

Dr Paul Vogel
Chairman
Environmental Protection Authority
Locked Bag 10
East Perth, WA 6892

25 September 2014

Your Ref: ER04-2013-0017

Dear Dr Vogel

RE: PROPOSED MODIFICATION OF THE BLUE HILLS IRON ORE EXPANSION PROJECT

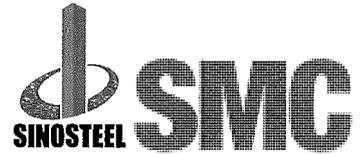
I refer to your letter dated 8 July 2014 requesting further information on the Blue Hills Expansion Project (**Proposal**) and clarification on the modification to the Proposal.

The EPA's preliminary view is the Proposal is environmentally unacceptable and the API (B) level of assessment should be applied. This view is supported by a Statement of Reasons (SoR). The SoR identifies that there are three preliminary key environmental factors for the Proposal:

- Landforms
- Flora and Vegetation, and Terrestrial Fauna
- Rehabilitation and Closure

The SoR then expresses preliminary conclusions that the Proposal cannot meet, or there is a high level of uncertainty regarding whether it can meet, the EPA's objectives for these factors.

As requested, SMC has collated further information on the modified Proposal to inform the EPA's decision on level of assessment. The attached report documents SMC's response to the SoR. SMC is firmly of the view its preliminary response provides cogent arguments and relevant information that goes to the key reasoning presented by the EPA in the SoR, warranting reconsideration of the appropriate level of assessment for the Proposal.



SMC is seeking the opportunity to work through a rigorous Public Environmental Review level of assessment, including detailed technical analysis, surveys and studies, as well as public participation. Such a process will define and refine the potential environmental impacts and risks associated with implementation of the Proposal so that an informed decision can be made by the Minister for Environment on whether the Proposal should be permitted to proceed. SMC respectfully requests the EPA to reconsider its position and allow the proposal to be assessed at Public Environmental Review level.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Phil Allsopp'.

Phil Allsopp
General Manager
Sinosteel Midwest Corporation Limited



Blue Hills Mungada East Expansion

Further Information

Prepared for
Sinosteel Midwest Corporation Ltd



DOCUMENT TRACKING

Item	Detail
Project Name	Sinosteel Blue Hills Mungada East
Project Number	14PERPLA-0021
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Abbreviations

Abbreviation	Description
BIF	Banded Iron Formation
DEC	Department of Environment and Conservation
DMP	Department of Mines and Petroleum
DoE	Department of the Environment (Commonwealth)
DPaW	Department of Parks and Wildlife
DSO	Direct Shipping Ore
EIA	Environmental impact assessment
ELA	Eco Logical Australia
EP Act	<i>Environmental Protection Act 1986</i>
EPA	Environmental Protection Authority (WA)
FCT	Floristic Community Type
GIOA	Geraldton Iron Ore Alliance
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
km	Kilometres
mAHD	Metres Australian Height Datum
MS	Ministerial Statement
OEPA	Office of the Environmental Protection Authority
PEC	Priority Ecological Community
PER	Public Environmental Review
SMC	Sinosteel Midwest Corporation Ltd
VIA	Visual Impact Assessment
WA	Western Australia
WC Act	<i>Wildlife Conservation Act 1950</i>

1 Background

1.1 Project history

Sinosteel Midwest Corporation (SMC) is developing and operating several iron ore projects in the expanding Mid West resources region of Western Australia (WA), including the Koolanooka/Blue Hills (Mungada) Direct Shipping Iron Ore Project (herein, DSO Project). The DSO Project involves the mining, crushing and screening of ore from three pits; one pit at the Koolanooka Iron Ore Mine (Koolanooka) [approximately 160 kilometres (km) south-east of Geraldton] and two pits (known as Mungada East and West, located on the Mungada Ridge landform) at the Blue Hills Iron Ore Mine (Blue Hills), approximately 60 km east of the Koolanooka site, as well as transport to the Geraldton Port (Figure 1).

The Blue Hills component of the DSO project occurs on the Karara Station, a former pastoral lease purchased with the Lochada, Kadji Kadji and Warriedar stations, to form a combined Conservation Park 109,291 ha in size. The purchased leases are under direct management by the Department of Parks and Wildlife, pending reservation.

The DSO Project was originally referred for assessment under the *Environmental Protection Act 1986* (EP Act) in April 2007 and was assessed at the level of Public Environmental Review (PER). In its original report and recommendations the WA Environmental Protection Authority (EPA) advised that it considered mining of Mungada Ridge as environmentally unacceptable; indicating that mining at Mungada East could not be managed to meet the EPA's objectives in relation to the conservation of biodiversity and ecological integrity (EPA 2009a). Key issues identified related to impacts on flora and vegetation; fauna; landscape and recreational values; and rehabilitation and mine closure. Following the provision of additional information relevant to these factors during the subsequent appeals process, State approval for the DSO Project was granted in November 2009 by way of Ministerial Statement (MS) 811. Additional expansions at Blue Hills have been considered and approved under Section 45C EP Act applications and MS 811 has been amended accordingly.

Project operations commenced at Koolanooka in April 2010; mining ceased in January 2014, crushing finished in March 2014 and road transport wound up in July 2014. Koolanooka Mine is now in care and maintenance and is now the subject of rehabilitation activities (SMC 2014).

Mining at both Blue Hills pits commenced in July 2013, with first production in September. The current approved mine schedule is for a three year operational period.

SMC is now pursuing further expansion of its existing operations at the Blue Hills component of the DSO project.

1.2 Compliance

SMC has submitted a Compliance Assessment Report for the Koolanooka/Blue Hills Project annually since November 2010 as per conditions in MS 811. In April 2014 SMC also submitted a Triennial Performance Review Report (SMC 2014). To demonstrate accountability in compliance reporting, SMC engaged independent consultants each year to audit compliance with conditions. On each occasion the external auditors found SMC to be in substantial compliance with no major issues identified. SMC has demonstrated ongoing compliance with conditions of environmental approval for the DSO Project.

1.3 Expansion Proposal

SMC has proposed further expansion of both Mungada East and West pits. The expansion was referred under Part IV of the EP Act on 30 August 2013, and on 10 April 2014 the EPA advised SMC in writing that it had formed a preliminary view that the proposal is environmentally unacceptable. As a result of subsequent meetings with the OEPA, it was decided approval for the Mungada West component of the expansion would be sought separately through an application under Section 45C of the EP Act, and this application was made on 15 August 2014.

The Mungada East component now forms the expansion proposal, requiring determination on the appropriate level of assessment by the EPA (herein, the Proposal).

Since the referral of both Mungada East and West pits for assessment under the EP Act in August 2013, there has been ongoing correspondence between the Office of the EPA (OEPA), the EPA and SMC. A summary of the key dates and correspondence exchanged is provided in **Table 1** below. Copies of the associated documents are provided on the CD included as part of the Further Information package.

Table 1: Summary of chronology and documentation relating to the Proposal

Date	Document	From	To
30 August 2013	Blue Hills Expansion Proposal Referral	SMC	OEPA / EPA
19 December 2013	DPaW comments on the Referral	EPA	SMC
31 January 2014	SMC response to DPaW comments on referral	SMC	OEPA
10 April 2014	Preliminary view that the proposal is environmentally unacceptable	EPA	SMC
14 May 2014	Response to EPA's preliminary view	SMC	EPA
29 May 2014	SMC request information for basis of EPA's preliminary view	SMC	EPA
10 June 2014	EPA request formal SMC response to preliminary view	EPA	SMC
17 June 2014	SMC advice on decision on how to proceed	SMC	EPA
8 July 2014	EPA response to SMC on how to proceed	EPA	SMC
15 August 2014	S45C application for Mungada West pit	SMC	EPA

The Proposal involves the construction and operation of one new mine pit at Mungada East, one waste rock dump, a processing plant and haul roads and associated access roads (**Figure 2**). Ore from the new pit will be processed at the new processing plant (located off the Ridge to the south-east of the pit).

Most of the waste rock from the new pit will be utilised to backfill the existing Mungada East pit (which will otherwise not occur), and the remainder will be stored in the new waste dump to be located immediately adjacent to the infrastructure area to the north (**Figure 2**). Only the pit, clearance boundary and a small area of haul road are located on Mungada Ridge itself. The majority of vegetation clearing associated with the Proposal will take place to the south-east (for the waste dump and processing plant).

The total area to be disturbed for the Proposal is 53.5 hectares (ha), which can be split into the following components:

- Access Road – 5.3 ha;
- Pit – 10.5 ha;
- Haul Roads – 7.3 ha;
- Processing plant – 11.3 ha;
- Clearance boundary (50 m buffer) – 8.1 ha; and
- Waste Dump – 11 ha.

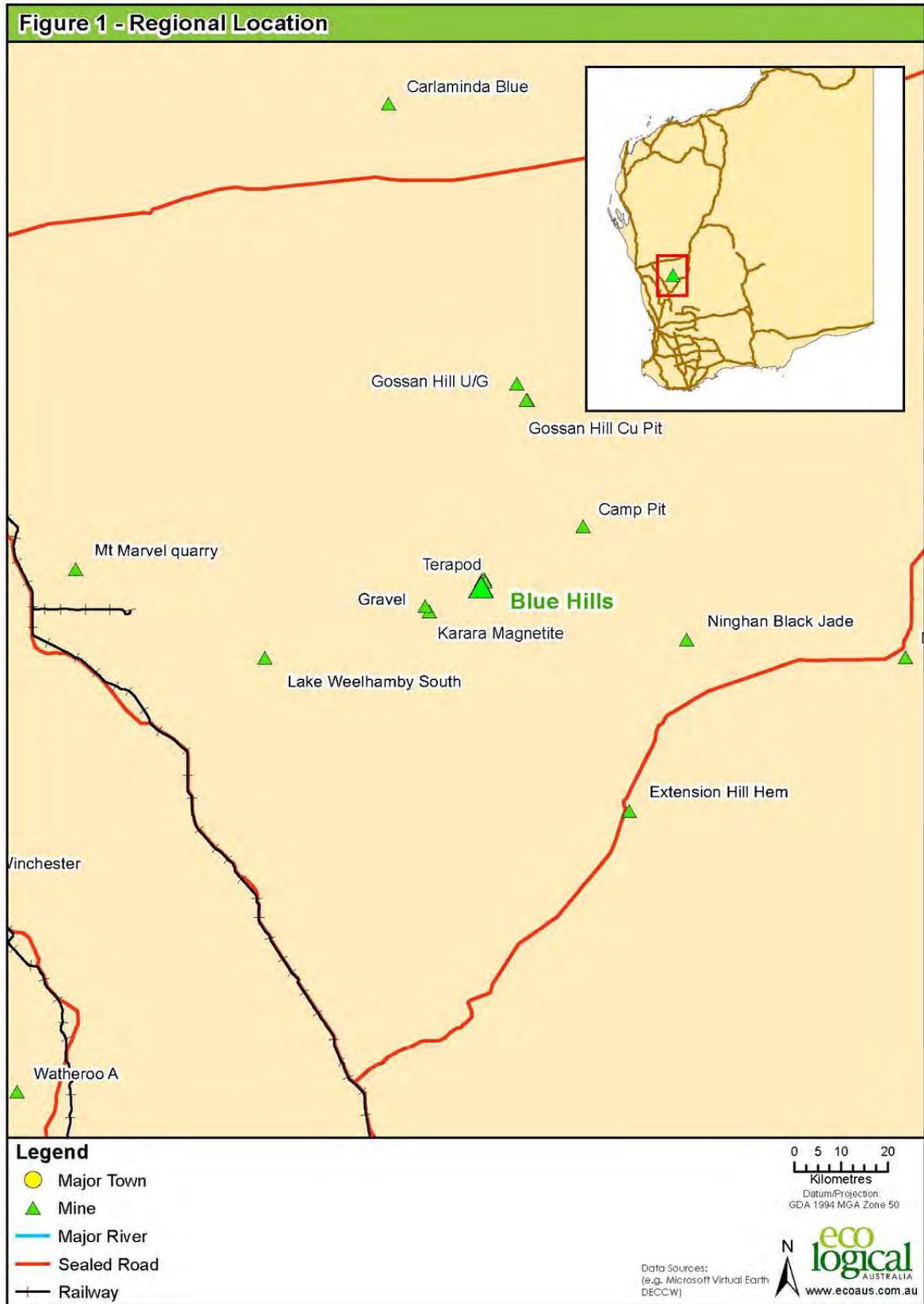


Figure 1: Regional location

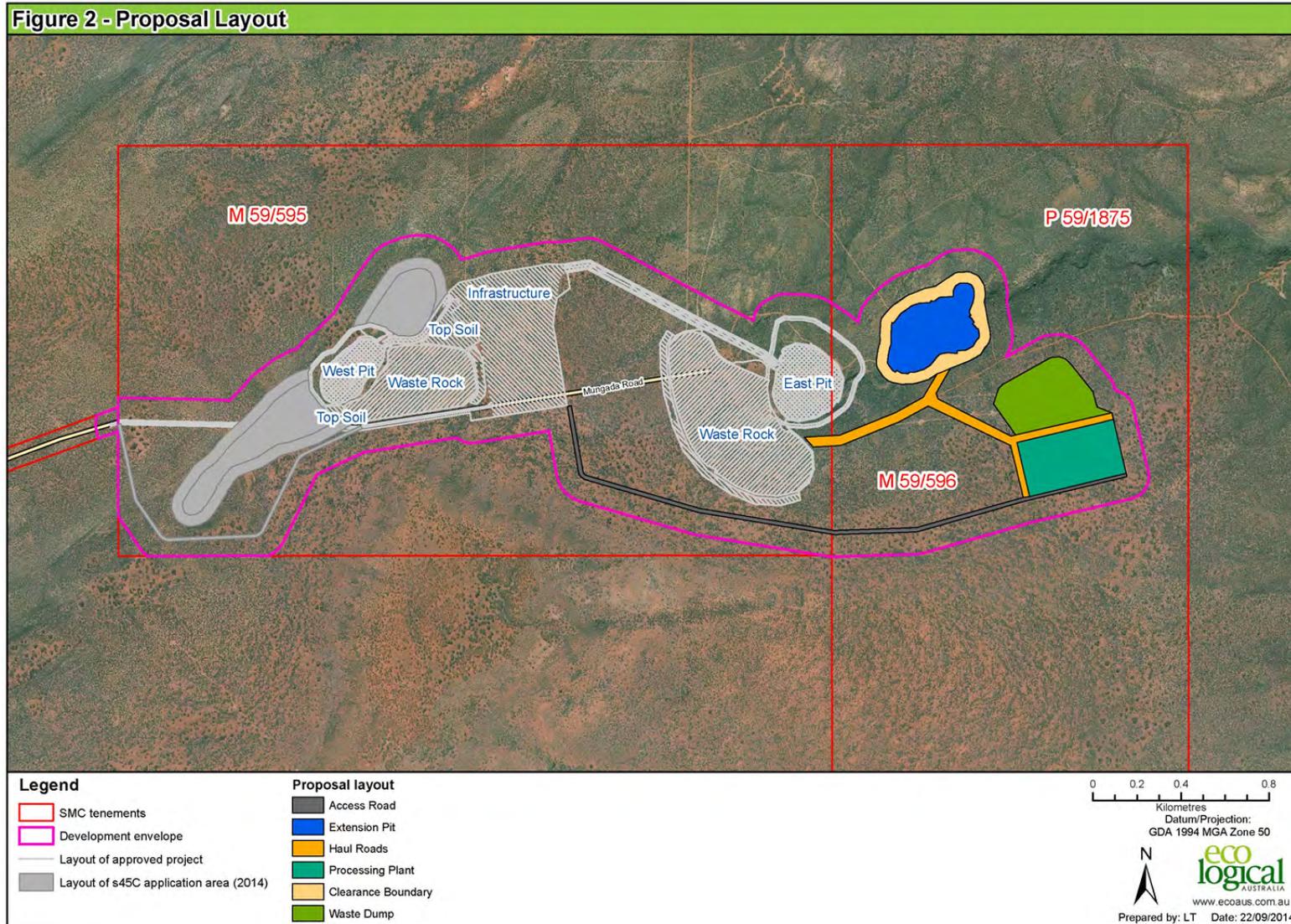


Figure 2: Proposal layout

1.4 EPA Concerns on key factors

The EPA advised it has formed a preliminary view that the Proposal, in its current form is environmentally unacceptable. The EPA's preliminary view is that the Proposal does not meet the EPA's objective for key environmental factors or Landforms; Flora and Vegetation and Terrestrial Fauna; and Rehabilitation and Closure for the reasons listed below.

Landforms:

- The proposal is located on the Mungada Ridge component of the Blue Hills Range; identified as one of the highest value Banded Iron Formation (BIF_ Ranges in the Yilgarn Craton
- The Mungada Ridge is recognised as having the greatest landscape and environmental values in the Blue Hills Range and is a priority for protection
- The proposal is for further removal and degradation of a significant portion of the Mungada Ridge, therefore the integrity and ecological function of the remaining Ridge cannot be maintained
- Once removed, BIF landforms and the environmental values they support cannot be restored.

Flora and Vegetation, and Terrestrial Fauna:

- The total impact to *Acacia woodmaniorum* has not been fully defined
- The Department of Parks and Wildlife (DPAW) has not verified the regional vegetation mapping
- Increased impact to *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468)
- Increased impact to *Cyclodomorphus branchialis*.

Rehabilitation and Closure:

- At present, there are no substantive examples of successful restoration and rehabilitation of mining areas on BIF Ranges
- There is no conclusive evidence that any endemic BIF plant species could be restored and no guarantee of the long term viability of the restored populations
- It is unlikely that additional studies or detailed assessment would lead to an outcome that would demonstrate that Landforms could be restored and rehabilitated.

1.5 Purpose and objectives

The purpose of this document is to present further information on the proposed Mungada East Expansion in response to the points listed above. The objective is to provide additional information to the OEPA to make a determination on the appropriate level of assessment under the EP Act. In meeting the purpose and objectives this document provides additional information and analysis in respect to the key environmental factors.

The analysis also includes specific discussion and reference to key reference documents including:

- Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields
- Publications by the Department of Environment and Conservation (DEC) / DPAW, on vegetation and flora
- Scientific (peer reviewed) articles on vegetation and flora

- Compliance, research and survey reports prepared for SMC.

2 Review of key information sources

From the Blue Hills expansion proposal, it is apparent from the 2012-2013 Annual Report (EPA 2013) that a significant concern exists for the EPA in that there are currently no BIF Ranges protected from mining development through secure (Class A) conservation tenure. The Annual Report states that The EPA is reviewing information in relation to the values of the Mungada/Karara/Koolanooka region which is also under development pressure, although the scope and status of this review is unclear.

From the comments made on the proposal and information publicly available it appears that the EPA advice regarding this project is predominantly based on the Strategic Review of the Banded Iron Formation Ranges of the Midwest and Goldfields (Department of Environment and Conservation [DEC] and Department of Industry and Resources 2007) including the Interim Status Report prepared by the DEC (2007). These documents will cumulatively be referred to as the 'BIF Strategic Review'. EPA correspondence on this proposal also refers to a journal article discussing plant diversity in ironstone ranges (Gibson et al 2012) as another source of information being used for decision making.

It is also apparent from both the EPA Annual Report and the recently released Section 16(e) advice on cumulative environmental impacts in the Pilbara region (EPA 2014a) that concerns exist regarding outcomes of rehabilitation from projects approved through formal impact assessment process. The Annual Report indicates that the approach based on setting environmental conditions on individual projects is failing to deliver the anticipated rehabilitation outcomes.

Discussion is provided below regarding the known and available key information sources and the manner in which they are being applied to consideration of this proposal.

2.1 Commentary on the BIF Strategic Review

As a component of preparing this additional information SMC sought independent advice regarding the Proposal in reference to the currency and status of the BIF Strategic Review (Talis 2014). This advice is provided in full as Appendix A and is summarised below.

2.1.1 Overview

The BIF Strategic Review report as prepared by the then DEC had the following objectives:

- *to the extent that available data allows, compile and deliver a strategic level understanding of the biodiversity values within the banded ironstone ranges;*
- *to explain the terms ecological and floristic communities and their application;*
- *to develop a framework and criteria for conservation and reservation decision-making;*
- *to commence comparative analysis of the relative biodiversity values of the individual ranges;*
and
- *where there is adequate information, provide strategic recommendations identifying options for proposed conservation reserves in the Midwest and Goldfields, based on assessment of banded ironstone areas that warrant protection via reservation in order to meet recognised conservation reserve system criteria for comprehensiveness, adequacy and representativeness.*

The nature of the BIF Strategic Review was to look at data that had been accumulated at the time of its preparation as well as provide some additional regional survey findings (over three months in 2005 across seven ranges including the Blue Hills Range) and provide some regional conclusions regarding potential for reservation of areas based on this data.

The BIF Strategic Review is a report that was targeted towards reservation of areas and is therefore written with that outcome in mind based on the information available at the time.

2.1.2 Currency and applicability of data

The BIF Strategic Review is now seven years old and while the report indicates there was an intention to update the document as additional information became available, this has never occurred. Decisions made by the EPA are therefore based on data that has been superseded.

The BIF Strategic Review was based on survey work completed in 2005 to supplement previous regional data and is unlikely to be as intensive or as robust as the work carried out by individual proponents in relation to their projects. Certainly the information provided within the Blue Hills region case study detailed in the BIF Strategic Review is a less intensive survey effort and data set than the work completed by SMC within the same region.

The BIF Strategic Review also makes particular reference to the value of adequate and appropriate information being available and an ongoing process of research and survey being conducted. It also refers to decision making taking into consideration the local and regional biodiversity and level of impact. The provision of additional site-specific information by SMC in relation to their proposal, including fieldwork over the project area, supports this approach.

At the very least, proponent data should be utilised to supplement the BIF Review, allow an update of the Review to be progressed and contribute to a review of its findings. There are certainly aspects to the BIF Review which have now been demonstrated to be out-dated based on the recent work completed by SMC and should be reconsidered in light of the new information.

2.1.3 Government policy and action

Since the completion of the report in 2007, very little action has been taken by Government to act on its findings and set areas aside for reservation. This would suggest that mining can still be considered on a case-by-case basis, utilising contemporary data, survey results and scientific analysis. Further to this, the reservation system also does not preclude mining from progressing, although it does ensure a more detailed level of environmental impact assessment (EIA) being pursued, generally under the Public Environmental Review (PER) process. Barrow Island is one example where exploitation of resources has been allowed to occur within a Class A Nature Reserve, the highest level of protection afforded under State legislation.

One of the conclusions of the Strategic Review is that “A minimum of 15% and up to 60% of the total number of ranges should be reserved in their entirety”. It is important to recognise that this advice covers the entire suite of BIF ranges, not individual ranges and whilst a number of sources have provided consistent advice, it would appear that this particular conclusion draws heavily from the *‘Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative (CAR) Reserve System for Forest in Australia’* (Commonwealth of Australia 1997) and detailed within the *‘Janis Report’*. This noted that “As a general criterion, 15% of the pre-1750 distribution of each forest ecosystem should be protected in the CAR reserve system.” It should also be noted however that this report recognised that “Reductions in the 15% criterion may also be appropriate on a case by case basis where biodiversity conservation objectives can be demonstrated to be met by a lesser area.”

As mentioned above, the BIF Review is very focused on reservation and the document notes that the State’s current reserve system incorporates 6.9% of WA’s land area, well below the target of 15%. Similarly, reservation values for the three IBRA regions covering the BIF areas (Murchison, Yalgoo and Avon), are all well below the 15% target. The current coverage for reservation does not constitute a definitive final position and these areas can and will no doubt increase. The question is how and where

such reservations should occur. This requires further information and detailed assessment which should be acquired from a range of sources, including site-specific ecological findings.

2.1.4 Analysis of the Proposal against BIF Strategic Review Recommendations

The recommendations of the BIF Review in reference to development proposals are:

1. *No development activity to proceed in the Yilgarn Craton BIFs that would result in the IUCN threat category of any given plant or animal taxa increasing. That is to say either:

 - a. *Initially not being listed as threatened under any category to being listed (the three IUCN categories for threatened species being Vulnerable, Endangered and Critically Endangered); or*
 - b. *increasing from Vulnerable to Endangered; or*
 - c. *increasing from Endangered to Critically Endangered.**
2. *No development activity to proceed in the Yilgarn Craton BIFs that would result in the increase of the IUCN Threat Category of any ecological community from:

 - a. *not being listed as threatened under any category to being listed; or*
 - b. *where already listed (or qualifying for listing) as a threatened ecological community, having its actual or recommended Threat Category increased from Vulnerable to Endangered; or*
 - c. *where already listed (or qualifying for listing) as a threatened ecological community, having its actual or recommended Threat Category increased from Endangered to Critically Endangered.**
3. *A minimum of 15% and up to 60% of the total number of ranges should be reserved in their entirety, protecting complete examples of the landform and ecosystem. Examples of the most outstanding BIF ranges should be protected in their entirety where development has not significantly progressed, eg Karara/Mungada/Blue Hills and the Helena-Aurora Range (consistent with recommendations in EPA Bulletin 1256). The initial objective should be to conserve 15% of ranges in their entirety. At the end of the three year DEC flora survey program, a further review should be undertaken to further define the list of ranges requiring reservation in their entirety, with the objective of achieving the 60% target objective of achieving the 60% target.*
4. *Conservation Reserves to include at least 60% of largely contiguous ecosystem/habitat for each of the key banded ironstone species and ecological communities which are restricted to the BIF ranges.*
5. *Subject to recommendations 1 and 2 above, the aim of detailed mine-site planning and assessment should be to maximise the protected area of any floristic community restricted to the BIF, or dependent on the BIF for its conservation.*
6. *Landscape, geodiversity, indigenous heritage values and potential for nature based tourism should be taken into account in developing a reserve system. State, national and international methodologies and criteria should be used for identifying areas of significant landscape, geodiversity, indigenous heritage and tourism potential for protection.*

Based upon currently available information, analysis of the Proposal against these six recommendations, as assessed by Talis (2014) is summarised below:

1. There are a number of criteria against which the IUCN threat category for species are considered and these cover specific requirements in terms of reduction of population size over defined periods, a reduction in the geographic range of the species as assessed against a range of criteria, a continuing observed decline of species numbers (based on initial low species numbers), a restricted or small population and a prediction of extinction within a defined timeframe. Based on current information it is concluded as being unlikely that the criteria would

- be triggered for either species and consequently unlikely that an increased threat category would result should the Proposal proceed.
2. There are similarly specific criteria in relation to the IUCN threat categories for ecological communities, which will not be triggered by the Proposal. That is the Proposal would not result in an increased IUCN category for any ecological community.
 3. The recommendation related to the reservation of proportions of BIF ranges is the responsibility of the State Government to implement and for proponents to be cognisant of the principle. Since the BIF Review was prepared, development has occurred within the Karara/Mungada/Blue Hills area such that reservation of these areas in their entirety, as recommended, is now no longer feasible. This demonstrates that the recommendation in terms of future development was not effectively endorsed, otherwise mining would not have been allowed to proceed.
 4. The technical work completed by SMC demonstrates that the cumulative impact from project development will retain greater than 60% of largely contiguous ecosystem/ habitat for each of the key banded ironstone species and ecological communities associated with the Mungada Ridge and therefore the Proposal aligns with this Recommendation.
 5. As outlined in the SMC technical documentation, a considerable array of technical detail has been provided in terms of the mine plan and assessment of impacts such that the areas of potential impact have been minimised as far as practicable. Notably in this regard, the Endemism Report (ecologia 2013) suggests limited, if any, local endemism for the key species and communities in question, thus demonstrating the impact of the Proposal to be less than what would be thought if relying solely on the BIF Review.
 6. There is no reserve system currently in place and, as such, SMC is unlikely to be required to satisfy any criteria in relation to the determination of a reserve system. This recommendation is not supported by technical data within the BIF Strategic Review. Additional studies are proposed as part of the assessment process which will add further value to the technical support for the project. This aligns with the recommendations within the BIF Review to conduct further site-specific assessment.

The BIF Strategic Review also presents a number of case studies including the Blue Hills area. It is clear in relation to each case study that the findings are very much based on a broad assessment based on limited and regional survey and assessment work. The assessment covered in the review is also not site-specific and covers a wider range of areas than just Mungada Ridge.

The BIF Strategic Review therefore draws few conclusions in relation to the key species of concern, being *Acacia woodmaniorum* and *Lepidosperma* sp. Blue Hills other than to note that further work and intensive surveys are required to determine actual population distribution, density and sizes. This has been undertaken by SMC and will continue to occur during any formal EIA process.

At no stage does the information contained within the case study for the Blue Hills area suggest that further mining cannot proceed. To the contrary, it recognises the likelihood of further proposals being considered but advises that the BIF Strategic Review is not a suitable instrument through which to base an assessment. Additional intensive and site-specific work is recommended to demonstrate the overall impacts (project and cumulative) of any proposal and this has been and will continue to be completed by SMC.

2.2 Plant Diversity in Ironstone Ranges (Gibson et al 2012)

Previous EPA advice on landform refers to the article by Gibson et al 2012 and states that it identifies three particularly important BIF areas, implying that this includes the Blue Hill Range. The article in

question appears to refer to two 'hot spots' for concentrations of specialist ironstone species, these being centred on the Helena and Aurora Range and the Koolanooka Hills. The article does not make specific reference to the Blue Hills Range, the data for which is included in and reported under the central Talling Land System (Markey & Dillon 2008). The central Talling Land System data appears to be the same data used in the Interim Status Report (DEC 2007) where it is discussed as the Blue Hills Range.

It is also noted that the Gibson et al 2012 article makes the following comment on conservation requirements:

“...a comprehensive reserve network would require the inclusion of part of all the ranges in the formal conservation reserve system. In terms of composition there are no clear priorities for reservation since vegetation on each range is unique.”

It is understood from the BIF Strategic Review that the recommendations relate to Ranges in their entirety and not to discrete features within any Range. In this regard, the Blue Hills Range includes the landscape features of Mount Karara, Blue Hills and Mungada Ridge. Part of the justification for selection of the Blue Hills Range as a conservation priority was that at the time of the BIF Strategic Review the Range was considered intact and protectable. Subsequent decisions on mining proposals have resulted in development of and impacts to locations within the Blue Hills Range, other than Mungada Ridge, and it is questionable that this Range can now be considered to be intact.

The article indicates that data collected to contribute to the 2007 BIF Strategic Review, but not included at that time, has undergone additional analysis. This reinforces the position that the 2007 analysis and conclusions were based on incomplete data analysis.

2.3 Flora and Vegetation Endemism at Mungada Ridge

In response to the surveys and analysis undertaken by the DEC and related EPA concerns, SMC commissioned ecologia Environment to revise available data regarding the potential concentration of ironstone flora species and vegetation communities (ecologia 2013a).

A total of 24 reports and the DPaW Threatened and Priority Flora database search, Threatened and Priority Ecological Community database search, WA Herbarium database search, Threatened and Priority Flora Species list were reviewed for the purpose of the assessment.

Based on the species list obtained from all reports and database searches reviewed, a total of 76 conservation significant taxa from 52 genera and 30 families were identified. Seven of these are listed as Threatened, 23 as Priority 1, seven as Priority 2, 36 as Priority 3 and three as Priority 4.

Acacia woodmaniorum is the only species determined to endemic to the local region, although is not strictly endemic to Mungada Ridge.

One Priority 1 PEC, Blue Hills (Mount Karara/Mungada Ridge/Blue Hills) vegetation complexes (banded ironstone formation) occurs over Mungada Ridge, although is not endemic to the ridge, with representation extending up to 20 km to the north and south, 7 km to the east and 16 km to the west. Mungada Ridge occupies 1.2% of the DPaW database search area for the PEC. However, this area of occupation also includes buffers and the actual extent of the PEC area is likely to be less. Two of the FCTs that contribute to the Blue Hills vegetation complexes PEC (Woodman FCT 1 and 4) have more than 15% of their extent on Mungada Ridge. However, neither of these FCTs, nor any other FCTs represented on Mungada Ridge are endemic to the Ridge.

2.4 Availability of Regional Information

As indicated in the EPA Annual Report there are 14 of the approximately 32 BIF Ranges currently being mined and many others the subject to exploration (EPA 2013). Due to the number of approved projects in operation, or within or intending to commence assessment processes, there is a substantial quantity of data being collected across the Yilgarn Craton by an array of stakeholders. The majority of this data is not currently available in a manner suitable to contribute to a shared and agreed understanding of regional context and environmental values.

In this regard, the Geraldton Iron Ore Alliance (GIOA) has been formed from a group of companies with iron ore deposits in the Geraldton / Mid West area. The vision of the GIOA is:

To position Geraldton Iron Ore Alliance members' iron ore projects as a valued and sustainable industry delivering social, economic and environmental benefits to the Mid West and be acknowledged as a strong contributor to vocational education and training, and a catalyst for infrastructure development.

GIOA has an Environment Committee and Board which as a component of addressing regional data deficiencies has developed an Environmental GIS Database Project initiative. This initiative will facilitate sharing, amalgamation and consequently analysis of environmental data not currently possible. This project is anticipated to include data on rehabilitation, mining footprints, ground disturbance, survey areas with related reports and data, heritage information, exploration activities, tenure and cumulative impact of operations.

The availability of environmental information, including that on biodiversity values and rehabilitation efforts, will facilitate a more informed analysis of key environmental factors of concern to the EPA.

3 Landform

3.1 EPA Objective

The EPA's objective for this factor is: *to maintain the variety, integrity, ecological functions and environmental values of landforms and soils.*

3.2 Discussion on EPA Concerns and Assessment Approach

The following stated concerns will be addressed within this section:

- The proposal is located on the Mungada Ridge component of the Blue Hills Range; identified as one of the highest value BIF Ranges in the Yilgarn Craton
- The Mungada Ridge is recognised as having the greatest landscape and environmental values in the Blue Hills Range and is a priority for protection
- The proposal is for further removal and degradation of a significant portion of the Mungada Ridge, therefore the integrity and ecological function of the remaining Ridge cannot be maintained
- Once removed, BIF landforms and the environmental values they support cannot be restored.

There are no specific policies or guidance pertaining to aspects of the objective for this factor. Some parameters therefore need to be placed upon aspects of the factor in order to respond to the stated concerns in an objective manner.

Landforms are an expression of the processes, past and present, acting on the landscape in which they occur. A landform is highly visible in the landscape and can be recognised from maps (topographic) or other imagery (Pain 2008).

The Blue Hills component of the DSO project is so called as it occurs on the Blue Hills Range. The Blue Hills Range is one of a number of BIF ranges of the Yilgarn Craton. The EPA has previously defined the Blue Hills Range as comprising Mt Karara, Mungada Ridge and the adjoining Blue Hills (EPA 2009b).

Mungada Ridge is therefore the landform affected by the proposal. In regard to landform as a key environmental factor, the pertinent aspects of the EPA concerns are therefore considered to be landscape values, landform integrity and ecological function.

The approach to the proposed assessment in context of the value being impacted and the EPA's concerns are further discussed below.

3.2.1 Value of the Blue Hills Range

SMC acknowledges that Mungada Ridge is within the broader Blue Hills Range that has been previously identified to have very high biodiversity conservation values. That the Blue Hills Range (including Mungada Ridge) is of biodiversity value is not in question, however the relative value of the BIF Ranges of the Yilgarn Craton has not been definitely established.

It is noted that the Interim Status Report Biodiversity Values and Conservation Requirement undertaken by the then DEC (2007) was based on results of the first of three years of planned survey effort on BIF ranges in the Yilgarn Craton with a specific focus on the Midwest and the Goldfields. The Interim Status

Report indicated that further investigations were being undertaken and were required to completely define values, to be followed by revision of conservation reserve proposals. This process does not appear to have been undertaken. While additional survey results for individual ranges surveyed have been compiled and are publicly available, no overall analysis of results with a consequent re-consideration of comparative values and reservation priorities at a strategic level appears to have occurred. This must occur before definitive views on the values and conservation significance of Mungada Ridge can be expressed.

The objective for the Landform factor is to '*...maintain... environmental values of landforms and soils.*' In this context the approach to assessment will be in reference to the ability of the landforms and soils to continue to support environmental (specifically biodiversity) values. This is also pertinent in reference to EPA Guidance on rehabilitation, where landform is considered an abiotic parameter (EPA 2006).

The environmental or biodiversity values of cleared vegetation will therefore be addressed in reference to:

- Flora and Vegetation and Terrestrial Fauna - in reference to impacts from clearing
- Rehabilitation and Closure - in reference to post-mining environmental (biodiversity) values to be achieved.

3.2.2 Landscape values

The EPA advice also refers to Mungada Ridge as possessing the greatest landscape values in the Blue Hills Range in terms of relief and structure, however the source of the assessment is not referenced and is consequently subjective in nature. It is not clear in the BIF Strategic Review and supporting DEC document that any systematic assessment of landscape or amenity values has been undertaken individually or comparatively across the BIF Ranges of the Yilgarn. There is no reasonable basis for broad conclusions regarding the landscape values, or the comparative landscape values, of Mungada Ridge to be drawn without such an assessment having occurred.

In this regard it is noted that Landform is a preliminary key environmental factor for the Polaris Metals Pty Ltd proposals for the Jackson 5 Low Impact Drill Program on M77/1095 and requires assessment. The Environmental Scoping Document for this proposal requires that:

Design and implement a visual impact assessment (VIA) for both before and after the proposed exploration activities; including aerial photographs and photographs from adjacent highpoints. Reference points are to be agreed on advice of the Department of Parks and Wildlife. The VIA shall give consideration to; defining the scope and context of the assessment, describe and evaluate the visual landscape character, describe the potential visual impacts from viewing areas and detail any management or mitigation measures to be taken.

In light of the precedent set for assessment of landscape values, SMC has commissioned Ecoscape to undertake a Visual Landscape Evaluation, consistent with the WA Planning Commission's (WAPC) visual landscape planning manual (WAPC 2007). The landscape evaluation is the first stage of the assessment and will proceed to a VIA as a component of formal impact assessment. This will provide an objective assessment of the landscape values and the impacts of the proposal to allow informed decisions to be made.

3.2.3 Integrity and ecological function

As landform is the expression of processes acting on the landscape, integrity and ecological function can be assessed in reference to the integrity of those processes and how they influence ecological function. Slope, topography, drainage and related geomorphological processes can be considered and consequently likely changes to ecological function can be assessed.

Assessment can be undertaken in reference to indicators of supporting processes (biotic and abiotic) not being maintained. The following aspects can therefore be assessed as indicators of integrity and ecological function:

- representative species composition and abundance
- no change in diversity, distribution and abundance
- dispersal mechanisms (pollination, seed/propagule dispersal)
- genetic diversity across ridge
- corridors for wildlife
- soil development and nutrient cycling
- hydrology
- rates of erosion.

Examples of how impact on integrity and function can be considered in an impact assessment context are provided in **Table 2** below.

Table 2: Landform integrity and ecological function in impact assessment

Indicator of integrity and function	How can potential impact be measured and assessed	Adaptive management response (if potential significant impact)
Representative species composition and abundance	Flora and fauna surveys along the ridge to ensure species composition and abundance is not unacceptably altered – and that any change can be directly attributable to the action and not climate, disease etc.	Rehabilitation and translocations if deemed necessary.
No change in the diversity distribution and abundance of ferals/weeds	Survey-based monitoring program	Control measures easily employed if increased diversity and distribution recorded
Dispersal mechanisms, genetic diversity	Knowledge of dispersal mechanisms. Will the presence of a project footprint limit dispersal?	Change / increase intervention in response to monitoring outcomes. Rehabilitation and translocations if deemed necessary.
Hydrological/catchment processes intact (surface hydrology, rainfall infiltration/groundwater recharge), no anthropogenic erosion	Digital elevation and 3D modelling of post-mining morphology Monitoring of erosion/runoff patterns.	Control measures easily employed.

Appropriate fire regime	Report frequency/intensity of fire against fire history.	Fire management plan
Soil development/nutrient cycling processes unaffected by mining	Monitoring of soil parameters is component of rehabilitation success	Change / increase intervention in response to monitoring outcomes in reference to agreed completion criteria

3.2.4 Restoration

The EPA objective for Landform is to maintain the variety, integrity, ecological functions and environmental values of landforms and soils. The objective is not to prevent modification to landform and soils from a proposed action. Nor does the objective or any existing policy require the restoration of landform and environmental values to pre-impact conditions. The statement regarding restoration can be interpreted that the EPA has taken a position that any mining of BIF landforms is unmanageable. This position is inconsistent with the history of mining approvals in BIF areas, including SMC's currently approved project.

The approach to Landform is consistent with EPA Guidance Statement 6 (EPA 2006) in that restoration is not an objective, however rehabilitation is. In reference to Landform the objective will be to establish stable landform, soils and hydrological processes that can support a self-sustaining native plant community that is as close to the original as possible. This is also consistent with the approach to existing conditions applied under Ministerial Statement 811, which exist to ensure SMC rehabilitates the landscape to a standard which will ensure the environmental values of the ridge are maintained in the future. This approach has been previously acceptable as a managed response to impacts on mining of BIF landforms and it is unclear why a similar approach cannot be adopted in this case, following detailed assessment of the Proposal.

SMC is committed to ensuring the environmental values of the Ridge are maintained and is undertaking a five year rehabilitation project at the Koolanooka, Blue Hills and Weld Range project areas. In addition SMC has undertaken data collection and analysis regarding hydrology and soils in order to provide the necessary inputs to closure and rehabilitation planning. SMC's rehabilitation project is in progress and is being undertaken by the Botanic Parks and Gardens Authority (BPGA), Science Division, to ensure the best possible information is available to inform SMC's rehabilitation activities.

Previously collected and new data, in combination with research results will be used to inform the SMC's future approach to rehabilitation of disturbance associated with the Proposal, consistent with EPA Guidance Statement 6 and Mine Closure Guidelines and is discussed in the Closure and Rehabilitation factor.

3.3 Impacts of Proposal

Mungada Ridge is 492 m AHD in height at its highest point in the landscape and covers an area of approximately 578 ha. The new Mungada East pit is located on the southern face of the ridge and covers an area of approximately 10.5 ha with an associated clearance boundary of 8.1 ha. The new pit is approximately 508 m across in a north-east to south-west direction and approximately 375 m across in a north-west to south-east direction and would take up approximately 3.2% of the total area of the ridge.

Impacts to the Mungada Ridge landform will result from the mining component of the proposed expansion. It is proposed that the waste rock from the new Mungada East pit will be utilised in backfilling the existing pit which can then be rehabilitated. The new pit, waste rock dump and supporting infrastructure will result in the clearing of 53.5 ha of vegetation (see Section 4).

3.3.1 Preliminary terrain and hydrology assessment

For the purposes of developing this further information, Eco Logical Australia (ELA) did some preliminary modelling of the impact of the proposed development on terrain, with preliminary consideration of post-development surface hydrology.

Generation and Modification of Impact of Proposed Development on Terrain

A Triangular Irregular Network (TIN) file representing the raw surface morphology of the study area and surrounding ridge prior to operations was provided by SMC. Additionally, a TIN of the existing and proposed pits was provided. In order to visualise the impact of the proposed development on ridge surface, elevation data embedded in the existing and proposed pit TIN data was extracted and used to 'cut' into the surface embedded in the raw surface TIN. This was achieved using ArcMap 10.2 in several steps:

1. 'Surface Contour' tool used to extract contour lines (2m interval) from raw terrain and existing and proposed pit TIN data;
2. 'Erase' tool used to remove all contour lines from raw terrain contours that intersected existing and proposed pit footprints;
3. 'Merge' tool used to embed existing and proposed pit contours into those areas removed in step 2; and
4. 'Create TIN' tool used to generate a new TIN using the contour lines generated in step 3.

This process generated a new TIN file that represented the surface morphology of the study area with the inclusion of impacts to terrain resulting from existing and proposed pit development. A high resolution aerial image of the area was 'draped' over the TIN and was visualised in 3D using ArcScene 10.2.

Indicative images of the dimensions of the existing and proposed pits have been prepared to visualise the impact to Mungada Ridge as a result of the existing and proposed development, namely the existing and proposed Mungada East pits. It is acknowledged that the remaining components of the Proposal and existing disturbance, including waste dumps and processing infrastructure, contribute to the overall impacts. However, for the purpose of this further information, these figures are preliminary and only include the pits as these form the direct impact to Mungada Ridge (the landform) itself.

The indicative images are shown in **Figure 3** to Figure 5. These figures also illustrate the locations and density of *Acacia woodmaniorum*.

Generation of Drainage before and after Proposed Development

Impacts to drainage lines were assessed both before and after proposed development. This was achieved using the 'Arc Hydro Tools 10.2' tool package provided by ESRI. The final output from this process was a dataset of drainage lines before and after proposed development. The process followed the following steps:

1. 'Topo to Raster' tool was utilised to create a 'Surface' digital elevation model (DEM) from the before and after proposed development contour lines generated above. This DEM is required to generate drainage flow direction and accumulation datasets used to derive drainage data.

2. Each DEM inspected and corrected for 'sinks' using the 'Fill Sinks' tool. Sinks are defined as any raster cell that is surrounded entirely by higher elevation cells. Failure to remove sinks causes an inaccurate model output as simulated water collects in these sinks and prevents accurate flow accumulation modelling.
3. Flow direction was generated using the 'Flow Direction' tool and each DEM as input. Flow direction is a key component of deriving hydrological characteristics of a surface. Every raster cell (representing elevation) in the input DEM is inspected in relation to each surrounding raster cell, ultimately creating a raster of flow direction values from each cell to its steepest downslope neighbour.
4. Flow accumulation was generated using the 'Flow Accumulation' tool with each flow direction raster used as input. This tool calculates accumulated flow as the accumulated weight of all surrounding cells flowing into each downslope cell. Cells with a high flow accumulation value are areas of concentrated flow and are used in the model to identify stream channels.
5. Flow direction and accumulation rasters were used as inputs into the Stream Definition tool with the default number of cells used as a third input (1% of the overall survey area). This tool was used to identify significant streams networks from within the flow accumulation raster (i.e. remove minor and insignificant drainage line offshoots from major drainage).
6. Finally, drainage line data was developed using the stream definition and flow direction rasters using the 'Drainage Line Processing' tool. This resulted in a polyline vector representing significant drainage lines for the survey area.

Comparison of the resulting drainage vector lines from the Arc Hydro Tools 10.2 process resulted in near identical drainage channels for the affected area. Only a small diversion to drainage could be observed as a result of the additional proposed pit.

3.4 Avoidance, mitigation and management

Significant avoidance mitigation has been undertaken in formulating the Proposal prior to referral in 2013. It is likely further mitigation can and will be identified and undertaken as further detailed planning occurs and as an outcome of a formal EIA process. As per the approved DSO project SMC will continue to investigate methods to avoid and mitigate disturbance to the landform as the project proceeds.

Establishment of post-mining landscape will be consistent with an updated and approved Closure Plan, in combination with rehabilitation actions as per a revised Blue Hills Revegetation strategy.

3.5 Outcome and conclusions

Landform can be assessed in reference to interaction between the topography and soils and ongoing geomorphic processes in combination with aspects of visual amenity. It is SMC's view that the variety, ecological functions and environmental values of landforms and soils can be maintained across the majority of Mungada Ridge. There will be temporary disturbance to the Ridge, however the landform and ecological function within this disturbance area can be re-established, albeit in an altered form, such that the disturbance does not significantly affect the broader landform's ability to maintain existing functions and environmental values.

SMC recognises that Mungada Ridge has biodiversity values that require careful management. However, as the cumulative impact to the landform of Mungada Ridge is anticipated to be less than 3.2% of the total feature, it is unlikely this level of impact will result in Mungada Ridge being unable to continue to support significant environmental values.

It is SMC's preliminary view that the impacts from the Proposal can be managed such the ecological function and environmental values of the landform are not significantly impacted.

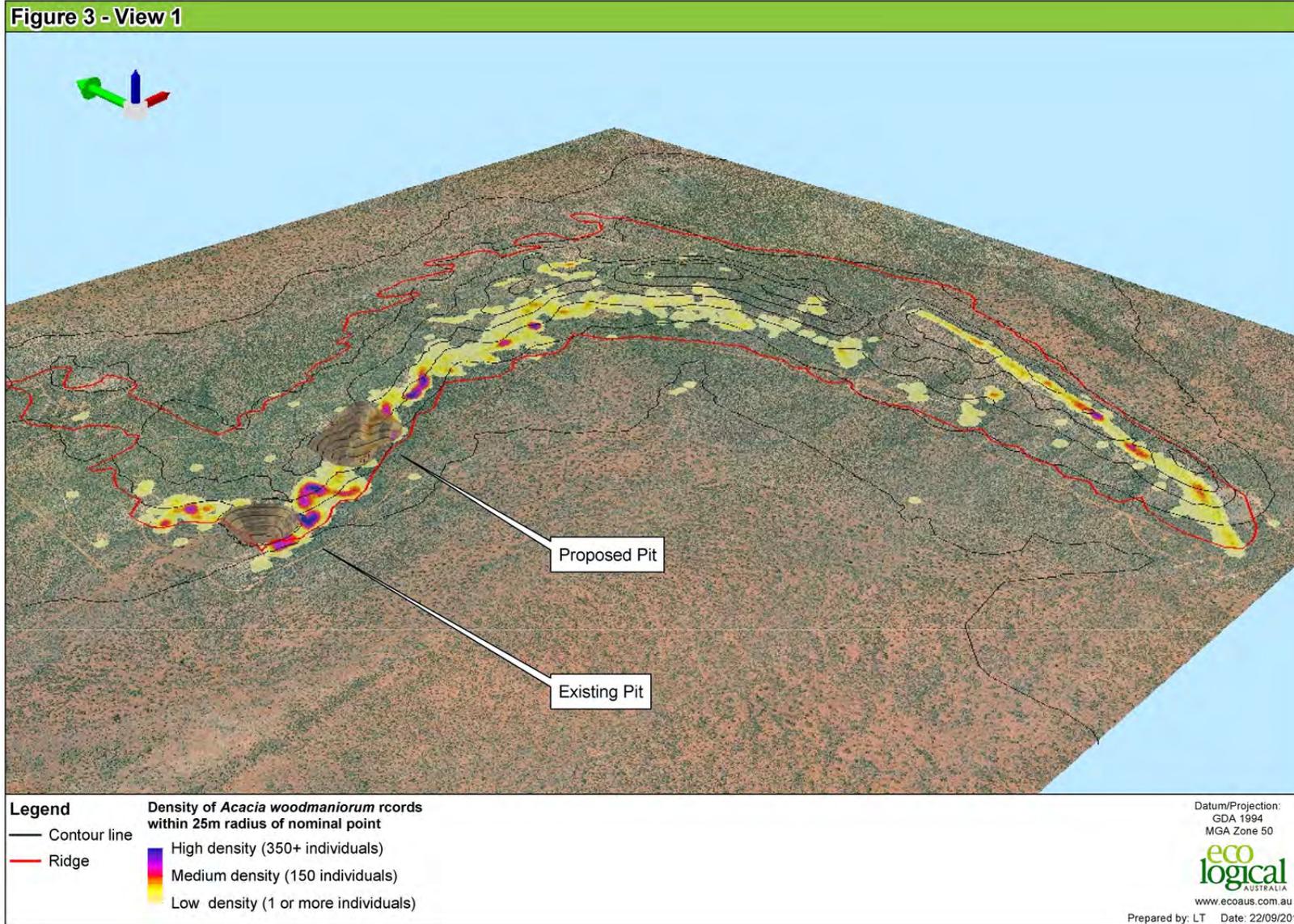


Figure 3: Mungada Ridge View 1

Figure 4 - View 2

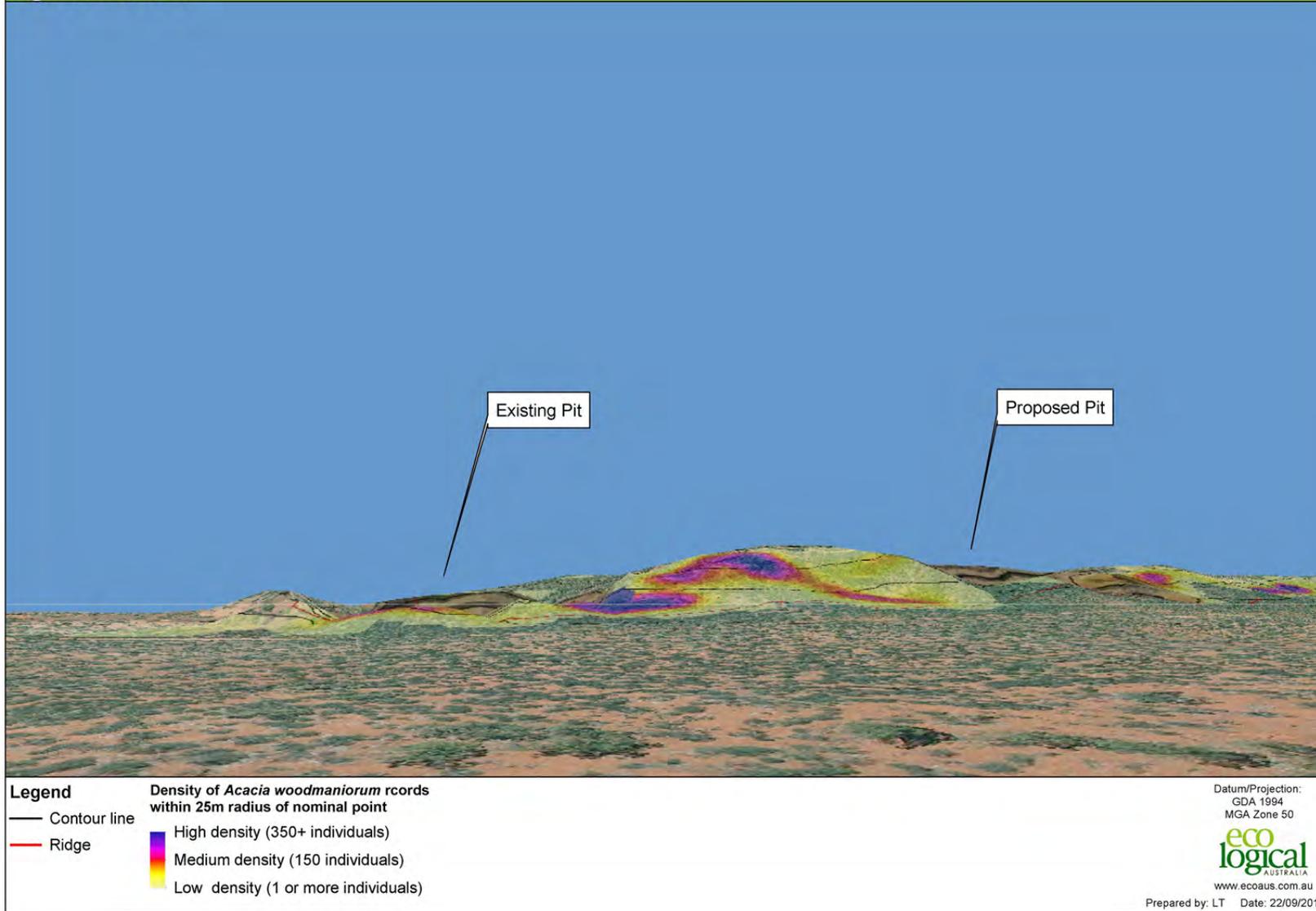


Figure 4: Mungada Ridge View 2

Figure 5 - View 3

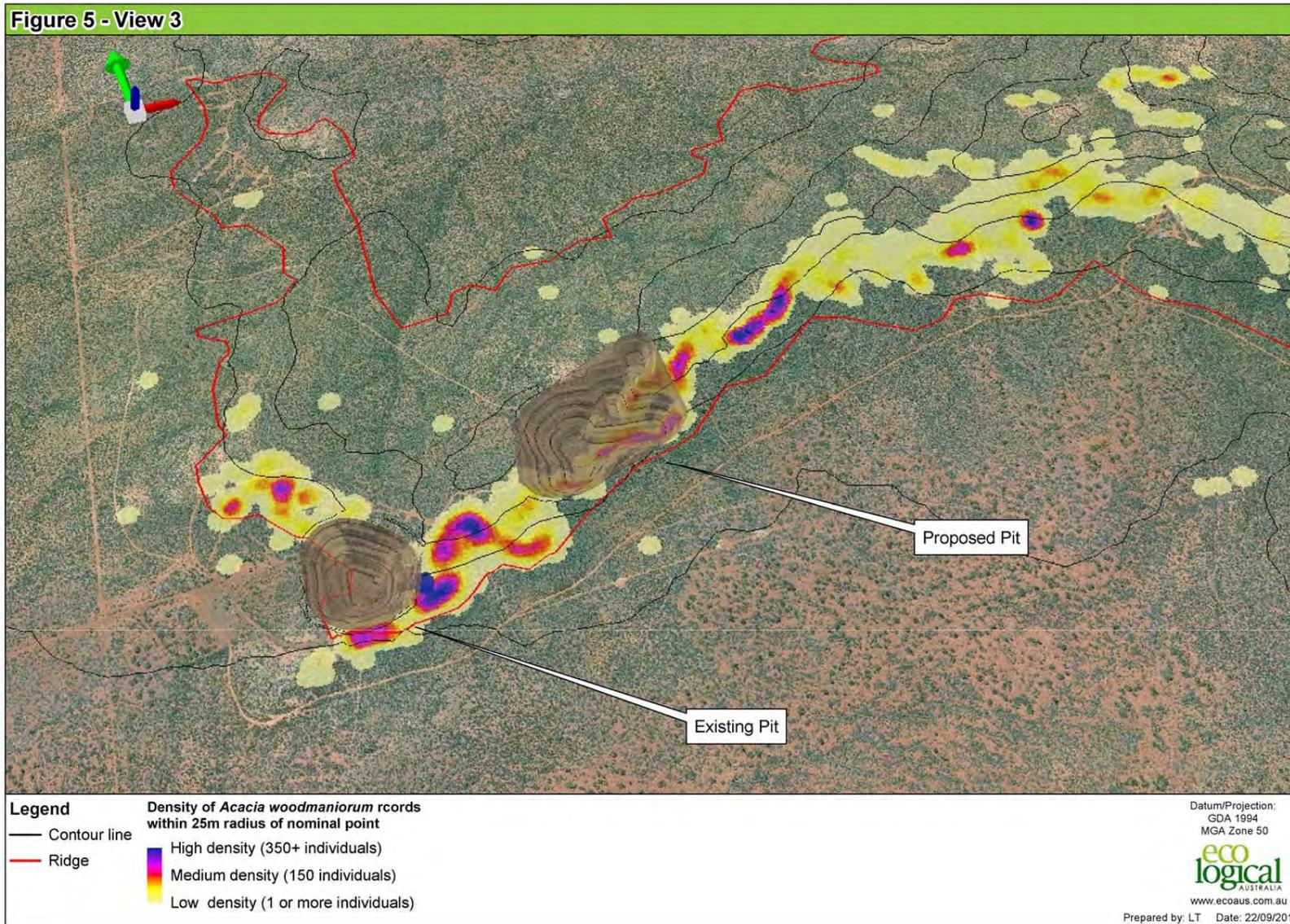


Figure 5: Mungada Ridge View 3

4 Flora and vegetation

4.1 EPA Objective

The EPA's objective for flora and vegetation is: *to maintain representation, diversity, viability and ecological function at the species, population and community level.*

4.2 Discussion on EPA Concerns and Assessment Approach

The following stated concerns will be addressed within this section:

- The total impact to *Acacia woodmaniorum* has not been fully defined
- Increased impact to *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468).
- The Department of Parks and Wildlife (DPaW) has not verified the regional vegetation mapping.

There has been substantial survey effort by SMC and other companies to define flora and vegetation values in the Blue Hills Range. Consequently there is now a considerable amount of data available regarding the location and extent of both *Acacia woodmaniorum* and *Lepidosperma* sp. Blue Hills.

It is noted that DPaW has previously provided advice to the EPA regarding knowledge and status of both these species and that there are discrepancies in and disagreement regarding information and assessments undertaken by consultants on these species.

Dialogue and agreement with DPaW is required regarding currency and accuracy of data and agreement regarding definition of population boundaries in order to place the impact assessment into an agreed context and to test statements regarding the potential for the proposal to change either species' International Union for Conservation of Nature (IUCN) threat category ranking.

In this respect, further surveys have recently been undertaken on SMC's tenements on Mungada Ridge providing additional and recent data on *A. woodmaniorum* and *Lepidosperma* sp. Blue Hills.

A recently published journal article presents new information on pollen dispersal and the mating system of *A. woodmaniorum* (Millar et al 2014) which would be pertinent to further definition of impact to the species. It is also noted that Karara Mining Limited has been undertaking recovery actions for *A. woodmaniorum* and is currently developing a Translocation Plan in consultation with DPaW for rehabilitation purposes.

A full analysis of the latest *A. woodmaniorum* data for Blue Hills (together with any further survey data to be gathered) and application of the findings of Millar et al. (2014) to the assessment of impacts to *A. woodmaniorum* from the Proposal would be undertaken as part of a formal EIA process. A full analysis of the latest *Lepidosperma* sp. Blue Hills data for Blue Hills (together with any further survey data to be gathered) would be undertaken as part of a formal EIA process.

In reference to total impact on both species, assessment of cumulative impacts to *A. woodmaniorum* and *Lepidosperma* sp. Blue Hills would be conducted during a formal EIA process to account for impacts to the species from other mining proposals.

Additional data and cumulative impact figures would be used to fully define the impact to both species and to assess the risk of any changes to either species' International Union for Conservation of Nature (IUCN) threat category.

Woodman Environmental Consulting (Woodman 2012) mapped thirty-two Floristic Community Types (FCTs) for the Karara to Minjar Block region through a regional flora and vegetation survey, and of these eight occur in the Proposal area. The Woodman (2012) assessment was undertaken to map vegetation communities associated with BIF within the regional survey area and to incorporate previous DEC and Woodman assessments from the area, additional quadrat-based survey and statistical analysis (Woodman 2012). The work undertaken was based upon and satisfies the intention of the then DEC Regional survey in increasing knowledge of presence and distribution of BIF related species and communities. There is a high level of confidence that the Woodman work is reliable and that assessment based upon this extensive survey effort will be found to be accurate.

The absence of DPaW verification of the regional mapping undertaken by Woodman 2012 is not considered a contributing factor in determining that the Proposal cannot meet the EPA's objective for Flora and Vegetation. It is understood that DPaW has been provided the regional mapping and data and that the EPA would have requested DPaW undertake an objective review of that data. In the absence of DPaW being able to provide scientific advice on the revised regional mapping, an alternative independent peer review would be the appropriate means of providing the EPA with objective and timely advice as the basis of informed decision making. SMC would co-ordinate an independent review in consultation with the EPA should DPaW be unable to provide this advice in an agreed timeframe.

4.3 Impacts of Proposal

4.3.1 *Acacia woodmaniorum*

A. woodmaniorum is a Threatened Flora species listed under the WA *Wildlife Conservation Act 1950* (WC Act) and categorised by DPaW as Vulnerable. *A. woodmaniorum* is an intricately branched, prickly, hard shrub which grows up to 2 m high on slopes, sides of hills, crests of ridges, ranges and disturbed overburden of mine sites (WAH 2014).

Data regarding the location and number of plants has altered over time additional survey effort has resulted in additional records of the species. In 2008 it was reported as occurring in three populations consisting of 12,000 plants (ecologia 2008a) and was estimated to have a population of ~29,000 plants from five populations (ecologia 2013a). Its geographic distribution has not substantially changed and it is recorded from Mungada Ridge, Windaning Hill and Jasper Hill in the Blue Hills Range (Maia 2012). Its habitat preference has been described as "Skeletal red silt, red-brown soil, banded ironstone, laterite. Slopes, sides of hills, crests of ridges, ranges, disturbed overburden of mine sites." (Maia 2014).

A total of 3,306 individuals of *A. woodmaniorum* have been recorded in the Proposal area, the majority occurring on the south facing slope of Mungada Ridge, with ~29,000 individuals recorded in the local region (SMC 2014b).

Additional survey work has been carried out for *A. woodmaniorum* since the Proposal was referred in September 2013. A targeted flora survey of areas proposed for exploration activities on mining tenements M59/595 and M59/596 at Blue Hills was undertaken by Maia Environmental Consultancy Pty Ltd (Maia) in June 2014. The survey area included localities within the proposed Mungada East pit. The results of this survey and subsequent data analysis will be incorporated into revised direct and cumulative impact assessment as the proposal progresses.

Based on the previous data available ~3,300 individuals of *A. woodmaniorum* occurring in the Proposal area are likely to be impacted, which equates to ~11.5% of individuals known in the local region (within a 10 km radius of the Blue Hills project area). In reference to SMCs cumulative impact, a total of 2,777 plants have previously been approved to be removed as a result of the Blue Hills component of the DSO Project. The indicative cumulative loss of plants from approved and anticipated impacts is approximately 21% of total known plants. It is noted that the Mungada Iron Ore Project involves removal of *Acacia woodmaniorum* however SMC understands that the impact has been significantly less than has been approved.

Further analysis of available data, approved impacts and actual plants removed from all projects is therefore required. In addition, agreement on the methods of delineating individual populations is necessary to determine whether the proposal would result in a change to the IUCN threat category for the species (ie change from Vulnerable to Endangered).

A recently published journal article presents new information on pollen dispersal and the mating system of *A. woodmaniorum* (Millar et al 2014) in maintaining contemporary levels of connectivity and facilitating persistence of small populations of *A. woodmaniorum*.

The key finding of the study, relevant to the assessment of impacts to *A. woodmaniorum* from the Proposal, was that like individuals of many common and widespread tree species, the disjunct, small populations of *A. woodmaniorum* are not genetically isolated (Millar et al. 2014). Pollen immigration is typically expected to decrease with increasing geographic disjunction and as populations become smaller and less dense (Aguilar et al., 2006; Leimu et al., 2006 as cited in Millar et al. 2014). Such a pattern was not observed in *A. woodmaniorum*, with population parameters being poor predictors of pollen immigration rates. The degree of genetic connectivity produced by extensive pollen dispersal appears sufficient to provide a buffer against a low number of plants in small populations of *A. woodmaniorum* (Millar et al. 2014).

The findings of the Millar et al. (2014) study indicate the maximum pollinator dispersal distances exceed 1,870 m for *A. woodmaniorum*. This suggests that genetic diversity on Mungada Ridge can be maintained, given the impact would not result in the requirement for pollinator dispersal of remaining populations to occur over distances $\geq 1,870$ m.

4.3.2 *Lepidosperma* sp. Blue Hills

Lepidosperma sp. Blue Hills is a Priority 1 sedge that grows to 0.5 m high and is found on hill slopes, breakaways and rocky outcrops of laterite, granite, banded ironstone and sandstone rock, producing brown flowers during September (Maia 2014). The species is known from two IBRA regions; Avon Wheatbelt and Yalgoo (WAH 2014) and has been recorded from the Blue Hills Range, Warriedar Station, Mount Karara and the Charles Darwin Reserve (Maia 2014). The species habitat is described as "Breakaway, laterite and sandstone. Creek bank. Granite outcrop. Slope of laterised haematite and banded ironstone." (Maia 2014).

A total of 534 individuals have been recorded in the Proposal area, the majority occurring on the south facing slope of Mungada Ridge. Approximately 53,000 individuals are known from the local region (SMC 2014b).

Additional records of *Lepidosperma* sp. Blue Hills were recorded during the Maia (2014) targeted flora survey. As for *A. woodmaniorum*, the data from the most recent survey is yet to be fully incorporated into the dataset used to assess the impacts of the Proposal.

Based on analysis of data prior to the June 2014 targeted flora survey the 534 individuals of *Lepidosperma* sp. Blue Hills occurring in the Proposal area are estimated to be impacted, which equates to 1% of individuals known in the local region (within a 10 km radius of the Blue Hills project area). Cumulative impact assessment can be carried out for this species if required, however the level of impact is unlikely to be significant at a local or regional level, nor is it likely to affect the overall conservation status of the species.

4.3.3 Regional Vegetation mapping

Assessment of vegetation by the then DEC across the BIF Ranges of the Yilgarn Craton and contributing to the BIF Strategic Review has demonstrated that plant communities on the ranges are structurally and compositionally different from the woodland and shrubland communities of the surrounding plains. These assessments have also found that BIF ranges along the boundary of the Arid Zone have acted as refugia during climatic cycles of the Tertiary period, resulting in 'hotspots' of species endemism (Gibson et al 2010 and 2012).

The work undertaken by DEC resulted in identification of Threatened and Priority Ecological Communities in the Mid West.

The Proposal area is located within one of these ecological communities, the Priority 1 Priority Ecological Community (PEC): Blue Hills (Mount Karara / Mungada Ridge / Blue Hills) vegetation complexes (banded ironstone formation) (DPaW 2014).

ecologia (2013) identified Mungada Ridge as being located entirely within the known extent of the PEC, however, the PEC was determined not to be endemic to the Ridge. Mapping of the PEC and regional floristic community types by Woodman (2012) has shown that these are very well represented beyond the geographical boundary of the Mungada Ridge. The potential impact from the proposal on the PEC and FCTs is considered marginal as SMC's overall project cumulative impact on the PEC will be 0.27% of the known extent of the PEC, and the highest impact to any FCT will be 0.62%.

It is considered that the work undertaken by Woodman (2012) and ecologia (2013) provides a sound basis for considering the values of the vegetation in the Proposal area in a regional context and that the impacts are not significant.

It is understood that DPaW has not had the opportunity to provide advice to the EPA in this regard and that consequently the EPA would not yet be able to reach conclusions regarding the environmental values of the vegetation.

4.4 Avoidance Mitigation and management

SMC's management objectives for vegetation and flora, based on EPA objectives, are:

- Minimise the loss of and adverse impacts to native vegetation and plant habitats.
- Protect Rare and Priority flora species that occur within the Proposal area.
- Maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and the improvement in knowledge, consistent with relevant EPA's objectives.

As a component of the PER for the DSO Project, SMC provided a list of management and mitigation commitments that will be implemented to achieve the objectives stipulated above. These management actions will remain applicable to construction and operational works of the Proposal, as listed below:

- Revision of the existing Significant Flora Management Plan (ecologia 2008b)

- Liaison with the DPaW regarding the management of conservation significant flora
- No-entry sites for protection of conservation significant flora, with clear demarcation to prevent accidental disturbance
- Training and induction measures for site personnel, to raise awareness of conservation significant flora and vegetation
- Demarcation of disturbance areas prior to site works commencing
- Clearance controls concerning topsoil and vegetation removal and stockpiling
- Training and tools provided to personnel to assist in general awareness of conservation significant flora and to aid in minimising vegetation clearing and disturbance
- Vehicles and machinery restricted to designated tracks/roads
- Rehabilitation to be undertaken as soon as practicable.

Measures to minimise and mitigate impacts on conservation significant flora (as relevant to *A. woodmaniorum* and *Lepidosperma* sp. Blue Hills) will be achieved by:

- Ensuring that all disturbance areas are inspected to record the location of specimens/populations of conservation significant flora prior to the completion of mine planning
- Clearly demarcating the presence of restricted access areas including areas of conservation significant flora and vegetation that are to be retained
- Identifying further opportunities to minimise the direct disturbance of recorded specimens of *Acacia woodmaniorum* by:
 - Refining required extent of the Mungada East mine pit and alignment of the new haul road to minimise the ground disturbance footprint and, therefore, impacts on conservation significant vegetation and flora.
 - Managing edge effects by ensuring the number and extent of weed species occurring in the area is not increased as a result of the development of new mine pits, waste dumps and haul road
- Undertaking field trials examining topsoil and overburden placement design and embankment/stockpile slopes for simulation of the natural soil substrate and physical conditions on the Mungada Ridge, to optimise potential for return of similar species composition and richness to that of the vegetation impacted in the Proposal area
- Conducting field and nursery trials to examine revegetation success of *Acacia woodmaniorum*, including the identification of factors that promote revegetation success.

4.5 Outcome and conclusions

It is considered that additional analysis of regional information regarding *Acacia woodmaniorum* is required to allow assessment of the full extent of impact on the species and implications for its conservation status. It is acknowledged however that there will likely be a significant residual impact that will require development of an appropriate offset package.

Whilst further analysis may be required it is considered that the impact to *Lepidosperma* sp. Blue Hills will not be significant and similarly impacts on vegetation communities will not be significant.

5 Terrestrial fauna

5.1 EPA Objective

The EPA's objective for terrestrial fauna is: *to maintain representation, diversity, viability and ecological function at the species, population and assemblage level.*

5.2 Discussion on EPA Concerns and Assessment Approach

The stated concerns regarding increased impact to *Cyclodomorphus branchialis* (Gilled Slender Blue-tongue) will be addressed within this section.

The impact to the Gilled Slender Blue-tongue and its habitat as a result of the Proposal is considered to be minimal. As stated in previous communication to the OEPA, further targeted surveys would be conducted to inform the PER process if required. However, given the minor nature of the impact (described briefly in the following sections), the removal of Terrestrial Fauna as a key environmental factor for the Proposal should be considered.

5.3 Description of key factor

The Gilled Slender Blue-tongue is listed as a Schedule 1 Threatened fauna species under the WC Act and is known only from the semi-arid coast and inland of south-western Australia. The species inhabits semi-arid Acacia woodlands and shrublands and is crepuscular and nocturnal, sheltering in the day in spinifex, leaf litter and under fallen timber.

The species has been recorded on three occasions from the Blue Hills area and vicinity. One occurrence was recorded in the Proposal area, within the proposed new Mungada East pit, and a second occurrence was recorded 60 m to the south-east of the first record. Both occurrences were within the rocky ridge with steep slopes habitat type (ecologia 2011). The record of the Gilled Slender Blue-tongue in the vicinity is from the nearby Karara ridge, approximately nine km from the Proposal area (ecologia 2011).

5.4 Impacts of Proposal

Approximately 17.1 ha of the rocky ridge with steep slopes habitat type will be cleared to facilitate the construction of the Proposal, and direct mortality of some individuals may also occur from vehicle strike.

The rocky ridge with steep slopes habitat type is represented outside of the Proposal area, as it is considered to be linked to the Talling land system which extends beyond the Proposal area. None of the terrestrial fauna habitat types recorded in the Proposal area (including rocky ridge with steep slopes) are considered unique or restricted to Blue Hills (ecologia 2011).

5.5 Mitigation and management

In addition to the general fauna management measures to be implemented for the Proposal, in line with those already being undertaken for the DSO Project, measures specific to the Gilled Slender Blue-tongue will be implemented are as follows:

- Minimise disturbance to the rocky ridge with steep slopes habitat type supporting Gilled Slender Blue-tongue

- Identify opportunities for habitat creation during progressive rehabilitation and closure. To this end, further work will be conducted in order to examine the potential for restoring physical characteristics for habitats for conservation significant species, including:
 - Rocky habitats to recreate habitat for the Gilled Slender Blue-tongue
 - Outcome and conclusions.

5.6 Outcome and conclusions

The impacts of the Proposal on the Gilled Slender Blue-tongue are unlikely to affect the distribution of the species locally or regionally, and are therefore unlikely to change the conservation status of the species.

6 Rehabilitation and closure

6.1 EPA Objective

The EPA's objective for rehabilitation and closure is: *to ensure that premises are closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State.*

6.2 Discussion on EPA Concerns and Assessment Approach

- At present, there are no substantive examples of successful restoration and rehabilitation of mining areas on BIF Ranges
- There is no conclusive evidence that any endemic BIF plant species could be restored and no guarantee of the long term viability of the restored populations
- It is unlikely that additional studies or detailed assessment would lead to an outcome that would demonstrate that Landforms could be restored and rehabilitated.

It is noted that there are few substantive examples of rehabilitation on BIF Ranges to date. However there are a number of factors to indicate that whilst this may be the case this does not provide a rationale for concluding that the EPA's objective for this key factor cannot be met.

One factor is that historically mining on BIF Ranges did not include requirements for rehabilitation and therefore research and development in this regard has only commenced relatively recently. In addition, numerous formally assessed projects on BIF Ranges, including the DSO project have been approved based upon similar requirements for rehabilitation and closure. These projects are also relatively recent and results are not yet publicly available.

The statement of reasons for the Jackson 5 Exploration Program currently under assessment by the EPA indicates that there is a high level of uncertainty regarding the ability to rehabilitate Yilgarn BIF Ranges to a reasonable level, however the proponent should be given the opportunity to demonstrate that avoidance, minimisation and rehabilitation to agreed standards is possible.

It is evident that a number of mining companies operating on BIF Ranges are undertaking research and rehabilitation trials in order to satisfy the completion criteria applied to their projects.

As previously indicated BGPA is undertaking a research and rehabilitation program for SMC for the overall DSO project. A summary of the outcomes to date from BGPA pertinent to this factor, is summarised below. The BGPA summary, along with quarterly and annual reports on research are included in full as Appendix B. This advice is considered to refute the concerns of the EPA and indicate that further consideration of this factor is warranted.

6.2.1 BGPA Research Program

BGPA has a demonstrated and successful framework, based on a scientific approach, in approaching restoration of post-mining ecosystems. Restoration practices informed by scientific programs are proven to result in highest quality restoration outcomes in WA (BGPA 2014). The BGPA research project for SMC has been underway for three years, during which time significant advancement has occurred.

Previous research undertaken by BGPA for Rocla on Banksia woodland restoration has resulted in knowledge regarding soil profiles, soil seed bank stripping, seed storage and return, direct seeding, aerosol smoke application and strategic greenstock planting. This knowledge provides a substantial

basis for determining aspects specific to individual sites that require research to allow the development of tailored rehabilitation solutions.

Upon completion of mining, a total of ~ 200 ha (107 ha at Blue Hills) is anticipated to require rehabilitation. As currently staged over seven years, this involves approximately 20 – 30 ha of rehabilitation per year which is manageable and comparable to Alcoa and Rocla operations.

Additional points of note include:

- The short timeframes between disturbance and rehabilitation delivers a topsoil resource in an optimal manner, where storage times are minimised and direct species return is maximised.
- Small scale and short timeframe operations allow for intensively managed rehabilitation efforts, which can maximise outcomes.
- SMC has invested in an innovative controlled environment facility which has allowed for research into various rainfall scenarios. This may result in a best practice approach of supplementary irrigation in the first year to provide mean annual rainfall equivalent to newly treated locations.
- Topsoil deficit can be overcome by addition of rock to topsoil and is found to have a negative impact on emergence (where slope is managed for rainfall infiltration)
- A total of 61 species have been tested for seed quality and germination, with only three species having unresolved germination issues
- Cross ripping has been demonstrated to improve soil properties at SMC operations and is required even with the addition of topsoil.

The research program is continuing and is focussed on addressing the known challenges specific to SMC operations.

The work undertaken to date by SMC, as supported by BGPA research and trials, indicates a commitment to ensuring compliance with completion criteria set in MS 811. It also indicates that successful rehabilitation practices can be developed and implemented where appropriate and adequate research occurs.

6.3 Closure and Rehabilitation Planning

The DSO operation has a current and approved Mine Closure Plan (ecologia 2013b) prepared to be consistent with EPA Guidance Statement No 6 and the Guidelines for Preparing Mine Closure Plans (Department of Mines and Petroleum [DMP] and EPA 2011).

Progressive rehabilitation is one of SMC's minimum standards for rehabilitation, as detailed in the rehabilitation planning strategies for Koolanooka and Blue Hills, developed in 2010 and 2013 respectively.

At Koolanooka, SMC has already rehabilitated all waste dumps, removed all redundant infrastructure and rehabilitated available infrastructure areas to date, a total of 27 ha. The 2014 rehabilitation plan for site is to complete rehabilitation of a further 27 ha of flat areas used as ore stockpile areas. Progressive rehabilitation at Blue Hills is planned to start in late 2014-early 2015 on available lower batters of waste dumps.

A rehabilitation monitoring program was established at Koolanooka in September 2013 to monitor success of rehabilitation. The program includes erosion and stability monitoring based on previous work done by Landloch on site. The Koolanooka program will be conducted annually and will be setup

at Blue Hills in 2015. Research trials established at Koolanooka in 2012-13 have been extended to Blue Hills in early 2014 with the set-up of topsoil plots to monitor the effects of various combinations of topsoil and vegetation debris material on seed bank germination and emergence.

Overall as a component of formal EIA assessment, SMC would revisit and update the Closure Plan consistent with Guidance Statement 6 and Mine Closure Planning guidelines current at the time of preparation (noting that the 2011 guidelines are currently under review). The updated Closure Plan would incorporate the Proposal and where necessary address data gaps pertaining to soils and hydrology. Additionally a suitable pit abandonment strategy will be developed and detailed in the Closure Plan.

A revised rehabilitation strategy incorporating findings of research completed to date can also be prepared as part of this process.

Rehabilitation and closure will also take into account the commitments for protection of conservation significant flora, vegetation and fauna relevant to the Proposal, including the potential for:

- Rehabilitation of conservation significant vegetation types, including those which make up the Blue Hills PEC
- Recruitment of populations of conservation significant flora, including the listed Threatened species *Acacia woodmaniorum*
- Creation of habitat characteristics for conservation significant terrestrial fauna

6.4 Outcome and conclusions

Rehabilitation and closure for mining projects does not aim to restore the previously occurring ecological communities, but will generally entail progressive rehabilitation of vegetation so that it is comparable with pre-mining vegetation.

SMC is committed to undertaking best practice rehabilitation. This includes a specific research program and focus in its management program into the propagation of this and other species in its rehabilitation of directly impacted sites. SMC would also consider a more extensive rehabilitation effort, in addition to areas disturbed by the Proposal, across the portion of the Mungada Ridge in the SMC lease.

Upon the completion of mining activities, rehabilitation will deliver:

- Re-establishment of stable landform with erosion protection for long term stability
- Ripping of compacted areas and on contours of slopes
- Spreading of vegetation debris to return organic matter to the area and provide supplementary seeding with appropriate species. Seed stock will be gathered as close to the pre-clearance of the area of impact as possible, to provide an effective provenance seed-set for use in rehabilitation.

The rehabilitation program will include development of completion criteria to indicate the stage when rehabilitation can be considered self-sustaining. Closure considerations will include assessment and remediation of contaminated sites, ongoing placement of waste materials to improve the form of existing waste dump areas, and the rehabilitation of all disturbed areas, including exploration drill pads and tracks.

7 Residual impacts and offsets

SMC is implementing the agreed offsets package for the approved DSO Project which includes the following:

- Financial contribution to the DPaW for conservation management within the Karara Block of former pastoral stations, specifically to assist:
 - Maintenance of existing feral goat trap yards
 - Purchase and establishment of new trapping yards
 - Management of feral goat removal and weed control programs.
- The development of a comprehensive rehabilitation planning strategy for Blue Hills including a restoration research program with KPBG (discussed in Section 6)
- Relinquishment of approximately 4,500 ha of exploration tenement for the purposes of conservation management by DPaW.

SMC is aware that since the referral of the Proposal in September 2013 (Eco Logical Australia 2013), the EPA has released an Environmental Protection Bulletin on Environmental Offsets (EPA 2014) and new guidelines on the use of environmental offsets in assessments and approvals of projects have been released (Government of Western Australia 2014). It is understood that as SMC is seeking an expansion of an existing approval, the new policy and guidelines would be applied to documentation for a formal EIA process.

SMC would therefore include both a section discussing application of the mitigation hierarchy to the proposal. Subsequently the EIA documentation would also provide details of proposed offsets for residual significant impact including:

- proposed offset projects
- objectives and completion criteria
- plans and policies
- timelines, milestones
- governance arrangements
- financial arrangements
- risk management
- monitoring
- reporting.

It is anticipated that appropriate environmental offsets will be required for the residual significant impact to *Acacia woodmaniorum* from the Proposal. These will be developed and confirmed with the EPA and relevant stakeholders during the assessment process.

Examples of potential offsets for the overall proposal include:

- Conducting research into the ecology of the conservation significant species, including the influence of fire and surface water hydrology
- Identifying methods to protect conservation significant flora and vegetation of the Mungada Ridge in areas outside the Proposal area, such as:
 - Monitoring edge effects and health/condition of vegetation adjacent to, and further afield from, the Proposal area

- Monitoring of *Acacia woodmaniorum* population outside of the Proposal area within SMC tenements
- Focussed management of populations within SMC operations
- Designating areas outside the Proposal area as 'conservation management areas' for protection of conservation significant flora, and manage accordingly during mining
- Additional conservation funding for DPaW related management of the Karara block of purchased pastoral leases
- Biodiversity management planning and implementation on SMC tenure
- revised, updated and improved significant flora management plan with targeted recovery actions

8 Conclusion

SMS respectfully requests the EPA reconsider its preliminary view on level of assessment as:

- The BIF Strategic Review is effectively out-dated and recent decisions and ongoing data collection suggest that its recommendations cannot be implemented and require revision. Assessment through a formal EIA process will assist contemporary knowledge in respect to Blue Hills.
- On any reasonably objective basis, the Proposal cannot be said to impact a significant portion of the Mungada Ridge, nor is there apparent evidence to state that the integrity and ecological function of the remaining ridge cannot be maintained.
- Additional analysis, including cumulative impact assessment on *Acacia woodmaniorum* and *Lepidosperma* sp. Blue Hills is warranted, with particular reference to DPaW concerns regarding changes to IUCN threat criteria.
- A rigorous and detailed regional vegetation mapping exercise exists and should be used as the basis for assessing impacts on regional and locally defined ecological communities.
- The project will not result in a significant impact to the Gilled Slender Blue-tongue.
- Demonstrated progress has been made in rehabilitation research and its continuation should be sufficient for completion criteria for rehabilitation and the EPA objective for rehabilitation and closure to be met.

It is clear that there has not been a real opportunity for SMC to evaluate the extent and significance of impacts of the Proposal due to the absence of guidance, information and knowledge from the EPA in respect to the concerns expressed on key environmental factors. SMC submit that the most appropriate and transparent forum for consideration of key environmental factors is through a formal EIA process.

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Appendix A – Talis Consulting Report

Appendix B - BGPA Research Summary



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