



**Sinosteel Midwest Corporation Limited: Blue Hills M59/595 and M59/596  
Mungada East Expansion Project, Revised Impacts to Conservation Significant Flora,  
Priority Ecological Community and Floristic Community Types**



This document presents amended impacts calculations for the conservation significant flora species, priority ecological community and floristic community types within an amended project footprint for Sinosteel Midwest Limited's (SMC) Mungada East Extension project on tenements M59/595 and M59/596 at Blue Hills.

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## Acronyms and Abbreviations

<b>BHIAA</b>	Blue Hills impact assessment area
<b>CSF</b>	Conservation significant flora
<b>DPaW</b>	Department of Parks and Wildlife
<b>FCT</b>	Floristic community type
<b>ha</b>	Hectare
<b>KML</b>	Karara Mining Limited
<b>Maia</b>	Maia Environmental Consultancy Pty Ltd
<b>OEPA</b>	Office of the Environmental Protection Authority
<b>P (1-4)</b>	Priority 1 to Priority 4 flora
<b>PDE</b>	Project Development Envelope
<b>PDEB</b>	Project Development Envelope Buffer
<b>PEC</b>	Priority ecological community
<b>PER</b>	Public Environmental Review
<b>PIA</b>	Project Infrastructure Area
<b>SMC</b>	Sinosteel Midwest Corporation Limited
<b>sp.</b>	Species, single
<b>subsp.</b>	Subspecies
<b>T</b>	Threatened
<b>TPFL</b>	DPaW's Threatened and Priority Flora database
<b>WA Herb</b>	Western Australian Herbarium
<b>WEC</b>	Woodman Environmental Consulting
<b>%</b>	Percentage
<b>&gt;</b>	Greater than
<b>&lt;</b>	Less than

# Sinosteel Midwest Corporation Limited: Blue Hills M59/595 and M59/596

## MUNGADA EAST EXPANSION PROJECT, REVISED IMPACTS TO CONSERVATION SIGNIFICANT FLORA, PRIORITY ECOLOGICAL COMMUNITY AND FLORISTIC COMMUNITY TYPES

### 1 INTRODUCTION

#### 1.1 PROJECT SCOPE OF WORK

Sinosteel Midwest Corporation Limited (SMC) proposes to extend its mining operations on tenements M59/595 and M59/596 at Blue Hills. As part of the public environmental review (PER) process, Maia Environmental Consultancy Pty Ltd (Maia) carried out a combined detailed Level 2 flora and vegetation and targeted flora survey over tenements M59/595 and M59/596 (Maia, 2016). An impact assessment for the conservation significant flora (CSF) species, vegetation, priority ecological community (PEC) and floristic community types (FCTs) (WEC, 2008a) occurring in the Project Area was carried out and the information included in the PER (Eco Logical, 2016).

The Mungada East extension area (comprising a proposed infrastructure area, development area and development area buffer) was referred to as the Project Area in the original report (**Map 1, Section 5**).

Since submitting the PER and receiving feedback from the Office of the Environmental Protection Authority (OEPA), SMC has amended the Project Area and asked Maia to carry out an impact assessment for the CSF, PEC and FCTs of the amended Project Area (**Map 2, Section 5**). The amended Project Area comprises the areas listed in the following dot points and shown on **Map 3, Section 5**.

- Proposed Development Envelope
- Expansion Pit (direct impact)
- 3 m Windrow (direct impact) surrounded by a 50 m wide indirect impacts area
- 10 m Abandonment Bund (direct impact)
- 45-60 m wide Haul Road (direct impact) with a 10 m wide indirect impacts area on both sides of the road
- 18-20 m Access Road (direct impact) with a 25 m wide indirect impacts area on both sides of the road
- Other Infrastructure (direct impact)
- Waste Dump (direct impact)

Since the impacts assessment was carried out for SMC's PER, Karara Mining Limited (KML) has supplied SMC with all of their records for *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) located during many flora surveys carried out in the region for KML's projects. This report presents the results of the impact assessment carried out for the amended Project Area and using these additional *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) plant locations.

## 2 CALCULATIONS

### 2.1 BACKGROUND

The methods used to carry out the impacts assessment for the Mungada East Expansion project are the same as those used for the original impacts calculations. The methods used were described in detail in the Level 2 report and are included in **Appendix 1** of this report.

In summary these calculations involved:

- Collation of available data from literature and database searches.
- Data standardisation and manipulation (to account for: plant records that were stated as plant cover or frequency or where no information was provided on plant number or frequency; and, dead and live plants).
- Removal of records falling in cleared areas identified using recent aerial imagery – including any CSF locations in approved mining project areas.
- Consideration of overlapping records from multiple surveys.
- Cumulative impacts to the CSF, Priority 1 PEC and the FCTs from the Project Area calculated either for WA, the Talling subregion, the Blue Hills Impact Assessment Area (BHIAA; **Map 4, Section 5**) and the Local Area (M59/595 and M59/596) or for the mapped extent of the PEC and FCTs.

While KML has supplied SMC with shape files for the Priority 1 species *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468), SMC (and Maia) does not have the data for all CSF located by Woodman Environmental Consulting (WEC) (or other consultants) for KML in the wider regional area. This includes the records for the *Acacia woodmaniorum* population at Jasper Hill - the number of *A. woodmaniorum* at this location was sourced from Millar *et al.* (2013), added to the plant records in Maia's database and attributed to the two FloraBase *A. woodmaniorum* records at Jasper Hill.

Because Maia does not have access to all data for CSF located in the regional area, plant numbers included in the original and this impact assessment were / are therefore Maia's best estimate made with the location data available to Maia (**Appendix 1**).

Because all of KML's CSF data are not available, the results of the calculations are discussed with reference to the number of plants included in Appendix 1 of KML's Public Environmental Review (PER) (KML, 2008) and in WEC's flora and vegetation cumulative impact assessment for the Karara – Mungada project survey area (WEC, 2008c). However, in the eight years since that report was published more plants of these CSF species have been located in the wider area (WEC, 2012) and SMC and Maia do not have access to these plant locations in shape file format or in hard copy. While threatened and priority flora point locations are listed in Table 3 of WEC 2012 and all plant records are shown on Figure 4, a table of plant numbers is not included in the report and the information cannot be used for this impacts assessment.

### 2.2 DIRECT AND INDIRECT IMPACTS

Direct impact is considered to be vegetation clearing while indirect impacts are those that can result from the effects of a number of activities associated with mining e.g. dust on vegetation, saline water application on vegetation, the introduction and spread of weeds on vegetation, groundwater drawdown on any riparian or groundwater dependent vegetation in an area, the alteration of water flow on vegetation, and the potential for increased incidence of fire and feral animal numbers and their effects on vegetation.

Project Area direct and indirect impacts are included in this impacts assessment.

The tables in **Section 3** present the impacts information in the same way as the impacts tables in the PER (Eco Logical, 2016) and not as presented in the Level 2 flora and vegetation report (Maia, 2016). In the PER direct impacts were those from the Project Infrastructure Area (PIA) and indirect impacts were those from the Project Development Envelope (PDE) and Project Development Envelope Buffer (PDEB). In the flora and vegetation report direct impacts were calculated from the PIA plus PDE and indirect impacts were calculated using the PDEB.

In this report both the original and amended impacts calculations are presented differently and include a total impact from the direct impact areas (PIA) and an indirect impact (from the indirect impact areas listed on page 1). An indirect impact of 10% of the CSF, PEC and FCTs located or mapped in the indirect impact areas placed around the PIA has been allowed for in these amended impacts calculations.

[Note: Direct impacts from previously approved KML and SMC project footprints have been calculated for the whole of the approved footprints; however, the whole footprint has not been cleared in some areas and therefore the impacts included for these already approved project footprints are the maximum possible rather than the actual impacts that have occurred from this clearing.]

### 2.3 CUMULATIVE IMPACTS

Cumulative impacts have been calculated for:

- the CSF, PEC and FCTs occurring in the Study Area (Study Area = M59/595 and M59/596 = Local Area).

These impacts are calculated using:

- All plant locations in WA available to Maia for each of the CSF species occurring in the Study Area, or to the mapped extent of the PEC and FCTs. [Table A9.1 of Version 4 of the Level 2 flora and vegetation report (Maia, 2016) is included as **Table 3.1** in this report, as it provides more detailed steps regarding the cumulative impacts calculated for the CSF of the Study Area.]

The Blue Hills impact assessment area (BHIAA) is the area within which approved project footprints and tracks and drill lines have been digitised to ensure that impacts from different projects in the area around the Local / Study Area are captured in the cumulative impacts calculations (**Map 4, Section 5**). Impacts have been calculated by tenement holder within the BHIAA and also for areas not covered by a tenement (indicated as 'other areas' or 'non-tenement holder').

The cumulative impacts assessment includes impacts from:

- a) all tenement holders in the BHIAA;
- b) 'other areas/non-tenement holder' not covered by tenements in the BHIAA;
- c) previous clearing outside the BHIAA – the difference between the pre-clearing total mapped extent for PEC or FCTs / total known plants in WA and the estimated impact within the BHIAA from approved clearing footprints and digitised drill lines and tracks.
- d) the amended Project Area (i.e. the Proposal - as a whole and by direct and indirect impact areas).

[Note: While existing impacts to the CSF / PEC / FCTs within the BHIAA are listed by tenement holder in the tables in the following section, there is some overlap of tenements (and tenement holders) within the BHIAA. Therefore the total impact to CSF / PEC / FCTs within the BHIAA was calculated using the joined shapefile for all clearing within the BHIAA (approved project footprints and newly digitised tracks etc) rather than by using the sum of the impact from each of the tenement holders and 'other areas'.]

### 3 IMPACTS TO CONSERVATION SIGNIFICANT FLORA SPECIES, PRIORITY ECOLOGICAL COMMUNITY AND WEC (2008) FLORISTIC COMMUNITY TYPES

The series of tables in this section presents the impacts calculated for the CSF species, PEC and FCTs of the Study / Local Area in the original and amended Project Area. As additional *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) plant locations were supplied to SMC the original calculations carried out for the PER have been reworked using the original Project Area and the additional plants and these calculations are also included. For consistency the difference between impacts for the original and amended Project Area have been calculated using the original Project Area with the additional *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) rather than using the original Project Area without the additional *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468).

**Table 3.1** presents the original impacts calculated for the CSF of the original Project Area, as presented on page 353, Table A9.1 of Maia (2016) – version 4 of the Level 2 Flora and vegetation report. This table indicates in more detail the steps taken to calculate a cumulative impact for each CSF species.

**Table 3.2** presents the original impacts calculated for the CSF of the original Project Area (presenting the direct and indirect impacts areas as in the PER rather than as in the Maia (2016)). However, this table includes extra rows to highlight the different impact areas.

**Table 3.3** presents impacts recalculated for the CSF of the original Project Area with the additional *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) plant locations supplied by KML (using the direct and indirect impacts areas as in the PER, however, this table includes extra rows to highlight the different impact areas).

**Table 3.4** presents impacts recalculated for the CSF of the amended Project Area with the additional *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) plant locations supplied by KML (using the new direct and indirect impacts areas, however, this table includes extra rows to highlight the different impact areas).

**Table 3.5** (A, B, C and D) summarises the proposal and cumulative impacts from Table 3.2, 3.3 and 3.4 and presents the difference (change) between the impacts for the original and amended Project Area (using the impacts calculated with the additional *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) plant locations and not those without the additional plants).

**Table 3.6** (A and B) presents impacts for the PEC for the original (using the direct and indirect impacts areas as in the PER) and amended Project Area (using the new direct and indirect impact areas).

**Table 3.7** presents the original and amended proposal and cumulative impacts for the PEC from Table 3.6 and presents the change (difference) in the impact between the original and amended Project Area.

**Table 3.8** presents impacts recalculated for the FCTs for the original Project Area (using the direct and indirect impacts areas as in the PER).

**Table 3.9** presents impacts recalculated for the FCTs for the amended Project Area (using the new direct and indirect impacts areas).

**Table 3.10** summarises the original and amended proposal and cumulative impacts from Table 3.8 and 3.9 and presents the change (difference) between the impacts for the original and amended Project Area.

**Table 3.11** presents the proposal and cumulative impacts to CSF species of the Study / Local Area (using plant locations available to Maia), WA and Tallering plant numbers (from **Table 3.4**) and also includes plant numbers from KML, 2008.

**Table 3.12** provides comments relating to any differences between the total impacts calculated using amounts included for all tenement holders in the BHIAA and the Proposal impact, compared with totals listed under

Cumulative impact. Depending on their known distribution, impact to some CSF includes impacts to plants outside of the BHIAA while others do not. Cumulative impact for the PEC and WEC (2008) FCTs is sometimes less than the sum of all individual impacts due to overlapping tenements in the BHIAA. Clearing in overlapping areas could not be attributed to a particular tenement holder and was therefore attributed to both tenement holders. In contrast, Cumulative impact was calculated using the disturbance footprints for KML's and SMC's approved projects and other clearing digitised by Maia (2016); as this does not include doubling up of clearing in overlapping areas it can sometimes be less than the sum of all individual impacts.

**Maps 5, 6 and 7** show the distribution of *Acacia woodmaniorum*, *Acacia karina*, *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) and the FCTs in the Study / Local Area and the amended Project Area.

Dot points follow that highlight the main results from the impact calculations. Impacts are presented for all CSF species located in the Study Area / Local Area. Impacts are calculated using the pre-impact number of CSF or mapped extent of the PEC and FCTs i.e. the number of CSF or extent of the PEC and FCTs before any other impacts are considered.

- Four of the 15 CSF species located in the Study / Local Area will not be impacted by the amended Project Area (*Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8, *Grevillea globosa*, *Polianthion collinum* and *Stenanthemum poecilum*). This is the same for the original and amended Project Area.
- Proposal impact (the total for direct and indirect) from the amended Project Area on the remaining CSF species ranges from 0.04% (*Acacia subsessilis* and *Gunniopsis divisa*) to 9.63% (*Micromyrtus trudgenii*). When direct impact only is considered these percentages are 0.04% (*Acacia subsessilis*), 0% (*Gunniopsis divisa*) and 9.21% (*Micromyrtus trudgenii*).
- Cumulative impact (the total for direct and indirect) on the CSF species ranges from 0.04% (*Acacia subsessilis*) to 43.76% (*Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468)). When direct impact only is considered these percentages are 0.04% and 43.75%.
- Proposal impact (the total for direct and indirect) to *Acacia woodmaniorum* has decreased from 20.45% to 5.62% (a decrease of 14.83%). Of this 5.62% impact, 5.44% is direct and the remainder is indirect.
- Cumulative impact estimated to *Acacia woodmaniorum* has decreased from 33.27% to 18.43% (a decrease of 14.83%). Of this 18.43% impact, 18.25% is direct and the remainder indirect.
- Proposal impact (the total for direct and indirect) to *Acacia karina* remains the same (0.39%), and this 0.39% is all direct impact.
- Cumulative impact estimated to *Acacia karina* remains the same (13.40%) and all of this is direct impact.
- Proposal impact (the total for direct and indirect) to *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) has decreased from 0.78% to 0.39% (a decrease of 0.39%). Of this 0.39% impact, 0.38% is direct and the remainder is indirect.
- Cumulative impact (the total for direct and indirect) estimated to *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) has decreased from 44.15% to 43.76% (a decrease of 0.40%). Of this 43.76% impact, 43.75% is direct and the remainder is indirect.
- Proposal impact (the total for direct and indirect) to *Micromyrtus trudgenii* has decreased from 23.44% to 9.63% (a decrease of 13.81%). Of the 9.63% impact, 9.21% is direct and the remainder is indirect.
- Cumulative impact estimated to *Micromyrtus trudgenii* has decreased from 49.56% to 35.75% (a decrease of 13.81%). Of this 35.75% impact, 35.33% is direct and the remainder is indirect.
- Proposal impact (the total for direct and indirect) to the Blue Hills P1 PEC has decreased from 1.4% to 0.19% (a decrease of 1.21%). Of the 0.19% impact, 0.18% is direct and the remainder is indirect.
- Cumulative impact (the total for direct and indirect) to the Blue Hills P1 PEC has decreased from 14.36% to 13.16% (minus 1.21%). Of this 13.16%, 13.14% is direct impact and the remainder indirect.
- Eleven of the 17 FCTs and mosaics (14 FCTs, three mosaics) located in the Study / Local Area will not be impacted by the amended Project Area (1a, 2, mosaic 4/17, 7b, 7c, 8, 10a, 11, mosaic 11/9, 15 and 16). This is the same for the original and amended Project Area.

- Proposal impact (the total for direct and indirect) from the amended Project Area on the remaining six FCTs ranges from 0.01% of the total area mapped (FCT 1b and FCT 3) to 2.03% (FCT 13). When direct impact only is considered these percentages are 0.001% (FCT 1b), 0.01% (FCT 3) and 1.97% (FCT 13).
- Cumulative impact (the total for direct and indirect) to the 17 FCTs and mosaics ranges from 0.26% (FCT 7c) to 67.87% (FCT 14). When direct impact only is considered these percentages are 0.26% (FCT 7c) and 67.86% (FCT 14).
- Proposal impact (the total for direct and indirect) has decreased for all six FCTs and mosaics (FCT 1b, mosaic of 1a/2, 3, 12, 13 and 14) in the original and amended Project Area. The decrease ranges from minus 0.42% (FCT 3) to minus 11.14% (FCT 12). When direct impact only is considered these percentages are minus 0.003% (FCT 3) and minus 0.68% (FCT 12).
- The decreases in cumulative impact (the total for direct and indirect) to the 17 FCTs and mosaics are the same as those for proposal impact.

A comparison of the plant numbers available to Maia with those included in KML 2008 / WEC 2008c, and with new locations for most of these CSF species that have been found in the surrounding areas (WEC, 2012), suggests that the proposal and cumulative impacts estimated in this current impacts assessment are higher than actual impacts would be for many of the species if all of the plant locations from the surrounding areas had been available for use in this impact assessment.

Comments on the number of CSF plants of the threatened and P1 species in the Local Area compared with KML records in WEC 2008c (**Table 3.11**) and WEC 2012 are provided in the following dot points.

- *Acacia woodmaniorum* (Threatened): the total number of baseline plants in WA derived by Maia is similar to that derived by WEC 2008c. Differences probably result from Maia having carried out a census in selected areas in the Local / Study Area, which involved grid searching of the area, and also from the fact that Maia sourced the number of plants at Jasper Hill from Millar, Coates and Byrne (2013) and does not have shape files for these plants. The proposal and cumulative impacts presented in this report for this species should be relatively accurate.
- *Acacia karina* (P1): Maia's derived total baseline plants in WA is much lower than that in WEC 2008c. In addition to this many more records for this species are shown on the map in WEC 2012 and the total number of plants in WA will be much higher than the 23,487 included in WEC 2008c / KML 2008. Based on this the actual proposal and cumulative impacts contributed by the two *A. karina* plants located in the amended Project Area (direct impact area) should be lower than those indicated in this report.
- *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468) (P1): the total number of baseline plants in WA has been derived using all of KML's data. More plants have been located since WEC 2008c and plant numbers in the tables in this current assessment are higher than in WEC 2008c / KML 2008 and the cumulative impacts estimates are therefore lower.

Even with regional records for the annual CSF species occurring in the amended Project Area (*Calotis* sp. Perrinvale Station and *Rhodanthe collina*), actual impacts would be hard to define because plant numbers will fluctuate from year to year depending, for example, on winter rainfall and temperatures and the timing of spring surveys. Excluding any additional regional data, cumulative impact (direct and indirect) estimated by Maia to these two P3 species is less than 10% (0.58% and 9.55% respectively). Impact to *Calotis* sp. Perrinvale Station from the proposal is 0.06% (and this is all indirect impact) and impact to the *R. collina* in the amended Project Area is 0.86% (0.83% direct and 0.03% indirect).

**Table 3.1: Estimated cumulative impact to CSF species recorded in the Local Area (using plant locations available to Maia) - extracted from Maia (2016) – ORIGINAL Project Area, excluding additional *Lepidosperma* sp. Blue Hills locations**

Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16												
Species	Rank	Regional CSR	Local CSR	WA		YAL02		BHIAA		LA		BHIAA-Auricup		BHIAA-FML		BHIAA-FMG		BHIAA-FI		BHIAA-KML		BHIAA-MG		BHIAA-MGML		BHIAA-RRL	
				# Pre	# Post	# Pre	# Post	# Pre	# Post	# Pre	# Post	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA
<i>Acacia woodmaniorum</i>	T	High	High	30,957	26,990	30,957	26,990	30,957	26,990	14,258	10,503	0	0	0	0	0	0	0	0	212	0.68	0	0	0	0	0	0
<i>Acacia karina</i>	P1	High	High	515	448	515	448	342	275	58	58	0	0	0	0	0	0	0	0	15	2.91	51	9.90	0	0	0	0
<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468)	P1	High	High	5,705	5,673	5,587	5,555	5,484	5,452	2,298	2,285	0	0	0	0	0	0	0	0	19	0.33	0	0	0	0	0	0
<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8)*	P1	High	High	796	759	796	759	793	756	1	1	0	0	0	0	0	0	0	0	36	4.52	1	0.13	0	0	0	0
<i>Acacia subsessilis</i>	P3	Moderate	High	2,428	2,428	2,415	2,415	9	9	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096)	P3	Moderate	High	1,713	1,704	357	349	355	347	336	334	0	0	0	0	0	0	0	0	6	0.35	0	0	0	0	0	0
<i>Drummondita fulva</i>	P3	High	Moderate	19,166	15,724	19,166	15,724	7,922	5,692	4,261	3,605	0	0	0	0	0	0	0	0	1,574	8.21	0	0	0	0	0	0
<i>Grevillea globosa</i>	P3	Moderate	High	4,637	4,582	4,636	4,582	276	245	9	9	0	0	0	0	4	0.09	0	0	27	0.58	0	0	0	0	0	0
<i>Gunnioopsis divisa</i>	P3	Moderate	High	2,636	2,634	1,699	1,697	1,583	1,581	142	141	0	0	0	0	0	0	0	0	1	0.04	0	0	0	0	0	0
<i>Micromyrtus acuta</i>	P3	Moderate	Moderate	14,897	13,759	14,636	13,628	13,510	12,503	8,187	7,281	0	0	0	0	0	0	0	0	101	0.68	0	0	0	0	0	0
<i>Micromyrtus trudgenii</i>	P3	Moderate	Moderate	20,885	15,430	20,872	15,417	16,973	12,488	14,068	9,902	0	0	0	0	0	0	0	0	319	1.53	0	0	0	0	0	0
<i>Persoonia pentasticha</i>	P3	Moderate	Moderate	569	518	468	425	437	394	264	237	0	0	0	0	0	0	0	0	10	1.76	6	1.05	0	0	0	0
<i>Polianthion collinum</i>	P3	High	High	5,119	3,298	5,119	3,298	2,733	2,065	114	111	0	0	0	0	0	0	0	0	665	12.99	0	0	0	0	0	0
<i>Rhodanthe collina</i>	P3	Moderate	High	39,667	36,222	39,518	36,073	39,485	36,041	10,251	10,142	0	0	0	0	0	0	0	0	3,335	8.41	0	0	0	0	0	0
<i>Stenanthemum poicilum</i>	P3	Moderate	High	965	960	57	57	8	8	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Column 1	2	3	4	17		18		19		20		21		22		23		24		25		26		27			
Species	Rank	Regional CSR	Local CSR	BHIAA-SMC		BHIAA-ZR		BHIAA-Other areas		BHIAA-all impact from previous clearing		Known impacts from previous clearing outside of BHIAA in WA		A – PDE - original		B – PIA - original		Direct Project Area impacts – original (A+B)		C - PDEB original-indirect Project Area impact		Direct and indirect impacts – original (A+B+C)		Cumulative impact - original			
#	% of WA	#	% of WA	ha	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA						
<i>Acacia woodmaniorum</i>	T	High	High	3,755	12.13	0	0	0	0	3,967	12.81	0	0	2,302	7.44	2,634	8.51	4,936	15.94	1,395	4.51	6,331	20.45	10,298	33.27		
<i>Acacia karina</i>	P1	High	High	0	0	1	0.19	0	0	67	13.01	0	0	0	0	2	0.39	2	0.39	0	0	2	0.39	69	13.40		
<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468)	P1	High	High	13	0.23	0	0	0	0	32	0.56	0	0	29	0.51	669	11.73	698	12.23	8	0.14	706	12.38	738	12.94		
<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8)*	P1	High	High	0	0	0	0	0	0	37	4.65	0	0	0	0.00	0	0	0	0.00	0	0	0	0	37	4.65		
<i>Acacia subsessilis</i>	P3	Moderate	High	0	0	0	0	0	0	0	0	0	0	2	0.08	1	0.04	3	0.12	0	0	3	0.12	3	0.12		
<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096)	P3	Moderate	High	2	0.12	0	0	0	0	8	0.47	1	0.06	67	3.91	0	0	67	3.91	2	0.12	69	4.03	78	4.55		
<i>Drummondita fulva</i>	P3	High	Moderate	656	3.42	0	0	0	0	2,230	11.64	1,212	6.32	426	2.22	1,164	6.07	1,590	8.30	41	0.21	1,631	8.51	5,073	26.47		
<i>Grevillea globosa</i>	P3	Moderate	High	0	0	0	0	0	0	31	0.67	24	0.52	0	0	0	0	0	0	0	0	0	0	55	1.19		
<i>Gunnioopsis divisa</i>	P3	Moderate	High	1	0.04	0	0	0	0	2	0.08	0	0	2	0.08	0	0	2	0.08	0	0	2	0.08	4	0.15		
<i>Micromyrtus acuta</i>	P3	Moderate	Moderate	906	6.08	0	0	0	0	1,007	6.76	131	0.88	7	0.05	867	5.82	874	5.87	0	0	874	5.87	2,012	13.51		
<i>Micromyrtus trudgenii</i>	P3	Moderate	Moderate	4,166	19.95	0	0	0	0	4,485	21.47	970	4.64	986	4.72	3,754	17.97	4,740	22.70	156	0.75	4,896	23.44	10,351	49.56		
<i>Persoonia pentasticha</i>	P3	Moderate	Moderate	27	4.75	0	0	0	0	43	7.56	8	1.41	28	4.92	45	7.91	73	12.83	16	2.81	89	15.64	140	24.60		
<i>Polianthion collinum</i>	P3	High	High	3	0.06	0	0	0	0	668	13.05	1,153	22.52	0	0	0	0	0	0	0	0	0	0	1,821	35.57		
<i>Rhodanthe collina</i>	P3	Moderate	High	109	0.27	0	0	0	0	3,444	8.68	1	0.00	3,081	7.77	1	0.00	3,082	7.77	580	1.46	3,662	9.23	7,107	17.92		
<i>Stenanthemum poicilum</i>	P3	Moderate	High	0	0	0	0	0	0	0	0	5	0.52	0	0	0	0	0	0	0	0	0	0	5	0.52		

Abbreviations: Column 2 - T = Threatened, P1 to P4 = Priority 1 to Priority 4; columns 3 and 4 - CSR = conservation significance rating, Local Area = Study Area = tenements M59/595 and M59/596, Regional Area = Tallering (YAL02) subregion; column 5 - WA = Western Australia; column 6 - YAL02 = Tallering subregion; column 7 to 21 - BHIAA = Blue Hills impact assessment area; column 8 - LA = Local area; columns 9 to 18 - Auricup = Auricup (Rothsay) Pty Ltd, FML = Falcon Minerals Limited, FMG = FMG Resources Pty Ltd, FI = Fraka Investments Pty Ltd, KML = Karara Mining Limited and includes DSO Ventures Pty Ltd and Gindalbie Metals Ltd, MG = Minjar Gold Pty Ltd, MGML = Mt Gibson Mining Limited, RRL = Raptor Resources Limited, ZR = Zetek Resources Pty Ltd; columns 22 to 25 - PDE = proposed development envelope, PIA = proposed infrastructure area, PDEB = proposed development envelope 50 m buffer.

Notes: Columns 5 to 8 = number of known plants pre any clearing for footprints, drill lines and tracks and post clearing (post clearing includes approved footprints and clearing from mining and exploration, tracks and roads, or clearing for agricultural purposes); columns 9 to 19 = BHIAA impact from clearing in different tenements and in other areas not covered by tenements – % of WA = ((# in columns 9 to 19/# Pre in column 5)\*100); column 20 = total for all impacts in columns 9 to 19 where # equals sum of # in columns 9 to 19 and % of WA = ((# in column 20/# Pre in column 5)\*100); column 21 = the impact from clearing outside of the BHIAA in WA where # is the difference between # Pre in column 5 and # in column 20 and % of WA = ((# in column 21/# Pre in column 5)\*100); columns 22 to 26 = impacts from the Project Area; column 22 – the proposed development envelope excluding the proposed infrastructure area; column 27 – # = (column 20# + column 21# + column 26#) and % of WA = ((# in column 27/# Pre in column 5)\*100).

**Table 3.2: Estimated cumulative impact to CSF species recorded in the Local Area (using plant locations available to Maia) – ORIGINAL Project Area, excluding additional *Lepidosperma* sp. Blue Hills locations**

Project / tenement holder	<i>Acacia woodmaniorum</i> (T)		<i>Acacia karina</i> (P1)		<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)		<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)		<i>Acacia subsessilis</i> (P3)		<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (P3)		<i>Drummondita fulva</i> (P3)		<i>Grevillea globosa</i> (P3)		<i>Gunniopsis divisa</i> (P3)	
	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA
Existing impacts within BHIAA																		
Auricorp (Rothsay) Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Falcon Minerals Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FMG Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.09	0	0
Fraka Investments Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Karara Mining Ltd (inc. Gindalbie Metals Ltd & DSO Ventures Pty Ltd)	212	0.68	15	2.91	19	0.33	36	4.52	0	0	6	0.35	1,574	8.21	27	0.58	1	0.04
Minjar Gold Pty Ltd	0	0	51	9.90	0	0	1	0.13	0	0	0	0	0	0	0	0	0	0
Mount Gibson Mining Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Raptor Resources Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sinosteel Midwest Corporation Ltd	3,755	12.13	0	0	13	0.23	0	0	0	0	2	0.12	656	3.42	0	0	1	0.04
Zetec Resources Pty Ltd	0	0	1	0.19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-tenement holder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total impacts within BHIAA	3,967	12.81	67	13.01	32	0.56	37	4.65	0	0	8	0.47	2,230	11.64	31	0.67	2	0.08
Impacts outside BHIAA	0	0	0	0	0	0	0	0	0	0	1	0.06	1,212	6.32	24	0.52	0	0
Total existing impacts within and outside of BHIAA (before proposal impact)	3,967	12.81	67	13.01	32	0.56	37	4.65	0	0	9	0.53	3,442	17.96	55	1.19	2	0.08
Proposal impact	6,331	20.45	2	0.39	706	12.38	0	0	3	0.12	69	4.03	1,631	8.51	0	0	2	0.08
Proposal impact - direct	2,634	8.51	2	0.39	669	11.73	0	0	1	0.04	0	0	1,164	6.07	0	0	0	0
Proposal impact - indirect	3,697	11.94	0	0	37	0.65	0	0	2	0.08	69	4.03	467	2.44	0	0	2	0.08
Cumulative impact	10,298	33.27	69	13.40	738	12.94	37	4.65	3	0.12	78	4.55	5,073	26.47	55	1.19	4	0.15
Cumulative impact - direct	6,601	21.32	69	13.40	701	12.29	37	4.65	1	0.04	9	0.53	4,606	24.03	55	1.19	2	0.08
Cumulative impact - indirect	3,697	11.94	0	0	37	0.65	0	0	2	0	69	4.03	467	2.44	0	0	2	0.08
Total plant locations available to Maia in Tallingering (pre-impact)	30,957		515		5,587		796		2,415		357		19,166		4,636		1,699	
Total plant locations available to Maia in WA (pre-impact)	30,957		515		5,705		796		2,428		1,713		19,166		4,637		2,636	
Project / tenement holder	<i>Micromyrtus acuta</i> (P3)		<i>Micromyrtus trudgenii</i> (P3)		<i>Persoonia pentasticha</i> (P3)		<i>Polianthion collinum</i> (P3)		<i>Rhodanthe collina</i> (P3)		<i>Stenanthemum poicilum</i> (P3)							
	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA						
Existing impacts within BHIAA																		
Auricorp (Rothsay) Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0						
Falcon Minerals Limited	0	0	0	0	0	0	0	0	0	0	0	0						
FMG Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0						
Fraka Investments Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0						
Karara Mining Ltd (inc. Gindalbie Metals Ltd & DSO Ventures Pty Ltd)	101	0.68	319	1.53	10	1.76	665	12.99	3,335	8.41	0	0						
Minjar Gold Pty Ltd	0	0	0	0	6	1.05	0	0	0	0	0	0						
Mount Gibson Mining Limited	0	0	0	0	0	0	0	0	0	0	0	0						
Raptor Resources Limited	0	0	0	0	0	0	0	0	0	0	0	0						
Sinosteel Midwest Corporation Ltd	906	6.08	4,166	19.95	27	4.75	3	0.06	109	0.27	0	0						
Zetec Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0						
Non-tenement holder	0	0	0	0	0	0	0	0	0	0	0	0						
Total of existing impacts within BHIAA	1,007	6.76	4,485	21.47	43	7.56	668	13.05	3,444	8.68	0	0						
Existing impacts outside BHIAA	131	0.88	970	4.64	8	1.41	1,153	22.52	1	0.00	5	0.52						
Total existing impacts within and outside of BHIAA (before proposal impact)	1,138	7.64	5,455	26.12	51	8.96	1,821	35.57	3,445	8.68	5	0.52						
Proposal impact	874	5.87	4,896	23.44	89	15.64	0	0	3,662	9.23	0	0						
Proposal impact - direct	867	5.82	3,754	17.97	45	7.91	0	0	1	0.00	0	0						
Proposal impact - indirect	7	0.05	1,142	5.47	44	7.73	0	0	3,661	9.23	0	0						
Cumulative impact	2,012	13.51	10,351	49.56	140	24.60	1,821	35.57	7,107	17.92	5	0.52						
Cumulative impact - direct	2,005	13.46	9,209	44.09	96	16.87	1,821	35.57	3,446	8.69	5	0.52						
Cumulative impact - indirect	7	0.05	1,142	5.47	44	7.73	0	0	3,661	9.23	0	0						
Total plant locations available to Maia in Tallingering (pre-impact)	14,636		20,872		468		5,119		39,518		57							
Total plant locations available to Maia in WA (pre-impact)	14,897		20,885		569		5,119		39,667		965							

Notes: Proposal impact = Proposal impact – direct plus Proposal impact – indirect. Proposal impact - direct = PIA direct and includes impacts from the Expansion Pit, 3 m Windrow, 10 m Abandonment Bund, 45-60 m Haul Roads, 18-20 m Access Roads, Waste Dump and Other Infrastructure. Proposal impact - indirect = PIA indirect and includes Pit Indirect Disturbance (50 m indirect impact area, excluding abandonment bund), Haul Road 10 m indirect impact area and Access Road 25 m indirect impact area. There is no overlap in the direct and indirect impact areas.

**Table 3.3: Estimated cumulative impacts to CSF species recorded in the Local Area (using plant locations available to Maia) – ORIGINAL Project Area, including additional *Lepidosperma* sp. Blue Hills locations**

Project / tenement holder	<i>Acacia woodmaniorum</i> (T)		<i>Acacia karina</i> (P1)		<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)		<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)		<i>Acacia subsessilis</i> (P3)		<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (P3)		<i>Drummondita fulva</i> (P3)		<i>Grevillea globosa</i> (P3)		<i>Gunniopsis divisa</i> (P3)	
	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA
Existing impacts within BHIAA																		
Auricorp (Rothsay) Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Falcon Minerals Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FMG Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.09	0	0
Fraka Investments Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Karara Mining Ltd (inc. Gindalbie Metals Ltd & DSO Ventures Pty Ltd)	212	0.68	15	2.91	37,726	41.89	36	4.52	0	0	6	0.35	1,574	8.21	27	0.58	1	0.04
Minjar Gold Pty Ltd	0	0	51	9.90	24	0.03	1	0.13	0	0	0	0	0	0	0	0	0	0
Mount Gibson Mining Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Raptor Resources Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sinosteel Midwest Corporation Ltd	3,755	12	0	0	13	0.01	0	0	0	0	2	0.12	656	3.42	0	0	1	0.04
Zetec Resources Pty Ltd	0	0	1	0.19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-tenement holder	0	0	0	0	31	0.03	0	0	0	0	0	0	0	0	0	0	0	0
Total of existing impacts within BHIAA	3,967	12.81	67	13.01	37,794	41.96	37	4.65	0	0	8	0.47	2,230	11.64	31	0.67	2	0.08
Existing impacts outside BHIAA	0	0	0	0	1,267	1.41	0	0	0	0	1	0.06	1,212	6.32	24	0.52	0	0
<b>Total existing impacts within and outside of BHIAA (before proposal impact)</b>	<b>3,967</b>	<b>12.81</b>	<b>67</b>	<b>13.01</b>	<b>39,061</b>	<b>43.37</b>	<b>37</b>	<b>4.65</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>0.53</b>	<b>3,442</b>	<b>17.96</b>	<b>55</b>	<b>1.19</b>	<b>2</b>	<b>0.08</b>
Proposal impact	6,331	20.45	2	0.39	706	0.78	0	0	3	0.12	69	4.03	1,631	8.51	0	0	2	0.08
Proposal impact - direct	2,634	8.51	2	0.39	669	0.74	0	0	1	0.04	0	0	1,164	6.07	0	0	0	0
Proposal impact - indirect	3,697	11.94	0	0	37	0.04	0	0	2	0.08	69	4.03	467	2.44	0	0	2	0.08
Cumulative impact	10,298	33.27	69	13.40	39,767	44.15	37	4.65	3	0.12	78	4.55	5,073	26.47	55	1.19	4	0.15
Cumulative impact - direct	6,601	21.32	69	13.40	39,730	44.11	37	4.65	1	0.04	9	0.53	4,606	24.03	55	1.19	2	0.08
Cumulative impact - indirect	3,697	11.94	0	0	37	0.04	0	0	2	0	69	4.03	467	2.44	0	0	2	0.08
Total plant locations available to Maia in Talling (pre-impact)	30,957		515		80,404		796		2,415		357		19,166		4,636		1,699	
Total plant locations available to Maia in WA (pre-impact)	30,957		515		90,067		796		2,428		1,713		19,166		4,637		2,636	
Project / tenement holder	<i>Micromyrtus acuta</i> (P3)		<i>Micromyrtus trudgenii</i> (P3)		<i>Persoonia pentasticha</i> (P3)		<i>Polianthion collinum</i> (P3)		<i>Rhodanthe collina</i> (P3)		<i>Stenanthemum poecilum</i> (P3)							
	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA						
Existing impacts within BHIAA																		
Auricorp (Rothsay) Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0						
Falcon Minerals Limited	0	0	0	0	0	0	0	0	0	0	0	0						
FMG Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0						
Fraka Investments Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0						
Karara Mining Ltd (inc Gindalbie Metals Ltd & DSO Ventures Pty Ltd)	101	0.68	319	1.53	10	1.76	665	12.99	3,335	8.41	0	0						
Minjar Gold Pty Ltd	0	0	0	0	6	1.05	0	0	0	0	0	0						
Mount Gibson Mining Limited	0	0	0	0	0	0	0	0	0	0	0	0						
Raptor Resources Limited	0	0	0	0	0	0	0	0	0	0	0	0						
Sinosteel Midwest Corporation Ltd	906	6.08	4,166	19.95	27	4.75	3	0.06	109	0.27	0	0						
Zetec Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0						
Non-tenement holder	0	0	0	0	0	0	0	0	0	0	0	0						
Total of existing impacts within BHIAA	1,007	6.76	4,485	21.47	43	7.56	668	13.05	3,444	8.68	0	0						
Existing impacts outside BHIAA	131	0.88	970	4.64	8	1.41	1,153	22.52	1	0.00	5	0.52						
<b>Total existing impacts within and outside of BHIAA (before proposal impact)</b>	<b>1,138</b>	<b>7.64</b>	<b>5,455</b>	<b>26.12</b>	<b>51</b>	<b>8.96</b>	<b>1,821</b>	<b>35.57</b>	<b>3,445</b>	<b>8.68</b>	<b>5</b>	<b>0.52</b>						
Proposal impact	874	5.87	4,896	23.44	89	15.64	0	0	3,662	9.23	0	0						
Proposal impact - direct	867	5.82	3,754	17.97	45	7.91	0	0	1	0.00	0	0						
Proposal impact - indirect	7	0.05	1,142	5.47	44	7.73	0	0	3,661	9.23	0	0						
Cumulative impact	2,012	13.51	10,351	49.56	140	24.60	1,821	35.57	7,107	17.92	5	0.52						
Cumulative impact - direct	2,005	13.46	9,209	44.09	96	16.87	1,821	35.57	3,446	8.69	5	0.52						
Cumulative impact - indirect	7	0.05	1,142	5.47	44	7.73	0	0	3,661	9.23	0	0						
Total plant locations available to Maia in Talling (pre-impact)	14,636		20,872		468		5,119		39,518		57							
Total plant locations available to Maia in WA (pre-impact)	14,897		20,885		569		5,119		39,667		965							

Note: Proposal impact = Proposal impact – direct plus Proposal impact – indirect. Proposal impact - direct = PIA direct and includes impacts from the Expansion Pit, 3 m Windrow, 10 m Abandonment Bund, 45-60 m Haul Roads, 18-20 m Access Roads, Waste Dump and Other Infrastructure. Proposal impact - indirect = PIA indirect and includes Pit Indirect Disturbance (50 m indirect impact area, excluding abandonment bund), Haul Road 10 m indirect impact area and Access Road 25 m indirect impact area. There is no overlap in the direct and indirect impact areas.

**Table 3.4: Estimated cumulative impacts to CSF species recorded in the Local Area (using plant locations available to Maia) – AMENDED Project Area, including additional *Lepidosperma* sp. Blue Hills locations**

Project / tenement holder	<i>Acacia woodmaniorum</i> (T)		<i>Acacia karina</i> (P1)		<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)		<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)		<i>Acacia subsessilis</i> (P3)		<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (P3)		<i>Drummondita fulva</i> (P3)		<i>Grevillea globosa</i> (P3)		<i>Gunniopsis divisa</i> (P3)		
	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	
Existing impacts within BHIAA																			
Auricorp (Rothsay) Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Falcon Minerals Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FMG Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.09	0	0
Fraka Investments Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Karara Mining Ltd (inc Gindalbie Metals Ltd & DSO Ventures Pty Ltd)	212	0.68	15	2.91	37,726	41.89	36	4.52	0	0	6	0.35	1,574	8.21	27	0.58	1	0.04	
Minjar Gold Pty Ltd	0	0	51	9.90	24	0.03	1	0.13	0	0	0	0	0	0	0	0	0	0	
Mount Gibson Mining Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Raptor Resources Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sinosteel Midwest Corporation Ltd	3,755	12	0	0	13	0.01	0	0	0	0	2	0.12	656	3.42	0	0	1	0.04	
Zetec Resources Pty Ltd	0	0	1	0.19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Non-tenement holder	0	0	0	0	31	0.03	0	0	0	0	0	0	0	0	0	0	0	0	
Total of existing impacts within BHIAA	3,967	12.81	67	13.01	37,794	41.96	37	4.65	0	0	8	0.47	2,230	11.64	31	0.67	2	0.08	
Existing impacts outside BHIAA	0	0	0	0	1,267	1.41	0	0	0	0	1	0.06	1,212	6.32	24	0.52	0	0	
Total existing impacts within and outside of BHIAA (before proposal impact)	3,967	12.81	67	13.01	39,061	43.37	37	4.65	0	0	9	0.53	3,442	17.96	55	1.19	2	0.08	
Proposal impact	1,739	5.62	2	0.39	350	0.39	0	0	1	0.04	1	0.06	508	2.65	0	0	1	0.04	
Proposal impact - direct	1,683	5.44	2	0.39	340	0.38	0	0	1	0.04	0	0	482	2.51	0	0	0	0	
Proposal impact – 10% of indirect	56	0.18	0	0	10	0.01	0	0	0	0	1	0.06	26	0.14	0	0	1	0.04	
Cumulative impact	5,706	18.43	69	13.40	39,411	43.76	37	4.65	1	0.04	10	0.58	3,950	20.61	55	1.19	3	0.11	
Cumulative impact - direct	5,650	18.25	69	13.40	39,401	43.75	37	4.65	1	0.04	9	0.53	3,924	20.47	55	1.19	2	0.08	
Cumulative impact – 10% of indirect	56	0.18	0	0	10	0.01	0	0	0	0	1	0.06	26	0.14	0	0	1	0.04	
Total plant locations available to Maia in Talling (pre-impact)	30,957		515		80,404		796		2,415		357		19,166		4,636		1,699		
Total plant locations available to Maia in WA (pre-impact)	30,957		515		90,067		796		2,428		1,713		19,166		4,637		2,636		
Project / tenement holder	<i>Micromyrtus acuta</i> (P3)		<i>Micromyrtus trudgenii</i> (P3)		<i>Persoonia pentasticha</i> (P3)		<i>Polianthion collinum</i> (P3)		<i>Rhodanthe collina</i> (P3)		<i>Stenanthemum poecilum</i> (P3)								
	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA	#	% of WA							
Existing impacts within BHIAA																			
Auricorp (Rothsay) Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0							
Falcon Minerals Limited	0	0	0	0	0	0	0	0	0	0	0	0							
FMG Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0							
Fraka Investments Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0							
Karara Mining Ltd (inc Gindalbie Metals Ltd & DSO Ventures Pty Ltd)	101	0.68	319	1.53	10	1.76	665	12.99	3,335	8.41	0	0							
Minjar Gold Pty Ltd	0	0	0	0	6	1.05	0	0	0	0	0	0							
Mount Gibson Mining Limited	0	0	0	0	0	0	0	0	0	0	0	0							
Raptor Resources Limited	0	0	0	0	0	0	0	0	0	0	0	0							
Sinosteel Midwest Corporation Ltd	906	6.08	4,166	19.95	27	4.75	3	0.06	109	0.27	0	0							
Zetec Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0							
Non-tenement holder	0	0	0	0	0	0	0	0	0	0	0	0							
Total of existing impacts within BHIAA	1,007	6.76	4,485	21.47	43	7.56	668	13.05	3,444	8.68	0	0							
Existing impacts outside BHIAA	131	0.88	970	4.64	8	1.41	1,153	22.52	1	0.00	5	0.52							
Total existing impacts within and outside of BHIAA (before proposal impact)	1,138	7.64	5,455	26.12	51	8.96	1,821	35.57	3,445	8.68	5	0.52							
Proposal impact	43	0.29	2,011	9.63	31	5.45	0	0	342	0.86	0	0							
Proposal impact - direct	20	0.13	1,924	9.21	29	5.10	0	0	331	0.83	0	0							
Proposal impact – 10% of indirect	23	0.15	87	0.42	2	0.35	0	0	11	0.03	0	0							
Cumulative impact	1,181	7.93	7,466	35.75	82	14.41	1,821	35.57	3,787	9.55	5	0.52							
Cumulative impact - direct	1,158	7.77	7,379	35.33	80	14.06	1,821	35.57	3,776	9.52	5	0.52							
Cumulative impact – 10% of indirect	23	0.15	87	0.42	2	0.35	0	0	11	0.03	0	0							
Total plant locations available to Maia in Talling (pre-impact)	14,636		20,872		468		5,119		39,518		57								
Total plant locations available to Maia in WA (pre-impact)	14,897		20,885		569		5,119		39,667		965								

Note: Proposal impact = Proposal impact – direct plus Proposal impact – 10% of indirect. Proposal impact - direct = PIA direct and includes impacts from the Expansion Pit, 3 m Windrow, 10 m Abandonment Bund, 45-60 m Haul Roads, 18-20 m Access Roads, Waste Dump and Other Infrastructure. Proposal impact – 10% of indirect = PIA indirect and includes 10% of the number of plants of each species located within the Pit Indirect Disturbance (50 m indirect impact area, excluding abandonment bund), Haul Road 10 m indirect impact area and Access Road 25 m indirect impact area. There is no overlap in the direct and indirect impact areas. Whenever 10% of the number of plants in the indirect impact area was a fraction it was rounded up to the nearest whole number and percentages were calculated using the whole number.

**Table 3.5: Proposal and cumulative impacts to CSF species of the Local Area (using plant locations available to Maia) – summarised from Table 3.2, 3.3 and 3.4, and including a table with the difference between impacts from the original and amended Project Area including additional *Lepidosperma* sp. Blue Hills locations**

A (Table 3.2) ORIGINAL (without extra LspBH)	<i>Acacia woodmaniorum</i> (T)		<i>Acacia karina</i> (P1)		<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)		<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)		<i>Acacia subsessilis</i> (P3)		<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (P3)		<i>Drummondita fulva</i> (P3)		<i>Grevillea globosa</i> (P3)		<i>Gunniopsis divisa</i> (P3)		<i>Micromyrtus acuta</i> (P3)		<i>Micromyrtus trudgenii</i> (P3)		<i>Persoonia pentasticha</i> (P3)		<i>Polianthion collinum</i> (P3)		<i>Rhodanthe collina</i> (P3)		<i>Stenanthemum poicilum</i> (P3)		
	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#
Proposal impact	6,331	20.45	2	0.39	706	12.38	0	0	3	0.12	69	4.03	1,631	8.51	0	0	2	0.08	874	5.87	4,896	23.44	89	15.64	0	0	3,662	9.23	0	0	
Proposal impact - direct	2,634	8.51	2	0.39	669	11.73	0	0	1	0.04	0	0	1,164	6.07	0	0	0	0	867	5.82	3,754	17.97	45	7.91	0	0	1	0.00	0	0	
Proposal impact - indirect	3,697	11.94	0	0	37	0.65	0	0	2	0.08	69	4.03	467	2.44	0	0	2	0.08	7	0.05	1,142	5.47	44	7.73	0	0	3,661	9.23	0	0	
Cumulative impact	10,298	33.27	69	13.40	738	12.94	37	4.65	3	0.12	78	4.55	5,073	26.47	55	1.19	4	0.15	2,012	13.51	10,351	49.56	140	24.60	1,821	35.57	7,107	17.92	5	0.52	
Cumulative impact - direct	6,601	21.32	69	13.40	701	12.29	37	4.65	1	0.04	9	0.53	4,606	24.03	55	1.19	2	0.08	2,005	13.46	9,209	44.09	96	16.87	1,821	35.57	3,446	8.69	5	0.52	
Cumulative impact - indirect	3,697	11.94	0	0	37	0.65	0	0	2	0.08	69	4.03	467	2.44	0	0	2	0.08	7	0.05	1,142	5.47	44	7.73	0	0	3,661	9.23	0	0	

B (Table 3.3) ORIGINAL (with extra LspBH)	<i>Acacia woodmaniorum</i> (T)		<i>Acacia karina</i> (P1)		<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)		<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)		<i>Acacia subsessilis</i> (P3)		<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (P3)		<i>Drummondita fulva</i> (P3)		<i>Grevillea globosa</i> (P3)		<i>Gunniopsis divisa</i> (P3)		<i>Micromyrtus acuta</i> (P3)		<i>Micromyrtus trudgenii</i> (P3)		<i>Persoonia pentasticha</i> (P3)		<i>Polianthion collinum</i> (P3)		<i>Rhodanthe collina</i> (P3)		<i>Stenanthemum poicilum</i> (P3)				
	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#
Proposal impact	6,331	20.45	2	0.39	706	0.78	0	0	3	0.12	69	4.03	1,631	8.51	0	0	2	0.08	874	5.87	4,896	23.44	89	15.64	0	0	3,662	9.23	0	0			
Proposal impact - direct	2,634	8.51	2	0.39	669	0.74	0	0	1	0.04	0	0	1,164	6.07	0	0	0	0	867	5.82	3,754	17.97	45	7.91	0	0	1	0.00	0	0			
Proposal impact - indirect	3,697	11.94	0	0	37	0.04	0	0	2	0.08	69	4.03	467	2.44	0	0	2	0.08	7	0.05	1,142	5.47	44	7.73	0	0	3,661	9.23	0	0			
Cumulative impact	10,298	33.27	69	13.40	39,767	44.15	37	4.65	3	0.12	78	4.55	5,073	26.47	55	1.19	4	0.15	2,012	13.51	10,351	49.56	140	24.60	1,821	35.57	7,107	17.92	5	0.52			
Cumulative impact - direct	6,601	21.32	69	13.40	39,730	44.11	37	4.65	1	0.04	9	0.53	4,606	24.03	55	1.19	2	0.08	2,005	13.46	9,209	44.09	96	16.87	1,821	35.57	3,446	8.69	5	0.52			
Cumulative impact - indirect	3,697	11.94	0	0	37	0.04	0	0	2	0.08	69	4.03	467	2.44	0	0	2	0.08	7	0.05	1,142	5.47	44	7.73	0	0	3,661	9.23	0	0			

C (Table 3.4) AMENDED (with extra LspBH)	<i>Acacia woodmaniorum</i> (T)		<i>Acacia karina</i> (P1)		<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)		<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)		<i>Acacia subsessilis</i> (P3)		<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (P3)		<i>Drummondita fulva</i> (P3)		<i>Grevillea globosa</i> (P3)		<i>Gunniopsis divisa</i> (P3)		<i>Micromyrtus acuta</i> (P3)		<i>Micromyrtus trudgenii</i> (P3)		<i>Persoonia pentasticha</i> (P3)		<i>Polianthion collinum</i> (P3)		<i>Rhodanthe collina</i> (P3)		<i>Stenanthemum poicilum</i> (P3)				
	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#
Proposal impact	1,739	5.62	2	0.39	350	0.39	0	0	1	0.04	1	0.06	508	2.65	0	0	1	0.04	43	0.29	2,011	9.63	31	5.45	0	0	342	0.86	0	0			
Proposal impact - direct	1,683	5.44	2	0.39	340	0.38	0	0	1	0.04	0	0	482	2.51	0	0	0	0	20	0.13	1,924	9.21	29	5.10	0	0	331	0.83	0	0			
Proposal impact -10% of indirect	56	0.18	0	0	10	0.01	0	0	0	0	1	0.06	26	0.14	0	0	1	0.04	23	0.15	87	0.42	2	0.35	0	0	11	0.03	0	0			
Cumulative impact	5,706	18.43	69	13.40	39,411	43.76	37	4.65	1	0.04	10	0.58	3,950	20.61	55	1.19	3	0.11	1,181	7.93	7,466	35.75	82	14.41	1,821	35.57	3,787	9.55	5	0.52			
Cumulative impact - direct	5,650	18.25	69	13.40	39,401	43.75	37	4.65	1	0.04	9	0.53	3,924	20.47	55	1.19	2	0.08	1,158	7.77	7,379	35.33	80	14.06	1,821	35.57	3,776	9.52	5	0.52			
Cumulative impact – 10% of indirect	56	0.18	0	0	10	0.01	0	0	0	0	1	0.06	26	0.14	0	0	1	0.04	23	0.15	87	0.42	2	0.35	0	0	11	0.03	0	0			

D DIFFERENCE BETWEEN ORIGINAL AND AMENDED (with extra LspBH)	<i>Acacia woodmaniorum</i> (T)		<i>Acacia karina</i> (P1)		<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468) (P1)		<i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1)		<i>Acacia subsessilis</i> (P3)		<i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (P3)		<i>Drummondita fulva</i> (P3)		<i>Grevillea globosa</i> (P3)		<i>Gunniopsis divisa</i> (P3)	
	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA
<b>Proposal impact</b>	<b>-4,592</b>	<b>-14.83</b>	<b>0</b>	<b>0</b>	<b>-356</b>	<b>-0.39</b>	<b>0</b>	<b>0</b>	<b>-2</b>	<b>-0.08</b>	<b>-68</b>	<b>-3.97</b>	<b>-1,123</b>	<b>-5.86</b>	<b>0</b>	<b>0</b>	<b>-1</b>	<b>-0.04</b>
Proposal impact - direct	-951	-3.07	0	0	-329	-0.36	0	0	0	0.00	0	0.00	-682	-3.56	0	0	0	0.00
Proposal impact – 10% pf indirect	-3,641	-11.76	0	0	-27	-0.03	0	0	-2	-0.08	-68	-3.97	-441	-2.30	0	0	-1	-0.04
<b>Cumulative impact</b>	<b>-4,592</b>	<b>-14.83</b>	<b>0</b>	<b>0</b>	<b>-356</b>	<b>-0.40</b>	<b>0</b>	<b>0</b>	<b>-2</b>	<b>-0.08</b>	<b>-68</b>	<b>-3.97</b>	<b>-1,123</b>	<b>-5.86</b>	<b>0</b>	<b>0</b>	<b>-1</b>	<b>-0.04</b>
Cumulative impact - direct	-951	-3.07	0	0	-329	-0.37	0	0	0	0.00	0	0.00	-682	-3.56	0	0	0	0.00
Cumulative impact – 10% of indirect	-3,641	-11.76	0	0	-27	-0.03	0	0	-2	-0.08	-68	-3.97	-441	-2.30	0	0	-1	-0.04
D DIFFERENCE BETWEEN ORIGINAL AND AMENDED (with extra LspBH)	<i>Micromyrtus acuta</i> (P3)		<i>Micromyrtus trudgenii</i> (P3)		<i>Persoonia pentasticha</i> (P3)		<i>Polianthion collinum</i> (P3)		<i>Rhodanthe collina</i> (P3)		<i>Stenanthemum poicilum</i> (P3)							
	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA						
<b>Proposal impact</b>	<b>-831</b>	<b>-6</b>	<b>-2,885</b>	<b>-13.81</b>	<b>-58</b>	<b>-10.19</b>	<b>0</b>	<b>0</b>	<b>-3,320</b>	<b>-8.37</b>	<b>0</b>	<b>0</b>						
Proposal impact - direct	-847	-6	-1,830	-8.76	-16	-2.81	0	0	330	0.83	0	0						
Proposal impact – 10% of indirect	16	0	-1,055	-5.05	-42	-7.38	0	0	-3,650	-9.20	0	0						
<b>Cumulative impact</b>	<b>-831</b>	<b>-5.58</b>	<b>-2,885</b>	<b>-13.81</b>	<b>-58</b>	<b>-10.19</b>	<b>0</b>	<b>0</b>	<b>-3,320</b>	<b>-8.37</b>	<b>0</b>	<b>0</b>						
Cumulative impact - direct	-847	-5.69	-1,830	-8.76	-16	-2.81	0	0	330	0.83	0	0						
Cumulative impact – 10% of indirect	16	0	-1,055	-5.05	-42	-7.38	0	0	-3,650	-9.20	0	0						

Note: LspBH = *Lepidosperma* sp. Blue Hills (A. Markey & S. Dillon 3468).

Table 3.6: Estimated cumulative impacts to PEC in the Local Area – ORIGINAL (A) and AMENDED (B) Project Area

A ORIGINAL	Total area mapped		Local Area		Auricorp (Rothsay) Pty Ltd		Falcon Minerals Limited		FMG Resources Pty Ltd		Fraka Investments Pty Ltd		Karara Mining Limited (inc. Gindalbie MetGals Ltd and DSO Ventures Pty Ltd)		Minjar Gold Pty Ltd		Mount Gibson Mining Limited		Raptor Resources Limited	
	ha Pre	ha Post	ha Pre	ha Post	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area
Blue Hills (Mount Karara/Mungada/Blue Hills) vegetation complexes (banded ironstone formation) (P1 PEC)	7,097.96	6,177.86	465.96	397.75	0	0	0	0	5.17	0.07	2.25	0.03	830.94	11.71	3.60	0.05	0.50	0.01	0.46	0.01
A ORIGINAL	Sinosteel Midwest Corporation Limited		Zetec Resources Pty Ltd		Non-tenement holder		Impacts from previous clearing in CIA (=BHIAA)		A - PDE		B - PIA		Direct Project Area impacts (A+B)		C - PDEB - indirect Project Area impact		Direct and indirect impacts (A+B+C)		Cumulative impacts	
	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area
Blue Hills (Mount Karara/Mungada/Blue Hills) vegetation complexes (banded ironstone formation) (P1 PEC)	82.59	1.16	0	0	13.91	0.20	920.10	12.96	63.44	0.89	21.41	0.30	84.85	1.20	14.61	0.21	99.46	1.40	1,019.56	14.36

B AMENDED	Total area mapped		Local Area		Auricorp (Rothsay) Pty Ltd		Falcon Minerals Limited		FMG Resources Pty Ltd		Fraka Investments Pty Ltd		Karara Mining Limited (inc. Gindalbie Metals Ltd and DSO Ventures Pty Ltd)		Minjar Gold Pty Ltd		Mount Gibson Mining Limited		Raptor Resources Limited	
	ha Pre	ha Post	ha Pre	ha Post	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area
Blue Hills (Mount Karara/Mungada/Blue Hills) vegetation complexes (banded ironstone formation) (P1 PEC)	7,097.96	6,177.86	465.96	397.75	0	0	0	0	5.17	0.07	2.25	0.03	830.94	11.71	3.60	0.05	0.50	0.01	0.46	0.01
B AMENDED	Sinosteel Midwest Corporation Limited		Zetec Resources Pty Ltd		Non-tenement holder		Impacts from previous clearing in CIA (=BHIAA)		A - PIA Direct		B - PIA Indirect		Direct and indirect Project Area impacts (A+B)		Cumulative impact					
	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area				
Blue Hills (Mount Karara/Mungada/Blue Hills) vegetation complexes (banded ironstone formation) (P1 PEC)	82.59	1.16	0	0	13.91	0.20	920.10	12.96	12.86	0.18	7.82	0.11	20.68	0.29	940.78	13.25				

Note: CIA = Cumulative Impacts Area; BHIAA = Blue Hills Impacts Assessment Area. PIA = Proposed Infrastructure Area; PDE = Proposed Development Envelope; PDEB = Proposed Development Envelope Buffer. ha Post = ha after impacts from previous clearing in CIA (=BHIAA) are deducted.

**Table 3.7: Estimated cumulative impact to PEC in the Local Area – original, amended and change / difference between original and amended (in PER table format)**

ORIGINAL IMPACT TO PEC Project / tenement holder	Blue Hills BIF P1 PEC		AMENDED IMPACT TO PEC Project / tenement holder	Blue Hills BIF P1 PEC		CHANGE from ORIGINAL to AMENDED	
	ha	%		ha	%	ha	%
Existing impacts in BHIAA			Existing impacts in BHIAA				
Auricorp (Rothsay) Pty Ltd	0	0	Auricorp (Rothsay) Pty Ltd	0	0		
Falcon Minerals Limited	0	0	Falcon Minerals Limited	0	0		
FMG Resources Pty Ltd	5.17	0.07	FMG Resources Pty Ltd	5.17	0.07		
Fraka Investments Pty Ltd	2.25	0.03	Fraka Investments Pty Ltd	2.25	0.03		
Karara Mining Limited (inc. Gindalbie Metals Ltd & DSO Ventures Pty Ltd)	830.94	11.71	Karara Mining Limited (inc. Gindalbie Metals Ltd & DSO Ventures Pty Ltd)	830.90	11.71		
Minjar Gold Pty Ltd	3.60	0.05	Minjar Gold Pty Ltd	3.60	0.05		
Mount Gibson Mining Limited	0.50	0.01	Mount Gibson Mining Limited	0.50	0.01		
Raptor Resources Limited	0.46	0.01	Raptor Resources Limited	0.46	0.01		
Sinosteel Midwest Corporation Limited	82.59	1.16	Sinosteel Midwest Corporation Limited	82.59	1.16		
Zetec Resources Pty Ltd	0	0	Zetec Resources Pty Ltd	0	0		
Non-tenement holder	13.91	0.20	Non-tenement holder	13.91	0.20		
<b>Total existing impact in BHIAA before proposal impact</b>	<b>939.42</b>	<b>13.24</b>	<b>Total existing impact in BHIAA before proposal impact</b>	<b>939.38</b>	<b>13.24</b>		
<b>Proposal impact</b>	<b>99.46</b>	<b>1.40</b>	<b>Proposal impact</b>	<b>13.64</b>	<b>0.19</b>	<b>-85.82</b>	<b>-1.21</b>
Proposal impact - direct	21.41	0.30	Proposal impact - direct	12.86	0.18	-8.55	-0.12
Proposal impact - indirect	78.05	1.10	Proposal impact - 10% of indirect	0.78	0.01	-77.27	-1.09
<b>Cumulative impact</b>	<b>1,019.56</b>	<b>14.36</b>	<b>Cumulative impact</b>	<b>933.74</b>	<b>13.16</b>	<b>-85.82</b>	<b>-1.21</b>
Cumulative impact - direct	941.51	13.26	Cumulative impact - direct	932.96	13.14	-8.55	-0.12
Cumulative impact - indirect	78.05	1.10	Cumulative impact - 10% of indirect	0.78	0.01	-77.27	-1.09
<b>Total mapped area (pre-impact)</b>	<b>7,097.96</b>						

Note: % = % of total mapped area. The boundaries of the PEC do not extend beyond the boundaries of the BHIAA. Differences between the Cumulative impact and the total calculated from all tenement and non-tenement holders plus the Proposal impact are a result of overlapping areas and tenements (see last paragraph of Section 2.3 for more detailed explanation).

**Table 3.8: Estimated cumulative impact to FCTs in the Local Area – ORIGINAL Project Area**

Project / tenement holder	FCT 1a		1b		mosaic 1a/2		2		3		mosaic 4/17		7b		7c		8	
	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area
Existing impacts in BHIAA																		
Auricorp (Rothsay) Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Falcon Minerals Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FMG Resources Pty Ltd	0.07	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fraka Investments Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Karara Mining Ltd (including Gindalbie Metals Ltd and DSO Ventures Pty Ltd)	91.71	11.52	43.49	2.76	641.66	18.39	23.55	1.86	121.81	13.05	7.64	1.62	0.17	0.32	0.35	0.20	57.66	14.91
Minjar Gold Pty Ltd	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Gibson Mining Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Raptor Resources Limited	0.70	0.09	1.52	0.10	0	0	1.42	0.11	0.04	0.00	0	0	0	0	0.10	0.06	0	0
Sinosteel Midwest Corporation Ltd	15.80	1.98	3.20	0.20	54.10	1.55	0	0	7.66	0.82	51.83	10.97	0	0	0	0	1.69	0.44
Zetec Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-tenement holder	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0
<b>Total existing impact in BHIAA pre proposal impact</b>	<b>108.28</b>	<b>13.60</b>	<b>48.21</b>	<b>3.05</b>	<b>695.77</b>	<b>19.95</b>	<b>24.96</b>	<b>1.98</b>	<b>129.50</b>	<b>13.88</b>	<b>59.47</b>	<b>12.59</b>	<b>0.17</b>	<b>0.32</b>	<b>0.45</b>	<b>0.26</b>	<b>59.36</b>	<b>15.35</b>
<b>Proposal impact</b>	<b>0</b>	<b>0</b>	<b>14.72</b>	<b>0.93</b>	<b>86.54</b>	<b>2.48</b>	<b>0</b>	<b>0</b>	<b>4.06</b>	<b>0.43</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Proposal impact - direct	0	0	0.01	0.00	30.77	0.88	0	0	0.07	0.01	0	0	0	0	0	0	0	0
Proposal impact - indirect	0	0	14.71	0.93	55.77	1.60	0	0	3.99	0.43	0	0	0	0	0	0	0	0
<b>Cumulative impact</b>	<b>96.11</b>	<b>12.07</b>	<b>59.70</b>	<b>3.78</b>	<b>759.00</b>	<b>21.76</b>	<b>24.96</b>	<b>1.98</b>	<b>126.07</b>	<b>13.51</b>	<b>52.53</b>	<b>11.12</b>	<b>0.17</b>	<b>0.32</b>	<b>0.45</b>	<b>0.26</b>	<b>57.66</b>	<b>14.91</b>
Cumulative impact - direct	96.11	12.07	44.99	2.85	703.23	20.16	24.96	1.98	122.08	13.08	52.53	11.12	0.17	0.32	0.45	0.26	57.66	14.91
Cumulative impact - indirect	0	0	14.71	0.93	55.77	1.60	0	0	3.99	0.43	0	0	0	0	0	0	0	0
<b>Total mapped area (pre-impact)</b>	<b>796.21</b>		<b>1,578.00</b>		<b>3,488.35</b>		<b>1,262.94</b>		<b>933.34</b>		<b>472.35</b>		<b>54.32</b>		<b>173.42</b>		<b>386.61</b>	
Project / tenement holder	FCT 10a		11		mosaic 11/9		12		13		14		15		16			
	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area
Existing impacts in BHIAA																		
Auricorp (Rothsay) Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Falcon Minerals Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FMG Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.60	0.77	0
Fraka Investments Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	0
Karara Mining Ltd (including Gindalbie Metals Ltd and DSO Ventures Pty Ltd)	3.94	8.89	5.51	2.52	5.01	2.21	50.01	7.77	140.37	54.38	218.01	67.27	88.83	6.37	393.57	26.01	0	0
Minjar Gold Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	0	0
Mount Gibson Mining Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Raptor Resources Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sinosteel Midwest Corporation Ltd	0.00	0.00	0.18	0.08	0	0	52.65	8.18	9.85	3.82	1.77	0.55	2.66	0.19	11.78	0.78	0	0
Zetec Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-tenement holder	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	0	0
<b>Total existing impact in BHIAA pre proposal impact</b>	<b>3.94</b>	<b>8.89</b>	<b>5.70</b>	<b>2.61</b>	<b>5.01</b>	<b>2.21</b>	<b>102.66</b>	<b>15.96</b>	<b>150.22</b>	<b>58.20</b>	<b>219.78</b>	<b>67.81</b>	<b>91.49</b>	<b>6.56</b>	<b>416.95</b>	<b>27.55</b>		
<b>Proposal impact</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>80.81</b>	<b>12.56</b>	<b>11.81</b>	<b>4.58</b>	<b>2.49</b>	<b>0.77</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Proposal impact - direct	0	0	0	0	0	0	12.90	2.00	6.57	2.55	0.77	0.24	0	0	0	0	0	0
Proposal impact - indirect	0	0	0	0	0	0	67.91	10.56	5.24	2.03	1.72	0.53	0	0	0	0	0	0
<b>Cumulative impact</b>	<b>3.94</b>	<b>8.89</b>	<b>5.70</b>	<b>2.61</b>	<b>5.01</b>	<b>2.21</b>	<b>181.18</b>	<b>28.16</b>	<b>162.03</b>	<b>62.78</b>	<b>222.27</b>	<b>68.58</b>	<b>89.14</b>	<b>6.39</b>	<b>393.76</b>	<b>26.02</b>		
Cumulative impact - direct	3.94	8.89	5.70	2.61	5.01	2.21	113.26	17.61	156.80	60.75	220.55	68.05	89.14	6.39	393.76	26.02		
Cumulative impact - indirect	0	0	0	0	0	0	67.91	10.56	5.24	2.03	1.72	0.53	0	0	0	0		
<b>Total mapped area (pre-impact)</b>	<b>44.32</b>		<b>218.66</b>		<b>226.41</b>		<b>643.33</b>		<b>258.11</b>		<b>324.10</b>		<b>1,394.27</b>		<b>1,513.28</b>			

Note: Differences between the Cumulative impact and the total calculated from all tenement and non-tenement holders plus the Proposal impact are a result of overlapping areas and tenements (see last paragraph of Section 2.3 and Table 3.12 for more detail).

**Table 3.9: Estimated cumulative impacts to FCTs in the Local Area – AMENDED Project Area**

Project / tenement holder	FCT 1a		1b		mosaic 1a/2		2		3		mosaic 4/17		7b		7c		8	
	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area
Existing impacts in BHIAA																		
Auricorp (Rothsay) Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Falcon Minerals Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FMG Resources Pty Ltd	0.07	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fraka Investments Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Karara Mining Ltd (including Gindalbie Metals Ltd and DSO Ventures Pty Ltd)	91.71	11.52	43.49	2.76	641.66	18.39	23.55	1.86	121.81	13.05	7.64	1.62	0.17	0.32	0.35	0.20	57.66	14.91
Minjar Gold Pty Ltd	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Gibson Mining Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Raptor Resources Limited	0.70	0.09	1.52	0.10	0	0	1.42	0.11	0.04	0.00	0	0	0	0	0.10	0.06	0	0
Sinosteel Midwest Corporation Ltd	15.80	1.98	3.20	0.20	54.10	1.55	0	0	7.66	0.82	51.83	10.97	0	0	0	0	1.69	0.44
Zetec Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-tenement holder	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0
<b>Total existing impact in BHIAA before Proposal impact</b>	<b>108.28</b>	<b>13.60</b>	<b>48.21</b>	<b>3.05</b>	<b>695.77</b>	<b>19.95</b>	<b>24.96</b>	<b>1.98</b>	<b>129.50</b>	<b>13.88</b>	<b>59.47</b>	<b>12.59</b>	<b>0.17</b>	<b>0.32</b>	<b>0.45</b>	<b>0.26</b>	<b>59.36</b>	<b>15.35</b>
<b>Proposal impact</b>	<b>0</b>	<b>0</b>	<b>0.08</b>	<b>0.01</b>	<b>31.97</b>	<b>0.92</b>	<b>0</b>	<b>0</b>	<b>0.12</b>	<b>0.01</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Proposal impact - direct	0	0	0.02	0.00	30.44	0.87	0	0	0.10	0.01	0	0	0	0	0	0	0	0
Proposal impact – 10% of indirect	0	0	0.07	0.00	1.52	0.04	0	0	0.02	0.00	0	0	0	0	0	0	0	0
<b>Cumulative impact</b>	<b>96.11</b>	<b>12.07</b>	<b>45.06</b>	<b>2.86</b>	<b>704.43</b>	<b>20.19</b>	<b>24.96</b>	<b>1.98</b>	<b>122.13</b>	<b>13.09</b>	<b>52.53</b>	<b>11.12</b>	<b>0.17</b>	<b>0.32</b>	<b>0.45</b>	<b>0.26</b>	<b>57.66</b>	<b>14.91</b>
Cumulative impact - direct	96.11	12.07	44.99	2.85	702.91	20.15	24.96	1.98	122.11	13.08	52.53	11.12	0.17	0.32	0.45	0.26	57.66	14.91
Cumulative impact - 10% of indirect	0	0	0.07	0.00	1.52	0.04	0	0	0.02	0.00	0	0	0	0	0	0	0	0
<b>Total mapped area (pre-impact)</b>	<b>796.21</b>		<b>1,578.00</b>		<b>3,488.35</b>		<b>1,262.94</b>		<b>933.34</b>		<b>472.35</b>		<b>54.32</b>		<b>173.42</b>		<b>386.61</b>	
Project / tenement holder	FCT 10a		11		mosaic 11/9		12		13		14		15		16			
	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area	ha	% of total mapped area
Existing impacts in BHIAA																		
Auricorp (Rothsay) Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Falcon Minerals Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FMG Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.60	0.77	0
Fraka Investments Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	0	0
Karara Mining Ltd (including Gindalbie Metals Ltd and DSO Ventures Pty Ltd)	3.94	8.89	5.51	2.52	5.01	2.21	50.01	7.77	140.37	54.38	218.01	67.27	88.83	6.37	393.57	26.01	0	0
Minjar Gold Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	0	0
Mount Gibson Mining Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Raptor Resources Limited	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sinosteel Midwest Corporation Ltd	0.00	0.00	0.18	0.08	0	0	52.65	8.18	9.85	3.82	1.77	0.55	2.66	0.19	11.78	0.78	0	0
Zetec Resources Pty Ltd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-tenement holder	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0	0	0	0
<b>Total existing impact in BHIAA before Proposal impact</b>	<b>3.94</b>	<b>8.89</b>	<b>5.70</b>	<b>2.61</b>	<b>5.01</b>	<b>2.21</b>	<b>102.66</b>	<b>15.96</b>	<b>150.22</b>	<b>58.20</b>	<b>219.78</b>	<b>67.81</b>	<b>91.49</b>	<b>6.56</b>	<b>416.95</b>	<b>27.55</b>		
<b>Proposal impact</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>9.14</b>	<b>1.42</b>	<b>5.23</b>	<b>2.03</b>	<b>0.18</b>	<b>0.06</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Proposal impact - direct	0	0	0	0	0	0	8.52	1.32	5.08	1.97	0.16	0.05	0	0	0	0	0	0
Proposal impact – 10% of indirect	0	0	0	0	0	0	0.62	0.10	0.14	0.06	0.02	0.01	0	0	0	0	0	0
<b>Cumulative impact</b>	<b>3.94</b>	<b>8.89</b>	<b>5.70</b>	<b>2.61</b>	<b>5.01</b>	<b>2.21</b>	<b>109.51</b>	<b>17.02</b>	<b>155.45</b>	<b>60.23</b>	<b>219.96</b>	<b>67.87</b>	<b>89.14</b>	<b>6.39</b>	<b>393.76</b>	<b>26.02</b>		
Cumulative impact - direct	3.94	8.89	5.70	2.61	5.01	2.21	108.89	16.93	155.31	60.17	219.94	67.86	89.14	6.39	393.76	26.02		
Cumulative impact - 10% of indirect	0	0	0	0	0	0	0.62	0.10	0.14	0.06	0.02	0.01	0	0	0	0		
<b>Total mapped area (pre-impact)</b>	<b>44.32</b>		<b>218.66</b>		<b>226.41</b>		<b>643.33</b>		<b>258.11</b>		<b>324.10</b>		<b>1,394.27</b>		<b>1,513.28</b>			

Differences between the Cumulative impact and the total calculated from all tenement and non-tenement holders plus the Proposal impact are a result of overlapping areas and tenements (see last paragraph of Section 2.3 and Table 3.12 for more detail).



**Table 3.11: Proposal and cumulative impacts to CSF species of the Study/Local Area (using plant locations available to Maia), WA and Tallering plant numbers (calculated with data available to Maia), and plant numbers in KML, 2008**

Table 3.5 C  AMENDED (with extra LspBH)	Aw (T)		Ak (P1)		LspBH (P1)		PspK (P1)		As(P3)		CspPS (P3)		Df (P3)		Gg (P3)		Gd (P3)		Ma (P3)		Mt (P3)		Pp (P3)		Pc (P3)		Rc (P3)		Sp (P3)	
	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA	#	% WA
Proposal impact	1,739	5.62	2	0.39	350	0.39	0	0	1	0.04	1	0.06	508	2.65	0	0	1	0.04	43	0.29	2,011	9.63	31	5.45	0	0	342	0.86	0	0
Proposal impact - direct	1,683	5.44	2	0.39	340	0.38	0	0	1	0.04	0	0	482	2.51	0	0	0	0	20	0.13	1,924	9.21	29	5.10	0	0	331	0.83	0	0
Proposal impact – 10% of indirect	56	0.18	0	0	10	0.01	0	0	0	0	1	0.06	26	0.14	0	0	1	0.04	23	0.15	87	0.42	2	0.35	0	0	11	0.03	0	0
Cumulative impact	5,706	18.43	69	13.40	39,411	43.76	37	4.65	1	0.04	10	0.58	3,950	20.61	55	1.19	3	0.11	1,181	7.93	7,466	35.75	82	14.41	1,821	35.57	3,787	9.55	5	0.52
Cumulative impact - direct	5,650	18.25	69	13.40	39,401	43.75	37	4.65	1	0.04	9	0.53	3,924	20.47	55	1.19	2	0.08	1,158	7.77	7,379	35.33	80	14.06	1,821	35.57	3,776	9.52	5	0.52
Cumulative impact – 10% of indirect	56	0.18	0	0	10	0.01	0	0	0	0	1	0.06	26	0.14	0	0	1	0.04	23	0.15	87	0.42	2	0.35	0	0	11	0.03	0	0
Total plant locations available to Maia in Tallering (pre-impact)	30,957		515		80,404		796		2,415		357		19,166		4,636		1,699		14,636		20,872		468		5,119		39,518		57	
Total plant locations available to Maia in WA (pre-impact)	30,957		515		90,067		796		2,415		1,713		19,166		4,637		2,636		14,897		20,885		569		5,119		39,667		965	
Baseline (No. of Plant (counts)) (Table 2.4 of KML, 2008)	29,080		23,487		52,769						nd		nd		nd		-		nd		nd		nd		nd		nd		nd	
Baseline (No. of Plants (inferred)) (Table 2.4 of KML, 2008)	29,213		113,613		619,823						nd		320,587		nd		-		240,000		353,095		nd		160,421		nd		nd	

Note re row 1: Aw = *Acacia woodmaniorum*, Ak = *Acacia karina*, LspBH = *Lepidosperma* sp. Blue Hills, PspK = *Prostanthera* sp. Karara, As = *Acacia subsessilis*, CspPS = *Calotis* sp. Perrinvale Station, Df = *Drummondita fulva*, Gg = *Grevillea globosa*, Gd = *Gunniopsis divisa*, Ma = *Micromyrtus acuta*, Mt = *Micromyrtus trudgenii*, Pp = *Persoonia pentasticha*, Pc = *Polianthion collinum*, Rc = *Rhodanthe collina*, Sp = *Stenanthemum poicilum*.

Notes re KML, 2008: No. of Plant (counts) = number of plants within a 5 km radius of the Karara – Mungada project survey area, each plant has been physically counted; No. of Plants (inferred) = number of plants within the Karara – Mungada project survey area, inferred from quantitative plot assessment (population density) and area of occupation (KML, 2008); nd = no data.

Note re KML 2008 and *Rhodanthe collina*: number data are not included in KML (2008) Table 2.4 for *Rhodanthe collina*; however, in WEC, 2008c >15,957 are noted as going to be impacted and >42,892 are not going to be impacted (i.e. 58,849 *R. collina* were estimated for KML's project area).

Note re plant numbers: when 10% of plant numbers for the 10% indirect impact was a fraction it was rounded up to the nearest whole number and percentages have been calculated using the whole number.

Table 3.12: CSF species, PEC and WEC (2008) FCTs - comments relating to data and tenement boundaries within and outside the BHIAA

Attribute	Comments
<b>Conservation significant species</b>	
<i>Acacia woodmaniorum</i> (T)	Records occur only within the BHIAA - therefore the Cumulative impact <sup>¥</sup> (including Proposal impact) is the same as the sum of the number of plants impacted by the tenement holders and non-tenement holder and the Proposal impact (no plants are located in areas where tenements / tenement holders overlap).
<i>Acacia karina</i> (P1) <i>Prostanthera</i> sp. Karara (D. Coultas & K. Greenacre Opp 8) (P1) <i>Acacia ?sessilis</i> (P3) <i>Gunniopsis divisa</i> (P3)	These species occur within and outside the BHIAA; however, impacts occur only within the BHIAA - therefore the Cumulative impact (including Proposal impact) equals the sum of the number of plants impacted by tenement holders and non-tenement holder and the Proposal impact (no plants are located in areas where tenements / tenement holders overlap).
<i>Lepidosperma</i> sp. Blue Hills (A. Markey & S. Dillon 3468) (P1) <i>Calotis</i> sp. Perrinvale Station (R.J. Cranfield 7096) (P3) <i>Drummondita fulva</i> (P3) <i>Grevillea globosa</i> (P3) <i>Micromyrtus acuta</i> (P3) <i>Micromyrtus trudgenii</i> (P3) <i>Persoonia pentasticha</i> (P3) <i>Polianthion collinum</i> (P3) <i>Rhodanthe collina</i> (P3) <i>Stenanthemum poicilum</i> (P3)	These species occur within and outside the BHIAA and impacts occur within and outside the BHIAA (apart from <i>Stenanthemum poicilum</i> where there are no existing impacts within the BHIAA) - therefore the Cumulative impact (including Proposal impact) does not equal the sum of the number of plants impacted by tenement holders and non-tenement holder and the Proposal impact because of the additional impacts outside of the BHIAA (no plants are located in areas where tenements / tenement holders overlap).
<b>Priority ecological community</b>	
Blue Hills (Mount Karara/Mungada/Blue Hills) vegetation complexes (banded ironstone formation) (P1 PEC)	Sections of some tenements overlap within the BHIAA and therefore the Cumulative impact <sup>¥</sup> (including Proposal impact) does not equal the sum for all tenement and non-tenement holders and Proposal impact e.g. SMC tenements overlap KML tenements in some areas and the PEC is mapped over these areas, therefore the overlapping areas are included for both companies when listed by tenement holder.
<b>WEC (2008a) floristic community types</b>	
FCT 2, 7b, 7c, mosaic 11/9	There are no overlapping tenement holder areas for these FCTs within the BHIAA and therefore the Cumulative impact <sup>¥</sup> (including Proposal impact) equals the sum of the tenement holders and non-tenement holder and Proposal impact.
FCT 1a, 1b, mosaic 1a/2, 3, mosaic 4/17, 8, 10a, 11, 12, 13, 14, 15, 16	There are overlapping tenements in areas mapped as these FCTs in the BHIAA and therefore the Cumulative impact <sup>¥</sup> (including Proposal impact) does not equal the sum of the tenement holders and non-tenement holder and Proposal impact e.g. SMC tenements overlap KML tenements and FCT 1a is mapped over this area, therefore the overlapping area is included twice - once for each tenement holder in the overlapping areas.

Note: T = Threatened, P1 = Priority 1, P3 = Priority 3, PEC = Priority Ecological Community, FCT = floristic community type, BHIAA = Blue Hills impact assessment area, green shading indicates where the sum of numbers or areas of impact by tenement holders plus project impacts does not equal the cumulative impact (including this project's impacts). <sup>¥</sup> Cumulative impact in the BHIAA is calculated using the joined shapefile for all clearing within the BHIAA (approved project footprints and newly digitised tracks etc) rather than using the sum of the impact from each of the tenement holders and 'other areas'.

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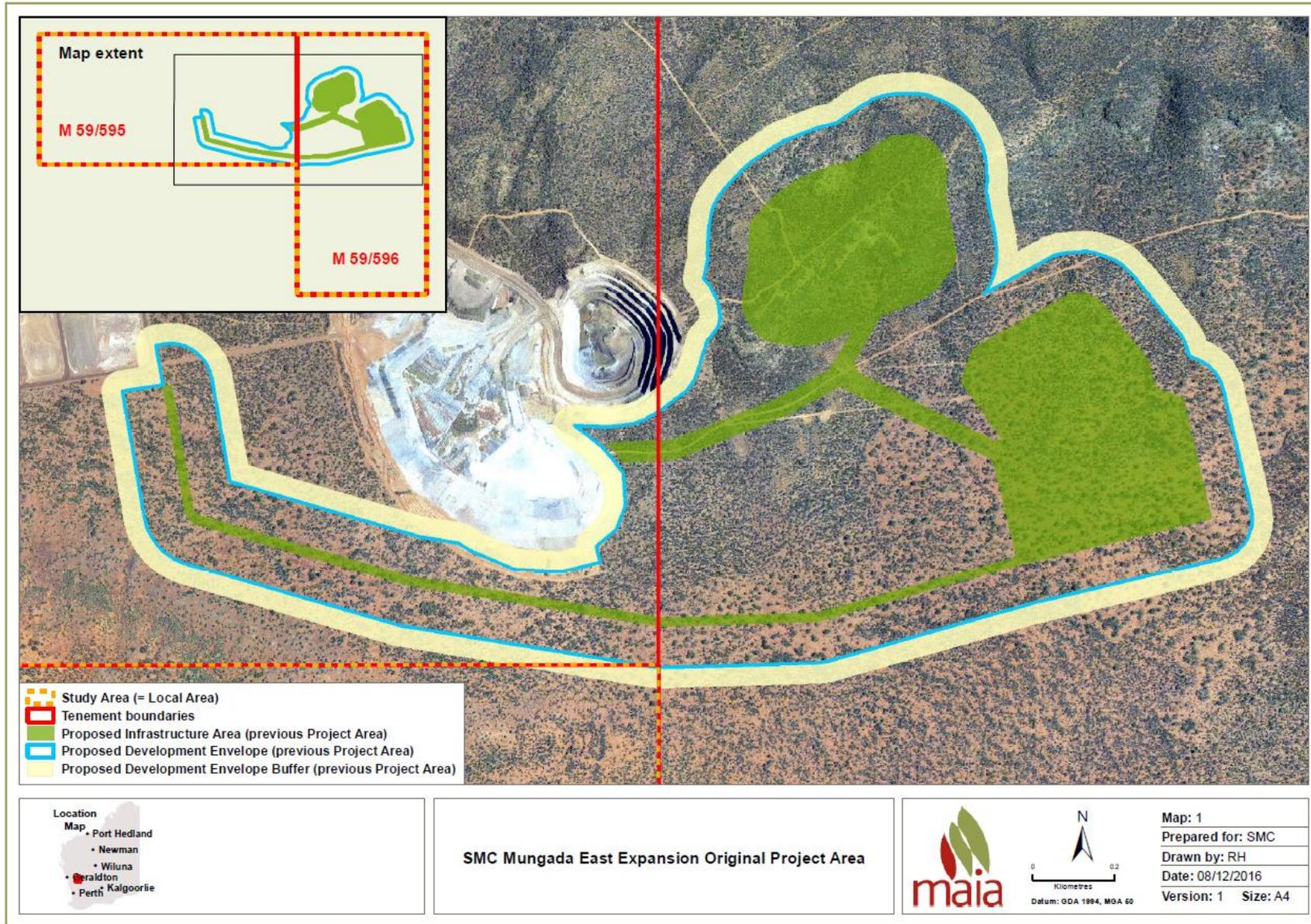
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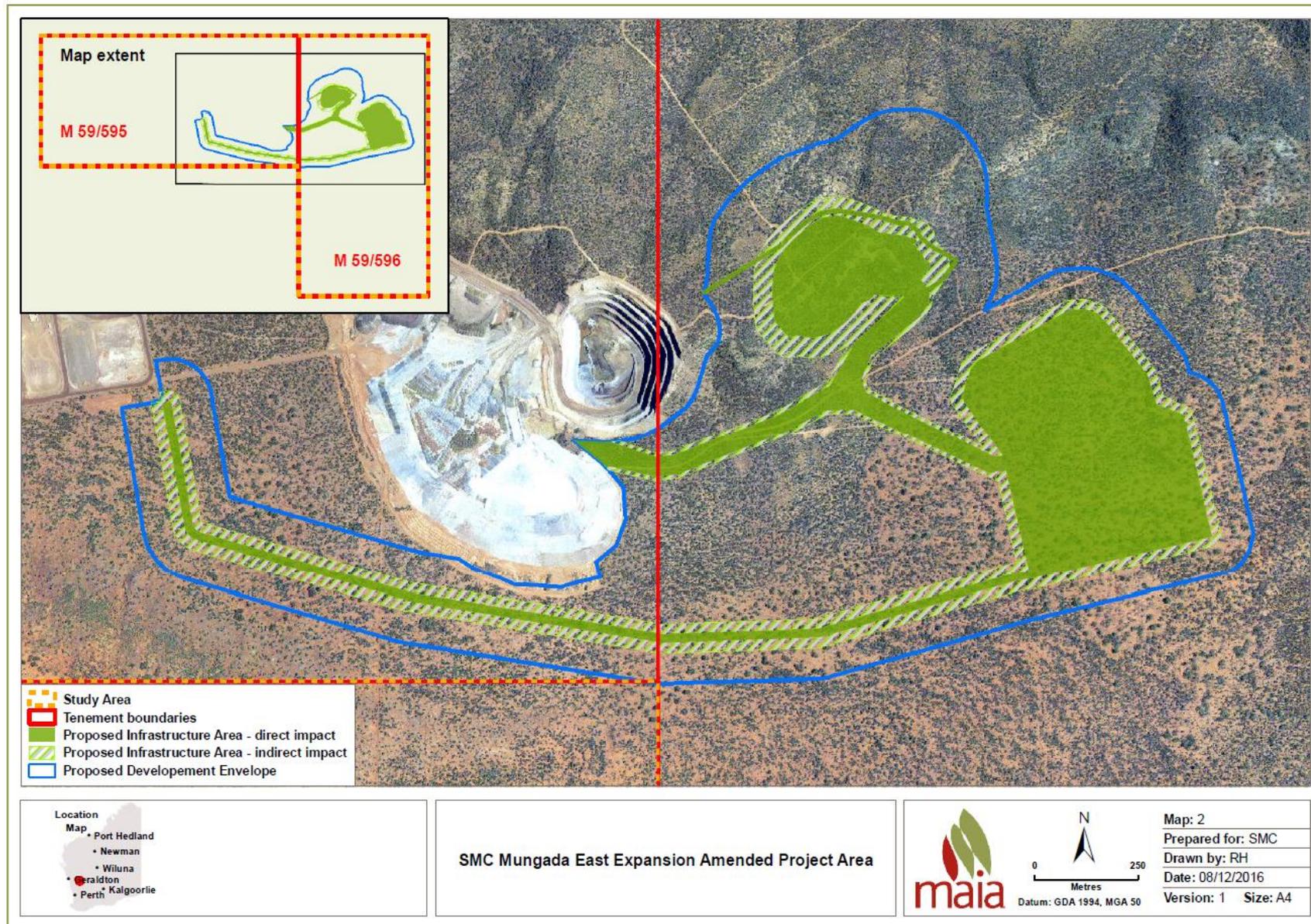
## 5 MAPS

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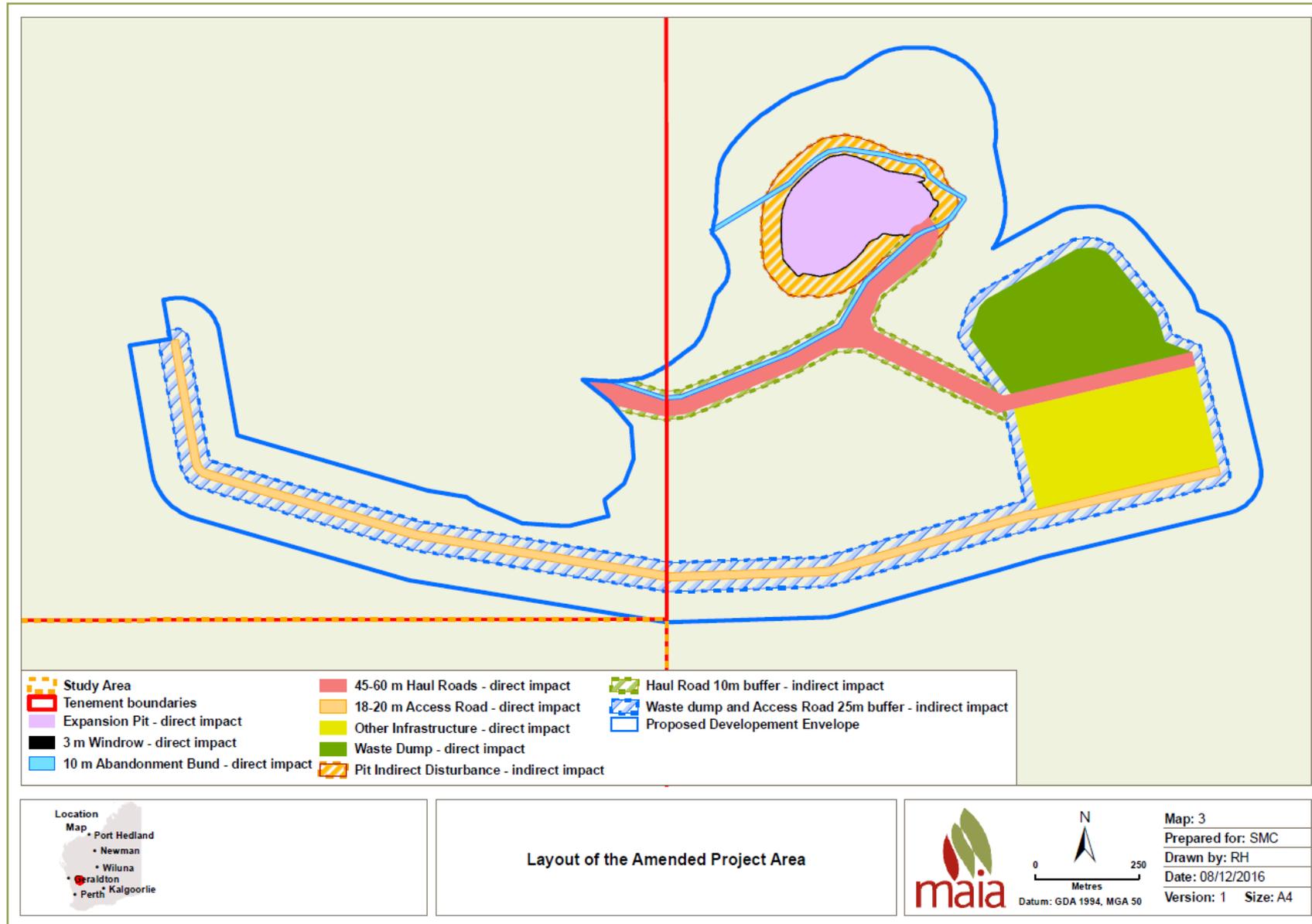
Map 5.1: SMC Mungada East Expansion Original Project Area



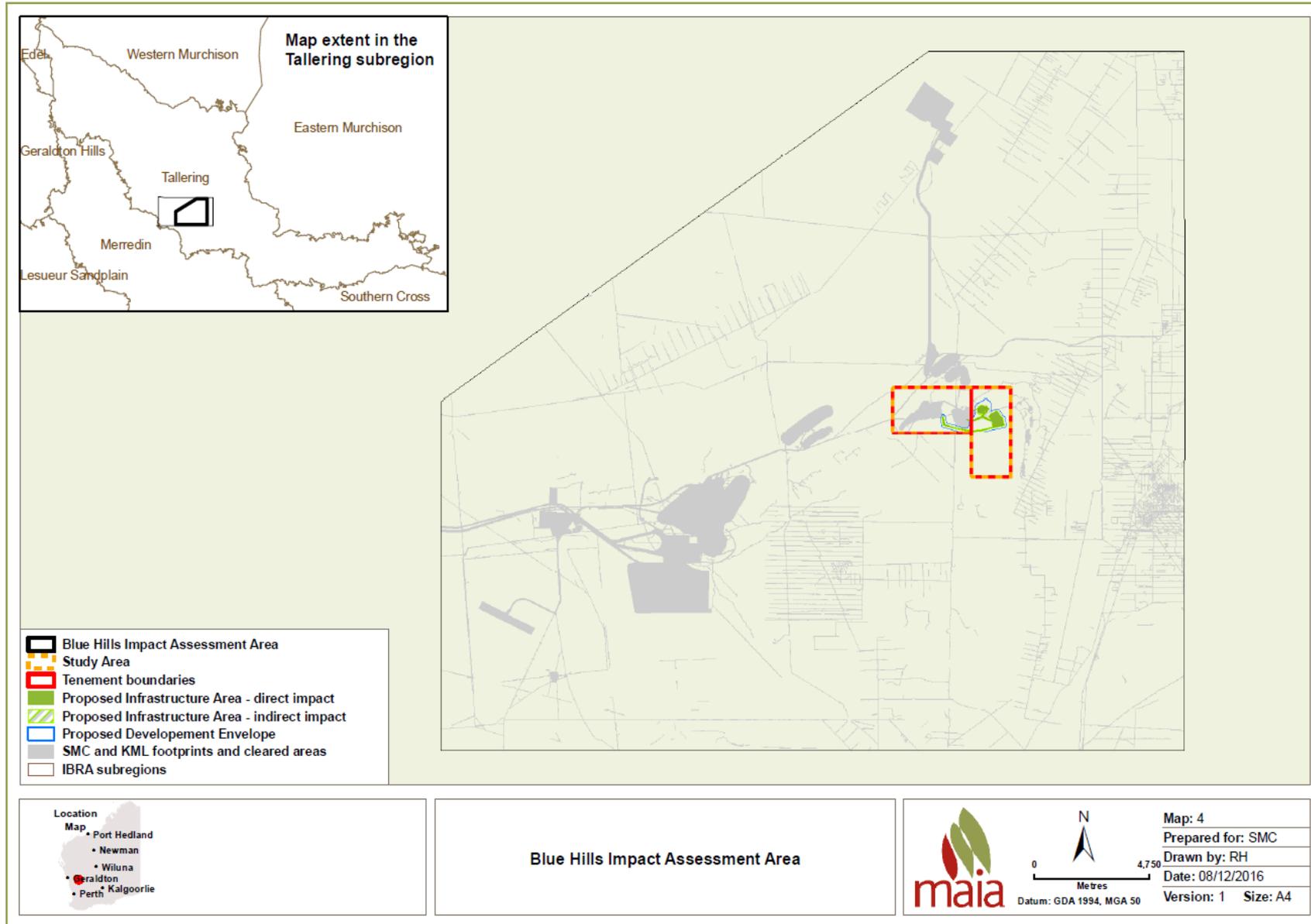
Map 5.2: SMC Mungada East Expansion Amended Project Area



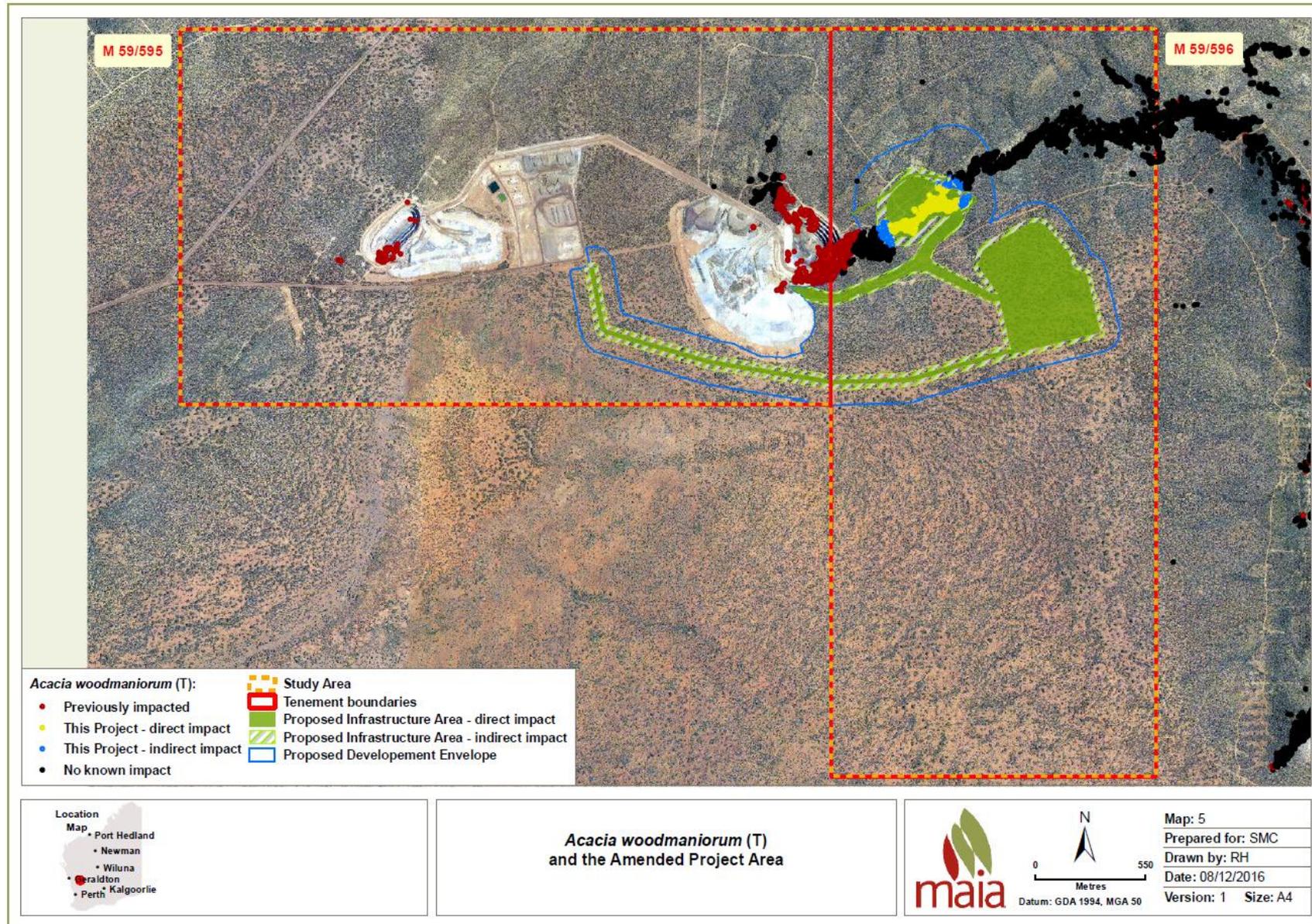
Map 5.3: Layout of the Amended Project Area



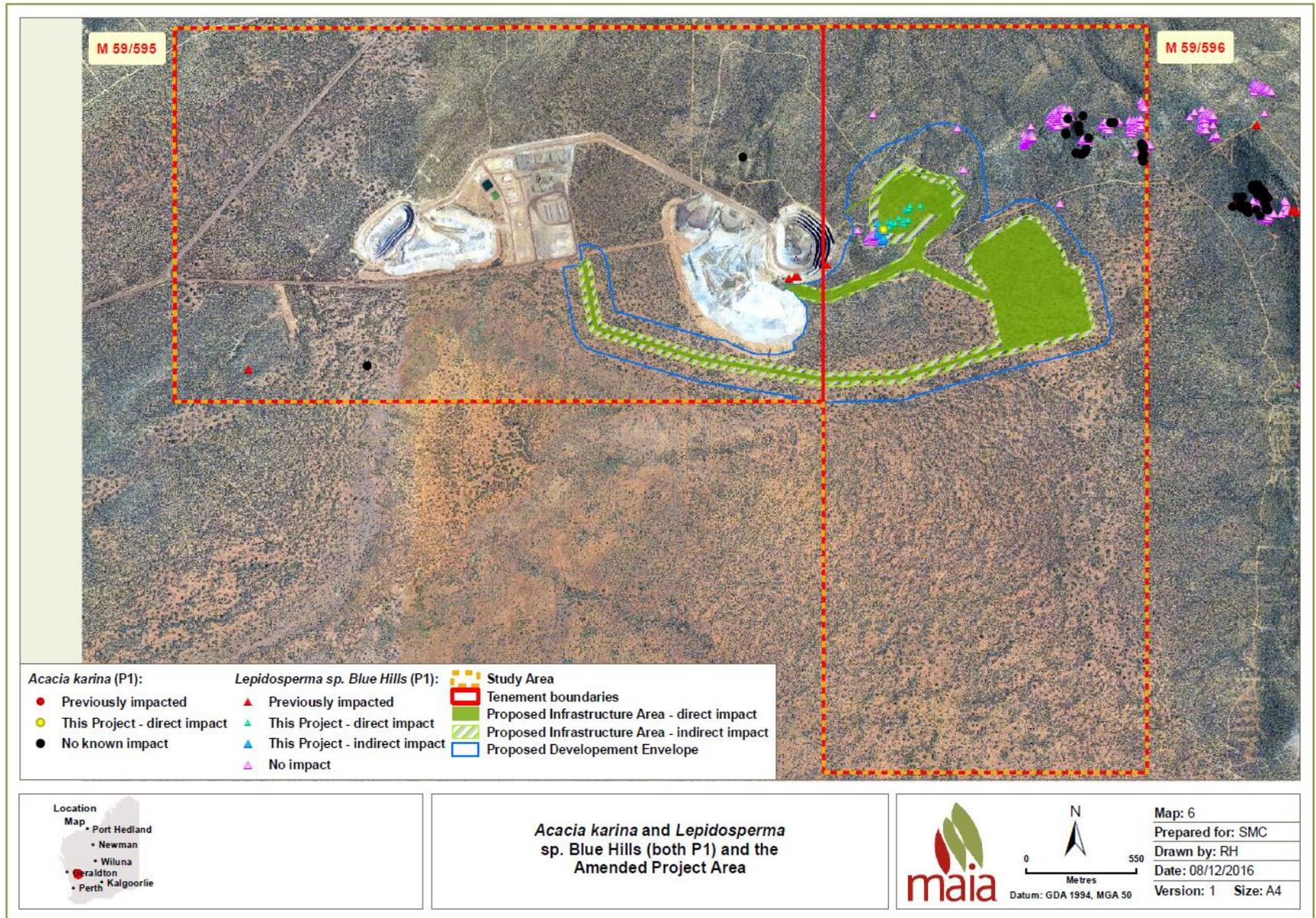
Map 5.4: Blue Hills Impact Assessment Area



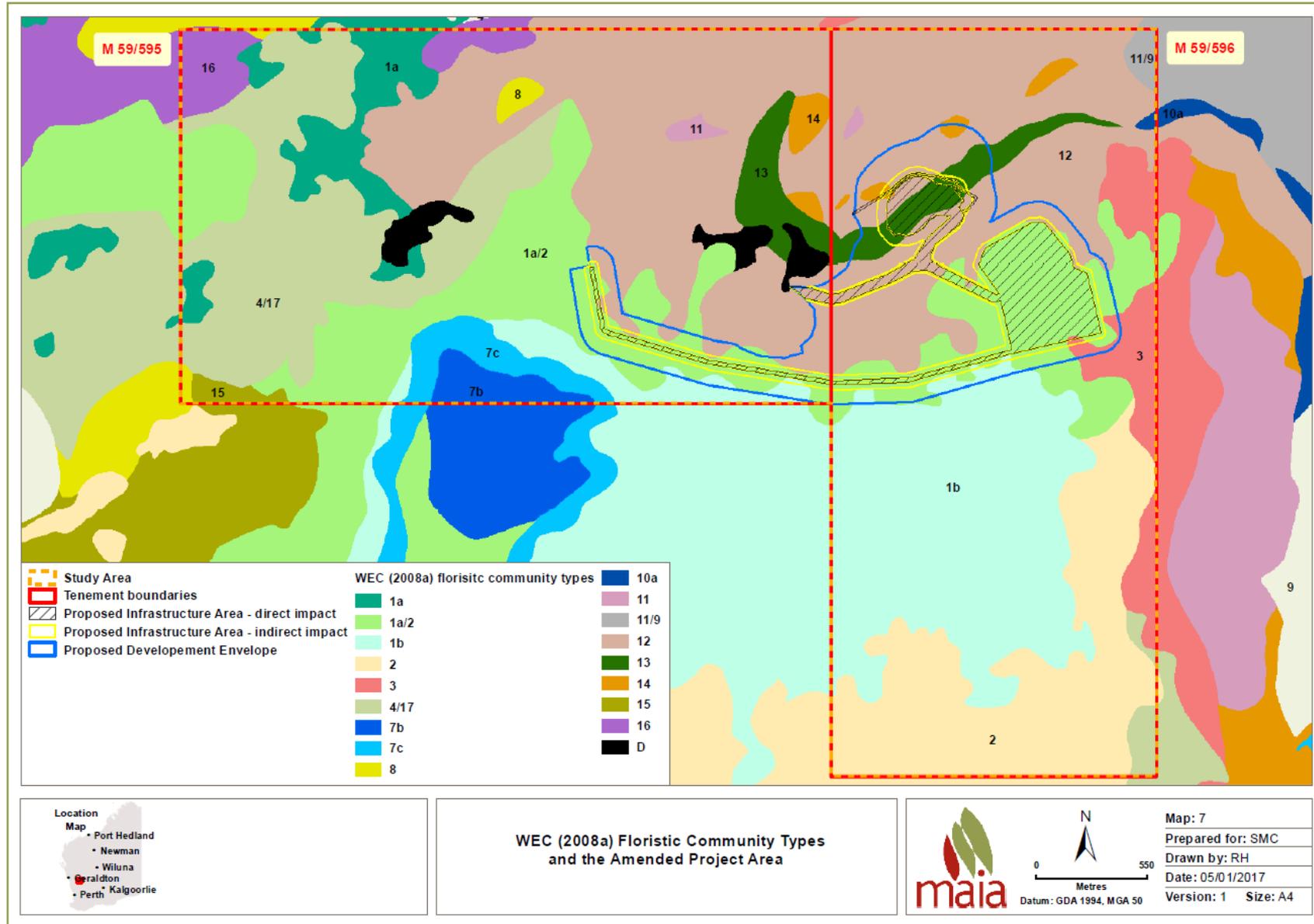
Map 5.5: *Acacia woodmaniorum* (T) and the Amended Project Area



Map 5.6: *Acacia karina* and *Lepidosperma* sp. Blue Hills (both P1) and the Amended Project Area



Map 5.7: WEC (2008a) Floristic Community Types and the Amended Project Area



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## APPENDIX 1: METHODS

### CONSERVATION SIGNIFICANT FLORA - PLANT NUMBERS

#### Data Collation from Literature and Database Searches

Information on locations of CSF recorded in the Project Area and surrounds was sourced from the following:

- TPFL = DPaW's Threatened and Priority Flora database (reference 36-0715FL, August 2015).
- WA Herb = the WA Herbarium (reference 36-0715FL, August 2015).
- DPaW datasets from flora and vegetation surveys on BIF and Greenstone Ranges (NatureMap (DPaW, 2007-)).
- Targeted flora surveys carried out by Maia on tenements M59/595 and M59/596 in June, July and September 2011 (Maia, 2011a; 2011b; 2012).
- Targeted flora survey and partial *Acacia woodmaniorum* census carried out within the Study Area in June 2014 (Maia, 2014a).
- Vegetation monitoring quadrats being assessed by Maia at Blue Hills (Maia, 2014b).
- Targeted flora surveys and vegetation monitoring sites assessed by Maia on SMC's Koolanooka tenements M70/1012, M70/1013 and M70/1014.
- Maia's database for records from surveys carried out at other locations in the surrounding area.
- Flora data collected by WEC during earlier surveys in the Mt Karara region and provided to SMC by Karara Mining Limited (KML). [Note: this does not include all of the data collected by WEC during later regional surveys carried out for KML.]
- Data collected at quadrats assessed during flora and vegetation surveys conducted by WEC for KML (extracted from WEC 2008a and 2012).
- Data collected at quadrats and relevés assessed in the Study Area and also during targeted flora surveys carried out by Ecologia – sourced from Ecologia 2007, 2008a and 2008b.
- Data collected at quadrats assessed in the Study Area by Bennett (from Bennett 2004).
- Data collected by Astron (2013), Botanica (2012) and Outback (2013) in KML's Hinge and Shine project areas and extracted from these reports.
- Millar, Coates and Byrne (2013).

The following reports were searched but no CSF data were included in them (either no conservation significant flora were located or no coordinates were provided in the reports) – WEC (2006, 2008b and 2009).

At the time of receiving DPaW's database search results (3 August 2015) all CSF populations had not been entered into DPaW's TPFL database, as this database is primarily for threatened species. Some data for the following priority species have yet to be entered into the database - *Acacia diallaga*, *Acacia karina*, *Chamelaucium* sp. Warriedar (A.P. Brown & S. Patrick APB 1100), *Prostanthera* sp. Karara (D. Coultas & K. Greenacre Opp 8) (all Priority 1), *Acacia subsessilis*, *Calotis* sp. Perrinvale Station (R.J. Cranfield 7096), *Drummondita fulva*, *Grevillea globosa* and *Psammomoya implexa* (all Priority 3).

Some of the older records produced by the DPaW database searches were collected before GPS technology was widely used and the actual location of the CSF might not be at the coordinates provided. This may influence the final number of plants and populations.

In addition to this SMC and Maia do not have all data for CSF located by WEC for KML in the wider area – including the *Acacia woodmaniorum* at Jasper Hill. The number of *A. woodmaniorum* at this location was sourced from Millar *et al.*

(2013). However, since carrying out the initial impact assessment KML's *Lepidosperma* sp. Blue Hills data has been supplied to SMC and made available to Maia, and that data has been included in the impacts calculations in this report.

As all data collected by consultants for KML and other proponents in the vicinity of SMC's Project Area were not available to Maia, plant numbers included in the original and this report are therefore Maia's best estimates made with the information available to Maia. While KML / WEC plant numbers are included in KML / WEC impacts assessment documents Maia does not have the shape files for most of this data and they could not be used in the intersects carried out for this impacts assessment.

### Data Standardisation and Manipulation

After collating all CSF records available to Maia the data was standardised for consistency. Instead of plant numbers, some CSF records indicated either plant cover with a cover code, or a percentage cover, or a statement on frequency. For some locations there was no information given on plant numbers, cover or frequency. The methods described in the following sections were used to convert cover code, cover or frequency information into plant numbers that could be more meaningfully used in the impact assessment.

Also, Ecologia recorded *Micromyrtus placoides* in one report (Ecologia, 2007) and in a later report this was updated to *M. acuta* (Ecologia, 2008a). Any *M. placoides* locations have been included as *M. acuta*. Ecologia (2007, 2008a and 2008b) list *Drummondita* aff. *microphylla* and *D. microphylla* – these have been included as *D. fulva*, a Priority 3 species commonly recorded in the local area.

In addition, *Prostanthera* ?sp. Karara and *Prostanthera* sp. Karara records were combined and also *Acacia* ?*subsessilis* and *Acacia sessilis*.

### DETERMINING PLANT NUMBERS WHEN NO PLANT NUMBER INFORMATION WAS PROVIDED FOR A RECORD

**Step 1:** Where a cover code was available (specifically Ecologia 2008a) or area occupied as a percentage (DPaW database searches), the number of plants was determined by applying a standard number of plants based on: a) Maia's knowledge of the species in the area, and b) the most likely size of quadrat and area of quadrat assessed (i.e. 20 m x 20 m (400 m<sup>2</sup>) in the Yalgoo bioregion).

The plant cover codes and corresponding plant numbers derived in this way are listed in **Table 1**.

**Table 1: Plant cover codes or cover class and corresponding plant numbers**

Species	Plant cover code or cover conversion to plant number			
	Cover code of N	Cover code of 1 or area occupied is < 2%	Cover code of 2 or area occupied is 2 - 10%	Cover code of 3 or area occupied is 10 - 30%
<i>Drummondita fulva</i>	1	2	10	15
<i>Micromyrtus trudgenii</i>	1	2	10	15
<i>Persoonia pentasticha</i>	1	-	-	-

**Step 2:** Where a frequency or abundance was listed in DPaW search results (rather than a number of plants) a standard number of plants was used for each frequency or abundance (**Table 2**).

**Step 3:** Where either no plant number information was available or it could not be extrapolated from available information a count of 1 was applied.

**Table 2: Plant frequency or abundance ratings and corresponding plant numbers**

Frequency / abundance	Number of plants
Rare	1
Uncommon	1
Isolated plants	1
Very sparse	1
Scattered	2
Occasional	2
Very scattered	2
Sparse	2
Some	3
Several	5
Few	5
Many	5
Frequent	5
Common	10
Dominant	10
Abundant	20
Very common	50
Large patch of <i>Micromyrtus acuta</i>	30
Small population of <i>Acacia karina</i>	5
Extensive population of <i>Polianthion collinum</i> and <i>Grevillea globosa</i>	5
Moderately dense patch of <i>Micromyrtus acuta</i>	20

### ADDITIONAL CONSIDERATIONS

Most of the originally proposed development envelope buffer, development envelope and all of the infrastructure area was systematically searched during the partial *Acacia woodmaniorum* census carried out by Maia in June 2014 and June 2015.

Dead and live *A. woodmaniorum* plants were recorded when the census was carried out and a count of zero was applied to any dead plants when deriving a total plant number for these areas. Similarly, any WEC dead *A. woodmaniorum* records were given a zero count.

*A. woodmaniorum* records located during surveys carried out previously by all other consultants and that fell in the census areas assessed in June 2014 and June 2015 were given a zero count.

Millar *et al.* (2013) list 3,108 *A. woodmaniorum* in the Jasper Hill population and Maia included this number in the counts; however, Maia does not have the actual locations for the plants and therefore these plants were attributed to the two FloraBase *A. woodmaniorum* records at Jasper Hill.

When all CSF records had been collated from the various sources they were plotted over Bing aerial imagery captured in November 2013. Any records lying in areas that had been cleared for mining and exploration or for tracks and roads or paddocks were given a zero count. Some records fell over areas cleared for tracks and drill lines on the aerial image; however, in areas surveyed by Maia since 2011 and that have not been cleared the records were retained.

Any CSF locations falling within SMC's approved impact areas and previous permit to take areas were given a zero count even if those areas appeared not to have been cleared on the imagery.

Any CSF locations falling within KML's approved impact areas were given a zero count.

## DUPLICATE RECORDS

Due to the number of botanical surveys that have been conducted within and in the vicinity of the Project Area, close or duplicate records were identified. The following points were considered when handling these records:

- Any Ecologia, Bennett, WEC (i.e. 'other consultancies') perennial CSF species located in areas that were searched by Maia in June 2014 and June 2015 (within the proposed development envelope, infrastructure area and small section of the buffer) were given a zero count. Any CSF data records collected in these areas by Maia before June 2014 were also given a zero count. Some transects were walked in June 2015 over areas grid searched in June 2014; perennial CSF data collected in June 2015 in these areas was not used.
- Perennial CSF records collected by Maia in 2011 and at vegetation monitoring quadrats in 2014 were given a zero count if they were  $\leq 1.5$  m away from CSF recorded by Maia in June 2015.
- Any DPaW CSF records (annual or perennial)  $\leq 2$  m away from any another record were given a zero count (because locations found by other practitioners are often visited by DPaW and the record is duplicated).
- Where perennial CSF records were recorded by one or more consultancies and were  $\leq 1.5$  m apart, the record with the lowest number of plants was given a zero count.
- Maia did not completely survey a section of the proposed development envelope buffer in the west near the existing Mungada East pit in June 2015 but carried out a partial census of the *A. woodmaniorum* in three cells selected before carrying out the survey. The counts from the cells assessed in June 2015 were used and any other records collected in these cells before June 2015 were given a zero count. In areas outside of these three cells but within the buffer, Maia's data from surveys carried out in 2011 were retained, and unless records from other consultancies occurred within 1.5 m of a Maia record the count data for the records were also retained. When other consultancies' plant records were  $\leq 1.5$  m away the plants recorded by the other consultancies were given a zero count.
- In June 2015 Maia assessed five cells for *Acacia woodmaniorum* outside of the Project Area but within tenements M59/595 and M59/596. Any pre-existing *A. woodmaniorum* locations in these cells were given a zero count.
- All CSF records in Maia survey data collected in 2011, 2014 and 2015 were treated as unique because they were definitely not duplicate records.
- Some *Acacia woodmaniorum* plant records in the Study Area (at three locations) were distant from the main population, particularly in SMC's Mungada West area. These locations and immediate surrounds were visited in either June 2014 or June 2015 and searched. No *A. woodmaniorum* was located in these areas and the records were given a zero count. Maia did not visit the Jasper Hill population and the numbers for this population are as stated in Millar *et al.* (2013).

## Impacts

Cumulative impacts are estimated for the CSF and the Blue Hills Priority 1 PEC.

Impacts are calculated for WA, the Talling subregion (YAL02), a Blue Hills Impact Assessment Area (BHIAA) and the Local Area (excluding the Project Area).

In the original calculations presented in the PER (but differently in Maia's Level 2 flora and vegetation report): impacts from the Project Infrastructure Area (PIA) are the direct impacts and impacts from the Project Development Envelope (PDE) and also from the Project Development Envelope Buffer (PDEB) are the indirect impacts and the total impact from the Project Area is the direct plus indirect impact, which is then included in the cumulative impacts.

The BHIAA is a polygon which encompasses KML's Karara, Blue Hills North, Terrapod and Hinge approved project footprints as well as SMC's approved project footprints. Shape files for KML and SMC approved project footprints were supplied to Maia for the cumulative impacts calculations. However, many drill lines and tracks have been cleared in the area and shape files for these were not available. Therefore clearing within the BHIAA was digitised by Maia using Bing

Map aerial imagery from November 2013 and imagery provided by SMC (November 2014). These cleared areas were joined with SMC and KML approved footprints within the BHIAA.

Tenements held by 10 companies cover approximately 58,915 ha of the BHIAA and the remaining 14,664 ha is not covered by tenements (DMP, 2016). Some tenements overlap others to different degrees in the BHIAA (e.g. KML's haul road overlies a section of SMC's tenement M59/595) and tracks cleared by tenement holders, pastoralists or the Shire also run through multiple tenements. As Maia cannot attribute clearing in overlapping areas to a particular tenement holder, some cleared areas are included for both tenement holders. Therefore, as clearing is calculated by tenement and then totalled for each tenement holder, if clearing for all tenement holders is summed it does not equal the total clearing in the BHIAA, which is calculated using digitised clearing and already approved project footprints within the BHIAA – and does not include any overlap. While clearing impacts within the BHIAA are calculated by tenement holder, clearing on KML tenements was combined with clearing on DSO Ventures Pty Ltd and Gindalbie Metals Ltd tenements to derive a total impact for KML projects. Clearing in areas not covered by a tenement in the tenement shape file used (DMP, 2016) is included as 'other areas' in the impacts assessments.

Further explanation of the methods used for these impacts calculations were included in **Section 8** and **Appendix 9** of the Level 2 flora and vegetation report.

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