



LEONORA GOLD PROJECT - FLORA AND FAUNA EXTRAPOLATION EXERCISE REPORT

PREPARED FOR **KIN MINING NL**

11 September 2018

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Executive Summary

Kin Mining NL (Kin) plans to develop the Leonora Gold Project (LGP), located between seven and 40 kilometres (km) east of the town of Leonora, in the Murchison bioregion. The LGP comprises historically mined areas, a proposed haul road that links the three Mining Areas (Mertondale, Cardinia and Raeside) and a processing plant. Stantec Australia (Pty) Ltd (Stantec) completed the Level 1 Flora and Fauna assessment for the LGP in 2016 and 2017. Subsequently, there have been additions made to the proposed disturbance footprints at Cardinia and Raeside which extend outside the area surveyed (the Study Area). As a result, it became necessary to expand the Study Area to include the additional areas. Stantec was appointed to undertake the desktop extrapolation exercise of the additional areas, referred to as the Extrapolation Area, to support the ongoing approvals process of the LGP.

The extrapolation exercise made use of existing aerial imagery, photographs of specific areas, data collected from the original field surveys, as well as data collected from a short reconnaissance survey conducted in March 2018, to extend the vegetation mapping (for both vegetation units and condition) and fauna habitat mapping.

The extent of the Revised Study Area has increased from 2,288 ha to 3,545 ha with the inclusion of the Extrapolation Area. A total of 20 vegetation units were previously mapped at Cardinia and Raeside, comprising broadly of mixed Mulga shrublands over mixed shrubs dominated by *Eremophila* species, *Ptilotus obovatus*, *Scaevola spinescens* and *Rhagodia* species, also with large areas dominated by *Cratystylis subspinescens*, *Maireana pyramidata* and *Maireana sedifolia*. Each of the 20 vegetation types were extrapolated to the additional areas. A small additional area (4.53ha) of the Asp.MsEs vegetation unit was identified in the north of the Study Area, mapped previously as AiMsTd. No Further additions were made to the previously mapped vegetation units.

In summary, all vegetation units and fauna habitats mapped within the Extrapolation Area were representative of vegetation units and habitats in the Survey Area previously assessed by Stantec.

None of the vegetation units identified in the Extrapolation Area correspond the vegetation of any known Threatened or Priority Ecological Communities.

No flora or fauna taxa of conservation significance were identified during the ground truthing field survey. However, both conservation significant flora identified during the survey of the Survey Area have potential to occur in the Extrapolation Area due to the likely presence of the same vegetation units that support these taxa.

Vegetation units *HpCsMp* and *AiMsTd* that were mapped within the Extrapolation Area have the potential to contain *Gunniopsis propinqua* (P3). Similarly, the vegetation unit *AaArAq* was mapped within the Extrapolation Area and has the potential to contain *Grevillea ? inconspicua* (P4).

In addition, the putative hybrid and potential new species identified previously in the Revised Study Area, *Acacia* sp. nov. aff. *resinimarginea*, was identified in the *A?rSaMs* vegetation unit that was present in the Extrapolation Area. This taxon is currently under review as a potential new species.

Kin Mining NL

Leonora Gold Project - Flora and Fauna Extrapolation Exercise Report

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1. Introduction

1.1 Project Background

Kin Mining NL (Kin) plans to develop the Leonora Gold Project (LGP) which is located between seven and 40 kilometres (km) east of the town of Leonora. The LGP comprises historically mined areas (**Figure 1-1**), a proposed haul road that links the three Mining Areas (Mertondale, Cardinia and Raeside) and a processing plant.

Stantec Australia (Pty) Ltd (Stantec) completed the Level 1 Flora and Fauna assessment for the LGP in 2016 and 2017 (Stantec 2018). Subsequently, there have been additions made to the proposed disturbance footprints at Cardinia and Raeside which extend outside the area surveyed (the Study Area) (**Figure 1-1**). As a result, it became necessary to expand the Study Area to include the additional areas, hereon referred to as the Extrapolation Area. Consequently, three areas are referred to in this report:

- **Survey Area:** a 2, 287.6 hectare (ha) parcel of land that was surveyed by Stantec in 2016 and 2017 (Stantec 2018);
- **Extrapolation Area:** a 1, 257.4 ha area that extends outside the Survey Area and requires extrapolation to encompass proposed disturbance footprints; and
- **Revised Study Area:** a 3, 545 ha area that encompasses both the Survey Area and the Extrapolation Area and will be used to support the approvals of the LGP.

Kin has appointed Stantec to undertake a desktop extrapolation exercise of additional areas, not previously surveyed in the field, to support the ongoing approvals process for Phase 2A and 2B of the Project. The extrapolation exercise has made use of existing aerial imagery, photographs of specific areas, data collected from the original field surveys, as well as data collected from a short reconnaissance survey conducted in March 2018, to extend the vegetation mapping (for both vegetation units and condition) and fauna habitat mapping to the extent of the Extrapolation Area.

This report details the results of the extrapolation exercise and includes mapping for the Extrapolation Area. The assessment was based primarily on the data collected and analysed from the following baseline survey conducted for the LGP:

- Leonora Gold Project: Level 1 Flora, Vegetation and Fauna Assessment (Stantec 2018).

1.2 Report Scope and Objectives

The overarching objective of this assessment is to extrapolate data collected from the previous surveys to the Extrapolation Area. The following figures were revised:

- Vegetation condition;
- Vegetation units; and
- Fauna habitats.

Further to this, this assessment was carried out in compliance to the following regulatory guidelines:

- Environmental Factor Guideline – Flora and Vegetation (EPA 2016f);
- Environmental Factor Guideline – Terrestrial Fauna (EPA 2016a);
- Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016b);
- Technical Guidance: Sampling methods for Terrestrial vertebrate fauna (EPA 2016c); and
- Technical Guidance: Terrestrial Fauna Surveys (EPA 2016d).

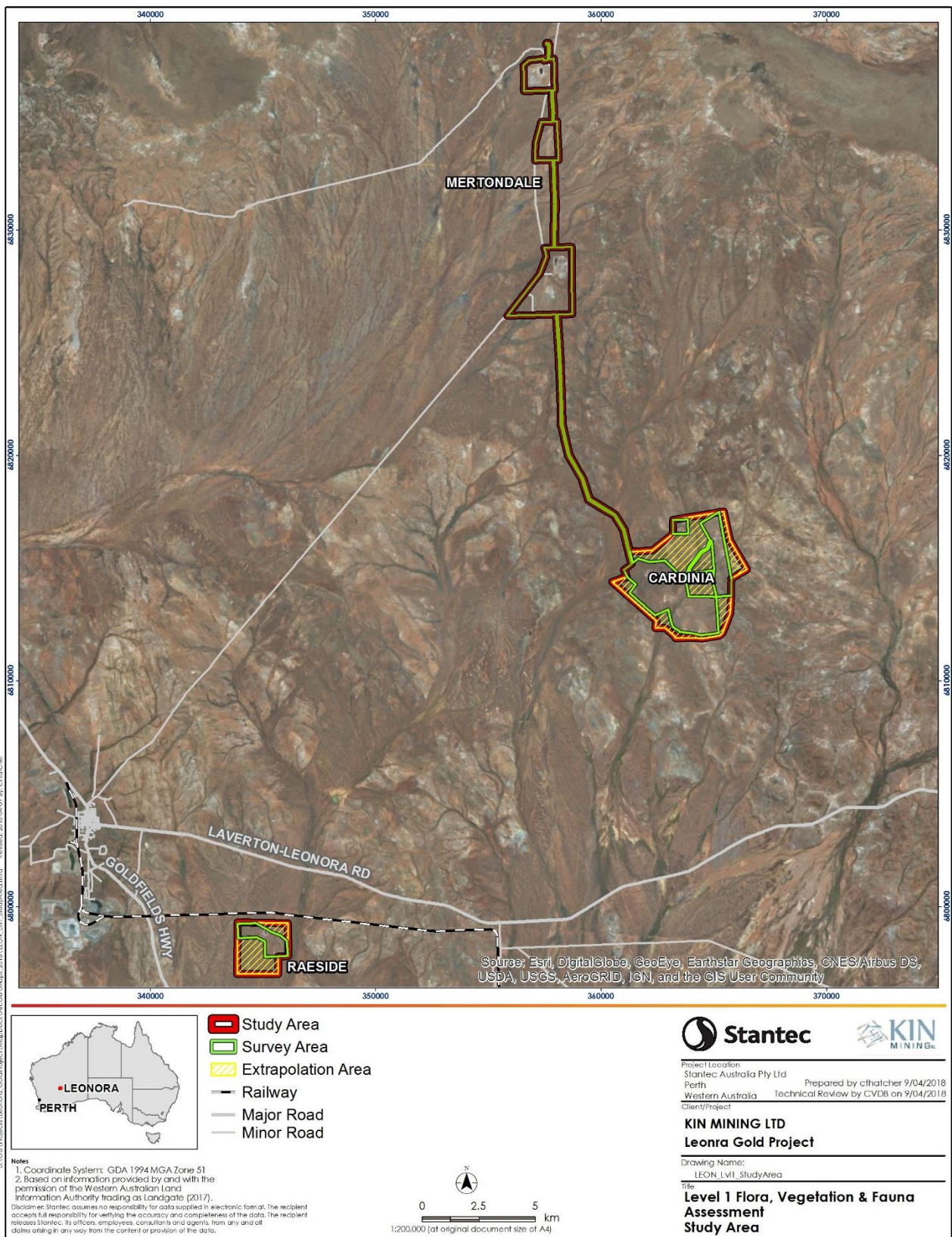


Figure 1-1: Study Area

2. Methodology and Approach

2.1 Survey Timing and Weather

The optimal timing for surveying flora and fauna in the Eremaean Province (where the Study Area is located) is six to eight weeks following the season which normally contributes the most rainfall (EPA 2016b, e). The reconnaissance field survey was conducted on the 17th and 18th of March 2018 to ground-truth habitats within the Extrapolation Area. Since the first significant rainfall event of the season took place on the 19th of February 2018, the field survey took place at least two weeks prior to the perceived optimal period for field surveys in the Eremaean Province. However, this timing was considered suitable due to the level of survey effort required for a reconnaissance-level assessment. **Table 2-1** represents summarises details of previous surveys undertaken for the LGP by Stantec, as well as the dates of the field survey for the reconnaissance survey.

Table 2-1: Field survey timing

Survey	Timing	Areas
Survey 1	28 th of November to 5 th December 2016	Mertondale, Cardinia and Raeside areas, as well as the proposed haul road, processing plant and accommodation camp.
Survey 2	10 th -12 th of May 2017	
Targeted survey for <i>Acacia</i> sp. nov. aff. <i>resinimarginea</i>	7 th – 10 th of August 2017	Cardinia and surrounding area.
Reconnaissance survey	17 th and 18 th of March 2018	Extrapolation Area

2.2 Survey Team and Licensing

The extrapolation exercise and reconnaissance survey were conducted by Stantec ecologists Crystal Heydenrych and Laura True. Both field members have knowledge and experience in Western Australia, specifically within the Murchison. All plant collections were taken under flora collecting permit SL012176 pursuant to the WC Act (Section 23C and Section 23F). Sharyna Thomson completed the identifications of the vascular flora specimens collected.

2.3 Extrapolation Exercise

The extrapolation exercise involved assigning vegetation units and fauna habitats to the Extrapolation Area on desktop level from areas that had been mapped previously in the Survey Area; as well as a short field ground-truthing survey. The Extrapolation Area was traversed on foot and photographs were taken of the landscape to supplement data collected from the ground-truthing field survey. A total of seven mapping notes were taken in the Extrapolation Area during the ground-truthing field survey (**Appendix B**). The following information was recorded at each mapping note:

- Mapping note number;
- Survey date;
- Personnel;
- GPS coordinates;
- Site photograph;

- Vegetation condition (based on Keighery (1994); **Appendix C**); and
- Vegetation structure description (based on ESCAVI 2003) (**Appendix D**);

For the extrapolation of vegetation units on aerial imagery, vegetation composition that were characteristic of the existing vegetation type mapping were used to extrapolate to the additional areas. The vegetation condition for the areas previously assessed ranged from Excellent to Completely Degraded (Keighery 1994). In order to extrapolate the vegetation condition mapping, landscape features such as tracks, cleared areas, infrastructure and existing operational areas and drill lines were identified on aerial imagery to determine the extent of disturbance of vegetation.

Broad fauna habitats identified in areas previously surveyed were comprised of; Acacia Shrublands on plains, drainage Lines, low hills and chenopod shrublands. Fauna habitats were distinguished based on changes in substrate composition (i.e. rock, sand or alluvial based), as well as vegetation density and structure. Aerial imagery was analysed to detect characteristics related to substrate composition and vegetation structure in order to map fauna habitats and extrapolate from the existing data.

2.1 Survey Limitations and Constraints

There are a number of possible limitations and constraints that can reduce the adequacy of vegetation, flora and fauna surveys (EPA 2016b, d). The extrapolation of vegetation units was completed with a low to moderate confidence level. Particularly, where vegetation mapping was more complex due to the presence of geological features and micro-scale changes across the vegetation across hill crests, slopes, and swales between the crests. The extrapolated vegetation mapping should be regarded as a broad indication of habitats and patterns present in the Extrapolation Area only. Given that broad habitats had been identified in the previous survey (Stantec 2018) and due to the availability of regional information pertaining to biodiversity, the level of survey effort was considered appropriate.

3. Results

No additional vegetation units, vegetation condition or fauna habitats were identified during the reconnaissance field survey that were not previously described in the Level 1 Flora and Fauna survey (Stantec 2018).

3.1 Revisions to Vegetation Unit Mapping

The vegetation recorded broadly comprised mixed Mulga shrublands over mixed shrubs dominated by *Eremophila* species, *Ptilotus obovatus*, *Scaevola spinescens* and *Rhagodia* species, also with large areas dominated by *Cratystylis subspinescens*, *Maireana pyramidata* and *Maireana sedifolia* (Stantec 2018).

Table 3-1 represents a summary of each of the vegetation units recorded within the Study Area and lists their extent in the Survey Area, as well as their extent within the Revised Study Area which includes the Extrapolation Area. The distribution of the vegetation units recorded within the revised Study Area is represented in **Figure 3-1** and **Figure 3-2** for Cardinia and Raeside respectively and show that the vegetation is dominated by the HPCsMp vegetation unit, comprising just under 20% of the total Study Area. Over 16% of the Study Area is occupied by the AaAtEsp vegetation unit which was found to be extensive in the Extrapolation Area and is dominant at Raeside.

A small additional area (4.53ha) of the Asp.MsEs vegetation unit was identified in the north of Cardinia during the field survey, mapped previously as AiMsTd (**Figure 3-1**). This area was comprised of *Acacia* sp. low open woodland over mixed mid shrubland dominated by *Maireana sedifolia* over chenopod shrubland. No Further additions were made to the previously mapped vegetation units.

Table 3-1: Areas of each Vegetation Unit within the Study Area including the Extrapolation Area

Code	Description	Area (ha/%)					
		Survey Area		Extrapolation Area		Study Area	
		ha	%	ha	%	ha	%
AiEIEc	<i>Acacia incurvaneura</i> low open woodland over <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Solanum lasiophyllum</i> and <i>Ptilotus obovatus</i> low sparse shrubland, over <i>Enneapogon caerulescens</i> low grassland over <i>Sclerolaena diacantha</i> isolated dwarf chenopod shrubs.	13.56	0.59	2.65	0.22	16.21	0.46
AiMsTd	<i>Acacia inceana</i> subsp. <i>conformis</i> low woodland over <i>Maireana sedifolia</i> mid isolated shrubs over <i>Maireana pyramidata</i> and <i>Tecticornia disarticulata</i> low isolated chenopod shrubs.	65.05	2.84	183.66	14.06	295.6	8.34
Asp.MsEs	<i>Acacia</i> sp. low open woodland over <i>Maireana sedifolia</i> and <i>Eremophila scoparia</i> mid open shrubland, over <i>Sclerolaena diacantha</i> sparse isolated dwarf chenopod shrubland.	18.96	0.83	10.38	0.83	33.87	0.96
AaAtEsp.	<i>Acacia aneura</i> , <i>Acacia caesaneura</i> and <i>Acacia pteraneura</i> low woodland over <i>Acacia tetragonophylla</i> tall isolated shrubs over mixed low isolated shrubs.	253.5	11.08	321.19	25.54	568.46	16.04
AbArEp	<i>Acacia burkittii</i> , <i>Acacia aneura</i> and <i>Acacia craspedocarpa</i> low open woodland over <i>Grevillea extorris</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> and <i>Eremophila platycalyx</i> subsp. <i>platycalyx</i> mid isolated shrubs over <i>Monachather paradoxus</i> low isolated grasses on rocky drainage line	0.87	0.04	3.65	0.30	0.87	0.02
AbAtTt	<i>Acacia burkittii</i> and <i>Acacia aptaneura</i> low open woodland over <i>Acacia tetragonophylla</i> and <i>Acacia burkittii</i> mid sparse shrubland over <i>Themeda triandra</i> , <i>Eriachne flaccida</i> and <i>Enteropogon ramosus</i> low tussock grasses on sandy drainage line.	75.28	3.29	169.35	13.47	243.87	6.88
AbEpPo	<i>Acacia burkittii</i> tall open shrubland over <i>Eremophila platycalyx</i> subsp. <i>platycalyx</i> , <i>Eremophila forrestii</i> subsp. <i>forrestii</i> and <i>Senna artemisioides</i> subsp. <i>artemisioides</i> mid isolated shrubs over <i>Ptilotus obovatus</i> low isolated shrubs, over <i>Aristida contorta</i> low isolated grasses on hills	6.65	0.29	0.00	0.00	6.65	0.19
AaAtEp	<i>Acacia aneura</i> , <i>Acacia aptaneura</i> and <i>Acacia caesaneura</i> low open woodland over <i>Eremophila platycalyx</i> subsp. <i>platycalyx</i> , <i>Acacia ramulosa</i> subsp. <i>ramulosa</i> and <i>Acacia tetragonophylla</i> tall to mid isolated shrubs over <i>Ptilotus obovatus</i> , <i>Eremophila</i>	239.27	10.46	4.49	0.37	243.76	6.88

Code	Description	Area (ha/%)					
		Survey Area		Extrapolation Area		Study Area	
		ha	%	ha	%	ha	%
	<i>metallicorum</i> and <i>Eremophila margarethae</i> low isolated shrubs, over mixed low grasses.						
AaArAq	<i>Acacia quadrimarginea</i> , <i>Acacia incurvaneura</i> and <i>Acacia aneura</i> low woodland over <i>Acacia ramulosa</i> var. <i>ramulosa</i> and <i>Acacia tetragonophylla</i> tall to mid sparse shrubland over <i>Eremophila</i> spp. low isolated shrubs over <i>Eragrostis eriopoda</i> and <i>Monachather paradoxus</i> isolated tussock grasses	71.52	3.13	20.08	1.60	91.6	2.58
AaArEsp.	<i>Acacia aneura</i> , <i>Acacia incurvaneura</i> and <i>Acacia caesaneura</i> low open forest over <i>Acacia ramulosa</i> var. <i>ramulosa</i> tall isolated shrubs over <i>Eremophila</i> spp. mid isolated shrubs over low isolated mixed shrubs, herbs and grasses,	265.54	11.61	39.68	3.15	305.89	8.63
AkAbMs	<i>Acacia kempeana</i> low open woodland over <i>Acacia burkittii</i> , <i>Maireana sedifolia</i> and <i>Eremophila scoparia</i> mid open shrubland, over <i>Ptilotus obovatus</i> , <i>Sida ectogama</i> and <i>Solanum lasiophyllum</i> low isolated shrubs, over <i>Enneapogon caerulescens</i> and <i>Sclerolaena eriacantha</i> low isolated forbs and grasses on rocky hills	44.04	1.93	64.76	5.30	108.74	3.06
A?rSaMs	<i>Acacia</i> sp. nov. aff. <i>resinimarginea</i> , <i>Acacia aneura</i> and <i>Acacia caesaneura</i> tall open shrubland, over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Scaevola spinescens</i> and <i>Acacia tetragonophylla</i> mid isolated shrubs over <i>Ptilotus obovatus</i> , <i>Maireana sedifolia</i> and <i>Solanum lasiophyllum</i> low isolated shrubs over <i>Ptilotus helipteroides</i> and <i>Enneapogon caerulescens</i> low isolated forbs and grasses on rocky hills	70.6	3.09	22.67	1.80	89.54	2.53
AaSaMs	<i>Acacia aneura</i> and <i>Acacia caesaneura</i> tall open woodland over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Maireana sedifolia</i> and <i>Ptilotus obovatus</i> low open shrubland over low mixed chenopod shrubland on rocky hills	111.66	4.88	5.65	0.46	150.01	4.23
AkHpEs	<i>Acacia kalgoorliensis</i> , <i>Acacia oswaldii</i> and <i>Hakea preissii</i> low open woodland over <i>Eremophila scoparia</i> , <i>Senna stowardii</i> and <i>Acacia craspedocarpa</i> mid isolated shrubs over <i>Ptilotus obovatus</i> , <i>Maireana triptera</i> and <i>Cratystylis subspinescens</i> low isolated shrubs over <i>Sclerolaena eriacantha</i> , <i>Sclerolaena densiflora</i> and <i>Ptilotus</i> sp. Goldfields (R. Davis 10796) low isolated forbs on rocky plains	36.11	1.58	4.49	0.36	40.45	1.14
AcHpEp	<i>Acacia craspedocarpa</i> , <i>Acacia aneura</i> and <i>Acacia incurvaneura</i> low open woodland over <i>Acacia oswaldii</i> , <i>Hakea preissii</i> and <i>Rhagodia drummondii</i> mid	19.09	0.83	9.16	0.01	28.25	0.8

Code	Description	Area (ha/%)					
		Survey Area		Extrapolation Area		Study Area	
		ha	%	ha	%	ha	%
	isolated shrubs, over <i>Eremophila pantonii</i> , <i>Maireana georgei</i> and <i>Atriplex nummularia</i> subsp. <i>spathulata</i> low isolated shrubs over <i>Sclerolaena densiflora</i> , <i>Enneapogon caerulescens</i> and <i>Ptilotus aervoides</i> low isolated forbs and grasses						
AcArSe	<i>Acacia craspedocarpa</i> and <i>Acacia aneura</i> low woodland over <i>Acacia ramulosa</i> var. <i>ramulosa</i> tall open shrubland, over <i>Sida ectogama</i> and <i>Eremophila</i> spp. mid isolated shrubs over low isolated mixed forbs and grasses			43.18	3.54	43.18	1.22
AcAtEo	<i>Acacia craspedocarpa</i> , <i>Acacia aneura</i> and <i>Acacia caesaneura</i> low woodland over <i>Acacia tetragonophylla</i> , <i>Scaevola spinescens</i> and <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> mid isolated shrubs over <i>Ptilotus obovatus</i> and <i>Maireana tomentosa</i> subsp. <i>tomentosa</i> low isolated shrubs, over <i>Ptilotus</i> sp. Goldfields (R. Davis 10796), <i>Enneapogon caerulescens</i> and <i>Aristida contorta</i> low isolated forbs and grasses	157.4	6.88	105.52	8.40	262.48	7.4
AcAtEm	<i>Acacia craspedocarpa</i> low open forest over <i>Acacia tetragonophylla</i> tall open shrubland over <i>Eremophila metallicorum</i> low isolated shrubs over low isolated mixed forbs and grasses	71.31	3.12	0.00	0.00	71.16	2.00
AcAtEp	<i>Acacia craspedocarpa</i> and <i>Acacia caesaneura</i> low open woodland over <i>Acacia tetragonophylla</i> and <i>Eremophila platycalyx</i> subsp. <i>platycalyx</i> tall isolated shrubs, over <i>Ptilotus obovatus</i> and <i>Eremophila</i> spp. mixed low isolated shrubs over low isolated mixed forbs and grasses	45.81	2.00	0.00	0.00	45.81	1.29
CpArEo	<i>Casuarina pauper</i> , <i>Acacia caesaneura</i> and <i>Acacia aneura</i> low woodland over <i>Acacia ramulosa</i> var. <i>ramulosa</i> and <i>Acacia tetragonophylla</i> tall isolated shrubs over <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> mid isolated shrubs over <i>Maireana triptera</i> , <i>Sclerolaena ericantha</i> and <i>Sclerolaena densiflora</i> low isolated forbs	11.11	0.49	5.74	0.47	16.85	0.48
EsEsPo	<i>Eucalyptus striatocalyx</i> and <i>Acacia aneura</i> low open woodland over <i>Eremophila scoparia</i> and <i>Eremophila glabra</i> subsp. <i>glabra</i> mid isolated shrubs, over <i>Ptilotus obovatus</i> , <i>Scaevola spinescens</i> and <i>Lepidium platypetalum</i> low isolated shrubs on rocky outcrops	0.4	0.02	7.65	0.63	0.4	0.01
HpCsMp	<i>Hakea preissii</i> low isolated trees over <i>Cratystylis subspinescens</i> and <i>Maireana pyramidata</i> mid open shrubland over <i>Tecticornia pruinosa</i> , <i>Tecticornia disarticulata</i>	434.85	19.01	242.74	19.30	680.95	19.21

Code	Description	Area (ha/%)					
		Survey Area		Extrapolation Area		Study Area	
		ha	%	ha	%	ha	%
	and <i>Tecticornia pergranulata</i> subsp. <i>pergranulata</i> low open chenopod shrubland over <i>Enneapogon caerulescens</i> low isolated grasses						
MpTdSd	<i>Maireana pyramidata</i> and <i>Tecticornia disarticulata</i> low chenopod shrubland over <i>Sclerolaena densiflora</i> isolated dwarf chenopod shrubs with <i>Aristida contorta</i> , <i>Enteropogon ramosus</i> and <i>Sporobolus actinocladus</i> isolated tussock grasses	5.23	0.23	12.39	0.99	19.83	0.56
Disturbed	Areas of disturbance including historical and recent mining activities.	216.7	9.47	0.00	0.00	216.13	6.10
Revegetation	Previously disturbed areas which have been revegetated	9.9	0.43	8.65	0.71	9.9	0.28
Total	-	2,287.6	100	1,257.55	100	3545.19	100

Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of individual values.

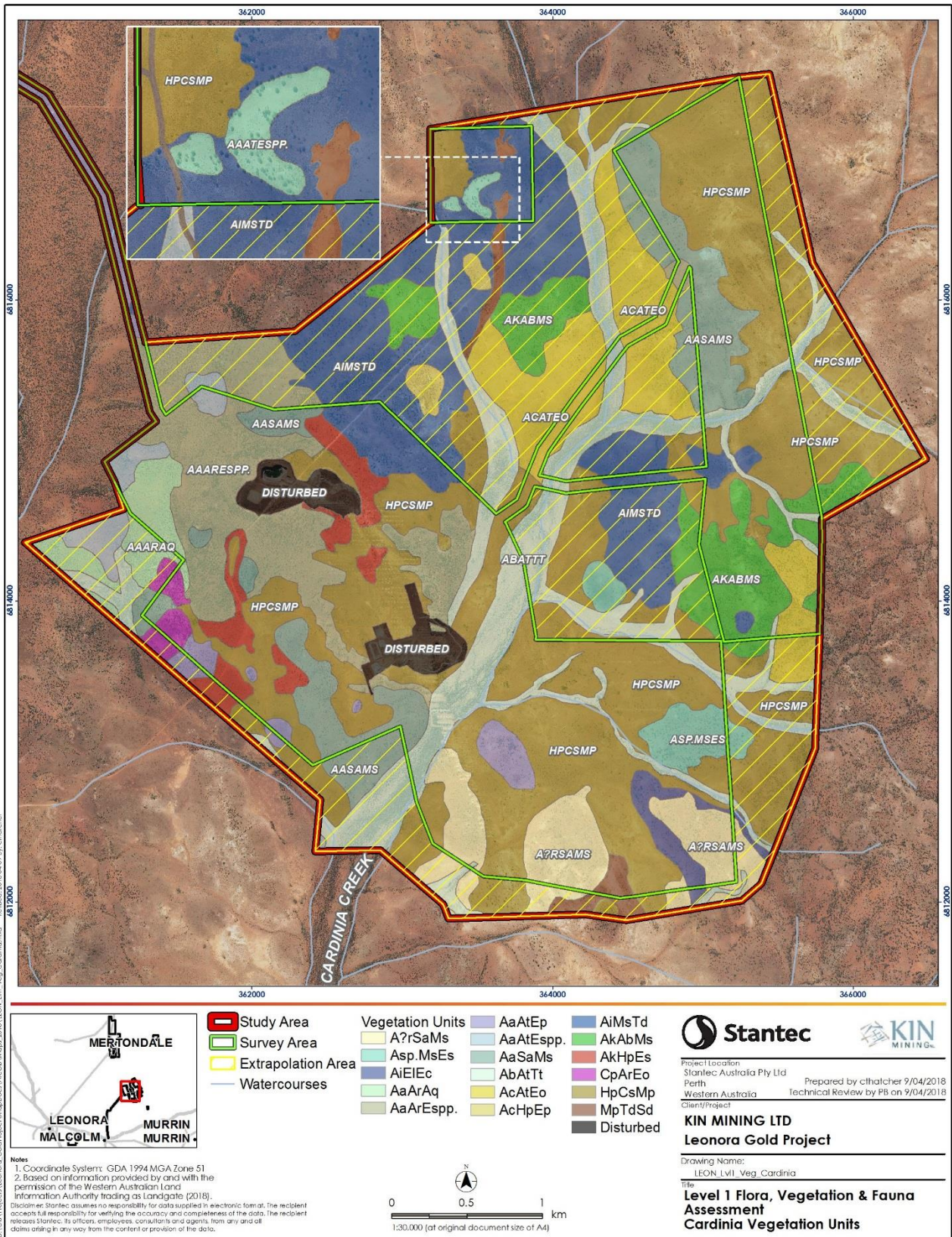


Figure 3-1: Vegetation Units – Cardinia

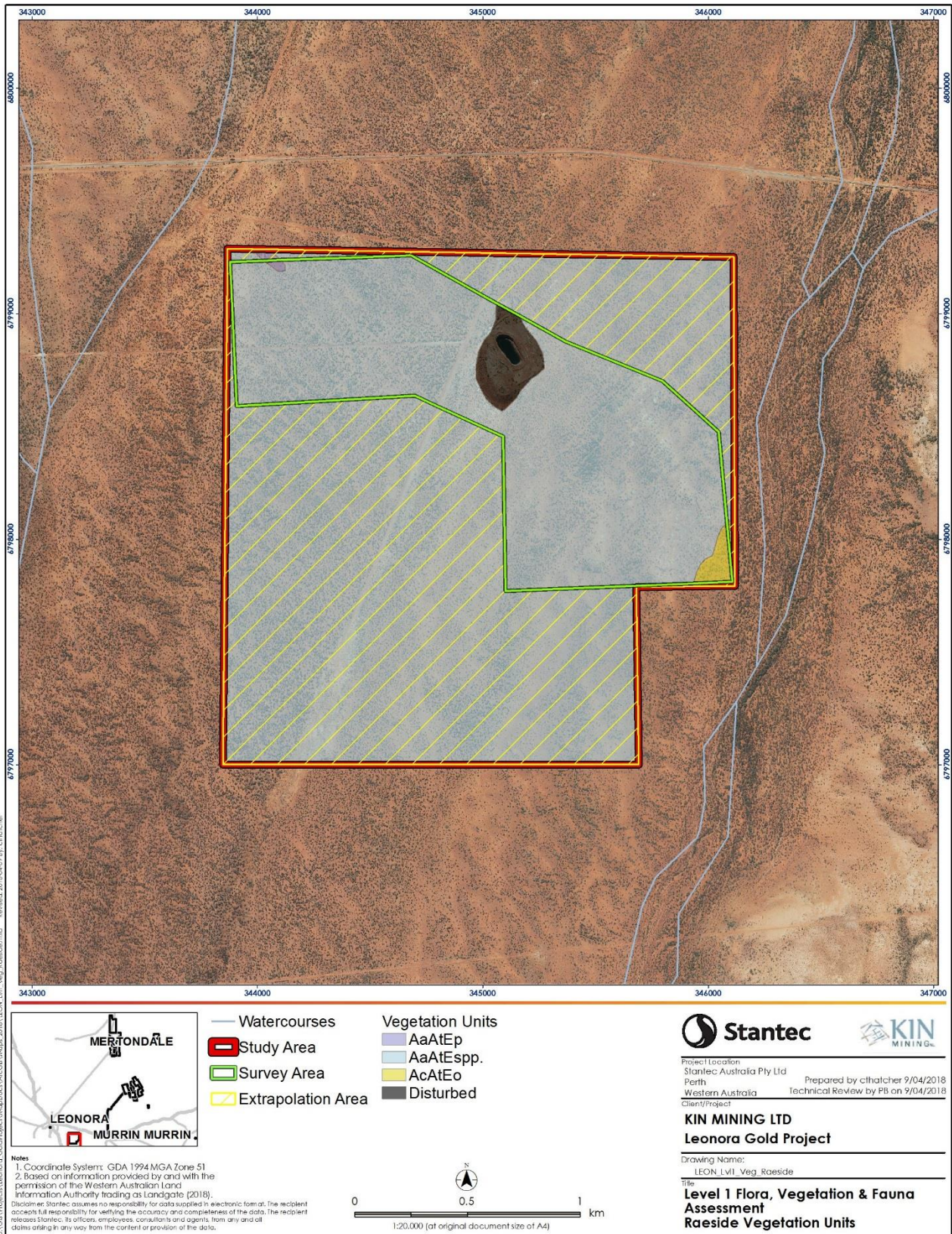


Figure 3-2: Vegetation Units – Raeside

3.1 Revisions to Vegetation Condition Mapping

Vegetation condition within the Study Area ranged from Excellent to Completely Degraded (**Table 3-2**, **Figure 3-3** and **Figure 3-4**). Over 70% of Cardinia was in a Very Good or Excellent condition, whereas the majority of Raeside was in a Good condition. This is consistent with what was mapped previously in the Level 1 Flora and Fauna survey (Stantec 2018).

Table 3-2: Areas of Vegetation Condition of the Study Area

Condition	Area (ha/%)					
	Survey Area		Extrapolation Area		Study Area	
	ha	%	ha	%	ha	%
Excellent	825.98	36.11	304.67	22.63	1110.55	31.33
Very Good	787.79	34.44	582.25	47.90	1390.23	39.23
Good	334.44	14.62	342.99	27.25	677.18	19.10
Degraded	132.40	5.79	23.28	1.86	155.73	4.39
Completely Degraded	195.65	8.55	4.37	0.36	200.16	5.65
Revegetation	11.34	0.5	0	0.00	11.34	0.32
Total	2,287.6	100	1,257.55	100	3545.19	100

Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of individual values.

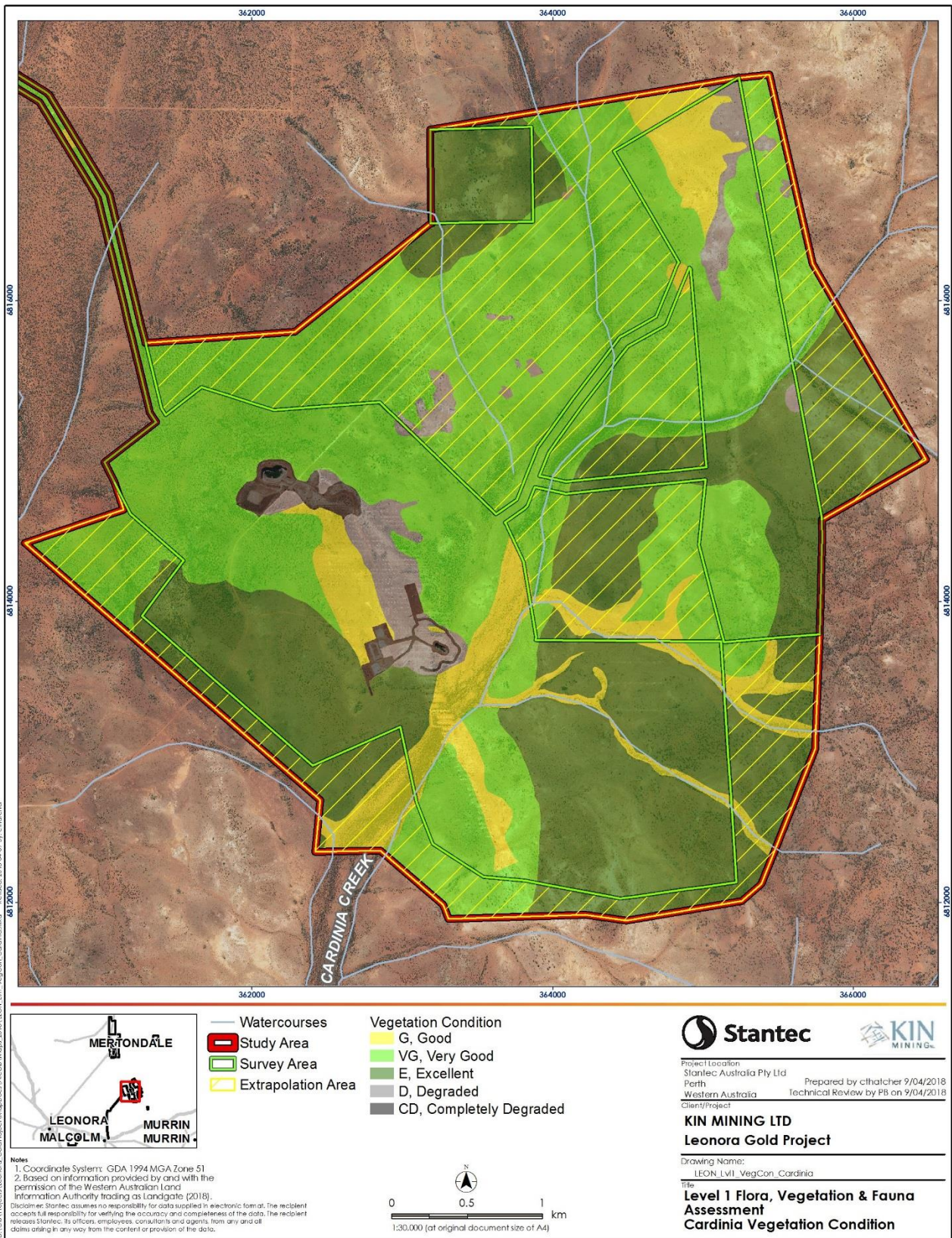


Figure 3-3: Vegetation Condition –Cardinia

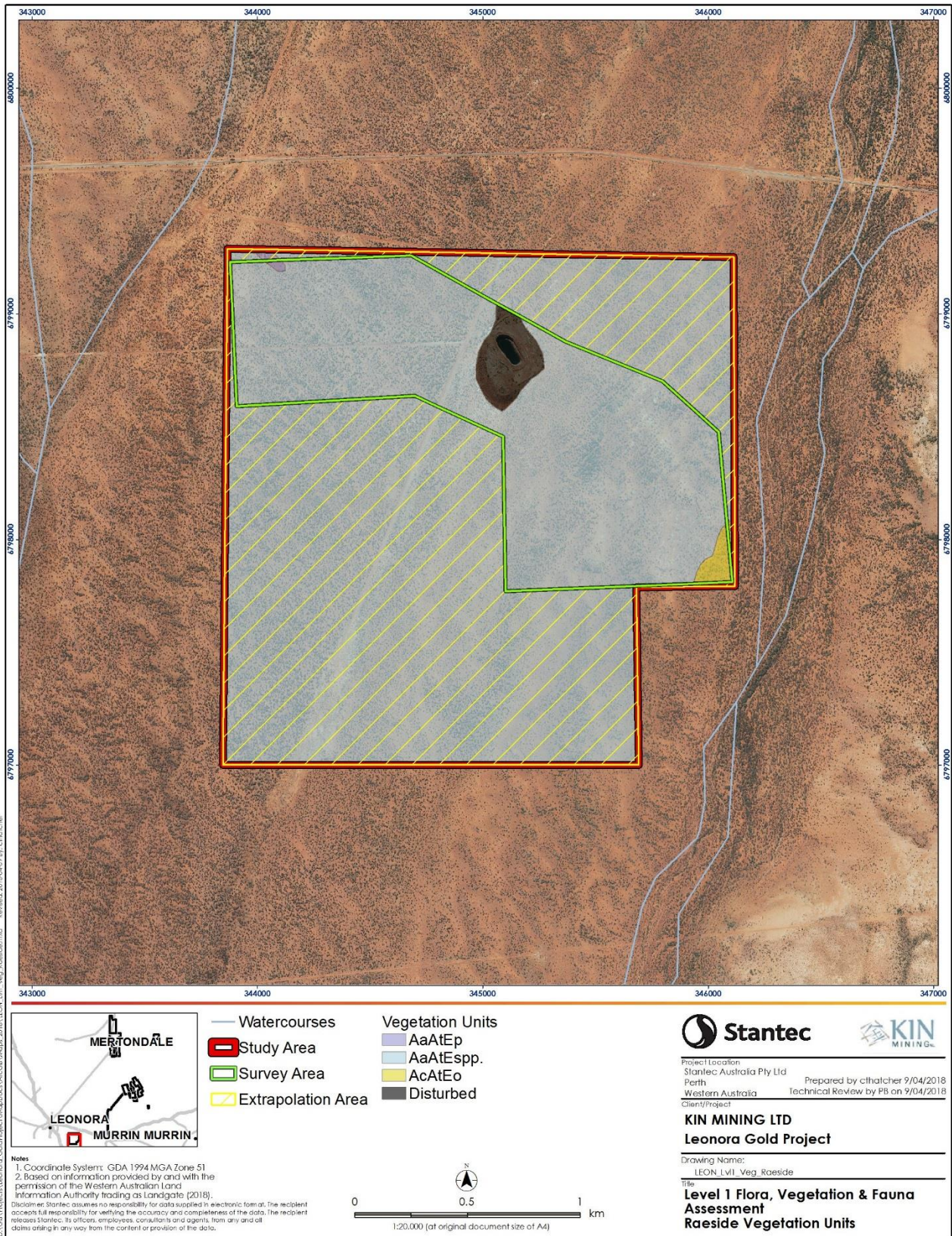


Figure 3-4: Vegetation Condition –Raeside

3.2 Revisions to Fauna Habitat Mapping

Table 3-3 represents a summary of each of the fauna habitat units recorded within the Extrapolation Area and lists their extent within the Survey Area and the Revised Study Area which includes the Extrapolation Area. The distribution of the fauna habitats recorded within the Revised Study Area is presented in **Figure 3-5** and **Figure 3-6**. Acacia shrublands on plains occupies just under 60% of the previous and current extents of the Study Area.

Table 3-3: Fauna habitat recorded within the Study Area

Fauna Habitat	Area (ha/%)					
	Survey Area		Extrapolation Area		Study Area	
	ha	%	ha	%	ha	%
Acacia shrublands on plains	1,300.30	56.84	701.50	55.78	2,062.81	58.03
Drainage Lines	76.15	3.33	169.35	13.47	244.74	6.90
Low Hills	244.46	10.69	131.58	10.46	320.64	9.02
Chenopod shrublands	440.08	19.24	255.12	20.29	700.78	19.77
Disturbed	226.60	9.91	0	0	216.13	6.10
Total	2,287.6	100	1,257.55	100	3545.19	100
Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of individual values.						

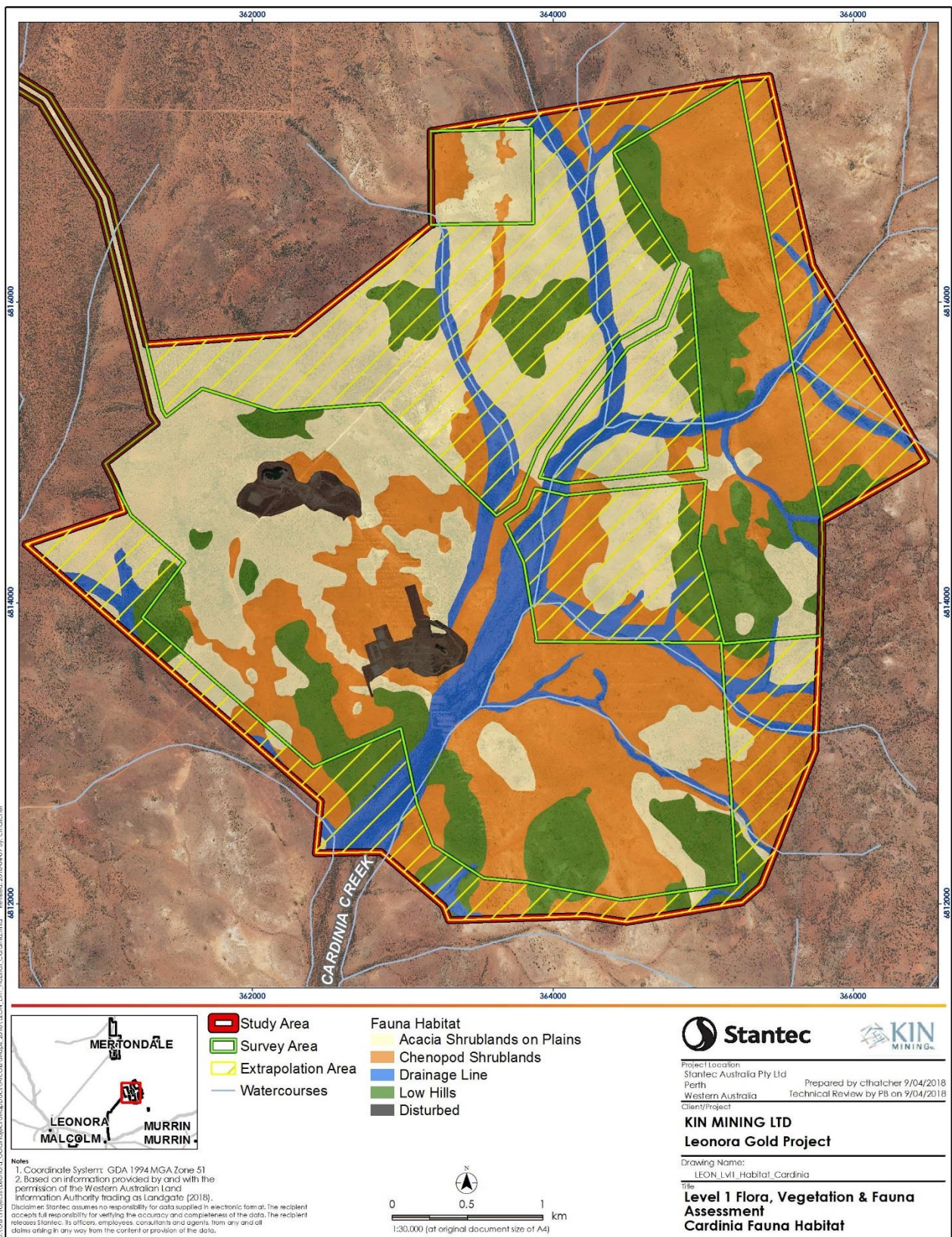


Figure 3-5: Fauna Habitat – Cardinia

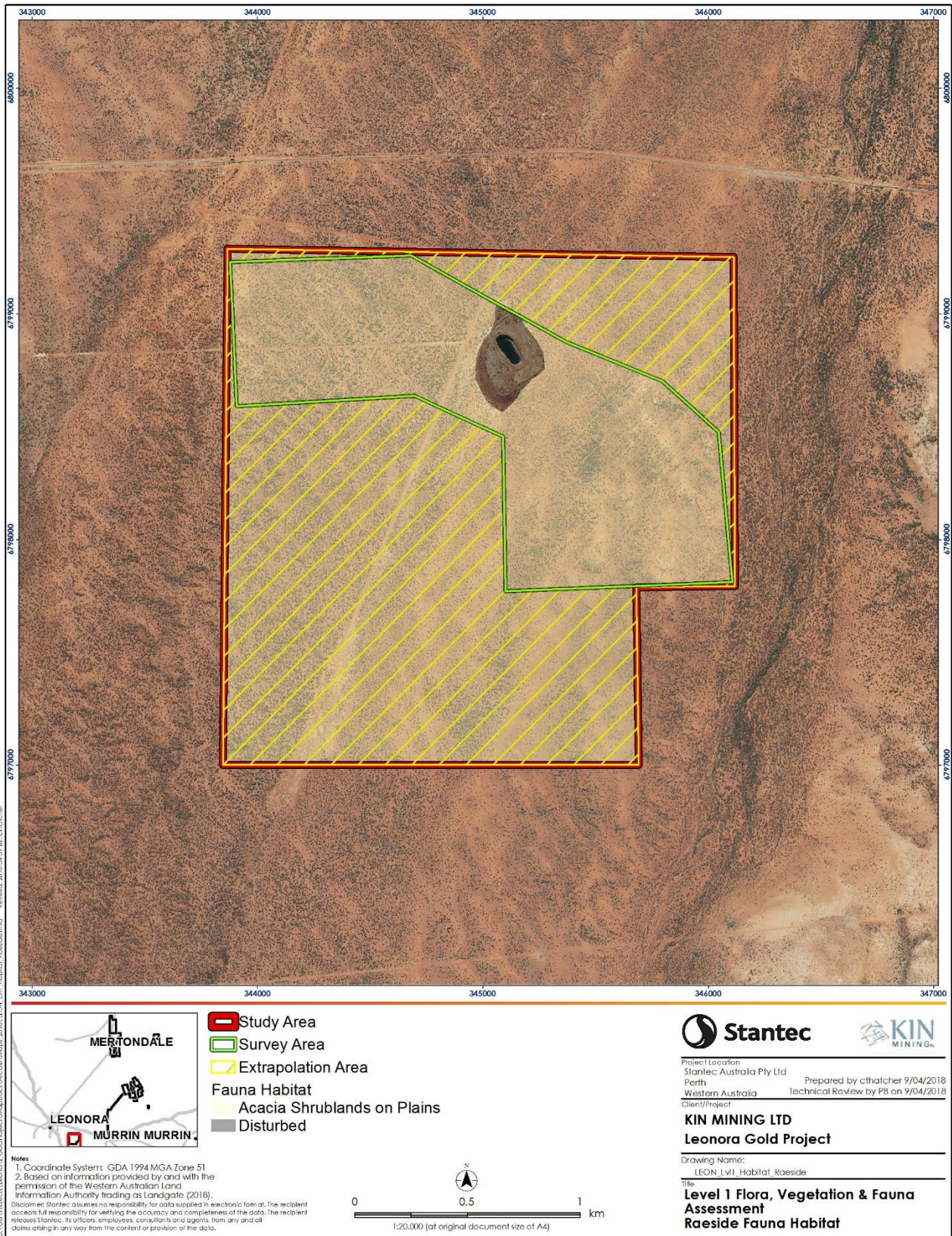


Figure 3-6: Fauna Habitat –Raeside

4. Conclusions

This extrapolation exercise utilised existing mapping (the Survey Area), aerial imagery and a ground truthing survey to map the extents of vegetation units, their condition and fauna habitats within the Extrapolation Area.

In summary, all vegetation units and fauna habitats mapped within the Extrapolation Area were representative of vegetation units and habitats in the Survey Area previously assessed by Stantec. None of the vegetation units identified in the Extrapolation Area correspond to the vegetation of any known Threatened or Priority Ecological Communities.

No flora or fauna taxa of conservation significance were identified during the ground truthing field survey. However, both conservation significant flora identified during the survey of the Survey Area have potential to occur in the Extrapolation Area due to the likely presence of the same vegetation units that support these taxa.

Vegetation units *HpCsMp* and *AiMsTd* that were mapped within the Extrapolation Area have the potential to contain *Gunniopsis propinqua* (P3) which may be present within these vegetation units.

In addition, the putative hybrid and potential new species identified previously in the Revised Study Area, *Acacia* sp. nov. aff. *resinimarginea*, was identified in the *A?rSaMs* vegetation unit that was present in the Extrapolation Area. This taxon is currently under review as a potential new species.

5. References

- EPA, Environmental Protection Authority. (2016a) *Environmental Factor Guideline - Terrestrial Fauna*, Perth, Western Australia.
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- Keighery, B. J. (1994) *Bushland Plant Survey: a Guide to Plant Community Surveys for the Community*. Wildflower Society of Western Australia (Inc.), Nedlands, Western Australia.
- Stantec, A. (2018) *Leonora Gold Project: Level 1 Flora, Vegetation and Fauna Assessment*. Prepared for Kin Mining NL.

Appendices



Appendix A Codes and Terms used to describe Species of Conservation Significance

Flora and fauna may be accorded legislative protection by being listed under the Environment Protection and Biodiversity Conservation Act 1999 (Cwth) (EPBC Act) and/or the Wildlife Conservation Act 1950 (WA) (WC Act), or by being listed on the WA Department of Environment and Conservation's Priority Species List. This Appendix presents a summary of the different rankings and listings used to describe conservation status. Some categories, such as 'extinct', 'extinct in the wild' and 'conservation dependent' (EPBC Act) are not presented here, as the table includes only the information needed to fully understand the codes presented in the preceding report. Refer to the relevant legislation for a full description of all codes in use, as well as their associated criteria.

Definitions of codes and terms used to describe flora and fauna of conservation significance

Categories used under the EPBC Act		
Status	Code	Description
Critically Endangered	Cr	Taxa that is considered to be facing an extremely high risk of extinction in the wild in the immediate future
Endangered	En	Taxa that is considered to be facing a very high risk of extinction in the wild in the near future
Vulnerable	Vu	Taxa that is considered to be facing a high risk of extinction in the wild in the medium-term future
Migratory	Mi	Species that migrate to, over and within Australia and its external territories

Schedules used under the WC Act			Description
Status	Code	Schedule	
Critically Endangered	Cr	S1	Taxa that is rare or likely to become extinct, as critically endangered taxa
Endangered	En	S2	Taxa that is rare or likely to become extinct, as endangered taxa
Vulnerable	Vu	S3	Taxa that is rare or likely to become extinct, as vulnerable taxa
Presumed Extinct	Ex	S4	Taxa that is presumed to be extinct
Migratory	Mi	S5	Birds that are subject to international agreements relating to the protection of migratory birds
Conservation Dependent	CD	S6	Taxa that are of special conservation need being species dependent on ongoing conservation intervention
Special Protection	SP	S7	Taxa that is in need of special protection

Priorities assigned under the DBCA Priority Taxa List		
Priority 1	P1	Taxa with few, poorly known populations on threatened lands. These are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened taxa
Priority 2	P2	Taxa with few, poorly known populations on conservation lands. These are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened taxa
Priority 3	P3	Taxa with several, poorly known populations, some on conservation lands. These are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened taxa
Priority 4	P4	Taxa in need of monitoring. These are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands
Priority 5	P5	Taxa in need of monitoring. These are not considered threatened but are subject to a specific conservation programme, the cessation of which would result in the species becoming threatened within five years

Appendix B Mapping Notes

Leonora Gold – LEXM01

Site Details:

Described by: Crystal Heydenrych

Date: 18-03-2018

Type: Mapping note

MGA Zone: 51J 363373 mE 6816318 mN

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Flora and Vegetation:

Vegetation condition: Very Good

Vegetation description: *Cratystylis subspinescens*, *Maireana pyramidata* mid sparse shrubland over low *Maireana tomentosa* chenopod shrubland



Leonora Gold – LEXM02

Site Details:

Described by: Crystal Heydenrych

Date: 18-03-2018

Type: Mapping note

MGA Zone: 51J 363374 mE 6816629 mN

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Flora and Vegetation:

Vegetation condition: Very Good

Vegetation description: Acacia sp. low isolated trees over *Eremophila scoparia* mid open shrubland over *Maireana sedifolia* sparse chenopod shrubland.



Leonora Gold – LEXM03

Site Details:

Described by: Crystal Heydenrych

Date: 17-03-2018

Type: Mapping note

MGA Zone: 51J 363673 mE 6816321 mN

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Flora and Vegetation:

Vegetation condition: Very Good

Vegetation description: *Tecticornia* ? *disarticulata*, *Maireana pyramidata*, *Cratystylis subspinescens* low open chenopod shrubland.



Leonora Gold – LEXM04

Site Details:

Described by: Crystal Heydenrych

Date: 17-03-2018

Type: Mapping note

MGA Zone: 51J 364021 mE 6812054 mN

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Flora and Vegetation:

Vegetation condition: Very Good

Vegetation description: *Hakea preissii* low open woodland over *Cratystylis subspinescens*, *Maireana pyramidata* low open chenopod shrubland.



Leonora Gold – LEXM05

Site Details:

Described by: Crystal Heydenrych

Date: 17-03-2018

Type: Mapping note

MGA Zone: 51J 364394 mE 364394 mN

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Flora and Vegetation:

Vegetation condition: Excellent

Vegetation description: *Acacia aneura*, *Acacia incurvaneura* mid open woodland over *Scaevola spinescens*, *Hakea preissii*, *Ptilotus obovatus* subsp. *obovatus* low shrubland over *Triodia basedowii* and chenopod shrubland.



Site Details:

Described by: Crystal Heydenrych

Date: 18-03-2018

Type: Mapping note

MGA Zone: 51J 364394 mE 6811972 mN

Environmental Variables:

Landform: Plain

Slope: Level (0-3°)

Flora and Vegetation:

Vegetation condition: Very Good

Vegetation description: *Acacia aneura*, *Hakea preissii*, *Acacia ramulosa* var. *ramulosa* low open woodland over *Senna artemisioides* subsp. *filifolia*, *Scaevola spinescens* sparse mid open shrubland over *Triodia basedowii* hummock grassland.



Leonora Gold – LEXM07

Site Details:

Described by:

Date: 18-03-2018

Type: Mapping note

MGA Zone: 51J 360958 mE 6814165 mN

Environmental variables:

Landform: Slope

Slope: Level (0-3°)

Flora and Vegetation:

Vegetation condition: Very Good

Vegetation description: *Acacia aneura* tall open shrubland over *Acacia ramulosa* var. *ramulosa*, *Acacia ? duriscula*, *Acacia craspedocarpa* (hybrid) mid to tall sparse shrubland over *Ptilotus schwartzii*, *Dodonaea rigida*, *Eremophila youngii* subsp. *youngii* low isolated shrubs.



Appendix C Vegetation Condition Scale

Code	Description
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Appendix D Vegetation Structure Classification

NVIS Vegetation Structural Classifications

Cover Characteristics							
Foliage cover *	70-100	30-70	10-30	<10	≈0	0-5	unknown
Crown cover **	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
% Crown cover ***	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
Cover code	d	c	i	r	bi	bc	unknown

Growth Form	Height ranges (m)	Structural Formation Classes						
tree, palm	>30 Tall	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
	10-30 Mid							
	<10 Low							
tree mallee	10-30 Tall	closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	mallee trees
	<10 Mid							
	<3 Low							
shrub, cycad, grass-tree, fern	>2 Tall	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs
	1-2 Mid							
	<1 Low							
mallee shrub	10-30 Tall	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrubs
	<10 Mid							
	<3 Low							
heath shrub	>2 Tall		heathland	open heathland				heath shrubs

Growth Form	Height ranges (m)	Structural Formation Classes							
	1-2 Mid	closed heathland				sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	
	<1 Low								
chenopod shrub	>2 Tall	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs	
	1-2 Mid								
	<1 Low								
samphire shrub	>0.5 Mid	closed samphire shrubland	samphire shrubland	open samphire shrubland	sparse samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs	
	<0.5 Low								
hummock grass	>2 Tall	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses	
	<2 Low								
tussock grass	>0.5 Mid	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grasses	isolated clumps of tussock grasses	tussock grasses	
	<0.5 Low								
other grass	>0.5 Mid	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses	
	<0.5 Low								
sedge	>0.5 Mid	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges	
	<0.5 Low								
rush	>0.5 Mid	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes	
	<0.5 Low								
forb	>0.5 Mid	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forbs	
	<0.5 Low								
fern	>2 Tall	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumps of ferns	ferns	
	1-2 Mid								
	<1 Low								

Growth Form	Height ranges (m)	Structural Formation Classes						
bryophyte	<0.5	closed bryophyte land	bryophyte land	open bryophyte land	sparse bryophyte land	isolated bryophytes	isolated clumps of bryophytes	bryophytes
lichen	<0.5	closed lichenland	lichenland	open lichenland	sparse lichenland	isolated lichens	isolated clumps of lichens	lichens
vine	>30 Tall	closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vines
	10-30 Mid							
	<10 Low							
aquatic	<1 Tall	closed aquatic bed	aquatic bed	open aquatic bed	sparse aquatics	isolated aquatics	isolated clumps of aquatics	aquatics
	0-0.5 Low							
seagrass	<1 Tall	closed seagrass bed	Seagrass bed	open seagrass bed	sparse seagrass bed	isolated seagrasses	isolated clumps of seagrasses	seagrasses

