- placement of the final waste rock dumps.

Assessment

The EPA's environmental objectives for this factor are to:

- ensure that mine closure planning and rehabilitation are carried out in a coordinated, progressive manner and are treated as an integral part of mine development, consistent with the ANZMEC/MCA Strategic Framework for Mine Closure, and the EPA/DMP *Guidelines for Preparing Mine Closure Plans*;
- ensure that closure and rehabilitation achieves stable, non-polluting and functioning landforms which are consistent with the surrounding landscape and other environmental values; and
- ensure that final mine pit lakes do not cause significant environmental impacts through groundwater pollution or by attracting wildlife, or, if the water is of good quality, by attracting increased numbers of grazing and predatory animals which may consequently impact on the ecology of the surrounding area.

The EPA acknowledges that the waste dumps will be left at the cessation of mining and that the pit voids would not be backfilled and pit lakes would form.

The EPA notes that the Madoonga waste dump is located partially in the 1/100 year ARI flood plain associated with the Food Bowl and would expect that DMP would ensure that the waste dump is designed and built in such a way to ensure that it is stable and non polluting.

As the pits are located within the Priority Ecological Community “Weld Range Vegetation Complexes (Banded Iron Formations)” and the BIF ranges are of significant biodiversity value it is the EPA's preference that the pits be backfilled to at least the water table. If this is not practicable, the EPA requires that any pit lakes created by the proposal should not result in an adverse impact to vertebrate native fauna or native vegetation. The creation of pit lakes should not impose any future management liability on the State.

The EPA notes that the proponent has prepared a CCP that includes management strategies for the implementation of progressive rehabilitation and closure of the project and has committed to post closure monitoring. The EPA expects that the monitoring of pit lakes and any potential contingency actions will be covered by the DMP under the mine closure plan.

The EPA also notes that the proponent has developed a set of conceptual closure objectives which would be revised and made more specific to the closure issues associated with the proposal over the life of the project.

The 2010 amendments to the Mining Act require a mine closure plan to be submitted to the DMP for approval as part of mining proposal applications received after 30 June 2011. The plan must be prepared in accordance with the DMP/EPA guidelines and needs to be reviewed and resubmitted again for approval by the DMP three years after its initial approval, or as required by the DMP.

Mine closure plans are required prior to mining to ensure that mine closure is an integral part of mine development and operations planning, and to ensure that mine closure planning is a progressive process and that mine closure plans are reviewed, developed and improved throughout the life of the mine.

The EPA acknowledges that the DMP is the lead regulator and decision making authority for mining projects in Western Australia under the Mining Act and that the DMP has the role of regulating the industry to ensure that closure conditions applied and commitments made are implemented during the life of the mining project. The EPA understands that mine closure plans that fail to provide the necessary information or requirements specified in the DMP/EPA guidelines will not be accepted by the DMP and so the EPA has confidence that the DMP can manage closure to ensure that the EPAs objectives are met. To avoid duplication, unless there is particular need for public transparency, the EPA would not normally recommend that conditions on mine closure be imposed under Part IV of the EP Act, if adequate conditions can be imposed under the Mining Act.

In view of the statutory requirements of the Mining Act, the EPA is satisfied that rehabilitation, and mine closure and decommissioning can be managed

by the DMP consistent with the DMP/EPA *Guidelines for Preparing Mine Closure Plans* (DMP/EPA 2011).

Summary

Having particular regard to the:

- (a) progressive rehabilitation;
- (b) design and rehabilitation of the waste dumps and pits;
- (c) demolition and removal of all redundant plant and infrastructure;
- (d) implementation of the CCP; and
- (e) closure and rehabilitation being managed by the DMP in accordance with the requirements of the Mining Act,

it is the EPA's opinion that it is likely that the EPA's environmental objectives for this factor can be achieved.

3.7 Environmental principles

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

4. Conditions

Section 44 of the EP Act requires the EPA to report to the Minister for Environment on the key 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.

4.1 Recommended conditions

Having considered the 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 develop an iron ore mine and associated infrastructure at Weld Range is approved for implementation.

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

- (a) Flora and vegetation;
- (b) Weeds;
- (c) Groundwater dependent ecosystems;
- (d) Short range endemics; and
- (e) Residual impact and risk management measures.

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

- *Rights in Water and Irrigation Act 1914* – licence for abstraction (dewatering);
- *Wildlife Conservation Act 1950* – licence to handle and remove native fauna from construction areas;
- Part V of the *Environmental Protection Act 1986* – various works approvals and an operating licence are required for construction and operation of the Weld Range Iron Ore mine;
- *Mining Act 1978* – the mining proposal requires approval by the DMP.
- *Explosive and Dangerous Goods Act 1961* – dangerous goods licence;
- Environmental Protection (Noise) Regulations 1997 – for construction and operational noise; and
- *Aboriginal Heritage Act 1972* – to protect Aboriginal Heritage sites.

4.2 Consultation

In developing these conditions, the EPA consulted with the proponent, the DEC, DIA, DMP and DoW in respect of matters of fact and matters of technical or implementation significance.

5. Other advice

Square Kilometre Array

The Weld Range mine-site lies approximately 100 km east of the proposed site for the Square Kilometre Array (SKA), otherwise known as the MRO. The location of the SKA has been chosen to be as far away as possible from undue interferences from radio transmissions. The mine site lies within the Mid West Radio Quiet Zone, which is administered by the Australian Communications and Media Authority (ACMA) to protect the radio frequency environment over the SKA.

Submitters raised the issue of mine related radio emissions and the potential impacts that they could have on the SKA. As this is not strictly an environmental issue it was not discussed in the PER, however has been addressed in the Response to Submissions document. Submitters stated that the SKA users should be recognised as stakeholders and that the PER should discuss the issues of the potential for interference with the SKA, including emission from aircraft flying to and from the mine-site. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) wishes to be fully consulted about the planning and operational phases of the mine-site and requested SMC to outline measures that would be adopted to ensure that the mine proposal would comply with radio quiet regulations and requirements. The EPA expects the SMC will consult and co-operate with the CSIRO during the development of the Weld Range project.

Management of salt post closure

The proponent has not finalised how they propose to dispose of salt from the evaporation pond post closure. They are considering a hierarchy of salt disposal options, with the preferred option being beneficial re-use, by treating the salt and making it into a commercially viable product (SMC 2012).

The second option would be to leave the salt in situ within the lined evaporation pond and apply a cap. This would ensure the encapsulation of the salt within a lined impermeable multi-cell landfill. The EPA would expect that the chosen method of salt disposal would be assessed by the DMP as part of mine closure plan required under the Mining Act, and that the evaporation pond would be designed, built and capped, with an impermeable cover, in such a way to ensure that the integrity of the evaporation pond will not allow salt to leak.

Appendix 1

List of submitters

Organisations:

CSIRO Astronomy and Space Science
Department of Environment and Conservation
Department of Health
Department of Indigenous Affairs
Department of Mines and Petroleum
Department of Water

Individuals:

Donna Blakeway
Elisabeth Vis
Frauke Chambers
Greg Burrows
Julie Matheson
Karen Doust
Louise Sparrow
Miguel Pez
Pat Gallaher
Rob Lennard
Robert Frith
Russell Speed
Wes Anderson

Appendix 2

References

ANZMECC 2000, *Strategic Framework for Mine Closure*, Canberra.

Association of Mining and Exploration Companies, 2000, *AMEC Mine Closure Guidelines*, Canberra.

DEC/DMP (2007), *Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields*. Department of Environment and Conservation and Department of Mines and Petroleum, Government of Western Australia. 2007.

DMP/EPA (2011), *Guidelines for preparing mine closure plans*. Department of Mines and Petroleum and Environmental Protection Authority, Government of Western Australia, June 2011.

Ecologia Environment (2009a), *Weld Range Iron Ore Project Short-Range Endemic Assessment*. Report prepared for Sinosteel Midwest Corporation Limited. March 2009.

Ecologia Environment (2009b), *Genetic Study of the Curtain-Web Spider *Cethagus* sp. from *C. fugas* Complex*. Report prepared for Sinosteel Midwest Corporation Limited. March 2009.

Ecologia Environment (2009c), *Weld Range Iron Ore Project, The Shield-Back Spider *Idiosoma nigrum* Targeted Survey*. Report prepared for Sinosteel Midwest Corporation Limited. October 2009.

Ecologia Environment (2009d), *Weld Range Iron Ore Project, Stygofauna Assessment*. Report prepared for Sinosteel Midwest Corporation Limited. October 2009.

Ecologia Environment (2009e), *Weld Range Vertebrate Fauna Assessment*. Report prepared for Sinosteel Midwest Corporation Limited. November 2009.

Ecologia Environment (2009f), *A Targeted Survey for Male Specimens of *Aureocrypta* sp. within the Shire of Chittering*. Report prepared for Sinosteel Midwest Corporation Limited. November 2009.

Ecologia Environment (2010a), *Weld Range *Idiosoma nigrum* Population Genetic Study*. Report prepared for Sinosteel Midwest Corporation Limited. April 2010.

Ecologia Environment (2010b), *Weld Range Vegetation and Flora Assessment*. Report prepared for Sinosteel Midwest Corporation Limited. June 2010.

Ecologia Environment (2010c), *Biological Desktop Survey of the Proposed Evaporation Pond - Weld Range Project*. Report prepared for Sinosteel Midwest Corporation Limited. June 2010.

Ecologia Environment (2010d), *Weld Range Iron Ore Project, Public Environmental Review*. Report prepared for Sinosteel Midwest Corporation Limited. September 2010.

Ecologia Environment (2010e), *Evaporation Pond Flora Survey*. Report prepared for Sinosteel Midwest Corporation Limited. September 2010.

Ecologia Environment (2010f), *Weld Range Evaporation Pond Short-Range Endemic Survey*. Report prepared for Sinosteel Midwest Corporation Limited. October 2010.

Ecologia Environment (2010g), *Floristic Data Addendum in Response to DEC Comments on Weld Range PER*. Prepared for Sinosteel Midwest Corporation Limited. December 2010.

Ecologia Environment (2011a), *Weld Range Haul Road Vertebrate Fauna Level 1 Assessment*. Report prepared for Sinosteel Midwest Corporation Limited. March 2011.

Ecologia Environment (2011b), *Weld Range Iron Ore Project Troglifauna Assessment*. Report prepared for Sinosteel Midwest Corporation Limited. April 2011.

Ecologia Environment (2011c), *Weld Range Haul Road Short Range Endemic Survey*. Report prepared for Sinosteel Midwest Corporation Limited. November 2011.

Ecologia Environment (2011d), *Weld Range Haul Road Priority Flora Survey*. Report prepared for Sinosteel Midwest Corporation Limited. December 2011.

Ecologia Environment (2012a), *Weld Range Iron Ore Project Response to Submissions*. Report prepared for Sinosteel Midwest Corporation Limited. April 2012.

Kewan Bond Pty Ltd (2008), *Greenhouse Gas Assessment Weld Range Iron Ore Project*. Report prepared for Ecologia Environment. August 2008.

Kewan Bond Pty Ltd (2010), *Greenhouse Gas Assessment Weld Range Iron Ore Project Revision 1*. Report prepared for Ecologia Environment. July 2010.

Lloyd George Acoustics (2009), *SMC Weld Range Airstrip Noise*. Report prepared for Ecologia Environment. November 2009.

Sinclair Knight Merz (2009), *SMC Weld Range Project Dust Assessment*. Report prepared for Sinosteel Midwest Corporation Limited. November 2009.

Sinosteel Midwest Corporation Limited (2012), *Weld Range Iron Ore Project – Response to EPA request for further information (EPA Meeting – 12 April 2012)*. May 2012.

SRK Consulting (2008a), *Pre-Feasibility Study Weld Range Iron Ore Project Hydrogeological Investigation and Modelling*. Report prepared for Sinosteel Midwest Management Pty Ltd. October 2008.

SRK Consulting (2008b), *Pre-Feasibility Mining Study, Weld Range Iron Ore Project*. Mine Report prepared for Sinosteel Midwest Management Pty Ltd. November 2008.

SRK Consulting (2009a) *Backfill Option Study Interim Report Weld Range Iron Ore Project*. Report prepared for Sinosteel Midwest Corporation Limited. February 2009.

SRK Consulting (2009b), *Hydrogeology Remodelling for PER*. Memo to Sinosteel Midwest Corporation Limited. July 2009.

SRK Consulting (2009c), *Geochemical Characterisation of Weld Range Waste and Mineralised Rock – Static and Kinetic Testing*. Report prepared for Sinosteel Midwest Management Pty Ltd. October 2009.

SRK Consulting (2009d), *Waste Rock Management Strategy – PER Contribution*. Memo to Sinosteel Midwest Corporation Limited. October 2009.

SRK Consulting (2009e), *Weld Range Conceptual Water Disposal*. Report prepared for Sinosteel Midwest Corporation Limited. December 2009.

SRK Consulting (2010a), *Weld Range Iron Ore Project Bankable Feasibility Study Hydrogeological Investigation and Modelling*. Report prepared for Sinosteel Midwest Corporation Limited. January 2010.

SRK Consulting (2010b), *PER, AMD and Metal Leaching*. Memo to Sinosteel Midwest Corporation Limited. May 2010.

SRK Consulting (2011a), *Geochemical Characterisation of Weld Range Waste and Mineralised Rock: Static and Kinetic Testing Report 2*. Report prepared for Sinosteel Midwest Corporation Limited. March 2011.

SRK Consulting (2011b), *Weld Range Project Waste Rock Water Quality Estimates*. Report prepared for Sinosteel Midwest Corporation Limited, July 2011.

SRK Consulting (2012a), *Results of groundwater model rerun for drawdown estimation*. Memo to Sinosteel Midwest Corporation Limited. Feb 2012.

Worley Parsons Resources and Energy (2007), *Weld Range Iron Ore Pre-feasibility Study. Power Generation Option Study*. Prepared for Sinosteel Midwest Management Pty Ltd. October 2007.

Worley Parsons Resources and Energy (2008a) *Weld Range Iron Ore Mine Pre-feasibility Study, Renewable Energy Study*. Prepared for Sinosteel Midwest Management Pty Ltd. June 2008.

Worley Parsons Resources and Energy (2008b), *Weld Range Iron Ore Pre-Feasibility Study, Desktop Study for Future Deslime Plant*. Prepared for Sinosteel Midwest Management Pty Ltd. September 2008.

Worley Parsons Resources and Energy (2008c) *Weld Range Iron Ore Mine Pre-feasibility Study. Mine Site Infrastructure Hydrology Study*. Prepared for Sinosteel Midwest Management Pty Ltd. December 2008.

Appendix 3

Summary of identification of key environmental factors and principles

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
BIOPHYSICAL			
Flora and Vegetation	<p>A total of 3589 ha would be directly impacted by the proposal for clearing (16% of the area of WR) An additional 1030.5 ha is expected to be impacted due to groundwater drawdown and 1365.6 ha due to dust.</p> <p>Pits and waste dumps will have a combined area of 1721.5 ha.</p> <p>The Weld Range lies within the Western Murchison sub region of the Murchison Biogeographic Region. The geology of Weld Range is Banded Iron Formation (BIF). BIF ranges of the Midwest are of very significant biodiversity value because of their unique geology, soils and relative isolation.</p> <p>The Weld Range project is primarily within the Weld Land System, however will also impact the Yarrameedie and Mileura land system. The Weld and Yarrameedie land systems are rated as regionally significant as they are mapped over small areas of WA and the Murchison and 34% of the Yarrameedie is in poor condition.</p> <p>There is expected to be a loss of approximately:</p> <ul style="list-style-type: none"> • 3.23% to the Weld Range Land System (1202ha/ 37,235 ha in WA = 3.23%. Only found in the Murchison.); and • Yarrameedie land system (impact to 854ha/44,169 in Murchison = 1.93%. Impact within WA is 854ha/68,324ha = 1.25%. 	<p><u>Department of Environment and Conservation</u></p> <ul style="list-style-type: none"> • The proponent should provide adequate information to enable the DEC to make determinations on whether direct and indirect impacts from the proposal on conservation significant flora, could lead to changes in their threat status under World Conservation Union (IUCN) categories. • The DEC should be given an opportunity to provide further advice on impacts of flora of conservation significance once the proponent has provided further advice on whether the direct and indirect impacts from the proposal could lead to changes in their threat status under World Conservation Union (IUCN) categories. • The DEC provided further advice on the Floristic Data Addendum. The DEC advised that the proposal could lead to significant impacts to the following species, due to the potential for local extinction or reduction in viability: Prostanthera ferricola (P3); 	<p>Considered to be a relevant environmental factor and is discussed under Section 3.1 – Flora and vegetation.</p>

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>The Mileura Land System is unique in the project area as it consists of seasonally inundated claypans supporting halophytic shrublands. Impact of 12ha/206,496 in the Murchison = 0.006%. Impact in WA is 12ha/261,223ha is 0.005%</p> <p>Three of Beard's vegetation units are considered to have high regional significance due to their limited distribution in WA. These are:</p> <ul style="list-style-type: none"> • a 1.14 Si (<i>Acacia aneura</i> and <i>Acacia quadrimarginea</i> scrub) – Impact within Murchison is 553ha/339,907ha = 0.16%. Impact within WA 553ha/448,700ha = 0.12% • a 1.9 LI (<i>Acacia Aneura</i>, <i>Acacia ramulosa</i> and <i>Acacia linophylla</i>, now <i>Acacia ramulosa</i> var. <i>linophylla</i> low woodland) – Impact within Murchison is 458ha/50965ha = 0.90%. Impact in WA is 458/94,031 = 0.49%.; and • a 1.17 Li (<i>Acacia aneura</i> and <i>Acacia grasbyi</i> low woodland) – No impact. Only found in Murchison are 3255ha. <p>No DRF or TECs were identified within the project area. The priority 1 state listed PEC "Weld Range vegetation complexes (Banded Ironstone Formations) occurs in the study area and represents a rare vegetation complex and is considered under threat from mining. The impact to the PEC is 8.15% (includes evaporation pond and corridors). Most of the infrastructure is outside the PEC. The area of the PEC to be impacted is 1655.4ha. The total area of the PEC is 20,311 ha.</p>	<p><i>Tecticornia cymbiformis</i> (P3); <i>Goodenia berringbinensis</i> (P4); <i>Beyeria lapidicola</i> (P1); and <i>Micromyrtus placoides</i> (P3).</p> <p>The DEC advised avoidance of the above species or further survey work.</p> <p>The DEC was concerned with the fact that several species have not been identified by the WA herbarium and so the identification of some specimens cannot be confirmed, which raises some concerns regarding the identity of some species.</p> <ul style="list-style-type: none"> • Offsets should be sought to address the potentially significant impacts proposed on flora of conservation significance, in consultation with and to the agreement of the DEC. • The proponent should resolve the taxonomic status of <i>Hemigenia</i> sp. nov (aff. <i>kochii</i>) and <i>Acacia</i> sp. nov (aff. <i>exilis</i>). • Should <i>Hemigenia</i> sp. nov (aff. <i>kochii</i>) and <i>Acacia</i> sp. nov (aff. <i>exilis</i>) be identified as new species endemic to Weld Range (i.e. conservation significant), the proponent should 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>80% of community 1 and 2 lies within the PEC and for that reason are considered conservation significant. 12.5% of community 1 and 2 in the PEC will be impacted by the proposal, however a total of 13.63% (231.02ha ish/1695.41 ha) will be impacted within the study area.</p> <p>Community 4 is considered locally and possibly regionally significant due to the high number of conservation significant flora recorded within it. Community 4a appears to be the only community that <i>Hemigenia sp. nov. (aff. exilis)</i> and <i>Acacia sp. Wilgie Mia</i> occur. 3.12% (262.64 ha/8411.77 ha), and 1.77%(16.85 ha/952.14 ha) of community 4b are expected to be impacted.</p> <p>Community 5b was originally only known from 56ha within the study area. Updated information shows that 4910.03 ha has been recorded in the project area, of which 514.85 ha will be impacted (10.49%).</p> <p>Community 6a which occurs on saline flats and drainage areas is regionally significant and there is expected to be an impact of 4.09% (41.43 ha/1014 ha). Community 6b which occurs mostly on saline flats is likely to be impacted by 16.42%(399.04 ha/2429.67 ha).</p> <p>Community 7 has a limited distribution in the area and is the only community that <i>Tecticornia cymbiformis</i> (P3) has been found.</p> <p>Community 7a is potentially a Groundwater Dependent Ecosystem (GDE). 0.58 % (3.66 ha/635.41ha) is</p>	<p>determine the significance or otherwise, of potential impacts from the proposal on these species.</p> <ul style="list-style-type: none"> • The proponent should undertake targeted flora survey/s, for flora species of conservation significance, for the access tracks leading to the 'Option 1' infrastructure area. • The proponent should incorporate the information gathered from the targeted survey/s undertaken for the access tracks leading to the 'Option 1' infrastructure area into the estimated impacts on flora species of conservation significance, for the project proposal. This information should then be used to establish an overall direct impact on these species (indirect impacts will also need to be incorporated into these calculations). • The proponent should provide the survey/s and information gathered from the targeted surveys including their estimated impacts for their project proposal to the OEPA for assessment on advice from the DEC on the significance of the newly calculated impacts. • The conservation value of vegetation 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>expected to be directly impacted. Indirect impacts from groundwater drawdown is expected to be 52% (1030/1958 ha) within the lease, however further surveys have identified that community 7a extends beyond the lease.</p> <p>Community 7b (Eucalypt sub-community) is considered locally significant as it occurs on seasonally inundated salt pans which provide refuge for threatened fauna. It is also likely to be a GDE, however the exact reliance on water is unknown. All of community 7b is expected to be indirectly impacted by groundwater drawdown, however community 7b will not be directly impacted.</p> <p>There is a significant salt pan in a depression immediately north of the Madoonga tenement.</p> <p><u>Phreatophytic Vegetation</u> Community 7a and 7b are expected to be phreatophytic. This community occurs in the vicinity of saline clay pans and seasonally inundated zones at Madoonga, however the degree of which these species are dependent on g/w is unclear.</p> <p><u>Priority Flora</u> A level 2 survey was carried out in the project area by Ecologia. Results from previous DEC surveys were also used.</p> <p>A flora survey of the new haul road was carried out in March and April 2011.</p>	<p>community 5b should be clarified. It is unclear, from the information provided in the PER, if the 5b vegetation community provides habitat for significant biodiversity conservation values. Currently, it is only known from 56 hectares and the proposal will impact on 76.66 per cent of this community.</p> <ul style="list-style-type: none"> • A condition should be applied that ensures impacts on flora of conservation significance, vegetation communities and fauna habitats are limited to an agreed direct and indirect disturbance footprint. • It should be agreed that within the zone of indirect impact (adjacent to the area of direct impacts), the condition and health of conservation significant flora, vegetation and fauna habitat, may decline to agreed limits. • The proponent should develop a vegetation health and condition monitoring program, for flora of conservation significance, vegetation and fauna habitat, to achieve the outcomes of decline to agreed limits. The monitoring program should include baseline measurements at suitable reference sites that will provide 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>A total of 393 flora species were recorded during the surveys. No DRF was identified during surveys. 25 priority flora species have been identified from surveys carried out in the area, consisting of 5 P1 species, 16 P3 species and 4 P4 species. This is a high number compared with the priority flora recorded at other BIF ranges north of Mt Magnet.</p> <p>A total of 14 priority species will be directly impacted. These consist of 3xP1, 8xP3 and 3xP4.</p> <p>3 species that may have be at risk from having their IUCN categories changes are: <i>Beyeria lapidicola</i> (P1) – 2% impact. <i>Micromyrtus placoides</i> (P3) – 22% impact; and <i>Prostanthera ferricola</i> (P3) – 2% impact (Removal of 100% of local population as it is in the Madoonga pit area) Removal of the southern western most population.</p> <p>90.78% of <i>Hemigenia virescens</i> (P3) - Found only on the haul road survey (but only haul road surveyed) but very similar to <i>Hemigenia tysonnii</i> therefore some tysonnii could be virescens.</p> <p>All priority species identified at Weld Range has a distribution of at least 100km. None of the confirmed species identified are thought to be endemic to Weld Range, except for <i>Acacia sp. Wilgie Mia</i> (P1) and <i>Hemigenia sp nov (aff exilis)</i>.</p> <p>Two undescribed taxa were also recorded. These are <i>Hemigenia sp. nov. (aff. exilis)</i> and <i>Acacia sp. Wilgie Mia</i></p>	<p>comparative data for measuring change in relation to trigger levels relating to:</p> <ul style="list-style-type: none"> the levels of acceptable decline in the health of flora of conservation significance and vegetation condition within the defined indirect impact zone areas; and the levels of flora health and vegetation condition change at which contingency measures are to be applied to avert further condition and health decline. <p>The trigger levels should be developed on the advice of the DEC.</p> <p>The proponent should report annually to the OEPA and the DEC on the results of monitoring and any contingency action implemented in response to trigger exceedance.</p> <p><u>Department of Health</u></p> <ul style="list-style-type: none"> Due to the large clearing of vegetation and weed control in the development, there is the potential for pesticide use. Any treatment and application of pesticides must be applied in accordance with the <i>Health (Pesticides) Regulations 1956</i>. A Pest Management 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p><i>Acacia sp Wilgie Mia</i> has now been classed as a P1.</p> <p><i>Acacia sp Wilgie Mia</i> has now been classified as a P1. 30 plants will be impacted out of 2949 known, equating to 1.02%. A total of 3 loci out of 8 is within the impact area therefore 37.5% of loci will be impacted. <i>Hemigenia sp nov (aff exilis)</i> has not been taxonomically defined.</p> <p>The 3 known locations of <i>Hemigenia sp. nov (aff exilis)</i> do not appear to be directly impacted but indirect impacts are unknown.</p> <p>No Declared plants were identified at Weld Range during the surveys, however 6 species of environmental weeds were recorded within the project area on the flat plains.</p> <p>Mulga shrubland makes up the majority of vegetation types in the Murchison region. Mulga vegetation is discussed in the Surface Water section.</p> <p>A desktop survey has been carried out for the evaporation pond area. Previous surveys of the project area included 3 quadrats from the evaporation pond area and some from the evaporation pond pipeline route.</p> <p>A floristic survey targeting DRF and priority species was carried out in the evaporation pond area in July 2010. The 5 priority taxa that were recorded were:</p> <p><i>Acacia speckii</i> (P3); <i>Dodonaea amplisemina</i> (P3); <i>Hemigenia tysonii</i> (P3);</p>	<p>Plan should be adopted to ensure that uses of pesticides are minimized. Contractors applying pesticides must hold a current pesticide operators licence with the correct endorsements and hold a current pest management firm registration. All treatment of and applications of pesticides at the accommodation facility must be conducted in accordance with the <i>Health (Pesticides) Regulations 1956</i>.</p>	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p><i>Micromyrtus placoides</i> (P3); and <i>Grevillia inconspicua</i> (P4).</p>		
Fauna	<p>A total of 10 main fauna habitat types occur in the project area with 7 additional habitats.</p> <p>The Mileura land system contains shrublands which form unique habitats with species such as Slender billed Thornbill and White-winged Fairy-wren restricted to these habitats.</p> <p>A level 2 survey was carried out for the pit areas and areas that best represented fauna habitats and a level 1 survey was carried out for the infrastructure areas.</p> <p>A fauna survey was carried out for the new haul roads in March 2011. The survey included 20 sites with opportunistic sampling.</p> <p>5 conservation significant fauna were recorded during the surveys. These were:</p> <ul style="list-style-type: none"> • Long Tailed Dunnart (<i>Sminthopsis longicaudata</i>, DEC P3), • Peregrine Falcon (<i>Falco peregrinus</i>, WCA Schedule 4); • Bush Stone-curlew (<i>Burhinus grallarius</i>, DEC P4); • Slender-billed Thornbill (<i>Acanthiza iredalei iredalei</i>, EPBC Act, Vulnerable); and • A Fossorial skink (<i>Lerista eupoda</i>, DEC P1). <p>The Rainbow Bee-eater (EPBC Act Migratory) and the</p>	<p><u>Department of Environment and Conservation</u></p> <p>The proponent should determine the significance of the potential impacts of the project proposal on the skink <i>Lerista eupoda</i> and its habitat.</p> <p>The proponent should provide the results of additional investigations (including but not limited to flora and fauna surveys and water modeling) into biodiversity values of the evaporation pond area for review by OEPA on advice of the DEC.</p>	<p>Considered to be a relevant environmental factor and is discussed under Section 3.2 – Fauna.</p>

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>Australia Bustard (DEC Priority 4) were not recording in the project area but were considered highly likely to utilise the area.</p> <p>The Slender-billed Thornbill is listed under the EPBC Act and was recorded during the surveys. The proponent referred the proposal to the commonwealth and they are assessing it as a controlled action. Community 7a, which is the habitat in which the Slender-billed Thornbill was found will be directly impacted by 0.58% (based on mapped area in lease, or 0.18% based on mapped area inside and outside the lease, or 0.1% based on expected area of 3,500ha). It is expected that 188.8 ha may be indirectly impacted by groundwater drawdown, equating to 29.7% within the lease, however mapping carried out beyond the lease confirmed that 1957.8 hectares existed, reducing the confirmed impact to 10%. It is expected that a total of 3500 ha exists overall, however not all has been mapped. It is expected that the impact would be 5.39% by groundwater drawdown.</p> <p>Community 7b will not be directly impacted by the proposal, however indirect impacts are likely to be 100%. 7.6 ha of the 14 ha found within the lease may be impacted. Slender-billed thornbill are expected to primarily occur in community 7a as it includes their preferred habitat.</p> <p>SMC state that the Chenopod vegetation in community 7a which the Slender-billed Thornbill habitat is shallow rooted and likely to be groundwater dependent.</p>		

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>Mitigation measures such as livestock removal are likely to improve the quality of the remaining vegetation. Also SMC propose to manually irrigate areas of GDE should impacts from dewatering negatively impact GDEs.</p> <p>The Fossorial skink (<i>Lerista eupoda</i>, DEC P1) is endemic to the region and inhabits a wide range of habitats on Weld Range and the flat lands around the range. It is known to range from Meekatharra to Cue.</p> <p>3 inactive Malleefowl nests were found in the area.</p> <p>84% of the range will not be cleared.</p> <p>A desktop survey has been carried out for the evaporation pond area and pipeline. Conservation significant species that have been previously found in the pipeline area are: Long tailed dunnart and <i>Lerista Eupoda</i> (skink)</p> <p>SMC states that targeted fauna surveys are not recommended due to a high amount of surveys effort in the immediate area of the evaporation pond.</p>		
Short Range Endemics (SRE)	<p>An SRE survey was carried out in August 06 to November 06 and April 07 to August 07.</p> <p>7 pitfall traps were within the direct impact project area. 37 pit fall traps were outside the direct impact area.</p> <p>45 invertebrate species were found at Weld Range.</p>	<p><u>Department of Environment and Conservation</u></p> <ul style="list-style-type: none"> Conservation offset measures should be implemented to mitigate the residual impacts on the <i>Idiosoma nigrum</i> (shield- 	<p>Considered to be a relevant environmental factor and is discussed under Section 3.3–Short Range Endemics.</p>

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>Most have uncertain SRE status as they have not been identified to Species level or are new species.</p> <p>The expected SREs that are likely to be restricted to Weld Range are:</p> <ul style="list-style-type: none"> • <i>Antichiropus sp Weld Range</i> (Millipede) <ul style="list-style-type: none"> ○ Impact from clearing and dust to habitat is 7.6%. ○ Found inside and outside direct impact area. • <i>Cethagus Sp. MUR HH ('Hampton Hill' Curtain web spider)</i> <ul style="list-style-type: none"> ○ Impact to habitat from clearing and dust is 9.9%. ○ Found inside and outside direct project area. • <i>Cethegus Sp. 'MUR WRS (Weld Range South Curtain web spider)</i> <ul style="list-style-type: none"> ○ Impact to habitat from clearing and dust is 3.9%. ○ Found inside and outside direct project area. • <i>Pleuroxia sp</i> (Land snail) <ul style="list-style-type: none"> ○ Impact to habitat from clearing and dust is 4.6%. ○ Found inside and outside direct impact area. <p>DNA testing was carried out on Cethegus Sp.</p> <p>Both <i>Cethegus Sp.</i> are different from each other and can aerially disperse, but <1km distance, therefore will need separate Conservation Management.</p> <p>Additional sampling was carried out on the <i>Cethegus Sp.</i> from September to October 2006 and June to August</p>	<p>backed trapdoor spider).</p> <ul style="list-style-type: none"> • The proponent should determine the SRE status of any invertebrate species (of the 45 invertebrate species of interest) that has not yet been classified. • If the SRE status of each of the 45 invertebrate species cannot be determined, the proponent should use the results of sampling and habitat analysis to attempt to demonstrate that no species or their associated habitat/s are likely to be restricted to the proposed disturbance footprint or significantly impacted. 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>2007.</p> <p>A targeted SRE survey of the evaporation pond was carried out in June 2010. The survey did not record <i>Cethegus fugax complex</i>, <i>I nigrum</i>, <i>Pleuroxia sp</i> or <i>Antichiropus</i>.</p> <p>A Bushfire Management Plan has been developed to ensure that risks of bushfires are identified and managed.</p> <p>A Spider Management Plan has been developed to reduce the impact of the proposal on the <i>Cethegus</i> and <i>Idiosoma nigrum</i> species.</p> <p>An SRE survey was carried out over the new haul road in February and March 2011. Of the species collected 1 was expected to be an SRE, <i>Pleuroxia ?bethana</i>, 22 potential SREs and 3 undetermined SREs.</p> <p>None of the habitats in which the species were found are unique to the proposed impact area.</p> <p><u>Idiosoma nigrum (Mygalomorph spider)</u></p> <p><i>I nigrum</i> is protected at state level and listed as Schedule 1 'Vulnerable'.</p> <p>SRE survey (detailed above) found that 8 males and 2 juveniles were collected from within the direct impact area.</p> <p>The populations on Weld Range have extended the range</p>		

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>of <i>I. nigrum</i> by 200km.</p> <p>A targeted <i>I nigrum</i> survey was carried out from 1-12 October 07 and 5-14 June 09 and found 1708 burrows over 5 areas.</p> <p>5 sub populations exist on Weld Range. These populations are:</p> <p>Madoonga; Beebyn; Wilgie Mia; Hampton Hill; and Weld Range North.</p> <p>An <i>I nigrum</i> genetic study was carried out and showed that WR North (northern and central ridge), WR south (Madoonga, Wilgie Mia and Hampton Hill) which are separated by >15km are 3 isolated units, expected to be determined by geographic features and that there is no gene flow between them therefore need to manage each unit as a separate entity.</p> <p>Total loss due to the proposal is 12%. This includes a direct loss of 69% of the Madoonga population plus 3% of the Beebyn population (equating to a total of 9%). An additional 3% loss is expected due to inbreeding loss at Madoonga.</p> <p>0-26% of the Beebyn population would be likely to be impacted by indirect impacts (Complete loss).</p>		

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	<p>2 other populations of <i>I nigrum</i> were found by the DEC in pastoral leases at Dalaranga and Lakeside.</p> <p><i>I nigrum</i> is associated with <i>Acacia</i> vegetation in proximity to drainage lines and soils with a high clay and rock component.</p>		
Subterranean Fauna	<p>A Stygofauna survey was carried out between April 2008 and March 2009. A total of 41 samples were taken at Beebyn and 41 at Madoonga. Further samples were taken outside the direct impact zone.</p> <p>No stygofauna were found within and outside the impact area at Beebyn.</p> <p>1 stygobitic Copepod (juvenile) was found in a troglofauna trap within the Madoonga pit area. The proponent thinks that the copepod is not a true stygobitic as no others were found.</p> <p>No habitat assessment has been carried out however the aquifer in which the specimen was found extends outside the project area.</p> <p><i>Two females of species Mesocyclops brooksi were collected from Station Well. They are stygophilic and are widespread in Australia.</i></p> <p><i>Cypridopsis vidua and Sarscypridopsis oschracea were collected from 5 pastoral wells and are surface specie and is found in well in S Australia</i></p>	<p><u>Department of Environment and Conservation</u></p> <ul style="list-style-type: none"> • The proponent should verify that the singleton copepod specimen found in a troglofauna trap within the Madoonga mine void disturbance footprint is truly stygobitic, or if this specimen was the result of a contaminated sample. • If the copepod specimen is determined to be truly stygobitic, the proponent should use the results of sampling and habitat analysis to attempt to demonstrate that this species or its habitat are not restricted to the Madoonga mine void disturbance footprint, including the proposed drawdown disturbance footprint/s. Continued sampling of existing bores in areas that will not be developed or impacted by the proposal, to support a robust risk assessment, is also 	<p>Considered to be a relevant environmental factor and is discussed under Section 3.2 – Fauna</p>

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p><u>Troglofauna</u> A 2 phase troglofauna survey was carried out from May to July 2007. The second phase was carried out from June to August 2008.</p> <p>Phase 1 consisted of monitoring 40 bores and Phase 2 consisted of monitoring 40 and 41 bores.</p> <p>A single centipede specimen from the order <i>Scolopendromorpha</i> (identified as <i>Cryptopidae</i>) was collected from a single bore (WRRD0273) in the Beebyn project area. No others were found in the surveys. (This species has been found elsewhere in WA but not anywhere else at WR. The species is a singleton with an unconfirmed conservation value but is probably a troglobite.</p> <p>Troglobitic centipedes including <i>Scolopendrids</i> are known in WA from Robe Valley, Mesa A, and a cave on the Nullarbor plain, but not Weld Range.</p> <p>Collembolans (springtails) were found inside and outside the impact area at Madoonga and Beebyn. They are not considered to be troglobitic.</p> <p>A habitat assessment has been carried out using geological data. The suitable habitat for troglofauna is dolerite, which is widespread and continuous along the Weld Range.</p> <p>The troglofauna habitat to be impacted by direct impacts</p>	<p>recommended.</p> <ul style="list-style-type: none"> The proponent should use the results of sampling and habitat analysis (including visual representation) to undertake a risk assessment to determine the likelihood of the troglobitic centipede species and its habitat not being restricted to the Beebyn mine void disturbance footprint. <p>.</p>	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>on the entire range is estimated to be (458 ha) 7%. The troglofauna habitat to be impacted by indirect impacts is estimated to be (1528 ha) 23%, therefore a combined impact of (1986 ha) 30% of Weld Range.</p>		
Groundwater	<p>The regional groundwater is fresh to marginal (500 to 1500 mg/l) except in the boreholes in the palaeochannels. The areas of high salinity correspond to low topographic areas and surface drainage. In these areas the water is brackish (1,500 to 5,000 mg/l) varying from 2,643 mg/l (7 Mile Well) to 4,900 mg/l (Gap bore) to saline (MDWB01 (48,000 mg/l) M_WBG_01R (46,000 mg/l), M-LTM-04 (35,000 mg/l).</p> <p>The groundwater level in the project area ranges from 5 to 50 metres below ground level (mbgl),</p> <p>The groundwater model was run for 9yrs (Even though the project is for 11 yrs) as no dewatering will occur in the first 2 years.</p> <p>A significant paleochannel occurs in the Madoonga gap area. Due to the fractured zone located below the paleochannel there could be significant inflow into the Madoonga pit.</p> <p>Any impact to stock watering bores will be mitigated by SMC. SMC will monitor and if needed will supply water to replace the water from the impacted bores. 5 bores will be impacted but all are on the Madoonga station which was purchased by SMC. 1 bore will be removed and the other</p>	<p><u>Department of Environment and Conservation</u></p> <ul style="list-style-type: none"> • The proponent should provide the results of additional investigations (including, but not limited to, flora and fauna surveys and water modelling) into biodiversity values of the evaporation pond area for review by the OEPA, on advice from the DEC. • It is unclear if the evaporation pond will be constructed to also act as an infiltration pond. If this is the case, then no assessment of the potential for groundwater mounding in the vicinity of the pond has been undertaken. Should groundwater mounding be a possibility, then there is the potential for additional impacts to occur to vegetation communities, the subterranean environment and water quality in the vicinity of the pond, which has not been assessed. 	<p>Considered to be a relevant environmental factor and is discussed under Section 3.4 – Groundwater and surface water</p>

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>4 will recover over time.</p> <p>The salinity of water from the Madoonga area, near the evaporation pond location has a large variation. And ranges from 740mg/l to 4800 mg/l. The discharge into evaporation pond will be 10,000 to 60,000 TDS.</p> <p><u>Water Supply</u> Potable water will be sourced from dewatering at Beebyn.</p> <p>11 boreholes will be pumped at Madoonga at a combined rate of 275 l/s. (25 l/s per borehole).</p> <p>9 boreholes will be pumped at Beebyn at a combined rate of 105l/s. (boreholes were pumped at a combination of 10 l/s and 15 l/s in BIF areas.) This will be adequate to achieve drawdown for mining.</p> <p>Water abstraction rates are estimated to be 11.95GL/annum (32.74 ml/day) (ranging from 6.74 to 11.95 Gl/a)</p> <p>The pit floors for Beebyn and Madoonga are expected to be 300mRL (180m below water table)</p> <p>3m contour for groundwater drawdown is used as the natural variations in the water table is up to 3m.</p> <p>Drawdown at Beebyn extends 23.5 km x 5.2 km, and at Madoonga extends 23 km by 9.5 km.</p> <p>Water consumption from mining is estimated to be approx</p>	<ul style="list-style-type: none"> • The proponent should quantify potential long-term impacts on ecohydrological water requirements associated with drawdown cones to the three metre groundwater contour of 9,000 metres (north) and 7,500 metres (south) from the Madoonga pit and 4,500 metres (north) and 5,000 metres (south) from the Beebyn pit for review by the OEPA, on advice from the DEC, particularly in relation to the following conservation values that have been identified as having the potential to be impacted: • locally significant groundwater dependent ecosystem vegetation community unit 7b (estimated direct impact from clearing of 38.82 per cent); • habitat value of community 7b for fauna species of conservation significance; • the cumulative impact to community 7b from both the proposed Madoonga waste dump (direct) and groundwater drawdown (indirect) impacts; and • the extent to which community 7b is dependent on groundwater sources for survival during periods of peak environmental (groundwater) demand. 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>3.19 GLpa to 4.96 GLpa (13.59 megalitres per day). 1.69 to 2.20 GLpa is expected to be low saline and used for process water at Beebyn, Madoonga, CPF and the Village. 1.5 to 2.76 GLpa is expected to be Higher Salinity and used for dust suppression at Beebyn, Madoonga, CPF and Village. According to GWMP no saline water from Madoonga will be used for dust suppression</p> <p>Reverse Osmosis will be used to treat raw water.</p> <p><u>Discharge of surplus water</u></p> <p>Discharge of surplus saline water will be into an Evaporation pond near the Madoonga pit. Fresh water from Beebyn will be used in mine process activities.</p> <p>Salt will be removed from the evaporation pond and disposed of at an approved facility.</p> <p>Inflow rate of water to evaporation pond is 7 GLpa..</p> <p>Evaporation is expected to be 3.2 m per annum.</p> <p>Inflow will have an average salt concentration of 25,000 TDS, varying from 10,000 to 60,000 TDS.</p> <p><u>Groundwater rebound</u></p> <p>Pit lakes will form and will be groundwater sinks. It is expected that there will be a rapid recovery of the water table in first 5 yrs followed by a slow down for the next 20</p>	<ul style="list-style-type: none"> Short term leach tests for some rock types showed elevated levels of Selenium and nickel in leachate. It is recommended the proponent further investigate the magnitude of the potential selenium hazard and nickel hazard. <p><u>Department of Mines and Petroleum</u></p> <ul style="list-style-type: none"> The 0.3 m freeboard stated for the Evaporation Pond may not be adequate to allow for wind and wave action on the pond wall. Usually 1m freeboard is required. Is the future tailings proposed for years 11 to 15? If so is it relevant to this proposal? Tenement conditions may be imposed under the <i>Mining Act 1978</i> and require annual geotechnical audits of the Tailings Storage Facility and its operation as well as construction reports to verify that the facility (or subsequent lifts) has been built to specifications. The groundwater section does not state the potential impacts arising from the use of an evaporation/infiltration pond. The impacts would be an increase in groundwater level in the vicinity of the 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>yrs. The concentration of solutes within the pit lakes will increase over time due to low precipitation and high evaporation.</p> <p>Recharge occurs only in and after significant storm events.</p> <p>Groundwater would need to be lowered by approximately 180m metres at Beebyn and Madoonga (Mining floor 300 mRL. Water table 480 mRL).</p> <p><u>Waste Rock</u></p> <p>The project will produce at least 273 Mt of waste rock from Madoonga and at least 450 Mt from the Beebyn pits (Based on current pit design BFS (VI).</p> <p>20.6 Mt from Madoonga (7.5%) is expected to be PAF. 3.3 Mt from Beebyn (0.7%) is expected to be PAF. (Based on PFS pit design which is 50m shallower and has a total waste of 363Mt)</p> <p>Kinetic tests were carried out on samples of various waste or low grade mineralized ore with sulphur content <1wt%. All showed low and decreasing rates of sulphur. 91% of material had a sulphur content of <1wt%.</p> <p>Kinetic tests on material with higher levels of sulphate started in Dec 2009 for a period of 45 weeks. These samples had a Sulphur content of between 0.1 and 23.8wt%</p>	<p>pond (mounding and vegetation death impacts from salts/high water table) and also the disposal/encapsulation of the salt/brine left behind at the end of the operation.</p> <ul style="list-style-type: none"> • Advice should be sought from DMP with regards to Acid Mine Drainage. • Section 5.4.7.2 should detail the constraints used to determine the evaporation pond location. The food bowl and gap are not included in figure 2.4 and it is not clear what the 'food bowl' is what its significance is. • The dimensions for the Tailings Storage Facility (TSF) of 280m x 280m x 5m does not add up to a footprint of 46.5 hectares. • A sprinkler system to control dust on the surface of the TSF may require a large amount of water. The system may clog up if poor quality water is used. Such a system may also exacerbate seepage issues. Another option would be to consider the use of dust suppressants or to gradually cover the dried up cells with suitable cover material stockpiled nearby. 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>The results will aid the design of the management i.e. thickness of NAF waste around PAF waste but will not change the method of management.</p> <p>Management will be to encapsulate PAF within NAF in the waste rock dumps.</p> <p>A total of 5 waste rock dumps will be developed in the project area, of which 3 will be at Beebyn and 2 at Madoonga.</p> <p>Waste rock dumps will be designed using the DMP's guidelines for mining in Arid Environment (2007).</p> <p>Monitoring of surface water and groundwater for AMD will be carried out throughout the life of the mine.</p> <p>SMC propose to continue static and kinetic testing throughout the operation of the mine (as per the National Handbook 'Managing Acid and Metalliferous drainage' (DITR 2007).</p> <p>Waste Rock Water Quality Estimates have been carried out which estimates that with adequate encapsulation of PAF at Madoonga it is likely that seepage from the base of the waste dumps will be near neutral in pH and metal concentrations should decrease significantly. With no management at Beebyn seepage in the waste dumps should remain neutral in pH and metal concentrations are expected to be low.</p>	<ul style="list-style-type: none"> • Section 7.2 should state if any Acid consuming Material (ACM) was located in the course of the waste characterization studies undertaken. • What are the results of the kinetic testing carried out on the samples containing higher sulphide to date? • Why was material of most concern tested after the material with less potential PAF issues? • The waste characterization studies need to look at the physical characteristics of the waste rock material as well as potential AMD issues. Those results are necessary to be able to design stable landforms. • An AMD management plan should be reviewed prior to construction and reviewed at regular intervals or as the mining schedule changes and potential PAF issues are raised as a result. • Seepage impacts arising from the evaporation pond should be looked at. <p><u>Department of Water (DoW)</u></p> <ul style="list-style-type: none"> • The proponent plans to utilise the water 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		<p>available from each of the pits onsite, matching uses with water quality. The DoW supports this reuse of dewatering effluent to meet the mines needs.</p> <ul style="list-style-type: none"> • The PER does not address the extent to which infiltration is to occur or the resulting impacts to the local aquifer. Further information relating to these matters should be provided. • The PER indicates that potentially groundwater-dependent vegetation will be affected by drawdown resulting from dewatering. The vegetations level of groundwater dependence or ability to adapt is unknown. Environmental Management Commitment No. 9 relating to monitoring potentially groundwater-dependent ecosystems will be will be supported by DoW but will need to include observing water levels. • The proponent has committed to monitor stock watering bores on Glen and Beebyn pastoral stations and to mitigate changes to water supply that result from mining activities. The DoW will include these commitments as conditions of the Section 5C licence required for dewatering. 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		<p><u>Department of Health (DoH)</u></p> <ul style="list-style-type: none"> The proponent will need to comply with the Australian Drinking Water Guidelines 2004 and establish a Drinking Water Management Plan and establish drinking water quality reporting procedures with WA Health for all four reverse osmosis private water supplies. The airport terminal water taps/faucets will need to be clearly marked as having non-potable supply which is not suitable for drinking. 	
Surface Water	<p>The major drainage line (Berhing Creek) drains through the Weld Range at the GAP.</p> <p>Ephemeral lakes form during episodic rainfall events in the lower parts of the northern watershed.</p> <p>The watercourses are deep and narrow in the upper sections of Beebyn and Madoonga catchments along Weld Range and become wide and shallow in the lower sections where the topography is flat.</p> <p>The project is in the 'Arid Interior' and the mean average rainfall is <255mm.</p> <p>There is a topographic depression north of Madoonga Gap, which fills with water from Madoonga Creek after</p>	<p><u>Department of Health (DoH)</u></p> <ul style="list-style-type: none"> The proponent correctly acknowledges that stagnant surface water has the potential to breed mosquitoes and must be minimised or prevented. The proponent should develop a Mosquito Management Plan to include the monitoring of larval mosquitoes; chemical control of larval mosquitoes, adult mosquito control, source reduction and provision of advice, repellents and clothing to reduce employee's exposure to biting mosquitoes. 	<p>Mosquito management is not considered to be a relevant environmental factor.</p> <p>Surface water is considered to be a relevant environmental factor and is discussed under Section 3.4 – Groundwater and surface water</p>

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>rainfall events. Stream flows will only discharge through Madoonga gap when the depression exceeds 486.2 m AHD. The topographic depression forms the 'foodbowl'. It is seasonally inundated during significant rainfall and is a common feeding site and water hole for many fauna.</p> <p>RORB modeling shows that runoff during 20, 50 and 100 yr ARI events will be contained in the depression storage, therefore there will be little or no runoff through Madoonga Gap. This results in a shallow lake immediately north of Madoonga gap.</p> <p>Drainage lines only flow during, and for short periods after, significant rainfall.</p> <p>Surface water flows are an important factor as they are relied upon by <i>Acacia aneura</i> (mulga). Mulga needs surface water for survival and are important as fauna habitat. Surface water flows may also impact <i>Idiosoma nigrum</i> which are found within boundaries of drainage lines of watercourses and underneath Acacia vegetation.</p> <p>The area of impact from mining is <2% of the combined catchments.</p> <p>Runoff from waste dumps will be directed into downstream sediment basins for treatment prior to discharge.</p> <p>Fuel handling areas will be bunded.</p> <p>The water for dust suppression will be of suitable quality</p>		

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	<p>(as per DOW Water quality protection guidelines 2000).</p> <p>The diversion drains will have 0.5m freeboard. The diversion drains around the mine site infrastructure will be designed to capture and divert the 10 yr ARI flood event.</p> <p>The Beebyn and Madoonga infrastructure has been located outside the 100 yr flood area of the main creeks.</p> <p>The Madoonga and Beebyn pits are unlikely to be flooded so long as a 1m freeboard is maintained above 100 yr ARI boundary.</p> <p>Part of the Madoonga waste dump is in the 100m ARI area therefore potentially significant. Scour protection may be needed to protect waste dump.</p> <p>Culverts and riprap pads will be used to prevent pooling and inundation upstream and reduce erosion and scouring downstream.</p> <p>Pipeline to the Evaporation Pond will be above ground.</p>		
General		<p><u>Department of Mines and Petroleum</u></p> <ul style="list-style-type: none"> The project Environmental Management Plan would be reviewed prior to approval of a mining proposal by DMP. <p><u>Department of Health</u></p>	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		<ul style="list-style-type: none"> • The proponent is encouraged to develop an Emergency Medical Response Plan, which should plan for the health impacts of applicable incidents identified in the 'Critical Infrastructure Emergency Risk Management and Assurance Handbook' (Emergency Management Australia, 2nd Ed May 2004). The plans should include a response plan and consider other factors such as the limited health infrastructure, health specialists and general personnel in the region, along with distance, communications redundancy and staff training. • The proponent should address the provision and safe transportation of food and comply with the <i>Food Act 2008</i> and associated standards and regulations. • The proponent should consult with the Department of Health representatives in the Midwest WA Country Health Service to ensure that its services can meet the increased population size due to the development of the mine. • The <i>Hospital and Health Service Act 1927</i> requires private health services to be licensed. If the project includes the provision of medical services and/or treatment of persons suffering from 	

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		<p>illness or injury or in need of medical, surgical or dental treatment, the facility is required to be licensed by the Department of Health, Licensing Standards and Review Unit. Contact details are 08 92224027 or LSRUreception@health.wa.gov.au.</p> <ul style="list-style-type: none"> • WA Health acknowledges the proponents commitments to address social and community concerns and ensure improved outcomes. It is recommended that the sustainability of operational activities are addressed using tools such as the Social and Health Impact Assessments and that planning for improved local outcomes are built into procedures. 	
POLLUTION			
Greenhouse Gas	<p>An assessment was conducted by Kewan Bond Pty Ltd in 2008. It was then revised in 2010 due to changes in the scope of the project.</p> <p>Total CO₂ (excluding clearing and road train haulage) is 2,899,269 tonnes of CO₂-e (i.e. 263,570 tonnes of CO₂ -e per annum).</p> <p>Emission from vegetation clearing will be 89,709 t CO₂ -e per annum in year 1.</p>		Not considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>The project will contribute 0.37% of WA's CO₂ figures, based on 2006 figures.</p> <p>SMC will apply to participate in the Greenhouse Challenge Plus Programme and WA Strategy and will report energy efficiency and greenhouse gas emissions.</p> <p>SMC will comply with National pollution inventory reporting requirements for emissions that trigger reporting thresholds.</p> <p>Scope 1 – Direct emissions e.g. from fuel consumption, Scope 2 – indirect emissions e.g. from the consumption of electricity or 3rd part. Scope 3 – indirect emission from other sources e.g. the production of diesel to be used for the project.</p> <p>A power generation study was carried out to find out the best and most environmentally friendly way to produce electricity.</p> <p>Best option is a diesel power station, backed up by wind power.</p> <p>Each of the 5 main areas of the project will have its own independent power generation system, comprising of:</p> <ul style="list-style-type: none"> • Madoonga (3MW power station); • Beebyn (3MW power station); • Airstrip (50 kW power station • Central Processing Facility (CPF) (12x1MW diesel generators); and 		

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<ul style="list-style-type: none"> Accommodation village (3MW power station). 		
Air Quality and Dust	<p>Sinclair Knight Mertz assessed air quality impacts using AUSPLUME for the project. PM10 and TSP were investigated.</p> <p>Aboriginal heritage reserve 1, 2 and 3 (part of Wilgie Mia Indigenous reserve) were tested for TSP only as they do not have permanent habitation.</p> <p>Madoonga homestead (1km north of pit) was not a sensitive receptor as it has been purchased by SMC.</p> <p>Activities including clearing, mining, hauling, crushing, screening and stockpiling ore have the potential to generate dust.</p>	<p><u>Department of Mines and Petroleum</u></p> <p>Section 8.4.3 should include dusting off from the TSF and the management measures that will apply to minimize dust from the dried tailings. This is also important when a mine goes into care and maintenance and the proponent will be expected to detail how it would manage that aspect of unplanned closure in a mining proposal.</p> <p><u>Department of Health</u></p> <ul style="list-style-type: none"> The Department of Health would support a period of campaign monitoring to verify that dust suppression techniques are effectively controlling dust at the closest residence and three accommodation sites. WA Health would expect good practice management of dust in the reservation areas where people are likely to be from time to time. It is also expected that key pollutants have been identified and that consideration was given to the presence of heavy metals and fibrous materials. <p><u>Department of Indigenous Affairs (DiA)</u></p>	<p>Not considered to be a relevant environmental factor</p> <p>.</p>

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		<ul style="list-style-type: none"> The results of the dust assessment are not included in the PER document. It may be possible for dust to impact on rock art engravings or paintings, of which there are many in the Weld Range area. 	
Waste Materials	<p>Project activities that will generate waste include:</p> <ul style="list-style-type: none"> Domestic waste (e.g. plaster, paper, workshop wastes and domestic solid wastes); Construction Waste (e.g. Wood, scrap metal, tyres, rubber, batteries); Sewage and grey water; Hydrocarbons and chemicals; and Plant maintenance related chemicals. <p>Industrial waste, inert waste and recyclable waste will be collected and transported off-site for disposal, resale or recycling.</p> <p>Domestic waste will be removed by a contracted service road tanker.</p> <p>Hazardous Waste will be removed from site by a licensed contractor for disposal in an approved facility in accordance with the requirements of the controlled waste regulations.</p> <p>Four main sewage plants will be installed at the following locations:</p> <ul style="list-style-type: none"> Beebyn; Madoonga; CPF; and 	<p><u>Department of Mines and Petroleum</u></p> <ul style="list-style-type: none"> Will there be enough capacity at the Shire Landfill at Cue to accommodate the volume of general waste to be expected from the Weld Range project? What is the expected tonnage/volume of salt expected to be removed from site and what sort of approved facility is SMC envisaging for that disposal. <p><u>Department of Health (DoH)</u></p> <ul style="list-style-type: none"> The PER states that dust suppression will use dewatering flows but does not refer to any actual recycling proposals, requiring such highly treated effluent. The proponent should be advised that where multiple wastewater treatment plants (WWTP) are to be used, each installation requires approval under the <i>Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste)</i> 	Not considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<ul style="list-style-type: none"> Accommodation village. <p>Waste will be stored on site prior to disposal and will be managed in accordance with the <i>Health Act 1911</i> requirements. The waste will then be disposed of offsite to an appropriate facility.</p> <p>Hazardous materials will be stored in appropriately bunded areas and any spills will be cleaned up immediately.</p> <p>Where possible pre mining drainage lines will be reinstated and the proponent aims to ensure that post closure flows are as close as possible to natural conditions.</p>	<p><i>Regulations.</i></p> <ul style="list-style-type: none"> Any proposals for the use of effluent or greywater, including for beneficial garden irrigation in proximity to the village or other buildings, requires separate approvals as recycling schemes and submission will be required for each WWTP site. Recycling submissions are to be made to the WA Health Water Unit, with a Recycled Water Quality Management Plan, in accordance with the <i>(draft) Guidelines for the Use of Recycled Water in Western Australia, April 2009</i>. Wastewater recycling schemes are subject to verification testing and ongoing water sampling and quality requirements. Many activities of the project have potential to contaminate ground and surface waters and soil, such as oxidation of acid forming material and sulphatic material, disposal of hyper saline water, storage of hazardous substances, and leachate containing hydrocarbons, chemicals and heavy metals. Public health must be considered in the preparation of the management plan and further 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		<p>information can be sought from the Toxicological Branch of the Environmental Health Directorate.</p> <ul style="list-style-type: none"> • Page 195 of the PER states that Hazardous substance management will be addressed in the Environmental Management Plan. The Environmental Management Plan (Appendix TA1) does not contain management of Hazardous substances. Sent 16/11 	
Noise	<p>Lloyd George Acoustics performed a noise impact assessment of the airstrip.</p> <p>The project location is isolated. The nearest homestead is 1km north of the Madoonga pit but has been purchased by SMC.</p> <p>The maximum noise levels were deemed suitable for residential buildings.</p> <p>Management of employee noise exposure will comply with the <i>Mines Safety and Inspection Act 1994</i>. Noise will be reduced by:</p> <ul style="list-style-type: none"> • Selecting the quietest practicable plant and machinery; • Design and layout of mine site; • Regular maintenance of plant; and • Daytime blasting to relevant Australian Standards. 		Not considered to be a relevant environmental factor

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
SOCIAL SURROUNDINGS			
Aboriginal Heritage	<p>A native title claim has been lodged by the Wajarri Yamatji People. SMC is liaising with the Wajarri Yamatji People represented by the Yamatji Land and Sea Council to enter into a mining agreement for the project area. Significant sites will be included in the agreement as areas to avoid, which will be legally binding on both parties.</p> <p>DiA's register of Aboriginal sites shows that 37 indigenous sites of heritage value occur in the project tenements.</p> <p>During surveys a number of sites of significance were identified. The majority of sites across the range were artifact scatters and SMC were advised by the Wajarri representatives that these sites were not so great a significance.</p> <p>A number of sites were identified in the surveys as being significant. All significant sites will be avoided, except for 2 sites in the Madoonga area, in which the Wadjarri People have agreed to the loss.</p> <p>Feb 2006 – Ethnographic survey was conducted over the Beebyn prospect.</p> <p>3 additional surveys were carried out at Weld Range in 2006.</p> <p>During 2007, 3 ethnographic surveys were carried out.</p>	<p><u>Department of Health (DoH)</u></p> <ul style="list-style-type: none"> • There is an opportunity to engage with Aboriginal people living in the area to meet some of the labour requirements for the construction and operation of the proposal. • There should be consideration for a holistic approach of training for school aged Aboriginal people with a view to participating in the workforce. This could be considered alongside a mentoring program for Aboriginal people already employed within the range of industries associated with the mining, processing and construction industries. • Appropriate management and education should be put in place to minimise the risk of communicable diseases arising from linkages between the workforce and local community. <p><u>Department of Indigenous Affairs (DiA)</u></p> <ul style="list-style-type: none"> • Table 9.3 on page 206 does not appear to be accurate as there are 37 registered sites which are within the proposed project footprint. A total of 18 of these 	<p>Considered to be a relevant environmental factor and is discussed under Section 3.5 – Aboriginal heritage.</p>

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>An archaeological survey was completed covering the W33-43, W6, W20 and the northern slopes of Beebyn and Madoonga in January 2008.</p> <p>During April, June and August 2009, archaeological and ethnographic surveys were carried out at several lenses at WR.</p> <p>Regional heritage surveys have been undertaken by the Wajarri Yamatji group to identify other potential heritage sites.</p> <p>Further surveys will be carried out for the infrastructure, pit, and waste dumps areas of the projects.</p> <p>SMC are currently working on a Mining Agreement with the Wadjarri people.</p> <p>SMC has developed a consultation process with the Wajarri Yamatji people to reach an agreement on the management of sites in the project area and work out what sites will be impacted, assess the significance of the sites and agree on proposed management. SMC are in negotiations with the Department of Indigenous Affairs on all matters relating to Weld Range.</p> <p>Further surveys are required to finalise the process and lodge S18 applications to the DiA.</p>	<p>sites are on the Permanent Register. There may be further sites identified during Aboriginal heritage surveys.</p> <ul style="list-style-type: none"> • Page 21 of the PER states that Aboriginal heritage sites are protected at federal level under the <i>Australian Heritage Council Act 2003</i>. It may be more appropriate to replace that reference with <i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i> instead. • Page 21 of the PER also states that there are 5 indigenous sites on the Weld Range tenements and that these will not be impacted by mining. This is incorrect as there are 37 sites within the project footprint. • The PER would benefit from a map of the areas where heritage surveys have been conducted and are due to be conducted. The Department looks forward to receiving the compiled results of the heritage surveys as stated on page 205 of the PER. • It is recommended that the progress of indigenous heritage surveys, as stated in section 9.2.1 in the PER, also be noted in section 8.7.3. 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		<ul style="list-style-type: none"> • Details that no impact to Aboriginal heritage sites will be made without consultation with the Wajarri Yamatji Claimant group and obtaining s18 consent under the <i>Aboriginal Heritage Act 1972</i> should be included on page 101-102. • It should be considered that heritage sites may be impacted by the formation of the shallow lake that will form north of Madoonga gap, or be impacted by dewatering. 	
Visual Amenity and Geoheritage	<p>The visual amenity of the area will change due to alteration to the peaks of ranges at Weld Range from the creation of waste dumps at Madoonga and Beebyn, clearing of native vegetation, pit excavation, construction of infrastructure and light spill.</p> <p>Impacts on visual amenity are expected to be minimal due to the low number of visitors to the area.</p>		Not considered to be a relevant environmental factor
Murchison Radio – astronomy Observatory (MRO)	The Murchison Radio-astronomy Observatory (MRO) has not been included in the PER.	<p><u>CSIRO</u></p> <ul style="list-style-type: none"> • The Weld Range Iron Ore Project lies within the Mid West Radio-Quiet Zone, administered by the Australian Communications and Media Authority 	Not considered to be a relevant environmental factor.

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		<p>(ACMA) to protect the radio frequency environment over the Murchison Radio-astronomy Observatory (MRO). The MRO is being established as Australia's premier site for radio astronomy observations and is the site for major national and international investment in radio astronomy. The MRO is Australia's core candidate site for the international Square Kilometre Array radio telescope (SKA).</p> <ul style="list-style-type: none"> • The Weld Range project has the potential to significantly impact on the radio-quietness of the MRO. The PER should therefore list MRO users as stakeholders that could be significantly impacted by the project and that it should outline measures to be adopted by the Weld Range Iron Ore Project to ensure that the project will comply with existing radio-quiet regulations and requirements. • Section 1.6 of the PER should mention radio quiet compliance as an area of concern that has been raised in several meetings between the WA government, the proponents and the CSIRO. • Section 9.1.2 of the PER should mention the WA department of Commerce and 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		<p>the discussions that have taken place regarding radio-quiet compliance.</p> <ul style="list-style-type: none"> • Section 4.15 should mention the importance of radio-quiet compliance as poor compliance could result in the MRO not being able to operate. • Section 8.7.1 should mention the fact that poor control of radio-quiet could lead to the inability of the MRO to function, leading to damage to Australia/New Zealand's SKA bid and consequent loss of benefits of the radio astronomy projects to the region, to WA, and Australia and New Zealand. • The Commonwealth Australian Communications and Media Authority have already implemented protection under the <i>Radiocommunications Act 1992</i> (Cth) (RALI MS32 and Embargo 41) to control radio-quiet. The legislative approvals section should therefore mention the requirements for the mining operations to comply with these measures. • It would be useful to know if any measures are to be put in place to ensure radio-quiet compliance. It is suggested that the proponent consult 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		<p>with CSIRO regarding the placement of facilities such as accommodation facilities, power station and airstrip in order to facilitate compliance with radio-quiet regulations.</p> <p><u>Public comments</u> Concern regarding the negative impact that the proposed mine will have on Australia's bid to host the international Square Kilometre Array (SKA) telescope which is billed as the largest scientific instrument in the history of mankind. The mine site is 100 km east of the proposed location and lies virtually on the perimeter of the core of the Radio Quiet Zone (RQZ) covered by Embargo 41 and lies well within the Radiocommunications Assignment and Licensing Instructions MS32 zone which extends up to 260 km from the centre of the RQZ.</p> <p>The mine will create numerous sources of Radio Frequency Interference (RFI), such as from aircraft, communication between vehicles, internet access, telephone lines, cable television and the use of remote controlled cars for recreation. The PER does not address the impacts of RFI.</p>	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
Rehabilitation and Mine Closure	<p>A Conceptual Closure Plan has been developed in alignment with AMEC Mine Closure Guidelines (2000) and ANZMECC Strategic Framework for Mine Closure (2000). It includes management strategies for the implementation of progressive rehabilitation and closure of the project, and includes a plan for:</p> <ul style="list-style-type: none"> • Comprehensive consultation with government regulators, non government organizations, and community stakeholders in the development of agreed closure criteria, • Rehabilitation of the evaporation pond. Salt will be removed from site by an approved contractor and disposed of at an approved facility; • The development of a mine closure and rehabilitation plan within 2 years of commencement of operations; • Annual review of the mine closure and rehabilitation plan; • Progressive rehabilitation to be carried out during mining; and • Post closure monitoring of the rehabilitated areas to ensure compliance with the agreed completion criteria. <p>Post closure monitoring will consist of:</p> <ul style="list-style-type: none"> • Flora and fauna (species abundance and diversity); • Invasive species (weeds, pests, grazing stock); • Groundwater quality (heavy metals and AMD); • Surface water quality (turbidity, heavy metals and AMD); and • Contaminated sites. 	<p><u>Department of Environment and Conservation</u></p> <ul style="list-style-type: none"> • A condition should be applied to ensure that the mine void is backfilled to a level that will prevent the formation of permanent surface water. • In the event that permanent water-filled voids, as proposed in the PER, are found to be environmentally acceptable and subsequently approved, conditions should be applied to: • require fencing (and funds to manage the fence in perpetuity) of the mine pit void post closure to an adequate standard to restrict access by conservation significant fauna and feral animals; and • avoid potential long-term impacts on water quality. • Any alterations (i.e. future tailings dam), expansions (i.e. 15-year life-of-mine) or changes to the project proposal post approval should be subject to a full environmental impact assessment. <p><u>Department of Mines and Petroleum</u></p>	Considered to be a relevant environmental factor and is discussed under Section 3.6 – Rehabilitation and mine closure

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>The waste dumps will be rehabilitated post mining. A crestal bund will be installed on the top of the waste dumps to retain water. SMC will conduct research to determine the best angle of slope, based on the type of material in the waste dump. Topsoil will be spread and ripped to create rock armouring. Loose vegetation will then be spread along the surface to reduce erosion.</p> <p>The placement of additional waste rock material on the top surface of structures will break up the uniformity of flat surfaces.</p> <p>Topsoil will be utilized to ensure a foundation into which native vegetation will be planted and/or seeded. Topsoil will be spread at 100mm where possible to achieve revegetation.</p> <p>Completion criteria for revegetation will be developed in consultation with DEC to determine when revegetation will be considered self sustaining.</p> <p>Reshaping of landforms will aim to be compatible with the surrounding landscape.</p> <p>Haul roads and road surfaces will be re-profiled to blend with surrounding topography and where necessary will allow free drainage to minimize interference with surface water flows.</p> <p>Pit lakes will be left post closure. The pits will be managed consistent with DMP's Environmental notes on mining (Sept 2009) – Care and Maintenance, in which</p>	<ul style="list-style-type: none"> • The proponent will be required to submit Mine Closure documents under recent changes to the <i>Mining Act 1978</i>. • The parameters for the waste rock dump design (slope of 20 degrees) would need to be justified and more detailed in the mining proposal based on waste rock characterisation results/studies. • Cut off drains that are built at the interface between the constructed landforms and the undisturbed land surface tend to be a weak point and a source of failure. Alternatives should be looked at. Cut off drains built in hard rock above the junction of the waste rock dump and natural land surface are less problematic during operation. Any designs need to take into consideration that drains and sediment traps are not maintained post closure and will eventually fail due to sediment build-up over time. • Abandonment bunds do not form a deterrent to feral or native animals seeking access to pit lakes for drinking water. Fencing is more likely to be an effective deterrent, if designed and maintained. Other considerations are removing all sources of water. 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<p>open pits will be managed with appropriate bunding and surface water drainage structures. A fence will be constructed around the pits to protect fauna and the public. SMC will consider back filling the pits and will manage the water quality in the pits and potential leaching from the pit shell, including monitoring bores. The groundwater surrounding the pits will be monitored yearly for the first 4 yrs and then every five years from year 5 to 25. Salinity, pH and leachate of contaminants will be monitored.</p> <p>Rehabilitation areas will be monitored using quadrats and photographs until the revegetation meets the required completion criteria.</p> <p>Following successful mine closure and rehabilitation the final land use is expected to comprise pastoralism with some restricted zones to ensure the future safety of people and wildlife.</p> <p>The closure of the operation would commence at the cessation of mining and would consist of:</p> <ul style="list-style-type: none"> • The demolition and removal of all redundant plant and infrastructure; • Contaminated material would be remediated on site or excavated for disposal at an appropriate off site facility; • Inert material would be placed in on-site excavated disposal areas and buried; • Below ground infrastructure would be cut off below ground level and capped 	<ul style="list-style-type: none"> • The document needs to be more specific on the expected impacts to the vegetation downstream of the TSF resulting from seepage and the increase in the water table below the TSF. What is the nature of the drainage system mentioned? Is it a cut off trench, drains built under the TSF, bores at the toe of the TSF? • When agreement is sought with DMP regarding infrastructure to be left behind, the pastoralist and the pastoral lands board will need to be involved in any agreement and the transfer of such liabilities to another party. • The proponent will need to comply with the recent amendments to the Mining Act 1978 in relation to mine closure and submissions of such documents. <p><u>Appendix TA2 Conceptual Closure Plan</u></p> <ul style="list-style-type: none"> • Appendix TA2 has not been endorsed and signed by the proponent. • Table 6.1 of Appendix TA2 states DoIR. DoIR is now DMP and the representative for the Environment Division Mineral Branch South is Eugene Bouwhuis. 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
	<ul style="list-style-type: none"> Disturbed areas would be re-contoured to restore natural drainage and re-vegetated with endemic species. <p>Post closure monitoring programs will be developed in consultation with the appropriate regulatory agency and will continue until completion criteria have been met.</p>	<p>DOCEP (Resources Safety) is now part of DMP.</p> <ul style="list-style-type: none"> A conceptual cost estimate should not be based on bond calculations as the bonds imposed in WA do not reflect full closure costs. The amount required is likely to be much higher than what is listed in table 8.1. Table 8.1 does not list monitoring costs associated with the post closure phase. How does the Australian Accounting Standard listed in section 8.3 compare with the international accounting standards that apply? This section should state if the sale of assets at the end of the mine life is considered or allowed in the closure provisions financial standard that is used. The reference to 1/100 year ARI flooding may be adequate while the site is operational. DMP refer to 1/100 year ARI design flood event and 72 hour recurrence interval scenarios. Depending on the potential risks posed by failures there is a need to look at Probable Maximum Precipitation (PMP) scenarios or 1/1000, 1/10000 year flood event scenarios for the closure phase 	

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Key Environmental Factors
		<p>and the design of certain structures (e.g. flood diversion drains/proximity of TSF to flood zones/rock armouring requirements).</p> <ul style="list-style-type: none"> • Is there information available to support the presumption that the pit lakes will be sinks and that no flow through can occur that could affect groundwater down gradient of the proposed pit location. • The final location of the waste rock dumps need to reflect the potential risk from PAF material stored within and where the potential pathways for AMD are should AMD occur. • Cumulative impacts associated with expansion plans may be significant. No indication has been provided in the PER of the location of potential future mining deposits that are expected will be required to fulfil tonnage estimates and commitments to the development of extensive regional infrastructure. 	

PRINCIPLES		
Principle	Relevant	If yes, Consideration
1. The precautionary principle		
Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by – (a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and (b) an assessment of the risk-weighted consequences of various options.	Yes	In considering this principle, the EPA notes the following: Investigations of the biological and physical environments provided background information to assess risks and identify measures to avoid or minimise impacts. The assessment of the adequacy of these impacts and management is provided in Section 3 of this report. Conditions have been recommended where considered necessary.
2. The principle of intergenerational equity		
The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.	Yes	The proposal would result in the loss of 3589 hectares of vegetation and fauna habitat and has the potential to impact diversity. The EPA has recommended conditions to mitigate impacts.
3. The principle of the conservation of biological diversity and ecological integrity		
Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Yes	The proposal would result in the clearing of native vegetation and fauna habitat. These impacts have the potential to affect biological diversity/integrity. Vegetation communities and flora and fauna are key environmental factors discussed.
4. Principles relating to improved valuation, pricing and incentive mechanisms		
a. Environmental factors should be included in the valuation of assets and services. b. The polluter pays principles – those who generate pollution and waste should bear the cost of	Yes	The proposal would require decommissioning and rehabilitation. The proponent should bear the cost of any potential pollution, containment, monitoring, management, rehabilitation and closure.

PRINCIPLES		
Principle	Relevant	If yes, Consideration
<p>containment, avoidance and abatement.</p> <p>c. The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.</p> <p>d. 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.</p>		
5. The principle of waste minimisation		
All reasonable and practicable measures should be taken to minimize the generation of waste and its discharge into the environment.	Yes	<p>In considering this principle, the EPA notes the following:</p> <p>The proposal would generate waste rock.</p> <p>Potential acid forming waste would be encapsulated within the waste dumps. This is discussed in section 3 of this report.</p> <p>Other waste products would be created as a result of implementation of the proposal, and would be disposed of according to relevant regulations and legislations.</p>

Appendix 4

Identified Decision-making Authorities and Recommended Environmental Conditions

Identified 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:

Decision-making Authority	Approval
1 Minister for Water	Water extraction licence
2 Minister for Indigenous Affairs	<i>Aboriginal Heritage Act 1972</i> – s18 approval for disturbance to recognized sites
3 Minister for Lands	<i>Land Administration Act 1997</i>
Director General, Department of Mines and Petroleum	<i>Mining Act 1978</i> and Mines Safety regulations – explosives
Department of Environment and Conservation	<ul style="list-style-type: none">• Works Approval and Licence• <i>Environmental protection (Clearing of Native vegetation) Regulations 2004</i>
Shire of Cue, Shire of Meekatharra, Shire of Mount Magnet.	Planning approval- <i>Local Government Act 1995</i>

Note: In this instance, agreement is only required with DMA #1, 2 and 3 since these DMAs are Ministers.

RECOMMENDED ENVIRONMENTAL CONDITIONS

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

WELD RANGE IRON ORE PROJECT, 85 KILOMETRES SOUTH WEST OF
MEEKATHARRA AND 60 KILOMETRES NORTH WEST OF CUE IN THE MIDWEST
REGION OF WESTERN AUSTRALIA.

Proposal: The proposal is to construct and operate an iron ore mine and associated infrastructure at Weld Range. Open pit mining would occur above and below the water table and would involve dewatering. Excess water would be discharged to a lined evaporation pond.

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

Proponent: Sinosteel Midwest Corporation Limited

Proponent Address: PO Box 529,
WEST PERTH WA 6872

Assessment Number: 1714

Report of the Environmental Protection Authority: Report 1441

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.

Published on

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 Office of the Environmental Protection Authority (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 CEO.
- 4-2 The proponent shall submit to the CEO the compliance assessment plan required by condition 4-1 at least six months prior to the first compliance report required by condition 4-6, or prior to implementation, whichever is sooner.

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 the method of reporting of potential non-compliances and corrective actions taken;
 - 5 the table of contents of compliance assessment reports; and
 - 6 public availability of compliance assessment 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 CEO.
- 4-5 The proponent shall advise the CEO of any potential non-compliance within seven days of that non-compliance being known.
- 4-6 The proponent shall submit to the CEO the first compliance assessment report fifteen months from the date of issue of this Statement addressing the twelve month period from the date of issue of this Statement and then annually from the date of submission of the first compliance assessment report.

The compliance assessment report shall:

- 1 be endorsed by the proponent's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer'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 Public Availability of Data

- 5-1 Subject to condition 5-2, within three months of approval by the CEO and for the remainder of the life of the proposal the proponent shall make publicly available, in a manner to the satisfaction of the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data, derived information products (e.g. maps) monitoring reports and the annual compliance assessment report) relevant to the assessment of this proposal and implementation of this Statement.
- 5-2 If any data referred to in condition 5-1 would:
- i. involve the disclosure of any data which is confidential or commercially sensitive to the proponent or a third party including any model, formula or process which is a trade secret; or
 - ii. involve an infringement of copyright held by a third party,

then the proponent may submit a request for approval from the CEO to not make this data publically available. In making such a request the proponent shall provide the CEO with the data and an explanation and reasons why the data should not be made publically available.

6 Flora and Vegetation

- 6-1 The proponent shall implement the proposal so that it does not directly or indirectly adversely affect conservation significant flora and vegetation communities, outside the project footprint as shown in Figure 1 attached and delineated by MGA co-ordinates listed in Schedule 3.
- 6-2 The proponent shall ensure that the implementation of the proposal does not result in the direct or indirect loss of more than 1,655.4 ha of the Priority Ecological Community (PEC), “Weld Range vegetation complexes (banded iron formation)” as shown in Figure 1 and delineated by MGA co-ordinates listed in Schedule 3.
- 6-3 The proponent shall ensure implementation of the proposal does not cause a decline in the threat status of conservation significant flora under the World Conservation Union (IUCN) categories.
- 6-4 Prior to ground disturbing activities the proponent shall carry out targeted surveys in accordance with Guidance Statement 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* to clarify the distribution of *Micromyrtus placoides*, *Beyeria lapidicola*, *Prostanthera ferricola*, *Acacia sp Wilgie Mia*, *Acacia sp. nov (aff. Exilis)*, and *Hemigenia virescens* at Weld Range, and if necessary, the local region, and then demonstrate, in consultation with the Department of Environment and Conservation and to the requirements of the CEO, that the net effect of the proposal is unlikely to lead to a decline in the regional conservation status of these species.
- 6-5 The proponent shall record and provide the MGA co-ordinates and population details for each occurrence of *Micromyrtus placoides*, *Beyeria lapidicola*, *Prostanthera ferricola*, *Acacia sp Wilgie Mia*, *Acacia sp. nov (aff. Exilis)*, and *Hemigenia virescens* to the CEO and the Department of Environment and Conservation within three months of the completion of the surveys required by condition 6-4.
- 6-6 Within twelve months from the date of issue of this Statement and then annually the proponent shall undertake an appropriately timed monitoring program to the satisfaction of the CEO to determine the health and condition of conservation significant flora and vegetation communities located within 1 kilometre of the project footprint as shown in Figure 1 attached and delineated by MGA co-ordinates listed in Schedule 3.
- 6-7 The monitoring program required to be undertaken pursuant to condition 6-6 shall be designed in consultation with the Department of Environment and

Conservation and carried out to the requirements of the CEO and include baseline measurements at suitable reference sites that will provide comparative data for measuring change.

- 6-8 The proponent shall develop trigger levels for the health and condition of conservation significant flora and vegetation communities in consultation with the Department of Environment and Conservation for the approval of the CEO.
- 6-9 Should the results of monitoring undertaken pursuant to condition 6-6 show that the trigger levels identified in condition 6-8 have been reached for the health and condition of conservation significant flora and vegetation communities the proponent shall provide a report to the CEO within 21 days of the decline or change being identified which:
- 1 describes the decline or change;
 - 2 provides information which allows determination of the likely root cause of the decline or change; and
 - 3 if considered likely to be the result of activities undertaken in implementing the proposal, proposes the actions and associated timelines to remediate the decline or change that have been developed in consultation with the Department of Environment and Conservation.
- 6-10 The proponent shall implement the actions identified in condition 6-9 (3) until the CEO determines that the remedial actions may cease.
- 6-11 The Proponent shall provide a copy of the approved monitoring program referred to in condition 6-7, the trigger levels referred to in condition 6-8, the results of monitoring carried out under condition 6-6 and any reports referred to in condition 6-9 to the Department of Environment and Conservation and make these documents publicly available in a manner approved by the CEO.

7 Weeds

- 7-1 The proponent shall undertake weed management to ensure that no new species of declared weeds and environmental weeds are introduced into the project area and that the abundance and distribution of existing weeds is not increased as a direct or indirect result of implementation of the proposal.
- 7-2 Within twelve months from the date of issue of this Statement the proponent shall undertake an appropriately timed baseline weed survey to the satisfaction of the CEO in consultation with the Department of Environment and Conservation to determine the species and extent of declared weeds and environmental weeds present at weed monitoring sites within the Project Area as delineated by the boundary shown in Figure 1 and the MGA co-ordinates provided in Schedule 3 and at a suitable number of reference sites

beyond 200 metres, but not more than 1km, from the outer extent of the project footprint.

- 7-3 The proponent shall submit the results of the survey required by condition 7-2 to the CEO and the Department of Environment and Conservation within six months of the survey being completed.
- 7-4 To verify the requirements of condition 7-1 are being met and to determine whether changes in weed cover and type within the project footprint have occurred and are likely to have resulted from implementation of the proposal or broader regional changes, the proponent shall survey the weed monitoring sites and reference sites as required by condition 7-2 at the time of year approved by the CEO on advice of the Department of Environment and Conservation within one year of the baseline results being submitted to the CEO as required by condition 7-3 and then biannually thereafter for the life of the project.
- 7-5 If the results of monitoring under condition 7-4 indicate that adverse changes in weed cover and type within the project footprint are attributable to the proposal, the proponent shall report the findings to the CEO and the Department of Environment and Conservation within 3 months of completion of the monitoring and shall propose actions and associated timelines to remediate the decline or change in consultation with the Department of Environment and Conservation.
- 7-6 The proponent shall implement measures approved under condition 7-5.
- 7-7 The proponent shall continue to implement the weed control and rehabilitation required by condition 7-6 until approval is given by the CEO to cease.

8 Groundwater Dependent Ecosystems

- 8-1 The proponent shall manage the proposal in a manner that ensures there is no adverse impact to groundwater dependent ecosystems outside the 0.25m drawdown contour as defined in Figure 1 and delineated by MGA co-ordinates specified in Schedule 3.
- 8-2 The proponent shall manage the proposal in a manner that ensures there is no irreversible impact to groundwater dependent ecosystems within the 0.25m drawdown contour as defined in Figure 1 and delineated by MGA co-ordinates specified in Schedule 3.
- 8-3 Prior to ground-disturbing activities the proponent shall prepare a Groundwater Dependent Ecosystems Monitoring and Management Plan for approval by the CEO.

The Monitoring and Management Plan shall include:

1. identification of potential impact monitoring and control sites;
 2. the design of a survey to acquire baseline biotic data, including health and abundance parameters and environmental data;
 3. definition of health and abundance parameters;
 4. definition of environmental parameters to be monitored, including groundwater drawdown;
 5. definition of monitoring frequency and timing;
 6. identification of criteria to measure decline in health; and
 7. definition of trigger levels for no impact, definition of trigger levels for no irreversible impact and management responses required should trigger levels be exceeded.
- 8-4 The proponent shall implement monitoring as identified in the approved Groundwater Dependent Ecosystems Monitoring and Management Plan required by condition 8-3 until advised otherwise by the CEO.
- 8-5 Prior to the commencement of dewatering, the proponent shall implement the baseline monitoring survey, required by 8-3 2 for all sites identified in 8-3 1 and submit the results to the CEO.
- 8-6 The proponent shall submit annually the results of monitoring required by condition 8-4 to the CEO.
- 8-7 In the event that monitoring required by condition 8-4 indicates a decline in health compared with the control sites, identified in condition 8-3 1, the proponent shall provide a report to the CEO within 21 days of the decline being identified which:
1. describes the decline or change;
 2. provides information which allows determination of the likely root cause of the decline or change; and
 3. if considered likely to be the result of activities undertaken in implementing the proposal, proposes the actions and associated timelines to remediate the decline or change.
- 8-8 The proponent shall implement the actions identified in 8-7 (3) until the CEO determines that the remedial actions may cease.
- 8-9 The proponent shall make the monitoring reports required by condition 8-4 publicly available in a manner approved by the CEO.

9 Short Range Endemics

- 9-1 The proponent shall implement the proposal so that it does not adversely affect Short Range Endemic species, in particular *Idiosoma nigrum*, *Cethegus sp. MUR HH 'Hampton Hill'*, *Cethegus sp. MUR WRS 'Weld Range South'*, *Antichiropus sp Weld Range* and *Pleuroxia sp*, outside the project footprint as shown in Figure 1 attached and delineated by MGA co-ordinates listed in Schedule 3.
- 9-2 Within twelve months from the date of issue of this Statement and then annually the proponent shall undertake a monitoring program to monitor the presence of Short Range Endemic species within 1 kilometre of the project footprint as shown in Figure 1 attached and delineated by MGA co-ordinates listed in Schedule 3. This monitoring program shall be designed and carried out to the requirements of the CEO on advice of the Department of Environment and Conservation.
- 9-3 The proponent shall submit the results of the survey required by condition 9-2 to the CEO within six months of the survey being completed.
- 9-4 The proponent shall develop trigger levels for the decline or change in the numbers of individuals within local populations of Short Range Endemic species for the approval of the CEO on the advice of the Department of Environment and Conservation.
- 9-5 Should the results of monitoring show that the trigger levels identified in 9-4 have been reached for the reduction in numbers of individuals within local populations of Short Range Endemic species the proponent shall provide a report to the CEO within 21 days of the decline or change being identified which:
1. describes the decline or change;
 2. provides information which allows determination of the likely root cause of the decline or change; and
 3. if considered likely to be the result of activities undertaken in implementing the proposal, proposes the actions and associated timelines to remediate the decline or change in consultation with the Department of Environment and Conservation.
- 9-6 The proponent shall implement the actions identified in 9-5 (3) until the CEO determines that the remedial actions may cease.
- 9-7 The Proponent shall make the results of the monitoring program referred to in 9-2, the trigger levels referred to in 9-4, and the report referred to in 9-5 publicly available in a manner approved by the CEO.
- 9-8 The proponent shall implement the proposal in accordance with the Spider Management Plan provided as Appendix H of the Response to Submissions

document (Ecologia 2012a) or subsequent revisions that are approved by the CEO in consultation with the Department of Environment and Conservation. The objective of the Spider Management Plan is to minimise impacts to *Idiosoma nigrum* and *Cethegus MUR Hamilton Hill* and *Cethegus MUR Weld Range South* species.

- 9-9 The proponent shall review and revise the Spider Management Plan required by condition 9-8 at intervals not exceeding five years, in consultation with the Department of Environment and Conservation to ensure that the mitigation and management techniques remain valid and incorporate any relevant new research.
- 9-10 The proponent shall provide a copy of the Spider Management Plan required by condition 9-8 to the Department of Environment and Conservation and make the plan publicly available in a manner approved by the CEO.

10 Residual impact and risk management measures

- 10-1 Given the residual impacts and risks of the proposal to *Idiosoma nigrum* and the Weld Range vegetation complexes (banded iron formation) PEC, the Proponent shall undertake a goat control and destocking program over its tenements in the Weld Range region for the purpose of improving vegetation and habitat condition.
- 10-2 The Proponent shall prepare a plan for the program in condition 10-1 which will include:
1. the boundary of the program and the management actions to be undertaken;
 2. monitoring arrangements, performance indicators and success criteria; and
 3. arrangements for the continuation of the program post mine closure where any funding has not been spent.

This plan shall be determined in consultation with the Department of Environment and Conservation, and approved by the CEO, within 12 months of the date of this statement.

- 10-3 This program shall have a monetary value of \$500,000 at the date this condition comes into effect.
- 10-4 The plan shall be implemented after the approval by the CEO.

Definitions

“0.25m Drawdown 9 years” is the boundary shown in Figure 1 and delineated by co-ordinates provided in Table 3 of Schedule 3.

“Conservation Significant Flora” Flora listed in Schedule 2.

“Groundwater Dependent Ecosystems” is vegetation community 7a and 7b.

“Irreversible” Lacking a capacity to return or recover to a state resembling that prior to being impacted within a timeframe of five years or less from cessation of groundwater drawdown (also see reversible).

“MGA” means Map Grid of Australia Zone 50, datum of Geodetic Datum of Australia 1994.

“PEC” Priority Ecological Community “Weld Range vegetation complexes (banded iron formation)” as shown in Figure 1 and delineated by MGA co-ordinates listed in Table 4 in Schedule 3.

“Project Area” is the boundary shown in Figure 1 and delineated by co-ordinates provided in Table 1 of Schedule 3.

“Project Footprint” is the boundary shown in Figure 1 and delineated by co-ordinates provided in Table 2 of Schedule 3.

“Reversible” A capacity to return or recover to a state resembling that prior to being impacted within a timeframe of five years or less.

“Vegetation Communities” Vegetation communities listed in Schedule 2.

The Proposal (Assessment No. 1714)

The proposal will consist of:

- concurrent mining from 2 open pits (Madoonga and Beebyn);
- disposal of overburden into specified waste dumps;
- construction and use of a Central Processing Facility (which will comprise road train unloading/tipping, screening, crushing, stockyards and train load out facilities);
- construction of an airfield;
- construction and use of site administration and support facilities, workshops, and hydrocarbon, explosive and chemical storage;
- construction and use of accommodation village;
- installation of mine dewatering bores and associated pipelines at the active pits which extend below the water table;
- construction of a lined evaporation pond and excess water pipeline; and
- construction of a haul road and access roads.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in section 5 of the PER (*Weld Range Iron Ore Project, Public Environmental Review*. Sinosteel Midwest Corporation Limited, 2010).

Table 1: Summary of Key Proposal Characteristics

Element	Description
Total overburden	<ul style="list-style-type: none"> • Not more than 723 million tonnes.
Overburden storage areas	<ul style="list-style-type: none"> • Placement of overburden in Waste Dumps adjacent to Madoonga and Beebyn pits.
Land disturbance area	<ul style="list-style-type: none"> • Not more than 3589 hectares
Madoonga pit and waste dumps Beebyn pit and waste dumps	<ul style="list-style-type: none"> • Not more than 625.5 hectares • Not more than 1098 hectares
Pit depth Madoonga Pit depth Beebyn	<ul style="list-style-type: none"> • Up to 205 metres • Up to 225 metres
Water demand	<ul style="list-style-type: none"> • Up to 4.96 gigalitres per annum, of which up to 2.20 gigalitres per annum of fresh water for processing, Central Processing Facility (CPF) and village, and up to 2.76 gigalitres per annum of water with higher salinity for dust suppression at the pits, CPF and village.
Mine dewatering	<ul style="list-style-type: none"> • Water abstraction at a rate of 11.95 gigalitres per annum from the Madoonga and Beebyn pits.
Excess Water Discharge	<ul style="list-style-type: none"> • Construction of a pipeline to convey excess dewatering discharge to the Evaporation Pond. It is estimated that up

Element	Description
	to 7 gigalitres per annum of highly saline water (10,000 to 60,000 TDS) would be transported into the evaporation pond.
Evaporation Pond	<ul style="list-style-type: none"> • Not more than 330 hectares.

Figures

Figure 1: Location of the Weld Range Iron Ore Project and impact boundaries

Conservation significant Flora

Acacia burrowsiana (P3)
Acacia sp. Wilgie Mia (P1)
Acacia speckii (P4)
Beyeria lapidicola (P1)
Dodonaea amplisemina (P4)
Eremophila arachnoides subsp.
arachnoides (P3)
Euphorbia sarcostemmoides (P1)
Goodenia berringbinensis (P4)
Goodenia lyrata (P3)
Grevillea inconspicua (P4)
Hemigenia sp. nov (aff. *exilis*) (SOI)
Hemigenia tysonii (P3)
Hemigenia virescens (P3)
Homalocalyx echinulatus (P3)
Indigofera gilesii subsp. *gilesii* (P3)
Micromyrtus placoides (P3)
Mirbelia stipitata (P3)
Phyllanthus baeckeoides (P3)
Prostanthera ferricola (P3)
Prostanthera petrophila (P3)
Ptilotus beardii (P3)
Ptilotus luteolus (P3)
Sauropus sp. Woolgorong (P1)
Stenanthemum patens (P1)
Tecticornia cymbiformis (P3)
Verticordia jamiesonii (P3)

Vegetation Communities

Community 1 and 2
Community 3a
Community 3b
Community 3c
Community 3d
Community 4a
Community 4b
Community 5a
Community 5b
Community 6a
Community 6b
Community 6c
Community 7a
Community 7b

Co-ordinates that define the Project area (Table 1), Project Footprint (Table 2), 0.25m Groundwater Drawdown for 9 years (Table 3), and PEC (Table 4).

Reference "Weld Range Iron Ore Project – Zones of Impact" Document Number: A503063 Revision 0, dated 11 May 2012"

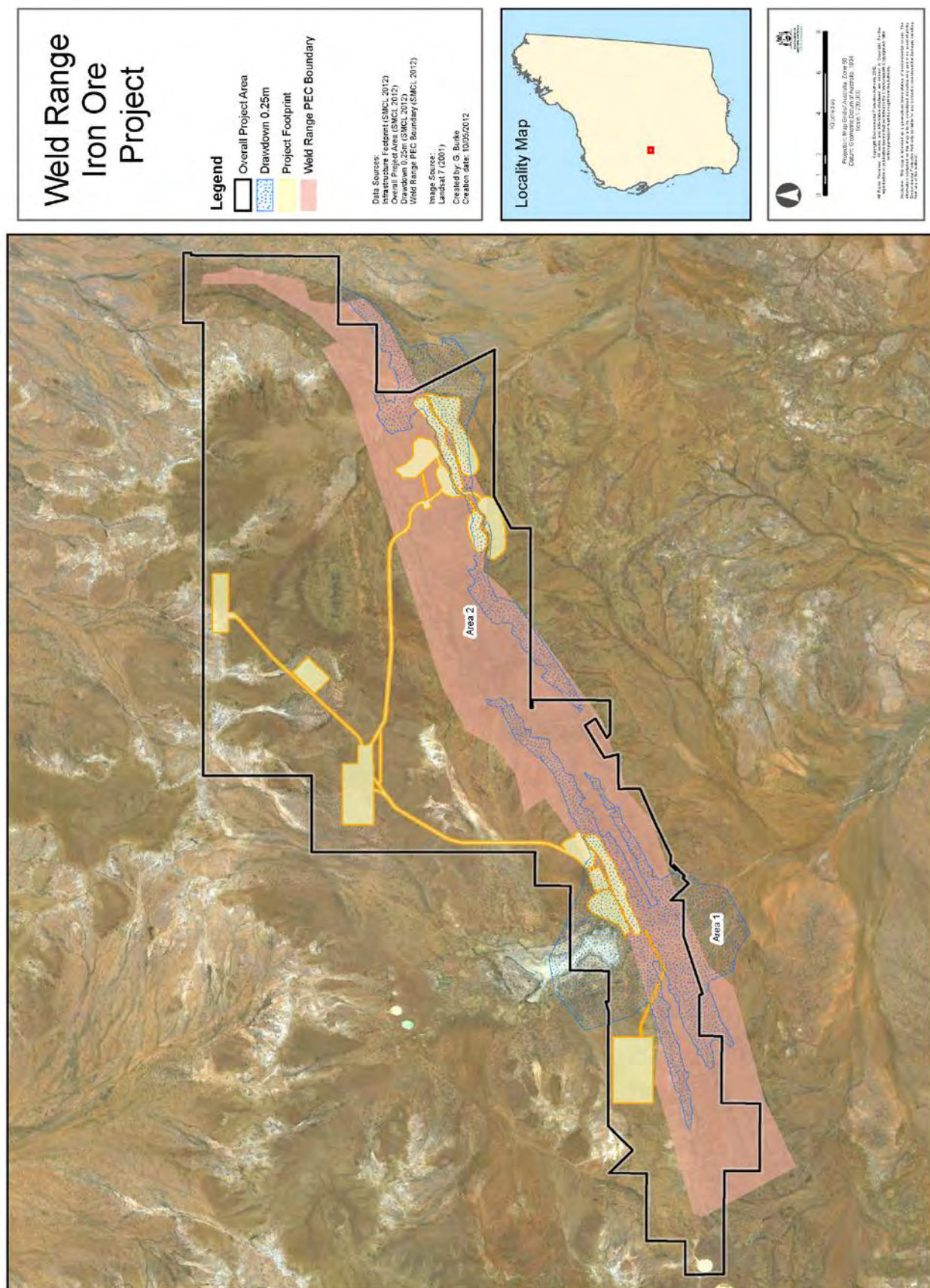


Figure 1: Weld Range impact boundaries

Appendix 5

Summary of Submissions and Proponent's Response to Submissions